BEAR MANAGEMENT PLANS IN CANADIAN NATIONAL PARKS:
FIFTEEN ESSENTIAL ELEMENTS

WARDEN SERVICE
PARKS CANADA
WESTERN REGION
BEAR MANAGEMENT PLANS IN
CANADIAN NATIONAL PARKS:
FIFTEEN ESSENTIAL ELEMENTS

By John Stuart Taylor

A Master's Degree Project
Submitted to the Faculty of Environmental Design
(Environmental Science)

Faculty of Environmental Design
Calgary, Alberta
May 1984
The undersigned certify that they have read, and recommend to the Faculty of Environmental Design for acceptance, a Master's Degree Project entitled

Bear Management Plans in Canadian National Parks:
Fifteen Essential Elements

submitted by John Stuart Taylor in partial fulfillment of the requirements for the degree of Master of Environmental Design.

Supervisor, Dr. Stephen Herrero,
Faculty of Environmental Design,
The University of Calgary.

Ms. Sue Donaldson, Faculty of Environmental Design, The University of Calgary.

Dr. Alan Brawn, Faculty of Physical Education, The University of Calgary.

Mr. Kurt Seel, Parks Canada, Western Region, Calgary, Alberta.

Date 1984-05-29
Bear Management Plans in Canadian National Parks: Fifteen Essential Elements

by John Stuart Taylor*

Completed in partial fulfillment of the requirements for the degree of Master of Environmental Design (Environmental Science)

Supervisor: Dr. Stephen Herrero
Faculty of Environmental Design
The University of Calgary
April 1984

Four authority fields considered to be influential in the development of bear management plans in Canadian National Parks were reviewed. The four authority fields were (1) the law, (2) policy statements and operational directives, (3) conventional practices and (4) management literature. Particular emphasis was placed on the influence of conventional practice. A total of 34 bear management plans from national and provincial parks throughout North America were reviewed. The management programs of 5 national parks (Yellowstone, Yosemite, Glacier§, Jasper and Banff) where bear management has been most intense, were reviewed in detail. Fifteen elements considered essential to bear management plans in Canadian National Parks were developed from the four authority fields. The 15 elements were (1) objectives, (2) organizational structure, (3) evaluation, (4) monitoring, (5) public information, (6) waste management, (7) food storage management, (8) human activity management, (9) problem bear management, (10) training, (11) emergency planning, (12) research planning, (13) regional management, (14) fiscal/person-year planning and (15) design characteristics. These elements were used to evaluate the content and design of 13 bear management plans from Canadian National Parks. A total of 195 elements (15 elements x 13 plans) were evaluated. Approximately 87% of the elements were rated as unacceptable. The most poorly completed elements were number 3 (evaluation), 7 (food storage management), 12 (research), 13 (regional management) and 14 (fiscal/person-year planning). Specific and general recommendations to improve bear management plans and practices were suggested. Finally, a bear management plan for Kootenay National Park was presented to illustrate the use of the 15 essential elements as a framework for the development of a bear management plan for any Canadian National Park.

* The author has been employed by Parks Canada as a Park Warden since 1975 and is currently stationed in Kootenay National Park.

§ Glacier National Park, Montana.
ACKNOWLEDGEMENTS

This project would not have been possible without the input and guidance of many individuals. In this regard I would like to extend my appreciation to the following.

Ray Breneman, Chief Park Warden, Auyuittuq National Park
Perry Jacobson, Park Warden, Banff National Park
Allan Westhaver, Park Warden, Banff National Park
Lisa Westhaver, Park Naturalist, Banff National Park
Francois Millette, Cape Breton Highlands National Park
Jean-Guy Chaverie, Park Warden, Forillon National Park
Paul Galbraith, Chief Park Warden, then of Fundy National Park
Roger Hamilton, then Chief of Visitor Services, Glacier/Mount Revelstoke National Parks
Norm Wentzell, Park Warden, then of Gros Morne National Park
John Woodrow, Park Warden, Jasper National Park
John Gormar, Kejimkujik National Park
Ray Frey, Park Warden, Kluane National Park
Pierre Lessard, Superintendent, La Mauricie National Park
Brent Kozachenko, Park Warden, Nahanni National Park
Mac Elder, Chief Park Warden, Pacific Rim National Park
Dean Allan, Chief Park Warden, Prince Albert National Park
Jean Fau, Park Warden, Prince Albert National Park
Greg Keesey, Park Warden, Pukaskwa National Park
Lou Comin, Assistant Chief Park Warden, Riding Mountain National Park
Keith Foster, Park Warden, Riding Mountain National Park
Fred Wallace, Park Warden, Terra Nova National Park
Rob Watt, Park Warden, Waterton Lakes National Park
Tom Elliot, Park Warden, then of Wood Buffalo National Park
Cal Sime, Park Warden, Yoho National Park
Jim Sime, former Warden Services Officer, Western Region
Jack Holroyd, Chief of Resource Conservation, Western Region
Mike Schintz, Warden Service Officer, Western Region
Richard Leonard, Wildlife Management Officer, Prairie Region
G. Corbett, Wildlife Management Officer, Atlantic Region
Fergus Lothian, Parks Canada Historian, Headquarters
Trevor Wickham, Project Officer, Headquarters.

F. Delikatny, District Manager, Garibaldi Provincial Park
G. MacPherson, District Manager, Bowron Lakes Provincial Park
J. Rogers, District Manager, Wells Gray Provincial Park, B.C.
Chris Sadlier, Assistant District Manager, Assiniboine Provincial Park
Roger Tierney, Superintendent, Mount Robson Provincial Park
J. Gunn, Superintendent, Meadow Lake Provincial Park
A. Harjula, District Manager, Quetico Provincial Park
Robert Stewart, Fish and Wildlife Supervisor, Algonquin Provincial Park
A special thank you is extended to Parks Canada for granting a four month educational leave of absence and funding in order that I could initiate this project; to Peter Whyte for being a patient, supportive and understanding Chief Park Warden throughout the course of this project; to the wardens of Kootenay National Park for the many occasions on which they covered my neglected warden duties; to my MDP committee members, especially Dr. Stephen Herrero, for their patience, guidance and time in overseeing this project; to Mr. Phil Elder, Professor of Law in Environmental Design, for his careful review of the legal sections of this paper; to the Chlans for the meals, shelter and support they furnished during my numerous stays in Calgary; and to Carol Snook for many hours of typing.

Finally, to Wenda and daughters Cayley and Laragh who have made many sacrifices during the last two years, I extend my deepest appreciation.
CONTENTS

Page No.
i. ABSTRACT
ii. ACKNOWLEDGEMENTS
iv. CONTENTS
vii. LIST OF TABLES
x. LIST OF FIGURES

1. CHAPTER I BACKGROUND INFORMATION
  1. A. INTRODUCTION
  8. B. PURPOSE
  12. C. METHODS
  14. D. LIMITATIONS
  15. E. ORGANIZATION

16. CHAPTER II BEAR MANAGEMENT: AN HISTORICAL SYNOPSIS
  16. A. INTRODUCTION
  17. B. POACHING CONTROL: 1885 - 1920
  42. E. MANAGEMENT BY PLAN: 1980 -
  42. F. BEAR MANAGEMENT IN CANADIAN NATIONAL PARKS: PAST and PRESENT

47. CHAPTER III DEVELOPMENT OF ESSENTIAL ELEMENTS
  47. A. LEGAL BACKGROUND
     Statutes
     Case Law
     Legal Opinions
  85. B. POLICY BACKGROUND
     National Parks Policy
     National Directives
     Regional Directives
     Management Reviews
  96. C. CONVENTIONAL PRACTICE
     North American Bear Management Plans
     Yellowstone National Park
     Yosemite National Park
     Glacier National Park
     Jasper National Park
     Banff National Park
D. FIFTEEN ESSENTIAL ELEMENTS

E. DISCUSSION

Program Element 1: Program Objectives
Program Element 2: Organizational Structure
Program Element 3: Evaluation
Program Element 4: Monitoring
Program Element 5: Public Information
Program Element 6: Waste Management
Program Element 7: Food Storage Management
Program Element 8: Human Activity Management
Program Element 9: Problem Bear Management
Program Element 10: Training
Program Element 11: Emergency Planning
Program Element 12: Research Planning
Program Element 13: Regional Management
Program Element 14: Fiscal and Person-year Planning
Program Element 15: Design Characteristics

F. SUMMARY

CHAPTER IV BEAR MANAGEMENT PLANS IN CANADIAN NATIONAL PARKS: AN EVALUATION

A. METHODS

B. RESULTS

C. DISCUSSION AND RECOMMENDATIONS

Program Element 1: Program Objectives
Program Element 2: Organization Structure
Program Element 3: Evaluation
Program Element 4: Monitoring
Program Element 5: Public Information
Program Element 6: Waste Management
Program Element 7: Food Storage Management
Program Element 8: Human Activity Management
Program Element 9: Problem Bear Management
Program Element 10: Training
Program Element 11: Emergency Planning
Program Element 12: Research Planning
Program Element 13: Regional Management
Program Element 14: Fiscal and Person-year Planning
Program Element 15: Design Characteristics

D. OTHER RECOMMENDATIONS
CHAPTER V CASE STUDY: KOOTENAY NATIONAL PARK

A. INTRODUCTION

B. BEAR MANAGEMENT PLAN: KOOTENAY NATIONAL PARK

LITERATURE CITED

STATUTES CITED

REGULATIONS CITED

CASES CITED
LIST OF TABLES

Page No.

3. Table 1. Number of black and grizzly bear relocations in Canadian National Parks, 1962 - 1981.


5. Table 3. Number of human injuries and fatalities by black, grizzly and unidentified bears in Canadian National Parks, 1929 - 1981.

6. Table 4. Estimated annual value of property damage inflicted by bears in selected Canadian and U.S. National Parks.

7. Table 5. Estimated annual bear management costs in selected Canadian and U.S. National Parks.

13. Table 6. Parks and other areas which supplied bear management plans and other related information.

100. Table 7. Annual average number of human injuries inflicted by grizzly and black bears in developed and backcountry areas of Yellowstone National Park, 1960 - 1979.

102. Table 8. Number of grizzly and black bears observed on a daily basis in developed and backcountry areas of Yellowstone National Park, 1970 - 1979.


Page No.  

175. Table 14. Agenda for the 1982 annual bear management training session, Glacier National Park (Montana).

177. Table 15. Information distribution plan used to train various levels of park employees and residents, Glacier National Park (Montana).

178. Table 16. Field guidelines for bear management actions, Glacier National Park (Montana).


219. Table 19. Fifteen elements considered essential to bear management plans in Canadian National Parks.

220. Table 20. Summary of key legislation, case law, policy statements, directives, legal opinions, literature and conventional practices and their implications for bear management in Canadian National Parks.


244. Table 22. Bear management programs in Canadian National Parks: composition and responsibilities of an idealized evaluation team.

247. Table 23. Categories of information required for a comprehensive bear monitoring system in Canadian National Parks.

249. Table 24. Suggested terminology for bear monitoring systems in Canadian National Parks.

260. Table 25. Categories of public information for bear management programs in Canadian National Parks.

262. Table 26. Contact points, information modes, and target audiences for bear management information systems in Canadian National Parks.

283. Table 27. Food storage management strategy for Canadian National Parks.

Table 29. Fifteen elements and associated sub-elements with potential applicability to the bear management plans of Canadian National Parks.

Table 30. Content analysis of bear management plans in Canadian National Parks.

Table 31. Summary of the content analysis of bear management plans in Canadian National Parks.
<table>
<thead>
<tr>
<th>Page No.</th>
<th>Figure No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Figure 1</td>
<td>Map showing the location of Canadian National Parks with black, grizzly or polar bear species.</td>
</tr>
<tr>
<td>9</td>
<td>Figure 2</td>
<td>Conceptual framework for a bear management system.</td>
</tr>
<tr>
<td>20</td>
<td>Figure 3</td>
<td>Photograph showing the large ornate bear sign located on Banff Avenue, circa 1953, Banff National Park.</td>
</tr>
<tr>
<td>28</td>
<td>Figure 4</td>
<td>Media cartoons of the early 1960's.</td>
</tr>
<tr>
<td>34</td>
<td>Figure 5</td>
<td>Photograph showing an early bear warning sign, circa 1960.</td>
</tr>
<tr>
<td>37</td>
<td>Figure 6</td>
<td>Photographs showing several styles of garbage containers in use circa 1960-1970.</td>
</tr>
<tr>
<td>45</td>
<td>Figure 7</td>
<td>Resource management planning process used by Parks Canada.</td>
</tr>
<tr>
<td>105</td>
<td>Figure 8</td>
<td>Bear monitoring system. Yellowstone National Park.</td>
</tr>
<tr>
<td>107</td>
<td>Figure 9</td>
<td>Bear Sighting form. Yellowstone National Park.</td>
</tr>
<tr>
<td>108</td>
<td>Figure 10</td>
<td>Excerpts from the entrance gate pamphlet, Danger. Your Safety. Yellowstone National Park.</td>
</tr>
<tr>
<td>109</td>
<td>Figure 11</td>
<td>Reproduction of the entrance gate pamphlet, Grizzly. Yellowstone National Park.</td>
</tr>
<tr>
<td>111</td>
<td>Figure 12</td>
<td>Reproduction of the entrance gate pamphlet, Enjoy Them at a Distance. Yellowstone National Park.</td>
</tr>
<tr>
<td>112</td>
<td>Figure 13</td>
<td>Excerpts from the entrance gate pamphlet, Special Activities. Yellowstone National Park.</td>
</tr>
<tr>
<td>112</td>
<td>Figure 14</td>
<td>Excerpts from the entrance gate pamphlet, Yellowstone. Yellowstone National Park.</td>
</tr>
<tr>
<td>113</td>
<td>Figure 15</td>
<td>Photographs showing two entrance gate road signs, Mammoth Hot Springs. Yellowstone National Park.</td>
</tr>
<tr>
<td>Page No.</td>
<td>Figure</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>121.</td>
<td>22.</td>
<td>Reproduction of several area closure and warning signs. Yellowstone National Park.</td>
</tr>
<tr>
<td>130.</td>
<td>23.</td>
<td>Number of bear incidents in frontcountry and backcountry areas of Yosemite National Park, 1975 - 1981.</td>
</tr>
<tr>
<td>150.</td>
<td>27.</td>
<td>Bear Sighting Form. Glacier National Park.</td>
</tr>
<tr>
<td>152.</td>
<td>29.</td>
<td>Case Incident Record. Glacier National Park.</td>
</tr>
</tbody>
</table>
156. Figure 32. Reproduction of the entrance kiosk sign Bear Country. West Glacier, Glacier National Park.

156. Figure 33. Photograph showing entrance sign Bear Country. West Glacier, Glacier National Park.

157. Figure 34. Photographs showing auto campground entrance signs warning of bear danger. Many Glacier Campground, Glacier National Park.

157. Figure 35. Reproduction of an auto campground sign warning campers to store food properly. Apgar Campground, Glacier National Park.

158. Figure 36. Photograph of auto campground self-registration centre poster Camping in Bear Country. Apgar Camp­ground, Glacier National Park.

159. Figure 37. Photographs of information centre displays showing bear related material. Apgar Information Centre, Glacier National Park.

160. Figure 38. Reproduction of the pamphlet About Bears. Glacier Natural History Society, Glacier National Park.

165. Figure 39. Reproduction of the trailhead poster Notice to Back­country Users. Glacier National Park.

165. Figure 40. Reproduction of the backcountry campsite poster Warning. Glacier National Park.

166. Figure 41. Reproduction of the backcountry permittee garbage bag. Glacier National Park.

168. Figure 42. Excerpts from the backcountry permittee pamphlet Backcountry. Glacier National Park.

170. Figure 43. Reproduction of the outhouse poster Warning. Glacier National Park.

170. Figure 44. Photograph showing the tenting enclosure. Many Glacier Campground, Glacier National Park.

184. Figure 45. Reproduction of the pamphlet You are in Bear Country. Parks Canada.

186. Figure 46. Reproduction of the Parks Canada litter bag.
<table>
<thead>
<tr>
<th>Page No.</th>
<th>Figure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>187.</td>
<td>47.</td>
<td>Reproduction of the Parks Canada entrance gate sign warning of hazardous wildlife.</td>
</tr>
<tr>
<td>187.</td>
<td>48.</td>
<td>Reproduction of the Parks Canada entrance gate sign regarding unlawful feeding of wildlife.</td>
</tr>
<tr>
<td>189.</td>
<td>49.</td>
<td>Photographs of recently installed bear proof garbage containers.</td>
</tr>
<tr>
<td>192.</td>
<td>50.</td>
<td>Reproductions of various area closure and warning signs. Parks Canada.</td>
</tr>
<tr>
<td>216.</td>
<td>56.</td>
<td>Six components of the bear management plans in Parks Canada, Prairie Region.</td>
</tr>
<tr>
<td>258.</td>
<td>58.</td>
<td>Reproduction of the pamphlet You May Be In Bear Country. Parks Canada.</td>
</tr>
<tr>
<td>265.</td>
<td>59.</td>
<td>Photographs showing non-bear proof garbage containers still in use by Parks Canada.</td>
</tr>
<tr>
<td>271.</td>
<td>60.</td>
<td>Enforcement procedures to control commercial garbage in Canadian National Parks.</td>
</tr>
</tbody>
</table>
CHAPTER I BACKGROUND INFORMATION

A. INTRODUCTION

Twenty-three of Canada's twenty-nine National Parks contain black bears (Ursus americanus); nine parks contain grizzly bears (Ursus arctos) and one park contains polar bears (Ursus maritimus). Figure 1 shows the location of Canadian National Parks and the species of bears supported by each park.

Throughout the history of National Parks bears have been one of the most intensely 'managed' of all game species. For the 20 year period 1962 to 1981 a minimum total of 2166 bears were captured and relocated in Canadian National Parks (Table 1) while another 1081 bears were intentionally destroyed (Table 2). Between 1929 and 1981 a minimum of 118 injuries and 6 fatalities have been attributed to bears (Table 3). Bear inflicted damage to personal and public property, while never systematically recorded, most certainly totals several hundreds of thousands of dollars. Damage estimates for some Canadian parks are given in Table 4 along with comparative figures from U.S. parks where accurate long term records have been kept. While annual management costs are difficult to estimate since manpower and operational requirements are often combined with other activities, Table 5 gives estimates for some Canadian parks along with comparative U.S. figures.

Parks Canada has a legislated mandate to protect bears and concurrently to protect humans using bear habitat. The often quoted dedication clause of the National Parks Act states that,
Fig. 1. Location of Canadian National Parks with black (B), grizzly (G) or polar (P) bear species.

NATIONAL PARKS

1. Kluane (B,G)
2. Nahanni (B,G)
3. Pacific Rim (B)
4. Glacier/Revelstoke (B,G)*
5. Yoho (B,G)
6. Kootenay (B,G)
7. Jasper (B,G)
8. Banff (B,G)
9. Waterton Lakes (B,G)
10. Wood Buffalo (B)
11. Prince Alberta (B)
12. Riding Mountain (B)
13. Pukaskwa (B)
14. La Mauricie (B)
15. Forillon (B)
16. Kouchibouguac (B)
17. Fundy (B)
18. Kejimkujik (B)
19. Cape Breton Highlands (B)
20. Gros Morne (B)
21. Terra Nova (B)
22. Auyuittuq (P)

* Glacier/Revelstoke consists of two parks, Glacier and Mount Revelstoke, that are administered as one.
Table 1. Number of black (B) and grizzly (G) bear relocations in Canadian National Parks, 1962-1981.a

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>G</td>
<td>B</td>
<td>G</td>
<td>B</td>
</tr>
<tr>
<td>Banff</td>
<td>45</td>
<td>8</td>
<td>89</td>
<td>11</td>
<td>83</td>
</tr>
<tr>
<td>Glacier/Revelstoke</td>
<td>40</td>
<td>10</td>
<td>56</td>
<td>9</td>
<td>44</td>
</tr>
<tr>
<td>Jasper</td>
<td>130</td>
<td>2</td>
<td>90d</td>
<td>3b</td>
<td>268</td>
</tr>
<tr>
<td>Kootenay</td>
<td>63</td>
<td>43</td>
<td>1</td>
<td>1</td>
<td>34</td>
</tr>
<tr>
<td>Pacific Rim</td>
<td>1</td>
<td>49</td>
<td>42</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>Waterton</td>
<td>32</td>
<td>1</td>
<td>29</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>Yoho</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auyuittuq (polar bears only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kluane</td>
<td></td>
<td>3</td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Nahanni</td>
<td></td>
<td>32</td>
<td></td>
<td>2f</td>
<td>228</td>
</tr>
<tr>
<td>Prince Albert</td>
<td>24</td>
<td>16f</td>
<td></td>
<td></td>
<td>139</td>
</tr>
<tr>
<td>Riding Mountain</td>
<td></td>
<td>1</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Wood Buffalo</td>
<td></td>
<td>11</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Pukaskwa</td>
<td></td>
<td>8</td>
<td></td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Fortillon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>La Mauricile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cape Breton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gros Morne</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kejimkujik</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kouchibouguac</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terra Nova</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2166</td>
</tr>
<tr>
<td>1974</td>
<td>192</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRAND TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All figures are very tenuous due to great variations in reporting procedures and terminology. Hence each figure probably represents a minimum value. Data from the central registries of selected parks; Kaye 1981; Millson 1978; Parks Canada Central Registry, Ottawa, File No. 66-A; Pengelly 1981; and Perren 1981.

b Data for 1969-70 not available.
c Data for 1974-76.
d Data for 1977-79.
e Data for 1967 only.
f Data for 1967-80.
g Data for 1975-76.
Table 2. Number of black (B) and grizzly (G) bears destroyed for management purposes in Canadian National Parks, 1962-1981.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>G</td>
<td>B</td>
<td>G</td>
<td>B</td>
</tr>
<tr>
<td>Banff</td>
<td>33</td>
<td>7</td>
<td>24b</td>
<td>5b</td>
<td>13</td>
</tr>
<tr>
<td>Glacier/Revelstoke</td>
<td>12</td>
<td>5</td>
<td>31</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Jasper</td>
<td>70</td>
<td>13</td>
<td>69</td>
<td>8</td>
<td>72</td>
</tr>
<tr>
<td>Kootenay</td>
<td>52</td>
<td>17</td>
<td>14</td>
<td>2d</td>
<td>14</td>
</tr>
<tr>
<td>Pacific Rim</td>
<td>39</td>
<td>2</td>
<td>25</td>
<td>2</td>
<td>23</td>
</tr>
<tr>
<td>Waterton</td>
<td>24</td>
<td>1</td>
<td>24</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Yoho</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auyuittuq</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(polar bears only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kluane</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Nahanni</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prince Albert</td>
<td>34</td>
<td>No data</td>
<td>143 (1973-81)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riding Mountain</td>
<td>11</td>
<td>4c</td>
<td>No data</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Wood Buffalo</td>
<td></td>
<td>7</td>
<td>No data</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Pukaskwa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forillon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>La Mauricie</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Cape Breton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gros Morne</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kejimkujik</td>
<td>2</td>
<td>(1970-72)</td>
<td>No response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kouchibouguac</td>
<td>2</td>
<td>(1970-72)</td>
<td>No response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terra Nova</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a All figures are very tenuous due to great variations in reporting procedures and terminology. Hence each figure probably represents a minimum value. Data from the central registries of selected parks; Kaye 1981; Millson 1978; Parks Canada Central Registry, Ottawa, File No. 66-A; Pengelly 1981; and Perren 1981.

b Data for 1969 not available.
c Data for 1967-68.
d Data for 1976 only.
### Table 3. Number of human injuries and fatalities by black (B), grizzly (G) and unidentified (U) bears in Canadian National Parks, 1929-1981.\(^a\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Park</th>
<th>B</th>
<th>G</th>
<th>U</th>
<th>B</th>
<th>G</th>
<th>U</th>
<th>B</th>
<th>G</th>
<th>U</th>
<th>B</th>
<th>G</th>
<th>U</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1929-1962</td>
<td>Banff</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>4(1)</td>
<td>2</td>
<td>4</td>
<td>11</td>
<td>12(1)</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glacier/Revelstoke</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>13</td>
<td>2</td>
<td>5</td>
<td>9</td>
<td>5</td>
<td>18</td>
<td>10</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>1962-1966</td>
<td>Jasper</td>
<td>1(1)</td>
<td>2</td>
<td>4</td>
<td>1(1)</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>6(1)</td>
<td>1</td>
<td>11</td>
<td>1</td>
<td>24(1)</td>
<td>13</td>
</tr>
<tr>
<td>1967-1971</td>
<td>Kootenay</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>(1)</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>1972-1976</td>
<td>Pacific Rim</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>(1)</td>
<td>7</td>
<td>(1)</td>
<td>12</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1977-1981</td>
<td>Waterton</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>(1)</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>Yoho</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>(1)</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

---

\(a\) Data for many years is either lacking, incomplete, or so vague as to be unusable. All figures are tenuous due to variations in reporting procedures or terminology. Each figure probably represents a minimum value. Data from the central registries of selected parks, Kaye 1982 and Millson 1978.

\(b\) Figures in parenthesis represent fatalities.

\(c\) Both incidents occurred prior to Kluane gaining National Park status.
Table 4. Estimated annual value of property damage inflicted by bears in selected Canadian and U.S. National Parks.

<table>
<thead>
<tr>
<th>Canadian National Parks</th>
<th>Estimate</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forillon</td>
<td>Very minimal</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Kluane</td>
<td>Low; some tents ripped</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Kootenay</td>
<td>$200-400/yr</td>
<td>Author's 1st hand experience</td>
</tr>
<tr>
<td>Nahanni</td>
<td>Less than $200/yr</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Pacific Rim</td>
<td>$45/yr (1972-82)</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Riding Mountain</td>
<td>$1,081 (1981 the 1st yr recorded)</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Wood Buffalo</td>
<td>Less than $1,000/yr</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Yoho</td>
<td>$250/yr (1972-82)</td>
<td>Pers. comm.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>U.S. National Parks</th>
<th>Estimate</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glacier</td>
<td>$882/yr (1976-82)</td>
<td>Glacier Bear Incidental Management Actions Report, Glacier National Prk (unpubl.)</td>
</tr>
<tr>
<td>Grand Teton</td>
<td>$1,449/yr (1970-81)</td>
<td>Black Bear Management Summary, Grand Teton (unpubl.)</td>
</tr>
<tr>
<td>Shenandoah</td>
<td>$4,545/yr (1970-81)</td>
<td>Annual Bear Incident and Management Action Reports, Shenandoah National Park (unpubl.)</td>
</tr>
<tr>
<td>Yellowstone</td>
<td>$3,056/yr (1970-81)</td>
<td>Bear Management Summary, Yellowstone National Park (unpubl.)</td>
</tr>
</tbody>
</table>
Table 5. Estimated annual bear management costs in selected Canadian and U.S. National Parks.

<table>
<thead>
<tr>
<th>Canadian National Parks</th>
<th>Estimate</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banff</td>
<td>$12,800  (Cdn)</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Glacier/Revelstoke</td>
<td>2,166</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Jasper</td>
<td>25,000</td>
<td>Woody 1980, 1981, 1982</td>
</tr>
<tr>
<td>Kootenay</td>
<td>1,000</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Nahanni</td>
<td>2,250</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Pacific Rim</td>
<td>54</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Prince Albert</td>
<td>400</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Riding Mountain</td>
<td>500</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Wood Buffalo</td>
<td>Less than 500</td>
<td>Pers. comm.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>U.S. National Parks</th>
<th>Estimate</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grand Teton</td>
<td>$15,000  (U.S.)</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>North Cascades</td>
<td>600</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Olympic</td>
<td>3,000</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Sequoia/Kings Canyon</td>
<td>5,000</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Yosemite</td>
<td>7,000 plus 3,500 for brochures</td>
<td>Pers. comm.</td>
</tr>
<tr>
<td>Yellowstone</td>
<td>275,000b</td>
<td>Approximate Costs for Bear Management - 1981 Yellowstone National Park (Unpublished)</td>
</tr>
</tbody>
</table>

---

a These are crude estimates only and are simply intended to indicate that bear management can involve large sums of money. With the exception of the Yellowstone figure all estimates exclude the cost of manpower and garbage handling. Most estimates are based on the more obvious expenses such as drugs, equipment and pamphlets. Helicopter time has been included in the Banff, Jasper and Nahanni figures.

b The Yellowstone estimate includes both manpower ($156,000) and garbage handling ($114,000).
The National Parks of Canada are hereby dedicated to the people of Canada for their benefit, education and enjoyment subject to this Act and the regulations, and the National Parks shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations. (National Parks Act, Section 4).

The dual objectives of use and preservation expressed in this clause have been the subject of lengthy discussions (Nelson 1970, Sheard and Blood 1973) that need not be repeated here. Suffice to say that, in respect to bears, park managers have been given the dual task of protecting bears and their habitat while at the same time allowing humans to use that habitat with a certain degree of safety.

It is this seemingly mutually exclusive goal that is the focal point of bear management in Canadian National Parks.

B. PURPOSE

Martinka (1976b) reviewed the bear management programs of six U.S. National Parks and determined that five basic components were essential to program success (Fig. 2). A written document or (1) management plan is needed to provide the basic vehicle for communicating, implementing, evaluating and planning at the park level. (2) Information systems that

1 Complete citations for all statutes, regulations and court decisions referred to in this paper are listed in the references immediately following chapter V.
Fig. 2. Proposed conceptual framework for a bear management system.\textsuperscript{a} 

\textsuperscript{a} Adapted from Martinka (1976b:Figure 1).
convey basic data from research and monitoring are essential to establish a data support base to set goals, implement procedures and make decisions. Aggressive (3) field implementation involving all levels of park operations must be encouraged to operationalize the plan. Periodic (4) scientific evaluations are required to determine current success, to provide a base for predicting future conditions and establish trends. And finally (5) planning direction must be developed on the basis of data generated by the program. Collectively the five elements can be viewed as a bear management system.

This paper deals with the first component, the written document or management plan, and attempts to establish its essential contents and design characteristics. In other words, this paper addresses the question of what ought to be considered in the content and design of a bear management plan for any Canadian National Park.

Existing bear management plans are normally the product of local 'brain storming' sessions conducted by wardens, sometimes with the assistance of regional personnel. While this method has served as a useful starting point, it is limited by the collective knowledge and experience of the 'brain stormers'. Effective bear management has become multidisciplinary requiring a clear understanding of very diverse fields of knowledge. Moreover, in light of recent Canadian and U.S. litigation (Sturdy et al. v. The Queen 1974, Claypool v. United States 1951, Williams v. United States 1962, Ashley v. United States 1964, Parratt v. United States 1966, Rubenstein v. United States 1973, and Martin v. United States 1975), it has become apparent that bears must be managed with considerable rigor and
consistency and that where possible, management techniques should be supported by either legislation, policy, operational directives, legal opinions, management literature or conventional practices. To thoroughly review the material in each of these areas or 'authority fields' and determine its implications for bear management practices is an immense undertaking probably beyond the resources of the individual park. If information from each of the authority fields could be distilled into a set of essential ingredients or elements necessary for comprehensive bear management, the preparation of bear management plans might be less reliant on the 'brainstorming' technique. Collectively, the elements might represent a framework upon which managers could flesh out a program suitable for the operational contingencies of their park.

This paper will attempt to meet four goals:

- To develop a set of essential elements to be considered during the preparation of a bear management plan for most Canadian National Parks.

- To illustrate the use of the elements through the development of a bear management plan for Kootenay National Park.

- To use the elements as a means of evaluating the bear management plans of all Canadian National Parks supporting bear populations.

- To develop general and specific recommendations for improved bear management practices in Canadian National Parks.
C. METHODS

Methods consisted of analyzing four authority fields considered to have an influence on the content and design of bear management programs. The four authority fields were determined to be (1) the law, (2) policy statements and operational directives, (3) conventional practice and (4) management literature.

Accordingly the content of each authority field was closely examined for information pertaining to bear management. Applicable areas of law including legislation, case law and legal opinions were reviewed to determine the legal basis of bear management. Questions of legality or anomalies in legislation were referred to Legal Services, Department of Justice, Ottawa for opinion. File searches were conducted in Headquarters, Western Region Office and Kootenay National Park. The National Parks Policy (Parks Canada 1979c), the Parks Canada Management Directives manual (Parks Canada 19811) and Western Region Directives (Kootenay National Park files) were reviewed to determine the policy and directive basis of bear management.

The bear management plans and associated documents from several large provincial parks and all Canadian and many U.S. National Parks containing bears were requested. The 34 plans that were received (Table 6) were carefully reviewed with particular emphasis placed on five national parks, Yellowstone, Yosemite, Glacier (Montana), Banff and Jasper, where bear problems and hence bear management practices have been most intense. Field trips were made to each of these parks (except Yosemite) to gather detailed information by way of field inspections and discussions with bear managers and other knowledgeable field personnel. In addition the annual 3-day bear
Table 6. Parks and other areas which supplied bear management plans (BMP) and other related information.

<table>
<thead>
<tr>
<th>CANADIAN NATIONAL PARKS</th>
<th>BMP RECEIVED</th>
<th>LETTER EXPLAINING PROGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auyuittuq (NT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Banff (AB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cape Breton Highlands (NS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forillon (PQ)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Fundy (NB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glacier/Mount Revelstoke (BC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gros Morne (NF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jasper (AB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kejimkujik (NS)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Kluane (YT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kootenay (BC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kouchibouguac (NB)</td>
<td>No reply</td>
<td></td>
</tr>
<tr>
<td>La Mauricie (PQ)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nahanni (NT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pacific Rim (BC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prince Albert (SK)</td>
<td>(Part 1)</td>
<td></td>
</tr>
<tr>
<td>Pukaskwa (ON)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Riding Mountain (MB)</td>
<td>(Part 1)</td>
<td></td>
</tr>
<tr>
<td>Terra Nova (NF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waterton Lakes (AB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood Buffalo (AB &amp; NT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yoho (BC)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>U.S. NATIONAL PARKS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Craterlake (OR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glacier (MT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Teton (WY)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great Smokey Mountains (TN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olympic (WA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denali (AK)</td>
<td>(Draft)</td>
<td></td>
</tr>
<tr>
<td>Mount Rainier (WA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North Cascades (WA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sequoia and Kings Canyon (CA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shenandoah (VA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rocky Mountain (CO)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellowstone (WY)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yosemite (CA)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CANADIAN PROVINCIAL PARKS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Algonquin (ON)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Assiniboine (BC)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Bowron Lakes (BC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garibaldi (BC)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Manning (BC)</td>
<td>No reply</td>
<td></td>
</tr>
<tr>
<td>Meadow Lake (SK)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Mount Robson (BC)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Quetico (ON)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Wells Gray (BC)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Whiteshell (MB)</td>
<td>No reply</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OTHER U.S. AREAS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bighorn Canyon National Recreation Area (WY)</td>
<td>(proposal)</td>
<td></td>
</tr>
<tr>
<td>Blue Ridge Parkway (NC)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Glacier Bay National Monument (AK)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pictured Rocks National Lakeshore (MI)</td>
<td>No BMP</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OTHER AREAS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Abruzzo National Park (Italy)</td>
<td>No BMP</td>
<td></td>
</tr>
<tr>
<td>Province of British Columbia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL: 34 BMP received
14 Letters explaining bear management program
3 No response
management training session in Glacier (Montana) was attended in June 1982 as was a 5-day bear management workshop in the same park during April 1983. Interviews were also held with selected personnel in Western Region Office, Calgary. Telephone interviews and correspondence with dozens of other park officials provided further information.

And finally the University of Alaska's computerized black and grizzly bear bibliography (Tracy et al. 1982a and 1982b) provided the basis for a thorough literature review.

The information from each of the four authority fields was carefully reviewed and then tentatively sorted into one of 15 common categories or elements. The information was then reviewed a second time to confirm proper categorization. Table 31 lists each of the 15 elements, the authority field from which it was derived, the contents of the authority field and its implications for bear management.

D. LIMITATIONS

The following limitations apply to the scope of this paper.

- The paper is limited to discussions of black and grizzly bear species and does not consider the unique management circumstances presented by Auyuittuq's polar bear population.

- This paper does not consider the influence of native hunting and trapping rights on bear management practices in Wood Buffalo National Park. Hence the analysis and recommendations might not necessarily apply to this park.

- This paper does not consider provincial legislation that may apply in those parks that are not yet gazetted. Hence the analysis and recommendations might not necessarily apply to Pacific Rim or Gros Morne National Parks.
E. ORGANIZATION

This paper is organized into five chapters. Chapter I has introduced the topic insofar as purpose, methods and limitations. Chapter II provides an historical synopsis of bear management practices in Canadian National Parks from 1885 to the present. Chapter III is divided into five major sections. Section A reviews the influence of the law on bear management while Section B reviews the influence of policy including operational directives. Section C reviews material from conventional practice with a strong emphasis on the management programs of the five key parks. Section D develops the 15 essential elements on the basis of material presented in Sections A, B and C. Section E presents a lengthy discussion of each element wherein the element is justified in relation to the overall program. Each element is broken down into sub-elements and strategies for implementing the sub-elements are developed. Woven throughout Sections A, B, C and D are the implications of key literature and the opinions of accredited park managers and scientists. Section F summarizes the material presented in Sections A-D. In Chapter IV the 15 essential elements are used to evaluate the content of most bear management plans in Canadian National Parks. Analysis of the evaluation is performed and recommendations for improved bear management practices are generated. And finally in Chapter V a bear management plan for Kootenay National Park is developed to illustrate the use of the 15 elements.
CHAPTER II BEAR MANAGEMENT: AN HISTORICAL SYNOPSIS

A. INTRODUCTION

There is an old adage which states that 'to know where you are going is to know where you have been'. Accordingly, this chapter presents a brief synopsis of bear management practices in Canadian National Parks from 1885 to present.

The bear management story in Canadian parks is a close parallel to that of Yellowstone National Park which has been artfully documented by Schullery (1982). During Yellowstone's early years (1872 - 1883) legal hunting produced wary bears and problems at food caches and dumps were insignificant. Subsequent (1883 - 1945) protection from hunting in combination with increased visitation and associated garbage soon produced the all too familiar bear/garbage relationship. Initially the bear dumps were an asset serving as a major tourist attraction during those years when the park's very existence depended upon increased visitation. Bear dumps and roadside beggars were a promotional tactic. As if the garbage dumps were not enough, regular feeding programs were started. Garbage attracted bears and bears attracted tourists: a type of symbiotic relationship. Soon however the number of bear related injuries, damages and complaints began to rise steadily (Schullery 1982: 68). Management came under mounting pressure and reacted by destroying nuisance animals. In time traps and drugs provided the means to embark upon an ambitious trap/release program.
Ever so slowly the realization grew that unnatural food sources were the root cause of most bear problems; open pit dumps were closed or securely fenced; trash cans were replaced with bear proof containers; enforcement of regulations was stepped up; a monitoring system was introduced; and a major educational program was launched. Yogi gradually returned to his natural food sources and injuries, damages and complaints declined to acceptable levels (Meagher and Phillips 1982).

Unfortunately, no one has compiled a detailed history of Canadian bear management and since such an endeavour can not be made here, the reader must be content with the following short account. Most of the historical material is taken from the mountain parks simply because of their age and long standing bear problems. My apologies to those readers east of the Rocky Mountains.

B. POACHING CONTROL: 1885 - 1920

In the early 1800's areas that were later to become National Parks were valued by Indians and whites for their game and furs. Noble (1972:20) reported that the Stony Indians were proficient hunters that depopulated wildlife in areas adjacent to their camps. In the 19th century this tribe hunted extensively throughout the foothills and western Alberta including the area later to become Banff National Park. Their hunting prowess may even have been responsible for the near extermination of several species of game in the Banff area during the 1870's and 1880's when a market for wild
meat, furs and trophies emerged. The area in and around future Glacier National Park (B.C.) was noted as prime bear hunting country in 1885. Canadian Pacific Railway literature assured sportsmen that, "bears can always be obtained" (Marsh 1972:291). This hunting legacy continued long after the formation of the park and until 1904 the CPR's promotional literature encouraged bear hunting in Glacier. Even after 1919, when federal regulations prohibited hunting, the practice continued for many years with the last major bear hunt taking place in 1926 along the eastern section of the park (Noble 1972:292). Although regulations in effect in Banff in 1887 prohibited hunting or killing of all game, poaching was more the rule than the exception (Noble 1972:34).

From 1909 to sometime in the late 1920's or early 1930's Banff's bear management actions consisted mainly of poaching control. In fact, park officials were so earnest in this endeavour that the size of Banff park was reduced in 1911 to facilitate better enforcement (Noble 1972:34). Many of the warden patrol cabins were built during this era to allow for more effective and prolonged anti-poaching patrols. By 1906 poaching had reached critical proportions and park officials asked that some urgent measures be taken (Noble 1972:38). As a result the Warden Service, which up to this point had been a seasonal organization, was given full time status in 1909. In the same year an amendment to the park regulations gave wardens the authority to destroy "noxious, dangerous and destructive" animals (Noble 1972:34). These were to be the watch words of bear management for the next 40 to 50 years.
C. THE BEAR SHOW 1920 - 1960

Like our counterparts in the U.S., the early years of Canadian National Parks were lean years. Parks were grossly understaffed and underfinanced. From their beginning to some time in the early 1950's the preservation aspect of parks was a distant second to their importance as major recreational resorts (Noble 1972:54 and Nicol 1970). The construction of roads, hotels, swimming pools, golf courses, bowling greens and the like were all tourist enticements. Parks had the opposite 'people problem' that it has now. There were too few tourists. Budget allocations were directly related to visitation statistics. Parks needed tourists and numerous, readily observable bears proved to be a major tourist attraction.

Bear watching at dumps became a popular pastime during the 1940's and 1950's (Sime 1982:pers.comm.). Brewster tours would frequently visit the dumps as part of their sightseeing excursions. Even visiting royalty, Princess Margaret Rose, was taken to view bears at the Banff dump during the mid-1950's (Holroyd 1982:pers.comm.). While bona fide feeding programs such as those conducted in the U.S. parks were never documented, nothing was done to deter either bears or tourists from gathering at the dumps. On the contrary, management of the time supported the program. A large ornate sign (Fig. 3) directing tourists to the 'bear dump' was strategically located on Banff Avenue during the early 1950's (Holroyd 1982:pers.comm.). So desirable was the bear/dump attraction during the mid-1950's that
Fig. 3. Large ornate bear sign located on Banff Avenue, Banff National Park, circa 1953. The sign directed visitors to a town dump that was frequented by bears. Photograph courtesy of the Banff Warden Service.
management deemed it necessary to spray the dumps in Banff and Lake Louise to control mosquitoes and flies that might interfere with the tourists' bear viewing (Perren 1981:29).

Hand feeding of bears along highways and campgrounds was a natural outcome of the bear/dump viewing. Bears (mainly black bears) and people simply lost their fear of each other. Soon the opportunity to hand feed a 'wild' bear became another popular tourist attraction. Cavell (1978) has collected a series of photographs showing park visitors nonchalantly feeding black bears.

Undocumented stories of parents, while searching for that cute photograph, placing babies on the back of a black bear or allowing black bears to lick honey from the bald head of a baby were not uncommon. Bear jams became a recurring problem on congested highways. However, unlike the bear/dump viewing that had no noticeable (to the public) side effects, hand feeding resulted in numerous injuries (Kaye 1982:5 and Taylor 1982). While virtually all feeding incidents involved black bears inflicting minor injuries such as puncture wounds and lacerations about the face and arms several injuries were of a more serious nature. In one case the victim was expected to lose sight in one eye and in another incident a tourist was killed by a passing vehicle as he tried to back away from a begging black bear (Taylor 1982). Noting the growing number of injuries, Jasper's Superintendent advised in 1939 that,

...the only solution to the problem that I can see, is the inauguration of an intensive educational campaign whereby information on the habits of wild animals will be made available to the travelling public and also the
22.

erection of suitable signs calling the attention of tourists to the fact that all animals are dangerous if irritated (Kaye 1982:5).

However, bear feeding prohibitions were still 12 years away.

Throughout most of the bear/dump viewing and hand feeding period (1920 - 1960) park wardens really had only one bear management tool -- the rifle. Leg hold traps were probably used to a limited degree prior to 1930 (Sime 1982:pers.comm.) but what was one to do with a caught bear? Culvert traps came into use in the 1930's in Yellowstone (Schullery 1980) but didn't find their way into Canadian parks until the mid-1950's and immobilizing drugs were not available until the early 1960's (Holroyd 1982:pers.comm.). While mild forms of aversive conditioning (rock throwing, bird shot etc.) were probably used somewhat, the only sure means of dealing with the miscreant bear was to kill it. One veteran warden mentioned that the finality of this solution had a certain advantage. Wardens knew that unless they were prepared to destroy the bear, problems had to be anticipated and corrected before they developed. No second chances were available (Sime 1982:pers.comm.). Another veteran mentioned that while most wardens of the time were conservationists and had an inherent distaste for destroying bears there were several wardens who were far less inclined to save ammunition (Holroyd 1982:pers.comm.). The management kill statistics (Table 2) speak for themselves. And it should be kept in mind that these figures represent the minimum number of animals destroyed. The 'final solution' was used often.
One must keep in mind that bear management during this period was not high priority. Aside from a warden who was killed by a grizzly in Jasper (1929) there were no fatalities until 1958 and it was not until the 'night of the grizzlies', June 1967 when two girls were fatally mauled in Glacier National Park, Montana, that public concern over bears and their management began in earnest. Thoughts of raging forest fires, not bear maulings, were the source of chief warden insomnia during the 1920-60 period (Holroyd 1982:pers.comm.).

The first report of management kills came from Jasper in 1916 (Kaye 1982). Banff reported its first control kill in 1929 when a warden shot a grizzly that had been "molesting" horses. In 1936 the first report of a grizzly being shot near a dump (Hector Lake, Banff) was made. A subsequent report in 1938 mentioned that bears with "mischievous tendencies" were sometimes shot (Noble 1970).

If one can generalize on the basis of Jasper records alone, management kills were relatively few until 1943 when a minor mauling of Yoho's Superintendent resulted in a change in management policy (Noble 1972:81). Apparently a grizzly had followed the Superintendent and his young son up the Twin Falls trail. As the grizzly approached, the son climbed a tree and the father laid flat across the trail. The bear took one nip at the father's leg, put a paw on his knee and left (Mundy 1973:33). As minor as it was the incident received wide media coverage and park officials became concerned that the adverse publicity might deter tourists. In order to assure residents and tourists that proper steps were being taken, park
officials quickly announced a (new?) bear management policy whereby all grizzlies approaching areas of human use or showing unnatural behaviour should be shot (Noble 1972:81). Even though several parks did not implement the policy in full, grizzlies that entered dumps, townsites or heavily used trail areas were routinely shot until the policy was withdrawn in the early 1950's (Noble 1972:81).

Jasper records (Kaye 1981:6) indicate that in the 27 years preceding 1943 only 2 grizzly bears were destroyed whereas in the 10 year period after 1943 a total of 19 grizzly bears were destroyed; 8 of these occurred in 1947 alone. Although the kill policy was to apply to grizzlies only, it would appear that it may also have been extended to black bears. In the 27 years preceding 1943 a total of 39 black bears were destroyed in Jasper whereas 56 were destroyed in 1943 alone (Kaye 1981:6).

The rifle was not the only means of control killing. Between 1947 and 1951 dynamite booby traps were planted near work camp dumps to destroy nuisance blacks and grizzlies in Kootenay (Noble 1972:87). Similar control techniques were reported for Glacier during the early 1960's (Noble 1972:87). Unfortunately, records to indicate the success of this method were not available.

The acceptability of the control programs can only be judged in the light of the times. Regardless of what the actual bear population numbers were it must have seemed as though bears were one of the more bountiful park species simply because they were concentrated at areas of human concentration, sources of unnatural food such as the dumps, campsites and
highway corridors. Surely, there could be no harm in destroying the few trouble makers. The seemingly ubiquitous black and grizzly bears were regarded with a certain degree of fear yet attractiveness; an animal that could be useful yet an animal that could be a nuisance. In 1925 the Superintendent of Glacier received a petition from local residents calling for the destruction of problem bears. Whether the petition referred to blacks or grizzlies is unknown.

Now that the snows have gone the bears are beginning to roam around as in former years. Apparently they seem to be more numerous and going round in threes and four's. Now that Junkin's camp is closed down, where the bears used to be fed often and frequently, they are getting to be a bother and very destructive. We suggest if you would allow six or seven of these bears to be shot and ammunition let off around here it would scare the rest away and then we would not have this worry and trouble over them. [Marsh 1972:292].

In 1945 Munro noted that in Glacier

... people admit an uneasiness and dislike of the animal (grizzly). It is met often enough to cause apprehension and there seems little doubt that its presence deters some people from visiting the park. [March 1972:292].

In 1929 the Superintendent of Banff requested permission from the Commissioner of the Parks Bureau to take the Duke of Gloucester on a grizzly hunt within Banff Park (Noble 1972:53). Although the request was rejected it indicates the rather prevalent attitude that park resources, including bears, were a commodity to be used. During the 1930's parks were viewed as 'animal warehouses' able to supply needed species for zoos, museums and exhibits. For example, the Commissioner's letter of October 1939, sent to the Superintendents of Banff, Jasper and Yoho stated that the
Parks Bureau wanted "one extra large grizzly bear and one extra large black bear for mounting for exhibition purposes." (Noble 1972:54). Other correspondence indicates that at least 4 grizzlies were shot in Jasper (1932-37) to supply museum specimens (Noble 1972:54). On a more pleasant note, Shintz (1982:pers.comm.) reflects that during the late 1940's Banff residents were quite tolerant of nuisance black bears in the townsite and that humorous bear antics were often a topic of conversation. At least one author of the early 1940's regarded Jasper's black bears as little more than humorous buffoons that only on occasion become a nuisance (Cory 1946).

During the mid to late 1940's a few changes began to creep into the bear management picture. The beginnings of a formal public education program took the form of permanently installed signs warning tourists of the hazards of feeding or approaching bears. The first bear pamphlet entitled "Don't Blame the Bears" was printed for public distribution (Lothian 1982:pers.comm.); a limited number of superficial wildlife studies were completed (Clarke 1939, Munro and McTaggart Cowan 1944, McTaggart Cowan 1943, Soper 1947); and warden Wildlife Observation Cards were initiated in 1945 to provide the first formalized wildlife observation system. More significant changes were to come during the early 1950's.

D. REGULATIONS, TRAPS, DRUGS AND LITIGATION: 1950 - 80

On December 14, 1951 an amendment to the National Parks Game Regulations made the act of touching, feeding, or enticing bears unlawful.
Although it would take another 2 decades for this regulation to have any noticeable effect it was the first formal recognition of the bear/human food problem and represented a positive step towards amelioration. Wardens now had a second bear management tool. However the public did not take kindly to the new regulation. Tourists had been feeding bears for 60 years and no doubt regarded it as one of the features of their park visit. As late as 1960 parks were receiving adverse criticism (Fig. 4). The first charge under the new regulation was not laid until July 1959, almost eight years after the regulation was enacted (Strong 1958 and 1959b). This implies a certain reservation to interfere with one of the parks' main attractions.

With the introduction of the culvert trap in the mid-1950's major changes in management practices were possible (Sime 1982:pers.comm., Schintz 1982:pers.comm., Holroyd 1982:pers.comm.). Although the rifle was to remain the main management tool until the early 1960's, an alternative was at least available. Bears could be trapped, moved to a new location and released. Incorrigible bears could still be shot on the spot or trapped and later shot out of the public view. Initially, trapped bears were released unmarked, but soon it was realized that the program would be enhanced if one could identify repeat offenders. While some wardens claimed they could recognize a bear by his body features much as a rancher recognizes his cattle, the practicality of the method was severely limited by the fact that the same warden was not always available to identify the
Fig. 4a and 4b. Media cartoons of the early 1960's give an indication of the then prevalent public attitude toward bears. Figure 4a from the Calgary Herald, June 20, 1960. Figure 4b from Maclean's, May 18, 1963.

"C'mon, wake up! The tourists will be here any minute."
animal. Paint, liberally applied to the bear's hide, was the first marking system (Holroyd 1982:pers.comm.). A paint soaked rag or brush was fastened to the end of a long stick and poked through one of the trap's portholes. In one instance free ranging grizzlies were marked at the Jasper Park Lodge dump by a warden who stood on scaffolding and poured yellow paint down onto the backs of the unsuspecting animals (Flook 1958:4). Inevitably the idea of painted bears soon attracted media attention and the marking scheme quickly developed into a national joke. Newspapers across the country carried cartoons depicting coloured bears and several tenders were received to paint park animals (Holroyd 1982: pers.comm.). The fact that parks were now engaged in a trap/release program of bear management had been well publicized.

The trap/release program was continued through the 50's, 60's, 70's and into the 80's (Table 1). Current relocation figures are still high. Jasper performed 56 relocations in 1980 (Woody 1980) and 48 in 1981 (Woody 1981). Banff performed 70 relocations in 1980 (Perren 1981) and 15 in 1981 (Pengelly 1981). The program represented management of symptoms rather than causes and met with only limited success. Conditioned bears often returned quickly over long distances to their source of human food. Repeat offenders were shot unobtrusively after being trapped and removed from public view. To the public, however, the program must have looked good. Nuisance bears could be quietly trapped and moved to a wilderness setting where their human food craving would soon be forgotten. There were no
shootings, no blood and no dead bears. The concept of preservation in National Parks was beginning to take hold during the late 1950's and the trap/release alternative must have been welcomed by park managers and the public.

The 1958 fatal mauling of a young girl at Sunwapta Falls in Jasper focused greater attention on bear management. Although there had been dozens of bear inflicted injuries over the years this was the first fatal mauling since 1929. The fact that the victim was a 4 year old girl and that the mauling was inflicted by a black bear probably made the incident even more alarming. The Chief of the National Park Branch reacted by issuing the first bear management guidelines in a letter dated July 14, 1959 (Strong 1959a). Efforts were to be made to devise bear proof garbage containers (at a reasonable price); bear proof containers were to be installed at all government facilities and concessionaires were required to follow suit; all garbage holding facilities at townsites, campgrounds and concessions were to be reviewed to ensure that garbage was not left exposed; enforcement of the no feeding regulation was to be carried out with special attention to residents; warning pamphlets were to be given to each motorist entering the park; trash bags were to carry printed warnings; bungalow camp operators were forbidden to set out garbage after 6 pm; all sources of publicity were to be used to warn of the dangers of bears; and the policy of destroying bears frequenting establishments patronized by the public was to be continued and extended to other National Parks. In 1961 this policy was re-affirmed with special emphasis placed on the control
kills. In a letter to the Superintendents of Western National Parks, the Chief of the National Parks Service stated that, "I wish to emphasize that there is to be no departure from our policy of destroying bears that frequent establishments patronized by the public" (Strong 1961). The policy went on to give further guidelines concerning trapping and control kills. Nuisance bears were to be trapped, marked and released in isolated areas; repeat offenders were to be retrapped and discretely destroyed.

Had these guidelines been rigidly followed, the bear problem in National Parks would have been history by the mid-1960's. Unfortunately, they were only partially implemented. Park managers had identified a major cause of the bear problem, garbage/food control, but for a variety of reasons, would be unable to implement effective control for another 20 years!

Well intentioned traditions die slowly, not overnight. Garbage management and bear management had, with few minor exceptions, remained static for the last 60 years. Changes to garbage handling and storage practices would involve tremendous expenditures. Bear proof designs for garbage receptacles and dumps had to evolve over years of field testing. Politically powerful chambers of commerce depended on bears as tourist attractions and would, understandably, be reluctant to see them suddenly disappear. Bear management responsibilities were fractionalized between the maintenance section managing the garbage, and the Warden Service managing the bears. Often the two did not perceive their common problem. Throughout the 1960's and early 1970's warden districts were operated basically as independent units. In terms of bear management there was very
little direction from upper management (Holroyd 1982:pers.comm.). This, coupled with the isolation of the district and the lack of good radio or phone communications, did little to promote a concerted management effort. Studies outlining bear behaviour and ecology were essentially non-existent. In short, management knew what actions should be taken but it had neither the funding, expertise, manpower nor political backing to accomplish the task. Behind each of these limitations was the fact that only one serious mauling had occurred in recent history. Perhaps the common thought of park managers was that this mauling was an isolated incident that was unlikely to recur. Therefore, there were no earth shattering innovations, merely a long slow progression of small changes; improvements that would eventually have a large cumulative effect.

During the late 1950's open dumps were gradually closed to public viewing; the bear dump sign was removed from Banff Avenue (Holroyd 1982:pers.comm.); incinerators were installed at many dumps; thousands of leaflets warning of bear dangers were distributed; prosecutions for feeding bears increased; field testing of bear proof garbage receptacles began; and the first management related study of bears in National Parks was completed (Flook 1958). Immobilizing drugs which first became available in the early 1960's provided another alternative to destroying the trap-wary bear. In addition, immobilization allowed bears to be closely inspected to determine age, sex, weight, presence of injuries or any assortment of anatomical measurements. More sophisticated marking devices such as coded ear tags could be used. All this led to an expanding data base upon which future
management actions could be founded.

The Interpretive Service which started in 1957-58 assumed an increasing responsibility for educating the public. Warning signs (Fig. 5) were posted along highways and well used trails. A suggestion was even made to paint the words "Don't Feed Bears" on the highway pavement (Coombs 1959) and jingles such as, "Highway bears are often rude. They eat fingers as well as food." were suggested for the back side of vehicle stickers (Coombs 1958).

The 1960's were years of rapid growth in visitation for most national parks. Between 1960 and 1966 visitation in Banff doubled from 1.0 million to well over 2.0 million. Jasper's visitation climbed from 0.3 million to 0.6 million (Nelson 1970:64). With the dramatic rise in park use came the associated rise in garbage, visitors feeding bears, nuisance bears, injuries, trappings and control kills. The problems at dumps worsened for now grizzlies started appearing in heavy concentrations: 11 near Bow Lake Lodge; 12 near Saskatchewan Crossing; 23 at the Lake Louise dump (Noble 1972:87). To make matters even worse National Parks suddenly found themselves being sued for negligence as a result of severe injuries sustained by a young man mauled by a Jasper grizzly in August 1965 (Sturdy et al. v. The Queen 1974). That a Superintendent and a park warden were named in the Petition of Right as being negligent, probably pricked the ears of many bear managers and forced them to take a long, close look at their management program. A successful suit resulting in a $100,000 settlement to a Glacier Park, Montana visitor who was mauled by a grizzly in 1959 probably
Fig. 5. Photograph showing an early bear warning sign that was first used circa 1960. The sign measures about 30 x 45 cm with black and red lettering on a bright yellow background. The sign was placed throughout frontcountry and backcountry areas of many parks.
focused further attention on bear management practices (Williams v. United States 1962). As if all this was not enough, in August 1967, 2 visitors were fatally mauled in separate incidents by 2 different grizzly bears during the same night in Glacier National Park, Montana. Media coverage given to the 'night of the grizzlies' was unprecedented; bear maulings were big news and National Parks and their bear management practices were thrust under the media spotlight. Chief Park Wardens could now list the thought of bear maulings as a likely cause of insomnia.

What effect these maulings and legal actions had on bear management is hard to determine. One member of the academic community called for the outright removal of bears from national parks (Moment 1968). On the other hand there was a much stronger vocalization for improved management (Herrero 1970a and 1970b).

Attitudes towards bears were changing. Certainly they were dangerous but now they were also a species worthy of protection and not just as a tourist attraction (Herrero 1980). In the early 1960's a large forest fire in the Chaba River area of Jasper killed a grizzly cub and although the distressed sow had harassed fire fighters for over a month by treeing several men, the sow was not destroyed (Schintz 1982:pers.comm.). The conservation movement had gained momentum by the mid-1960's and this along with political clout of millions of new park visitors was to keep management improvements coming at an accelerated pace. The first detailed ecological studies of grizzly bears in national parks were completed in 1963 (Mundy) and 1966 (Riegelhuth). And in the United States the first of
a long list of Craighead reports on the Yellowstone grizzly were published (Craighead and Craighead 1961). In Canada, the National Parks Garbage Regulations were passed in 1968. In the same year a "Carry In-Carry Out" policy for backcountry garbage was initiated (Seel 1984:pers.comm.) and a new warning pamphlet Bear Facts was issued. Bear proofing experiments continued but without much success: garbage receptacle designs ranged from totally subterranean models to those which were suspended in mid air (Fig. 6). None proved effective. Several different types of reinforced fencing were placed around open dumps but this also proved ineffective. Bears either dug under the fencing or ripped holes in the mesh (Kaye 1981:42 and Perren 1981:32). At least one dump (Jasper's townsite) was permanently closed (about 1970) and moved to the Palisades area. The bears followed.

Perhaps the most significant advance made in the late 1960's was the inclusion in the 1969 National Parks Policy statement of a section dealing with wildlife conflicts.

Conflicts between wildlife and other park interests including human safety should be resolved if possible without destruction of wildlife. For example adequate handling of garbage should replace destruction of garbage-fed bears, and feeding of bears by visitors should be stopped. When removal or destruction of animals is decided upon on the basis of research findings, it should be done by departmental employees and as promptly and unobtrusively as possible. (Parks Canada 1969:5)

Here, for the first time, was a formal public statement outlining, although briefly, the direction that bear management was to follow.

The 1970's saw further refinements in all aspects of bear management. Two models of consistently bear proof garbage containers, the
Fig. 6a. (Top Left) Photograph showing the garbage portal of an underground garbage receptacle used in several Canadian National Parks circa 1960. The subterranean portion was enclosed with large diameter timbers and then covered with soil. In 1961 a grizzly bear managed to gain access to one of these structures in Kootenay National Park. The bear could not get out and by the time he was discovered by park staff, the bear had become so weak that it had to be destroyed. Photograph courtesy of the Banff Warden Service.

Fig. 6b. (Top Right) Photograph showing another 'bear proof' garbage receptacle that was used frequently by Parks Canada during the 1960's. Bears would commonly cuff the receptacle until it turned over. Eventually bears learned how to pull themselves up into the swinging can.

Fig. 6c. Even heavy steel industrial garbage bins used in the 1970's proved ineffective.
concrete bin type used in Jasper (ca. 1973) and the letter box type used extensively in many Canadian and U.S. parks, were installed in most high use areas by the mid 1970's. A variety of fence designs were placed around the Banff and Jasper dumps. Bears continued to gain access through holes left in the mesh by machinery, or by digging under the fencing even after it had been reinforced with cement packs. Gates, inadvertently left open by garbage crews, provided the easiest access. Finally in 1981, transfer stations were set up in Banff for household garbage and the dump was closed to all but trade wastes (Perren 1981:32). In 1981 Jasper fortified its dump with an electric fence. Both systems seem to be effective after two years of field testing (Westhaver 1983:pers.comm. and Woodrow 1983:pers. comm.). Other parks made arrangements to use municipal dumps outside the park. In 1973 Kootenay hauled all of its garbage to Edgewater and Yoho, perhaps the cleverest of all, arranged to dump all of its garbage at the Lake Louise dump!

Park managers were given a pat on the back in 1974 when judgement on the Sturdy case (Sturdy et al. v. The Queen 1974) was handed down. In essence, the Court held that through the use of signs and pamphlets the park had given adequate warning and therefore could not be held liable in cases similar to the Sturdy case (Toews 1974). No doubt this decision gave even greater impetus to the educational/warning aspects of bear management: in 1974 the first of a series of warning pamphlets entitled, You Are in Bear Country were distributed; in 1977 the film Bears and Man was produced at a cost of over 0.3 million dollars; most interpretive talks carried some
form of bear warning; and many trail heads and information centres posted warnings.

The 1977 fatal mauling of a young girl (Muser) at a picnic site in Waterton Lakes National Park may have produced a further refinement. The parents filed suit claiming they had not been warned of a bear danger. More specifically, they claimed they had neither been given a warning pamphlet nor seen any warning signs when they entered the park. Even though the case has not been finalized, two significant management actions have occurred which were probably a direct result of the mauling. First a memorandum from the Director, Western Region requested that more prominence be given to warning visitors of the dangers of bears by including a clear warning statement in the main park brochures plus ensuring that the pamphlet, You Are in Bear Country receive wide distribution at all entrances (Turnbull 1977). Secondly, in 1980 large signs warning of wildlife and other dangers were conspicuously posted at the entrance of all parks. The intent of both actions was obvious.

Another series of maulings at Whiskey Creek, Banff, 1980, involving four different men in three separate incidents, prompted an informal review of the park's bear management practices. A team consisting of park managers, scientific experts and legal advisors tabled a document listing dozens of recommendations (Westhaver and Williams 1980) which clearly set
the stage for major improvements in bear management. Even though the report was prepared specifically for Banff, its applicability, for the most part, should be universal to all Canadian National Parks.

Research took a big upswing during the 70's. Analysis of bear attacks (Herrero 1970) was followed by a round of ecological studies (Mundy and Flook 1973, Hamer 1974, Herrero 1975, Retfalvi 1975, Vroom et al. 1977). Of particular note are two major studies, one in Jasper (Russell et al. 1979) and the other in Banff (Hamer and Herrero 1983). The data base grew enormously in the last 10 years enabling wardens to base management decisions and strategies on fact rather than mere speculation. An era of informed bear management had begun.

Senior management played an increasingly stronger role in bear management throughout the 1970's. This was in marked contrast to the previous practice of permitting a great deal of autonomy at the park level. A series of operational policy directives entitled, Control of Animals Deemed Dangerous to Human Safety (Parks Canada 1971b), Immobilization Equipment and Drugs (Parks Canada 1975c) and Bear Management in National Parks (Parks Canada 1978d) were issued from Ottawa. Western Region Directive No. 31 (circa 1981) further stipulated the manner in which warning pamphlets would be dispensed (Parks Canada undated b). A later Western Region Directive, No. 48 required that each park in Western Region prepare a bear management plan according to a specified outline (Parks

2 Since the document was marked 'confidential' the author requested permission from the Superintendent of Banff to outline the Review Team's findings in this report. This request was denied due to pending court action involving the 1980 maulings.
Canada 1983d). The rationale behind all these directions was to provide a rigorous, consistent and safe approach to managing bears.

During the latter part of the 70's a number of new techniques crept into the warden's bear management tool box. Area closures were routinely used to exclude visitors from potentially dangerous areas; quota systems permitted controlled usage; habitat analysis allowed for proper trail alignment and campsite placement; computerized monitoring systems provided rapid accurate data storage and manipulation; leg hold snares made trapping in remote areas possible; helicopter use permitted trap/release programs to be conducted in remote areas; and improved drugs allowed for faster, safer immobilizations.

Despite all these new tools the management program was only as good as the field staff responsible for its implementation. This fact was embodied in a detailed review of the Warden Service and its function in 1968 (Sime and Shuler 1968). The report identified implementation of resource plans as the primary role of the warden and, recognizing the need for more highly qualified personnel, recommended significant academic upgrading of existing personnel plus higher recruitment standards to meet this goal. At this time 80% of the existing warden personnel had less than grade 12 education and 53% were 40 years of age and over. This was not surprising since wardens had been hired mainly on the strength of their horsemanship and bush experience with academic credentials being secondary (Holroyd 1982:pers.comm.). The recommendations were accepted and a major training program was introduced to upgrade existing personnel. In addition, the recruitment standards were raised setting 2 years post secondary school education or equivalent experience as the minimum requirement. By
the mid 70's there was a blend of experienced, bush-wise veterans and inexperienced, academic-wise rookies. The two complemented each other to produce an organization well equipped to handle the contingencies of the 70's. It was this shift in training and recruitment standards, more than anything else, that led to the improved bear management practices of the last decade.

E. MANAGEMENT BY PLAN: 1980 -

Bear/human problems in national parks are a long way from being solved: bears still manage to snatch the odd picnic basket or raid the unsuspecting camper; garbage frequently overflows at bear proof containers; chance encounters between bears and humans will always provide the risk of human injuries or fatalities; and it will always be necessary to relocate some bears and destroy others. We have entered the 80's with vastly improved management tools, well trained managers and, in the form of the recently produced bear management plans, a more systematic, organized approach to bear management.

F. BEAR MANAGEMENT PLANS IN CANADIAN NATIONAL PARKS: PAST AND PRESENT

The notion that bears should be managed by a preconceived set of actions and that planned actions should be set out in a document is relatively new. Bear Management Plans, per se, did not appear until the mid 1970's. Up to this point, management actions had been left to field staff guided only by general statements from their superiors. The first Plans
were short (5 to 6 pages), rudimentary papers that gave only a vague impre-
sion of the management program (Parks Canada 1974c). Subsequent efforts 
were done in considerable detail reaching lengths of 35 pages (Parks Canada 
1977b). Influenced perhaps by a series of fatal maulings in Banff (1973), 
Glacier (1976), and Waterton (1977), Headquarters chose to become involved 
in the planning process by issuing an operational policy directive (1978) 
entitled Bear Management in the National Parks (Parks Canada 1978d) which, 
amongst other things, called for the development of bear management plans. 
Accordingly, by 1980 most parks containing bears had outlined its 
management program in a level of detail ranging from the relatively simple 
to the more complex. Generally, plans became more complex as one moved 
from the Atlantic to Western Regions just as one might expect given the 
greater number of bear problems in Western Canada.

The plan prepared by Kootenay National Park (Parks Canada 1981j) was 
by far the most comprehensive document and served as a guideline for 
Western Region Directive #38 (Parks Canada 1981m) which attempted to foster 
higher management standards and consistency throughout the Region by 
calling on each park to prepare similar plans. By 1982 most parks had 
complied and there resulted a series of relatively sophisticated plans in 
Western Region parks.

To fully understand bear management plans one must understand their 
context within the total planning process. All resource management plann-
ing in National Parks must proceed in a pre-determined orderly fashion as 
The Natural Resource Management Process is linked to another process known as Systems Planning.
Fig. 7. The resource management process used by Parks Canada.\textsuperscript{a}

\textsuperscript{a} Adapted from Parks Canada 1980.
mation not collected in the resource inventory then a Resource Management Study would be undertaken.

The vast majority of Canadian bear management plans reviewed for this project are of an interim status, or according to the foregoing terminology, they are Interim Management Guidelines only. That these plans are founded on the scantest of resource data is quite evident. Management actions linked to such specific information as critical habitat requirements or population dynamics cannot be made. For most parks, this information may not be available for many years to come. The Existing Canadian bear management plans are based, almost exclusively, on the gut feelings of field personnel and the direction provided by an array of statutes, policy statements and operational directives.
CHAPTER III DEVELOPMENT OF ESSENTIAL ELEMENTS

In this chapter material from the four authority fields will be reviewed to determine its implications for bear management plans.

The legal and policy framework within which all bear management plans must function is described in Sections A and B. An understanding of this framework is important for several reasons. First, it provides program direction by establishing general objectives and outlining procedural steps for certain actions and setting limitations for others. Second, it provides the authority to implement otherwise impotent management actions. Third, most parks have documented their management program by way of a bear management plan which undoubtedly would become a primary document during any legal proceeding. In this regard, the necessity of ensuring that written statements are consistent with the law and policy become obvious.

A. LEGAL BACKGROUND

At the very outset the reader should be aware that there are few, if any, clear and simple legal issues concerning bears and humans in our national parks. Hunt (1979:32) has commented on this point.

A lawyer who sets out to write a legal essay about parks and people in Canada faces several difficulties. First, there is an almost total void in Canadian legal literature on this subject. Secondly, the role of the courts in this country as arbiters of disputes in parklands has been very slight. Since judicial decisions provide the traditional grist for a lawyer's mill, the paucity of case law deprives a legal researcher of her most familiar tool. One is left to examine the statutory framework within which parks operate. Here, too, the near vacuum
in research leaves a commentator with uncertainties as to the appropriate starting place.

This matter is further complicated by unclear and often confusing Regulations derived from an outdated National Parks Act.

STATUTES

The National Parks Act is the primary statute governing bear/human relations in Canada's National Parks. While many sections of the Act could be construed as having an indirect influence on management practices, the following material will focus only on those sections relating directly to bear management.

The Act provides two items of importance to bear management: general objectives and authority to make specific regulations. Section 4, the so called 'dedication clause', sets the general purpose of National Parks: use by Canadians for their benefit, education and enjoyment but use that will leave the park lands unimpaired for the enjoyment of future generations. Herein, lie two general objectives that all bear management programs must pursue; public information/education about bears and protection of bears. As man and his activities represent the only real threat to bears, protection must stem from control of man and his activities.4

Most of the provisions under the National Parks Act with applica-

---

4 Herrero (1979) contends that the clause "... shall be maintained unimpaired for future generations." (National Parks Act, Section 4) was intended primarily to prevent major resource extractions such as logging.
49.

bility to bear management are contained in the Regulations pursuant to the Act. Section 6(1) of the Act prohibits use of any park land except in accordance with the Act or regulations.

Public lands within the parks shall not be disposed of or located or settled upon, and no person shall use or occupy any part of such lands, except under the authority of this Act or the regulations (National Parks Act, Section 6(1)).

Section 7(1) gives the power to make regulations (which could have a direct influence on bear management) to the Governor-General in Council.

The Governor in Council may, as he deems expedient, make regulations for ...

the preservation, control and management of the parks (National Parks Act, Section 7(1)(a))

the protection of wild animals, the disposal of noxious predatory or superabundant animals and the taking of animals for scientific and propagating purposes (National Parks Act, Section 7(1)(b))

the granting of permits for the use of public campgrounds by persons visiting the parks (National Parks Act, Section 7(h)(vi))

the establishment, operation, maintenance and administration by the Minister of public works and utility services and the use of the same within the parks, including ... garbage removal ... (National Parks Act, Section 7(i))

the administration and use of ... trails, ... and the circumstances under which ways shall be open or may be closed to public traffic or use; ... (National Parks Act, Section 7(j))

controlling trades, business ... (National Parks Act, Section 7(l)).

Using the authority derived from these sections the Governor in Council has issued five sets of regulations which are of prime concern to management.
The National Parks Wildlife Regulations set out several prohibitions and conditions, the most important of which are the conditions under which 'nuisance' animals may be destroyed. Three conditions are cited. Section 14 gives the Superintendent or park warden authority to destroy wildlife where either individual considers such action necessary to protect persons from an imminent danger.

A Superintendent or park warden may destroy wildlife where he considers such destruction necessary because of imminent danger to persons from the wildlife. (National Parks Wildlife Regulations, Section 14)

Section 15(1)(a) gives the Director power to authorize the destruction of wildlife for scientific purposes.

The Director may authorize the taking or killing of wildlife for scientific purposes; (National Parks Wildlife Regulations, Section 15(1)(a))

Section 15(2) gives the Director power to authorize the destruction of wildlife where he considers such destruction necessary for the protection of property.

A Director may authorize the destruction of wildlife where he considers such destruction necessary for the protection of property. (National Parks Wildlife Regulations, Section 15(2))

Destruction of wildlife by any person for any reason other than those just mentioned is prohibited under Section 4(a).

Except as otherwise provided in these Regulations, no person shall hunt, disturb, hold in captivity or destroy any wildlife within a park. (National Parks Wildlife Regulations, Section 4(a))
Several points are worth emphasizing regarding bear destruction criteria. Destinations can be done legally only under three limited conditions and only by certain individuals.

- A Superintendent or a park warden may destroy a bear if in their opinion, the animal presents an imminent danger to park users. What circumstances would constitute an imminent danger are difficult to specify. Certainly in situations where a bear is mauling, has mauled or is behaving in such a manner that it appears a mauling will soon occur, a decision to destroy the animal is justified under section 14. However, the necessity of destroying an animal beyond these limitations is unclear and must be left to discretion based on field experience and scientific findings.

- The Director may authorize the destruction of a bear provided the destruction is made for scientific purposes. To whom this authority would be given is not specified and one can only assume that park personnel would be involved in the destruction. Given the present 'hands-off' or non-invasive approach to research in National Parks it is difficult to imagine any Director ordering a destruction under this section. Nevertheless, such action is legally sanctioned.

- The Director may authorize the destruction of a bear if he considers the destruction is necessary to protect property. Since it would be next to impossible for a Director to be aware of, not to mention analyze the hundreds of bear/property damage incidents that occur annually it would only seem reasonable that he would set guidelines defining what he considers to be reasonable grounds for destruction under this section. To date, only the Western Regional Director has issued such guidelines. To whom the Director might give authority to destroy bears is not specified and again one can only assume that Park personnel would be involved.

The three destruction criteria mentioned above are worded in such general
terms as to adequately cover most situations.\(^5\)

Section 4(f), which has been used frequently to curb the roadside begging problem, prohibits the feeding or enticement of bears with foodstuffs.\(^6\)

Except as otherwise provided in these Regulations, no person shall touch or feed wildlife in a park or entice wildlife to approach by holding out or setting out foodstuffs or bait of any kind (National Parks Wildlife Regulations, Section 4(f))

The National Parks General Regulations make provisions for 'visitor control' through restrictive use of areas, complete area closures and control over food and garbage storage. Section 7 allows the Superintendent to restrict activities or entry and travel in certain areas.

The Superintendent may, where it is necessary for the proper management of the Park to do so, designate certain activities, uses or entry and travel in areas in a Park as restricted or prohibited (National Parks General Regulations, Section 7(1))

Notice of a restriction or prohibition referred to in

\(^5\) One exception may arise. If a bear, injured to the extent that it posed no threat to humans were destroyed for humanitarian reasons, the destruction would fall beyond the three criteria and therefore would be illegal. Similarly, the destruction of any injured animal such as the hundreds that are crippled on park highways is, in terms of the National Parks Wildlife Regulations, an illegal act.

\(^6\) It is interesting to note is that the act of trapping or setting out bait for a bear is also illegal pursuant to sections 4(a) and 4(f). No exception is made for management purposes. Bears may be legally trapped for "scientific purposes" pursuant to section 15(1)(a) provided that the term "taking" were interpreted to mean the act of trapping. The trapping of bears for any other reason is, strictly speaking, an illegal activity. To make a poor situation even worse, section 20(5) prohibits any person (including a park warden) from so much as carrying a trap outside a vehicle unless he is in possession of a permit from the Superintendent.
subsection (1) shall be posted by the Superintendent at park warden offices and information bureaus in the Park or at entrances to the Park. (National Parks General Regulations, Section 7(2))

A notice posted in accordance with subsection (2) shall include

(a) a description of the activity or use to which the restriction prohibition applies;
(b) the extent of restriction, where an activity or use is being restricted;
(c) a description of the area to which the restriction or prohibition of entry or travel in that area applies;
(d) a map of the area in which the restriction or prohibition applies, where that area is not the total area of the Park. (National Parks General Regulations, Section 7(3))

No person shall engage in an activity or use or enter and travel in an area that has been designated as restricted or prohibited pursuant to subsection (1) otherwise that in accordance with the terms and conditions prescribed in a permit issued under subsection (5). (National Parks General Regulations, Section 7(4))

The Superintendent may, on application to him by any person in respect of any activity or use restricted or prohibited pursuant to subsection (1) or any entry and travel in an area that has been restricted or prohibited, pursuant to that subsection, issue to that person a permit to

(a) engage in that activity or use, or
(b) enter and travel in that area

on such terms and conditions as the Superintendent may prescribe in the permit. (National Parks General Regulations, Section 7(5))

Therefore, section 7 provides the authority to effect a potentially very useful management technique. Although it has been used sparingly in the past, the notion of controlling or restricting human use in certain critical bear habitats will certainly gain acceptance once managers are able to identify those habitats and gauge what level of visitor use is acceptable. In the interim, managers could use this section to impose a number of
visitor controls such as those used commonly in the United States; these include restricting camping to hardsided units only, manipulation of campground opening and closing dates, hiking/camping ground size restrictions, mode of travel restrictions, et cetera (pages 123 and 124). Care must be taken to post notices as per section 7(2) and 7(3) and to require park personnel to obtain permits (verbal or written) to enter, travel through or engage in restricted activities according to sections 7(4) and 7(5).

Section 36 gives the Superintendent power to close areas of the park if he feels there exists a seasonal or temporary danger to persons, flora, fauna or natural objects.8

Where the Superintendent deems it necessary for the prevention of any seasonal or temporary danger to persons, flora, fauna or natural objects in a Park, he may by notice in writing close to public use of traffic any area in the Park for the period he considers the danger will continue (National Parks General Regulations, Section 36(1))

A notice referred to in subsection (1) shall be displayed on each approach road, trail or other way of access to the area in the Park closed to public use or traffic (National Parks General Regulations, Section 36(2))

No person shall enter any area in a Park during the period that it is closed to public use or traffic pursuant to subsection (1) except with the permission of the Superintendent (National Parks General Regulations, Section 36(3))

---

7 A hardsided unit refers to camping units such as motor homes, trailers and vans which have hard sides rather than cloth sides as do tents and tent trailers.

8 A strict interpretation of the words "No person" used in section 7(4) would also prohibit park wardens from entering restricted areas.
This is another potentially powerful management tool that has seen only limited use in Canadian parks, most often after a serious bear incident. Several U.S. parks, on the other hand use an average of 50 (bear related) closures/year (page 124) in an effort to head off dangerous situations.

One might note that the decision to close an area rests with the Superintendent and whether he can delegate this responsibility is unclear. The closure can be put in place only if a danger to either park users, bears or bear habitat exists. Notices must be posted by the Superintendent at all trailheads or other points of access to the closed areas. Although the content of the notice is unspecified one might assume that it would contain information as to what area is closed, why it is closed and under whose authority it is closed. It would seem reasonable that a highly visible notice be used.

There is little doubt that inadequate garbage storage and disposal methods have been the single largest cause of bear problems in parks. Therefore it would only seem logical that stringent regulatory control be available. As discussed below, although there are numerous regulations that could be applied to garbage handling practices, very few are clearly worded. Nevertheless regulatory control is possible although more so in the case of commercial garbage than residential or visitor garbage.

Sections from four sets of National Parks Regulations (Garbage, General, Camping and Businesses) have applicability to storage and handling

---

9 Kootenay National Park closes the area around four carrion deposit sites during the May through October period (page 276).
of garbage.

The National Parks Garbage Regulations stipulate the manner in which garbage must be stored to reduce wildlife/garbage problems.

Every owner shall store garbage between collection times in approved enclosures except when the Superintendent allows the use of steel refuse containers without an enclosure. (National Parks Garbage Regulations, Section 4(g))

The definition of "approved enclosures" is important.

In these Regulations "approved enclosure" means a type of enclosure designed for the storage of containers between collection times that prevents access to the garbage by domestic animals and wildlife and the design and construction of which has been approved by the Superintendent. (National Parks Garbage Regulations, Section 2)

Here then is the authority to impose stringent garbage holding requirements on all "owners". The Superintendent is allowed discretion in approving the enclosure only in so far as its design and construction. The enclosure must, at the very minimum, be such that it prevents access by bears and other animals. Note, however, the Superintendent may (pursuant to section 4(g)) allow the use of non-bear proof "steel containers". In this regard, the quality of garbage storage devices is still contingent upon the discretion of individual Superintendents.

"Owner" is defined in rather narrow terms that would include only commercial operators.

In these Regulations "owner" means any individual, syndicate, association, corporation, company, club or organization in charge of or responsible for the operation of any accommodation, facility, activity, business or entertainment or any church, hospital, school, university or other facility within a park and includes any employee, manager, lessee, transferee or partner of an owner, and any beneficial owner. (National Parks Garbage Regulations, Section 2)
The definition of "owner" seems to be very business oriented. It is doubtful that a resident or visitor would be classified as one who "operates" an "accommodation" or "facility". A court ruling is necessary for clarification.

Even further control over commercial garbage can be maintained through the National Parks Businesses Regulations. If the Superintendent determines that it would be in the best interests of the park not to issue a licence he may do so pursuant to Section 8.

The Superintendent may, for any reason that he considers sufficient in the interests of the park, refuse to issue a licence for any business (National Parks Businesses Regulations, Section 8)

Or the Superintendent may, at his discretion, stipulate conditions under which the licence is issued. Conditions so stipulated are to be endorsed on the licence pursuant to Section 5(5).

The Superintendent, in his discretion, may by endorsement on the licence stipulate any condition under which the licence is issued. (National Parks Businesses Regulations, Section 5(5))

Since every business must be licenced under Section 3 it follows that the Superintendent may set specific garbage holding or other requirements for any business operation. This may be particularly applicable to commercial enterprises who do not have a fixed point of operation (outfitters/guides) or those requiring more "persuasion". To take matters one further step, offenders may have their licences revoked under section 9(a).

The Superintendent may revoke any licence if the licensee fails to comply with the terms and conditions of his licence or these Regulations; (National Parks Businesses Regulations, Section 9(a))
If the Superintendent decides to reinstate the licence he may pursuant to Section 9(b), prescribe any term or condition of the reinstated licence.

The Superintendent may reinstate a licence revoked under paragraph (a) upon such terms and conditions as he may prescribe. (National Parks Businesses Regulations, Section 9(b)).

Further, the Superintendent may impose financial guarantees of compliance under Section 7(b).

Before issuing a licence for any business, the Superintendent may require the applicant for the licence to furnish a bond in the amount of $500.00 with two sufficient sureties payable to Her Majesty in right of Canada upon the failure of the applicant to comply with the terms and conditions of the licence to be issued to him. (National Parks Businesses Regulations, Section 7(b))

Hence section 7(b) might be useful in dealing with repeat offenders during application for a new business licence. Quite obviously it would take a particularly strong Superintendent to overcome the political pressures that could develop if he were to apply these regulations.

Even further control over commercial garbage can be maintained through the National Parks Businesses Regulations. Section 13 empowers the Superintendent to set conditions for the use and maintenance of all buildings, premises and equipment used in connection with the licencee's business. "Buildings, premises and equipment" would certainly include all garbage holding facilities.

All buildings, premises and equipment to be used by the licensee in connection with his business shall be maintained in a condition satisfactory to the Superintendent. (National Parks Businesses Regulations, Section 13)
Regulatory control of visitor/resident garbage is less clear. Several sections under the Garbage, General or Camping Regulations may be applicable.\(^\text{10}\) At first glance Section 8 of the Garbage Regulations would appear to be the most applicable regulation.

No person shall discard or dispose of or deposit garbage anywhere in a park except in such places and at such times and under such conditions as the Superintendent may authorize. (National Parks Garbage Regulations, Section 8)

One should note that section 8 refers to the discarding, disposing or depositing of garbage. No mention is made of garbage storage. Since section 4(g) of the Garbage Regulations specifies "storage of garbage between collection times", one might assume that "discard", "dispose" or "deposit" apply to the final resting place of garbage and not interim storage. If this were true Section 8 would give the Superintendent full control over the final resting place of garbage but not interim storage. The question to be answered is whether garbage set for collection, or placed behind a restaurant is discarded, disposed, deposited or stored. A judicial ruling is necessary for clarification.

Section 27 of the General Regulations provides another possibility for visitor/resident garbage control.

Where in the opinion of the Superintendent or of a Park Medical Officer or a medical or sanitary inspector, a nuisance exists on any premises in a Park, the Superintendent may order the owner, lessee, licensee or any other occupier of the premises to abate the nuisance and cleanse the premises. (National Parks General Regulations, Section 27(1))

\(^\text{10}\) Many of these sections could also be applied to commercial operators although the previously mentioned sections are more appropriate.
Just what would constitute a "nuisance" is difficult to say. Would an incident have to occur first to establish that certain garbage attracted the bear and thereby transforming the garbage into a nuisance? Or would the bear itself be the "nuisance"? Perhaps a more appropriate section to enforce control over visitor/resident garbage might be section 28.

No person shall deposit any snow, leaves, rubbish or any matter of an offensive nature in a Park except in such places, at such times and under such conditions as the Superintendent specified. (National Parks General Regulations, Section 28)

However the applicability of section 28 is uncertain due to the use of the undefined terms "deposit", "rubbish" and "offensive nature". Is a resident depositing or storing garbage when he places it outside his residence? If he is storing the garbage then Section 28 might not apply. If a dictionary definition of "rubbish" were used garbage edible to bears would be included. However if the Garbage Regulations definition of "rubbish" were applied it would exclude edible garbage and hence the regulation would be inapplicable for bear management. Would a plastic bag of edible garbage set out behind a motorhome or cottage be a "matter of an offensive nature"? Again judicial clarification is required before this section could be applied with confidence.

Section 31(2) of the General Regulations provides that ...

Where incinerators or trash receptacles are provided in a park, all refuse, waste paper, or other material being discarded shall be placed therein. (National Parks General Regulations, Section 31[2])

Again, section 31(2) does not address the problem of garbage storage prior
to discarding. Section 32(1)(c) of the General Regulations stipulates
that,

No person shall, in a Park, carry out any action that
unreasonably interferes with fauna or the natural beauty
of the Park. (National Parks General Regulations, Section 32[1](c))

The Superintendent may remove or have removed from a Park
any person who by his disorderly conduct, behaviour or
action is in violation of subsection (1). (National
Parks General Regulations, Section 32[2])

No person who has been removed from a Park under subsec-
tion (2) shall enter or attempt to enter that Park for
one year following the date of removal unless that person
applies for and obtains permission from the Director to
enter the Park. (National Parks General Regulations, Section 32 [3])

The obvious question of what represents unreasonable interference with
fauna or interferes with the park's natural beauty must be answered if
section 32 is to be applied. Is a bear/garbage incident necessary to
establish unreasonable interference or is the mere anticipation of an
incident based on past experience sufficient to claim interference? Quite
obviously one may have difficulty applying this section.

The Camping Regulations present several opportunities for control of
camper garbage. Central to any enforcement potential is the requirement
that all campers possess a camping permit.

No person shall use or occupy or reside or camp on any
public land in a Park or park on any vehicle on such land

Section 8 of the National Parks Act provides for monetary penalties
only. The removal of violators seems to be a penalty beyond that
provided by section 8. It would appear therefore that the Regulations
and the Act contradict each other. It might be illegal to remove violators.
for the purpose of camping unless he is the holder of a valid camping permit authorizing him to use that land for that purpose or a member of a group in respect of which a camping permit has been issued and is still valid. [National Parks Camping Regulations, Section 3(1)]

Section 9 empowers the Superintendent to set conditions for the maintenance of campsites and, further, stipulates that the camping permittee must comply with those maintenance conditions at all times.

The holder of a camping permit shall, at all times, maintain the campsite to which the permit applies in a condition satisfactory to the Superintendent. [National Parks Camping Regulations, Section 9]

Just how one would inform permittees of satisfactory maintenance conditions is not clear. Section 16(d)(i) and 16(d)(iii) empower the Superintendent to cancel camping permits if the holder of the permit fails to comply with either conditions on the permit, or any instructions posted by the Superintendent at campground entrances.

The Superintendent may cancel a camping permit where the holder of the permit fails to comply with the conditions of the permit. [National Parks Camping Regulations, Section 16(d)(i)]

The Superintendent may cancel a camping permit where the holder of the permit fails to comply with any instructions that may be posted by the Superintendent at the entrance to a public campground. [National Parks Camping Regulations, section 16(d)(iii)]

Therefore one might assume that two methods of notifying permittees of satisfactory campsite maintenance conditions might be by way of endorsement on the camping permit or by posting "instructions" at campground entrances. Section 5(2)(b) clearly stipulates that camping prohibitions may be given by way of the camping permit or a campground entrance notice.
On a notice located at the entrance to a public campground or in a camping permit, the Superintendent may set out any prohibitions made pursuant to section 13. (National Parks Camping Regulations, Section 5(2)(b))

However Section 13 limits the prohibitions to those actions which may unreasonably interfere with fauna or the natural beauty of the park.

The Superintendent may at any time and for such period as he deems necessary for the management and control of a public campground, prohibit any action in a campground that unreasonably interferes with fauna or the natural beauty of the Park. (National Parks Camping Regulations, Section 13(d))

Since the Superintendent can only prohibit those actions that "unreasonably interfere with fauna or natural beauty" one is left with the same questions presented by section 32(1)(c) of the General Regulations. What is unreasonable interference and is an incident necessary to establish interference? If these questions were favourably resolved further steps could be taken. Section 5(3) provides that,

No person shall camp in a public campground except in compliance with any conditions prescribed pursuant to paragraph (2)(a) and any prohibition set out pursuant to paragraph (2)(b). (National Parks Camping Regulations, Section 5(3))

If section 16(d)(iii) is enforced to cancel the camping permit for non-compliance with the prohibitions and if section 4(3) is enforced to prohibit camping without a permit, the offender and, hopefully, the garbage problem would be removed. Section 4(3) allows the Superintendent to refuse to issue another permit (to an offender).

The Superintendent may refuse to issue a camping permit where, in his opinion, it is necessary to do so for the preservation, control or management of the Park or for the safety of the public. (National Parks Camping Regulations, Section 4(3))
One useful aspect of Section 5(2)(b) is that it allows for the prohibitions to be appended to the camping permit. This is particularly convenient in the case of backcountry campgrounds where posting of notices at trail entrances or the actual campground would be costly and less than aesthetic.

Improperly stored food is probably second only to garbage mismanagement as the single largest cause of bear incidents. In many parks where garbage has come under close scrutiny in the last decade, unattended food may now be the most important single cause of incidents (Harms 1980). The U.S. government has seen fit to enact legislation that specifies exactly how food must be stored to render it inaccessible to wildlife (page 122). Unfortunately there are no comparable regulations under the National Parks Act and Canadian bear managers can only rely on a number of indirect regulations. Section 10(c) of the Camping Regulations gives partial control at certain facilities.

No person shall leave any food, equipment or personal effects in a kitchen shelter or on a picnic table, grill, stove, barbecue or fireplace provided by the Superintendent for public use in a Park, except during such reasonable period as such facilities are required for the purpose of preparing and consuming a meal or for cleaning up immediately thereafter. (National Parks Camping Regulations, Section 10(c))

Control is obviously limited to food left in a kitchen shelter or on other public facilities. It is doubtful that the section was ever intended as a means of controlling food storage.

An argument could be made that a campsite, for which the occupant is holding a valid camping permit, is not, during the term of the permit, a public facility.
Section 4(f) of the Wildlife Regulations (page 52) which prohibits feeding or enticing wildlife to approach by setting out foodstuffs, would probably be applicable but only if one could demonstrate intent. In other words one would have to show that the accused was deliberately storing his food improperly to feed or attract bears.

Section 32(1)(c) of the General Regulations (page 61) and Sections 9 and 5(2)(b) of the Camping Regulations (pages 62-63) probably represent the best available means of controlling food storage. However, the question of what "unreasonably interferes with fauna" could be an issue in respect to section 32(1)(c).

At least one section of the Criminal Code could have an influence on bear management practices within National Parks. Section 402 prohibits cruelty to animals.

\[\text{Everyone commits an offense who (a) wilfully causes or, being the owner, wilfully permits to be caused unnecessary }\]
\[\text{pain, suffering or injury to an animal or bird, (b) by wilful neglect causes damage or injury to animals or birds while they are being driven or conveyed, (c) being the owner or the person having the custody or control of a domestic animal or bird or animal or bird wild by nature that is in captivity, abandons it in distress or wilfully neglects or fails to provide suitable and adequate food, water, shelter and care for it. (Criminal Code, Section 402(1)(a))}\]

The obvious implication of this section is that bear managers have, in addition to a moral responsibility, a very definite legal responsibility

---

13 "Unnecessary" means that one is obliged not to inflict pain, suffering or injury which is not inevitable given the circumstances of a particular case. For example, euthanasia cannot be undertaken by a means that causes pain and suffering if alternative economically feasible methods were available (R. vs Menard (1978), 43 C.C.C. (2d) 458, 4 C.R. (3d) 333 (Que. C.A.).
to trap, handle, hold in captivity, transport or destroy bears in the most humane manner available.  

Several statutes apply to the control and use of immobilizing drugs. The drug etorphine (M99) and diprenorphine (M50-50) are controlled under the Narcotic Control Act as is phencyclidine HCl (sernylan). Ketamine falls under the Food and Drug Act Schedule F Part I. Xylazine (rompun) falls under Section C.08 "new drugs" of the Food and Drug Act. Further explanation of the safety and legal implications of these commonly used immobilization drugs is given in Hebert and McFetridge (1979). Generally the user is obliged to maintain strict control over the drug by means of locked storage both in the field and office. Precise use logs must also be kept.

The Official Languages Act stipulates that all federal literature including pamphlets, signs and other information sources must be available in both official languages.

Finally the Access to Information Act implies that Parks Canada has an obligation to supply the public with complete, accurate, timely and factual information within the limitations of the Act. According to the provisions of this Act, only certain classes of bear management information may, at the discretion of the head of a government institution, be withheld

---

14 The once common practice of destroying a bear by administering an overdose of the drug Anectine would probably be illegal under this section. The drug is a muscle relaxant and does not produce sensory loss or anesthesia. The injected animal remains paralyzed but fully conscious and able to sense pain. An overdose application essentially suffocates the animal due to paralysis of the respiratory muscles (Hebert and McFetridge 1979:19). In addition the drug has been found to cause heart damage (Rogers et al. 1976)
from the public. Some important classes of information that may be withheld are (1) information associated with a legal matter such as a law enforcement investigation or lawsuit, (2) information such as the location of carrion being fed upon by a sow grizzly and cubs of the year which, if given, could reasonably be expected to threaten the lives of individuals and (3) information of a personal nature such as the name and address of a bear mauling victim. What probably cannot be withheld are routine day-to-day and year-to-year management records detailing such figures as the number of relocations, destructions, incidents, garbage problems and so forth.

CASE LAW

The possibility of legal action arising from bear/human injuries in National Parks is a very real one. Since the early 1950's a minimum of seven actions relating to maulings in U.S. National Parks have been launched under the Federal Tort Claim Act (Title 28 U.S.C.A.). Of these three were settled out of court in favour of the plaintiff; one was found in favour of the plaintiff; and two were found in favour of the defendant (i.e. the U.S. Government). (These cases are discussed below). In Canada, there have been only three actions; one (Sturdy et al. v. The Queen 1974) was found in favour of the defendant while the remaining two have yet to reach trial.15

15 One action was filed by the family of a five year old girl who was fatally mauled by a grizzly bear in Waterton Lakes National Park, 1977. This action was apparently stopped when the government chose to make an out-of-court settlement with the victim's family (Young 1983:pers.comm.). Despite numerous requests to The Department of Justice, further details could not be obtained. The third and most recent action arose from the mauling of a Swiss citizen by a grizzly in Banff National Park, 1980. At time of writing, this action has yet to be settled.
Each of these cases hinged on the question of negligence. Since the concept of negligence or more properly, the avoidance of negligence, plays or ought to play a major role in the management program, a clear understanding of the term is required. While many authoritative explanations exist (Linden 1972, Wright and Linden 1975) perhaps the most appropriate for the purposes of this discussion are those given by Kerr J. in the Sturdy case. Definitions from four authorities were quoted.

Negligence is a specific tort and in any given circumstances is the failure to exercise that care which the circumstances demand. What amounts to negligence depends on the facts of each particular case and the categories of negligence are never closed. It may consist in omitting to do something which ought to have been done either in a different manner or not at all. Where there is no duty to exercise care, negligence in the popular sense has no legal consequence. Where there is a duty to exercise care reasonable care must be taken to avoid acts or omissions which can be reasonably foreseen to be likely to cause physical injury to persons or property. The degree of care required in the particular case depends on the accompanying circumstances, and may vary according to the amount of the risk to be encountered and to the magnitude of the prospective injury. The duty of care is owed only to those persons to whom injury can reasonably be foreseen and not necessarily to all persons in the same situation. The same act or omission may accordingly in some circumstances involve liability as being negligent, although in other circumstances it will not do so. The material considerations are the absence of the care which is on the part of the defendant due to the plaintiff in the circumstances of the case and damage suffered by the plaintiff, together with a demonstrable relation of cause and effect between the two. (Halsbury's Laws of England. 3rd edition. vol. 28: 3-4)
Negligence is the omission to do something which a reasonable man, guided upon those considerations which ordinarily regulate the conduct of human affairs, would do, or doing something which a prudent and reasonable man would not do. (Salmond on Torts, 16th edition p. 197)

Accordingly the essential ingredients of actionable negligence are:
1. the existence of a duty to take care owing to the complainant by the defendant;
2. failure to attain that standard of care prescribed by the law;
3. damage suffered by the complainant, which is causally connected with the breach of duty to take care. (Charlesworth on Negligence, 5th edition, p. 13-14)

Negligence is conduct falling below the standard established for the protection of others against unreasonable risk of harm. This standard of conduct is ordinarily measured by what the reasonable man of ordinary prudence would do in the circumstances. (Fleming's The Law of Torts, 4th edition, p.106)

The concept of the "reasonable" man should be explained more fully at this point. If a malpractice negligence action is lodged against a brain surgeon the court can only judge the reasonableness of his practice against what another reasonable brain surgeon would do in a similar situation. He is not judged against what another reasonable layperson would do. Accordingly, if a negligent action involving the mismanagement of bears was lodged against a park warden, the reasonableness of his management practice would be judged against what another reasonable park warden would do in a similar situation. Therefore a park warden whose duties involve the
management of bears must know far more about bears than the average visitor. Furthermore the warden's management decisions must reflect that higher level of knowledge (Elder: 1983 pers.comm.).

The Crown Liability Act governs all negligence actions brought against the federal government. Under this statute the government can be held liable for damages as a normal private citizen. Two courses of action are provided (Hunt 1979:41).

- Section 3(1)(a) permits recovery where a wrongful act (tort) is committed by a Crown servant.
- Section 3(1)(b) permits recovery where the Crown has breached its duty arising from the ownership, occupation, possession, or control of property.

Actions falling under the first section are fairly straight-forward (Hunt 1979:41) The plaintiff must show that a duty, owed to him by a government employee, was breached and that his injuries resulted from that breach of duty.

Application of the second section (under which most actions would fall) known as occupier's liability, is far more complicated. In fact, according to Harris (1972), occupier's liability is "one of the most confused areas of Canadian negligence law". As a result many provinces have passed reform legislation to clear up ambiguities. For example, Alberta's Occupier's Liability Act and British Columbia's Occupier's Liability Act attempt to spell out the legal duties of property owners and means by which liability may be limited. Unfortunately the reform legislation does not simplify matters in respect to claims against the federal government since it is doubtful as to whether provincial legislation would prevail in such a case. Further, although the
federal government may voluntarily submit to provincial reform legislation, it is not clear as to whether it may choose to have its liability decided by common law principles (Hunt 1979). As a result, bear managers in Canadian Parks cannot be certain as to which statutes apply to questions of liability.

Notwithstanding these ambiguities, a reasonably clear picture of negligence can be developed if one focuses on those issues which a court might consider when attempting to establish negligence in an occupier's liability case. Namely:

- Was there an unusual danger?
- Was the unusual danger reasonable foreseeable by the defendant?
- Was a duty owed by the defendant to take reasonable care to prevent harm to the plaintiff from the danger?
- Was this duty breached?
- Was the injury a direct result of the breach of duty?
- Did the plaintiff take reasonable care to avoid the danger?

These were the issues considered by Kerr J., in the only bear/human injury case from Canadian National Parks to reach the courts. In Sturdy et al. v. The Queen 1974 a summer employee of a concessionaire was severely mauled by a grizzly. The young man had been walking near a Park operated dump\(^\text{16}\) in the Maligne Lake area of Jasper National Park when a grizzly attacked him just after nightfall.

Since National Parks are 'dedicated to the people of Canada for their

\(^{16}\) Open dumps were common in all Canadian National Parks at the time of the incident (1965).
benefit, education and enjoyment' (National Parks Act, Section 4) and since the Crown was the owner of the Park, the Court classified Sturdy as an "invitee" and the Crown as an "occupier". It followed that an "occupier" owes a duty to an "invitee" as set out in the often cited clause from Indermaur v. Dames (1866).

"Unusual danger" was defined as follows:

I think "unusual" is used in an objective sense and means such danger as is not usually found in carrying out the task or fulfilling the function which the invitee has in hand, though what is unusual will, of course, vary with the reasons for which the invitee enters the premises.

(Kerr J., went on to indicate that the degree of care to be taken must be a factor of both the likelihood of injury occurring and the magnitude of the injury. Further, although compliance with common practice is evidence that reasonable care has been used, it is not conclusive. Similarly, the fact that few or no incidents occurred under a given standard of care also indicates application of proper care but is also not conclusive.

"Unusual danger" was defined as follows:

17 Hunt (1979:43) points out that a visitor might be classified as a trespasser if he were injured in a closed area. The occupier's duty to a trespasser is simply not to wilfully injure him or to act with reckless disregard for his presence. Naturally a more onerous duty would apply if the trespasser was a child.
Accordingly the Court held that although the park warden knew there were bears in the general area of Maligne Lake, the use of warning pamphlets and signs served to give the public adequate notice of this danger and therefore a reasonable standard of care had been applied. Sturdy was well aware that bears frequented the Maligne Lake area and that these animals could be dangerous. Not only had he seen the warning signs posted along the highway but he had also read and handed out pamphlets warning of bears. Since there was no evidence to indicate that any bear attacks had taken place in the area prior to the incident or that any bear was habitually frequenting the dump prior to the incident, an unusual danger could not be established. Sturdy's claim was therefore dismissed.

The principles and application of U.S. negligence law seem to be almost identical to that found in Canada. As indicated in the following cases the occupier or owner is under a duty to warn (or protect) "invitees" of hidden dangers that are known or ought to be known by the occupier or owner.

The earliest case on record stems from a grizzly mauling in Yellowstone (Claypool v. United States 1951). On July 13, 1948 the plaintiff and his family entered the Park and were given a brochure containing the traditional warning against feeding bears. After asking a Park Ranger whether it was safe to sleep outside in a tent and being told that it was, the plaintiff and family slept outside on July 13th in Old Faithful Campground. After visiting other areas of the park, the plaintiff returned to Old Faithful Campground where his wife asked a different Park Ranger (in
plaintiff's presence) as to whether it was safe to sleep out in a tent. The Ranger replied that hundreds of people slept out every night and "they had never seen anyone attacked without provocation". Further, he replied that bears would not bother them unless the campers had food. Having no food in either his vehicle or tent the plaintiff and family retired. During the night, a bear entered the tent and seriously mauled the plaintiff.

On July 13, just prior to the plaintiff's entry into the park, several campers at Old Faithful had been mauled by an unidentified bear or bears. Although Rangers killed a small grizzly shortly after the incidents they could not be certain it was the bear in question. It was clear that the Rangers with whom the Plaintiff and his wife had discussed the question of safety were aware of those previous attacks.

The Court found that the Government was under a duty to warn the plaintiff, especially after the previous maulings as to the safety of sleeping outside. In this case, the risk of attack was concealed negligence. Furthermore the Rangers were unjustified in assuming the correct bear had been shot and that they had failed to inform the plaintiff of the true facts. The court held that the minimum duty owed to the plaintiff was "an honest disclosure of the known danger" so that "an opportunity for an intelligent choice" could be made as to whether he wished to assume any risk. Therefore the court held that the plaintiff suffered injury caused by the negligent omission of the Rangers while acting within the scope of their duties.

Closely paralleling the Claypool case is that of Parratt v. United States 1966. A seasonal Ranger permitted his young son to accompany two
off-duty Rangers on a hike within Glacier National Park, Montana. While hiking, the party spotted a female grizzly and her cubs about 50 yards ahead on the trail. The Rangers quickly advised everyone to scatter and climb a tree. However, before the boy could climb to safety the bear caught and mauled him severely (Gottlieb and Gantt 1967).

Both Rangers knew that an unidentified bear had inflicted minor injuries on an adult visitor in the same area eight days earlier and that the offending bear had not been caught. It was later determined that the Superintendent had not closed the trail after the first mauling simply because the victim had suggested that it was not necessary. These facts convinced the Assistant United States Attorney that the Government would be found liable and therefore a $100,000.00 out of court settlement was struck.18

The salient fact is that the Rangers knew of an unusual danger in the area but failed to publicize this danger or to take reasonable measures to prevent additional incidents.

In another case (Esling v. United States 1957) a woman was seriously mauled when her husband stopped their vehicle to photograph a black bear in Yellowstone National Park. Unknown to the victim the bear circled the vehicle and suddenly poked its head through the open window and bit the woman on the shoulder. Even though the plaintiffs had received literature

18 Gottlieb and Gantt (1967:115) surmise that given the severity of injuries sustained by the young boy an award in the vicinity of $250,000 would have been made had the case gone to court and the Government been found liable.
when they had entered the Park warning of the dangers associated with
bears, they argued that neither this literature nor any of the bear warn­
ings posted on bulletin boards throughout the Park made reference to the
fact that they should close their vehicle windows when bears approached.

The Government raised the defense of contributory negligence due to
the failure of the plaintiffs to close their windows as the bear approached
and on this basis a settlement offer of $5,000 was rejected by the Justice
Department. Further investigations revealed, however, that the offending
bear had been involved in several other minor attacks and that this fact
was known to Park managers. In view of the factual similarity between this
case and the Claypool case, the Government chose to settle out of court for
the sum of $4,000 (Gottlieb and Gantt 1967:65).

In another almost identical case (Ashley v. United States 1963) the
plaintiff's arm was severely bitten by a roadside bear. The wife of the
plaintiff had been driving along a Yellowstone road when she stopped to
watch several roadside bears. Ashley had fallen asleep in the passenger
seat with his right elbow on the open window sill. He awoke to find a bear
biting his right elbow.

Ashley claimed that the warning literature that he had received upon
entering the Park and which he had read prior to the incident failed to
inform visitors to roll up their windows when bears approached. The court
held that such a warning was not necessary to a mature individual. It
further held that the plaintiff was, under Wyoming law, an invitee and as
such the Government had an obligation to "use ordinary and reasonable care
to keep the premises reasonably safe for the plaintiff and to warn him of
any hidden danger" (Gottlieb and Gantt 1967:73). The court found this obligation had been fulfilled by posting warning signs and issuing general warning literature about bears. Since the bear had no prior record of attacks, a foreseeable or hidden danger could not be shown and the case was dismissed.

In Rubenstein v. United States (1972) the plaintiff, his son and a friend of the son camped out in a well-used public campground within Yellowstone National Park. At about 1:00 a.m., a grizzly bear entered the tent where the plaintiff was sleeping. Naturally, when he awoke to find the bear in the tent the plaintiff was extremely startled (to say the least) and tried to flee. During the attempted escape the grizzly severely mauled Rubenstein's legs.

The court dismissed Rubenstein's claim on the ground that he had received adequate warning as to the general dangerous propensities of bears via pamphlets and signs and that Park Rangers could not have reasonably foreseen the incident.

Warnings as to known physical dangers such as those in the various thermal areas are, of course required. But warnings as to unanticipated earthquakes, lava flows, landslides should not be. So too, while reasonable control of animals such as that currently practised, and warnings to currently known presence of attack-minded animals are also required, the law imposes no duty on park authorities to warn about completely unforeseeable actions of wild animals such as indicated in this case. (Rubenstein v. United States, 1972)

The argument could be raised here that once an unforeseeable incident of this nature had occurred the Rangers might reasonably have foreseen it happening again (Elder 1983:pers.comm.). In other words, the culprit bear had become conditioned to humans and human food and had developed rather
aggressive tactics. Since the bear was still at large there was a good chance that it would cause further injuries. Unfortunately the court did not address this question.

In Williams v. United States (1962) a manager of a concession in Glacier National Park (Montana) informed his newly hired employee, Joe Williams, that there was more danger from Indians than bears and that he should simply sit still and do nothing if a bear approached him. On the second day of his employment, Williams, despite following his employer's advice, was approached and severely mauled by a grizzly.

The Government was found liable for two reasons. First, since the Park Superintendent had authorized and expected both employees and managers of the concessionaire to issue bear related information to visitors, the Government was held liable for the quality of that information despite the fact that the concessionaire manager was an employee of Glacier Park Co., an independent contractor to the Government. Hence the Government was found liable for the manager's negligent advice to Williams.19 Second, the bear warning pamphlet and posters which Williams received as he entered the park, were found to be misleading in that the wording led one to believe that bears were only dangerous if one attempted to feed or molest them.

A settlement totalling $108,051.20 was made to the plaintiff for injuries sustained and health care arising out the injuries (Gottlieb and Gantt 1967:118).

19 Gottlieb and Gantt (1967:76) describe this decision as a "substantial legal hiatus" and refers to an analogous case where liability was fixed to the concessionaire owner.
Probably no other negligence action involving bears received as much publicity and interest as that of Martin v. United States (1975 and 1976). In June 1972 a young man, Harry E. Walker, was attacked and fatally mauled by a grizzly bear in Yellowstone National Park. A U.S. District Court of California held that the government was negligent in failing to provide adequate warnings concerning the dangers of grizzlies and in abruptly closing garbage dumps where grizzlies had become accustomed to feeding. A judgment totalling $87,417.67 was awarded to the decedent's family (Martin v. United States 1975). The case was subsequently brought before the U.S. Court of Appeals which reversed judgement due to clearly erroneous findings of fact, contributory negligence on the part of the decedent, and provisions pursuant to the Federal Torts Claims Act which, under the circumstances of the case, rendered the government exempt from liability (Martin v. United States 1976). The following is a brief account of the Appeal Court's findings.

Walker and a friend, Bradberry, had been driven into Yellowstone by Searer, an employee of a Park concessionaire. Searer's car had a park sticker on it and was therefore waved through the Park entrance gate. As a result Walker and Bradberry did not receive the bear warning literature normally dispensed to park visitors. A large sign at the entrance warned against illegal camping. Searer testified that Walker and Bradberry had asked if they needed a permit to camp and that she had told them they did and that the permit could be picked up at the Ranger Station. They refused to go to the Ranger Station and asked Searer to recommend a good place to camp. Again she told them to get a permit at the Ranger Station. Walker and Bradberry left Searer near the Old Faithful Inn and hiked into the Old
Faithful Geyser area and illegally pitched camp. The two men camped in the same site for 2 nights. Searer visited them on the first night and told them they would "catch hell" if caught at the illegal campsite. The next day the two men cooked dinner and left a pot of food tied in a tree before leaving the campsite for a trip to Searer's dorm. While returning to their camp at midnight, Walker was attacked and killed by a grizzly. The next day grizzly No. 1792 was trapped and shot at the campsite.

Testimony from the Walker case included the controversy surrounding the abrupt closure of open garbage dumps in 1970 and 1971. Records indicated that while all parties agreed the dumps had to be closed, there was no consensus as to how they should be closed. Two researchers (the Craig-heads) argued that the dumps should be slowly phased out and that supplemental feeding in the form of carrion should be given to bears during the phase out period. They argued that abrupt closure would change well-established feeding and movement patterns of bears and would result in bears entering campgrounds to search for human food. The Park Service argued that a phasing out program would only prolong the bear problem by fostering a new generation of garbage habituated bears. The National Sciences Advisory Committee had submitted a report which stated there was no clear data upon which to base closure methods and that a final decision was dependent on judgement. In 1970 and 1971 all garbage dumps were abruptly closed down.

The Appeal Court held that the decision to make the abrupt closures was a policy judgement made at the planning level. According to provisions of the Federal Tort Claims Act a judgement or policy made at the planning level involves "discretionary function" which can not be held as the basis
of negligence so long as the discretion is "exercised reasonably, after investigation, consultation and reports by qualified experts."

Dr. Frank Craighead had also argued that the Park was negligent in releasing bear No. 1792 (2 years prior to the mauling) at a distance of only 18 miles from the point of the mauling. Craighead stated that No. 1792 had probably been involved in a campsite destruction at an area referred to as the Fire Hole Camp and that the same bear had been seen in the Old Faithful area the week prior to the Fire Hole Camp incident. Craighead argued that a bear transplanted a distance less than 50 miles from its point of capture will soon return to the point of capture. However, Dr. Leopold testified that No. 1792 had been successfully transplanted since it did not reappear until 2 years after the transplant and that there was no evidence to say that No. 1792 had been involved in the Fire Hole incident. He also stated that 18 miles was a sufficient transplant distance given that the action took place in late fall when the campgrounds were empty and bears were about to hibernate. Dr. Arthur Pearson also testified that transplanting grizzly bears often has a negative impact on the animal such that it does not return to its point of capture. He stated that "each translocation must be judged on its own merits as to whether it is successful." Pearson supported Leopold's claim that No. 1792 had been successfully transplanted and that the bear was in her normal (natural) habitat at the time of the fatal mauling.

The Court of Appeal also found that Walker and Bradberry had knowingly camped illegally and had avoided receiving information about bears. "We find there is no credible evidence to support the trial judge's find-
ings that the Park Service wilfully failed to warn the decedent of a dangerous condition. Instead, the trial court could well have found that the decedent wilfully disregarded the warnings he was given." Accordingly, Walker was found to have been contributorily negligent and therefore would be barred from recovery.

Further the Court found that the Park had made reasonable efforts to dispense information about bears and that the Park could not be expected to seek out all individuals who, like Walker, had entered the park without paying and without receiving warning pamphlets.

LEGAL OPINIONS

Two legal opinions concerning bear management in Canadian National Parks have been issued by the Federal Department of Justice. Both opinions are concerned with the law of negligence. The first opinion stems from a letter of inquiry by the Director of Western Region (Robinson 1973). The letter poses three situations and asks the legal implications of each.

- An attack occurs on a non-posted trail although nearby trails are posted with warning signs.
- A bear injury occurs in a campground where there is daily garbage pick-up and an information program on bear problems.

In January 1982, I mailed two letters requesting legal opinions on a wide variety of bear management related issues to a Mr. John Young, a lawyer employed by the Legal Services section of the Department of Justice, Ottawa. Mr. Young's duties include giving legal advice to Parks Canada. Despite Mr. Young's initial verbal agreement to assist in this project and despite approximately 12 phone calls, in which I requested a response to my two letters, no reply has been received.
While feeding a bear along a highway a person is injured by the bear. Signs and pamphlets had been issued warning not to feed bears.

In response to the first situation the Department of Justice advised that "if a hiker entered a trail with a bear warning posted on it and from that trail, entered another trail without a bear warning, he would nevertheless have no remedy because he had been previously warned." (Toews 1974). The Department suggested erecting warning signs on as many trails as possible, especially those trails where visitors originate their walks.

The second and third situation questions were answered as one. The Department advised that a public information program on the danger of bears along with warning signs posted in the vicinity of and at the entrance to campgrounds fulfills the Crown's duty to warn of the danger.

The question of liability arising from the practice of tagging bears gave rise to the second legal opinion. The Director of National Parks asked if the act of tagging a bear implied ownership and if so what were the legal implications (Kun 1979). The Department of Justice replied that since the purpose of tagging was not to assume physical control of the animal (as in the case of zoo animals) but rather merely to identify the animal for future action, and since the released animal was free to go where it wished, absolute property in the animal did not exist. However, prior to its release, a captured bear would be considered as qualified property and in this case the Crown would be under a clear duty to prevent

21 This response does not fully answer the question. The implied question is how widely must warnings be posted given a specific danger in a certain location, and given the propensity of bears to range over a wide area.
danger from the animal (Cullinan 1979). Obviously, this opinion has many implications not only for trap design but also trapping and handling procedures.

What are the implications of negligence law to bear management practitioners? Some generalities may be useful at this point.

• First: it appears likely that all visitors would be classified as "invitees" and the government as the "occupier" (Toews 1974). From this classification it is highly probable that the occupier would be under a duty to use reasonable care to prevent damage (to the invitee) from unusual danger which is known or ought to be known (by the occupier).

• Second: managers must identify those circumstances, whether existing or anticipated, which represent unusual danger to the visitor. In determining these circumstances it is imperative that managers take into account the general skill and knowledge of the average visitor. Generally, unusual dangers may arise from one of the following broad categories: improper food/garbage storage; improper trail alignment or facility placement; release of known aggressive animals; dispersal of inaccurate, incomplete, false, misleading or out-of-date information; inappropriate visitor use of critical "defendable" habitat; encounters with more aggressive species, family groups or age/sex classes; improper carrion management; escalation of nuisance problems; improper use of traps, drugs and other equipment, and failure to take appropriate enforcement action.

• Third: a "reasonable" set of management actions must be implemented to prevent these unusual dangers from damaging visitors. While top notch public information systems

---

22 Few if any of the culvert traps currently used by Parks Canada are designed to prevent human access into a 'sprung' trap. Several traps used by Lake Louise, Yoho and Kootenay are equipped with an automatic locking device designed to prevent non-authorized persons from opening a sprung trap door. Kootenay's design appears most advanced.

23 Leg hold snares have been used frequently in the last 5-6 years. Because of the obvious hazard inherent with this style of capture, very stringent procedures must be followed. The same caveat applies to free ranging immobilizations especially those performed in campgrounds.
undoubtedly will be the main preventative measure, several other 'tools' are readily available; these include: activity or area use restrictions, temporary or seasonal closure of areas, posting of specific warnings, prompt removal of nuisance bears and destruction of overly aggressive animals; strict enforcement of applicable regulations; an efficient monitoring system and routine inspections and patrols.

B. POLICY BACKGROUND

In addition to the legal duties imposed by the statutes and case law described above, there also exists a certain duty to implement, or at least consider, a number of policy documents when designing the management program. The following section discusses the role of Parks Canada Policy and Management Directives on bear management programs. Also, mentioned briefly, is the possible influence of a yet to be released management review conducted in Banff following the triple mauling of 1983.

National Parks Policy

While Parks Canada Policy (Parks Canada 1979c) does not carry the enforceable weight of a statute, it does however, represent an official public statement describing, in broad terms, the manner in which National Parks are to be managed. To be specific the Policy offers,

... guidance for planning and managing each park. (It) also provide[s] the framework for the development of more detailed policies which will guide the day-to-day efforts of Parks Canada personnel. Thus the broad policies contained in this document will be further elaborated through strategic policies in a number of key areas as required. (Parks Canada 1979c:12)

The Policy clearly establishes protection of natural resources as the first priority of Parks Canada.
Ecological and historical integrity are Parks Canada's first considerations and must be regarded as prerequisites to use. (Parks Canada 1979c:12)

This is an important statement for it prioritizes the dual purpose (use and preservation) of parks. Clearly, preservation is to take precedence over use. All too often management actions have been directed at removal of nuisance bears rather than more politically sensitive techniques such as visitor restrictions or area closures even though these techniques are sanctioned.

Parks Canada will regulate the amount, kind, time and location of outdoor recreation activities using the zoning plan and other management actions to protect park resources or to ensure visitor safety and enjoyment. (Parks Canada 1979c:43)

All management plans must be subjected to the Federal Environmental Assessment and Review Process (E.A.R.P.) and all documents related to the process must be available to the public (Parks Canada 1979c:42).

The Policy provides for 'accurate information' dispersal concerning management programs, regulations and facilities. The dispersal system must go beyond park boundaries to educational institutions, public associations, and those providing visitor services within the parks (Parks Canada 1979c:43). Information dispersal regarding bears and their management has traditionally taken place only at the park level. Certainly a dispersal system extending into cities where most visitors originate will contact a broader range of users.

The Policy contains a very positive approach to research. Research is considered "essential at all stages in the establishment, development and management of the national parks system." (Parks Canada 1979c:45)

Parks Canada will encourage and conduct research into natural phenomena, public needs, visitor use and impacts
so as to contribute directly to the identification, selection, establishment, protection, development, interpretation, planning, and managing of national parks. (Parks Canada 1979c:45)

All research information must be made available to the public (Parks Canada 1979c:45).

Provisions are also included which could lead to a regional ecosystem approach to bear management.

Parks Canada will co-operate with other levels of government, private organizations and individuals responsible for the planning of areas adjacent to national parks and for the provision of facilities and services in adjacent communities to ensure that national parks are integrated in a positive manner with their surrounding regions. (Parks Canada 1979c:46)

Parks Canada will develop co-operative arrangements with organizations and individuals to promote public appreciation and enjoyment of national parks and to encourage their protection. (Parks Canada 1979c:43)

Although this policy has commonly been applied to socio-economic matters, there is no reason that it could not be more broadly interpreted to apply to the management of bears on an ecosystem basis.

NATIONAL DIRECTIVES

Directives from various levels of Parks Canada administration constitute another source of input for management programs. Although they do not possess the enforceable weight of a statute, they are nevertheless, an enforceable order that employees are bound, with few exceptions, to follow. Section 106 of the Public Service Terms and Conditions of Employment Regulations of the Public Service Employment Act authorizes the Deputy Minister to establish standards of discipline. These standards are set out
in the Code of Ethics (Indian and Northern Affairs undated: 6) which require the employee to "follow instructions attentively and co-operate with his supervisor." Failure to do so may result in a range of disciplinary actions.

One can only speculate as to how a court, in the event of a negligence action, would view a management program that was inconsistent with orders from senior management. Quite likely the "respondeat superior" law of agency would hold the employer liable unless the employee was acting beyond the scope of his prescribed duties. In addition superiors may be held negligent if they ask their subordinates to take action in contravention of some higher authority about which they know or should have known (Elder 1983:pers.comm.).

There are at least 15 documents, referred to as Management Directives, issued by the Deputy Minister that could be interpreted as having a significant influence on bear management on a national basis.

Management Directive PRM 40-6 Natural Resource Management Process (Parks Canada 1980) is a key resource management document which sets out the following series of suggestions for the content and format of all resource management plans (Parks Canada 1980: 7.4). Strict content or format guidelines are expressly avoided presumably to allow for creative management approaches that fit the contingencies of individual parks. The suggested content for resource management plans is as follows.

- Definition of the resource problem
- Objectives of the resource management plan
- A summary of background information including
  - the resource problem
  - bio-geographic and historical setting
  - policy, legislative and other constraints
• park management objectives
• source documents

• Identification of all alternate causes of action
• Rationale used in selecting the preferred course of action
• Methodologies to be used
• Time and frequency of management actions
• Persons responsible for various management actions
• A time action schedule for fiscal and person-year resources
• Identification of knowledge gaps and a statement of acquisition priority
• Identification of decision points in the plan, the decision makers and decision making guidelines
• Identification of methods to evaluate the effectiveness of the plan.

Bear Management in National Parks (Parks Canada 1978d) is the only national directive pertaining specifically to bear management. Hence, a more detailed examination of the document is warranted. Although the directive was issued about 6 years ago, it still provides sound advice. The following are some of the more salient guidelines.

• Bear management plans should be drawn up and contain information on research requirements, monitoring, incident procedures, facilities slated for phase out or relocation, facilities or procedures in need of upgrading, training requirements, individual responsibilities, and fiscal/person-year/time requirements.

• Annual bear management reviews including a summary of all bear management activities, and an evaluation of the management program should be documented.

• Information programs will attempt to educate the public in acceptance of bears as an inherent aspect of the wilderness experience.
90.

- Information programs should stress precautionary measures to avoid conflicts along with evasive tactics when an encounter occurs.

- Information programs should place emphasis on personal contacts with backcountry users to convey current information on seasonal distribution patterns.24

- Attractants which alter the natural distribution of bears are to be removed where possible.

- All garbage storage and disposal areas should be bear proof. Where feasible, garbage should be disposed of outside the park.

- In backcountry areas management actions are to be directed at control of human activities.

- Campgrounds and other facilities with a history of bear incidents should not be expanded. Facility relocation is to be considered.

- Restricted access to and activity in certain areas is sanctioned to prevent bear/human conflict.

- Trails or campsites should be closed following a bear/human incident or if the area is frequented by a sow grizzly with cubs. Areas will be re-opened when the Superintendent decides it is safe to do so.

- All environmental impact studies should assess the impact of proposed development on bear populations.

- Relocation of nuisance bears should only be considered as a short term measure.

- A bear should be destroyed only if there is an immediate threat to human life, or the bear is seriously ill/injured,25 or the bear's presence creates a potential human threat and alternative measures have failed or are not feasible. Where possible conflicts involving bears will be resolved without destruction of the bear.

---

24 In most instances there is insufficient biological data for this to be accomplished.

25 Destruction of a seriously ill or injured bear may be illegal. See footnote number 5, page 52.
Employees of the park and concessionaires should be made aware of management objectives, the content of the information program and reporting procedures for problem bears.

The directive entitled Control of Animals Deemed Dangerous to Human Safety (Parks Canada 1971b) outlines the procedures to be followed for control of naturally and unnaturally dangerous animals. "Naturally" dangerous animals are defined as those animals which pose a human danger when, for a variety of "natural" reasons, exhibit a defensive reaction while in their native environment; for example, a grizzly sow may react dangerously if a visitor comes between the sow and her cubs. Management of this class of animal is to be limited to ensuring that the visitor is made aware of the danger and the reason for that danger.26

An "unnaturally dangerous" animal is one which poses a hazard due to its physical condition (disease, injury, disability), its presence in high visitor use areas, or atypical behaviour which poses a definite threat to humans. Management of this class of animals may involve relocation or destruction.

The Immobilizing Equipment and Drugs (Parks Canada 1975c) directive outlines the conditions under which wildlife may be immobilized. Of parti-

26 Does this preclude the use of other measures such as area closures?
cular interest is the emphatic restriction that only "personnel qualified by special training in the use and proper handling and transportation of immobilized animals, as well as special first aid training" may use immobilizing drugs and equipment. Even further, qualified individuals must be authorized as such by the Regional Director. At present there is no authorization process in place.

Cooperative Activities (Parks Canada 1981b) outlines the department's policy on development of co-operative agreements with outside organizations and sets out procedural steps to realize the agreements. Generally Parks Canada recognizes the importance of such agreements and is willing to play a lead role in their development. There is no doubt the agreements pertaining to bear management are sanctioned under this directive.

Communications with the Public Through the Media (Parks Canada 1983f) is a rather important directive that reaffirms the public's right to high quality information. Information supplied to the public can only be limited as per the Access to Information Act and Privacy Act. Procedural steps for media releases are also outlined.

The Management Directive entitled Access to Information Act and the Privacy Act (Parks Canada 1983c) is based on two acts which were passed in the summer of 1983. Essentially the directive reaffirms the principles laid down in the Acts and outlines their applicability to Parks Canada. Federal employees have an obligation to supply the public with complete, accurate, timely and factual information within the limitations of the
Acts. With the exception of those 3 classes of information mentioned previously (page 67), there is no bear related information that can legally be withheld from the public. For all intents and purposes, routine bear management files are open to public scrutiny. This places increased onus on managers to compile complete and accurate records and to store these records in a manner that they can be readily accessed.

Environmental Assessment and Review in Parks Canada (Parks Canada 1981a) details the practice to be followed in applying the Environment Assessment and Review Process (EARP). In relation to bears any activity or facility development that may have a deleterious affect on bears or bear habitat must be subjected to EARP.

Pack In - Pack Out - Litter Control (Parks Canada 1975a) establishes the pack in - pack out policy for waste management in backcountry areas. In addition, bear-proof garbage receptacles are suggested for all backcountry trailheads. Public education concerning the use of appropriate backcountry food is also suggested.

Bilingualism - Parks Canada Service to the Travelling Public (Parks Canada 1975b) reaffirms principles laid down in the Official Languages Act. Essentially, every effort is to be made to make all forms of communication with the public bilingual.

Public Safety and Search and Rescue Procedures in National Parks (Parks Canada 1978c) outlines standards for training, equipment maintenance, reporting, evaluations and agreements with outside agencies. Although this directive is commonly thought of in relation to water or mountain rescue work, it would apply equally to any form of emergency response involving bears.
Directive on Humane Trapping (Parks Canada 1983g) stipulates that only footsnares can be used to trap bears.27

Reporting of Serious Accidents Involving the Public (1983b) states that all fatalities or serious injuries involving visitors are to be reported immediately to the Regional Director.

Issuance of Permits to Collect Specimens (Parks Canada 1974a) outlines the conditions under which specimens may be collected in a national park.

Disposal of Surplus Animals (Bison Excluded) (Parks Canada 1983e) outlines a priority list for the distribution of surplus animals. This directive would apply when bear managers are attempting to locate an institution or agency to accept a bear that otherwise would be destroyed for management reasons. It might also apply to the disposal of bear carcasses.

REGIONAL DIRECTIVES

Some regional offices have given further direction to management in their regions through the use of regional directives. In Western Region, three such directives apply. Western Regional Directive, Number 43, Use of Firearms, (Parks Canada 1978b) stipulates the conditions under which firearms may be used by park wardens. Of particular importance is the order that wardens must be trained in the safe use and care of firearms. Western Regional Directive Number 46, You Are in Bear Country (Parks Canada

27 The author can only believe that a mistake has been made. Clarification has been requested.
1983i) orders that the information pamphlet, You Are in Bear Country must accompany the purchase of every motor vehicle licence sold at gateways. All visitors registering at campgrounds, acquiring a backcountry use permit or enquiring about hiking or picnicking should be offered this pamphlet. Finally, Western Region Directive, Number 48, Bear Management in National Parks (Parks Canada 1983d) supports and further refines the direction given by the national directive, Bear Management in National Parks (Parks Canada 1978d). Essentially the regional directive attempts to promote consistency throughout the region by requiring each park to produce a bear management plan which follows given skeleton criteria in regard to public information, garbage management, control actions, closures warnings, monitoring, responsibility assignments and injury/mauling reviews.

Special note should be made of Prairie Region's recent bear management directive, Sub-activity Involvement in Bear Management Planning and Implementation (Parks Canada 1983h). The document sets out a very logical and a very practical approach to bear management in that it recognizes that "active and ongoing participation of sub-activities in bear management is the only effective solution to achieving Parks Canada's mandate." Each sub-activity is therefore directed to prepare and implement applicable portions of the bear management plan. Other important clauses provide for: (1) the inclusion of bear management requirements in the park work plan and multi-year operational plan; (2) review and updating of the plan at 5 year intervals; and (3) formation of a Bear Management Working Group (comprised of representatives from each park) which functions to co-ordinate bear management on a regional basis.
MANAGEMENT REVIEWS

Following the quadruple mauling incident in Banff, 1980, the Park Superintendent convened a review team consisting of two out-of-park bear experts, the Chief Park Warden, General Works Manager, and the Superintendent. The team produced a document entitled Report of the Superintendent's Review Team on the Bear Mauling Incidents (Westhaver and Williams 1980). The Superintendent of Banff has refused to release this document for public consumption pending settlement of the lawsuit launched against the Government by one of the mauling victims. There is little doubt that such a report, once released, will have many implications for future management.

C. CONVENTIONAL PRACTICE

NORTH AMERICAN BEAR MANAGEMENT PLANS

Bear management plans were requested from a total of 51 separate organizations (Table 6). These included all Canadian National Parks supporting bear populations, major provincial parks, selected U.S. national parks and areas, and one European national park. The Canadian parks and one European park were selected on the basis of the author's personal experience. U.S. organizations selected were those areas whose bear management programs were reviewed by Martinka (1976) and Harms (1979). A total of 48 organizations responded. Thirty-four organizations supplied

28 Dr. Stephen Herrero of The University of Calgary and Mr. Jack Nolan of the Alberta Environmental Centre.
their most current plan. An additional 14 organizations which did not have plans per se, forwarded letters and other material explaining their management program. Bear management plans were received from 17 Canadian National Parks, 13 U.S. National Parks, and 4 other organizations. Explanatory material was received from 4 Canadian National Parks, 7 Canadian Provincial Parks and 3 other organizations.

All plans and material were carefully reviewed for unique approaches or innovative techniques. Programs at five national parks where bear management has been most intense appeared to be exemplary. The programs at each of these parks were explored in detail through field trips, interviews with key personnel and literature review.

The following lengthy section discusses the bear management program of Yellowstone, Yosemite, Glacier (Montana), Jasper and Banff National Parks. The bears in these parks have probably received more attention than bears in all other national parks combined. With the exception of Yosemite, all five parks have experienced grizzly inflicted human fatalities in addition to many other serious maulings some of which were accompanied by negligence litigation. This, coupled with the inherent precariousness of their grizzly populations, and the U.S. classification of the grizzly as a threatened species under the Endangered Species Act 1974 (P.O. 93-205) has led to rigorous management programs supported by detailed research projects. In Yosemite the number of black bear incidents, which annually range into the thousands, has also necessitated intensive management and research. No doubt a great deal can be learned from both the successful and not so successful management approaches taken by these five parks.

For the sake of clarity each program is discussed under the headings of the 15 essential elements which are developed later in section D.
YELLOWSTONE NATIONAL PARK

The world's first National Park, Yellowstone, was established in 1872. Situated in the northwest corner of Wyoming, the Park encompasses an area of 7,680 km² and when added to adjacent land comprises an area of 71,680 km² known as the Yellowstone Ecosystem. In the recent past, the Park population of about 200 grizzlies (Knight et al. 1982) and 650 black bears (Cole 1976) mixed with annual visitation of over 2.0 million have resulted in numerous damage incidents, human injuries, one fatality and several liability suits. Since the late 1960's the bear/human problem has been the subject of intensive study and management.

The Yellowstone bear population had a long history of easy access to human foods. During the 1920's and 30's bears were fed by park officials in an attempt to lure tourists to the Park. As many as 70 grizzlies could be seen in one night at the (garbage) feeding grounds (Schullery 1980:69). Even after the feeding programs had been stopped (mid 1930's) inadequate food and garbage storage facilities perpetuated a population of 'hooked' bears. As late as 1969 an estimated 98-132 grizzly bears were concentrated around the Trout Creek dump area (Cole 1971:860). While human injuries by grizzlies averaged one or less per year between 1930-60, injury figures suddenly climbed to an average of 4 per year in the 1960's. Access to human food was determined to be the basic cause of 95% of all bear inflicted injuries (Cole and Meagher 1979).

In 1970 the Park introduced a bear management program consisting of: (1) bear proof garbage management, (2) public education and (3) control of

Program Objectives

On the recommendation of the Natural Sciences Advisory Committee an intensive bear management program was initiated in 1970 (Cole 1976:1). The dual objectives of the program were:

- to maintain the grizzly and black bear population under natural conditions and
- reduce human injuries.

Three hypotheses were proposed to evaluate the program (Cole 1976:4). The management program would:

- Reduce bear injuries to humans in developed areas from previous levels.
- Restore more natural conditions as evidenced by bears occurring in spaced distributions on natural foods in summer and declines in the number of bears visiting developed areas or being controlled.
- Not prevent the park's grizzly and black bear populations from maintaining or re-establishing their numbers at natural carrying capacities.

Data presented by Meagher and Phillips (1980) illustrates the program's success. The average annual number of grizzly inflicted human injuries in developed areas decreased by 900% from the 1960's to the 1970's. Similarly the average annual number of black bear inflicted human injuries in developed areas decreased by 1150% (Table 7). Observations of grizzlies in developed areas declined from 178 in 1970 to 3 in 1979. Black bear observations in developed areas declined from 57 to 13. Backcountry
Table 7. Annual average number of human injuries inflicted by grizzly and black bears in developed and backcountry areas of Yellowstone National Park, 1960-1979.a

<table>
<thead>
<tr>
<th></th>
<th>Injuries by Grizzlies</th>
<th></th>
<th>Injuries by Blacks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Developed Areas</td>
<td>Backcountry Areas</td>
<td>Developed Areas</td>
</tr>
<tr>
<td>1960-69</td>
<td>3.6</td>
<td>0.4</td>
<td>46.0^b</td>
</tr>
<tr>
<td>1970-79</td>
<td>0.4</td>
<td>1.0</td>
<td>4.0</td>
</tr>
<tr>
<td>% Increase(Decrease)</td>
<td>(900)</td>
<td>250</td>
<td>(1150)</td>
</tr>
</tbody>
</table>

a Adapted from Meagher and Phillips 1980.
b Data for 1931-69.
observations for both species varied through the 1970's indicating the wide distribution one would expect under natural foraging conditions (Table 8). The total number of control actions decreased from 96 in 1970 to 1 in 1979 (Table 9). On the basis of these data the authors concluded that the first two hypotheses could be accepted. The management program had clearly produced a significant decline in the number of injuries in developed areas, and restored more natural foraging conditions. The third hypothesis could neither be accepted nor rejected. The authors concluded that although natural carrying capacities for both species were not known, animals removed after 1972 under the management programs "did not appear to be a probable cause of a long-lasting depression of numbers from those which would be dictated by natural conditions" (Meagher and Phillips 1980:13). In short, the program had proved to be an immense success.29

The bulk of Yellowstone's management program is found in two short documents: the 1982 Bear Management Plan (U.S.D.I. 1982f) and the 1982 Bear Management Policy (U.S.D.I. 1982g). The Policy represents the general long term approach to bear management while the Plan supplies specific details for the current year (Brown 1983). Periodic evaluations by Meagher (1977, 1978) and Meagher and Phillips (1980) provide further detail. The following is a brief account of the Yellowstone program based on these documents, field trips, interviews and correspondence with key personnel.

Organizational Structure

One Ranger, referred to as the Bear Management Specialist, has overall responsibility for implementing the program including the centralized

29 A recent article by Chase (1983) refers to the program as a failure. The U.S. Government is in the process of preparing a rebuttal article (Brown 1983).
Table 8. Number of grizzly and black bears observed on a daily basis in developed and backcountry areas of Yellowstone National Park, 1970-1979.a

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grizzly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obs/Dev.</td>
<td>178</td>
<td>146</td>
<td>105</td>
<td>54</td>
<td>26</td>
<td>5</td>
<td>65</td>
<td>45</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>Obs/Bkctry</td>
<td>614</td>
<td>320</td>
<td>349</td>
<td>348</td>
<td>426</td>
<td>216</td>
<td>331</td>
<td>528</td>
<td>406</td>
<td>346</td>
</tr>
<tr>
<td>Blacks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obs/Dev.</td>
<td>No data</td>
<td>57</td>
<td>60</td>
<td>147</td>
<td>15</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obs/Bkctry</td>
<td>No data</td>
<td>347</td>
<td>441</td>
<td>499</td>
<td>221</td>
<td>271</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Data from Meagher and Phillips 1980.
Table 9. Number of control actions for grizzly and black bears in Yellowstone National Park, 1968-1979.\textsuperscript{a}

\begin{tabular}{lcccccccccccc}
Grizzly & 59\textsuperscript{b} & 57 & 70 & 39 & 26 & 10 & 14 & 0 & 15 & 9 & 2 & 1 \\
Blacks & 24\textsuperscript{c} & 24\textsuperscript{c} & 26\textsuperscript{d} & 19 & 45 & 16 & 14 & 6 & 17 & 22 & 1 & 0 \\
\end{tabular}

\textsuperscript{a} Data from Meagher and Phillips 1980.

\textsuperscript{b} Control actions 1968-79 include relocations, destructions and zoo donations.

\textsuperscript{c} Control actions include the average number of yearly destructions based on data 1931-69.

\textsuperscript{d} Control actions 1970-79 include relocations and destructions.
monitoring system, co-ordination of observations, management actions and procurement of drugs. Within each of the 5 districts one Ranger is designated to oversee all operations within the district and funnel all reports back to the Bear Management Specialist via the Communications Centre.

Program Evaluation

The usefulness of any resource plan is diminished unless it is carefully evaluated at periodic intervals. Feedback is essential. Yellowstone's management program was evaluated in 1971 (Cole), 1974 (Cole), 1976 (Cole), 1977 (Meagher), 1978 (Meagher) and 1980 (Meagher and Phillips). Historical management data such as human injury rate, number of control actions, number of observations in developed areas and the number and spatial distribution of backcountry observations were used as evaluation criteria to test hypotheses generated from management objectives.

Up to 1977 all evaluations were done by the office of the Research Biologist and published in easily obtainable sources. Subsequent evaluations have been the responsibility of the Resource Management Specialist.

Monitoring

Meagher (1977) contends that Yellowstone's daily bear monitoring system (Fig. 8) is the operational key to the program's success. All bear sightings or incidents are immediately radioed into a 24-hour Communications Centre. As soon as possible the Centre notifies each subdistrict
Fig. 8. Bear monitoring system, Yellowstone National Park.¹

¹ Adapted from Meagher 1978.
ranger of sightings or incidents in his area. At the same time the Superintendent, Chief Ranger and/or Resource Management Specialist are notified of any serious incidents. Radio reports are supplemented by written reports (Fig. 9) which are collected at the Centre and delivered to the Resource Management Specialist where reports are collated and stored on a computer system. Weekly and annual summary reports are generated and sent to each subdistrict office, the Superintendent, Chief Ranger, regional office and headquarters. All grizzly sightings are sent to the Interagency Grizzly Study Team (discussed below). The system provides for:

- immediate information dispersal to field staff responsible for taking management actions, and
- comprehensive, consistent record keeping which provides a data basis for management actions and program evaluation.

Public Information

Yellowstone has nothing short of a comprehensive public information system. It is almost impossible to enter the park, let alone travel within the park, without being overly aware of bears and potential bear dangers. No less than 5 warning/information messages in the form of 5 pamphlets (Fig. 10-14) are given to each person (or vehicle) entering the Park. In addition, 2 highly visible warning signs (Fig. 15) are situated at some entrances. Warnings are continued at all campground entrances where one large sign indicates the potential danger (Fig. 16). At least one poster supplying additional information about proper food storage and garbage handling is prominently displayed at all self registration centres (Fig. 17).

30 The Resource Management Specialist is a Ranger who has overall field responsibility for bear management.
Fig. 9. Bear Sighting form, Yellowstone National Park.

<table>
<thead>
<tr>
<th>YELL 373 5/81</th>
<th>BEAR SIGHTING AND/OR IDENTIFICATION REPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Sighted by _</td>
<td>Address _</td>
</tr>
<tr>
<td>II. Sighting date _</td>
<td>Time _</td>
</tr>
<tr>
<td>III. Sighting location (Check one)</td>
<td>Within Development _</td>
</tr>
<tr>
<td>IV. Description of bear(s):</td>
<td>UTM _</td>
</tr>
<tr>
<td>A. Species</td>
<td>As reported</td>
</tr>
<tr>
<td>Grizzly</td>
<td>_</td>
</tr>
<tr>
<td>Black</td>
<td>_</td>
</tr>
<tr>
<td>Unknown</td>
<td>_</td>
</tr>
<tr>
<td>B. Number of bears seen by size and coat color: (also describe any identifying ear tags or markers)</td>
<td></td>
</tr>
<tr>
<td>Predominant coat color:</td>
<td>Weight in pounds 3/</td>
</tr>
<tr>
<td>1 - Other</td>
<td>10-50</td>
</tr>
<tr>
<td>2 - Blond (wht.-yellow)</td>
<td></td>
</tr>
<tr>
<td>3 - Gray/Silver</td>
<td></td>
</tr>
<tr>
<td>4 - Light brown</td>
<td></td>
</tr>
<tr>
<td>5 - Reddish-brown</td>
<td></td>
</tr>
<tr>
<td>6 - Medium brown</td>
<td></td>
</tr>
<tr>
<td>7 - Dark brown (choc.)</td>
<td></td>
</tr>
<tr>
<td>8 - Black</td>
<td></td>
</tr>
<tr>
<td>C. Diagram coat color pattern of female/young groups only, using 1 to 8 above.</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>Young</td>
</tr>
<tr>
<td>D. Activities of bear(s): Preying on</td>
<td>Scavenging on</td>
</tr>
<tr>
<td>Digging</td>
<td>Grazing</td>
</tr>
<tr>
<td>See Case Incident Record Number 4/</td>
<td>Bims #</td>
</tr>
<tr>
<td>Distance between observer and animal?</td>
<td></td>
</tr>
<tr>
<td>How long did you observe the animal?</td>
<td></td>
</tr>
<tr>
<td>Did the bear see you? If so, what did it do?</td>
<td></td>
</tr>
<tr>
<td>V. Report filled out by _</td>
<td>At (location)</td>
</tr>
<tr>
<td>Date/Time _</td>
<td></td>
</tr>
<tr>
<td>Notified Communications center (date/time) _</td>
<td>Rec'd by _</td>
</tr>
<tr>
<td>Notified (date/time):</td>
<td></td>
</tr>
<tr>
<td>Sub-district office _</td>
<td>Resource Mgmt.</td>
</tr>
<tr>
<td>District office _</td>
<td>Grizzly team</td>
</tr>
</tbody>
</table>

1/ Overnite or day-use facilities for people, accessible by vehicle.
2/ Correct when description by observer is not adequate to identify bear species, or indicates a different species from that reported. Verify if species description is correct.
3/ Cubs-of-year are usually less than 1/4 of female size, or 10-50 lbs.; Yearlings, 1/4-1/2 of female size, or 51-100 lbs.; 2 year olds, 1/2-3/4 of female size, or 101-200 lbs; Small Adult bears are 101-200 lbs; Medium Adults, 201-400 lbs; and Large Adults, 400 plus lbs.
4/ Refer to Case Incident Record Number if bear is involved in control action or other incidents.
Fig. 10. Excerpts pertaining to bears from the entrance gate pamphlet, Danger, Your Safety, Yellowstone National Park. The pamphlet measures about 24 x 30 cm with white lettering on a bright red background.
Fig. 11. Reproduction of the entrance gate pamphlet, Grizzly, Yellowstone National Park. The original pamphlet measures about 24 x 30 cm with brown lettering on a beige background.

SAFETY IN NUMBERS
Traveling alone in bear country is not recommended. Hike in groups and make enough noise so that bears aren't taken by surprise. Bears usually avoid people. If you do not invade its territory, a bear generally will not attack.

BEARS DON'T LIKE SURPRISES
When in bear country, make your presence known. Many experienced hikers wear bells, dangle a can of rattling pebbles, whistle, talk loudly, or sing. However, noise is not a foolproof way of avoiding bears.
A surprise encounter, particularly with a female bear and cubs, is dangerous. A normally placid mother may be quickly provoked if her cubs are disturbed or if you come between the cubs and her.
If you see a bear, give it plenty of room. Do not make abrupt moves or noises that would startle the bear. Slowly detour, keeping upwind so it will get your scent and know you are there.
If you can't detour, wait until the bear moves away from your route.

BEARS AND DOGS DON'T MIX
Dogs are not allowed on trails in National Parks. In National Forests, it's a good idea to leave your dog at home when you go hiking or camping in bear country. A dog can easily disturb a bear and lead it back to you.

MOST ADULT GRIZZLIES CANNOT CLIMB TREES
Should a bear advance aggressively, head for the nearest tree tall enough to get you out of reach. Most adult grizzlies cannot climb trees. Grizzly cubs and black bears can often be discouraged from climbing. Drop some sizeable item — a bedroll or pack — to divert the bear and give you more time to retreat.
If you are caught by a bear, try playing dead, lying on your stomach or side with your legs drawn up to your chest. Clasp your hands over the back of your neck. Bears have passed by people like this without harming them. Don't run blindly down the trail or into the brush — it will only excite the animal. Bears can easily outdistance humans.
ODORS ATTRACT BEARS

- Pack out all garbage. Make sure items such as empty food containers are clean and odor free.
- When camping, use freeze-dried food instead of fresh food.
- Store food in plastic bags out of reach of bears and well away from sleeping areas.
- Sleep some distance from your cooking area.
- Don’t sleep in the same clothes you wore when cooking.
- Keep sleeping bags and personal gear clean and free of food odor.
- Cook with gasoline or liquid petroleum burners instead of making campfires.
- Don’t use perfumes, deodorants, and other sweet smelling substances.
- Women should stay out of bear country during their menstrual period.
- Personal cleanliness is good insurance.
- Human sexual activity attracts bears.

LAND OF THE GRIZZLY


Because all types of bears are unpredictable by nature, identification of species is not as important as being aware of potential danger. To make your visit to bear country safe, you should:

- Be prepared for any situation.
- Be responsible for your behavior.
- Become familiar with the habits and tendencies of bears.

The strongest and most ferocious mammal in North America, the adult grizzly bear can weigh 1200 or more pounds and stand upright nearly 9 feet. The black bear stands only 5 to 6 feet high and is less massive.

The grizzly has high, humped shoulders; the black bear does not.

Faces vary widely in color and shape and there seems to be no typical profile for either species.

The grizzly has long, curved, exposed claws on his front feet; the black bear’s claws are shorter.

The grizzly can be various colors, from almost black through the browns and creams, to practically snow white. Usually the grizzly’s hairs are tipped with white, giving him a frosted or grizzled look, and his coat is never glossy.

The black bear may be black, brown, cinnamon, or even blond. Color is of little help in distinguishing between species.

After they awaken from their winter sleep, bears normally move down to lower elevations along the rivers to feed on grasses and decaying animals that have died during the winter. In June and July, most grizzlies and black bears will move gradually to higher elevations where they will feed in open, park-like areas. In late July and August, bears will once more move down to lower elevations to feed on huckleberries and other fruits. In September and October, the high country is again the favored area. In late October, bears begin digging their dens, usually under a large tree or on a sidehill. By late November, most bears are sleeping for the winter.
Fig. 12. Reproduction of the entrance gate pamphlet, Enjoy Them at a Distance, Yellowstone National Park. The pamphlet measures about 9.5 x 23 cm with red and black lettering on a yellow background.

**PARK BEARS AND OTHER ANIMALS ARE DANGEROUS**

Don't encourage them to approach.
Park regulations prohibit feeding or molesting animals.
Stop cars in pullouts ONLY — not on roadway.
Keep car windows closed when near bears.

**ABOUT BEARS**

Like all animals in our National Parks, bears are wild animals. Because of their protected status they have lost their fear of man. While this may make them appear tame, actually in this state they are more dangerous.

Troublesome bears are trapped and removed to remote areas of the park, or in extreme cases must be destroyed. In order that visitors may continue to enjoy the sight of bears roaming freely in our National Parks, and to avoid personal injury, please follow these suggestions when camping:

- Keep a clean camp and use a minimum of odorous food. Seal surplus food in clean wrapping material or in airtight containers. Ice chests are generally not bear proof. A good deodorizer is effective in eliminating food odors from your camp.
- Food left on tables or stored in a tent in open boxes or food containers is a natural target for bears and an invitation for bear damage. Back country campers often suspend their supplies between two trees out of bear's reach.
- Food should not be stored in vehicles with convertible tops. Properly wrapped or sealed food is normally safe when stored in the trunk of a hard-topped car provided all windows are closed.
- Burn all garbage and food containers. Do not bury food scraps and containers. In the back country pack out any noncombustible litter to the nearest trash containers provided.

REPORT ANY BEAR DAMAGE OR PERSONAL INJURIES TO A PARK RANGER IMMEDIATELY.

U.S. DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
Fig. 13. Excerpts pertaining to bears from the entrance gate pamphlet, Special Activities, Yellowstone National Park.

Caution!

BEAR COUNTRY

In the past, travelers were halted along the roads by begging bears. Through a concentrated effort to remove all human sources of food, the begging bears and their offspring were allowed to return to a more natural and healthier lifestyle. This rehabilitation program has also eliminated most injuries to visitors. Black bears and grizzlies are still numerous in the park. Most of the bears live in large tracts of backcountry areas, so few are seen from the road. Bears Are Dangerous — They have seriously injured and killed people. To protect yourself and your property from damage, and for the safety and future of Yellowstone's bears, don't offer food to bears (or other animals) anywhere. If you are planning to stay in a campground, you are required to keep all food and food containers locked in your vehicle overnight. Campers should also be aware that the Canyon and Fishing Bridge campgrounds permit only hard-sided camping units due to the frequency of bears in these areas. Backpackers are urged to stop into a ranger station or visitor center for detailed information about hiking in bear country. A back-country permit is required for those planning a trip of one or more nights into Yellowstone's backcountry.

Fig. 14. Excerpts pertaining to bears from the entrance gate pamphlet, Yellowstone, Yellowstone National Park.

DANGEROUS ANIMALS

Bears—all bears—head the list of dangerous animals in Yellowstone National Park. Despite their sleepy, friendly looks, bears claw and bite visitors each year and destroy thousands of dollars worth of equipment.

If you are caught in a "bear jam," stay in your car with the windows rolled up. When camping don't put food in your tent! Food can be detected by bears, even when it is tightly wrapped. Bears may come right in with you during the night. To discourage these uninvited guests, keep your food locked in the trunk of your car. Never feed wild animals, most people who have been bitten were feeding animals—in violation of park regulations.

Bison, moose, and elk, as well as some of the smaller animals, can be extremely dangerous, especially when closely approached. Again, keep your distance or remain in your car.

FOR YOUR SAFETY

In bear country noisy hikers are safest because they are least likely to surprise bears. A loud, continuous talker may be your best companion on the trail, if not in camp! It's a good idea to wear a bell as you walk. If you see a bear, detour!

Some special hazards in Yellowstone:

All park animals are wild and potentially dangerous. Do not get close to any animal. Watch large animals from your vehicle. Stop only in roadside pullouts, out of the traffic lane.
Fig. 15a. Entrance gate road sign containing a general bear warning. Mammoth Hot Springs entrance, Yellowstone National Park. The lower portion of the sign reads, "WARNING. Bears and other large animals are dangerous. For your personal safety do not feed or approach wildlife. View from a safe distance.

Fig. 15b. Entrance gate road sign alerting campers to the hardsided only restriction. Mammoth Hot Springs entrance, Yellowstone National Park.
Fig. 16. Reproduction of a campground sign, Warning Yellowstone is Bear Country, Yellowstone National Park. The sign measures about 70 x 70 cm with brown lettering on a bright yellow background. It is conspicuously located at the entrance to autocampgrounds.

WARNING

YELLOWSTONE IS BEAR COUNTRY
USE EXTREME CAUTION
FOOD MUST BE SECURED FROM BEARS
READ REGULATIONS ON CAMP BULLETIN BOARD

Fig. 17. Reproduction of the text of a self registration centre poster, Camping and Bears, Yellowstone National Park. The poster measures about 25 x 35 cm with black lettering on a white background. The poster also contains an illustration of a bear rummaging through a picnic hamper.

CAMPING and BEARS

BEARS ARE WILD ANIMALS: They often wander into camping areas in search of food. It is unlawful to feed, molest, or approach bears closely. To further protect yourself against property damage and personal injury:

1. Never keep food in your tent. When food is not in use the best place to keep it is in the trunk of your car. There is no ice chest yet on the market that a bear cannot open or destroy trying.

Try not to let food come in contact with your tent or other camping gear because the odor remains and bears are attracted to anything with the odor of food on it.

2. Bears are attracted by some cosmetics and hair preparations. These should be stored the same as food and used as little as possible when tent camping.

3. If you are injured or have property damaged by a bear please report it to the nearest ranger station. Prompt reporting allows rangers to remove offending bears to remote areas before they become habitual offenders and have to be destroyed.
and a bright orange sign (Fig. 18) explaining the legal requirements of food storage is affixed on the outside of every washroom door. In addition, every campground is staffed with a Campground Ranger who can supply up to date bear information and ensure proper food storage and garbage handling practices are followed. Campground walkthroughs are a regular function of this personnel. Campgrounds restricted to hard sided units are well signed (Fig. 19) indicating the rationale for this restriction.

All trailheads are well marked and signed with at least two warning/information posters (Fig. 20). Recipients of backcountry use permits are issued with a pamphlet (Fig. 21) containing detailed bear information. A computerized monitoring system (discussed below) enables park staff to furnish current bear activity reports to all backpackers.

Bears and their management are given high profile at visitor information centres through displays, free literature and books for purchase. Some centres carry whole body mounts of blacks and grizzlies along with information and examples of distinguishing characteristics.

Brightly coloured closure or warning signs (Fig. 22) are posted at trailheads when unusual dangers arise.

Waste Management

All garbage receptacles are bear proof and depending on garbage volumes are serviced once or twice late in the day. Plastic liners are changed at every pickup and receptacles are washed out every second or third week to prevent lingering odours. Large banks of small bear proof letter box type receptacles have been installed rather than the large bulk containers used in many other parks. The smaller units have proved to be
Fig. 18. Reproduction of a poster, Warning Bear Habitat, Yellowstone National Park. The poster measures about 32 x 32 cm with black lettering on a fluorescent orange background. The poster is affixed to washroom doors in all autocampgrounds.
Fig. 19. Reproduction of 2 signs, Restriction and Warning, Yellowstone National Park. The signs measure about 70 x 70 cm with brown lettering on a bright yellow background and are positioned at the entrance to campgrounds restricted to hardsided units only.

RESTRICTION

HIGH BEAR FREQUENCY
ONLY HARD SIDED TRAILERS
OR RECREATION VEHICLES
NO TENTS, TENT TRAILERS
AND NO SLEEPING ON GROUND

WARNING

This campground closed to Tents, Tent Trailers, Pop-Ups and sleeping on the ground.

HIGH BEAR FREQUENCY
ATTENTION

YELLOWSTONE BACKCOUNTRY USERS

Grizzly and Black Bears are found throughout the park. Whether they avoid you or defend themselves against you may depend on your behavior.
Ask a Ranger about Bears before using this trail.

Overnight Stops or the Building of Fires Require A Backcountry Use Permit - Available at Any Yellowstone National Park Ranger Station

Avoid Bear Contacts - Keep a Clean Camp
Pack Out All Cans, Bottles, Foil and Unburnable Trash
Pack Animals Should Be Led At All Times
Dogs Are Not Allowed On Any Park Trails

Enjoy the Backcountry
Help keep it clean for others to enjoy.

DANGER

Grizzly and Black Bears are found throughout the park. They are usually shy and avoid people, but whether they avoid you or defend themselves against you may depend on your behavior.

When Hiking:
1. Do Not Travel Alone. Do Not Hike After Dark.
3. Do Not Carry Odorous Foods.
5. If Charged By A Bear, Climb A Tree or Play Dead. You Can’t Outrun A Bear, and Will Only Excite Him If You Try.

When Camping:
1. Avoid Areas Frequent by Bears. Watch For Fresh Tracks, Droppings or Signs of Digging.
3. At Night, Suspend Food Packs Between Two Trees And At Least 10 Feet Off The Ground. Sleep Well Away From Food Storage Area.

When Fishing:
1. Dispose Of Entrails By Puncturing The Air Bladder And Dropping In Deep Water In a Stream or Lake. They Will Decompose Naturally Without Odor.

IMPORTANT: Information On Bears Is Necessary To Protect Park Visitors. Report All Fresh Bear Sign, Damage, or Personal Injuries, To A Park Ranger. Thank You.

--- National Park Service ---
BEARS AND OTHER ANIMALS

Bears are wild and dangerous. They can injure or kill you, and can destroy your camp. They are particularly dangerous when startled, when cubs are present, when approached too closely, or when they have lost their fear of man. The Greater Yellowstone Area is the home of 200-400 grizzly and perhaps twice that many black bears.

Avoid large animals such as moose, bison, elk and deer at close range, especially during mating season or when young animals are present. While bears or large animals cause greatest concern, remember too that small rodents, porcupines, squirrels, chipmunks, and other animals can ruin your tent or backpack in their quest for food.

Rattlesnakes are found at low elevations in the north end of the park.

In bear country, there are no hard and fast rules to insure protection from bear attacks. Bear behavior varies, but the following precautions are strongly recommended.

Do not hike alone. Injuries most often have occurred to one or two hikers. Groups of four or more are recommended, and required in some areas of the park. Hike only during daylight hours. Use special caution when sight is limited by trails or heavy cover, or when hearing or scent are covered by high winds, or by rushing streams.

Bear droppings, tracks, and diggings indicate that bears are in the area. If you see a bear at a distance, make a wide detour around it, keeping upwind so that the bear will get your scent and not be startled. Bears usually avoid people, so let them know you are there. Many hikers tie bells to their packs. Most bear attacks are caused by suddenly encountering a sow with cubs. Whistling and loud talking can serve the purpose of warning a bear of your presence, but are difficult to keep up continuously.

Avoid cosmetics, perfumes, scented lotions, and deodorants. Bears are attracted or irritated by these scents. The odors of menstruation attract bears. The odor of sexual intercourse may also attract bears.

Do not camp in an area frequented by bears. Do not camp on the trail. Avoid camping on ridge tops, streambanks and lakeshores. They are natural travelways and feeding areas for bears. If you suddenly meet a bear, stay calm. Do not run. Running may cause a bear to chase you. Do not move toward the bear. It may feel threatened and become defensive. Bears are curious. As soon as the source of disturbance has been identified, the bear may leave. A grizzly will often rise on its hind legs to investigate. If it does, it may be effective to speak softly; steady, soft human monotones may reassure the bear that you are not a threat. At the same time, look for a tree to climb. Mature grizzlies can climb a short distance, and black bears can climb very well. The tree must be tall enough to get you out of the reach of the bear. As a delaying action, drop some sizeable item, such as your pack, camera bag, or sleeping bag, which may divert the bear’s attention and give you more time to retreat. If you can get into a tree, stay there until you are certain that the bear is out of the area. If you cannot reach a tree and the bear continues to advance, your best chance may be to play dead. As a last resort, lie on your stomach or on your side with your legs drawn up to your chest, and clasping your hands over the back of your neck. Grizzlies have passed by people in this position without harming them. Others have been only slightly injured when the bear made one or two half-hearted slaps at them. Never harass a bear unless it is actually attacking someone. In such an emer-
ergency, try to distract the bear from its victim(s) by shouting or throwing sticks, rocks, or any handy object. In any event, do not run blindly down the trail or through the brush hoping to outdistance the bear. It will only excite the animal, and bears can easily run at twice the speed of the fastest human.

A MOTHER GRIZZLY WITH CUBS IS A SPECIAL HAZARD

Most encounters and injuries in Yellowstone's backcountry and several serious attacks that have taken place here and in other national parks have occurred when people came upon a female grizzly with cubs. The mother's protective instinct is highly developed and she looks upon intruders as a threat to her family. She may attack, charging and slapping with her forepaws at the nearest person, and then pass on to others. If the human intruders have dropped to the ground to play dead, the sow may sniff each one and perhaps claw and bite them before moving her cubs to safety. Lying still under the jaws of a biting bear takes a lot of courage, but it may prevent greater injury or death. Resistance normally would be useless.

DON'T INVITE BEARS INTO YOUR CAMPSITE

Make your fire and cook at your designated campsite, using the established fire pit or backpacker's stove. Separate your sleeping and cooking areas by sleeping some distance away from your cooking site. Camp where trees are handy and the kind you can climb. Place the open end of the tent close to these trees and sleep with your head at that end. This may provide an exit toward safety if the need arises.

Dispose of fish viscera in the water in which you caught the fish. Throw the entrails away from shore into deep water. Part of a fish carcass decaying in a lake or stream is no more ecologically wrong than the entire carcass of a fish dying a natural death in the same water. Puncture the air bladder so the viscera will sink to the bottom. In bear country especially, this is a far better method of disposal than dropping the viscera near a stream bank, burying them near a campsite, or trying to burn them in a fire.

Burn all combustible trash, tin cans, and all noncombustible trash (except glass) to destroy odors. Then take cans and foil from the cold ashes, flatten and pack them out to the trailhead for deposit in trash containers. Burying does not work because cans will be dug up later by bears. Burying only trains bears to search for food around campsites, and could result in a bear harassing or injuring the next camper there. Wash your dishes, and dispose of the dish water far from your campsite.

Food, cooking utensils, and any scented articles such as soap, deodorants, suntan lotion or gum and garbage should be stored out of the reach of all animals and away from the sleeping area. Suspend them in a bag or pack by a 50-foot nylon line between two tall trees at least 10 feet above the ground and 4 feet from either tree. Avoid cooking greasy, odorous foods such as meat. Avoid cooking more food than you can eat. Dehydrating any excess food in a frying pan will render it almost as light as when you packed it in. Even outer clothing that you wore while cooking might be stored overnight with your food. Keep tents and sleeping bags clean and free of food odors. Never use them as storing places for any food or sweet drinks. A clean camp reduces the possibility of, but does not insure against, a visit by a bear.

There are no guarantees in bear country. The hazard of a bear encounter is low, but very real. If you cannot accept the possibility of an encounter, then hike elsewhere.

Tell a park ranger about sightings, damage, or confrontations with bears.
Fig. 22. Reproductions of various closure and warning signs used by Yellowstone National Park. All signs are printed on flexible lightweight plastic with black and red lettering on a bright orange background. Each sign measures about 21 x 29 cm. Bear related signs are often a prize for souvenir seekers. The penalty caution on each sign might help to reduce the frequency of theft.

DANGER

All Area Beyond This Sign is Closed Because of Bear Danger

Entering a closed area or removal of this sign is punishable by fine up to $500 or imprisonment for 6 months, or both.

DANGER

This Trail is Closed Because of Bear Danger

Entering a closed area or removal of this sign is punishable by fine up to $500 or imprisonment for 6 months, or both.

DANGER

This Campsite is Closed Because of Bear Danger

Entering a closed area or removal of this sign is punishable by fine up to $500 or imprisonment for 6 months, or both.

WARNING

The Trail Is Closed KM Ahead Because of Bear Danger

Entering a closed area or removal of this sign is punishable by fine up to $500 or imprisonment for 6 months, or both.

WARNING

The Campsite is Closed Because of Bear Danger

Entering a closed area or removal of this sign is punishable by fine up to $500 or imprisonment for 6 months, or both.

WARNING

GRIZZLY FREQUENTING AREA TRAVERSED BY THIS TRAIL

BE ALERT

REMOVAL OF THIS SIGN MAY RESULT IN INJURY TO OTHERS
less costly to purchase, maintain, service and are easier to handle. They
also have a distinct advantage of not developing huge amounts of odorous
garbage that either repels visitor use or attracts animals (Brown 1982:
pers.comm.).

Strict control over garbage holding facilities of concessionnaires
has been developed by supplying, on a rental basis, the proper holding
device and enforcing its use (Brown 1982:pers.comm.).

All garbage is hauled out of the Park to dumps far removed from the
Park or to closer dumps which have been bear proofed through co-operative
agreements with local authorities. Several once influential outside dumps
have been closed via these agreements.

Carrion, found in areas likely to be used by visitors, is removed and
usually deposited at the bottom of a cliff (Brown 1982:pers.comm.). A
pack-in-pack-out garbage policy is enforced in all backcountry areas.

An estimated $110,000 (1982$) are spent annually on garbage storage
and handling practices that are directly attributable to bear management
requirements (Brown 1982:pers.comm.).

Food Storage Management

Food storage in all U.S. National Parks is governed by regulation
which states that,

All food or similar organic material must be kept completely sealed in a vehicle or camping unit that is con-
structed of solid, non-pliable material or must be suspen-
ded at least 10 feet above the ground and four feet hori-
zontally from any post or tree trunk. This restriction
does not apply to food that is being eaten or is being
prepared for eating. (Title 36, Code of Federal Regula-
tions, 57.16(e)(3))

This regulation is strictly enforced. Food storage facilities (sling
poles\textsuperscript{31}) are provided at some auto campgrounds. Backcountry users\textsuperscript{32} must rely on available trees\textsuperscript{33} for food storage.

**Management of Human Activities**

The Yellowstone program places considerable emphasis on controlling the activities of park users through camping and travel restrictions. Two campgrounds with histories of bear problems are restricted to hard sided units only; the use of tents, tent trailers, pop-ups or sleeping in the open is prohibited. Although originally implemented to force campers into more protective shelters, the technique's success lies mainly in the fact that people using hard sided units can store food and waste more effectively than those campers in soft sided units. Control actions in the two hard sided only campgrounds have fallen substantially since the implementation of the restriction in 1972 (Brown 1982:pers.comm.). Temporary restriction is sometimes used when a grizzly sow and cubs are frequenting an area adjacent to a campground. Apparently, the restriction, whether temporary or permanent, is well accepted by the public.

\textsuperscript{31} A sling pole is simply a pole or bar that is attached to 2 trees spaced approximately 3 to 7 metres apart. The pole is attached in a horizontal position at a height of 3 to 5 metres from ground level. Often the trunks of the two trees are wrapped with galvanized sheet metal to a height of 2 metres. The user throws a rope over the pole, hauls his food pack up and ties off the other end of the rope to one of the trees.

\textsuperscript{32} Pack boxes containing horse feed and other supplies have been a continual problem (Fowler 1983:pers.comm.). The boxes are too large and heavy to sling in a tree and therefore have been easily accessible to bears. The park is now experimenting with electric fences placed around permanent horse camp stores (Brown 1983:pers.comm.).

\textsuperscript{33} The counter balance technique is encouraged (Fig. 30).
Other forms of visitor control are as follows:

• Temporary closure of campsites, trails or areas is commonly used. Brown (1982:pers.comm.) reports that an average of 50 closures per year, each lasting a minimum of one week are not uncommon in Yellowstone. Closures are implemented when any bear frequents a trail or backcountry campsite, or when a backcountry confrontation occurs. Through travel may be allowed but is restricted to horseback or groups of 4 or more. Campsites are not re-opened until it is clear that attractants have been removed or neutralized and the bears have left the area. Closure may also be used where man's impact is causing adverse effects on bear populations or bear habitats. (No further details are given).

• One large area in the northwest section of the Park, (noted for its high grizzly densities) is restricted to horse parties or foot parties of 4 or more. Camping is prohibited. Another area is restricted to daylight use only.

• Campground opening and closing dates are manipulated to allow for seasonal habitat usage.

• Backcountry campsites are frequently monitored and rotated when necessary to prevent odour and garbage build-up. Brown (1982:pers.comm.) noted that this procedure is used only occasionally and, when used, is mainly to prevent undue impact rather than reducing the risk of bear incidents.

Management of Problem Bears

When a problem bear situation develops, the corrective emphasis is on prompt action aimed at preventing escalation and habituation. Therefore any bear ...

• foraging in a developed area during daylight,
• obtaining food in a developed area, or
• persistently observed along a roadside whether begging food or not
is promptly removed. Stokes (1970) has outlined, in terms of learning theory, the importance of prompt removal. Trapped animals are immobilized and marked with a small strap type ear tag prior to being released. All grizzly bears are radio collared as part of the interagency grizzly bear project (Brown 1983).

Release criteria are based on the animal's history, age, sex, presence of cubs with the final decision made after consultation with field staff and research biologists (Brown 1983). Bears captured anywhere within the Yellowstone Ecosystem may be released anywhere within the ecosystem including the Park. To date no bear captured outside the ecosystem has been released within the ecosystem although management is open to the concept (Brown 1983). When available, roadkill ungulate carcasses are placed at release sites to entice the bear to stay (Brown 1982:pers.comm.).

No criteria for destroying incorrigible animals are given except that bears exhibiting natural behaviour such as defense of young or natural food sources will not normally be destroyed. In addition bears will not be destroyed in a backcountry area except when the bear has shown unnatural aggression and no alternative is available.

**Research Planning**

The Yellowstone Bear Management Policy (1982) recognizes research as an integral part of bear management and calls for the continuation of "a vigorous, integrated research program" with a stated objective of providing

---

34 One assumes the term "removed", as used in the Yellowstone Bear Management Plan (U.S.D.I. 1982), to imply either destruction or live trapping.
management with "comprehensive factual knowledge ... (and) to evaluate the effectiveness of management programs affecting or affected by the grizzly population" (U.S.D.I. 1982:27). Study emphasis is placed on distribution patterns, population dynamics, behaviour, ecology of human/bear interrelationships and the effects of adjacent land use practices. To accomplish this an in-park Research Office is maintained and staffed by 4 full time personnel with an annual budget of about $165,000 (Meagher 1983:pers.comm.). Moreover, research by non-park scientists in the areas of physical, biological and behavioural sciences is actively encouraged. Tracy et al (1982a) lists 89 papers dealing with Yellowstone black bears and 181 papers dealing with Yellowstone grizzly bears.

Regional Management

For many years it was realized that Yellowstone's bear population and in particular grizzly populations made use of habitat in areas contiguous with the Park, areas that fell within the jurisdiction of 7 federal agencies and 3 States (Meagher and Phillips 1980). If bears were to be effectively managed a degree of co-operation between all agencies was needed. In 1973 the Interagency Grizzly Bear Study Team consisting of research biologists from the Park, U.S. Fish and Wildlife Service, U.S. Forest Service and the states of Wyoming, Montana and Idaho was formed. The Team's objectives are "to determine the status and trend of the grizzly bear population, the use of habitat by bears, and the effects of land management practices on bear population" (U.S.D.I. 1981). The results of such interagency co-operation have been encouraging even though the co-ordination of the activities and interests of all jurisdictions have been somewhat frustrating at times. Major accomplishments include:
• bear proofing of garbage dumps adjacent to the Park.
• completion of several studies (Knight et al. 1980, Knight et al. 1981, Knight et al. 1982)
• provision of a forum for resolution of existing and future management problems.

YOSEMITE NATIONAL PARK

Yosemite National Park, which was established in 1890, covers an area of 3080 km² on the west slope of the Sierra Nevada in central California. Annual visitation of over 2.4 million is in part due to the Park's proximity (4-6 hour drive) to two major population centres, the Los Angeles basin and the San Francisco Bay area. Backcountry usage has averaged 200,000 visitor nights per year since 1974, most of this occurring in a 100 day period during the summer months. The park supports a population of 220-350 black bears (Harms 1980).

In some respects the magnitude of bear related problems in Yosemite dwarf those of all other parks and for individuals not familiar with bear management may even seem incredible. An average of 550 bear incidents with damages of $42,000 have been reported annually since 1975 (Binnewies 1982:pers.comm.). Since research has indicated that only 8-11% of all incidents are reported (Keay and Van Wagendonk 1980:8), a more accurate average annual figure would, therefore, exceed 5000 incidents.

Program Objectives

In 1975 the Park introduced an intensive management program designed to...

• restore and maintain the natural integrity, distribution, abundance and behaviour of the endemic black
bear population,
• provide for the safety of park visitors, and
• provide opportunities for visitors to understand, observe and appreciate the black bear in its natural habitat (Harms 1976:2)

Harms (1980:206) proposed evaluating the program by testing the following hypothesis:

Bear control procedures, law enforcement, public information systems, and management actions to eliminate unnatu­ral food sources, applied under the 1975 Human-Bear Management Program, will (1) restore a more natural black bear population than exists at present, as evidenced by fewer bears using developed areas and by a progressive reduction in the number of bears controlled or destroyed; (2) reduce the number of property damage and human injury incidents from previous levels; and (3) not prevent the park bear population from stabilizing at the natural carrying capacity of the Park.

As of 1981 only limited success has been achieved. Management data for the period 1970-1981 is given in Table 10. Although the number of incidents, control actions, injuries and damages have declined from 1975, they remain at very high levels. When the number of incidents are partitioned as to their locations, frontcountry or backcountry (Fig. 23), one can see an inverse relationship developing between the two locations. Keay and Van Wagendonk (1980) report this may be partially explained by increased reporting of backcountry incidents and increased backcountry use (use tripled between 1965 and 1975).

Yosemite's entire program is outlined in the current Human/Bear Management Plan (U.S.D.I. 1982h). The plan consists of 5 program elements:

• public information and education
• removal of artificial food sources
• enforcement of applicable regulations
Table 10. Number of bear incidents, control actions, human injuries and property damage values in Yosemite National Park, 1970-1981.a

<table>
<thead>
<tr>
<th>Year</th>
<th>Bear Incidents</th>
<th>Control Actions</th>
<th>Human Injuries</th>
<th>Estimated Damage Value (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>0</td>
<td>40</td>
<td>3</td>
<td>4,730</td>
</tr>
<tr>
<td>1971</td>
<td>1975</td>
<td>61</td>
<td>10</td>
<td>11,835</td>
</tr>
<tr>
<td>1972</td>
<td>81</td>
<td>81</td>
<td>3</td>
<td>28,588</td>
</tr>
<tr>
<td>1973</td>
<td>43</td>
<td>43</td>
<td>16</td>
<td>24,367</td>
</tr>
<tr>
<td>1974</td>
<td>26</td>
<td>26</td>
<td>28</td>
<td>80,248</td>
</tr>
<tr>
<td>1975</td>
<td>975</td>
<td>134</td>
<td>15</td>
<td>113,197</td>
</tr>
<tr>
<td>1976</td>
<td>680</td>
<td>146</td>
<td>12</td>
<td>40,835&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>1977</td>
<td>516</td>
<td>98</td>
<td>6</td>
<td>30,820</td>
</tr>
<tr>
<td>1978</td>
<td>454</td>
<td>96</td>
<td>2</td>
<td>36,282</td>
</tr>
<tr>
<td>1979</td>
<td>379</td>
<td>60</td>
<td>3</td>
<td>21,795</td>
</tr>
<tr>
<td>1980</td>
<td>343</td>
<td>10</td>
<td>1</td>
<td>19,766</td>
</tr>
<tr>
<td>1981</td>
<td>476</td>
<td>30</td>
<td>1</td>
<td>27,905</td>
</tr>
</tbody>
</table>


b Bear incident defined as incident involving property damage or human injury. These are reported incidents and represent only 8-11% of the actual incidents.

c Control actions from 1970-74 include relocations, destructions and zoo donations. Data from 1975-81 include relocations and destructions.

d Harms (1980) reports this figure as $66,294.
Fig. 23. The number of bear incidents\textsuperscript{a} in frontcountry and backcountry\textsuperscript{b} areas of Yosemite National Park 1975 to 1981\textsuperscript{c}.

\begin{itemize}
\item \textsuperscript{a} Bear incident defined as incident involving property damage or human injury.
\item \textsuperscript{b} Backcountry defined as any area two or more miles from any roads or developed area excluding the five High Sierra Camps.
\item \textsuperscript{c} Data from Cella and Keay (1981:Appendix F).
\end{itemize}
• control of conditioned bears
• research and monitoring.

Further information is given in the Annual Bear Management and Incident Report (Cella and Keay 1981). The following is a brief description of the Yosemite program based on these two documents, associated research and correspondence with park personnel.

Organizational Structure

Yosemite has employed a team approach to bear management giving overall responsibility to one division and major responsibilities to four additional divisions. Responsibilities for each are spelled out in minute detail in the Human/Bear Management Plan (U.S.D.I. 1982h). Efforts are made to integrate both training opportunities and field experience. For example, the Interpretive Division is primarily responsible for implementing the public education element yet four interpreters are given special training in bear control procedures. Of note is the fact that bear management duties are included as a special assignment on job descriptions and are therefore an integral portion of performance appraisals. Each assignment lasts a minimum term of 2 years.

Evaluation

Yosemite has developed what appears to be a fairly rigorous procedure for evaluating its management program. Each year staff from all park sections involved in bear management along with representatives from regional offices and nearby parks, meet to critique the past year's program and consider new approaches for the coming year. The proceedings of the critique are compiled to form the Annual Bear Management and Incident
Report which consists of a lengthy narrative backed by historical data presented in tabular and graphic format.

Of note in the evaluation process is the fact that although the number of bear incidents and the amount of property damage are used as the primary measures of the program's effectiveness, each program element is evaluated on an individual basis. For example, recording the information source of each bear incident victim gives a simple yet meaningful way to roughly evaluate both the effectiveness of information dispersal and the content of that information. For example, Table 11 indicates a moderately effective information dispersal, especially in backcountry areas where only 3.3% and 1.0% of bear incident victims received no information in 1979 and 1980 respectively. The fact that the Park ran out of pamphlets during the 1980 season is evidenced by the relatively low number of frontcountry victims who received pamphlets and the high number of victims receiving no information. Pamphlets followed by either signs or personnel contact appear to be the victim's most common source of information. However, since approximately 95% of backcountry victims received information from pamphlets, it would seem to indicate excellent dispersal of low impact material. Changes in pamphlet content and layout may be required.

Monitoring forms have been specifically designed to collect data required for evaluative purposes. Heavy emphasis is placed on determining causative factors and information sources.

Monitoring

All observations, incidents and control actions are recorded on specialized forms. Individual sections are reserved for detailed informa-
Table 11. Sources of bear information by victims of bear incidents in Yosemite National Park, 1970-1980.\textsuperscript{a}

<table>
<thead>
<tr>
<th></th>
<th>Frontcountry</th>
<th></th>
<th>Backcountry</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pamphlets</td>
<td>75.2 %</td>
<td>48.1 %</td>
<td>95.0 %</td>
<td>94.5 %</td>
</tr>
<tr>
<td>Signs</td>
<td>34.2 %</td>
<td>37.0 %</td>
<td>53.3 %</td>
<td>26.6 %</td>
</tr>
<tr>
<td>Personal Contact</td>
<td>25.6 %</td>
<td>29.6 %</td>
<td>61.1 %</td>
<td>66.3 %</td>
</tr>
<tr>
<td>Interpretive Program</td>
<td>4.8 %</td>
<td>11.1 %</td>
<td>5.6 %</td>
<td>3.2 %</td>
</tr>
<tr>
<td>Radio</td>
<td>7.7 %</td>
<td>1.8 %</td>
<td>8.9 %</td>
<td>1.0 %</td>
</tr>
<tr>
<td>No Information</td>
<td>8.6 %</td>
<td>24.0 %</td>
<td>3.3 %</td>
<td>1.0 %</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Data from Cella and Keay 1981.
tion on causative factors, information source, and other pertinent data that can be used to evaluate program elements. All information is fed into a centralized computer system (BIMS - discussed below) which generates monthly and annual summaries for appropriate personnel.

Special note might be made of the fact that all pamphlets and several other information sources emphasize that bear victims should report incidents.

Public Information

Information dispersal is much the same as Yellowstone's program. Permanent warning signs are conspicuously located at all park entrances, trail heads, campgrounds and problem parking lots. Pamphlets explaining bear problems, causes, the visitor's role in prevention, regulations and management objectives are given to all campers. Bear information must be given at every evening interpretive program and at least once a week an entire evening interpretive program is devoted exclusively to bears. Comprehensive articles as well as short notes on bears appear in each monthly issue of the Park newspaper. Exhibits describing the human/bear problem are maintained at all major visitor centres and museums. Whenever possible short slide programs emphasizing proper food storage techniques are shown at wilderness permit kiosks. Protection (Rangers assigned to law enforcement duties) and interpretive personnel are assigned roving contact duty in campgrounds and developed areas with the primary duty of conversing with visitors about bears. All park staff are to be fully cognizant of the bear problem, management objectives and management techniques and be willing to assist visitors in understanding and complying with regulations. High quality publications dealing with bears are available at all
sales outlets of the Yosemite National History Association. Bear facts are broadcast via short range A.M. radio transmitters at selected Park locations.

One interesting and probably useful point is that all handouts, posters, exhibits, and signs are, where possible, designed specifically for Yosemite in order to make the message appear more credible and less of a routine bureaucratic statement. Figure 24 illustrates one such pamphlet.

**Waste Management**

Yosemite has implemented a strict control program aimed at total elimination of all unnatural food sources. Installation and proper servicing of bear proof garbage containers has been a major factor in reducing the number of frontcountry incidents. All outside garbage containers, whether owned by the Park or concessionaires are bear proofed and non bear proof containers must be stored indoors. Garbage pick-ups are scheduled to prevent overflow. Containers are inspected and cleaned at regular intervals. Concessionaires are required to either provide bear proof lockers at all housekeeping units or to install signs advising users to store food in their vehicles.

**Food Storage Management**

Just as important as proper garbage control is proper food storage; in fact improper food storage is now the most common cause of all bear incidents (Table 12) and for this reason Yosemite has launched a very concerted effort at controlling this factor. Information on proper food storage techniques is emphasized in a special backcountry pamphlet (Fig.
Fig. 24. Reproduction of the pamphlet, Life Certificate, Yosemite National Park. The pamphlet measures about 22 x 28 cm with brown and black lettering on a white background. This pamphlet represents a creative approach to bear information which is personalized to the needs of Yosemite.
Fig. 24.(Cont'd) Reproduction of the pamphlet, Life Certificate, Yosemite National Park. The pamphlet measures about 22 x 28 cm with brown and black lettering on a white background. This pamphlet represents a creative approach to bear information which is personalized to the needs of Yosemite.

SURVIVAL PLAN

• Store food in vehicle trunk.
• In vehicles without trunks, cover food completely with blanket.
• Use bear-proof food lockers where provided.
• Use bear-proof garbage cans.
• Keep a clean camp. Don't leave refuse in camp anytime.
• Be respectful of wild animals.

Special Food Storage Regulation

Federal law requires that all food be stored in a manner that will prevent bears from gaining access to it. Title 36, Code of Federal Regulations, §7.16(e)(3) states:

All food or similar organic material must be kept completely sealed in a vehicle or camping unit that is constructed of solid, nonpliable material, or must be suspended at least ten feet above the ground and four feet horizontally from any post or tree trunk. This restriction does not apply to food that is being eaten or is being prepared for eating.

For those people with no vehicle in which to store food, cables are provided in walk-in campgrounds and some designated backcountry sites from which food can be suspended. Food lockers are available in some campgrounds.

If you are injured or have property damaged by a bear, please report to the nearest ranger station.

Federal law requires proper food storage. Violation of this law can result in a fine of up to $500 or imprisonment.
Table 12. Probable causes of bear incidents in Yosemite National Park 1980.a

<table>
<thead>
<tr>
<th>Cause</th>
<th>Frontcountry (N=70)</th>
<th>Backcountry (N=261)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improperly stored food</td>
<td>60.0</td>
<td>67.5</td>
</tr>
<tr>
<td>Conditioned bear responseb</td>
<td>30.0</td>
<td>18.5</td>
</tr>
<tr>
<td>Food left unguarded</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Improperly Disposed Garbage</td>
<td>1.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Feeding, baiting</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Accidental Encounter</td>
<td>1.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Other</td>
<td>1.4</td>
<td>7.0</td>
</tr>
<tr>
<td>Unknown</td>
<td>5.7</td>
<td>7.0</td>
</tr>
</tbody>
</table>

aData from Cella and Keay 1980.
bConditioned bear response defined as an incident that is the result of a previous reward.
25) given out with each camping permit. Food storage cables are provided in backcountry areas and walk-in and group autocampgrounds with high levels of bear incidents. These devices have not been overly successful due to (1) maintenance problems (2) the unaesthetic clutter of ropes and packs that accumulate over the season and (3) user difficulties.

In 1977 permanent metal bear proof storage lockers were installed at one frontcountry campground having a history of bear incidents. Not one incident has been reported since this time. A similar device was recently (1979) tested at one of the most heavily used backcountry campsites and although minor theft of food and garbage accumulation were continual problems, the lockers proved extremely successful, provided that regular surveillance was available. Bear feeding activity, human/bear interactions and damages were all lowered during the first season (Hastings and Gilbert 1981:301). Records for the following year showed a 61% reduction in incidents (Cella and Keay 1980:5).

Due to high initial costs, high maintenance costs and user difficulties associated with bear cables and lockers, various designs of portable bear proof food containers are currently being evaluated. One promising device is a 1.4 kg (3 lb.) section of standard ABS and PVC pipe fitted with a bottom and removable top. The design offers the advantage of simplicity,

---

A food storage cable or 'bear cable' consists of one strand of 5 mm cable and a pulley. Two trees approximatey 7 m apart are selected. One end of the cable is firmly attached to one tree at a distance of 10 m from ground level. The other end of the cable is run through a pulley which is also located 10 m above ground on the other tree. The user ties his foodpack to the centre of the cable and pulls down on the pulley end until the cable is taut thereby suspending his pack in mid air. The cable is then tied off by means of a hook.
Fig. 25. Excerpts pertaining to bears from the backcountry permittee pamphlet, Welcome to the Backcountry, Yosemite National Park. Heavy emphasis is placed on proper food storage techniques. The pamphlet measures about 21 x 28 cm with brown lettering on a brown background.

BACKCOUNTRY FOOD STORAGE

BEARS ARE VERY CLEVER, ANY DEVIATION FROM THIS METHOD WILL NOT PROTECT YOUR FOOD

1. Search for a tree

2. Appropriate Branch

3. Balance Foodsacks

4. Position Rope

5. Tie on Food

6. Toss to Position

7. Retrieval

TIPS:
1) Store cosmetics, toothpaste, soap etc., with food.
2) Leave pack on ground with pockets and flaps open.
3) Food taken by bears is still your responsibility, please clean up.
4) Make sure no branches or solid objects are under food for bear to stand on.
5) Use steel cables when provided.

PLEASE REPORT ALL BEAR DAMAGE TO A PARK RANGER

RESULTS OF IMPROPER STORAGE CAN BE PERSONAL PROPERTY DAMAGE, AND KILLING OF BEARS THAT HABITUALLY RAID CAMPS.

Federal Law Requires Proper Food Storage.
low maintenance, and personalized food storage. Furthermore, garbage can be conveniently and safely transported out of the backcountry within the container.

Federal food storage regulations are strictly enforced.

Management of Problem Bears

Responsibilities of various personnel, along with procedures for capturing, marking, releasing or destroying bears are given in considerable detail. Several points are worthy of further elaboration.

First is the fact that predetermined release sites, each having a release frequency of not more than one bear per week, are used to inhibit 'homing' and prevent intraspecific competition.

Second is the different management strategies used for frontcountry and backcountry bears. Bears frequenting developed areas, or causing incidents in the frontcountry are promptly removed. Depending on the animal's dossier it is either relocated or destroyed. Between 1975 and 1981 a total of 2164 reported incidents resulted in a total of 521 relocations and 42 destructions. These control measures coupled with other management actions, especially improvements in food storage and waste management, undoubtedly were responsible for the reduction of incidents from 879 (1975) to 128 (1981).

Quite a different approach is taken in backcountry areas. Reported incidents have steadily increased (Fig. 23) from 96 (1975) to 348 (1981) totalling 1667 incidents. However, only one relocation and 7 destructions have been recorded during the same period. The strategy for backcountry areas is to positively identify (tag) troublesome bears, and monitor their activities thereby developing dossiers upon which to base future management
actions. Except for extreme cases of aggression, trouble makers are neither relocated nor destroyed. Management efforts are directed mainly at control of unnatural sources of food with the assumption that conditioned bears can be deconditioned once unnatural food sources are removed. "Destruction of problem bears only provides temporary relief from human/bear confrontations and conflicts. Only the removal of human food will reduce the problem to an acceptable level." (Cella and Keay 1980:8).

One can only speculate as to the outcome of the backcountry strategy. Food storage control will take several years to be effectively implemented yet in the interim one may be predisposing visitors to a higher risk of injury while further reinforcing unacceptable bear behaviour.

Research Planning

Like Yellowstone, Yosemite's management plan recognizes research as an essential ingredient for proper management. A staff of 3 full time researchers has focussed its attention on census techniques, seasonal and annual distribution patterns, population dynamics, habitat requirements, ecological relationships and the effects of bear/human interactions. Additional studies may be conducted by outside researchers when authorized by the Park's resident Research Scientist.

GLACIER NATIONAL PARK, MONTANA

Glacier National Park encompasses an area of 4,100 km² in the north-western corner of Montana. An apparently stable and reproductively healthy population of 200 grizzly bears and 500 black bears inhabit the park which receives an annual visitation in excess of 1.7 million
(U.S.D.I. 1982a:1). Since the park's beginning in 1910, grizzly bears have been involved in 27 human injuries and six deaths. Twenty-three of the injuries occurred during the 1951-80 period and all six fatalities occurred during 1967-80 period (Martinka 1982:472).

Glacier's bear management policy is to (1) maintain natural population dynamics (2) foster pristine habitat relationships and (3) encourage shyness as the characteristic behaviour of bears in the presence of humans. The policy recognizes that shyness may be the result of selective pressures against undesirable traits rather than a completely natural behavioral characteristic. Selective pressures include the past 80 year practice of removing aggressive bears (U.S.D.I. 1982a:2).

Behavioural science is to be used as the basis of all management actions. Behaviour classified as defensive is termed as natural and management actions are directed at visitor use controls whereas behaviour classified as aggressive is considered undesirable and management actions are directed toward control of the bear. When a potential or actual bear/human conflict arises in a natural area (i.e. backcountry) management actions are usually directed at control of the human element. Conversely, bear/human conflicts in developed areas are resolved by removal of the bear (U.S.D.I. 1982a:2).

Table 13 shows Glacier's management data for the 21 year period 1962-82. Although there appears to be a general trend toward lower injury-.

36 Comparable data for black bears was not readily available.

37 The Park produces annual statistical summaries of management data but does not include interpretations or analysis of the data.
Table 13. Bear management data\(^a\) for Glacier National Park, Montana, 1962-1982.\(^b\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Visitation(^c)</th>
<th>Injuries</th>
<th>Fatalities</th>
<th>Injury/Fatality(^d) Rate</th>
<th>Incidents(^e)</th>
<th>Destrucons(^f)</th>
<th>Relocations(^g)</th>
<th>Closures(^h)</th>
<th>Enforcement(^i)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962</td>
<td>966,100</td>
<td>2</td>
<td></td>
<td>.207</td>
<td>10</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1963</td>
<td>811,214</td>
<td>3</td>
<td></td>
<td>.370</td>
<td>6</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1964</td>
<td>642,100</td>
<td>1</td>
<td></td>
<td>.156</td>
<td>7</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td>847,104</td>
<td>3</td>
<td></td>
<td>.354</td>
<td>18</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1966</td>
<td>907,839</td>
<td>3</td>
<td></td>
<td>.330</td>
<td>10</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1967</td>
<td>804,049</td>
<td>5</td>
<td>2</td>
<td>.792</td>
<td>11</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>964,493</td>
<td>2</td>
<td></td>
<td>.207</td>
<td>22</td>
<td>38</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>1,051,165</td>
<td>1</td>
<td></td>
<td>.095</td>
<td>9</td>
<td>18</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>1,241,003</td>
<td>4</td>
<td></td>
<td>.153</td>
<td>7</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>1,303,073</td>
<td>2</td>
<td></td>
<td>.153</td>
<td>7</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>1,392,145</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>1,398,958</td>
<td>3</td>
<td></td>
<td>.214</td>
<td>2</td>
<td>13</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>1,406,643</td>
<td>3</td>
<td></td>
<td>.213</td>
<td>3</td>
<td>8</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>1,571,393</td>
<td>7</td>
<td></td>
<td>.445</td>
<td>3</td>
<td>20</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>1,662,678</td>
<td>4</td>
<td>1</td>
<td>.301</td>
<td>71</td>
<td>4</td>
<td>24</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>1,655,212</td>
<td>1</td>
<td></td>
<td>.060</td>
<td>35</td>
<td>10</td>
<td>21</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>1,601,131</td>
<td>2</td>
<td></td>
<td>.125</td>
<td>46</td>
<td>9</td>
<td>18</td>
<td>52</td>
<td>176</td>
</tr>
<tr>
<td>1979</td>
<td>1,446,236</td>
<td>1</td>
<td></td>
<td>.069</td>
<td>31</td>
<td>3</td>
<td>7</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>1980</td>
<td>1,475,538</td>
<td>3</td>
<td></td>
<td>.203</td>
<td>44</td>
<td>4</td>
<td>7</td>
<td>44</td>
<td>30</td>
</tr>
<tr>
<td>1981</td>
<td>1,786,843</td>
<td>3</td>
<td></td>
<td>.168</td>
<td>26</td>
<td>5</td>
<td>8</td>
<td>32</td>
<td>161</td>
</tr>
<tr>
<td>1982</td>
<td>1,666,431</td>
<td>1</td>
<td></td>
<td>.060</td>
<td>26</td>
<td>1</td>
<td>2</td>
<td>26</td>
<td>396</td>
</tr>
</tbody>
</table>

\(^a\) Black and grizzly data combined.


\(^c\) Unpublished data.

\(^d\) Injury/Fatality Rate is the number of injuries or fatalities per 100,000 visitors.

\(^e\) 'Incidents' not defined. Incidents prior to 1976 included such minor actions as setting traps and checking false reports and therefore are not comparable with post 1975 data.

\(^f\) Figures include intentional management destructions plus transfers to zoos.

\(^g\) Figures are for relocations with Glacier National Park.

\(^h\) Data 1968-70 referred to as Hiking/Camping Restrictions and includes closures plus minimum hiking party (5) size. Data 1973-82 represents area closures only.

\(^i\) Data includes citations plus warnings. Warnings represent the vast majority of all enforcement actions.
fatality and management destructions figures, Martinka (1982) has shown that for the 1951-80 period both variables are increasing in direct proportion with visitation. Whether management actions introduced in the 1980's can curb this trend remains to be seen.

Glacier's bear management program is outlined in a single document, the Bear Management Plan (U.S.D.I. 1982a). The fact that the Plan has been formally scrutinized by the House of Representatives Subcommittee on Public Lands and National Parks (U.S. Government 1981) lends a measure of authority and credibility to the document and the Park's management program.

The following is a detailed account of Glacier's management program based on the Plan, field trips and discussions with park personnel.

Program Objectives

General goals of the bear management program are to:

• protect and maintain natural habitat and status of grizzly and black bears

• provide for the maximum security and safety to the park visitor while recognizing the inherent dangers of a natural wilderness.

Specific objectives of the program are to:

• Minimize the rate of bear/human incidents and prevent it from accelerating.38

• Provide to all persons employed in the park specific training on bears and their management.

38 Glacier's ten year average human injury/death rate inflicted by both black bears and grizzlies is 2.1 per year or 1.41 per year per million visitors.
• Alert visitors and potential visitors to the presence of bears and the inherent dangers of visiting bear country. Inform visitors how best to minimize risks and enjoy a quality experience.

• Provide information and enforcement, so that all campers and backcountry visitors will adhere to proper food and garbage handling procedures.

• Enforce proper food and solid waste disposal regulations for all residents and business establishments within the park and also serve as catalyst in resolving local sanitation situations adjacent to the park.

• Bearproof all garbage containers and garbage storage and handling facilities in the park.

• Incorporate bear reports received in Headquarters into summaries, which will go out to Subdistrict Rangers, Information Centers, and adjacent cooperating agencies on a regularly scheduled basis.

• Initiate management action early enough to insure that specific objectives of this Plan are achieved.

• Continue with research surveillance of biological aspects of the bear management program.

• Assess all proposed park Resource Management programs for compatibility with the management and preservation of grizzly and black bears.

• Support regional research on bear behaviour and aversive conditioning.

• Implement "A Model for Assessing the Status and Management of Grizzly Bear Populations" as a method of determining trends useful in developing bear management plans.

• Evaluate and revise the Plan after each summer season, and update prior to March 1.
Organizational Structure

The day to day management of the program falls under the responsibility of the Resource Management Specialist. Field operations are conducted by a Bear Management Team consisting of 10 Rangers who have received special training for this task (Blair 1983).

Table 14 lists training responsibilities of various park staff. Interesting to note is the fact that overall responsibility for the training and information elements is left with the Superintendent whereas monitoring and evaluation of the elements is the responsibility of the Resource Management Specialist.

The decision to destroy a bear (other than emergencies), to limit camping to hardsided units only, to close auto campgrounds (except in emergencies) or to use a helicopter for relocations is left strictly with the Superintendent.

All other management actions are at the discretion of trained bear management Rangers except for the use of immobilizing drugs which the Resource Management Specialist co-ordinates.

Evaluation

Management personnel meet annually to discuss the program and make recommendations for the coming year. Unfortunately, no reports of the review are prepared (Kendall 1983:pers.comm.).
Monitoring

Figure 26 illustrates Glacier's bear monitoring system. Incidents and management actions are phoned or radioed into the Communications Centre while routine sightings are received by the Resource Management Office. Both offices log reports (Fig. 27 and 28) and forward them daily to the Resource Management Clerk for entry on the computer terminal. The Communication Centre reports all incidents and management actions to the Chief Park Ranger by phone. Case incident reports (Fig. 29) which are to follow all reported incidents and management actions are used to update the computer record. Weekly summaries of all sightings, incidents and management actions are sent to all Staff Offices, District and Subdistrict Ranger Offices and Information Centre. Annual statistical summaries are also prepared.

By way of an annual letter, park residents, concessionaires and contractors are asked to report all sightings and incidents. In addition, the importance of complete and prompt reporting is emphasized to all park staff in seasonal training sessions. Every pamphlet and most posters also emphasize reporting procedures.

One interesting and unique technique used by Glacier is to collect bear photographs to form a type of 'mug shot' display which has been useful in assisting visitors to recall certain physical characteristics of individual bears (Haraden 1982:pers.comm.).

39 Case incident reports have been hand sorted since 1981 due to a lack of funding for computerization. The Park hopes to purchase a small in-Park computer to handle all case incident reports (Burns 1982:pers.comm.)
Fig. 26. Bear monitoring system, Glacier National Park.

Adapted from U.S.D.I. 1982a.
<table>
<thead>
<tr>
<th>Glacier National Park BEAR SIGHTING FORM</th>
<th>CASE #</th>
<th>REPORTER</th>
<th>RECORDER</th>
<th>OCCURRENCE: YEAR</th>
<th>MONTH</th>
<th>DAY</th>
<th>TIME</th>
<th>REC</th>
<th>U.S. DRAINAGE NUMBER</th>
<th>OR</th>
<th>CANADIAN DRAINAGE NUMBER</th>
<th>DESCRIPTION (CIRCLE ONE COLUMN FOR EACH BEAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kishelineh</td>
<td>26</td>
<td>Para</td>
<td>Cameron</td>
<td>1985</td>
<td>9</td>
<td>26</td>
<td>0</td>
<td>6</td>
<td>10 Kishelineh</td>
<td>26</td>
<td>0 Kishelineh</td>
<td>26 Kishelineh</td>
</tr>
<tr>
<td>Clint</td>
<td>27</td>
<td>Oye</td>
<td>Blankston</td>
<td>1993</td>
<td>9</td>
<td>27</td>
<td>0</td>
<td>6</td>
<td>27 Blankston</td>
<td>27 Oye</td>
<td>0 Blankston</td>
<td>27 Blankston</td>
</tr>
<tr>
<td>Akala</td>
<td>28</td>
<td>Bear</td>
<td>Amasa</td>
<td>1994</td>
<td>9</td>
<td>28</td>
<td>0</td>
<td>6</td>
<td>28 Amasa</td>
<td>28 Bear</td>
<td>0 Amasa</td>
<td>28 Amasa</td>
</tr>
<tr>
<td>Bowman</td>
<td>29</td>
<td>Railroad</td>
<td>Logan</td>
<td>1995</td>
<td>9</td>
<td>29</td>
<td>0</td>
<td>6</td>
<td>29 Logan</td>
<td>29 Railroad</td>
<td>0 Logan</td>
<td>29 Railroad</td>
</tr>
<tr>
<td>Quartz</td>
<td>30</td>
<td>Two Medicine</td>
<td>Waterton</td>
<td>1996</td>
<td>9</td>
<td>30</td>
<td>0</td>
<td>6</td>
<td>30 Waterton</td>
<td>30 Two Medicine</td>
<td>0 Waterton</td>
<td>30 Two Medicine</td>
</tr>
<tr>
<td>Logging</td>
<td>31</td>
<td>Cut Bank</td>
<td>Belly</td>
<td>1997</td>
<td>9</td>
<td>31</td>
<td>0</td>
<td>6</td>
<td>31 Belly</td>
<td>31 Cut Bank</td>
<td>0 Belly</td>
<td>31 Cut Bank</td>
</tr>
<tr>
<td>Anaconda</td>
<td>32</td>
<td>Red Eagle</td>
<td>Beaver</td>
<td>1998</td>
<td>9</td>
<td>32</td>
<td>0</td>
<td>6</td>
<td>32 Beaver</td>
<td>32 Red Eagle</td>
<td>0 Beaver</td>
<td>32 Red Eagle</td>
</tr>
<tr>
<td>Cams</td>
<td>33</td>
<td>St. Mary</td>
<td>Crypt</td>
<td>1999</td>
<td>9</td>
<td>33</td>
<td>0</td>
<td>6</td>
<td>33 Crypt</td>
<td>33 St. Mary</td>
<td>0 Crypt</td>
<td>33 St. Mary</td>
</tr>
<tr>
<td>Aspen &amp; Lower</td>
<td>34</td>
<td>Cracker</td>
<td>Boundary</td>
<td>2000</td>
<td>9</td>
<td>34</td>
<td>0</td>
<td>6</td>
<td>34 Boundary</td>
<td>34 Aspen &amp; Lower</td>
<td>0 Boundary</td>
<td>34 Aspen &amp; Lower</td>
</tr>
<tr>
<td>McDonald Creek</td>
<td>35</td>
<td>Brinnell</td>
<td>Martha</td>
<td>2001</td>
<td>9</td>
<td>35</td>
<td>0</td>
<td>6</td>
<td>35 Martha</td>
<td>35 McDonald Creek</td>
<td>0 Martha</td>
<td>35 McDonald Creek</td>
</tr>
<tr>
<td>Upper McDonald Creek</td>
<td>36</td>
<td>Sulfur</td>
<td>Lineham</td>
<td>2002</td>
<td>9</td>
<td>36</td>
<td>0</td>
<td>6</td>
<td>36 Lineham</td>
<td>36 Upper McDonald Creek</td>
<td>0 Lineham</td>
<td>36 Upper McDonald Creek</td>
</tr>
<tr>
<td>McDonald Lake</td>
<td>37</td>
<td>Iceberg-Peareigan</td>
<td>Rowe</td>
<td>2003</td>
<td>9</td>
<td>37</td>
<td>0</td>
<td>6</td>
<td>37 Rowe</td>
<td>37 McDonald Lake</td>
<td>0 Iceberg-Peareigan</td>
<td>37 McDonald Lake</td>
</tr>
<tr>
<td>Lincoln</td>
<td>38</td>
<td>Many Glacier</td>
<td>Stony W</td>
<td>2004</td>
<td>9</td>
<td>38</td>
<td>0</td>
<td>6</td>
<td>38 Stony W</td>
<td>38 Lincoln</td>
<td>0 Many Glacier</td>
<td>38 Lincoln</td>
</tr>
<tr>
<td>Harrison</td>
<td>39</td>
<td>Gable</td>
<td>Crooked</td>
<td>2005</td>
<td>9</td>
<td>39</td>
<td>0</td>
<td>6</td>
<td>39 Crooked</td>
<td>39 Harrison</td>
<td>0 Gable</td>
<td>39 Harrison</td>
</tr>
<tr>
<td>Haas</td>
<td>40</td>
<td>Bally River</td>
<td>Sage</td>
<td>2006</td>
<td>9</td>
<td>40</td>
<td>0</td>
<td>6</td>
<td>40 Sage</td>
<td>40 Haas</td>
<td>0 Bally River</td>
<td>40 Haas</td>
</tr>
<tr>
<td>Mack</td>
<td>41</td>
<td>Waterton</td>
<td>Castle</td>
<td>2007</td>
<td>9</td>
<td>41</td>
<td>0</td>
<td>6</td>
<td>41 Castle</td>
<td>41 Mack</td>
<td>0 Waterton</td>
<td>41 Mack</td>
</tr>
<tr>
<td>Moir</td>
<td>42</td>
<td>Outside Park (U.S.)</td>
<td>Castle</td>
<td>2008</td>
<td>9</td>
<td>42</td>
<td>0</td>
<td>6</td>
<td>42 Castle</td>
<td>42 Moir</td>
<td>0 Outside Park (U.S.)</td>
<td>42 Moir</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MANAGEMENT AREA BEAR WAS IN</th>
<th>BEAR'S MAIN ACTIVITY</th>
<th>SILVERTIP</th>
<th>SIZE</th>
<th>SEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>off trail</td>
<td>standing</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>backcountry trail</td>
<td>walking</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>heavy-use trail</td>
<td>walking</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>illegal camp</td>
<td>standing</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>BC Illegal camp</td>
<td>standing</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>BC illegal camp</td>
<td>standing</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>BC illegal camp</td>
<td>standing</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>BC Illegal camp</td>
<td>standing</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>BC Illegal camp</td>
<td>standing</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>BC Illegal camp</td>
<td>standing</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DID BEAR REMAIN IN AREA? (Y/N/T)</th>
<th>IDENTIFYING MARKS/NAME</th>
<th>SEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>T</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBSERVATION TYPE</th>
<th>OBSERVER TYPE</th>
<th>OBSERVER'S MAIN ACTIVITY</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>sighting</td>
<td>unknown</td>
<td>standing</td>
<td></td>
</tr>
<tr>
<td>scat</td>
<td>unknown</td>
<td>standing</td>
<td></td>
</tr>
<tr>
<td>track</td>
<td>unknown</td>
<td>standing</td>
<td></td>
</tr>
<tr>
<td>digging</td>
<td>unknown</td>
<td>standing</td>
<td></td>
</tr>
<tr>
<td>foraging signs</td>
<td>unknown</td>
<td>standing</td>
<td></td>
</tr>
<tr>
<td>carrion</td>
<td>unknown</td>
<td>standing</td>
<td></td>
</tr>
<tr>
<td>predation</td>
<td>unknown</td>
<td>standing</td>
<td></td>
</tr>
<tr>
<td>rubbing tree</td>
<td>unknown</td>
<td>standing</td>
<td></td>
</tr>
<tr>
<td>day bed</td>
<td>unknown</td>
<td>standing</td>
<td></td>
</tr>
<tr>
<td>den site</td>
<td>unknown</td>
<td>standing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GROUP SIZE:</th>
<th>PLACE:</th>
<th>ELEVATION:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CASE #</th>
<th>PLACE:</th>
<th>ELEVATION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Park Sightings</td>
<td>830039</td>
</tr>
<tr>
<td>2</td>
<td>Waterton Lakes N.P.</td>
<td>830040</td>
</tr>
<tr>
<td>3</td>
<td>Blackfeet I.R.</td>
<td>830041</td>
</tr>
</tbody>
</table>

**Explanation:**
(1) 270 characters for "COMMENTS"
(2) 80 characters for "PLACE"
(3) 30 characters for "IDENTIFYING MARKS/NAME"
(4) "REC #" to be filled in by computer operator
Fig. 28. Incident/Control Action Form, Glacier National Park, Montana. The form measures about 21 x 28 cm.

### Glacier National Park INCIDENT/CONTROL ACTION FORM

<table>
<thead>
<tr>
<th>CASE INCIDENT #:</th>
<th>REC #:</th>
</tr>
</thead>
</table>

#### INCIDENTS

<table>
<thead>
<tr>
<th>INCIDENT TYPE</th>
<th>OFFENSE</th>
<th>TYPE OF CONTROL LOSS</th>
<th>POPULATION LOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>law enforcement only</td>
<td>improper food storage</td>
<td>natural death</td>
<td>IN PARK</td>
</tr>
<tr>
<td>property damage</td>
<td>feeding, baiting</td>
<td>death</td>
<td>death</td>
</tr>
<tr>
<td>non-fatal injury</td>
<td>injuring a bear</td>
<td>vehicle</td>
<td>accident</td>
</tr>
<tr>
<td>fatal injury</td>
<td>illegal hunting</td>
<td>illegal kill</td>
<td>illegal kill</td>
</tr>
<tr>
<td>victim/owner TYPE</td>
<td>U.S. Fish &amp; Wildlife</td>
<td>mgmt removal</td>
<td>hunting</td>
</tr>
<tr>
<td>visitor</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>inholder</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>concessioner</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>contractor</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPS employee</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### PROPERTY DAMAGE (R)

<table>
<thead>
<tr>
<th>TYPE</th>
<th># ESTIMATE</th>
<th>FOOD</th>
<th>FOOD CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>tent</td>
<td>presence unknown</td>
<td>none</td>
<td>present</td>
</tr>
<tr>
<td>ice chest</td>
<td>odor</td>
<td>only</td>
<td>odors</td>
</tr>
<tr>
<td>building</td>
<td>food present</td>
<td>4</td>
<td>food present</td>
</tr>
<tr>
<td>motor vehicle</td>
<td>unburned garbage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>other</td>
<td>abandoned when bear came</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### BEAR'S AGGR. BEHAVIOR (R)

<table>
<thead>
<tr>
<th>NOTES:</th>
</tr>
</thead>
<tbody>
<tr>
<td>stood up</td>
</tr>
<tr>
<td>ran toward observer</td>
</tr>
<tr>
<td>walked toward observer</td>
</tr>
<tr>
<td>growled</td>
</tr>
<tr>
<td>other</td>
</tr>
</tbody>
</table>

#### CONTROL ACTIONS

<table>
<thead>
<tr>
<th>TYPE OF CONTROL LOSS</th>
<th>POPULATION LOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>capture attempt</td>
<td>natural death</td>
</tr>
<tr>
<td>release to:</td>
<td>death</td>
</tr>
<tr>
<td>in park, same location</td>
<td>vehicle</td>
</tr>
<tr>
<td>in park, front country</td>
<td>illegal kill</td>
</tr>
<tr>
<td>in park, back country</td>
<td>mgmt removal</td>
</tr>
<tr>
<td>Montana Fish &amp; Game</td>
<td>mgmt removal</td>
</tr>
<tr>
<td>captivity</td>
<td></td>
</tr>
</tbody>
</table>

#### LAW ENFORCEMENT

<table>
<thead>
<tr>
<th>MAIN TRANSPORT METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>not moved</td>
</tr>
<tr>
<td>rescue litter</td>
</tr>
<tr>
<td>boat</td>
</tr>
<tr>
<td>truck</td>
</tr>
<tr>
<td>trap and trailer</td>
</tr>
<tr>
<td>helicopter</td>
</tr>
<tr>
<td>other</td>
</tr>
</tbody>
</table>

#### DISTANCE RELOCATED:

<table>
<thead>
<tr>
<th>MEASURED WEIGHT: (Lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>relocation site:</td>
</tr>
</tbody>
</table>

#### AREA MANAGEMENT (R)

<table>
<thead>
<tr>
<th>CASE INCIDENTS REFERENCED:</th>
</tr>
</thead>
</table>

#### RELEASE DATE: YEAR MONTH DAY TIME

<table>
<thead>
<tr>
<th>UTM-EAST:</th>
<th>NORTH:</th>
<th>ELEVATION: (Ft)</th>
</tr>
</thead>
</table>

#### COLLAR FREQUENCY: (Hz) TAG:

#### EXPLANATION:

1. **Case INCIDENT #:** 46 characters for "NOTES"
2. **Rec #:** 30 characters for "CASE INCIDENTS REFERENCED"
3. "R" means "repeated field" - choose as many as apply
4. "REC #:" to be filled in by computer operator
Fig. 29. Case/Incident Record and Supplemental Case/Incident Record. These forms are used throughout the U.S. National Parks to report various types of incidents including those incidents involving bears.
Public Information

Like Yellowstone and Yosemite, Glacier has put considerable emphasis on public education as a preventative tool through a program consisting of signing, pamphlets, posters, exhibits, interpretive talks, personal contacts and media releases. Unlike most other North American parks, Glacier has attempted to set standards for information sources concerning bears. Bears must be interpreted as wild, free ranging animals representing an important aspect of the park’s wilderness ecosystem and state ...

- that the potential for a dangerous or even fatal bear/human encounter, although remote, does exist;
- that the probability of bear/human encounters can be minimized but never completely removed; and
- that control of human activity is the best means of minimizing risks.

These are important principles underscoring the entire information program.

The park has recognized that effective education must start prior to visitation. Therefore,

- all replies to mail inquiries must include two pamphlets both of which carry bear information;
- information concerning bear management and safety is provided to newspapers, radio and television; and
- interpretive programs are available for area schools and organizations throughout the year.

If one has not received a certain amount of information prior to arriving at the park he would find it difficult to avoid warnings at the six main entrances. At each entrance every visitor, including all bus
passengers and visitors with park passes (senior citizens), are given a minimum of 3 pamphlets (Fig. 11, 30 and 31) each containing bear related warnings. The reverse side of the pamphlet *Enjoy Them At A Distance* (Fig. 12b) is designed to protrude beyond the other two thereby drawing attention to bears. A small sign affixed to the entrance kiosk warns of bear dangers (Fig. 32). Just beyond each entrance kiosk is a large highly visible sign (Fig. 33) cautioning that one is entering bear country. Note might be taken that the sign is set off by itself in an area of slow moving traffic, two features which probably increase its effectiveness.

Additional warnings are given at the entrances to all auto campgrounds (Fig. 34-35) and at each self-registration centre (Fig. 36).

Visitor information centres all contain some form of display indicating proper campsit sanitation, bear sign identification or information on bear biology (Fig. 37). A user operated audio-visual slide presentation containing bear information operates at the Apgar Visitor Centre.

Three separate exhibits explaining the natural history of bears and their role in the park ecosystem have been established on a permanent basis. The Logan Pass exhibit explains the habitat and behavioural differences between blacks and grizzlies and the Haystack Bend exhibit discusses the grizzly's place in the alpine ecosystem.

One pamphlet is worthy of further mention. *About Bears* (undated) (Fig. 38) is a one page fold out (costing 50¢) published by the Glacier Natural History Society in co-operation with the Park. What separates this pamphlet from others is the use of good quality photographs to illustrate important traces of bears such as diggings and preferred foods. Knowledge of what these traces mean could help to avoid encounters.

Posters at all trailheads warn hikers they are entering bear habitat
May and June in Glacier are exciting months for wildlife observations. Animals are frequently seen feeding in the meadows or moving from winter to summer haunts. Bears are introducing their cubs to the world and, in June, newborn elk and deer can be seen with their mothers.

This is also a time to be more cautious around the animals, as the adults are very protective of their young. To enjoy seeing wildlife without endangering yourself or disturbing the animals, here are a few tips to remember:

**FOR YOUR WELL-BEING** and the welfare of the animals, observe all wildlife from a distance, preferably from the security of your car. ALL BEARS ARE POTENTIALLY HAZARDOUS. Approaching, molesting or feeding them is foolhardy, dangerous and illegal.

**CAMPERS** — Be especially careful to keep a clean camp. Place all garbage in the bearproof garbage cans. All food, including ice chests and stoves, should be locked in the trunk of your car when not needed. Animals that become accustomed to human-related food sources may lose their fear of man and become dangerous.

**BACKPACKERS & HIKERS** — Hiking alone is not recommended. By making noise - bells, talking, whistling - as you walk, you alert all animals to your presence, avoiding a surprise encounter. If you do see a bear, maintain a prudent distance and allow the bear to go its way. If an animal approaches you, do not run, as this might provoke more aggressive behavior. Back slowly away or climb a tree if available. As a final resort, fall down, curl into a ball and play dead.

Unlikely as that sounds, it has been known to discourage more aggressive behavior on the part of a bear. Knowledge and alertness can help you avoid a bear encounter. Read the bear pamphlets available at all park entrances and visitor centers.

Keep your campsite clean. Store all food in sealed containers and, when not in use, keep it inside the trunk of your vehicle or in a similar container. And please remember, it is unlawful and dangerous to feed or molest any wild animal. Use a telephoto lens to photograph wildlife instead of disturbing the animal by getting too close. Do not approach any wild animal; such action may be interpreted by the animal as aggression. While hiking, regularly announce your presence; tie a small bell to your clothes or talk and sing.

**Pets** must be leashed at all times and are not allowed on trails.
Fig. 32. Reproduction of the entrance kiosk sign, Bear Country, Glacier National Park, Montana. The sign measures about 20 x 26 cm with white lettering on a bright red background. The sign is positioned in the window of the entrance gate kiosk.

**BEAR COUNTRY**

ALL BEARS ARE DANGEROUS
READ THE INFORMATION
GIVEN YOU - IT COULD
PREVENT INJURY OR DAMAGE
TO YOU AND YOUR PROPERTY

Fig. 33. Warning sign, Bear Country, is located at all major vehicle entry points, Glacier National Park, Montana. The sign is constructed of steel and measures about 70 x 90 cm with white lettering on a bright red background. It is fastened to a steel post by means of bolts which are positioned to inhibit theft. An illustration of a grizzly bear, similar to that shown in Fig. 34b, is positioned in the centre of the sign.
Fig. 34a (Top). Bear warning signs are conspicuously located at the entrance to some autocampgrounds. The signs shown are bright red in color. Many Glacier Campground, Glacier National Park, Montana.

Fig. 34b (Bottom Left). Close up of the sign shown on the right in Fig. 34a. The sign measures about 70 x 90 cm with white lettering on a bright red background.

Fig. 35. (Bottom Right). Reproduction of an autocampground entrance sign warning campers to store food properly. The sign measures about 50 x 120 cm. Apgar Campground, Glacier National Park, Montana.

**APGAR CAMPGROUND**

ONE MOBILE HOME PER CAMPSITE
FIRES MUST BE IN GRATES
CATCH ALL WASTE WATER
KEEP PET ON LEASH

REGULATIONS REQUIRE
THAT ALL FOOD, COOKING
UTENSILS AND COOLERS
BE KEPT IN A HARD-SIDED
VEHICLE WHEN NOT IN USE

THANK YOU

HAVE A GOOD TIME
Fig. 36. Reproduction of the autocampground self-registration centre poster, Camping In Bear Country, Glacier National Park, Montana. The poster measures about 22 x 28 cm with black lettering on a white background.

CAMPING IN BEAR COUNTRY

ALL BEARS ARE WILD ANIMALS AND DANGEROUS. This is the home of the grizzly and black bear and they will enter this campground on occasion. Whether they stay may be up to YOU! There is no guarantee of your safety while camping in bear country; however, you may decrease the likelihood of bear molestation or attack by the following suggestions:

1. Do not approach bears or other wild animals—they are dangerous.
2. Store food in tight containers, in the trunk of your car or hung between two trees away from the camp area. DO NOT STORE FOOD IN YOUR TENT.
3. If possible, do not sleep in clothes you wore when cooking. Packs and sleeping bags should be kept free of food odors. As a precaution against the presence of food odors, wash your hands and face before retiring.
4. Keep a clean camp—put garbage and waste in trash containers. Do not leave food or scraps in or around your camp—dump dishwater in receptacles in comfort station—NOT near your camp.
5. Wash the picnic table after use—clean your cook stove and/or fire grill.

If you see a bear in the campground, are injured, have property damaged or observe a bear damaging the property of others, please contact a ranger as soon as possible.

(Removing this sign may endanger others)

U.S. Dept. of the Interior—National Park Service
GLACIER NATIONAL PARK
Fig. 37. Displays illustrating various aspects of bear biology and management are located in most information centres. Apgar Information Centre, Glacier National Park, Montana.
Fig. 38. Reproduction of the pamphlet, About Bears, published by the Glacier Natural History Society. The pamphlet measures about 28 x 47 cm and includes 15 good quality colored photographs. The pamphlet sells for $.25.

About Bears

Black Bear
Ursus americanus

Glacier is the home of about 500 black bears. Black bears are the smallest North American bears, weighing about 90 kilograms and standing 1 meter tall. On its hind legs, an adult black bear stands about 1½ meters tall.

The highest point of a black bear is the middle of its back—it has no prominent shoulder hump. In profile, its muzzle is straight. Despite their name, black bears are not always black—they may be honey-colored or blond, and even a black one may have a tan muzzle or a white spot on its chest. Black bears sometimes change color as they grow older.

An adult black bear can run 50 meters in 4 seconds. Their short, curved claws enable black bears to climb trees, and black bears are also good swimmers.

Grizzly Bear
Ursus arctos

About 200 grizzlies live in Glacier. A grizzly is an awesome creature. An adult grizzly may weigh 160 kilograms or more and is 1¼ meters tall at the shoulder. Upright, it stands 2 meters tall and can reach even higher with its forepaws.

The highest point of the grizzly’s back is its hump, a great mass of muscle over its shoulder—and an indication of the bear’s immense strength.

Grizzlies have impressive claws on their front feet which make their footprints unmistakable. Used primarily in digging, the claws are dull and cannot be used to climb trees. Nevertheless, with the help of well-placed branches, grizzlies have been known to climb more than 7 meters into a tree.

The grizzly’s head is round and usually concave or “dished,” although face profiles vary considerably. A grizzly may be any shade of brown, from blond to nearly black, or a pattern of several shades. Some grizzlies are silver-tip, a beautiful shining effect produced by white-tipped hairs.

The grizzly’s ponderous size belies the starting speed with which it can move—an adult grizzly can dash 50 meters in 3 seconds. Grizzlies are also good swimmers, able to swim across lakes.

How Bear Cubs Are Raised

Grizzlies may live to be 25 to 30 years old but most black bears live only 20 years. Although grizzlies breed for the first time at 5 to 7 years of age, they are not full-grown until 8 to 10 years of age.

Bears mate in early summer but development of the embryo is delayed until autumn. After a 7- to 8-month gestation period 1 to 4 (usually 2) tiny cubs are born in midwinter. Nurtured with their mother’s very rich milk, they grow from less than 1/5 kilogram at birth to 5 to 10 kilograms by the time they emerge from the den in spring.

Most grizzly cubs stay with their mother for two summers. During the first summer, the mother bear is very attentive toward her cubs—she seldom lets them out of her sight, nor will she leave them to flee from danger. The cubs watch their mother and learn by mimicking her—where to look for food during each season, how to dig a winter den, and what to do when confronted by people. By the time grizzly cubs third spring arrives, their mother has taught them to be self-reliant and she abandons them. The littermates may stay together through the summer, and then perhaps even den together, but they will not reunite with their mother. Black bear cubs stay with their mother for only one summer.

The female bear does not breed again while her offspring are with her; so there is an interval of at least 3 years between each time a female grizzly reproduces. In a population of 200 grizzlies, there are only about 15 females with new cubs in any given year. This very low reproductive rate makes it difficult for a grizzly population to expand.

Measurements in this folder are metric. If you don’t think in terms of metric units, they’re easy to convert:

One meter equals about one yard.
Multiply kilograms by 2¼ to get pounds.
How Bears Stay Alive in Winter

Since little food is available during winter, bears couldn't survive if they remained active. The data a bear enters its den depends on the abundance of food during the previous summer. In Glacier, most bears enter their dens during November.

While hibernating, a bear's heart rate and breathing slow, and its body temperature drops. Since its metabolic rate is so low, the bear loses little fat during hibernation. When it leaves the den in April, however, snow is still on the ground and few plants have sprouted, and it is a week or two before the bear's digestive system can adjust to being active again. During this critical period, the bear must rely on every ounce of fat it stored in the previous summer.

A grizzly constructs its den by digging horizontally about 2 feet meters into a slope. The soil must be deep enough and of a consistency that won't collapse in the middle of winter. After the bear enters its den, snow seals the entrance, insulating the interior from the wintry air outside. The grizzly chooses a den site where the air outside is cold so the insulating snow will be less likely to melt—if it did melt, not only would cold air enter the den, but the bear might find itself sleeping in a puddle of chilly meltwater.

Black bears don't usually dig their dens since they don't have the grizzly's long front claws and powerful shoulder muscles. Instead, they hibernate in rotten trees or hollow logs, beneath tree roots, or in brushy thickets.

Arrival of Europeans Spelled Doom for the Grizzly...

Native Americans, living on the same land as grizzlies, recognized the similarities between themselves and the grizzly—they ate the same food, had similar bones and organs, and the great bear could even walk like a man. Many tribes believed the grizzly was a brother or cousin. Others believed that the first Indians were children of a bear and a woman.

The first Europeans to see grizzlies were Spanish explorers of the Southwest in the 1500s. Other explorers roaming the West found grizzlies in foothills, river-bottoms, and brushland, south as far as central Mexico, east across the Great Plains, and west to the Pacific coast.

A priest on board a ship anchored in Monterey Bay in 1802 wrote of watching grizzlies feeding on a whale carcass on the beach. In 1805, Lewis and Clark saw many grizzlies in the vicinity of the Great Falls of the Missouri River where the bears fed on carcasses of bison swept over the falls. At that time, the bears had no reason to fear people. The grizzly's lack of fear, coupled with its inclination to fight back when threatened or injured, won it a reputation for ferocity as well as its scientific name Ursus arctos horribilis.

As civilization spread, grizzly range receded. Convinced that the bears posed a threat to them and their livestock, people exterminated grizzlies near settled areas. In many places, bounties were placed on grizzlies. Grizzlies did not retreat into inaccessible wilderness because they couldn't tolerate people—on the contrary, only the grizzlies that already inhabited inaccessible areas escaped man's persecution. After little more than a hundred years, self-perpetuating grizzly populations remained only in large remote areas of Wyoming, Montana, and Canada. Even in Glacier, there were few grizzlies when the park was established in 1910.

In 1975, the grizzly was designated a threatened species. One that was not yet in danger of extinction but would probably become so if their numbers continued to decline.

161.

Fig. 38 (Cont'd). Reproduction of the pamphlet, About Bears, published by the Glacier Natural History Society. The pamphlet measures about 28 x 47 cm and includes 15 good quality colored photographs. The pamphlet sells for $.25.

...or Did It?

Establishment of Glacier National Park in 1910 created an area where the grizzly is protected, where a truly wild grizzly population is to be restored and preserved and people are no longer allowed to eliminate the bears they fear. Maintaining a wild grizzly population in a national park is no simple task. However, harmful effects that people have on bears must be identified and eliminated in Glacier. Some bears have become accustomed to the presence of people and a few become so flagrantly aggressive that they must be destroyed. Although conflicts between bears and people are rare, those that do occur generate exciting news stories that evoke apprehension and public sentiment against bears.

Protecting Bears and People

Glacier National Park is a natural area, but a managed natural area. It must be managed in order to prevent pervasive human influences from destroying the very qualities that make it priceless. Rather than manage the park by manipulating the wilderness and its wild inhabitants, however, it is human use that is manipulated in Glacier while the natural processes are allowed to proceed as they will. You may find a trail closed or fishing restricted—this is to protect you from the bears and to protect the bears from influences you and other people unintentionally have on them.
Are Bears
Bad Tempered or Friendly?

Neither bears are individuals. One may be more aggressive while another is more fun-loving. But all bears are solitary animals and won't associate with any other bears except their immediate family or mates. Bears may gather at a place with abundant food, but this is for eating, not socializing.

Bears may be active anytime day or night, most often during morning and evening twilight. When not foraging, they rest in sun-dappled areas or beneath the dense brusn or in the depression left by a uprooted tree. Bears frequently sleep under the ground in daytime dens—next to a log in a windfall, in exposed soil—evidence of a grizzly's feast. Bears may stand upright, with ears of smell and hearing when a bear first detects you. It may stand upright, with ears stuck up, tail wagging, breathing add to the frightening effect, and dislikes. It may cautiously investigate a novel object it discovers. This natural behavior can lead to trouble in the presence of people, especially if the bear develops destructive or aggressive tendencies that are rewarded with food.

Bear Signs
You may not see a grizzly during your visit to Glacier. If you are observant, you may discover that one passed that way only a few hours earlier. Look for tracks on the trail—a five-toed footprint as long as yours but twice as wide. Claws extending well beyond the toes. It is difficult not to notice a grizzly's massive dropping of partially digested berries, seeds, and grass (not hay)!

As your trail skirts an alpine meadow, look for areas of turf turned over so recently that no new plants are growing on the exposed soil—evidence of a grizzly's least on flower bulbs or its pursuit of a burrowing animal. In the forest, look for a bear tree—white markings on its hind legs, a bear bites and scratches the tree, leaving vertical scratch marks and peeled bark as high as 4 meters above the ground. It seems as though the bear tries to reach higher each time than it did the time before. (Remember to avoid a grizzly!)

Living in Familiar Territory

Every bear has a home range which it knows and frequents. The bear has places in its home range where it can find what it needs during each season—remains in one part of its home range for awhile and then moves on, traveling to different areas as snow recedes, plants sprout, and berries ripen. Having spent most of its life there, a bear is intimately familiar with its home range. It knows where its neighbors are likely to be and avoids them. It also knows where trails are. Bears use trails just as people do since it is easier to travel on a trail than through the underbrush. Most bears are aware that people also use trails. If you travel off-trail, however, you will probably surprise any bear you meet (a very dangerous situation!) since it will not be expecting to see a person there.

Young bears roam until they find habitat that is not already occupied. Having been on its own for only a short while and still looking for a home of its own, a young bear is adventurous and curious about the world and everything in it, and it won't hesitate to tackle a challenge or investigate a novel object it discovers. This natural behavior can lead to trouble in the presence of people, especially if the bear develops destructive or aggressive tendencies that are rewarded with food.

For Bears to Eat, They Must Kill a Lot, Right?

No bears are omnivores—about 90% of a bear's diet is made up of the most nutritious and energy-rich portions of plants, whereas about 10% of its diet consists of animal matter. Bears are very intelligent and curious. They know where their neighbors are likely to be and they avoid them. They Must Kill a Lot, Right?

Grizzlies, on the other hand, need habitat with a variety of evergreen forests, alpine meadows, brushy snowchutes, grasslands, and burned-over areas. Grizzlies are not as sensitive to temperature as grizzlies. They are more tolerant of cold and will venture into the snow. Grizzly caches unripe meat for later meals by covering it with dirt, twigs, and leaves—and guards it possession vigorously.

As the snow recedes, grizzlies frequent subalpine meadows, grazing on plant sprouts, digging up the bulbs and roots of glacier lilies and wild onions, munching on cow-parsnip, pursuing ground squirrels, and foraging for ants, beetles, and other insects. Huckleberry bushes are especially abundant in burned-over areas, and black bears as well as grizzlies gather to feast on the berries as they ripen in late summer.

As winter approaches and the air turns frosty, grizzlies move toward their den sites. They continue to eat berries, supplemented with grass and roots. The typical grizzly frequents the lowlands in spring, alpine meadows in midsummer, and brushland and forest during autumn, and yet grizzlies are frequently encountered in dense brush throughout the summer. In fact, the "typical" bear is probably as mythical as the "typical" person. Every bear is an individual, with individual likes and dislikes.
Fig. 38 (Cont'd). Reproduction of the pamphlet, About Bears, published by the Glacier Natural History Society. The pamphlet measures about 28 x 47 cm and includes 15 good quality colored photographs. The pamphlet sells for $.25.

Favorite Grizzly Foods

![Cow-parsnip](image)

![Huckleberries](image)

![Ground squirrels](image)

![Glacier lilies](image)

What Do Bears Need Besides Food?

Bears have to eat voraciously during the summer in order to gain enough weight on which to subsist during and immediately after hibernation. So bear habitat must have a lot of food available. Adequate food is not enough, however—bears also need places for a den and daybeds, and minimal conflict with people. And these must be sufficient not just for one bear, but for enough bears to perpetuate the population. Thus an area of good habitat must be extensive if bears are to survive there.

What Can You Do to Increase Your Safety?

As long as you are in bear country, your safety cannot be guaranteed. There are some things you can do to minimize the danger, for yourself and for those who follow.

While you’re in the park, do what you can to keep bears from becoming accustomed to the presence of people nearby or becoming conditioned to think of food whenever they see a person. Because so many people have been led to believe that bears are cute buffoons, when they encounter a real one, unthinking people don’t give it the respect due a wild animal. Even if a bear looks tame, don’t approach it. It may ignore you but react violently the moment you enter its “personal space.”

While hiking—

Hike with a friend.

Hike only during the day, not at night or during twilights.

Make enough noise so that bears will know you’re coming. If you and your companions can’t keep up a loud conversation, wear a loud bell or dangle a can of pebbles.

Don’t wear cosmetics or deodorant or take loosely wrapped food with you.

Women should not hike during their menstrual period.

Use extra caution where hearing or visibility is limited—in brushy areas, near a stream, where the trail rounds a bend, or on windy days.

While camping—

Keep your camp clean.

When you’re not eating or cooking, store your food in your car or suspended high in a tree. Don’t underestimate the ingenuity of a bear.

Use only freeze-dried food, and use a stove instead of building a campfire.

Keep your clothes, tent, and sleeping bag free of food odors.

Sleep well away from where you cooked and where you stored your food.

Dispose of your garbage properly—in a bearproof garbage can or pack it out of the backcountry. Don’t bury it. Burn only inedible trash.

Remember that a bear will claim any food it finds, even yours.

Do You Care?

Bears occasionally wander through nearly every campground in the park, and one may well pass through your campsite at night. Finding no food available, it will go on its way. If you carelessly left any food out, though, even your dirty dishes from supper, the bear will do its best to get it and may damage you or your belongings in the process. And it will return, probably a little more bold, to look for food from the next people who use that campsite. Eventually, the bear will become so dangerous that it must be destroyed—for the protection of other bears as well as people. All because of that first careless person.

Be cautious but not fearful—respect the wild country and its inhabitants.
and list techniques that may be used to minimize risks (Fig. 39). Another poster (Fig. 40) is located at backcountry campsites. All backcountry campers must obtain a permit and when doing so are given a specific verbal warning concerning bears. The warning is then stamped or written on the permit which must be signed by the permittee. In addition each permittee is supplied with a free plastic garbage bag (Fig. 41) carrying bear information, and a copy of the pamphlet _Grizzly_ (Fig. 11) and a second pamphlet entitled _Backcountry_ (Fig. 42). Those who plan to fish are given an additional pamphlet _Fishing Regulations_ which also contains bear information.

Each evening's interpretive talk must at least comment on bear safety by explaining the anti-feeding regulations, and by making suggestions for safe hiking and camping. At the start of each guided walk the interpreter must explain what actions will be taken if the group should encounter a bear during the trip. When closures prevent an interpretive hike the interpreter must spend an equivalent amount of time at the trailhead or another appropriate area to present informal talks on bear management. Interpreters are assigned to the Logan Pass Visitor Centre area whenever a grizzly is observed.

_Glacier's Bear Management Plan_ is available to the public at any staff office, Ranger Office or Information Centre. Additional reports and research findings are made available at the Park Library, Park Headquarters and from the Research Biologist.

---

40 This represents good use of high profile media space.
Fig. 39. Reproduction of the trailhead poster, Notice To Backcountry Users, Glacier National Park, Montana. The poster measures about 21 x 29 cm with black and red lettering on a white background.

NOTICE
TO BACKCOUNTRY USERS

The back country you are entering is inhabited by black and grizzly bears. They are usually shy and avoid people, but are potentially dangerous and may attack without warning. For your safety these precautions are necessary.

When Hiking
1. Do not travel alone. Do not hike after dark.
2. Make your presence known by noise. Use caution where vision is obstructed.
3. Do not carry or use odorous foods.
4. Avoid bears when seen. Never approach or attempt to feed them.

When Camping
1. Do not camp in areas frequented by bears. Sleep near trees when possible.
2. Use “Pack-in, Pack-out” policy. Burn all garbage and combustibles. Carry out trash that will not burn.
3. Regulations require that all food and cooking gear be suspended 10 feet above the ground between two trees. In the absence of trees, store food in airtight containers away from sleeping areas.

When Fishing
1. Dispose of entrails and other fish wastes by burning on a hot fire or pack out in a tight plastic bag.

IMPORTANT: Information on bears is necessary to protect Park visitors. Report all bear sightings, damage, personal injuries to a Park Ranger.

THERE IS NO GUARANTEE OF YOUR SAFETY WHILE CAMPING AND HIKING IN GRIZZLY COUNTRY.

U.S. DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
GLACIER NATIONAL PARK

Fig. 40. Reproduction of the backcountry campsite poster, Warning, Glacier National Park, Montana. The poster measures about 15 x 19 cm with black lettering on a green background.

WARNING

THIS AREA IS GRIZZLY BEAR HABITAT. THERE IS NO GUARANTEE OF YOUR SAFETY WHILE CAMPING IN GRIZZLY COUNTRY; HOWEVER, YOU CAN DECREASE THE LIKELIHOOD OF BEAR ENCOUNTERS BY:

1. KEEPING A CLEAN CAMP.
2. SEAL FOOD IN PLASTIC BAGS AND HANG HIGH BETWEEN TWO TREES AWAY FROM CAMP AREA.

DO NOT STORE FOOD IN YOUR TENT.

3. IF POSSIBLE, DO NOT SLEEP IN CLOTHES YOU WORE WHEN COOKING. PACKS AND SLEEPING BAGS SHOULD BE KEPT FREE OF FOOD ODORS. WASH YOUR HANDS AND FACE BEFORE RETIRING.

4. CARRY OUT ALL TRASH. DO NOT BURY.
Fig. 41a (Side 1). Reproduction of the backcountry permittee plastic garbage bag, Glacier National Park, Montana. The bag measures about 34 x 40 cm with black lettering on a white background. A great deal of information has been included on this bag which is given to all backcountry permittees.

WELCOME
to your
National Park
...yours to enjoy...protect...keep clean!

FOR YOUR SAFETY WHILE USING THE BACKCOUNTRY OF THIS NATIONAL PARK, A FEW SPECIAL PRECAUTIONS ARE NECESSARY TO PROTECT YOU, THE ENVIRONMENT AND THE ANIMALS THAT LIVE HERE. WILD ANIMALS, LIKE PEOPLE, ARE INTERESTED IN THE SMELL OF FOOD. THEY WILL BECOME TROUBLESOME IF FOOD SMELLS BECOME TOO PREVALENT. THE ANIMALS, ESPECIALLY BEARS, TRAVEL ON TRAILS TOO, ESPECIALLY AT NIGHT. WITH THESE FACTS IN MIND A FEW TIPS AND REGULATIONS ARE NECESSARY FOR YOUR SAFETY AND THE PROTECTION OF THE PARK.

AN AREA FREQUENTED BY BEARS IS THE WRONG PLACE TO CAMP. WATCH FOR TRACKS, EXCREMENT AND HAIR RUBBED ON TREES. DO NOT CAMP WHERE THESE SIGNS ARE EVIDENT. CAMP AWAY FROM TRAILS AND NEAR CLIMBABLE TREES, IF POSSIBLE.

AVOID THE USE OF OPEN FIRES BY COOKING ON A SELF-CONTAINED, PRESSURIZED STOVE. OPEN FIRES ARE NOT PERMITTED IN MANY CAMPING AREAS. USE THIS BAG TO PACK OUT LEFT-OVER REMNANT FOOD ITEMS AND PACKAGING MATERIALS.

PLEASE OBSERVE THE FOLLOWING BACKCOUNTRY REGULATIONS:

ALL BACKCOUNTRY TRAVELERS, WHO INTEND TO HAVE A FIRE OR TO CAMP OVERNIGHT, MUST OBTAIN A BACKCOUNTRY USE PERMIT.

PETS, FIREARMS, AND VEHICLES OF ANY KIND, ARE NOT PERMITTED ON TRAILS.

CAMPS MUST CAMP AT SITES AS AUTHORIZED ON THE PERMIT.

THE CAMPING PERMIT AUTHORIZES THE HOLDER TO BUILD FIRES IN THE BACKCOUNTRY AT SPECIFIC LOCATIONS. THE BUILDING OF FIRES MAY BE PROHIBITED AT CERTAIN TIMES AND AT CERTAIN LOCATIONS.

USE ONLY DEAD AND DOWNT WOOD FOR FIRES WHERE PERMITTED. NEVER CUT GREEN VEGETATION FOR ANY PURPOSE.

THE DIGGING OR LEVELING OF THE GROUND AT ANY PLACE IS PROHIBITED. NEVER DRIVE NAILS INTO TREES.

ALL EQUIPMENT MUST BE REMOVED AND CAMPSITES CLEANED BEFORE DEPARTURE. PACK OUT ALL UNBURNABLE TRASH.

NEVER FEED, MOLEST, OR TEASE ANY WILD ANIMAL.

CARRY WASH WATER TO CAMPSITE. DO NOT BATH OR WASH DISHES OR CLOTHES IN LAKES OR STREAMS.

FOLLOW THESE IMPORTANT BACKCOUNTRY MANNERS AND HELP TO AVOID IMPAIRMENT OF THE ENVIRONMENT.

NOTE: CAMPING AND HIKING REGULATIONS IN WATERTON LAKES NATIONAL PARK VARY FROM THOSE IN GLACIER. CONSULT CANADIAN OFFICIALS BEFORE BEGINNING TRIP. IDENTIFICATION IS REQUIRED OF ALL PARTIES ENTERING WATERTON BY TRAIL FROM GLACIER.
Fig. 41b (Side 2). Reproduction of the backcountry permittee plastic garbage bag, Glacier National Park, Montana. The bag measures about 34 x 40 cm with black lettering on a white background. A great deal of information has been included on this bag which is given to all backcountry permittees.

FOR YOUR TRASH

— TO HELP YOU KEEP YOUR CAMP CLEAN

REGULATIONS REQUIRE THAT FOOD, COOKING UTENSILS AND FOOD CONTAINERS BE SUSPENDED, AWAY FROM SLEEPING AREA, AND AT LEAST 10 FEET ABOVE THE GROUND AND 4 FEET AWAY FROM ANY TRUNK OR LIMB. IN THE ABSENCE OF TREES, STORE FOOD AND COOKING GEAR IN AIRTIGHT CONTAINERS AWAY FROM SLEEPING AREAS, WHERE POSSIBLE, COOK AWAY FROM YOUR SLEEPING AREA AND KEEP YOUR CLOTHES AND SLEEPING BAG CLEAN.

ODORS ATTRACT BEARS

- Pack out all garbage, make sure items such as empty food containers are clean and odor free.
- When camping, use freeze-dried food instead of fresh food.
- Store food in plastic bags out of reach of bears and well away from sleeping areas.
- Sleep some distance from your cooking area.
- Don't sleep in the same clothes you wore when cooking.
- Keep sleeping bags and personal gear clean and free of food odor.
- Cook with gasoline on liquid petroleum burners instead of making campfires.
- Don't use perfumes, deodorants, and other sweet smelling substances.
- Women should stay out of bear country during their menstrual period.
- Personal cleanliness is good insurance.
- Human sexual activity attracts bears.

BEAR SAFETY TIPS

- Dispose of your camp waste properly—pack it out of the backcountry, don't bury it.
- Where fires are permitted, burn only inedible trash.
- Pack out food remnants, cans, bottles, foil, etc.

REPORT ALL BEAR SIGHTINGS TO A RANGER
Fig. 42. Excerpts pertaining to bears from the pamphlet, Backcountry, which is given to all backcountry permittees in Glacier National Park, Montana.

1. A mandatory non-fee fishing permit and copies of the fishing regulations are available at all Ranger Stations and Visitor Centers.
2. Some park waters are barren of fish, so inquire before you plan a long trip.
3. When cleaning fish, do not dispose of entrails along the streambanks, lake-shores, or near campsites as they attract bears.

Consider yourself lucky to see a black or grizzly bear. But remember . . . the wilderness is their home. Please be a well-mannered guest. Bears are usually shy; however, make no attempt to approach or startle them. They have been known to attack without warning. When hiking make some noise to alert your presence, or wear a bear bell on your pack. Never offer food to bears and never get between a sow and her cub. As bears have an excellent sense of smell, it is important to avoid the use of odorous food. Regulations require that food, cooking utensils and food containers be suspended, away from sleeping area, and at least 10 feet above the ground and 4 feet from any trunk or limb. In the absence of trees, store food and cooking gear in airtight containers away from sleeping areas. Where possible, cook away from your sleeping area and keep your clothes and sleeping bag clean.

Report all bear sightings to a ranger.
Waste Management

Since the mid 1970's all garbage receptacles in the park have been bear proofed (letter box design). Garbage pick-up schedules which are appendixed to the Plan are carried out to ensure there is no overflow problem. For most areas this requires daily pick-up. In campgrounds where bear problems have been most common, the pick up is made last each day. All garbage is hauled to either the town of Kalispell or Browning both of which are a distance from the Park boundary.

Of particular note is the fact that Glacier includes stipulations requiring proper handling and storage of food and waste on all concessionaire permits and contracts. That the park is serious about enforcement of these regulations is made clear in an annual letter mailed to each operator.

Park residents are also required to follow stringent garbage handling regulations. Those residents without bear proof holding facilities must store receptacles indoors. Uncleaned barbecue grills or pet food cannot be left outside. These requirements along with a caution that they will be strictly enforced are mailed annually to each resident.

A pack-in pack-out garbage policy is used for all backcountry users. Small signs (Fig. 43) prohibiting the dumping of garbage in pit toilets are being installed in every outhouse (Blair 1983). Backcountry concessionaires must store all garbage indoors until it can be removed by pack animal.

Glacier is currently experimenting with a fish entrail disposal program whereby entrails are thrown back into the lake. According to regulations entrails are to be either burned or packed out; both methods pose obvious problems. Thus far the experiment is limited to 2 lakes which
Fig. 43. Reproduction of the poster, Warning, which is placed in all the backcountry outhouses of Glacier National Park, Montana. Visitor garbage thrown down outhouse holes not only attracts bears and other scavengers but also necessitates more frequent relocation of the outhouse once the 'hole' becomes full. The poster is constructed of strong flexible plastic and measures about 14 x 22 cm with red lettering on a white background.

Fig. 44. Tenting enclosure provides an area for tenters in a campground restricted to hardsided units only. It has been in use for many seasons and has been well received by the public. Many Glacier Campground, Glacier National Park, Montana.
have been adequately signed to explain the project. Preliminary results indicate this to be a successful technique and park authorities expect there will soon be a change to regulations to make this method universal.

Food Storage

As noted under the Yellowstone section (page 95) the U.S. Government has enacted regulations pertaining to proper storage of food.

Glacier maintains strict enforcement of this regulation. Autocamp areas having a history of bear problems are equipped with at least one food sling while similar devices are provided at many of the backcountry campsites.

Management of Human Activities

At least 6 methods are currently employed to control visitor activities.

• The opening dates of campgrounds having a history of early season incidents is delayed while those campgrounds showing late season problems are closed early.

• Two auto campgrounds are restricted to hard sided units throughout the year. (This is similar to the Yellowstone program). Temporary restrictions can be applied to other campgrounds should the need arise. Apparently the restriction does evoke some adverse reaction from tenters who are offered an alternative campground in a safer location (Haraden 1982:pers.comm.). A sleeping enclosure (Fig. 44) at the Many Glacier Campground (hard sided restriction) offers an alternative to tenters, cyclists or itinerant backpackers. The

41 The hardsided restriction was applied to Many Glacier after a 1976 grizzly inflicted human fatality. Only one black bear has been observed in the campground since that date although numerous grizzlies have been observed on the open slopes surrounding the area (Many Glacier Park Ranger 1982:pers.comm.). Pentilla (1983) has mentioned that the hardsided restriction prevents incidents simply because it is easier to properly store food in a camper unit. Hence the restriction is mainly a means of food storage control.
enclosure, although admittedly unaesthetic, is well accepted by the public.

• Warning posters (Fig. 22) are posted at trailheads when a grizzly is observed less than 300 metres from a maintained trail or backcountry campsite. If the bear is not observed after two consecutive routine patrols the sign is removed.

• Closure of areas, trails or campsites is a commonly used management technique in Glacier. In the 1981 season alone there were approximately 50 area closures each in effect for a minimum of 7 days (Frye 1982:pers.comm.). Generally closures are implemented for one of the following reasons:

  • when a bear remains in a close proximity to a maintained trail or backcountry campsite even though there is no human interaction and the animal continues feeding on natural foods and displays neutral behaviour;

  • when a bear is found feeding on carrion that is in close proximity to maintained trails or backcountry campsites;

  • when a bear found in close proximity to maintained trails or backcountry campsites, displays aggression, damages equipment, obtains unnatural food or appears habituated to humans; closure of a developed area may be implemented for any of these reasons;

  • when a bear inflicts personal injuries or death regardless of the location;

  • a temporary closure may be implemented while reports of an incident are confirmed or denied.

• Closed areas are patrolled at set intervals and may not be opened until 2 consecutive patrols indicate the danger has been reduced or 7 days have elapsed since the posting. Fig. 22 illustrate the highly visible closure signs. Note might be taken that each sign is constructed of a light yet strong weatherproof plastic material. The sign's colour is reserved for bear warnings and closures only. A caution as to the illegality of removing the sign is printed at the bottom to deter would be souvenir collectors.

• Quotas exist for all backcountry campgrounds thereby limiting the

42 The extensive huckleberry stands on the Apgar Range attract many bears. As a result the area is now routinely closed to visitors during the August through October period.
number of overnight parties. Quotas are continually evaluated and may be adjusted to provide greater safety and less impact.

- Patrols of developed and backcountry areas are performed routinely by enforcement personnel. Large auto campgrounds are staffed 10 hours per day (1200 to 2200 hrs) 7 days a week by a campground Ranger who, as one of his main duties, ensures that food and garbage are properly stored and supplies direct information about bear safety. Approximately 200-300 warnings and 20-30 citations are issued each year for improperly stored food or garbage (Frye 1982:pers.comm.). One backcountry area (Granite Park)\(^{43}\) that has been a source of frequent bear incidents is manned full time by a Ranger trained in bear management techniques.

Management of Problem Bears

Criteria for capturing, marking, releasing and destroying bears have been set out in the Plan.

Captures are made under the following criteria:

- when area closures have failed to deter a bear from frequenting a backcountry campsite even though the bear is foraging on natural foods, exhibiting neutral behaviour and no human interactions have occurred;
- when a bear poses a threat in a developed area even though there is no human interaction; this does not include bears who may be passing through the area;
- when a bear, attracted to a roadside or developed area by carrion, remains in the area after the carrion has been removed;
- when a bear is observed several times at a roadside area even though there is no human interaction;
- when a bear exhibits aggressive behaviour, causes property damage in a camp, obtains unnatural food, or becomes overly familiar with humans;
- when a bear causes human injury or death.

---

\(^{43}\) A bear proof hiker shelter is soon to be built here as a result of the high number of bear incidents. The proposed construction is a point of controversy.
Capture techniques include the use of culvert traps, Aldrich leg hold snares, and free ranging immobilizations with M99/M50 or Ketamine/Rompun.

Bears captured for reasons 1 through 4 may be relocated within the Park at one of 5 preselected areas for grizzlies or 7 preselected areas for blacks. Bears, captured for reasons 5 or 6, are to be relocated outside the Park or destroyed. Regardless of the reason for capture, grizzlies are, whenever possible, to be released outside the Park as per arrangements with outside agencies. All released bears are ear tagged in such a manner as to permit identification by tag placement and colour.

Bears are destroyed only if capture criteria are met plus one of the following criteria:

- the bear is involved in a life threatening emergency
- capture is not feasible or cannot be made promptly
- capture attempts have failed
- a release site (outside the park) is not available.

Grizzly carcasses are sent to a lab to determine age, physical measurements, parasite loads, stomach content and other related biophysical data (Haraden 1982:pers.comm.). Only the heads of black bears are sent for analysis.

Training

An exceptionally fine training program is conducted each year in Glacier. During a 3-5 day training session park employees involved in the bear management program gather to review procedures. Table 14 lists the

---

44 Glacier uses large Rototag eartags colour coded to species to allow easier identification, especially by visitors.
Table 14. Agenda for the 1982 annual bear management training session, Glacier National Park, Montana.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Presenter/Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 22</td>
<td>8:30-8:45</td>
<td>INTRODUCTION</td>
<td>Supt. &amp; Chief Ranger</td>
</tr>
<tr>
<td></td>
<td>8:45-9:15</td>
<td>1982 BEAR MANAGEMENT PLAN</td>
<td>Res. Mgmt. Specialist</td>
</tr>
<tr>
<td></td>
<td>9:15-9:45</td>
<td>PARK RESEARCH PROGRAM</td>
<td>Research Biologist</td>
</tr>
<tr>
<td></td>
<td>10:00-10:30</td>
<td>REPORTING PROCEDURES, BIMS APPLICATIONS</td>
<td>Blacker</td>
</tr>
<tr>
<td></td>
<td>10:30-11:00</td>
<td>INVESTIGATION OF ACCIDENTS</td>
<td>Supv. Pk. Rgr. Ryder</td>
</tr>
<tr>
<td></td>
<td>11:00-12:00</td>
<td>DRUG USE AND SECURITY</td>
<td>Rangers Blair &amp; Frye</td>
</tr>
<tr>
<td></td>
<td>12:00-1:00</td>
<td>LUNCH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1:00-4:30</td>
<td>USE OF CAP-CHUR EQUIPMENT, SNARE TECHNIQUES &amp; CULVERT TRAPPING</td>
<td>Ranger Frye &amp; Team</td>
</tr>
<tr>
<td>June 23</td>
<td>8:30-9:30</td>
<td>MANAGEMENT ACTION PROCEDURES</td>
<td>Ranger Frye</td>
</tr>
<tr>
<td></td>
<td>9:30-10:00</td>
<td>BEAR IDENTIFICATION</td>
<td>Ranger Penttila</td>
</tr>
<tr>
<td></td>
<td>10:00-10:30</td>
<td>RELOCATION: PROCEDURES AND CRITERIA</td>
<td>Ranger Ryder</td>
</tr>
<tr>
<td></td>
<td>10:30-11:30</td>
<td>FIREARMS SAFETY</td>
<td>Rangers Blair, Penttila, &amp; Vis. Prot. Spec.</td>
</tr>
<tr>
<td></td>
<td>11:30-12:00</td>
<td>OPEN</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12:00-1:00</td>
<td>LUNCH</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1:00-2:00</td>
<td>PHARMACOLOGICAL ASPECTS AND PROPERTIES OF TRANQUILIZING AGENTS - USE OF BIOCIDES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2:00-4:30</td>
<td>FIRST AID PROCEDURES FOR ACCIDENTAL HUMAN INJECTION OF TRANQUILIZING AGENTS</td>
<td></td>
</tr>
<tr>
<td>June 24</td>
<td>8:30-4:30</td>
<td>FIREARMS QUALIFICATIONS, CAMAS RANGE</td>
<td>Burns, Blair &amp; Bell</td>
</tr>
</tbody>
</table>

Source: Glacier National Park, Montana.
agenda\textsuperscript{45} for the 1982 training session which was attended by approximately 50 employees including rangers, trail crew, fireguards, information centre attendants, interpreters and upper level managers.

Training is also supplied to concession employees, maintenance crews and administration clerks. Concession employees must sign a sheet indicating that they attended a training/orientation session and received a bear information package (Blair 1983). Table 15 summarizes the level of training given to all parties.

Emergency Procedures

Emergency procedures are included in the Field Guidelines for Bear Management Actions (Table 16) under the section dealing with injuries or human fatalities. Note should be taken of the use of a special "investigative team" trained especially for such incidents. Note might also be made that the annual training program includes a session reviewing emergency procedures.

Research Planning

In order to provide scientific criteria for the Bear Management Plan, research is to be conducted, co-ordinated and encouraged by the Park. An annual in-house workshop is conducted to review research results, and prioritize research needs. An annual research plan is appended to the Bear Management Plan.

\textsuperscript{45} The author attended this session and found it to be of exceptionally fine quality.
Table 15. Information distribution plan used to train various levels of park employees and residents, Glacier National Park, Montana.

<table>
<thead>
<tr>
<th>Audience</th>
<th>Responsible Individual</th>
<th>Information (cumulative list from top to bottom)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All visitors</td>
<td>Chief Naturalist</td>
<td>Entering bear country: Keep a clean camp:...do not feed animals, all bears are dangerous. Report all bear observations. Overnight backcountry use requires registration at information centre.* More information available at ranger stations and information centers.</td>
</tr>
<tr>
<td>Residents and Inholders</td>
<td>Assistant Superintendent</td>
<td>Specific requirements and procedures for handling garbage. Appendix 5. Letters to inholders and memos to employees.</td>
</tr>
<tr>
<td>Concession employees and backcountry users</td>
<td>Assistant Superintendent and Chief Naturalist</td>
<td>Backcountry regulations. Pack in/pack out garbage from backcountry. How to minimize risks of hiking and camping in bear country.</td>
</tr>
<tr>
<td>Concession employees</td>
<td>Assistant Superintendent</td>
<td>Distribute packets to all concession employees and receive a receipt.</td>
</tr>
<tr>
<td>All Glacier Park employees</td>
<td>Chief Ranger</td>
<td>General Bear Safety. Report violation of park regulations. Notebooks containing plan and research available in subdistricts and information centers.</td>
</tr>
<tr>
<td>N.P.S. Employees</td>
<td>Personnel Officer</td>
<td>Distributes bear orientation information to seasonal employees.</td>
</tr>
<tr>
<td>Gate Rangers, Dist. Office Admin. Clerks &amp; front desk personnel</td>
<td>Chief Ranger</td>
<td>How to counsel backcountry users. How to use bear monitoring system.</td>
</tr>
<tr>
<td>Trail crew, Maintenance and Information Center personnel</td>
<td>Chief Naturalist</td>
<td>How to handle and control crowds or groups of observers.</td>
</tr>
<tr>
<td>Interpreters</td>
<td>Chief Naturalist</td>
<td>How to handle guided hikes and visitors when bears are observed.</td>
</tr>
<tr>
<td>Seasonal Rangers &amp; Fire Guards trails</td>
<td>Chief Ranger</td>
<td>How to assist with managing bears. Procedure for posting/closing/opening regulations and enforcement. Handling traffic.</td>
</tr>
<tr>
<td>Law enforcement personnel</td>
<td>Visitor Protection Spec.</td>
<td>Regulations and enforcement.</td>
</tr>
</tbody>
</table>

* Information center refers to visitor and information centers and information desks at district/subdistrict offices.

The audience who will be informed is identified in the first column. The individual responsible for distributing the information is identified in the second column. In the third column is a list of the information which will be distributed. This list is cumulative from top to bottom. Visitors must receive at least the information in the first block of the Table; park residents (listed in the second block) must receive at least all the information in that block and anything above and so on. The information to be distributed becomes more specialized as one moves down the list. The Superintendent's staff, listed at the bottom, must be aware of all information listed throughout the Table.

---
a Adapted from U.S.D.I. 1982a:Table 3.21.
<table>
<thead>
<tr>
<th>BEAR SIGHTING (No human interaction)</th>
<th>OFF TRAIL AREAS (greater distance than 300m from maintained trail or road)</th>
<th>MAINTAINED TRAILS AND AREAS (less than 300m from trails)</th>
<th>BACKCOUNTRY CAMPSITES</th>
<th>RESIDENT/BUSINESS, AUTO CAMPGROUNDS AND LOGAN PASS</th>
<th>ROADSIDES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Investigate and monitor additional reports for potential mgmt actions</td>
<td>2. Post bear frequenting signs on both ends of appropriate trail segments</td>
<td>2. Investigate and monitor additional reports</td>
<td>2. INVESTIGATE. Notify people in area and advise to keep foodstuffs secure</td>
<td>a. Investigate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Investigate/monitor additional reports</td>
<td>3. Investigate and monitor additional reports</td>
<td>a. Bear observed:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Bear observed remaining in area, feeding naturally, and/or displaying neutral behaviour</td>
<td>4. Bear observed remaining in area, feeding naturally and/or displaying neutral behaviour</td>
<td>1. Control people</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Close and patrol</td>
<td>a. CLOSE and PATROL</td>
<td>2. Direct people to safe areas</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Notify 720 of closure and DOCUMENT</td>
<td>b. NOTIFY 720 Control and DOCUMENT</td>
<td>3. If bear is determined to be of no threat, and is passing through. Photograph and ID</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Photograph and ID if possible</td>
<td>c. Assist campers in moving to another camping area</td>
<td>4. If bear constitutes a threat: (a) TRANSLOCATE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>d. Photograph and ID</td>
<td>b. Bear not observed:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>e. Attempt to TRANSLOCATE</td>
<td>1. PATROL and MONITOR additional reports for potential future mgmt actions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Bear not observed during patrols or bear translocated</td>
<td>3. Notify 720 Control and DOCUMENT</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a. Open area, monitor additional reports</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b. Notify 720 and DOCUMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6. PATROL until carrion consumed, and bear leaves site</td>
<td>6. Bear report to Resource Mgmt ext. 254</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a. OPEN</td>
<td>1. Remove carrion. Clean up site</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b. NOTIFY 720 Control and DOCUMENT</td>
<td>2. ALERT and CONTROL PEOPLE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. PATROL</td>
<td>3. PATROL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. TRANSLOCATE, if bear remains in area</td>
<td>4. TRANSLOCATE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Notify 720 Control and DOCUMENT</td>
<td>5. Obtain bear report details and notify Resource Mgmt ext. 254</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. Remove carrion and clean up site</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. CONTROL PEOPLE/TRAFFIC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. MONITOR additional reports</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. PATROL area</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Obtain bear report details and notify Resource Mgmt ext. 254</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6. If bear remains in area, TRANSLOCATE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Table 16. (Cont'd) Field guidelines for bear management actions, Glacier National Park, Montana.**

<table>
<thead>
<tr>
<th>OFF TRAIL AREAS (greater distance than 300m from maintained trail or road)</th>
<th>MAINTAINED TRAILS AND AREAS (less than 300m from trails)</th>
<th>BACKCOUNTRY CAMPSITES</th>
<th>RESIDENT/BUSINESS, AUTO CAMPGROUNDS AND LOGAN PASS</th>
<th>ROADSIDES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agressive behaviour, tore up camp, obtained other than natural foods, or overly familiar with humans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1. Close area | 6. Bear not observed:  
   a. Prepare to REMOVE target bear  
   b. PATROL and closely MONITOR additional reports for return of target bear to same or another area  
   c. Keep area CLOSED until information indicates that the bear has moved to another area  
   d. OPEN after patrols indicate target bear is not in area  
   e. Obtain bear report details and notify Resource Mgmt. ext. 254 | 1. Investigate:  
   a. CLOSE as necessary  
   b. Law enforcement action may be indicated | 2. Notify 720 Control and DOCUMENT | 1. Investigate:  
   a. CLOSE area adjacent to scene, Notify Subdistrict Ranger | |
| 2. Notify 720 and document | 7. Bear observed:  
   a. REMOVE  
   b. Obtain bear report details and notify Res. Mgmt ext. 254  
   c. OPEN  
   a. Attempt to REMOVE (for destruction in all fatalities)  
   b. PATROL and MONITOR additional reports for return of bear to same or different area  
   c. Obtain bear report details and notify Res. Mgmt ext. 254  
   d. Keep area CLOSED until Subdistrict Ranger and/or Dist. Ranger feel threat is over  
   e. Notify 720 Control and DOCUMENT  
   f. Maintain ALERT status for return of bear | |
| 3. Investigate:  
   a. Photograph and ID  
   b. Law enforcement action may be indicated | 8. Bear observed:  
   a. REMOVE  
   b. Obtain bear report details and notify Res. Mgmt ext. 254  
   c. Open area only by Subdistrict Ranger and District Ranger concurrence  
   d. Obtain bear report information and notify Res. Mgmt ext. 254 | 3. Notify 720 Control | 4. INVESTIGATE, Investigative assistance may be needed. Contact Law Enforcement Specialist | |
| 4. Attempt to remove bear | 9. Bear observed:  
   a. REMOVE  
   b. Notify 720 Control | 4. INVESTIGATE | e. Maintain ALERT status for return of bear | |
| 5. Bear observed:  
   a. REMOVE  
   b. Obtain bear report details and notify Res. Mgmt ext. 254  
   c. OPEN  
   d. Notify 720 Control | 10. Bear observed:  
   a. REMOVE  
   b. Notify 720 Control | 5. Bear observed:  
   a. REMOVE  
   b. OPEN  
   c. Notify 720 Control | | |

---

*Adapted from U.S.D.I. 1982a:1-3 Appendix 7. The Park is considering deleting this table from future bear management plans.*
Regional Management

The only co-operative agreement currently in place allows researchers from adjacent lands to radiotrack collared bears inside the park. A regional program similar to that of Yellowstone may come about in the not too distant future (Kendall 1983:pers.comm.).

JASPER NATIONAL PARK

Jasper National Park, which was established in 1907, now encompasses 10,878 km² of mountainous terrain in west central Alberta. The park is inhabited by an estimated population of at least 200 black and 100 grizzly bears. Since the early 1960's visitation has grown by approximately 8.5% per annum to reach figures of over 1.9 million during 1981.

If total relocations plus destructions are used as an indication of a park's bear management activity, Jasper (Tables 1 and 2) can be seen as the Canadian 'hot spot'. In fact Jasper is second in North America only to California's Yosemite National Park. Management data for the 1962-82 period is shown in Table 17.

In 1981 the Park introduced a sophisticated plan entitled Interim Bear Management Guideline (Parks Canada 1981i) which outlines the bear management program in minute detail. The following is a synopsis of the Park's program based on the Guideline and discussions with park personnel.

Program Objectives

Jasper's program has six objectives:

46 Park managers feel there is no good data upon which to base population estimates. Hence, even the minimum figures given may be erroneous (Woodrow 1983:pers.comm.)

<table>
<thead>
<tr>
<th>Year</th>
<th>Visitation</th>
<th>Injuries</th>
<th>Fatalities</th>
<th>Injury/Fatality Rate</th>
<th>Incidents</th>
<th>Destructions</th>
<th>Relocations</th>
<th>Closures</th>
<th>Enforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962</td>
<td>392,987</td>
<td>10</td>
<td>73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1963</td>
<td>468,579</td>
<td>26</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1964</td>
<td>480,102</td>
<td>17</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td>522,658</td>
<td>1</td>
<td>23</td>
<td>.191</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1966</td>
<td>595,164</td>
<td>20</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1967</td>
<td>652,186</td>
<td>9</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>834,748</td>
<td>16</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>1,135,558</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>1,317,279</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>1,430,370</td>
<td>35</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>1,501,632</td>
<td>10</td>
<td>19</td>
<td>.366</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>1,624,746</td>
<td>18</td>
<td>58</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>1,709,770</td>
<td>23</td>
<td>98</td>
<td>.058</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>1,585,738</td>
<td>55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>1,650,505</td>
<td>12</td>
<td>45</td>
<td>.102</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>1,713,670</td>
<td>15</td>
<td>43</td>
<td>.058</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>1,770,872</td>
<td>33</td>
<td></td>
<td>.282</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>1,649,632</td>
<td>4</td>
<td>23</td>
<td>.162</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>1,566,630</td>
<td>27</td>
<td>56</td>
<td></td>
<td>246</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>1,937,436</td>
<td>48</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>1,859,194</td>
<td>5</td>
<td>9</td>
<td></td>
<td>128</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Black and grizzly data combined.

d Injury/Fatality Rate is the number of injuries or fatalities per 100,000 visitors.
e Incident data is difficult to compare due to variation in reporting terminology. For example, the 1979-80 data is reported as 'complaints of both black and grizzly problems' (Woody 1981); 1982 data reported as 'complaints' and 'incidents' for both species (Woody 1982).
f Data 1962-80 from Kaye (1981). Data 1981-82 from Woody (1981, 1982). All figures are for intentional management destructions. Relocation data is difficult to compare due to variation in reporting terminology. For example, the term 'handled' includes bears destroyed by management or by vehicles plus relocated bears (Woody 1981). Also it is difficult to determine whether figures represent the actual number of relocation attempts or the number of different bears relocated. For example Woody (1981) reports a total of 86 black bear relocations while Kaye (1981) reports 56 bears 'handled'.
g Data from Woody (1980, 1981, 1982). Figures do not include permanent closures such as at the landfill site.
h Data from Woody (1982). The figure represent the number of charges laid related to illegal feeding or improper garbage disposal.
• To protect human life and property.
• To maintain viable bear populations.
• To make available accurate and current bear information to the park user.
• To encourage, initiate, and actively participate in inter-agency co-operative efforts leading toward improved management practices.
• To monitor human and bear activities and their inter-relationships for the guidance of and improvement to management actions.
• To identify and encourage research required to improve management actions.

**Organization Structure**

A so-called "Bear Management Committee" comprised of all section heads, the Bear Management Warden, and the Assistant Chief Park Warden sits twice a year to discuss garbage handling practices and make recommendations to the Superintendent. The Committee does not deal with any other aspects of bear management.47 Responsibilities of all park staff are clearly outlined.

**Evaluation**

The bear management program is reviewed annually by a group of wardens (Resource Management Committee) who submit updating recommendations to the Superintendent. No evaluation criteria have been formalized, however the number of handlings, destructions and successful relocations

---

47 The Committee would be more appropriately named the Solid Waste Committee (Woodrow 1983:pers.comm.).
are generally thought to be the unofficial evaluation criteria (Woodrow 1983: pers. comm.).

Monitoring

Nine different forms are used to collect information on all management actions and sightings. This information is sent to the Warden Office where the Duty Warden compiles a Daily Bear Report. This report is sent to the Superintendent who ensures that copies are sent to all information outlets.

One effective technique is the use of the detailed Yellowstone Bear Sighting form (Fig. 9) to assist visitors in completing their observations.

With the exception of wildlife observations which are handled by a computerized system (CANSIS)48, all data is hand sorted and collated. The 3-4 month return delay in wildlife observations make the computerized system of little use to bear management except for long term planning. The Park has recently purchased its own computer which may soon make rapid manipulation of data a reality.

Public Information

Jasper's entire bear information program relies very heavily on the content and distribution of one pamphlet, You Are in Bear Country (Parks Canada 1981k) shown in Figure 45. Although provision is made for posting of other bear related information, to date the pamphlet remains the main

48 CANSIS = Canadian Soil Information System.
You are in Bear Country

It's their home for thousands of years. You are the visitor. We are wild animals that demand your respect. They are strong. They are agile. Respect them. They will defend themselves, their young and their territory if they feel threatened.

Knowledge and patience can help you avoid an encounter with a bear.

All Bears are Potentially Dangerous

They are unpredictable and can inflict serious injury. Because of the danger, NEVER feed an approach a bear. It is unlawful to enticing. Approach or feed bears — this is to protect both you and the animal.

Every bear has individual behavior characteristics. Not even the experts can be sure how one will react in a particular situation.

Black and Grizzly Bears

Black bears can be found in most of Canada's national parks. The western and northern national parks are a sanctuary for the grizzly.

Black bears adapt readily to human environment and they are seen more frequently than grizzlies. The black bear prefers heavily-wooded areas and dense bushland year-round. In summer, the black bear feeds on berries, nuts, and fruit. In the fall, it inhabits valley bottoms. The promise of easily-obtained succulent food is the big attraction.

Length: about 1.5 m
Height: about 90 cm at the shoulder
Weight: ranges from 57 kg to more than 270 kg. Females are generally smaller than males.

Distinguishing characteristics:
Smallest member of the North American bear family. Usually has straight facial profile and tapered nose with long nostrils. Feet are flat-soled with short sloping back line. Prominent humps over the shoulders formed by the muscles of massive forelegs. Sloping back line. Curved claws. Smaller than grizzly and has a higher lipped fur, giving a grizzled appearance.

Grizzly bear

(Ursus arctos horribilis Osob)

Colour: varies from black to brownish blond. Frequently with white-tipped fur, giving a grizzled appearance.
Height: a little over 1 m at the shoulder. Reaches 1.8 to 2 m when standing on hind legs.
Weight: averages about 200 kg; some weigh up to 450 kg. Females are generally smaller than males.

Distinguishing characteristics:
Prominent humps over the shoulders formed by the muscles of massive forelegs. Slapping back line. Dished or concave face. Long curved claws.

A small grizzly is often difficult to distinguish from a large black bear. Treat all bears with extreme caution.

Bear Confrontations

You may still encounter a bear, despite taking precautions.

If you see a bear at a distance, make a wide detour. Do not leave the area at once. If you cannot make a detour or retreat, wait until the bear moves away from your path — always leave the animal an escape route.

Don't throw rocks or stones at a bear — it may provoke an attack.

Attacks

Both black bears and grizzlies can be aggressive. Most attacks result from surprising a bear, coming between a sows and her cubs or coming too close to carrion or other food sources. Bears will rarely attack unless they feel threatened or provoked.

Try to Keep Calm! Arouse the Situation

There is no guaranteed life-saving method of handling an aggressive bear. But some behavior patterns have proved more successful than others.

Attacks are not a good solution. Most bears can run as fast as a racehorse. A preceding or following movements such as running, may trigger an attack. If a bear runs on its hind legs and waves its nose in the air, it is trying to identify you. Remain still and speak in low tones. This may indicate to the bear that you intend no harm.

Assess your surroundings before you act.

If you meet an aggressive grizzly in a wooded area, speak softly and back slowly toward a tree. At the same time slowly remove your pack and set it on the ground to distract the bear.

Pick a tall, climbable tree and climb as high as you can. Adult grizzlies don't usually climb trees, but large ones can easily reach up to three metres (or 10 feet). Be quiet — noise may attract the bear's attention.

Black bears are agile climbers or a tree may not offer an escape. If you are attacked you may, as a last resort, have to "play dead." Drop to the ground facedown, lift your legs up to your chest and clasp your hands over the back of your neck. Wearing your pack will shield your body. Bears have been known to inflict minor injuries under these circumstances. It takes courage to lie still but resistance would be useless.

Sometimes bears will bluff their way out of a threatening situation by charging then veering away at the last second. Back away quietly — never run!

Bears, Man and National Parks

Bears are an important part of the park ecosystem in which they occur and are worthy of continued protection.

The number of bear attacks that have occurred in national parks is small, especially considering the number of visitors each year. Many of them have been the result of unfortunate coincidence but some have been brought about by carelessness and ignorance.

To promote understanding of the interaction between bears and man, a film, Bears and Man, has been produced by Parks Canada. It is available at Parks Canada's Western Regional Office in Calgary and at National Film Board outlets.

Our national parks are dedicated to the protection of all wildlife. With your cooperation, we can live up to this concept.

Keep trails and campgrounds clean.

Report any bear sightings or carcass locations to the nearest warden.

Published by authority of

Parks Canada

Canada 1984
form of information. As such it is prominently displayed and available at no cost at all high visitor use areas. In addition the pamphlet is available, upon request, to those purchasing a Park Motor Licence. Anyone acquiring a Park Use Permit, Certificate of Registration or a Camping Permit for one of four bear prone auto campgrounds is offered the pamphlet. Campers using these four areas are verbally warned of the bear problem and asked to store food and garbage properly (Woodrow 1983:pers.comm.).

A free plastic litter bag (Fig. 46) which contains only a cursory mention of bears and garbage storage procedures is given to all backcountry permittees.

Two permanent warnings located at all vehicle entry points give a general caution about the possibility of dangerous wildlife and the unlawfulness of feeding wildlife (Fig. 47 and 48).

Strict control over the content of bear information released by non warden personnel is maintained by the screening of all information by the Chief Park Warden.

Most interpretive personnel deliver a 5 minute talk on bear/human problems and draw attention to the pamphlet at the beginning of each program (Woodrow 1983:pers.comm.).

Each year a package of information explaining the garbage regulations and their implications to bear management is sent to all residents.

Waste Management

As mentioned previously (page 55), garbage management in all national parks is governed by the National Parks Garbage Regulations. Accordingly Jasper's approach to garbage handling is to enforce these regulations.
Fig. 46. Reproduction of the Parks Canada plastic garbage bag. Fig. 46a shows side 1 and Fig. 46b shows side 2. Only the English text is shown here. The bag measures about 34 x 54 cm with black lettering on a yellow background. Like its U.S. counterpart (Fig. 41) the bag is given to backcountry campers.

Littering kills!
Les déchets tuent!

Notice
This bag may be used to carry water to completely extinguish your campfire — never leave a campfire unattended.
For emergency warning, tear along bottom and one side, unfold and use as a flag to signal your position.

For safety
1. Stay on regular trails and register before entering the back country.
2. Get permission for campfires.
3. Smoke only during rest stops or in your campsite.
4. Remember, cans and bottles cause injury to animals and people.

Pack-in Pack-out
1. Use this bag to pack-out your garbage from the back country.
2. Place bags in trash cans at the trail head.
3. Where campfires are permitted, burn foil and cans to remove food smells.
4. Flatten cans to reduce volume to be packed out.

Warning
Bears and other scavenging animals are attracted to garbage. Pack yours out.

Protect your park
Fig. 47. Reproduction of the Parks Canada entrance gate sign warning of hazardous wildlife. The sign measures about 107 x 152 cm with yellow lettering on a brownish background. The sign is located at all major vehicle entry points of most Canadian National Parks.

Wildlife and natural areas can be hazardous.
Advice available from Park Wardens & Information Centres.

Attention aux animaux sauvages et aux accidents de terrain.
Renseignez-vous auprès des gardes de parcs et des Centres d'information

Fig. 48. Reproduction of the Parks Canada entrance gate sign prohibiting the feeding of wildlife. The sign measures about 60 x 120 cm with yellow lettering on a brownish background. The sign is located at all major vehicle entry points of most Canadian National Parks.

It is unlawful to feed wildlife

Il est illegal de nourrir les animaux sauvages
Approximately 95% of all government operated facilities are now bear proof. Some open containers still exist in the townsite and outlying areas (Woodrow 1983:pers.comm.). Over the last 3 years many of the smaller letter box and concrete bunker style receptacles have been replaced with large volume containers (Fig. 49) which have proven extremely effective. Only one bear entry has been reported from both Banff and Jasper after 3-4 years use (Woodrow 1983:pers.comm.). The container has a capacity of 10 cubic meters which represents 20 times the capacity of the standard letter box style receptacle. Garbage is deposited through 2 large spring loaded close fitting doors with either recessed spring loaded handles or standard industrial type twist knobs. The container's self dumping hydraulic mechanism is activated by a garbage truck which has been outfitted with an electric or hydraulic adaptor kit. The operator simply connects two hoses from the truck to the container to activate the dumping action. One container can be serviced in approximately one minute by a single operator. No lifting or handling of garbage is required (Neufeldt Industries Ltd. 1983:pers.comm.). This container style is now used exclusively in Jasper's auto campgrounds as well as many commercial operations.

Garbage with the potential to attract bears is hauled to a single sanitary landfill site surrounded by an electric fence which, over the last 3 seasons, has proven 100% effective in excluding bears (Woodrow 1983:pers.comm.).

At least once per year all garbage holding facilities throughout the park are inspected by government personnel and deficiencies are reported to the Superintendent for action.

Like many other Canadian National Parks, Jasper contains several
Fig. 49a. High volume, hydraulic, self dumping, garbage containers have proven to be essentially bear proof. Significant manpower savings are also possible due to the unit's capacity and ease of service. Low slung models which do not require steps are available.

Fig. 49b. Smaller versions of the container are also available. Although they must be serviced manually, they are much easier to empty than the older letter box style containers such as those shown in Fig. 59c.
hundred miles of highway and 50 miles of railway track. Since 1970 large mammal roadkills have averaged about 80 animals per annum. Carcasses found near man made facilities readily accessible to the public are removed to the sanitary landfill. In remote locations, area closures or warning signs are implemented if the carcass cannot be removed.

Food Storage Management

One campground (Whistlers) with a historically high number of bear incidents has two food storage buildings each containing individual food lockers. Almost all auto campgrounds and primitive campsites have a food sling consisting of a pole tied to two trees wrapped with galvanized steel.\[49\]

Management of Human Activities

Area closures,\[50\] posting of warning signs, campsite quotas and enforcement of regulations are the four techniques used to control visitor activities.

Area closures may be implemented under two conditions only:\[51\]

- a bear/human encounter considered to be aggressive

\[49\] Management reports that a large number of incidents now seem to be caused by bears (mainly black bears) entering campgrounds during meal preparation and simply scaring campers off their site (Woodrow 1983:pers.comm.).

\[50\] Area closures are regulated by Section 7.0 of the National Parks General Regulations.

\[51\] Closures in Western Region are limited to these two circumstances by Western Regional Directive No. 48 (Parks Canada 1983d).
and a threat to human life, or

- a grizzly female with cubs of the year is known to be in the area.

Areas may be re-opened after a minimum of two monitoring trips if Park staff fail to reveal new encounters or fresh signs of the animal(s) that prompted the closure.52 Procedures for closing and re-opening areas are given along with individual responsibilities for each procedural step. Figure 50 shows the area closure sign.

Warning signs (Fig. 50) are posted, at the discretion of the Chief Park Warden at locations known to be habituated by bears that are a recognized or potential hazard to human life or property. Similarly the signs may be removed at the Chief Park Warden's discretion.

A quota system is used to regulate the number of campers using a given trail.

At least one campground with a high number of bear incidents is patrolled by warden staff until 2:00 a.m. each night.

Management of Problem Bears

Aversive conditioning, relocation of nuisance bears and destruction of those incorrigible or particularly aggressive animals are three techniques used to control problem bears.

When a bear, which has not previously been captured, first appears in or near a campground, aversive conditioning in the form of loud noise (yelling, siren) or rock throwing is the first method used to deter the animal. If the animal fails to respond to this technique, a capture attempt

52 As per Western Regional Directive No. 48 (Parks Canada 1983d).
Fig. 50. Reproductions of various styles of area closure and warning signs used by Parks Canada. The circular sign measures about 46 cm in diameter with white lettering on a fluorescent red background. The other signs measure about 20 x 30 cm with black lettering on a bright yellow background.

Warning
trail closed
because of
bear danger.

Attention
sentier fermé
zone fréquentée
par les ours.

Warning
trail closed
____ km ahead
because of
bear danger.

Attention
sentier fermé
a ____ km d'ici-
zone fréquentée
par les ours.

Warning
Bear in the
area.
Travel with
cautions.

Attention
Ours dans
le secteur.
Aancez
prudemment.
may be implemented. Other forms of aversive conditioning may not be used without prior consent.

In order for a capture attempt to be made one or more of the following criteria must be met:

- the bear presents an imminent threat to life or property;
- there is an imminent threat of injury to the bear; or
- the bear must be captured to facilitate authorized research.

Although whole body culvert traps are the preferred method of capture, Aldrich leg hold snares and free ranging immobilizations\(^5^3\) are used.

Similarly, destruction criteria are clearly outlined. A bear is destroyed only when one of the following criteria are met:

- when it presents an imminent and immediate threat to human life and live capture attempts have failed or are not feasible;
- when it is severely injured and the extent of the injuries are clearly observable and the possibilities of recovery are remote; or
- when it has been deemed a problem bear and has been relocated a maximum of three times.

Animals can only be released at predesignated sites after having been marked with a number coded ear tag. Release sites are used on a rotational basis.

\(^{53}\) 'Free ranging immobilization' refers to the process of drugging a bear which is not yet trapped. The drug is administered by means of a projectile dart.
Training

A 2-3 day training session dealing with most aspects of bear management is held annually for warden personnel. With respect to immobilization techniques, trainee, advanced or instructor levels of proficiency are assigned to each warden. Approximately 12-15 wardens have attended a one week instructor level firearms course sponsored by the Alberta Department of Fish and Wildlife. The Park now has its own firearms ranges and includes regular firearms training as a component of the bear management program.

Emergency Procedures

Figure 51 shows the sequence of events that are to be followed when a bear related emergency occurs. Unfortunately detailed information beyond the initial stages of action is not developed.

Research Planning

The Bear Management Warden\textsuperscript{54} submits research requirements as and when required. All research must be in accordance with the National Parks Regulations and applicable directives. To date there is no formal research plan or list of research requirements (Woodrow 1983:pers.comm.).

Regional Management

Although co-operative management with adjacent land agencies is recognized as an important aspect of bear management, formal steps have not been initiated to develop agreements.

\textsuperscript{54} The Bear Management Warden is responsible for the day to day implementation of the entire program.
Fig. 51. Procedures for responding to bear related emergencies in Jasper National Park.

EMERGENCY

- Human Death
  - Yes → Advise Ass't C.P.W., B.M.W. and R.C.M.P.
  - No
- Serious Human Injury
  - Yes → Advise Ass't C.P.W. and B.M.W. → Treat and Evaluate Injured → Suspect Bear in Area → Yes → See Destruction Section #6
  - No
- Extensive Property Damage
  - Yes → Advise B.M.W. → Record Details and Interview Witnesses → If Required Advise Park Staff as per 1.5.4.1.3 → See Reporting Section #9
  - No

a Adapted from Parks Canada 19811.
BANFF NATIONAL PARK

Banff, Canada's oldest and most well known national park, lies along the eastern slopes of Alberta's Rocky Mountains. From its original (1887) area of 664 km² the park has gone through a series of expansions and contractions to attain its present status of 6,641 km² (Scharff 1966). The popularity of the Park cannot be denied: visitation has grown from approximately 0.5 million in the early 1950's (Scharff 1966) to over 3.7 million in the early 1980's, the highest of all Canadian National Parks (Parks Canada 1983a).55

While there is no good data upon which to determine bear population figures, park personnel estimate 100-130 grizzlies and in excess of 100 black bears (Westhaver and Jacobson 1983:pers.comm.).

Despite improved bear management practices throughout the 1970's, especially in terms of stricter garbage control, Banff continues to experience a high number of bear problems. The number of control actions, and incidents (Table 18) is second only to Jasper in Canadian National Parks.

In 1982 Banff tabled its first Bear Management Plan. The following is a synopsis of the Park's management program based on this document supplemented by annual reports and discussions with park staff.

55 Visitation records are taken from the number of entrants at the Park's East Gate which is situated on the Trans Canada Highway. Hence, many of the so-called visitors simply pass through the Park.

<table>
<thead>
<tr>
<th>Year</th>
<th>Visitation</th>
<th>Injuries</th>
<th>Fatalities</th>
<th>Injury/Fatality Rate</th>
<th>Incidents</th>
<th>Destructions</th>
<th>Relocations</th>
<th>Closures</th>
<th>Enforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962</td>
<td>1,374,576</td>
<td></td>
<td></td>
<td></td>
<td>21</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1963</td>
<td>1,650,257</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1964</td>
<td>1,605,784</td>
<td>1</td>
<td>.062</td>
<td></td>
<td>4</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td>1,803,490</td>
<td>2</td>
<td>.079</td>
<td></td>
<td>8</td>
<td>69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1966</td>
<td>2,044,537</td>
<td>4</td>
<td>1.111</td>
<td></td>
<td>13</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1967</td>
<td>2,050,735</td>
<td>1</td>
<td>.033</td>
<td></td>
<td>10</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>2,147,425</td>
<td>.047</td>
<td></td>
<td></td>
<td>9</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>2,346,030</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>2,301,922</td>
<td>1</td>
<td>.043</td>
<td></td>
<td>5</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>2,527,679</td>
<td>1</td>
<td>.040</td>
<td></td>
<td>13</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>2,518,507</td>
<td>2</td>
<td>.079</td>
<td></td>
<td>8</td>
<td>69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>2,697,830</td>
<td>2</td>
<td>1.111</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>3,024,966</td>
<td>1</td>
<td>.033</td>
<td></td>
<td>10</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>2,870,113</td>
<td>.035</td>
<td></td>
<td></td>
<td>10</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>3,059,655</td>
<td>.033</td>
<td></td>
<td></td>
<td>5</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>3,040,769</td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>3,163,876</td>
<td>1</td>
<td>.032</td>
<td></td>
<td>292</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>3,642,928</td>
<td></td>
<td></td>
<td></td>
<td>187</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>3,772,455</td>
<td>5</td>
<td>.159</td>
<td></td>
<td>272</td>
<td>3</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>3,713,479</td>
<td></td>
<td></td>
<td></td>
<td>123</td>
<td>4</td>
<td>15</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

a Black and grizzly data combined.
b Area I includes the Banff townsite area and highway area from the East Gate to Castle Junction. Data for other areas was not readily available.
c Data from Parks Canada (1977a, 1978a: 235 and 1983a: 267)
e Injury/Fatality Rate is the number of injuries/fatalities per 100,000 visitors.
f Pengelly (1981) uses the term 'occurrences' without definition. 'Encounters' are also used but left undefined. The 1980 report of Westhafer and Rose defines 'occurrence' as "any bear related report received by Warden dispatch or as noted by wardens themselves". This definition would include recordings of many natural events such as bears feeding on carrion etcetera. This makes comparison with other parks difficult. Incident data 1972-81 from Pengelly (1981).
h The 1981 figure is from Pengelly (1981).
i Enforcement data was not available.
Program Objectives

The overall goal of the program is to protect and maintain natural populations of black and grizzly bears while minimizing the chances of bear/human encounters. Regulation of human activity with a minimal amount of direct manipulation of bears or their natural habitat is the primary method of achieving this goal. Control of unnatural sources of food is recognized as the major cause of bear problems.

Six management objectives, essentially identical to Jasper's are listed:

- To maintain self-sustaining bear populations living within their natural habitats.
- To encourage the use of Park lands and to ensure visitor safety and enjoyment in accordance with the National Park's Act and Regulations, National Parks Policy and Parks Canada Directives.
- To provide accurate, current bear management information directly to the public and indirectly through other Park personnel.
- To monitor man and bear activities and their inter-relationships for the guidance of and application to management actions.
- To encourage, initiate and actively participate in inter-agency co-operative efforts leading towards improved bear management practices.
- To initiate research in areas where knowledge gaps exist that limit ecologically sound management action.

Organizational Structure

In recognition of the fact that successful implementation of the program will require a multidisciplinary effort, a "Bear Management
Steering Committee" composed of representatives from all sections is proposed in the 1982 Plan. The Committee would be responsible for:

- initiating active programs and projects necessary for achievement of objectives,
- providing co-ordination among all park sections in order to complete projects,
- reviewing bear information packages for residents, visitors, and employees,
- reviewing special management concerns as necessary,
- reviewing annual reports, and
- annual review and revision of the Bear Management Plan.

Unfortunately the formation of this key driving element of the program has not been developed by the Park's senior managers.

A second "Bear Committee" composed of park wardens has responsibility for day to day monitoring, report preparation and dissemination, design of field operations, liaison with other park sections and outside organizations, preparation and delivery of training programs, and updating of literature review. Overall implementation of the program and day-to-day field operations are carried out by the High Visitor Use Supervisor and his staff.

Responsibilities of all park staff are given in detail.

Program Evaluation

At present there is not a formal review or evaluation process in place. Annual summary reports which have appeared periodically since 1973

57 This proposal was the central recommendation of the 1980 annual report (Westhaver and Rose 1980).
represent a form of evaluation. The most current summaries (Westhaver and Rose 1980, Pengelly 1981) present an excellent overview of the program giving information on the number, location and causes of incidents, trap/release and destruction data, human encounters and recommendations for improvement.

The 1982 Bear Management Plan recommends that the following statistics be used to evaluate subsequent years:

- number of bears destroyed
- number of bears relocated
- number of bears captured
- number of bear/human conflicts.

Monitoring

Banff has recently developed one of the more sophisticated bear monitoring systems in Canada. All bear reports are radioed to a 24-hour communications centre where detailed forms are completed and weekly, monthly and annual summary reports are collated and submitted to the Chief Park Warden.

In 1982 work was begun on a computerized Bear Activity Monitoring System in conjunction with The University of Calgary. All bear reports are recorded on a single form (Fig. 52) which combines routine observations with information on bear/human interactions, property damage incidents (and their causative factors) and management actions in a computerized format. The system should provide for the rapid recording storage manipulation and

58 The report for the 1982 season was not available.
Fig. 52. Reproduction of the Bear Monitoring Form used by Banff National Park. The form measures about 22 x 28 cm.
retrieval of data. (Kunelieus and Buckley 1982). Although only in its second year of operation 1982-83 preliminary results appear encouraging. (Westhaver 1983:pers.comm.).

Public Information

Providing accurate, current information to the public is recognized as an integral component of the bear management program. Two pamphlets, You Are in Bear Country and Warning (Figs. 45 and 53) are at present the main sources of public information. The former pamphlet is given to all visitors purchasing Park Motor Licences at the East Gate while the latter is handed to all visitors purchasing an autocampground permit. Both pamphlets are available at all Information Centres and Warden Offices.

Backcountry registrants are given a specific pamphlet, Backcountry: Banff National Park, which warns that bears are dangerous and refers the visitor to the You Are in Bear Country pamphlet.

At present there are no permanent warning, information signs or posters other than the same two signs as used in Jasper (Fig. 47 and 48). A trailhead information package similar to that used in Yellowstone is planned (Westhaver and Jacobson 1983:pers.comm.). Similarly, although there are no completed exhibits, several are well along in the planning stage. These will be completed pending approval of funds (Westhaver 1983:pers.comm.). A map display entitled Areas You Are Most Likely to Encounter Grizzly Bears was posted in the Banff Warden Office in 1982. However, the map's usefulness is dubious, according to park staff, and therefore may be discontinued (Westhaver and Jacobson 1983:pers.comm.).

During the last two years the Warden Service and Interpretive staff have devised an information program known simply as the 'bear awareness program'. Although still in the initial development stages, the program
Fig. 53. Reproduction of the English text of the Parks Canada pamphlet, Warning. The pamphlet measures about 22 x 28 cm with brown lettering on a yellow background. The pamphlet has been widely dispersed in auto campgrounds.

**THE BEAR FACTS**

**Bears:**
- have a taste for human food and garbage
- will find food and garbage nearly anywhere with their tremendous sense of smell
- are not deterred by ordinary garbage cans
- are easily angered by free-running pets
- can tear through nylon and canvas tents with ease
- are probably not afraid of you
- are bigger and stronger than you and can be unpredictably dangerous

**THE BEAR PROBLEM**

Where bears have easy access to your food and garbage, they can cause damage to your equipment and park facilities. They get used to an unnatural diet and begin to frequent campgrounds and roadways looking for human food. Every year, too many park bears die on highways while looking for handouts or are destroyed because they have become a danger to campers through poor management of food, garbage and pets.

**THE BEAR ANSWER**

**Garbage:**
- should be deposited in the special bear-proof garbage disposal units throughout the campground
- should be stored in your vehicle or trailer between trips to the disposal units
- must never be left in the open or in your tent

**Food:**
- should be stored in your vehicle or trailer until used
- must never be left in the open or in your tent

**Pets:**
- must be kept on leashes even at your campsite

**Bears:**
- must never be fed or approached
- will learn campgrounds aren’t sources of easy meals if you follow these simple rules
- will return to a natural way of life if your food, garbage and pets are properly managed

THANK YOU
has produced some fine results. An 18 minute audio-visual program explaining the natural history of bears, bear/garbage problems and management actions has been prepared for showing at various staff training sessions. An excellent pamphlet (Fig. 54) detailing the bear/garbage problem, garbage regulations and related information was printed for distribution to all park residents in 1983. At least one 'bear' article per summer is placed in the local newspaper and the Park's newsletter (Westhaver L.1983:pers. comm.).

Most impressive, are plans to begin (in 1983) a large scale annual bear information/training session for most of the Park's 600 summer employees. A similar program is to be conducted for concessionaire employees by an interpreter assigned specifically to this task. The subject matter is tailored to meet the information needs of various employee groups. If successful, this program should have a large multiplier effect.

Waste Management

At a cost in excess of one million dollars, all park operated facilities have been bear proofed during the last 10 years. The letter box design that was used extensively is now being replaced by large volume self dumping containers (Fig. 49). All garbage is hauled to bear proof transfer stations where it is held temporarily until it can be transported to a Calgary landfill site.

---

59 Semi-tractor trailers service the stations twice daily during the off season and thrice daily during the summer.
Fig. 54. Reproduction of the pamphlet, Bears & You. The pamphlet measures about 31 x 43 cm with black lettering on a beige newsprint background. The pamphlet was designed by the Banff Interpretive Service and was mailed to all Banff residents.

**BEARS & YOU**

Our attitudes towards bears have changed considerably in the past 20 years. At one time, National Parks in "bear country" used the garbage dump as a "showplace" for bears. The dump in Banff National Park used to be sprayed for mosquitoes for the comfort of visitors watching the bears. Do you remember signs that directed you "To The Bears"? Today, bears are no longer regarded as sideshow attractions and the opportunity to observe bears in their natural habitat has become a much more highly valued experience.

**TEST YOUR BEAR KNOWLEDGE.**

1. Bears can't run downhill. **T** **F**
2. Like many animals, grizzlies give birth to their young in spring (April) and in days are ready to search for food with their mother. **T** **F**
3. Bears have poor eyesight. **T** **F**
4. Bears are mostly carnivorous (meat eaters). **T** **F**
5. You should be as quiet as you can when hiking in bear country. **T** **F**

**TEST (CONT'D)**

6. Black bears aren't dangerous. **T** **F**
7. Burying your garbage is the best way to avoid attracting a bear to your campsite. **T** **F**
8. Bears may be attracted or irritated by the smell of cosmetics. **T** **F**
9. You should take your dog with you while hiking in bear country to protect you from bears. **T** **F**
10. Bears can smell you from a mile away under certain conditions. **T** **F**
(answers on page 2)
THE PROBLEM

Normally, bears are about 90% vegetarian in their eating habits. Since they are not often active predators, meat makes up a small proportion of their diet. Bears require large amounts of high energy food so that fat reserves can be accumulated - reserves sufficient to sustain them during their long winter sleep. Some of their favorite foods are those pictured on page one.

Bears are opportunists. If garbage is left available, they will readily adapt to it as a potential food source. The pattern of bears depending upon garbage as a food source in Banff developed over many years. As the bears became increasingly dependent on garbage they began visiting the back doors of restaurants and homes, and feasting regularly on the food of careless visitors in the campgrounds. With growing numbers of visitors and residents in the park, bears became a nuisance in certain areas and an increasing threat to public safety.

The bear-garbage problems have led to thousands of dollars worth of property damage and, undeniably, to both human death and injury on a number of occasions. An ugly result of poor garbage management over the past few decades has been the destruction of hundreds of black and grizzly bears within Banff National Park. To continue this indiscriminate reduction of populations is unacceptable and unjustified in light of modern values, decreasing numbers of bears, and the shrinking area of undisturbed habitat available to them.

NEW PARK REGULATIONS

The National Park Garbage Regulations have recently been revised. These changes are going to affect each resident and visitor to Banff National Park in one way or another. Parks Canada would like you to know more about these changes to the regulations, the reasons for the changes, and the ways in which the changes could affect you.

HOW DO THEY AFFECT YOU?

The National Park Garbage Regulations were revised in 1980 in order to help resolve wildlife/garbage conflicts of all types, particularly those involving bears. Following are a few excerpts from the new regulations which apply directly to businesses, residents and visitors to Banff National Park. For a complete copy of the Regulations see a copy of the November, 1981, edition of the Crag and Canyon, or contact the Warden Office.

AS A BANFF RESIDENT, HERE'S WHAT YOU MUST DO.

Excerpts from National Park Garbage Regulations - effective March 27, 1980

Duties of an Owner:

4. Every Owner shall
   a) provide and maintain in a serviceable and sanitary condition a sufficient number of containers to hold all garbage accumulated on his premises at any time;

9. (1) No owner shall accumulate or allow to accumulate any garbage on his premises without the written authorization of the Superintendent.

Type of Garbage Containers listed in Schedule I:
1. Rigid metal or plastic
2. Steel refuse containers
3. Disposal Plastic Bag (may be used only for containing waste when plastic bags containing waste are stored inside an approved enclosure.)

Definitions:

In these Regulations, "approved enclosure" means a type of enclosure designed for the storage of containers between collection times that prevents access to the garbage by domestic animals and wildlife and the design and construction of which has been approved by the Superintendent.

"container" means a type of garbage container listed in Schedule I that has been designated by the Superintendent of the park as being acceptable for use in that park or at specific locations in the park.

---

Fig. 54 (Cont'd). Reproduction of the pamphlet, Bears & You. The pamphlet measures about 31 x 43 cm with black lettering on a beige newsprint background. The pamphlet was designed by the Banff Interpretive Service and was mailed to all Banff residents.
Fig. 54 (Cont'd). Reproduction of the pamphlet, Bears & You. The pamphlet measures about 31 x 43 cm with black lettering on a beige newsprint background. The pamphlet was designed by the Banff Interpretive Service and was mailed to all Banff residents.

**MANAGING BEARS**

A bear that frequents high visitor use areas must be removed. Such a bear is tattooed for future identification, and if a reasonable chance of "rehabilitation" exists, it is flown beneath a helicopter to a remote area of the park. This experience is both traumatic to the bear and expensive to the park, and is not always successful. Moreover, this process merely treats a symptom rather than attacking the root of the problem.

It is internationally recognized that the only permanent solution to the bear-garbage-human conflict is to make garbage entirely inaccessible to bears. Parks Canada has resolved to correct this problem. The assistance and cooperation of all residents and visitors is required.

To meet this objective, Parks Canada has taken a number of initiatives:
1. Closure of sanitary landfill sites.
2. Installation of bear-proof transfer stations and daily removal of all garbage from the park.
3. Development and implementation of approved bear-proof containers (hydraulic bins or enclosures) at all public facilities within the park.
4. Increased enforcement of appropriate regulations in the campgrounds and other high visitor use areas.
5. Intensified bear management efforts to rehabilitate or eliminate bears conditioned to eating of garbage.

To date the people of Canada have invested close to a million dollars to provide bear-proof garbage facilities within Banff National Park. Positive results are already evident in the decreased number of bear problems during the last two years.

**HERE'S WHAT YOU MUST DO.**

Over the past year and a half, most local businesses have taken the initiative to construct and install approved garbage enclosures. Owners of condominiums, apartments, and staff housing complexes have been approached and the majority have complied with the National Park Garbage Regulations.

All private residences in the park are required to fulfill the intent of the regulations. At present, practical and economical solutions for private residences are being sought. In the meantime, residents are requested to tightly secure garbage and store it within their homes or garages until the day of pick-up.

With the cooperation of all residents and visitors, Banff National Park is becoming a cleaner, safer, and more enjoyable place to live or visit.
Fig. 54 (Cont'd) Reproduction of the pamphlet, Bears & You. The pamphlet measures about 31 x 43 cm with black lettering on a beige newsprint background. The pamphlet was designed by the Banff Interpretive Service and was mailed to all Banff residents.

HOW'S YOUR BEAR KNOWLEDGE?

1. False. Bears are agile and can run downhill easily and quickly.

2. False. Cubs (usually 2) are born in late January or early February while the female is still in hibernation. The young weigh less than a pound each at birth and are hairless and helpless. They nurse, sleep and grow to about 8 pounds before they leave the den with their mother in spring.

3. False. Researchers have found that bears have good eyesight. They are able to see colour and form, but prefer to trust their more sensitive senses of smell and hearing.


5. False. Make plenty of noise while hiking to warn a bear of your presence.

IF YOU SEE A BEAR....

The Wardens are trying to monitor bear activity in the Park. You can help them by carefully noting what kind of bear you see, what it is doing, where it is located and, if possible, what age and sex it is. Please report this information to the Warden's Office....762-4506.

YOUR BEAR KNOWLEDGE (CONT'D)

6. False. Black bears are as wild and unpredictable as any other member of the bear family.

7. False. Bears can easily smell your buried garbage and dig it up. Burying your garbage simply creates a hazard for the next group of campers coming to that site.

8. True. Research indicates that bears may be attracted to or irritated by the scent of cosmetics, so it is wise to avoid their use in bear country.

9. False. A dog may irritate a bear and cause the bear to chase the dog. A frightened dog will probably return to its master - you - with an angry bear on its tail.

10. True. Bears have tremendously powerful noses which they depend on to find food.
Currently, about 90-95% of all commercial operators and 85-90% of all condominium, townhouse and apartment complexes have installed bear proof "approved enclosures" for garbage storage (Westhaver and Jacobson 1983 b:pers.comm.). Deadlines for installation of proper facilities have been set by the Superintendent to enforce complete compliance with the Garbage Regulations. Figure 55 illustrates the enforcement sequence being used.

Almost none of the several hundred privately owned residential homes have "approved enclosures" in place. This segment of the park garbage problem has yet to receive a great deal of attention.60

During the summer months road kills61 and other carrion found near developed areas are promptly removed and placed in cold storage until they can be hauled to a processing plant (for pet food) in Calgary.

A pack-in-pack-out garbage policy is used for all backcountry areas.

Food Storage Management

Current food storage facilities consist of one food storage locker at a group autocampground, several personalized food lockers at another auto campground and food storage cables at approximately 50% of the backcountry campsites. Both the personalized lockers and backcountry cables were

60 Of the 123 bear incidents reported in 1981 approximately 61% (75) were directly related to improper garbage storage. The former Cascade landfill site accounted for 31% (23) of these incidents; 36% (27) of the incidents were related to commercial operations and 33% (25) were related to residential sites.

61 In 1980 large mammal road kills totalled 176 (Damas and Smith 1981).
Fig. 55. The law enforcement sequence for commercial garbage control in Banff National Park.\textsuperscript{a}

\textsuperscript{a} Adapted from Parks Canada 1982a: Appendix 10.

\textsuperscript{b} A.C.P.W. = Assistant Chief Park Warden
installed during the summer of 1983 and have therefore not been adequately evaluated. Preliminary findings are positive (Westhaver 1983:pers.comm.). In addition, portable heavy gauge steel food lockers have been fabricated for backcountry trail crews to alleviate continual break-ins. To date these devices have proven 100% effective (Westhaver and Jacobson 1983:pers.comm.).

Although the importance of proper food storage is mentioned in several park publications, no detailed instructions or methods are given. Banff is presently preparing a set of conditions to be endorsed upon the business licences of all commercial group camps operating in the backcountry. The second draft calls for stringent food and garbage handling procedures. Specified aerial caches must be constructed for dry goods storage; condiments and cooking supplies must be stored in steel boxes; meat and vegetables must be stored in a subterranean steel box; wet 'slop' must be strained and the residue sealed in plastic bags stored in an aerial cache; burnable garbage may only be burned in a wood stove or airtight heater; nonburnable garbage must be stored in the aerial cache; and garbage must be removed from the camp at specified periods (Pengelly 1983:6).

Management of Human Activities

Control of human activities rather than control of bear activities is recognized as the primary method of realizing the overall goal of the bear management program.
Three methods are currently used to control visitor activities. Area closures may be instituted when ...

- there is a life threatening bear/human encounter
- there is a high probability of a dangerous encounter
- snares are being used to effect capture.

Warnings may be posted when ...

- a grizzly is remaining in an area where a grizzly would not normally be expected to be seen
- a grizzly is attracted to an area near visitor facilities by a natural or artificial source of food
- a female bear with cubs is known to be in the area.

The criterion for re-opening an area or removing warnings is three consecutive days of monitoring which indicate that the danger no longer persists. Figure 50 illustrates the types of signs currently used for closure and warnings. Signs similar to those used in Yellowstone and Glacier (Fig. 22) have been ordered (Westhaver and Jacobson 1983a:pers-comm.).

Active enforcement of garbage and anti-feeding regulations is employed as the third means of visitor control. Unfortunately detailed statistics are not readily available.

Management of Problem Bears

The capture, relocation, or destruction of bears are recognized as undesirable management actions that are to be minimized. One of the following criteria must be met to attempt capture:

- any bear found in or adjacent to a high visitor use area that acts abnormally or is judged to be a threat to people;
- any bear that persists in staying within a high visitor use area or has persisted in raiding campsites or has been causing property damage; or
any bear in a backcountry area that acts abnormally or is judged to be a threat to people may be captured if unusual circumstances apply and if prior approval of the Chief Park Warden has been obtained.

Capture may be effected through the use of culvert traps, Aldrich leg snares, or free ranging immobilizations with Ketamine/Rompun.

In all cases emphasis is first placed on removal of those factors attracting bears. A bear may be destroyed when ...

- it presents a life threatening situation;
- it has been involved in a mauling unless otherwise indicated by the Chief Park Warden or Assistant Chief Park Warden;
- it has been captured and released on three prior occasions except in the case of a female (with cubs of the year) who may be permitted a fourth relocation; or
- it is found in or adjacent to a high visitor use area and is acting abnormally or is judged to be a threat to human safety; or if the bear continues to stay within the high visitor use area and persists in raiding campsites or causing property damage and if trapping and immobilization efforts have failed.

Captured bears may be released at pre-designated sites selected with consideration to public safety, the bear's behaviour and past history and the nature of resident bear populations. All bears are lip tattooed and ear tagged prior to release.

Training

A one-day local training session for selected park wardens is held each year. The entire bear management program is reviewed with emphasis placed on capture/handling procedures. In addition, selected personnel annually undertake an intensive 45 hour firearm handling course.

As mentioned earlier, annual presentations covering general aspects of bear biology/behaviour along with management implications are given to
those staff handling garbage or those staff who have direct contact with
the public. Less detailed annual presentations are made to other park
staff.

Emergency Procedures

Banff's "Bear Emergency Plan" is excellent. The plan is based on
seven major principles:

- immediate, safe evacuation and treatment of victims;
- safe removal and exclusion of other people from the vicinity;
- rapid, initial containment of the bear;
- evaluation of attack circumstances;
- disposition of the bear;
- safety of rescue personnel; and
- preservation, collection and documentation of evidence and
  response actions.

Detailed sequential checklist procedures are modelled closely along
the lines of the Park's standard rescue plan which has seen many years of
successful use.

Research Planning

An interesting and very logical approach to research is identified in
the Banff's Bear Management Plan. Acquisition and review of existing
literature is given first priority in an effort to eliminate redundancy and
develop an organized, as-needed approach to research. A regional or eco-
system approach to research is called for to reflect management based on
ecological units and until such an approach can be developed new research
will not be initiated.
Regional Management

Banff is contiguous with several national parks on the west and north boundaries and is bordered by the newly formed Kananaskis Provincial Park on portions of the eastern boundary. Several sections of the eastern and most of the southern boundary is adjacent to Crown land and to a much lesser extent private and municipal holdings. These latter areas present the greatest challenge to regional management.

Although no formal agreements are in place with any of the adjacent land managing agencies, a reasonable working relationship does exist in terms of established liaison contacts.

PARKS CANADA - PRAIRIE REGION

Bear management in Parks Canada, Prairie Region is undergoing rather extensive changes. Leonard et al. (1983) have presented a comprehensive review of bear management practices in the Region and on the basis of this information have developed a set of six components for bear management plans. Figure 56 shows the components and the sub-activities responsible for designing and implementing each component. Procedural Guidelines are detailed daily operational guidelines. The Annual Report analyzes (1) bear/human interactions (2) public information and (3) garbage collection data which may be used to modify procedural guidelines. The Program for Providing Information on Biology of Bears identifies research requirements and the steps necessary to complete this research. The Program for Instituting Changes to Bear Management due to Management and Area Plan Implementation attempts to anticipate changes in bear management that will be brought about through the planning process. Included here are
Fig. 56. Six components of bear management plans in Prairie Region, Parks Canada.\textsuperscript{a}

\textsuperscript{a} Adapted from Leonard et al. 1983:47
requirements for biological information, literature and EARP requirements along with the resources necessary to realize these requirements. The Program for Instituting Changes to Bear Management due to Correction of Inappropriate Practices attempts to identify and outline plans to correct aspects of park operations (e.g. closure of a landfill site) which may be detrimental or interfere with management objectives. Finally the Program for Establishing and Maintaining a Co-operative Bear Management Agreement with Surrounding Land Management Agencies recognizes the importance of contiguous land management practices on bear management and outlines procedures to develop co-operative agreements between the park and contiguous land jurisdictions.

Parks in the Prairie Region are currently preparing bear management plans based on these six components. Until some of these plans are completed it is difficult to ascertain exactly what specific topics will be covered under each of the six broadly worded components. Hence, how closely the six components will reflect the 15 essential elements developed in this paper, remains to be seen. Some similarities are apparent. Prairie Region's Component 2 seems to touch on some aspects of Program Element 4: Monitoring; Component 3 appears to be similar to Program Element 12: Research; and Component 6 appears to be similar to Program Element 13: Regional Management. Components 1 and 5 could very well include many of the 15 essential elements. At the very least, the fact that all Parks in the Region are designing plans according to a standardized set of broadly worded components should produce some very interesting results. In addition, the fact that various components of the plan are being written by a team of authors from the 4 sub-activities should help to produce a document that is realistic and workable.
D. FIFTEEN ESSENTIAL ELEMENTS

Sections A and B of this chapter discussed a number of legal and policy factors that have a direct bearing on the nature of bear management plans. Section C examined conventional practices with particular emphasis on five national parks where bear management has been most intense. Threaded through both sections were references to selected research findings and their implications for management. On the basis of this review it is now possible to develop a tentative list of those elements which one might consider essential ingredients to the bear management plan of any Canadian National Park.

Table 19 lists each of the 15 essential elements. Table 20 furnishes further information on each element. In the extreme left hand column the essential element is listed in large bold type. Directly beneath the element is a list of authority fields which gave rise to the element. In the next column the sources of the authority field are given. The next column shows the applicable contents of each source. Finally in the extreme right hand column the management implications are shown.

E. DISCUSSION

In the following pages the significance of each element is discussed in relation to the overall bear management program. In addition, each element is developed more fully to include a number of sub-elements. The sub-elements are merely an elaboration of their parent element and, like the parent element, were derived from one of the four authority fields. In each discussion the emphasis is placed on strategies designed to operationalize the element or sub-elements.
Table 19. Fifteen elements considered essential to bear management plans in Canadian National Parks.

<table>
<thead>
<tr>
<th>ESSENTIAL ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Program Objectives</td>
</tr>
<tr>
<td>2. Organizational Structure</td>
</tr>
<tr>
<td>3. Evaluation</td>
</tr>
<tr>
<td>4. Monitoring</td>
</tr>
<tr>
<td>5. Public Information</td>
</tr>
<tr>
<td>6. Waste Management</td>
</tr>
<tr>
<td>7. Food Storage Management</td>
</tr>
<tr>
<td>8. Human Activity Management</td>
</tr>
<tr>
<td>9. Problem Bear Management</td>
</tr>
<tr>
<td>10. Training</td>
</tr>
<tr>
<td>11. Emergency Planning</td>
</tr>
<tr>
<td>12. Research Planning</td>
</tr>
<tr>
<td>13. Regional Management</td>
</tr>
<tr>
<td>14. Fiscal and Person-Year Planning</td>
</tr>
<tr>
<td>15. Design Characteristics</td>
</tr>
</tbody>
</table>
Table 20. A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.

<table>
<thead>
<tr>
<th>Program Element</th>
<th>Source</th>
<th>Applicable Contents</th>
<th>Management implications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>1. PROGRAM OBJECTIVES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>legislation</td>
<td>National Parks Act (Section 4)</td>
<td>- must protect resources for future generations yet provide for use that does not cause impairment</td>
</tr>
<tr>
<td></td>
<td>policy</td>
<td>Parks Canada Policy (Parks Canada 1979c:12)</td>
<td>- provides further refinement to mgmt objectives</td>
</tr>
<tr>
<td></td>
<td>western region directive</td>
<td>Bear Management in National Parks (Parks Canada 1983d)</td>
<td>- reaffirms notion of dual objective</td>
</tr>
<tr>
<td></td>
<td>literature</td>
<td>Management involving grizzly and black bears in Yellowstone National Park 1970-75 (Cole 1976)</td>
<td>- sets exemplary mgmt objectives</td>
</tr>
<tr>
<td></td>
<td><strong>2. ORGANIZATIONAL STRUCTURE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>legislation</td>
<td>Public Service Terms and Conditions of Employment Regulations (Parks Canada 1977c)</td>
<td>- managers must follow directives pertaining to bear mgmt</td>
</tr>
<tr>
<td></td>
<td>national directives</td>
<td>Bear Management in National Parks (Parks Canada 1978d)</td>
<td>- requirements must be determined preferably on an element by element basis</td>
</tr>
<tr>
<td></td>
<td>conventional practice</td>
<td>Natural Resource Management Process Manual (Parks Canada 1980)</td>
<td>- responsibilities for various types of mgmt actions must be outlined</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yellowstone National Park</td>
<td>- provides content criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yosemite National Park</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Banff National Park</td>
<td></td>
</tr>
</tbody>
</table>
Table 20. (Cont'd) A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.

<table>
<thead>
<tr>
<th>Program Element</th>
<th>Source</th>
<th>Applicable Contents</th>
<th>Management Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. EVALUATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>national directives</td>
<td>Bear Management in National Parks (Parks Canada 1978d)</td>
<td>- bear mgmt programs and plans should be reviewed and evaluated annually - evaluations should include summary of mgmt activities</td>
<td>- establishes authority for evaluation element - provides basic evaluation criteria</td>
</tr>
<tr>
<td>western region directive</td>
<td>Natural Resource Management Process Manual (Parks Canada 1980)</td>
<td>- suggests plans include methods to evaluate effectiveness of mgmt plan</td>
<td>- provides content criteria</td>
</tr>
<tr>
<td>literature</td>
<td>Restoratıon of the natural populations of grizzly and black bears in Yellowstone National Park (Meagher and Phillips 1980)</td>
<td>- provides 10 year evaluation of Yellowstone program</td>
<td>- provides content criteria - establishes and illustrates the use of several evaluative criteria - generates evaluative criteria from objectives</td>
</tr>
<tr>
<td></td>
<td>Annual bear management and incident report, Yosemite National Park, 1980 (Cella and Kasy 1981)</td>
<td>- illustrates the nature of Yosemite's evaluation process</td>
<td>- provides content criteria - illustrates use of evaluative criteria for public Information and food store elements</td>
</tr>
<tr>
<td></td>
<td>Yellowstone National Park, Yosemite National Park</td>
<td>- both parks have developed relatively comprehensive evaluation procedures</td>
<td>- establishes and illustrates the use of several evaluation criteria</td>
</tr>
<tr>
<td>4. MONITORING</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>legislation</td>
<td>Access to Information Act</td>
<td>- outlines classes of information that must be made available to the public</td>
<td>- managers must be willing to provide certain mgmt data to the public</td>
</tr>
<tr>
<td>national directives</td>
<td>Bear Management in National Parks (Parks Canada 1978d)</td>
<td>- bear mgmt plan should include monitoring element - establishes several reporting procedures relating to destructions, human fatalities and annual mgmt summaries</td>
<td>- establishes authority to develop monitoring element - sets several operational criteria</td>
</tr>
<tr>
<td></td>
<td>Use of Immobilizing Drugs and Equipment (Parks Canada 1975c)</td>
<td>- immobilization data to be sent to Regional Offices</td>
<td>- provides content criteria</td>
</tr>
<tr>
<td>western region directive</td>
<td>Bear Management in National Parks (Parks Canada 1983d)</td>
<td>- bear mgmt plan will undertake a monitoring system for sightings and observations - annual statistical summaries must be developed and forwarded to WRO by year end</td>
<td>- establishes authority for monitoring element - provides content criteria</td>
</tr>
</tbody>
</table>
Table 20. (Cont’d) A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.

<table>
<thead>
<tr>
<th>Program Element</th>
<th>Source</th>
<th>Applicable Contents</th>
<th>Management Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>conventional practice</td>
<td>Yellowstone National Park Glacier National Park Banff National Park</td>
<td>- all have developed relatively sophisticated monitoring systems</td>
<td>- provides content criteria</td>
</tr>
</tbody>
</table>

5. PUBLIC INFORMATION

|          | | - the relationship establishes a duty on the part of the occupier to warn the invitee of foreseeable, unusual danger | - managers must identify potential sources of unusual danger and take reasonable steps to prevent injury from these dangers |
|          | | | - giving adequate warning through a systematic public information program is probably the single most important preventative measure. |
|          | | | - negligence law has implications for all program elements but focuses mainly on public information, control of human activities and control of problem bears |
| legislation | The Crown Liability Act The Official Languages Act Access to Information Act | - Crown considered as an individual and can be held liable | - design problems are obvious |
| | | - procedural steps established | | |
| | | - requires all publications, signs, posters pamphlets to be bilingual | | |
| | | - government departments must supply the public with complete, accurate, timely, factual information within the limitation of the Act | | |
| | | | - opens many mgmt records to public scrutiny |
| | | | - government officials have tended to avoid publicizing even the most routine management data - this may no longer be legally permissible |
| | | | - accurate, up to date monitoring systems must be implemented if quality records are to be developed. |
| policy | Parks Canada Policy (Parks Canada 1979c: 43) | - must provide the public with accurate information about management programs | - again, quality information can only be derived from a quality monitoring system |
| | | - information dispersal must be extended beyond park | - more effort must be made to contact visitors prior to park visits |
Table 20 (Cont'd) A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.

<table>
<thead>
<tr>
<th>Program Element</th>
<th>Source</th>
<th>Applicable Contents</th>
<th>Management Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>national directives</td>
<td>Bear Management in National Parks (Parks Canada 1978d)</td>
<td>- information program to emphasize acceptance of bears as part of ecosystem and wilderness experience</td>
<td>- sets general and specific standards for the content of public information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- should include precautionary measures, and seasonal distribution</td>
<td>- sets priority information dispersal method for backcountry travellers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- personal contact to be emphasized as main mode for visitors frequenting bear habitat</td>
<td></td>
</tr>
<tr>
<td>Control of Animals Deemed Dangerous to Human Safety (Parks Canada 1971b)</td>
<td></td>
<td>- mgmt of &quot;naturally dangers&quot; bears limited to supplying proper avoidance information</td>
<td>- preventative avoidance techniques must be component of public information element</td>
</tr>
<tr>
<td>Access to Information Act and the Privacy Act (Parks Canada 1983c)</td>
<td></td>
<td>- reaffirms principle established by the Acts per se</td>
<td>- preventative avoidance techniques must be component of public information element</td>
</tr>
<tr>
<td>Pack in - Pack out - Litter Control (Parks Canada 1975a)</td>
<td></td>
<td>- a program to be developed to educate staff and visitors as to littering and especially the pack in - pack out policy</td>
<td>- provides content criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- must educate public as to most suitable back-country foods to reduce litter</td>
<td></td>
</tr>
<tr>
<td>Communications with the Public through the Media (Parks Canada 1983f)</td>
<td></td>
<td>- establishes operating standards for media releases</td>
<td>- managers must be knowledgeable as to what information can be protected and what information cannot be protected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- affirms that public has right to full, accurate information</td>
<td>- accurate monitoring systems must be developed to supply quality information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- affirms that all departments have obligation to foster public awareness of dept. &amp; programs</td>
<td>- generally opens the bear mgmt program to public scrutiny</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- maintaining open and effective communications with the media is important</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- information supplied to media is to be factual</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- information supplied limited only to that exempted by the Access to Information and Privacy Act</td>
<td></td>
</tr>
<tr>
<td>Bilingualism - Parks Canada Service to the Travelling Public (Parks Canada 1975b)</td>
<td></td>
<td>- reaffirms principles established by the Official Languages Act</td>
<td>- applicable information modes must be delivered in both official languages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- every effort to be made to make all signs, texts and publications bilingual</td>
<td>- closure and warning signs to receive priority</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- emergency signs to receive top priority</td>
<td></td>
</tr>
<tr>
<td>western region directives</td>
<td>Bear Management in National Parks (Parks Canada 1983d)</td>
<td>- bear mgmt plans will outline a program of public information aimed at avoidance of bear problems</td>
<td>- establishes authority for public information element</td>
</tr>
<tr>
<td></td>
<td>You Are in Bear Country (Parks Canada undated b)</td>
<td>- reaffirms obligation to inform visitor of potential bear hazard and how to avoid or minimize the hazard</td>
<td>- program emphasis on avoidance techniques</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- establishes where and when the bear pamphlet is to be distributed</td>
<td>- provides content criteria</td>
</tr>
<tr>
<td>Program Element</td>
<td>Source</td>
<td>Applicable Contents</td>
<td>Management Implications</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------</td>
<td>---------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>legal opinion</td>
<td>Department of Justice (Toews 1974)</td>
<td>- recommends establishment of public information program to fulfill Crown's duty to warn of danger</td>
<td>- provides additional authority for public information element</td>
</tr>
<tr>
<td>literature</td>
<td>The Information and Education Plan for the Grizzly in the Yellowstone Ecosystem (Servheen et al. 1983)</td>
<td>- downplays danger aspect of bears and places emphasis on positive aspects i.e. grizzly's importance</td>
<td>- provides general direction as to information content and development of content standards</td>
</tr>
<tr>
<td>conventional practice</td>
<td>Yellowstone National Park</td>
<td>- identifies bear mgmt plans as being a key mgmt component</td>
<td>- mgmt plan must be a quality document and be readily accessible to the public</td>
</tr>
<tr>
<td></td>
<td>Glacier National Park</td>
<td>- mgmt plans becoming major form of communication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yosemite National Park</td>
<td>- both parks have developed comprehensive, systematic, high profile program employing numerous modes and contact points to reach all levels of park user - established content standards (Glacier)</td>
<td>- provides content criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- park specific design for pamphlets</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- developed evaluation system for content and dispersal</td>
<td></td>
</tr>
<tr>
<td>6. WASTE MANAGEMENT</td>
<td>legislation</td>
<td>National Parks Garbage Regulations Sections 4(g)</td>
<td>- these Regulations provide for effective control of commercial &quot;owners&quot; garbage but may not apply to residential or visitor source garbage - a judicial decision is required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - definition of 'owners' may limit applicability to commercial operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 - defines 'approved enclosure' for garbage storage</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 - prohibits any person from discarding, disposing or depositing garbage except in designated locations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>National Parks Businesses Regulations Sections 5(5)</td>
<td>- manner of garbage storage can be made a condition of business licence</td>
<td>- these regulations combined with the above mentioned garbage regulations represent sufficient legislation for stringent control of commercial source garbage</td>
</tr>
<tr>
<td></td>
<td>9(a)9(b)</td>
<td>- business licence may be revoked for non-compliance and reinstated under prescribed conditions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7(b)</td>
<td>- financial guarantees of compliance may be made condition of business licence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>- business licence may not be issued if in best interests of Park</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>- allows Superintendent to prescribe conditions in which buildings, premises and equipment must be kept</td>
<td>- allows access to section 9(a) if business licence has been issued without terms and conditions endorsement</td>
</tr>
</tbody>
</table>
Table 20. (Cont'd) A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.

<table>
<thead>
<tr>
<th>Program Element</th>
<th>Source</th>
<th>Applicable Contents</th>
<th>Management Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Parks General Regulations</td>
<td>Sections 27</td>
<td>- may order clean up of &quot;nuisance&quot;</td>
<td>- applicability may be limited by definition of &quot;nuisance&quot; - a judicial decision is necessary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- prohibits depositing of &quot;rubbish&quot; or &quot;matter of an offence nature&quot; by any person</td>
<td>- question of whether depositing means the same as &quot;storing&quot;</td>
</tr>
<tr>
<td></td>
<td>Sections 31(2)</td>
<td>- discarded material to be placed in incinerators or receptacles where provided</td>
<td>- applicable to littering situations but probably would not apply to &quot;storage&quot; problems</td>
</tr>
<tr>
<td></td>
<td>Sections 32</td>
<td>- prohibits any action that unreasonably interferes with fauna or natural beauty of park</td>
<td>- applicability may be limited by definition of what is unreasonable interference and whether an incident is necessary a priori to establish interference</td>
</tr>
<tr>
<td>National Parks Camping Regulations</td>
<td>Sections 5(2)(b) &amp; 13(d)</td>
<td>- may prohibit any action in a campground that unreasonably interferes with fauna or the natural beauty of the park</td>
<td>- applicability may be limited by definition of unreasonable interference and whether an incident is necessary a priori to establish interference</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- prohibitions may be set out in a mandatory camping permit or on a notice at campground entrances</td>
<td>- applicable even if accused is not holding a camping permit</td>
</tr>
<tr>
<td></td>
<td>Sections 9</td>
<td>- holder of camping permit must maintain site in condition satisfactory to Superintendent</td>
<td>- satisfactory conditions should be stipulated on permit or at campground entrances</td>
</tr>
<tr>
<td>national directive</td>
<td>Bear Management in National parks (Parks Canada 1978d)</td>
<td>- all attractants altering natural distribution of bears to be removed</td>
<td>- establishes authority to implement waste mgmt strategy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- should provide and maintain adequate garbage facilities</td>
<td>- set basic design and operational criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- bear proof facilities should be used at all commercial facilities</td>
<td>- provides support authority for commercial garbage control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- campground garbage facilities should be serviced daily</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- garbage to be disposed of outside the park if possible</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- landfill sites should be bear proof</td>
<td></td>
</tr>
<tr>
<td>Pack in-Pack out Litter Control (Parks Canada 1975a)</td>
<td></td>
<td>- all backcountry users must adhere to a pack-in-pack-out garbage policy</td>
<td>- establishes a waste mgmt strategy for back-country areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- litter bags to be supplied at all information centres, kiosks and headquarters</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- guides, outfitters and fishing permit issuers must also provide litter bags</td>
<td></td>
</tr>
<tr>
<td>western region directive</td>
<td>Bear Management in National Parks (Parks Canada 1983d)</td>
<td>- bear mgmt plan will outline criteria for control and handling garbage</td>
<td>- establishes authority for waste mgmt element and development of control strategies</td>
</tr>
</tbody>
</table>
Table 20.(Cont'd) A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.

<table>
<thead>
<tr>
<th>Program Element</th>
<th>Source</th>
<th>Applicable Contents</th>
<th>Management Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>literature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applicable</td>
<td>- have documented several hundred studies describing the bear-garbage relationship and its implications</td>
<td>must develop strategies to separate bears and garbage - information is readily available in the form of a computerized bibliography</td>
<td></td>
</tr>
<tr>
<td>contents</td>
<td>- vast majority of grizzly inflicted injuries tentatively attributed to improper storage of garbage or food</td>
<td>garbage mgmt must receive commensurate emphasis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- any alteration of food source may result in distribution shift</td>
<td>establishes rationale for carrion mgmt strategy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- describes ability of grizzly bear to locate carrion from great distance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- describes changes in grizzly bear distribution due to carrion availability</td>
<td>establishes rationale for fish entrails mgmt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- higher number of incidents at campsites where fishing is available</td>
<td>establishes rationale for fish entrails mgmt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- all parks have developed comprehensive strategies to control various ownership classes of garbage - regional approach (Yellowstone) - fish entrails mgmt (Glacier) - carrion mgmt</td>
<td>must develop strategies for each ownership class of garbage - regional mgmt is important</td>
<td></td>
</tr>
<tr>
<td>conventional</td>
<td>Banff National Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td>practice</td>
<td>Yellowstone National Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glacier National Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yosemite National Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jasper National Park</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>all parks have developed comprehensive strategies to control various ownership classes of garbage - regional approach (Yellowstone) - fish entrails mgmt (Glacier) - carrion mgmt</td>
<td>must develop strategies for each ownership class of garbage - regional mgmt is important</td>
<td></td>
</tr>
</tbody>
</table>

7. FOOD STORAGE MANAGEMENT

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Source</th>
<th>Applicable Contents</th>
<th>Management Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Parks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camping Regulations Sections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10(c)</td>
<td>- prohibits leaving unattended food in or on specified facilities</td>
<td>provides limited control</td>
<td></td>
</tr>
<tr>
<td>5(2)(b)</td>
<td>- may prohibit any action in a campground that unreasonably interferes with fauna or the natural beauty of the park</td>
<td>applicability may be limited by the definition of unreasonable interference and whether an incident is necessary apriori to establish interference</td>
<td></td>
</tr>
<tr>
<td>8(2)(b)</td>
<td>- prohibitions may be set out in a mandatory camping permit or on a notice at campground entrances</td>
<td>applicable even if accused is not holding a camping permit</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>- holder of camping permit must maintain site in a condition satisfactory to Superintendent</td>
<td>should stipulate conditions on permit or entrance notices</td>
<td></td>
</tr>
<tr>
<td>National Parks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildlife Regulations Section</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4(f)</td>
<td>- prohibits feeding, enticing or baiting wildlife</td>
<td>applicable only if intent could be shown</td>
<td></td>
</tr>
</tbody>
</table>
Table 20. (Cont'd) A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.

<table>
<thead>
<tr>
<th>Program Element</th>
<th>Source</th>
<th>Applicable Contents</th>
<th>Management Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>National Parks General Regulations Section 32(1)(c)</td>
<td>- prohibits any action that unreasonably interferes with fauna or natural beauty of park</td>
<td>- applicability may be limited by the definition of what represents unreasonable interference and whether an incident is necessary a priori to establish interference</td>
</tr>
<tr>
<td></td>
<td>Bears Management in National Parks (Parks Canada 1978d)</td>
<td>- attractants altering natural distribution of bears to be removed if possible</td>
<td>- provides authority to implement strategies for food storage control</td>
</tr>
<tr>
<td></td>
<td>Black bear management in Yosemite National Park (Harms 1980)</td>
<td>- presents analysis of food storage incidents and causative factors</td>
<td>- illustrates the importance of proper food storage and determination of causative factors for each incident</td>
</tr>
<tr>
<td></td>
<td>Annual bear management and Incident report, Yosemite National Park 1980. (Cella and Keay 1980)</td>
<td>- presents summary data on various food storage techniques</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yosemite National Park</td>
<td>- has developed the most sophisticated food storage control strategy</td>
<td>- provides content criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- experimenting with new storage techniques</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- heavy emphasis placed on information dispersal, causative factors and evaluation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yosemite National Park</td>
<td>- provides mechanism to control human use and activities in areas where bears have priority</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- provides the means to exclude humans from critical habitat or dangerous situations</td>
<td>- can be a powerful preventative measure</td>
</tr>
<tr>
<td></td>
<td>Parks Canada Policy (Parks Canada 1979c:12)</td>
<td>- preservation given priority over use</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parks Canada Policy (Parks Canada 1979c:43)</td>
<td>- must use zoning plan to regulate type and extent of visitor activities</td>
<td>- program emphasis to be placed on control of human activities as opposed to controlling bear activity</td>
</tr>
<tr>
<td></td>
<td>Parks Canada Policy (Parks Canada 1979c:42)</td>
<td>- projects or activities with potential for significant environmental impact must be subjected to EARAP</td>
<td>- should tie management actions into zoning system: management practices will vary from zone to zone</td>
</tr>
<tr>
<td></td>
<td>Bear Management in National Parks (Parks Canada 1978d)</td>
<td>- clearly establishes control of human activities especially in backcountry areas as the key mgmt strategy</td>
<td>- provides program direction and operational criteria</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- lists means of control such as facility design and location, impact assessments, closures, warnings, activity restrictions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- sets closure criteria</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- provides an important means of protecting bear habitat</td>
<td></td>
</tr>
</tbody>
</table>
A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.

<table>
<thead>
<tr>
<th>Program Element</th>
<th>Source</th>
<th>Applicable Contents</th>
<th>Management Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>western region directives</td>
<td>Environmental Assessment and Review in Parks Canada (Parks Canada 1981a)</td>
<td>- all projects or activities with the potential for significant environmental impact must be subjected to the EAR</td>
<td>any project or activity which has potential for significant impact on bear populations, behaviour patterns or distribution must be screened - this may include major control measures for bears, waste or humans</td>
</tr>
<tr>
<td></td>
<td>Bear Management in National Parks (Parks Canada 1983d)</td>
<td>- bear mgmt plan will outline criteria for area closures and posting of warning signs - closures will only be instituted in the case of (1) an aggressive encounter threatening human life or (2) when a female with cubs of the year are known to be in the area - warning signs should be posted only for situations less grave than those outlined in (1) and (2) above</td>
<td>establishes several operational criteria - specifies content criteria which severely limit anticipatory techniques in relation to closures and posting of warnings</td>
</tr>
<tr>
<td></td>
<td>Rationale and options for management in grizzly bear sanctuaries (Martinka 1982)</td>
<td>- provides statistical analysis indicating that control of human activities is the only viable mgmt strategy</td>
<td>control of human activities should be the main thrust of all programs</td>
</tr>
<tr>
<td></td>
<td>Yellowstone National Park, Glacier National Park</td>
<td>- both parks employ a wide range of techniques to place heavy emphasis on controlling human activities</td>
<td>establishes content criteria</td>
</tr>
</tbody>
</table>

9. PROBLEM BEAR MANAGEMENT

**legislation**

<table>
<thead>
<tr>
<th>Source</th>
<th>Applicable Contents</th>
<th>Management Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criminal Code (Section 402)</td>
<td>- defines and prohibits cruelty to animals</td>
<td>- all bear handling procedures must be done in a humane fashion - certain aversive conditioning techniques may be prohibited</td>
</tr>
<tr>
<td>National Parks Wildlife Regulations Sections 14</td>
<td>- Superintendent or park warden may destroy bear if there is imminent danger to persons</td>
<td>- these regulations clearly establish three criteria for destruction - destruction under 15(1)(a) is unlikely</td>
</tr>
<tr>
<td>15(1)(a)</td>
<td>- Director may authorize destruction of bear for scientific purposes</td>
<td>- destruction under 15(1)(a) is unlikely</td>
</tr>
<tr>
<td>15(2)</td>
<td>- Director may authorize destruction of bear for protection of property</td>
<td>- note that only certain individuals may destroy or authorize the destruction under section 15(2)</td>
</tr>
<tr>
<td>4(a)</td>
<td>- destruction of bear for any other reason by any individual is prohibited</td>
<td>- destruction of severely injured animals on humanitarian grounds is prohibited</td>
</tr>
</tbody>
</table>
Table 20 (Cont'd) A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National Directives</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control of Animals Deemed Dangerous to Human Safety (Parks Canada 1971b)</td>
<td>outlines procedures for control of 'naturally' (defined) and 'unnaturally' (defined) dangerous animals</td>
<td>refines capture, release and destruction criteria, refines procedural steps</td>
</tr>
<tr>
<td>Immobilizing Equipment and Drugs (Parks Canada 1975c)</td>
<td>outlines conditions under which bears can be immobilized</td>
<td>sets capture criteria and procedural steps</td>
</tr>
<tr>
<td>Bear Management in National Parks (Parks Canada 1978d)</td>
<td>strategy design to control bear activities is mainly directed at frontcountry areas, relocation efforts to be considered as a short term measure, sets destruction criteria, requires armed warden presence for certain operations</td>
<td>reinforces the notion of zoned management, especially front and backcountry, gives impetus to control strategies that carry long term results, sets operational criteria for destruction and human safety</td>
</tr>
<tr>
<td>The Control and Disposal of Surplus Animals (Parks Canada 1974b)</td>
<td>outlines procedures for control and disposal of surplus animals</td>
<td>provides direction for purposely reducing bear populations and the subsequent release of bears (live or dead) to outside institutions</td>
</tr>
<tr>
<td>Report of the Federal Provincial Committee for Humane Trapping (Heave 1983:57-59)</td>
<td>policies and procedures adapted by Parks Canada and to be followed as a directive, sets criteria and procedures for various trapping techniques</td>
<td>sets design standards and procedures for use of culvert traps and leghold snares.</td>
</tr>
<tr>
<td><strong>Western Region Directive</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bear Management in National Parks (Parks Canada 1983d)</td>
<td>bear mgmt plan will outline strict criteria related to capture, handling, release, marking and destruction, release sites must be stipulated, out of park release sites may be considered, 'problem bear' should be defined, 'problem bears' will be allowed a maximum of 3 relocations</td>
<td>provides content criteria, has implications for regional or ecosystem management, severely limits managerial flexibility, surplus bears (alive or dead) may be released to agencies accordingly</td>
</tr>
<tr>
<td>Control of Surplus Animals (bison excluded) (Parks Canada 1983e)</td>
<td>agencies who are eligible to receive surplus animals are prioritized, disposal must reflect the dictates of approved mgmt plan, procedural guidelines are established</td>
<td></td>
</tr>
<tr>
<td><strong>Legal Opinion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department of Justice (Cullinan 1979)</td>
<td>no absolute property in tagged bears hence no absolute duty to protect from that bear, qualified property in captured bear hence an absolute duty to protect from that bear</td>
<td>bear trap design and trapping procedures must be developed so that the animal, while captured, is isolated from park visitors</td>
</tr>
<tr>
<td><strong>Literature</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>An ethologist's view on managing grizzly bears (Stokes 1970)</td>
<td>discusses the bear/human food/garbage relationship in respect to learning theory</td>
<td>illustrates the importance of prompt action</td>
</tr>
<tr>
<td><strong>Conventional Practice</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellowstone National Park, Glacier National Park</td>
<td>both parks have developed comprehensive programs outlining action criteria</td>
<td>establishes content criteria</td>
</tr>
</tbody>
</table>
Table 20. (Cont’d) A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.

<table>
<thead>
<tr>
<th>10. TRAINING</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>national directives</td>
<td><strong>Immobilizing Equipment and Drugs</strong> <em>(Parks Canada 1975c)</em></td>
<td>- sets standards for training in relation to immobilizing drugs and associated equipment</td>
</tr>
<tr>
<td></td>
<td><strong>Bear Management in National Parks</strong> <em>(Parks Canada 1978d)</em></td>
<td>- bear mgmt plan should include training requirements</td>
</tr>
<tr>
<td></td>
<td><strong>Public Safety and Search and Rescue Procedures in National Parks</strong> <em>(Parks Canada 1978c)</em></td>
<td>- training in mgmt objectives, information content and monitoring requirements to be given to all park and concession employees</td>
</tr>
<tr>
<td>western region directive</td>
<td><strong>Use of Firearms</strong> <em>(Parks Canada 1978b)</em></td>
<td>- emergency response must be included in the training plan</td>
</tr>
<tr>
<td>conventional practice</td>
<td><strong>Glacier National Park</strong></td>
<td>- defines firearm as any rifle, shotgun or immobilization device issued by Parks Canada</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- park wardens will be trained in safe use and care of guns</td>
</tr>
</tbody>
</table>

| | | - has developed a comprehensive training program covering all aspects of mgmt | - provides content criteria |

11. EMERGENCY PLANNING

<p>| national directives | <strong>Public Safety, Search and Rescue Procedures</strong> <em>(Parks Canada 1978)</em> | - sets standards regarding training, equipment maintenance, reporting, evaluations and agreements with outside agencies in relation to emergency operations | - establishes authority for development of emergency planning element |
| | <strong>Bear Management in National Parks</strong> <em>(Parks Canada 1978d)</em> | - bear mgmt plan should designate staff responsibilities for bear incidents | - responsibilities and lines of authority must be clearly spelled out particularly for emergency incidents |
| | <strong>Reporting Serious Accidents Involving the Public</strong> <em>(Parks Canada 1983b)</em> | - outlines reporting procedures | - establishes content criteria |
| | | - all fatalities or serious injuries are to be reported to the Regional Director immediately by phone | - incidents involving fatalities or serious injuries must be reported to superiors immediately |
| | | - written confirmation must follow | |
| conventional practice | <strong>Banff National Park</strong> | - both parks have developed comprehensive programs that have been repeatedly field tested | - establishes content criteria |
| | <strong>Glacier National Park</strong> | | |</p>
<table>
<thead>
<tr>
<th>Table 20. (Cont'd) A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>12. RESEARCH PLANNING</strong></td>
</tr>
<tr>
<td><strong>policy</strong></td>
</tr>
<tr>
<td><strong>national directives</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>literature</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>conventional practice</strong></td>
</tr>
<tr>
<td><strong>13. REGIONAL MANAGEMENT</strong></td>
</tr>
<tr>
<td><strong>policy</strong></td>
</tr>
</tbody>
</table>
Table 20. (Cont'd) A summary of key legislation, case law, policy statement, directives, legal opinions, literature, and conventional practices and their implications for bear management in Canadian National Parks.

<table>
<thead>
<tr>
<th>Type</th>
<th>Reference</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>national directives</td>
<td>Parks Canada Policy (Parks Canada 1979c:46)</td>
<td>- Parks Canada to co-operate with other levels of government, organizations and individuals in adjacent land jurisdictions regarding planning and integration of facilities and services.</td>
</tr>
<tr>
<td></td>
<td>The Control and Disposal of Surplus Animals (Parks Canada 1974b)</td>
<td>- Adjustments to hunting regulations along boundary areas encouraged to assist in control of surplus animals.</td>
</tr>
<tr>
<td></td>
<td>Cooperative Activities (Parks Canada 1981b)</td>
<td>- Encourages the concept of regional or ecosystem management.</td>
</tr>
<tr>
<td>western region</td>
<td>Bear Management in National Parks (Parks Canada 1983d)</td>
<td>- Out of park release sites may be considered.</td>
</tr>
<tr>
<td>directive</td>
<td>Guidelines for management involving grizzly bears in the greater Yellowstone area. (U.S. National Forest and U.S. National Parks 1979)</td>
<td>- Illustrates the range of topics and procedures used in the mgmt of the Yellowstone Ecosystem.</td>
</tr>
<tr>
<td>literature</td>
<td>Yellowstone National Park</td>
<td>- Provides content criteria.</td>
</tr>
</tbody>
</table>

14. FISCAL AND PERSON-YEAR PLANNING

<table>
<thead>
<tr>
<th>Type</th>
<th>Reference</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>national directives</td>
<td>Bear Management in National Parks (Parks Canada 1978d)</td>
<td>- Mgmt plans must include fiscal and person-year requirements needed to implement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Provides content criteria.</td>
</tr>
</tbody>
</table>

15. DESIGN CHARACTERISTICS

<table>
<thead>
<tr>
<th>Type</th>
<th>Reference</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>national directives</td>
<td>Natural Resource Management Process Manual (Parks Canada 1980)</td>
<td>- Suggests that plan include summary of background information.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Provides content criteria.</td>
</tr>
<tr>
<td>regional directives</td>
<td>Bear Management in National Parks (Parks Canada 1983d)</td>
<td>- Suggests that mgmt plans will proceed strictly in accordance with an approved mgmt plan.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Provides content criteria.</td>
</tr>
</tbody>
</table>

232.
PROGRAM ELEMENT 1: PROGRAM OBJECTIVES

Well defined objectives are crucial to every bear management plan for two reasons. First, and most obvious, is the direction they provide for decision making and strategy planning. Less obvious is their role in the evaluation process. When determining the success of a given program one must have some gauge, something against which he can compare or measure. Objectives can serve this purpose. Provided they are properly worded, the objectives should in fact, give rise to evaluation criteria.

Section 4 of the National Parks Act sets the overall purpose of parks from which a general objective of bear management programs can be inferred. Managers must attempt to preserve bear populations (presumably in a natural state) while allowing for the (presumably safe) use of the park by visitors. This dual objective is reflected in almost every bear management program throughout Canadian National Parks. Unfortunately no park has refined this legislated objective to a point where it is measurable, non-ambiguous and realistic. As a whole, parks have couched their bear management objectives in vaguely worded statements that defy quantification. Some objectives are next to impossible to attain. For example, Kootenay's prime objective is "to protect human life and the natural life of bears" (Parks Canada 1981j). How does one measure or evaluate the amount or the degree of protection afforded to humans and bears? How does one measure the minimization of bear/human conflicts in Riding Mountain (Parks Canada 1982b) or the maintenance of "viable bear populations" in Jasper (Parks Canada 1981i)? Can managers 'ensure' public safety in Gros Morne and Wood Buffalo (Parks Canada 1975b and 1981g)?
Refinements to this broad legislated objective comes from Western Region Directive 48 (Parks Canada 1983d) which states that the principle objective of bear management is to provide the highest degree of protection to visitors while at the same time fostering a healthy and natural bear population. Further management actions should be aimed at reducing the amount of bear handling and improving the control of artificial foods.

Therefore there appears to be four interrelated components to this administrative objective. (1) Visitors must be protected. (2) Bears must be healthy and natural. (3) Bear handlings must be reduced. And (4) better controls must be exerted over artificial foods. If these components can be operationalized in the sense that they are measurable, non-ambiguous and realistic, then one would have a program objective derived from both the National Parks Act and a Western Region Directive. The following is offered as a bear management objective that can be refined by any national park by simply inserting the desired values. For example, the objectives of Kootenay's Bear Management Plan (Chapter 5 page 13) call for specific percentage reductions in all categories of incidents, encounters, control actions and storage deficiencies over a five year period.

- To provide sufficient measures for the preservation of bears in their natural habitat and the safe human use of parklands as evidenced by

  - a progressive yearly reduction in the number of aggressive encounters, incidents, control actions, garbage/food storage deficiencies and frontcountry bear observations,\textsuperscript{62} until predetermined 'acceptable' levels are attained.

\textsuperscript{62} Aggressive encounters, incidents, control actions, garbage/food storage deficiencies, frontcountry and backcountry must be carefully defined. Table 24 gives suggested definitions.
235.

•a corresponding increase in the number of backcountry bear observations until a predetermined 'acceptable' number is attained.

This model objective offers the following important features. First, it was derived from both the National Parks Act and an operational directive. This is important in terms of program credibility. Secondly, it represents a quantifiable, non-ambiguous touchstone against which overall program results might be evaluated. Thirdly, it is realistic in that yearly reductions are called for rather than wholesale eliminations. Obviously, in its present text it may not be applicable to all parks. The number of garbage storage deficiencies may be so low as to be relatively insignificant. Control actions may not be as important as the number of incidents (as in Yosemite). Other parks may wish to either parcel out or emphasize different management objectives for various areas or zones of the park. Yet other parks may wish to apply further refinements by stipulating the percentage reductions required to gauge year to year success or failures. Some parks may wish to relate reductions to visitor use. However, no matter what modifications are made the same principles of non-ambiguity, measureability and realism must be followed.

PROGRAM ELEMENT 2: ORGANIZATIONAL STRUCTURE

Multifunctional Team Approach

The management of bears covers a very wide spectrum of duties, from garbage collection to scientific research. Only a multifunctional team
approach is likely to succeed. Nearly all parks have at least recognized this fact and a few parks have taken positive steps in this direction. For instance, Jasper's Bear Management Committee (page 182) consists of members from all sub-activities and although Yosemite places overall responsibility on one division, major responsibilities are assigned to 4 other divisions (page 131). From an operations perspective the team approach to both the design and implementation of the program is only logical given the diversity of jobs that must be accomplished.

Assignment of Responsibilities

Part and parcel of the team approach is a clear assignment of defined responsibilities ranging from the Superintendent down to field staff. Everyone must realize where he fits in the program and his associated responsibilities. Canadian parks, particularly those in Western Region, have done well in this respect. Very detailed assignments supplemented with organizational flow charts are common to many plans. One person in each park must be assigned as the overall co-ordinator -- one who controls and directs the day-to-day operation of the program. The 'Bear Management

63 Personnel in Canadian National Parks are organized into 5 functional groups or sub-activities namely: Resource Conservation, Interpretation, Visitor Services, Finance & Administration and General Works. Major bear management responsibilities lie with the Resource Conservation sub-activity.

64 Personnel in U.S. National Parks are also organized into 5 functional groups or divisions namely; Resource Management, Interpretation, Research, Administration and Maintenance. Major bear management responsibilities lie with the Division of Resource Management.
Warden' (Jasper), 'Bear Management Specialist' (Yellowstone), and 'Resource Management Specialist' (Glacier) are all terms used to describe this individual. The complexities of the program and its implementation necessitate that this individual be assigned to the position for an extended period of time. Frequent changes in the assignment will not facilitate an intimate understanding of the park's bear management problems and needs. In addition, care must be taken to select an individual with well developed managerial skills and not necessarily, or solely, the individual with the highest field level expertise.

Development of Expertise

Overall responsibility for the design and implementation of bear management programs has usually rested with a park warden at the GT-02 level. Bear management represents only a portion of this individual's responsibilities. With the exception of several public safety positions, all GT-02 park wardens are expected to perform as generalists in that they perform duties associated with many different aspects of the job. It would not be uncommon for a warden to be involved in rescue work, bear management, resource planning and law enforcement all in the same day. This approach does not allow one to develop specialized skills and knowledge to the same degree as another individual whose duties are more specialized. However bear management has reached a point where it requires specialized skills and knowledge. If the Warden Service is going to develop these skills and knowledge, a degree of specialization is necessary. The following is offered as a suggestion.
One park warden could be selected from each of Parks Canada's five Regions to act as a 'regional bear management co-ordinator'. A substantial portion of the co-ordinator's duties could be devoted to bear management in terms of providing a high level of bear management expertise to the field staff in all parks in the region. His duties might also include the provision of field level assistance for the development of research plans and for the supervision of bear related studies conducted by the Canadian Wildlife Service or private organizations. This is similar to 'Alpine Specialists' (Western Region) who provide expertise on public safety functions. Possibly the position could be classified at the GT-03 level.

A 1982 consultant's report (O'Dell and Barkow 1982:32) on career development and mobility within the Warden Service recommended creation of additional GT-03 positions to help fill the void between GT-02 and GT-04 positions.

Retaining the position within the Warden Service and centering the position within the field, should promote acceptance and credibility among field staff. Well qualified personnel are currently available within the Warden Service. Nationwide there are at least 16 full-time park wardens with university level education and at least 6 who have completed or are close to completing Master's level education (O'Dell and Barkow 1982:8).

65 Most Regional Offices have one person, often referred to as a Resource Studies Manager, assigned the responsibility of overseeing research studies. In respect to research the 'regional bear management co-ordinator' could assist the Resource Studies Manager by providing field level expertise.

66 The survey covered exactly one half of the existing fulltime wardens from across Canada. Hence, the actual numbers may be closer to 32 and 12 respectively. All figures refer to field level wardens and exclude Chief Park Wardens.
Given the time to develop their knowledge by way of literature reviews, seminars, workshops and the like, selected wardens could eventually provide the necessary level of expertise.67

Regardless of the method used, it is absolutely essential that at least one individual, whether he is stationed in the field or regional office, be assigned the responsibility of keeping up to date in regard to bear management literature and conveying new techniques and approaches to park personnel. The requisite time, manpower and funding must accompany this responsibility.

PROGRAM ELEMENT 3: EVALUATION

Feedback is an essential element of all systems for without it there is no data base upon which to take corrective action. One would think this would be intuitively obvious to all program managers. Yet there has been little or no attention paid to this element in the vast majority of parks.

67 Most, if not all, Regional Offices have a Fisheries and Wildlife Manager whose responsibilities include supplying field staff with expertise on topics ranging from fisheries to avifauna. For topics such as bear management, a great deal of time would be required to keep abreast of an ever increasing volume of research findings and changes to management techniques. Whether this individual will be able to devote the necessary time to bear management is very questionable.
In a cursory review of black bear management in selected U.S. National Parks, Martinka (1976:2) noted that quantitative standards for measuring program success were universally omitted. With the exception of Yellowstone (page 104), Yosemite (page 131) and Sequoia/Kings Canyon (Werner 1982), evaluations are still sadly lacking. This is particularly surprising given the number of professionally trained biologists involved with U.S. parks and the fact that Canada's only service-wide bear management directive (Parks Canada 1978d) specifically calls for annual reviews and evaluations of management programs. Since evaluations are so closely tied to objectives and effective monitoring systems, the general lack of comprehensive evaluations may simply reflect deficiencies in the two elements.

Four points are worthy of mention in regard to program evaluations: (1) evaluation criteria (2) evaluation teams (3) impartial evaluators and (4) evaluation periods.

**Evaluation Criteria**

Formalized evaluation criteria must be carefully selected along with a monitoring system that can provide the necessary data. The choice of criteria may vary from park to park but should, as mentioned previously (page 233), be a derivative of the program's objectives. Table 21 suggests

---

68 Several managers in the Yellowstone ecosystem have maximum destruction quotas written into their job descriptions against which they are evaluated (Servheen 1983).
Table 21. Evaluation criteria\textsuperscript{a, b} for bear management programs in Canadian National Parks.

1. Number of Garbage Storage Incidents
2. Number of Food Storage Incidents
3. Number of Property Damage Incidents
4. Number of Threat Encounters
5. Number of Bluff Charge Encounters
6. Number of Thwarted Charge Encounters
7. Number of Injury Encounters
8. Number of Relocations
9. Number of Destinations
10. Total Ecosystem Loss
11. Number of Garbage Storage Deficiencies
12. Number of Food Storage Deficiencies
13. Number of Observations of Bears in Developed Areas\textsuperscript{c}
14. Number of Observations of Bears Feeding on Natural Foods

\textsuperscript{a} Terminology for criteria 1 through 12 as defined in Table 24.
\textsuperscript{b} Each criterion could be expressed in absolute terms and in terms relative to visitation. Visitation might be expressed in camper-nights, number of trail users, gate entries or other significant units. Since most incidents and storage deficiencies seem to occur in campgrounds, the number of camper-nights might be the most meaningful unit.
\textsuperscript{c} 'Development Areas' would have to be defined in relation to each park.
a number of quantifiable criteria that could be used to evaluate the success of the overall program. Several of these criteria are currently being used by Yellowstone, Glacier or Yosemite. A more refined evaluation could be made by assessing each program element separately. This might be advantageous in that managers would be able to identify particular strengths and weaknesses and, if necessary, apply specific remedial measures. Several elements such as Waste Management and Food Storage lend themselves to quantification while others such as Regional Ecosystem Management and Monitoring must rely on more subjectively derived criteria.

Evaluation Teams

Since it is extremely unlikely that any one individual possesses expertise covering all elements of the management program, an evaluation team may be necessary. A few parks such as Glacier and Yosemite currently use this approach. However in each case the team consists of various park staff including the resident research scientist.

Impartial Evaluators

The fact that the very people who design and operate the program are the evaluators of the program must introduce a certain amount of bias although unintentionally. Use of outside evaluators, individuals external to the park, might render a more impartial opinion and provide 'fresh' ideas and methodologies. Glacier seems to be moving in this direction; periodic evaluations are performed by a review team appointed by the Regional Director (Sigler 1983).
Table 22 indicates an idealized evaluation team. The team is composed of 6 members from various fields of expertise. All evaluators are external to the sponsor park and are drawn from either the academic community, other parks, private industry or regional offices. Each member is assigned to evaluate specific program elements falling within his area of expertise. Members 1, 4 and 6 represent key evaluators whose input is critical to the proper function of the team. If logistic or monetary restrictions limit participation, priority should be given to those individuals. The omnibus responsibilities of members 1, 4 and 6 should act to provide co-ordination, consistency and information exchange between members.

Evaluation Periods

Martinka (1983) has indicated that there is a great danger in basing management decisions on yearly evaluations. Year to year data may represent nothing more than aberrant fluctuations having no relation to long term trends. Therefore full scale evaluations may only be necessary on long term historical data. This approach will not only save time and money associated with the evaluation process but will also present a more accurate and meaningful assessment of the park's bear management program and the future directions it might take. Nevertheless, more frequent but less detailed evaluations of individual program elements, such as waste management or food storage, may prove useful in order to correct obvious shortcomings. All evaluations should be completely documented and made available to the public in conjunction with the current bear management plan.
Table 22. Bear management programs in Canadian National Parks: composition and responsibilities of an idealized evaluation team.

<table>
<thead>
<tr>
<th>Area of Expertise</th>
<th>Possible Evaluators</th>
<th>Evaluation Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. biological/behavioural/research</td>
<td>one acknowledged expert from the academic community</td>
<td>provides overall evaluation of all elements with special emphasis on research planning, control of problem bears, evaluations and population and behavioural dynamics.</td>
</tr>
<tr>
<td>2. information/communications</td>
<td>one acknowledged expert in communications or interpretive techniques: this individual could be the Chief Naturalist (from another park) or an individual drawn from private industry (advertising firms) or the academic community; preference should be given to the latter two sources.</td>
<td>provides indepth evaluation of the public information element: contents, dispersal systems and effectiveness.</td>
</tr>
<tr>
<td>3. mechanical/design</td>
<td>one acknowledged expert in design and construction of mechanical devices; this individual could be drawn from Regional offices (mechanical engineer), private industry or the academic community.</td>
<td>provides in depth evaluation of the waste management and food storage elements; evaluates the existing devices and provides design/construction advice to improve structures and methodology.</td>
</tr>
<tr>
<td>4. managerial/administrative</td>
<td>one individual with extensive experience in the managerial/administrative field; this individual could be a Superintendent (preferably with warden experience), a Chief Park Warden (from another park), or be drawn from Regional Offices (e.g. Chief of Resource Conservation)</td>
<td>provides overall evaluation with special emphasis on control of human activities, emergency procedures, training, organizational structure and evaluations.</td>
</tr>
<tr>
<td>5. computer programming</td>
<td>one individual with advanced programming experience; this individual could be drawn from the academic community or Regional offices.</td>
<td>provides detailed evaluation of the monitoring element: evaluates data input/output variables, collection and dispersal systems.</td>
</tr>
<tr>
<td>6. field operations</td>
<td>one individual with extensive field level experience; this individual might include the warden responsible for overall co-ordination of the bear management program (from another park) or the 'Regional Bear Management Co-ordinator' (if such a position were to be created).</td>
<td>provides overall evaluation of all elements.</td>
</tr>
</tbody>
</table>
PROGRAM ELEMENT 4: MONITORING

The success or failure of many program elements are inseparably tied to the existence of an efficient monitoring system. The decision to either release or destroy a nuisance bear is, or ought to be, based partially on the animal's past history or dossier which is itself a product of the monitoring system. Similarly only a monitoring system can, as dictated by Parks Canada Policy (Parks Canada 1979c:43), provide accurate information to the public. Many aspects of bear research are heavily dependent upon the observations and records of field staff. Better monitoring systems may remove the need for some research (Martinka 1983). A sound defence against a liability action must rely heavily on accurate, concise and complete records. Over the long term monitoring will provide the data base upon which to evaluate programs, determine trends, and alter management strategies. The monitoring element has such an ubiquitous influence. In fact one might go so far as to say that almost all management actions must be preceded by a monitoring action (Brown 1983). So important is the monitoring element that Meagher (1977:1) has referred to Yellowstone's daily monitoring program as the operational key to success.

Two questions must be answered in the design of a monitoring system: what needs to be recorded and how best can it be accomplished?

Required Data

In response to the first question the answer must be to collect as much detail as possible on each program element given the limitations of
manpower and finances. A review of various monitoring systems reveals that although no one system is totally comprehensive, data is gathered from 5 general categories dealing with the more contemporary types of information such as pure observations, incidents, aggressive encounters and resultant management actions. These are shown in categories 1 through 5 in Table 23. Accurate records dealing with visitor use and the more administrative side of management must also be generated. This type of information is shown in categories 6 to 14, Table 23. The resultant 14 categories represent the essential items that all programs should monitor.

Terminology

How to collect and store this information is much more involved and must be tailored to the needs and capabilities of each park. What becomes very evident to anyone inspecting multiple year records for a single park or trying to compare records from a number of parks, is that data is often non-intelligible and non-comparable due to two factors: (1) the use of undefined terminology and (2) the lack of standardized reporting format.

So confusing is the mix of undefined terms that many park records are next to useless. What is an 'incident': does it include property damages, maulings, bluff charges, or merely meeting a bear on a trail? What are bear 'removals': does the term imply in-park relocations, zoo transfers or destructions? What does the term 'control action' include? Do 'captures' include those done for research? Other often used yet undefined terms are 'encounters, confrontations, interactions, occurrences, attacks, contacts,
Table 23. Categories of information\textsuperscript{a} required for a comprehensive bear monitoring system in Canadian National Parks.

<table>
<thead>
<tr>
<th>Category</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Incidents\textsuperscript{b}</td>
<td></td>
</tr>
<tr>
<td>2. Encounters\textsuperscript{b}</td>
<td></td>
</tr>
<tr>
<td>3. Garbage Storage Deficiencies\textsuperscript{b}</td>
<td></td>
</tr>
<tr>
<td>4. Food Storage Deficiencies\textsuperscript{b}</td>
<td></td>
</tr>
<tr>
<td>5. Management Actions</td>
<td>• data related to capture attempts\textsuperscript{c} \hspace{1cm}</td>
</tr>
<tr>
<td></td>
<td>• immobilization data \hspace{1cm}</td>
</tr>
<tr>
<td></td>
<td>• destruction/autopsy data \hspace{1cm}</td>
</tr>
<tr>
<td></td>
<td>• mark/release data \hspace{1cm}</td>
</tr>
<tr>
<td></td>
<td>• data related to area closures \hspace{1cm}</td>
</tr>
<tr>
<td></td>
<td>• data related to warning postings \hspace{1cm}</td>
</tr>
<tr>
<td></td>
<td>• enforcement data</td>
</tr>
<tr>
<td>6. Bear Dossiers\textsuperscript{d}</td>
<td></td>
</tr>
<tr>
<td>7. Visitor Use\textsuperscript{e}</td>
<td></td>
</tr>
<tr>
<td>8. Documents pertaining to emergency responses</td>
<td></td>
</tr>
<tr>
<td>9. Research findings/plans</td>
<td></td>
</tr>
<tr>
<td>10. Minutes of seminars/workshops/training sessions</td>
<td></td>
</tr>
<tr>
<td>11. Regional agreements or minutes of meetings</td>
<td>concerning regional management</td>
</tr>
<tr>
<td>12. Costs and manpower requirements</td>
<td></td>
</tr>
<tr>
<td>13. Program or element evaluations</td>
<td></td>
</tr>
<tr>
<td>14. General Correspondence</td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a} Data should be reported according to its association with either black bears, or grizzly bears or unidentified bear species.

\textsuperscript{b} These terms are defined in Table 24.

\textsuperscript{c} Although no park collects data on these topics, the information would have definite value. Information pertaining to the date/time/location of the trap set, the bait used, etc., could be easily gathered by use of a trap register. This data might be useful in determining trap success, monitoring frequency and substantiation of other records.

\textsuperscript{d} Bear dossiers consist of a collation of all reports concerning a particular bear's involvement in categories 1, 2 or 5.

\textsuperscript{e} Kendall (1983) has noted a particular deficiency in this area especially in terms of day use data. Most incident, encounter, storage deficiency or management action data become much more meaningful when reported in relation to visitation.
trappings and handlings. If records are to be meaningful, clearly defined terminology must be consistently applied and until this is accomplished bear managers will have great difficulty intelligently discussing their management programs.

Few authors define the terminology used in their analysis. Singer (1982:2) defined 7 terms but, unfortunately mixed aggressive and non-aggressive reactions under common headings: serious charge, minimal bear/human physical contact and property damage were placed under the heading of 'Bear Incident'; curious approaches, distant bluff charges and neutral responses were included under the heading 'Bear Encounter'. The seven category system used by Banff (page 201) to describe a bear's reaction to humans along with a property damage category is probably the most comprehensively defined set of terminology currently available. However, even this system has serious shortcomings. For example, terms to describe incidents involving bears and garbage/human food are omitted.

Table 24 lists terminology that could be used to describe various types of interactions between bears and garbage, human food, property or humans. Also included are terms describing various types of garbage and food storage deficiencies and management actions. As a matter of convenience, the terms are organized in four main groups - incidents, encounters, control actions and storage deficiencies. Incidents involve those interactions between bears and garbage, bears and human food or bears and property damage. Encounters relate to the interaction between bears and humans. Control actions describe various 'hands-on' types of management actions. Storage deficiencies denote situations wherein either garbage or
Table 24. Suggested terminology for bear monitoring systems in Canadian National Parks.a,b

INCIDENTS

**Garbage Storage Incident:** used to describe any interaction between bears and garbage wherein the bear gains access to improperly stored garbage; human presence at the time of the incident is not necessary. Garbage storage incidents should be classified as either government, commercial, residential or visitor dependent upon the ownership of the garbage.

**Food Storage Incident:** used to describe any interaction between bears and human food wherein the bear gains access to improperly stored human food; human presence at the time of the incident is not necessary. Food storage incidents should be classified as either government, commercial, residential or visitor according to food ownership at the time of the incident. Food storage incidents do not include those situations wherein a bear forces tourists to surrender their food.

**Property Damage Incident:** used to describe any interaction between bears and human property wherein the property is damaged in any way; human presence at the time of the incident is not necessary. Property damage incidents will normally be accompanied by either a garbage or food storage incident or one or more encounter categories. Property damage incidents should be classified as either government, commercial, residential or visitor according to property ownership.

**NON-AGGRESSIVE ENCOUNTERS**

**No Change Encounter:** used to describe an interaction between a bear and human wherein the bear gives no indication of being aware of the human and continues its normal routine.

**Flight Encounter:** used to describe an interaction between a bear and human wherein the bear departs the area at the time of the encounter or soon after; no aversive conditioning is applied.

**Aversive Conditioning Encounter:** used to describe an interaction between a bear and human wherein the bear departs the area immediately after the human applies some form of aversive conditioning (e.g. shout, throw rock, etc.). This type of encounter may be very common in campgrounds. A Type I aversive conditioning encounter implies that the aversive conditioning was effective and the bear moves away although it may soon return. A Type II encounter implies that the aversive conditioning technique has no effect and the bear remains in the area.

**Neutral Encounter:** used to describe an interaction between a bear and human wherein the bear indicates that it is aware of the human presence (e.g. pauses, orient towards the human, etc.) but continues its pre-encounter behaviour.

**Curiosity Encounter:** used to describe an interaction between a bear and human wherein the bear stops its current activity to investigate the human presence (e.g. may move toward the human, follow the human, sniff the air, stand on its hind legs and sniff) and then return to its pre-encounter behaviour.

**Illegal Feeding Encounter:** used to describe an interaction between a bear and a human wherein the human purposely attracts the bear to within close proximity by enticement with food. A Type I encounter implies that the bear did not receive any reward. A Type II encounter implies that the bear received human food.

**Food Seeking Encounter:** used to describe an interaction between a bear and a human wherein the bear is fully aware of the human presence yet boldly moves to within close proximity of the humans in an attempt to gain access to their food. The humans take evasive action (e.g. picnickers are forced to pack up and move due to an approaching bear; a bear approaches a roadside vehicle and stands up against the vehicle forcing the tourists to roll up their windows or move on). A Type I encounter implies that the bear did not receive any food. A Type II encounter implies that the bear received human food.

**Inadvertent Contact Encounter:** used to describe an interaction between a bear and human wherein the bear inadvertently makes physical contact with a human; inadvertent injuries of a minor nature may occur (e.g. a bear steps on a sleeping camper). This type of encounter will probably occur in conjunction with a food seeking encounter.

**AGGRESSIVE ENCOUNTERS**

**Threat Encounter:** used to describe an interaction between a bear and human wherein the bear either growls, huffs, slaps, naws, pops jaws, pants loudly or shows other signs of aggressive intent.

**Bluff Charge Encounter:** used to describe an interaction between a bear and human wherein the bear charges toward the human but stops short of making physical contact; the bear stops the charge or veers off on its own volition or after the human applies some form of aversive conditioning (shout, wave, etc.). In the latter case an aversive conditioning encounter should be noted also. A Type I encounter implies that the bear stopped the charge on its own volition - no aversive conditioning is applied. A Type II encounter implies that the bear stopped the charge after aversive conditioning was applied.
Thwarted Charge Encounter: used to describe an interaction between a bear and human wherein the bear charges but is unable to make physical contact because of some evasive action (climb tree, enter vehicle, the bear is shot, etc.) on the part of the human.

Injury Encounter: used to describe an interaction between a bear and human wherein the bear purposely makes physical contact with the human and in so doing inflicts injuries.

**CONTROL ACTIONS**

Capture: used to describe a management action wherein a bear is physically captured by means of traps or drugs; this category does not include captures made for research purposes. Captures should be classified as to method used - culvert, snare, free ranging immobilization.

Release/In Park: used to describe a management action wherein a bear is released within the park in which it was captured.

Release/In Ecosystem: used to describe a management action wherein a bear is released outside the park in which it was captured but within its known or suspected ecosystem (e.g. a bear is released in an area 10 km beyond the boundary and no impassable barriers exist).

Release/Out of Ecosystem: used to describe a management action wherein a bear is released outside of its known or suspected ecosystem and there is no reason to believe the animal will be able to return to its former ecosystem (e.g. a bear is transferred from Montana to Alaska). This classification poses the obvious problem of delineating the ecosystem.

Release/Institution: used to describe a management action wherein a bear is transferred to a zoo, game farm, etc. where there is no possibility of return to its former ecosystem.

DeSTRUCTION: used to describe a management action wherein a bear is purposely destroyed for management reasons; mercy killing of injured animals is excluded except where prior plans had indicated the bear was to be destroyed.

**STORAGE DEFICIENCIES**

Garbage Storage Deficiency: used to describe a situation wherein garbage is accessible to bears due to the use of improper storage techniques. Garbage storage deficiencies should be reported on a site-day basis i.e. one deficient site for 5 days would constitute 5 site-days of deficiency. Responsibility for the deficient site should be classified as either government, commercial, residential or visitor according to ownership.

*One or more incidents or encounters often occur almost simultaneously. For example: a warden finds a bear breaking into garbage container; the bear orients toward the approaching warden and then continues foraging in the garbage; the warden throws several rocks and the bear runs. This series of events might be classified as three separate interactions: (1) a bear/garbage incident; (2) a neutral encounter; and finally (3) an aversive conditioning encounter.*

Food Storage Deficiency: used to describe a situation wherein human food is accessible to bears due to the use of improper storage techniques. Food storage deficiencies should be reported on a site-day basis i.e. one deficient site for 5 days would constitute 5 site-days of deficiency. Responsibility for the deficient site should be classified as either government, commercial, residential or visitor according to ownership.

**MISCELLANEOUS**

Other Population Losses: used to describe other population losses resulting from poaching, roadkill, a drug overdose or hunter kills within the ecosystem.

Total Ecosystem Loss: used to describe the total number of bears lost from the ecosystem; this would constitute the sum of Releases/Out of Ecosystem, Release/Institution, Destruction and Other Population Losses.

Ecosystem: must be defined within the context of the specific park. Due to a lack of specific data, most parks will have to draw operationally based boundaries rather than boundaries dictated by ecological parameters.

Frontcountry: must be defined within the context of the specific park.

Backcountry: must be defined within the context of the specific park.

Bear Season: used to describe the period of time during which visitor use statistics will be recorded in order to develop use-specific bear management data. The actual period of time must be defined within the context of the specific park.

*Black, grizzly or unidentified bear data should always be reported separately.*
human food is potentially accessible to bears. One might note that several of the 'encounter' terms are those used by Banff (page 201). Also listed are several terms that should be defined within the context of the individual park. The terminology is designed to remove the reporting confusion now prevalent in the literature and promote a higher level of precision and consistency.

**Data Collection Format: A Single Form System**

The second cause of inconsistency is the lack of standardized data collection forms and the resulting variation in data collected. While many Canadian Parks use the Cansis Wildlife Observation Card for routine observations, each park has developed its own peculiar format for other reports. Kootenay, for instance, uses an Occurrence Report form which is basically a blank sheet which depends on the reporting warden to think of and record all important details, a system which has obvious limitations. Jasper on the other hand uses a series of 7 relatively detailed fill-in-the-blank type forms. Banff's Bear Monitoring form (Fig. 52) probably represents the state of the art in reporting format. However, even it has serious omissions such as garbage and food storage incident categories and their associated causative factors.

If year to year data or park to park data is to be consistent and comparable, a single standardized, comprehensive reporting format must be developed and used in association with clearly defined terminology. In the U.S., the Case Incident Report (Fig. 29) is used as a national reporting form. Its narrative design allows reporting of all types of incidents
including those related to bears. However, reporting inconsistency is bound to develop since bear incidents must be described mainly under the narrative section. While the Banff form (Fig. 52) allows for detailed consistent reporting through the use of a checklist system, the form is specific to bear management and could not be used for other functions such as law enforcement and so forth.

Reporting could be greatly simplified by the use of a single form system capable of handling very detailed information on all types of incidents including those involving bears. To accomplish this a coded checklist design with some narrative space is suggested. British Columbia's Motor Vehicle Traffic Incident Police Investigation form (Fig. 57) illustrates the quality and quantity of detail that can be generated using a coded checklist design. A similar form, specific to park operations could be developed to provide for all types of field reporting including bear management. Given the establishment of clearly defined terminology, the type of data required in categories 1 through 5 (Table 23) could readily be coded and entered on the form. The coded values could then be easily sorted by hand or key punched for computer processing. Kootenay National Park is currently developing this type of form.

Monitoring Systems

Most monitoring systems employed by well-known parks involve the use of a centralized reporting system. The systems used by Yellowstone, Glacier and Banff were discussed on pages 104, 148, and 200 respectively. The following features appear to be common to all three systems.
Fig. 57. Reproduction of the form Motor Vehicle Traffic Incident Police Investigation, Province of British Columbia. The form illustrates the volume of data that can be collected using a code checklist format. A similar format could be used to collect detailed bear management data.
254.

- Centralization. A central dispatcher or information centre acts as a general clearing house for all incoming and outgoing observations and management action reports.

- Standardized Report Forms. Collection of detailed information through the use of checklist style forms supplemented by more lengthy narrative style reports if necessary.

- Computerized Data Processing. To ensure rapid data turn around and sorting.

- 24 Hour Operation. To provide continual input/output access.

- Periodic Summary Reports. Usually compiled on a daily, weekly and yearly basis.

- Daily Information Dispersal. To all information centres, district and subdistrict offices (Yellowstone and Glacier only).

Computerized monitoring systems lend themselves to a single nationwide monitoring system such as BIMS (Bear Information Management System) used by at least six U.S. parks (Cella and Kapler 1979:163). The system is designed to allow each park to establish a data base tailored to its individual needs. Incident reports, control action reports and routine observations can be stored and retrieved or manipulated into specific reports such as bear dossiers69 (Wauer 1982:pers.comm.).

Only individuals who have gone through the frustrating experience of trying to gather and compare multi-park data can fully appreciate the convenience and relative accuracy of BIMS. Nevertheless the system is not

69 A 'dossier' consists of a description of the known bear along with reference to all observations or reports in which the animal has been identified. Dossiers are essential for many management decisions.
without disadvantages. Processing delays\textsuperscript{70} inherent in a centralized system used by very distant parks have been so troublesome as to force several parks (Yellowstone and Glacier) to purchase their own in-house computers. Independent computer storage should not cause problems as long as standardized terminology and reporting forms are used.

**Monitoring: Training and Encouraging the Visitor to Report**

Two other factors play a major role in the monitoring system: training and the number of observers. No matter how simple a system is, a certain degree of training is required. Understanding the need for monitoring and the use to which the data is put can be every bit as important as understanding the mechanics of properly completed forms. Employees must be given reason to believe in the system. Glacier's emphasis on monitoring during its annual training session (Table 15) is an example that other parks might follow.

The number of park employees is relatively minute compared to the number of park visitors. Every visitor ought to be considered as a potential observer or monitor. U.S. parks have recognized this fact and encourage visitors to report all observations by way of boldly printed messages on most pamphlets and posters. In Canada there is much less encourage-

\textsuperscript{70} Personnel in both Glacier (Blair 1983:pers.comm.) and Yellowstone (Brown 1982:pers.comm.) indicated that slow data turn around made BIMS impractical for day to day decision making.
ment. Most pamphlets\textsuperscript{71} and other forms of public information have generally failed to convey this simple yet important message.

PROGRAM ELEMENT 5: PUBLIC INFORMATION

Some authors (Parks Canada 1982a:2) maintain that unnatural sources of food are the 'root cause' of most bear problems. However, sources of unnatural foods may be merely symptomatic of a more basic 'root cause' that being a lack of adequate information. One could easily put forth the hypothesis that if visitors were given detailed food/storage information the number of related bear incidents would greatly diminish. Of course this hypothesis is premised on a belief that the majority of incidents are related to: (1) outright ignorance (2) an inability to follow instructions (3) a failure in information quality (i.e. effectiveness) and/or (4) a failure in dispersal methods.

The public information element is important for another reason. The single most important aspect of any bear management program is public support (Brown 1983). Without it the program will not function properly and inevitably funding will diminish. It is the public information element that carries the major role in gathering and maintaining this support.

Three factors seem essential to this element: (1) content and design

\textsuperscript{71} The 1984 edition of the pamphlet You are in Bear Country (Fig. 45) now carries the message "Report any bear sightings or carrion locations to the nearest warden office".
standards (what is to be said and how it is to be said) (2) dispersal
methods and (3) evaluation techniques.

Content and Design Standards

Most parks have failed to apply a systematic approach to the content
and design of public information related to bears. Although additions to
the text of the most recent edition of the You are in Bear Country pamphlet
(Fig. 45a), represents a major improvement over previous editions, the
pamphlet is still lacking in several important features. Notable in the
new edition is the lack of illustrations or photographs to indicate pre­
ferred foods, habitats and signs of bear presence. Most city dwellers
would be unable to identify these or other indications that a bear could be
close by. Another recently published pamphlet, You May Be In Bear Country
(Fig. 58), also represents a major improvement in both the content and
design of bear information. However, the pamphlet was developed as part of
a 'Parks West' promotional venture, and given the apparent costs of the
pamphlet, it may be less widely distributed than the You are in Bear
Country pamphlet. The Parks Canada garbage bag (Fig. 46) also represents
another high profile information mode that has not been effectively uti­
lized. The bag currently contains only one cursory statement about bears.
When one compares the content of Parks Canada pamphlets and garbage bags to
those of the U.S. National Parks it becomes apparent that, although Parks
Canada has recently made significant improvements, there is still consider­
able room for improvement.

At least one park (Glacier, Montana) has seen fit to outline stan-
Adult grizzly. Colour varies from black to blonde; frequently with white-tipped fur.

Adult grizzlies feeding on carrion.

Sanctuary for the grizzly is limited to western and northern parks.

The black bear is the smallest member of the North American bear family.

A black bear using improperly stored garbage.

Bears are found in many of Canada's national parks and near some of the historic parks and sites.

ALL BEARS ARE POTENTIALLY DANGEROUS

Bears are animals that demand respect. They have great strength and agility, are unpredictable and can inflict serious injury. When they feel threatened, they defend themselves, their young and their territory.

BLACK AND GRIZZLY BEARS

Black bears can be found in most of Canada's national parks. They adapt readily to human environments and year-round prefer heavily wooded areas and dense bushland. Grizzlies are found in western and northern mountain parks. They tend to be migratory, inhabiting the high alpine country in summer and descending to the valleys in the spring and fall. The promise of easily-obtained food often lures them into areas occupied by humans.

POLAR BEARS

Polar bears can be found in Auyuittuq National Park in the Northwest Territories and near Fort Prince of Wales National Historic Park and York Factory National Historic Site in northern Manitoba. The behaviour of polar bears differs from that of Black and Grizzly Bears and they may be even more dangerous because they have no fear of humans. Contact the Superintendent of Manitoba North Sites or the Superintendent of Auyuittuq National Park for more information.

Few bear attacks have occurred in the national parks, especially considering the numbers of visitors each year, and the majority of encounters have been brought about by human carelessness.

Our national parks are dedicated to the protection of all wildlife. With your cooperation, we can continue to live up to this ideal without endangering you, the visitor.

TO AVOID A BEAR ENCOUNTER
- don't hike alone. Stay alert and think ahead;
- watch for bear signs such as fresh tracks, droppings (droppings);
- stay in the open and avoid berry patches and carcass remains;
- be especially alert when traveling into the wind. The bear may not catch your scent and your approach will surprise him;
- carry a noisemaker (bells or stone-filled cans), but remember that it may not be effective in dense bush or near rushing water;
- use a telephoto lens to take photographs at a distance;
- NEVER go near a bear cub. The mother may be nearby;
- don't take your dog into the backcountry. The sight and smell of a dog often infuriates a bear and may bring on an attack;
- don't, when camping, encourage bears by leaving food or garbage around. Garbage-trained bears associate food with humans and soon lose their fear of man. They may become a danger to campers and have to be destroyed.

DON'T LET YOUR CARELESSNESS KILL A BEAR

In established campgrounds:
- keep your campsite clean and lock food in the trunk of your vehicle;
- put garbage in containers provided by the park;
- don't cook or eat in your tent and don't leave dirty utensils around.

In the backcountry:
- camp away from animal or walking trails and near large, sparsely branched trees you can climb if it becomes necessary;
- choose another area if you notice fresh bear signs;
- cache food away from your tent, preferably hung from a tree;
- cook away from your tent — food smells can permeate it — and try to use relatively odor-free freeze-dried foods;
- don't sleep in clothes you wore while cooking; food odors attach themselves to clothing;
- don't bury garbage. If you can't burn it, pack it out to the nearest container.

BEAR CONFRONTATIONS

If you encounter a bear, you can reduce the hazard by:
- making a wide detour if you see a black bear;
- leaving the area at once if you see a grizzly;
- keeping upwind so the bear will catch your scent;
- leaving the bear an escape route if you can't deter or retreat. Then wait until he moves from your path.

ATTACKS

Most grizzly attacks result from surprising the bear, coming too close to a kill, or moving between a sow and her cubs. Black bears, normally less aggressive than grizzlies, may attack when humans feed them or come between a sow and her cubs.

FACED BY AN AGGRESSIVE BEAR
- don't run (quick, jerky movements can trigger an attack);
- remember that a bear rearing on its hind legs is not always aggressive. Remain still and speak in low tones to indicate to the animal that you mean no harm;
- if you meet an aggressive grizzly in a wooded area, speak softly and back up slowly toward a tree. As you do, slowly remove your pack and set it on the ground to distract the bear. Then climb high up the tree (while adult grizzlies usually can't climb, they can stretch eight to ten feet up a tree).
- if you meet an aggressive black bear, remember that he is an agile climber, so a tree may not offer an escape;
- be aware that bears sometimes bluff their way out of a threatening situation by charging and then veering away at the last second;
- as a last resort, "play dead". Drop to the ground face down, move your legs up to your chest and clasp your hands over the back of your neck. Your pack will shield your body. It takes courage to lie still, but resistance would be useless.

Published by authority of the Minister of the Environment
©Minister of Supply and Services Canada 1983
CS-R121-000-BB-41
Canada
dards that all modes of information must follow (page 153). The courts have had a major influence in this regard (Blair 1983). The law of negligence places a legal duty on management to warn visitors of known or unusual dangers. Although the magnitude of the risk might be statistically qualified, selected information sources must make mention of the potentially dangerous aspect of bears and the means to minimize such dangers. Moreover, unusual dangers must be well publicized by way of signs, or other information modes. The use of computerized monitoring systems has made it possible to supply accurate information. Hand in hand with this development goes the associated liability for failing to provide such information.

In the past, information content has dwelt heavily on the danger aspect of bears. Although this is undeniably important and must be addressed, there is an emerging trend to downplay safety while emphasizing the more positive aspects of bears such as their role in the ecosystem and the measures that must be taken to ensure their survival (Servheen 1983). The Information and Education Plan for the Grizzly in the Yellowstone Ecosystem (Servheen et al. 1983) is a prime example of this new emphasis.

Table 25 indicates basic categories of information that could be included in the public information element.

The design quality of Canadian information also seems to be lacking, most notably in the pamphlet modes. Compare the design quality of You Are

72 Waterton Lakes National Park has prepared a short document entitled Bear Essentials which lists 18 commonly asked questions about bears and the answers that park employees are to supply. Employees, other than park wardens, are requested to confine their responses to these 'stock' answers.
Table 25. Categories of public information for bear management programs in Canadian National Parks.

1. Natural history of bears
2. Importance of bears to the park ecosystem and to the visitor experience
3. Identification of (1) bear species, (2) preferred foods, (3) preferred habitat, and (4) bear traces (e.g. tracks, scats, rub trees, diggings)
4. Avoidance techniques for hikers, campers and other visitors (identification of dangerous areas and situations, hiking and camping techniques that reduce the chance of bear problems, what to do during an aggressive encounter)
5. Garbage storage techniques
6. Food storage techniques
7. Management concerns and attempted solutions (problems defined, causative factors, past and current solutions, historical management data, research efforts, future management directions, etc.) This category must emphasize the following three points:
   • that the potential for a dangerous or even fatal bear/human encounter, although remote, does exist;
   • that the probability of bear/human encounters can be minimized but never completely eliminated;
   • that control of human activity is the best means of minimizing risks
8. Importance of reporting all incidents, encounters and observations
9. Current observations, posted warnings/closures and incident/encounter locations
10. Reference to other sources of information
in Bear Country (Fig. 45) with that of Glacier's About Bears (Fig. 38) or Yosemite's Life Certificate (Fig. 24). You Are in Bear Country is a standardized pamphlet dispensed by all Canadian parks with black or grizzly bear populations. Although advantageous from a logistics and economic point of view, standardization of this type does not permit inclusion of a park's individual peculiarities. Moreover standardization of the pamphlet's outward design, as has been the case during the last 10 years, may even act to reduce its effectiveness. Even though important additions have been made to the text of the most recent edition, the pamphlet looks essentially the same as the previous edition. Visitors may not bother to read the new edition on the assumption that it contains the same information as the look-alike former edition (Maw 1984). More varied and graphic means of presenting this information is needed. Rigid adherence to the standardized pamphlet also presents problems for parks without a grizzly bear population. Yosemite's efforts to 'personalize' public information (page 135) seems like an excellent approach.

Information Dispersal

The effectiveness of even high quality information is directly related to dispersal methods. Who are the target groups? Where are the best contact points? What information mode is most suited to each point? Table 26 summarizes an answer to these questions. Particular note might be made of the importance of concessionaire operations in information dispersal. Most visitors will, during the course of their stay, make at least one stop at a concession either out of necessity (gas, groceries, etc.) or
Table 26. Contact points, information modes, and target audiences for bear management information systems in Canadian National Parks

<table>
<thead>
<tr>
<th>Contact Points</th>
<th>Information Modes</th>
<th>Target Audiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-visit contacts</td>
<td>school &amp; community presentations, bear pamphlet included with all information replies; radio and TV broadcasts; local newspaper articles</td>
<td>M, DH, AC, BC</td>
</tr>
<tr>
<td>Gateway Contacts</td>
<td>signs, pamphlets; provision for multiple visitor entries; contact backsight</td>
<td>M, DH, AC, BC</td>
</tr>
<tr>
<td>Information Centres</td>
<td>signs, pamphlets, exhibits, publications for sale, current Bear Management Plan on display; public access computer terminals</td>
<td>M, DH, AC, BC</td>
</tr>
<tr>
<td>Backcountry Registration Centres</td>
<td>signs, pamphlets, verbal contacts, current information, Bear Management Plan, self operated audio-visual, exhibits, garbage bags with pertinent information</td>
<td>BC</td>
</tr>
<tr>
<td>Trailheads</td>
<td>signs, pamphlets, current information status, with special emphasis on encounter procedures, and garbage/food storage</td>
<td>DH,BC</td>
</tr>
<tr>
<td>Backcountry Campsites</td>
<td>posters in unobtrusive yet high profile locations such as outhouses (with adequate light) detailing the importance of clean camping and food storage methods</td>
<td>BC</td>
</tr>
<tr>
<td>Auto Campground Entrances</td>
<td>sign giving current status; pamphlet affixed to camping permit, message on permit</td>
<td>AC</td>
</tr>
<tr>
<td>Autocamp Self Registration Centres</td>
<td>signs, pamphlets, exhibits with special emphasis on proper garbage/food storage</td>
<td>AC</td>
</tr>
<tr>
<td>Concessionaire Operations</td>
<td>signs, pamphlets, portable exhibits and audio-visual programs, interpretive talks, Bear Management Plan supplied</td>
<td>M, DH, AC, BC</td>
</tr>
<tr>
<td>Interpretive Talks</td>
<td>committed to a certain percent of 'bear shows', committed to 5 to 10 minute 'bear blurb' at every program; pamphlet distribution</td>
<td>DH, AC</td>
</tr>
<tr>
<td>Interpretive Hikes</td>
<td>pamphlets, personal contacts</td>
<td>DH</td>
</tr>
<tr>
<td>Resident Households</td>
<td>pamphlets, local newspaper, form letters</td>
<td>R</td>
</tr>
<tr>
<td>High Visitor Use Areas</td>
<td>roving interpreters, pamphlets, portable exhibits</td>
<td>M</td>
</tr>
<tr>
<td>Fishing Licence and Fishing</td>
<td>affix pamphlet or reference to other information sources</td>
<td>DH, BC</td>
</tr>
<tr>
<td>Regulation Summary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closure or Warning Posted at High Visitor Use Trail</td>
<td>personal contact through interpreter stationed at trailhead to discuss management action</td>
<td>DH, BC</td>
</tr>
<tr>
<td>Warden Offices</td>
<td>personal contacts, Bear Management Plan, pamphlets, current information status, exhibits</td>
<td>M, DH, BC</td>
</tr>
<tr>
<td>Highway Viewpoints Campground Patrols</td>
<td>exhibits personal contacts, pamphlets distribution</td>
<td>M, AC, DH, BC</td>
</tr>
<tr>
<td>Washrooms</td>
<td>posters</td>
<td>M, DH, AC, BC</td>
</tr>
<tr>
<td>Garbage Bags</td>
<td>with printed bear information; given to all campers</td>
<td>DH, AC, BC</td>
</tr>
</tbody>
</table>

a M - Motorist, DH - day hiker, AC - autocamper, BC - backcountry camper, R - resident
b Glacier (B.C.) has installed an On-Tel computer information terminal in one of its Information Centres. The terminal is freely accessible to the public. Perhaps this will be the information dispersal system of the future.
pleasure. This, coupled with the fact that concessionaire employees greatly outnumber park employees means that they will be able to contact many more visitors. This is particularly true for employees working in high contact locations such as restaurants, gas stations and souvenir stores. In addition, the fact that most summer staff originate from widely dispersed geographic locations to which they return at summer's end, make them ideal 'national' spokespeople (Blair 1983). Time spent educating these personnel could have a large multiplier effect over a wide geographic area.

One final note concerning information dispersal should be emphasized. Although bear management plans, per se, are a relatively new concept, they are fast becoming the lead form of communication for management programs (Martinka 1983). If properly designed and written in an easily understood fashion, the plan can describe the entire program including historical data, objectives, methods, current results and future direction.

Evaluating the Information Element

That public information systems concerning bears have not been highly refined is evident by the lack of data quantifying the effectiveness of any given mode. Yosemite (page 132) has made some progress by analyzing the information source of each property damage or injury victim (Table 11). Other means must be devised to evaluate the effectiveness of each information mode in terms of its content and dispersal. For example, the effectiveness of a pamphlet describing food storage techniques might be evaluated by correlating the storage techniques of pamphlet recipients
against the storage techniques of non-recipients. Data on storage techniques obtained prior to the pamphlet's issue would also be useful. Similar techniques could be applied to other information modes.

PROGRAM ELEMENT 6: WASTE MANAGEMENT

Easy access by bears to human garbage has been and continues to be a major cause of bear/human incidents. Pengelly (1981) reported that about 61% of the 123 bear incidents reported for the Banff Township area in 1981 were directly attributable to improper garbage management. Herrero (1976:124-125) held that 49 out of 54 injury incidents preceded by camping and involving grizzly bears in national parks between 1872 and 1973 could 'tentatively' be attributed to poor management of garbage and human food. Meagher and Phillips (1980) indicated a dramatic decrease in the number of control actions required in Yellowstone after the Park introduced a management program one component of which was intensive garbage sanitation. It is realistic to assume that proper garbage handling practices will play a major role in all bear management programs. Although many Canadian National Parks have recently instituted vastly improved garbage handling practices there is still considerable room for improvement (Fig. 59).

To establish and maintain an effective garbage management program can be an expensive, time consuming and often unpleasant task. A thorough systematic approach must be followed. The following schema is offered as a model.
Fig. 59. Despite the vast improvements made in recent years, non-bear proof garbage facilities are not uncommon in Canadian National Parks.

Fig. 59a. Open cans can still be found. The sign in the background reads, "It is illegal to feed wildlife."

Fig. 59b. Lack of proper maintenance can reduce the effectiveness of otherwise bear proof containers.
Fig. 59 (Cont'd). Despite the vast improvements made in recent years, non-bear proof garbage facilities are not uncommon in Canadian National Parks.

Fig. 59c. The letter box style container is often inadequate due to its low volume capacity or its portal door which will not accept large bags of garbage.

Fig. 59d. Inadequate garbage facilities at park business establishments are prevalent in many parks.
Setting Objectives

A 100% bear proof garbage system is ideal but probably unrealistic given the size of a park, the number of commercial operators, and the ubiquitous visitor. A more realistic objective might be the acceptance of a certain number of garbage storage deficiencies, which, if exceeded, might indicate a need for a modified control strategy. Defining the acceptable number of deficiencies could be related to both the garbage source and visitation pressures. Garbage sources might be classified as either government operated facilities, commercial facilities, residential facilities or visitor facilities (i.e. garbage at campsites or picnic tables). Visitation pressure might be expressed in terms of entrance gate figures, operator-months, resident-months, camper-nights or any other unit relevant to the park. Hence an objective of the waste management element might read as follows.

- To maintain the number of garbage storage deficiencies within the following limits:
  - government facilities - 2 deficiencies/100,000 visitors/yr
  - commercial facilities - 2 deficiencies/100 operator-months/yr

73 'Garbage Storage Deficiency' is defined in Table 24.
residential facilities - 2 deficiencies/100 resident-months/yr
visitor facilities - 2 deficiencies/100,000 camper-nights/yr

One might also state a second objective in terms of the number of 'acceptable' garbage incidents. For example, the objective might read...

- To reduce (maintain) the number of bear/garbage incidents to (at) 1/500,000 visitors/yr.

All garbage storage facilities in the park must be carefully catalogued and classified as to ownership.

**Park Facilities: Control Strategy**

In the case of park operated facilities a combination of 100% bear proof containers, routine inspections, daily monitoring, and carefully scheduled pick ups supplemented by a concerted public information system should provide good results. The following routine might be adopted by any park.

- Pre-season (March) inspection of all facilities by warden/maintenance staff to ensure 100% operation and that garbage facilities are totally bear proof.

- Daily monitoring of all facilities by pick-up crews. A form denoting any deficiencies, maintenance problems or bear incidents should be completed by pick-up crews. Corrective action must be prompt.

- Systematic monthly monitoring of all facilities by warden/maintenance staff. Maintenance problems or deficiencies noted and actioned promptly.

---

74 'Garbage Incident' is defined in Table 24.
• Pick-up schedules arranged such that areas with historically high numbers of bear problems are serviced last each day.75

• Once/month cleaning program. All receptacles washed and disinfected.

Although letter box style receptacles have been the mainstay for many years, self dumping units have recently gained favour in several large parks. The high volume capacity of these units create manpower savings which may be used more effectively in terms of monitoring and cleansing programs. Figures 59 and 49 illustrate the letter box and self dumping units respectively.

Most parks have closed all but trade waste dumps and haul wet garbage to dumps beyond the park. Those unable to haul garbage out of the park have installed bear proof sanitary landfills (Jasper) or incinerators (Waterton). However in several parks, Pacific Rim and Gros Morne for example, have developed problem bears have developed as a result of the proximity of non-bear proof regional or municipal dumps. This underscores the importance of the Yellowstone 'ecosystem' approach whereby operators of non-park dumps have, by way of agreements, bear proofed their facilities.

Commercial Garbage: Control Strategies

Control of commercial garbage involves basically the same procedures as applied to government facilities with several important additions. Many commercial operators have balked or dragged their feet when asked to install bear proof facilities because of associated expenses. When the...

75 Garbage incidents seem to be most frequent during the night.
public relations approach fails one must rely on the regulations to force compliance. A recent case, R. vs Canadian Pacific Hotels Ltd. 1980, involving the mismanagement of garbage at the Chateau Lake Louise indicates that while this approach may not be pleasant, it is effective.

That any park entrepreneur is still operating with non-approved or inadequate garbage facilities is strictly a matter of politics or non-concern since the applicable regulations (pages 56-58) are among the most stringent under the National Parks Act. Under the National Parks Businesses Regulations, officials may (1) refuse to issue a licence pursuant to Section 8, (2) affix terms and conditions to the licence pursuant to Section 5(5), (3) require a $500.00 performance bond pursuant to Section 7(b), or (4) revoke a licence for failing to comply with endorsed terms and conditions pursuant to Section 9(a). These are powerful tools that can be applied to any commercial garbage problem within national parks.

Figure 60 outlines 2 strategies for the control of commercial garbage in any Canadian National Park. Critical to both strategies is a Superintendent who is willing to take strong measures. In situation A an operator with deficient or questionable garbage facilities applies for a business licence. Pursuant to Section 8 of the Business Regulations the Superintendent may refuse the licence application, as in the case of glaring deficiencies, or pursuant to section 5(5), issue a licence endorsed with appro-

76 There is no centralized system to record law enforcement statistics for offenses under the National Parks Act. Hence, accurate garbage enforcement figures cannot be cited.
Fig. 60. Enforcement procedures a to control commercial garbage in Canadian Parks.

**SITUATION A**

Operator with deficient or questionable garbage facilities applies for Business Licence

- Application is refused pursuant to section 8
- Operator corrects deficiencies

- Licence issued with terms and conditions endorsement pursuant to section 5(5)
- Operator fails to comply with terms and conditions

- Licence revoked pursuant to section 9(a)
- Operator corrects deficiencies

- Licence re-instated pursuant to section 9(b) with additional terms and conditions if necessary

- $500.00 performance bond required for 2nd offence pursuant to section 7(b)

**SITUATION B**

- Licence issued without terms or conditions endorsement

- Garbage problem develops

- Enforce of applicable regulations b and/or letter c issued pursuant to section 13

- Court

- Operator fails to comply with conditions of letter

- Operator corrects deficiencies

- Licence re-instated pursuant to section 9(b) with additional terms and conditions if necessary

---

a All section numbers refer to the National Parks Businesses Regulations.
b This may include Sections 8 or 4(g) of the National Parks Garbage Regulations, and/or sections 27, 28, 31(2) or 32 of the National Parks General Regulations.
c All correspondence should be forwarded by either double registered mail (maintaining receipts as evidence) or, preferably, by hand delivering correspondence in the presence of two Park Wardens.
appropriate terms and conditions. Failure to comply with the terms and conditions may result in the licence being revoked pursuant to section 9(a). Performance bonds can be required for second offenders pursuant to section 7(b). In situation B the operator has been issued a business licence without a term or condition endorsement. During the life of the licence, garbage deficiencies develop and the operator fails to take corrective action. Pursuant to section 13 the Superintendent forwards a letter to the operator describing acceptable conditions of operation and noting deficiencies. However, the acceptable conditions can only apply to premises, buildings and equipment. Failure to comply with the conditions may result in the licence being revoked under section 9(a).

One convenient feature of section 5(5) is that, at the Superintendent's discretion, any term or condition may be affixed to the licence. This would allow managers to stipulate some useful operating criteria such as (1) requiring operators to report all bear observations or incidents on their leasehold, (2) compulsory bear training sessions for all employees, (3) posting of bear related information in rental accommodations, and so forth.

Residential Garbage: Control Strategies

The matter of residential garbage control is not quite as straightforward due to a lack of clearly worded regulations (pages 59-61). A concerted public relations campaign similar to that of Banff, Glacier or Jasper may be the most productive approach given that many park residents are residents because of the park's aesthetic qualities and unlike commercial operators, may be more willing to preserve those qualities.
Consideration might be also given to supplying residential garbage facilities on a rental basis. One high volume self dumping container (Fig. 57) could be located to supply a number of households. Current dwelling house garbage fees range from $13.78 to $49.82 per year for seasonal collection (National Parks Garbage Regulations, Schedule II). The 1983 cost of one high volume self dumping container is $2450.00 F.O.B. Lethbridge, Alberta (Neufeldt Industries Ltd., Lethbridge, Alberta). If each container were placed to service 10 households the annual collection fee per container would range from $137.80 to $498.20 giving a pay back period on the principle sum of $2450.00 of 17.7 to 4.9 years. These payback periods are based on the assumption that no interest fees are incurred on each $2450.00 outlay. The greatest gain, however, would be derived from manpower (garbage collectors) savings which could be reduced by as much as 1000%. This is based on the assumption that 1 Neufeldt container services 10 residences and can be emptied just as quickly as one standard garbage can. Capital costs might be further reduced by some form of cost sharing arrangement with residents. Obviously a careful review of the park's garbage operations would be a prerequisite to instituting such an arrangement.

If all else fails one can still rely on several regulations, namely, sections 8 and 4(g) of the National Parks Garbage Regulations, and sections 27, 28, 31 or 32 of the National Parks General Regulations even though difficulties (pages 59-61) may arise.
Visitor Garbage: Control Strategies

The transient nature of park visitors places the reliance for garbage control on an adequate number of well positioned receptacles supported by a comprehensive information program especially in respect to the pack-in-pack-out policy for backcountry areas. The efforts of both Glacier and Yellowstone have set the standard to which other parks might aspire. A bank of letter box style containers are never more than a stone's throw from any high visitor use area and at least six different signs and six different pamphlets contain warnings about garbage handling practices. The pack-in-pack-out policy is mentioned on both trailhead signs, camping permits and free trash bags.

In terms of regulatory control of visitor garbage there are ample measures available vis-a-vis section 8 of the Garbage Regulations, section 27, 28, 31(2) and 32 of the General Regulations and sections 4(3), 5(2)(b), 9 and 16(d)(iii) of the Camping Regulations.

Carrion Management

Carrion disposal, especially in those parks experiencing large numbers of roadkills, is another important aspect of waste management (Herrero 1980:9). The ability of bears to locate carcasses from great distances (up to 30 airline km in 36 hrs.) has been documented (Craighead 1976:104). A significant number of aggressive encounters (in national parks) have been the result of suddenly surprising a grizzly feeding on carrion (Herrero 1976:127). Many parks are now paying closer attention to carrion and its disposal. Notable are the efforts of Banff (page 209) and
Fig. 61. Carrion is a preferred food source of bears. Careful management of carrion is necessary to avoid bear/human conflicts. Grizzly bear resting on top of a dead horse. The bear fed on this horse for 2 weeks. Kootenay Crossing, Kootenay National Park.
Kootenay. Between 1978 and 1982 Kootenay recorded an average of 44 large animal road kills per year (Park files). Prior to 1981 carcasses were simply dragged off the highway and into the treeline. Craighead (1976:107) found that any alteration in food sources may cause changes in bear ranges and movements. Distribution of Yellowstone grizzlies was found to vary according to the distribution of winter ungulate kills (Cole 1972:559). In an effort to avoid attracting bears to roadside areas, Kootenay initiated a 1981 program whereby during the months of April through October, roadkills were promptly removed from the accident scene and deposited in one of four predesignated carrion deposit sites. The selection of each site was based on the following criteria.

- Visitor use of the area had to be minimal or nil to avoid the obvious danger of visitors happening upon a feeding bear.

- For the same reason the area had to be one that could be legally closed to the public pursuant to the provisions of National Parks General Regulations.

- In order to minimize costs the area had to be accessible by park vehicle.

- To avoid attracting bears from great distances the area had to be situated in a natural or man-made depression that was not subject to strong winds.

- In the hope that airborne scavengers would clean up the carcass before bears were attracted, open sites easily visible from the air, were selected.

All sites were located in man made depressions, old gravel pits or dumps, accessible by park vehicles only. Each site was legally closed to the public by way of well positioned signs. Large mammals (mostly elk) were deposited in the sites on a rotational basis to prevent a stockpiling
effect and the concomittant attraction of bears.

To date the program has seen only partial success. Although roadside attractions have been avoided, bears are nevertheless attracted to the carrion sites and it soon became apparent that the sites could become nothing more than high class dumps. Towards the end of the 1982 season arrangements were made with a local sawmill operator to incinerate carcasses in his beehive.\(^{77}\) Although time consuming and totally dependent on mill operations, this alternative proved successful and will be used when carrion sites become too heavily used.\(^{78}\)

**Fish Entrails Management**

The management of fish entrails can also be an important aspect of the garbage program. Merrill (1978) found significantly higher numbers of bear incidents at campgrounds where fishing quality was highest and improper disposal of entrails appeared to be the causative factor. Entrail disposal experiments being conducted in Glacier (page 169) seem promising and perhaps definitive entrail disposal instructions may soon be available for fishermen. In Canadian National Parks, section 26 of the National Parks Fishing regulations prohibit the disposal of fish entrails in any park waters thereby leaving park managers with few options for an entrails

---

\(^{77}\) 'Beehive' is a colloquial term used to describe the large beehive like structure in which sawmill operators burn sawdust and other wood scraps.

\(^{78}\) Experiments are now being conducted to test the usefulness of explosives for carrion removal. This technique has been used successfully in the Flathead National Forest to remove dead horses in backcountry areas (Claar 1983).
management strategy. The once informal policy of telling fisherman to pack out the entrails is clearly unworkable. Few fishermen would be willing to comply with this policy and even fewer managers would (or should) be willing to run the risk of asking visitors to hike through bear country carrying such an odorous attractant. Disposal of entrails in bear proof garbage receptacles or in a hot fire are two alternatives that may be applied in some areas. However in backcountry areas where garbage receptacles are not available and fires are not allowed, other alternatives much be developed.

There is no clear solution to the problem of fish entrails management at this time. Regulatory amendment will be necessary before we can (officially) implement a policy of throwing entrails back into the waters from which they came and until such amendments are made managers must follow common sense in deciding how to advise visitors to safely dispose of fish entrails.

PROGRAM ELEMENT 7: FOOD STORAGE MANAGEMENT

Data from Canadian parks quantifying the number of bear incidents related to improper food storage does not exist. However, if an inference can be taken from U.S. national parks the figures are apt to be high. Yosemite reports improper food storage as the causative factor in up to 67% of all bear incidents (Cella and Keay 1980:17); Great Smokey Mountains places the figure as high as 30% (Signer and Bratton 1980:138); Sequoia and
Kings Canyon indicate that most of the bear incidents in campgrounds (1959-1976) were related to bears obtaining small food items, breaking into coolers or rummaging through garbage (Zardus and Parsons 1980:197); and in 1981 the same two parks recorded 135 incidents involving 'food violations' (Werner 1982:20).

U.S. parks currently place considerable emphasis on proper food storage through a program consisting of public information, provision of storage facilities, regulatory control, monitoring and evaluation. Most pamphlets mention the importance of food storage while several pamphlets (Fig. 24 and 25) are devoted almost exclusively to the subject. Similarly one side of the free plastic garbage bag (Fig. 41) distributed in Glacier is devoted almost exclusively to food storage techniques. Large sums of money have been expended to provide storage facilities such as individual food lockers79, food sling poles (page 123), storage cables (page 139), or bear poles80 in both front and backcountry settings. The recent experimental work on personalized portable plastic food containers (page 139) indicates an emerging level of sophistication. Specific regulation

79 In 1981 $62,500.00 (U.S.) were spent on the acquisition and installation of bear proof food lockers for the 250 sites in the Lodgepole Campground of Sequoia National Park (Werner 1982:6).

80 Bear poles (Fig. 62) are a new design that is bound to become popular due to its simplicity and effectiveness. One end of a 5 cm steel pole, 5 to 6 m in length is placed securely in the ground leaving 4 to 5 m of the pole above ground. A series of 4 hooks are welded to the top of the pole. The camper uses a 4 m length of light conduit pipe with a hook on the end to lift his food pack onto the pole hooks thereby suspending the pack 3.5 to 4 m above ground. The one disadvantage is that only a small weight (2-4 kg) can be lifted due to leverage factors.
Fig. 62. Grand Teton National Park has developed a unique food storage device known as a 'bear pole'. The device has been in use for several years and appears to be functioning well.
governs the storage of all food in both frontcountry and backcountry (page 122). Several parks (Singer and Bratton 1980; Werner 1982; Cella and Keay 1980) have designed their monitoring system to include not only the cause of the bear incident but also the victim's source of information thereby providing a steady source of evaluative feedback. Yosemite's evaluation system (Cella and Keay 1980 and 1981; Hastings and Gilbert 1981) is exemplary in this regard.

The following schema is offered as an example food storage strategy.

- set realistic, non-ambiguous, measurable objectives
- identify sites where improperly stored food is apt to be a problem and design control strategies for each site
- establish a monitoring and evaluative strategy

**Setting Objectives**

Even though a 100% bear proof food storage program should be the ultimate goal of all parks, difficulties associated with applying food storage strategies necessitate that more realistic operational objectives be set from year to year. Despite the concerted efforts made by Yosemite, non-compliance figures are, for some reason, very high. In 1979 92% of the campers sampled felt they had followed instructions and stored food properly but in fact only 3% had done so (Cella and Keay 1980:3).

Perhaps the best measure of success would be a year to year percentage reduction in the number of food storage deficiencies\(^{81}\) and the number

---

\(^{81}\) 'Food Storage Deficiency' is defined in Table 24.
of food storage incidents. A realistic objective might call for a certain annual percentage reduction until an acceptable level is reached. The objective of the food storage element might read as follows:

- To reduce the number of food storage deficiencies and the number of food storage incidents from the preceding 5 year average figure by the following factors:
  - Frontcountry: food storage deficiencies - 40%
    food storage incidents - 20%
  - Backcountry: food storage deficiencies - 50%
    food storage incidents - 30%

This is a model objective for which numerical values must be chosen to suit the contingencies of each park.

Control Strategies

Food storage deficiencies and incidents generally occur at one of five locations. While autocampsites, backcountry campsites or picnic sites have been the 'hotspots', problems have also developed at outfitter and trail crew camps. Control measures for each location must be based on a combination of public information, provision of facilities, enforcement of regulations, and monitoring/evaluation systems. Table 27 indicates a control strategy that might be applicable in any park.

Monitoring and Evaluation

Food storage facilities are relatively new to bear management pro-

82 'Food Storage Incident' is defined in Table 24.
Table 27. Food storage management strategy for Canadian National Parks.

Public Information

• Establish content/design criteria (why food storage is important and 'how to' instructions).
• Establish dispersal methods to reach each problem area

Provision of Food Storage Facilities

• Autocampgrounds: individual or private storage lockers, sling poles
• Backcountry Campsites: storage cables, bear poles, sling poles, food lockers, cannisters, counter balance technique.
• Commercial Horse Camps: portable electric fence
• Private Horse Camps: must use existing facilities or portable electric fence
• Trail Crews: portable steel containers

Enforcement of Regulations

• Campers with Camping Permit: apply sections 5(2)(b), 9, and 10(c) of the Camping Regulations
• Campers without Camping Permit: apply sections 32(1)(c) of the General Regulations
• Commercial Horse Camps: apply sections 5(5), 7(b), 8, 9(1), 9(b) and 13 of the Business Regulations
• Trail Crews: proper food storage a condition of employment

Monitoring/Evaluation

• Establish routine inspection schedule with prompt maintenance
• Establish items to be monitored: number of food storage deficiencies, bear/food incidents, and the causative factors for each; mini surveys to record deficiencies and causative factors

Experiments involving the use of electric fences to prevent bear access to food are being conducted in Yellowstone (page 123).
grams especially in Canada where very few parks have installed storage devices. Comprehensive monitoring and evaluation systems are important to assess the impacts of new facilities and techniques. Emphasis should be placed on recording the number of deficiencies and incidents along with their causative factors. This might be accomplished through the normal monitoring system (i.e. recording incident deficiencies observed on random patrols) or by establishing a series of mini surveys. In respect to the latter method, a post midnight campground walk-through might be conducted to record improperly stored food. Causative factors could be determined the next morning by interviewing offenders. Similar tactics could be applied at backcountry sites. Obviously time and manpower restrictions will limit the number of mini surveys that can be conducted per season. In either the random patrol or mini survey method emphasis should be placed on ferreting out causative factors thereby providing data upon which to base corrective action.

PROGRAM ELEMENT 8: HUMAN ACTIVITY MANAGEMENT

Martinka (1982) has analyzed the relationship between the number of visitors, the number of human injuries inflicted by grizzly bears and the number of grizzly bears intentionally removed from the population of Glacier National Park, Montana. Data is presented in Table 28. The analysis indicates a perfect correlation between each of the three variables, and suggests a 'fundamental relationship' between the number of park visitors (cause) and the number of injuries/deaths (effect). As visitation increased, there was a proportional increase in the number of
Table 28. Interactions between grizzly bears and visitors in Glacier National Park (Montana), 1951-1980 and projections for the 1981-1990 period.a

<table>
<thead>
<tr>
<th>Decade</th>
<th>Million Visits</th>
<th>Number of confrontations</th>
<th>Number of bear removals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951-60</td>
<td>6.7</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>1961-70</td>
<td>8.8</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>1970-81</td>
<td>12.6</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>1981-90b</td>
<td>15.3</td>
<td>13</td>
<td>21</td>
</tr>
</tbody>
</table>

a Data from Martinka 1982
b Predicted from trend line equations
injuries and the number of bears removed from the population. Trend projections based on this relationship predict a steady rise in all three variables from 1981 to 1990. Records for the first year of the predictive period indicate the projections to be true.

Although removal rates are currently within acceptable biological limits, the projections indicate they may soon be exceeded, thereby jeopardizing the Park's grizzly population. Given the legislated and moral mandate of the park, manipulation of grizzly densities is not considered to be a viable management option. Similarly, political realities preclude the possibility of limiting the total number of visitors to the park. Martinka concludes that manipulation of visitor use patterns over time and space is the only means of breaking the fundamental relationship. "The total number of visitors may not be as important as what they do, when and where" (Martinka 1983). This represents a distinct departure from pre-1980 management strategy of many Canadian and U.S. parks which emphasized aggressive control of problem bears through relocation or destruction.

The applicability of Martinka's 'fundamental relationship' to other parks and other bear species is difficult to assess. A direct linear relationship between levels of backcountry use and the number of black bear incidents in Yosemite (Keay and Van Wagendonk 1980, Singer and Bratton 1980) indicate that it may apply to black bears in some locations. Further clarification must be developed through applied research.

Control of visitor activities as a management tool is not a new concept. Martinka (1974) and Mundy and Flook (1973) recommended several control measures (distribution of campers and restricted use of important
habitat) over 10 years ago. The 1979 Parks Canada Policy recognizes that preservation must be given priority over use (Parks Canada 1979c:12). The 1978 Management Directive on bear management clearly establishes control of human activities, especially in backcountry areas, as the key management strategy (Parks Canada 1978d:1). What is new is the magnitude and variety of techniques now used particularly in the U.S. parks. The following is a brief synopsis of techniques that might be applied in any Canadian National Park.

Zone Management

Nearly all parks tend to manage bears according to two roughly outlined management zones. Normally only two zones are mentioned: front-country or developed areas and backcountry or undeveloped areas. In front-country areas human use is given priority over bears and when conflicts develop management actions are normally directed at removing the bear. Human use of backcountry areas however is secondary to that of bears and whenever feasible management actions are directed at controlling human use. The programs of Yellowstone (page 123) and Yosemite (page 141) are good examples of this technique.

The notion of a zoned management system has been recognized by Parks Canada. Policy states that a zoning system will be used to regulate the time, type, extent and location of outdoor recreational activities (Parks Canada 1979c:43). In addition the national directive implies that manage-

83 These two management zones have no relation to the 5 management zones outlined in Parks Canada Policy.
ment strategies designed to control bear activities should be applied mainly in frontcountry areas (Parks Canada 1978d:1).

Inherent in the notion of zoned management is the clear definition of the zone. The 5-zone system outlined in the Policy (Parks Canada 1979c:40) represents a logical basis for developing bear management strategies. In those parks where systems planning has not yet advanced to the point where the 5 zones can be delineated, a two-zone system (frontcountry and backcountry) may be adequate provided each zone is carefully defined.

Area Closures

Area closures have been traditionally used in a reactive manner, i.e., to prevent a further incident. Only recently have closures been applied in an anticipatory style of management. Yellowstone's 'Grizzly Bear Habitat/Human Use Adjustment Areas' are a prime example (USDI 1983) wherein human use of critical grizzly habitat is restricted or completely prohibited. The notion of restricting human use of grizzly habitat either on a permanent or seasonal basis has been strongly advocated by Hamer and Herrero (1983). Three types of closure may be considered: the temporary emergency closure to prevent further incidents; the seasonal closure to prevent competition between humans and bears for seasonally critical habitat; and the long term closure to remove human/bear competition entirely. Tantamount to all closures are clearly worded criteria and procedural steps
for initiating the closure, monitoring and re-opening\textsuperscript{84} the closed area. High quality, well designed signs \textsuperscript{85} consistent with National Parks Regulations are also essential.

**Activity Restrictions**

Activity restrictions are being used in selected national parks. These restrictions are applied to (1) mode of travel (e.g. horse travel only) (2) minimum party size (3) restricted travelling hours (Yellowstone) (4) trail use quotas (Jasper) (5) campsite quotas (Kootenay and Glacier) (6) manipulation of campground opening and closing dates to coincide with seasonal usage by bears (Yellowstone) and (7) camping restrictions to either hardsided units (Yellowstone and Glacier) or tenting enclosures (Glacier).

\textsuperscript{84} Winkler (1983) mentioned that a major drawback to area closures was the potential liability involved with re-opening an area. Langshaw (1983) suggested that in situations where managers feel uneasy about re-opening a closed area they might consider posting warning notices at the same time the area is re-opened. This seems like a logical phase out step for closures.

\textsuperscript{85} Of the 48 parks surveyed for this project only one employed a closure or warning sign that gave an explanation for the closure or warning beyond the mention that some form of bear danger existed. During the 1982 season Kootenay National Park began adding typed messages to standard departmental closure and warning signs. The message explained the reason for the closing/warning giving the date, location and nature of the incident. Each message was signed and dated by a park warden. The intention was to supply information specific to each situation. In the case of warning notices this type of detail is probably important insofar as park visitors are given sufficient information upon which to base their decision to travel in the affected area. The fact that each message was signed and dated by a supposedly knowledgeable person adds credibility to the sign.
Warnings

Posting of warning notices, whether permanently, seasonally or in response to a specific incident, are now a commonly used management technique in U.S. national parks and to a lesser extent in Canadian parks. As with closures, carefully thought out criteria outlining the conditions for posting, monitoring and de-posting areas must be developed in conjunction with high quality signs.

Backcountry Design Standards

The design and location of campsites and hiking trails has an obvious indirect effect on controlling human use in the park. It is probably safe to assume that most of the existing campsites, both autocampgrounds and backcountry sites, trails and some major visitor use facilities were developed without consideration for bears, their habitat requirements and human safety. The fact that most backcountry campsites have been placed on major hiking trails, and that cooking and sleeping areas are placed side by side lend credence to this assumption. More recently, considerable effort has been placed on bear habitat identification in the planning stages of park development. The work of McCrory and Herrero (1981), McCrory et al. (1982), Herrero et al. (1983), Hamer and Herrero (ed.) 1983 and Kunelius (1982) provide methods to evaluate potential bear habitat. Use of bear

---

86 There are no universal or definitive de-posting criteria. Reliance must be placed on field observations of competent personnel.
sensitive maintenance standards such as Glacier's Backcountry and Wilderness Maintenance Standards (USDI 1982a) play an important role in controlling human activities and the chances of bear/human incidents.

Fire Ecology

The importance of fire ecology to bear management has been discussed by many authors (Hamer and Herrero (ed.) 1983, Zager 1980, Beck 1979, Harms 1979, Pelton 1979, Martinka 1976:154). In areas where wildfire is suppressed, such as national parks, there may be a long term detrimental influence on bear habitat and therefore bear populations and behavioural patterns. Although the ecological role of wildfire is generally recognized by park managers, Parks Canada Policy (Parks Canada 1979c:41) continues to emphasize a very conservative approach to fire management.

The Environmental Assessment and Review Process (EARP)

Both the Policy (Parks Canada 1979c:42) and Management Directive 2.4.2 (Parks Canada 1981a) stipulate that projects or activities with the potential for serious environmental impact must be subjected to the EARP. This represents one of the prime tools that managers could use to protect bears and bear habitat from human encroachment.

Patrol Schedules and Enforcement

As mundane as it may sound, one cannot over-emphasize the importance of establishing routine patrols as part of the overall bear management program. It is only through 'being there' that managers can accurately
judge field conditions and take appropriate action. While many parks have established daily and nightly patrols through major auto campgrounds, back-country campsites and hiking trails are generally seldom patrolled in any systematic fashion. Since backcountry patrols can be manpower consumptive and expensive, managers might consider establishing a systematic patrol plan based upon quantitative or qualitative factors which leave sufficient flexibility to respond to the contingencies of day to day operations.

PROGRAM ELEMENT 9: PROBLEM BEAR MANAGEMENT

As discussed in Chapter II direct control of problem bears through either destruction or relocation efforts constituted the major thrust of bear management practice until sometime in the mid 1970's. While many parks still place considerable emphasis on this technique there is at least an emerging recognition that other aspects, vis-a-vis control of human activities, may be more important to long term success (Martinka 1983). This sentiment is echoed in both the Management Directive 4.4.15 (Parks Canada 1978d) and a western region directive (Parks Canada 1983d). Banff's Bear Management Plan (Parks Canada 1982:1) even goes as far as to recognize that destroying, capturing or relocating bears are undesirable management actions that must be minimized. In this light one might consider capture attempts, relocations or destructions as a reactive style of management

87 Quantitative factors might include the number of visitors using the trail or area; qualitative factors might include the ecological significance of the area.
that usually reflects a failure in one or more of the other program elements. The bear might not have been in the camp if the food had been stored properly and the food might have been properly stored had quality information been given to the camper.

Nevertheless, so long as bears and people inhabit the same area there will be conflicts that require, among other actions, removal of the bear. A strategy designed to deal with problem bears should include the following considerations: (1) action promptness, (2) zone management, (3) specific criteria for control actions, (4) post mortem analysis, (5) identification system and (6) release site management.

**Action Promptness**

Stokes (1970) has outlined, in terms of learning theory, the importance of promptly removing bears from unnatural attractants. Repetitive behaviour is to a great degree shaped by reward and punishment. If the behaviour is rewarded, it is likely to be repeated. The likelihood of repeat behaviour is a factor of the reward strength (quantity and quality of food) and the level of reinforcement (the ratio of rewarded behaviour to non-rewarded behaviour). Experiments with many species indicate that an extremely low level of reinforcement (1: 100's) is sufficient to perpetuate an animal's food seeking behaviour. A bear that wanders into a campground by chance for the first time and is rewarded by breaking into a food cooler is very likely to make many more campground appearances even if it is unsuccessful in obtaining food.

The capture criteria set by Yellowstone (page 124) and Glacier (page 173) reflect an understanding of this principle. Both parks emphasize
Fig. 63. Bears quickly become conditioned to humans and human food. Management actions should be aimed at prompt removal of bears that frequent frontcountry areas in search of human food or garbage. Black bear begging human food along Hwy 93, Kootenay National Park.
prompt removal of a bear that merely persists near a developed area even though there is no indication the animal is obtaining unnatural foods. Management strategies should stress prompt action as a means of preventing conflicts or reducing the potential for conflict escalation.

Zone Management

The same principles apply here as outlined for program element 8: human activity management. Control strategies for problem bears should be developed according to a zone system whether the system is developed from empirical knowledge such as the two frontcountry-backcountry zones or a more sophisticated technique.

Capture, Release, Destruction Criteria

Carefully worded criteria for capture, release, and destruction are essential for operational consistency. Consideration must be given to the legal criteria for destruction set out in the Wildlife Regulations (pages 50-51), Parks Canada Policy (page 86), known or estimated recruitment levels (Russell 1979:97) and bear dossiers. One might also note that several parks, Yellowstone and Glacier for example, have included criteria whereby bears are not to be destroyed for exhibiting normal defence reactions.

Post Mortem Analysis

Laboratory post mortem analysis is routine procedure in Glacier, Montana (page 174). While field autopsies can reveal the more obvious
abnormalities, lab assistance is essential for accurate aging and detection of pathological disorders. In order to more clearly understand the reasons for aggressive bear behaviour, bears destroyed for inflicting human injuries should be submitted for detailed laboratory analysis. Less costly field analysis should be reserved for those bears destroyed for other management reasons. Accurate aging via tooth cementum annuli is relatively inexpensive and should be considered for all destroyed bears.

**Identification System**

There is little use in releasing a bear unless it can be positively identified at some later date. While all parks mark released animals, usually with a numbered ear tag, the functional marking scheme of Glacier (Many Glacier Ranger 1982:pers.comm.) seems to make the most sense. Large Rototag plastic ear tags, colour coded to species, are used. Since park visitors are, by their very number, the most likely observers, the species coded tags should provide for more positive species identification. Kootenay has taken the coding one step further by adding a sexing code. All females are tagged in the right ear and males in the left. Since females and females with cubs are often given preferential management treatment, and since female grizzly bears with cubs are known to pose an increased hazard to visitors (Herrero 1976) the ability to identify a bear as to species and sex is important.

**Release Site Management**

Management of release sites insofar as they are predetermined and used on a rotational basis seems inherently wise. Yellowstone's ecosystem
approach to release sites (page 125) has considerable merit.

**PROGRAM ELEMENT 10: TRAINING**

No management program can function smoothly without adequately trained personnel. Of the parks surveyed Glacier (page 174) appeared to sponsor the most comprehensive training program. While most parks carry out some form of annual spring training, they are, without exception heavily oriented toward the trapping/immobilization aspect with little or no attention paid to the other facets of bear management. No doubt the inherent nature of the topic and the influence of *Management Directive 4.4.4* (Parks Canada 1975c:1), which specifically requires special training in this area, may partially explain the heavy emphasis. This is not to say that too much time is spent on capture/immobilization techniques but rather that other equally important topics are not given due attention.

A systematic approach might provide a more comprehensive means of training. *Management Directive 4.4.15* (Parks Canada 1978d:2) stipulates that training requirements should be included in management plans. Identification of training objectives, what needs to be taught and to whom, is a logical starting point followed by the development of standards, methodologies, and cost/time scheduling. Glacier seems to be proceeding in this direction (Table 14) by identifying target trainee groups and their aspired level of training. Important to note is that training is not limited to selected personnel only. Rather all personnel including conces-
sionnaire employees, are given a level of training geared to their needs. This reflects the park-wide team effort so important to first rate management. A more detailed training session touching on many essential aspects of management is available for those employees who are more heavily involved in bear management. The length of the session (3-5 days) is indicative of the importance placed on this program element.

PROGRAM ELEMENT 11: EMERGENCY PLANNING

Herrero (1976:122-123) has shown that the frequency of injuries inflicted by grizzly bears in several national parks is low. Crude estimates based on 1960-73 data range from 1 injury per 2,620 man days of back-country use to 1 injury per 17,170,465 total visitors. Nevertheless, between 1872 and 1973 there were at least 100 injuries inflicted by grizzlies (Herrero 1976:122). Data presented by Martinka (1982:471) has shown that the number of attacks by Glacier's grizzlies may be expected to increase. Although comprehensive data indicating the number of injuries inflicted by black bears does not exist the best available data (Table 3) indicate the figure might be many times higher than the corresponding grizzly figure. From a manager's point of view these figures indicate that the probability of having a bear related emergency (grizzly or black) in
any given year is currently high and may become higher. The importance of emergency planning becomes obvious in this light.

Of the parks surveyed, only two, Glacier (page 176) and Banff (page 214) have emergency plans of any substance. The work of Banff probably represents the current state of the art. The seven basic principles along with the sequential checklists and flow charts give a hands on approach to emergency situations that have been time tested.

PROGRAM ELEMENT 12: RESEARCH PLANNING

Non-informed management is blind management, a management style that is unlikely to realize national park objectives. That research is or ought to be an essential ingredient of bear management programs is clearly spelled out in Parks Canada Policy (Parks Canada 1979c:45), Management Directive 4.4.15 (Parks Canada 1978d), management literature (Theberge 1978 and Herrero 1980) and the bear management plans of notable U.S. national parks. The recognition of the importance of research and the inclusion of this fact in the management plan is the first step toward an informed and enlightened style of management.

Bear studies in Canadian National Parks have not been numerous. Major multi-year studies dealing with the ecology of grizzly bears have been completed in Jasper (Russell et al. 1979) and Banff (Hamer and Herrero

88 This type of data, if available, might be very useful to rationalize funding requests.
Year two of a three year grizzly bear study in Waterton Lakes has also been completed (Hamer et al. 1983). In addition to dealing with grizzly bear food habitats and feeding sites, the study is investigating the relationship between bears and people. Other ecological studies of the grizzly bear have been conducted in Glacier, B.C. (Mundy 1963, Hamer 1974). Given the number of black bear/human conflicts in Canadian National Parks over the last 20 years (Tables 1-3), it is surprising to find that there has not been a single black bear ecological study completed in Parks Canada.

Information obtained from completed or ongoing ecological studies could have significant implications for the manner in which we manage bears and visitors. Habitat analysis should eventually allow managers to predict which areas of the park bears are most likely to be utilizing during a given time of the year. Once the information is known visitor usage can be controlled via closures, quotas or activity restrictions so as not to unnecessarily crowd bears out of preferred habitat thereby reducing the potential for conflicts. Integration of detailed ecological data with the public information element should also enhance public appreciation of the day to day complexities of a bear's life. An appreciation of bear ecology may be a key factor in developing a sympathetic public attitude toward area closures and other restrictions necessary to preserve bear populations.

Although further research on the ecology of bears is essential, other topics should be given due consideration. These topics include: the effects of aversive conditioning; the nature of bear human encounters and
the means of avoiding or coping with aggressive encounters; public attitudes toward various management strategies; public knowledge of bear ecology and behaviour; the effects of various visitor control strategies on both bear population/behaviour and the quality of the visitor's park experience; and the effectiveness of various public information techniques. At least one study (Maw in preparation) dealing with visitor attitudes towards bears is currently in progress in Waterton Lakes.

Monetary and manpower limitations dictate an organized approach to research be developed. Research plans that prioritize knowledge requirements represent a logical approach that has been actioned by several U.S. parks.

If research efforts are to be maximized they must be conducted on a regional or ecosystem basis and not halted by jurisdictional boundaries. This sentiment has been noted by Clarkson (1982:52) and Parks Canada Policy (Parks Canada 1979c:45).

A system for promoting and encouraging research in Canadian National Parks has yet to be developed. In the U.S. the practice of housing a research section within the park has produced numerous studies (e.g. the work of Martinka in Glacier and that of Cole and Meagher in Yellowstone). While some individuals (Theberge 1978:50, Herrero 1980:12 and Clarkson 1983:53) have called for the establishment of in-house park biologists to organize and conduct research in Canadian National Parks, the suggestion has not been implemented and studies continue to be done under contract to the Canadian Wildlife Service or independent researchers. The practice of establishing co-operative research units between a park and nearby educa-
tional institutions (e.g. Great Smokey Mountains National Park and the University of Tennessee) has been instrumental in promoting research in U.S. National Parks. This technique could also be applied in Canadian National Parks.

**PROGRAM ELEMENT 13: REGIONAL MANAGEMENT**

It has been recognized that grizzly bears can occupy huge ranges. Craighead (1976:98) reported grizzly seasonal ranges in Yellowstone varying from 20 to 435 km² and home ranges from 18 to 324 km². Russell et al. (1979) found home ranges of Jasper's grizzlies varied from 532 to 1628 km². Alt et al. (1980:132) found home ranges of Pennsylvania black bears averaged 173 km² for males and 41 km² for females.

National park boundaries were seldom drawn to include complete ecological units (Herrero 1979:6). Often boundaries dissect species habitat. For example, the winter range of bighorn sheep in Kootenay lies almost entirely adjacent to, but outside, the existing boundaries. In Waterton Lakes large herds of elk move in and out along the north boundary during the winter months. Since 1980 at least 3 bears trapped and released within Kootenay have been destroyed in areas well beyond park boundaries (unpubl. data). Clarkson (1982:15-18) found that grizzly and black bears inhabit most of the boundary areas of Banff, Jasper, Kootenay and Yoho.

The point to be made here is that bears, along with most other wildlife, are subject to very different and often contrary management strategies as soon as they cross the imaginary boundaries separating the park
from other land jurisdictions. In most provincial areas this translates into a multiple use management strategy (including hunting) with little or no emphasis on those strategies considered important in national parks. The result is less than ideal. In some cases, the practices of provincial authorities may completely undermine the efforts of national parks. It is of little use to install bear proof garbage containers in the park if, only 100 metres away, the province still relies on open garbage barrels. Several parks have reported the negative influence of provincially operated open dumps adjacent to park lands (Parks Canada 1981f, 1979b and 1981j). For some species, such as the grizzly, the lack of conservative management practices throughout its entire home range could lead to drastic population reductions or eventual eradication of the species from some areas.

Yellowstone is clearly the lead park in establishing a regional ecosystem approach to bear management. While the approach was, no doubt, prompted by listing the grizzly as 'threatened' pursuant to the Endangered Species Act (P.L. 93-205) the consistent, co-ordinated efforts of the various land agencies (U.S. National Forests and National Parks 1979) represents the current touchstone for regional ecosystem management.

Although Parks Canada Policy (Parks Canada 1979c:43 and 46) implicitly calls for the establishment of co-operative agreements between the park and adjacent lands, very little has been accomplished in terms of bears. In fact the only accomplishments to date have been the informal establishment of liaison contact persons (Parks Canada 1982a) and the recognized desirability of further co-ordination (Clarkson 1982:30).
No manager should endorse a plan of action unless he knows what financial and person-year resources will be required. Management Directive 4.4.15 recognizes this fact and stipulates that each bear management plan must include financial, manpower and time requirements necessary to implement the program (Parks Canada 1978d:2). Nevertheless very few parks have included these requirements in their management plan.

Bear management can be an expensive and time consuming function that requires detailed short term and long term administrative planning that must be based on the best available estimates. While dollar costs can be easily obtained insofar as most material acquisitions such as immobilization equipment, food storage facilities and traps are concerned, difficulties arise in trying to proportion costs involved during multifunction activities. For instance; what proportion of the cost of gas for routine patrols should be charged to bear management? Even greater difficulties exist in trying to determine person-year requirements. How much time do information attendants spend dispensing bear information? What proportion of warden patrol time is directly related to bear management?

Although precise figures will be exceedingly difficult to obtain, close approximations can be developed through systematic analysis of all bear management activities. One obvious approach might be to break all bear management activities down into their smallest components, list the persons responsible for each component, the amount of time each person contributes and any associated material costs. While this process may be
tedious and time-consuming it should, after several approximations, yield reasonably accurate figures.

PROGRAM ELEMENT 15: DESIGN CHARACTERISTICS

Prerequisite to writing any management document is a clear understanding of its purpose and its potential readership. Of the 34 bear management plans reviewed for this project not one stated the objectives of the document per se and without exception objectives that were listed referred solely to the management program per se.

At least one researcher has referred to the bear management plan as having a communicating, implementing, evaluating and planning function (Martinka 1976:4). The same author has referred to the plan as being the lead form of communication regarding bear management (Martinka 1983). While policy statements (Parks Canada 1979c), and some regional directives (Parks Canada 1983d) hint at the purpose of the bear management plan they fall short of being explicit. More definitive guidelines are presented by Management Directive PRM 40-6 (Parks Canada 1980) which outlines 7 principle objectives of the Parks Canada Resource Management Process. These objectives, combined with inferences drawn from policy statements and other directives and the author’s intuition and field experience can be used to develop a set of objectives for the bear management plan per se. Six objectives are suggested.

• To provide a planned, organized, and co-ordinated approach to bear management actions.
To provide a public document which clearly reflects the entire bear management program.

To provide consistency and continuation of the bear management program over time and administration succession.

To provide staff with a clear understanding of the entire bear management program.

To provide a basis for evaluating and modifying bear management strategies.

To provide a basic document for fiscal and manpower planning necessary to implement the bear management program.

Acceptance of these objectives has several implications concerning the overall design and content of the document.

First: it must be factually accurate, complete in detail, current in time, and consistent within the existing hierarchy of legislation, policy, operational directives, accepted conventional practices and applicable research findings or techniques. The document should contain a dated, signed approval page to enhance credibility and show authority. Background data pertaining to the size, geographic location, vegetation types, population trends and management history of the park should be provided to enable the reader to develop an understanding of the park's management needs. The fact that the plan would probably serve as a primary document in any legal proceeding places a special onus on authors to instill accuracy and completeness. However, a fine line exists between sufficient detail and hyperdetail. In fact Glacier's legal advisors have suggested that, in the event of a negligence action, an overly detailed plan may jeopardize the park's defence insofar as minute details may not have been carried out in the field. In other words the more you say you are going to do, the more you must do or face the legal consequences. The potential for liability
increases with the amount of responsibility exercised. Yellowstone's short (4 pages) point form Plan supplemented by a brief Policy statement (9 pages) seems to reflect this philosophy. One must keep in mind however that U.S. parks operate in a completely different civil law milieu than Canada. Legal suits are much more common and in fact, are almost an American institution. Although it would be inaccurate and unfair to say that U.S. parks have become gun shy, it is probably safe to say that the U.S. management approach reflects, to a degree, the constant threat of legal suit. Nevertheless, Glacier's practice of having a professional writer and their legal advisors review bear management documents seems inherently wise.

Second: if the plan is to be a public document with wide readership while at the same time serve as an operational need, it must be written in an easy to read, organized fashion. Scientific jargon should be avoided or defined in lay terms. Simple flow charts, bar graphs, or tables should be relied upon to reduce verbiage and improve clarity.

Third: the plan should be graphically appealing to enhance readability but at the same time must be relatively inexpensive to reproduce and mail.

F. SUMMARY

Table 29 shows the 15 essential elements and associated sub-elements derived from the preceding review of the four authority fields considered to be influential in the design and content of bear management plans. I believe these elements and sub-elements, taken together, represent a
Table 29. Fifteen elements and associated sub-elements with potential applicability to the bear management plans of Canadian National Parks

<table>
<thead>
<tr>
<th>1. Program Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify source of objective</td>
</tr>
<tr>
<td>2. develop non-ambiguous, realistic measurable objectives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Organizational Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and management policy</td>
</tr>
<tr>
<td>2. identify importance of multidisciplinary team approach</td>
</tr>
<tr>
<td>3. develop individual responsibilities and lines of authority</td>
</tr>
<tr>
<td>4. develop strategy to develop or access expertise</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and policy</td>
</tr>
<tr>
<td>2. identify evaluation criteria</td>
</tr>
<tr>
<td>3. identify evaluation procedures using multidisciplinary, non-biased evaluation team</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and policy</td>
</tr>
<tr>
<td>2. identify required data and format</td>
</tr>
<tr>
<td>3. identify and define terminology</td>
</tr>
<tr>
<td>4. develop collection/dispersal strategy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Public Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and management policy</td>
</tr>
<tr>
<td>2. develop mode specific content standards</td>
</tr>
<tr>
<td>3. develop mode specific design standards</td>
</tr>
<tr>
<td>4. identify target audience, contact points and preferred modes</td>
</tr>
<tr>
<td>5. develop dispersal strategy for each target audience</td>
</tr>
<tr>
<td>6. develop mode specific evaluation strategy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. Waste Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and management policy</td>
</tr>
<tr>
<td>2. identify each garbage site and classify as to responsibility</td>
</tr>
<tr>
<td>3. develop control strategy for park operated facilities</td>
</tr>
<tr>
<td>4. develop control strategy for commercial facilities</td>
</tr>
<tr>
<td>5. develop control strategy for residential facilities</td>
</tr>
<tr>
<td>6. develop control strategy for visitor facilities</td>
</tr>
<tr>
<td>7. develop control strategy for carrion</td>
</tr>
<tr>
<td>8. develop control strategy for fish entrails</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7. Food Storage Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and management policy</td>
</tr>
<tr>
<td>2. identify problem sites</td>
</tr>
<tr>
<td>3. develop control strategy for autacampgrounds</td>
</tr>
<tr>
<td>4. develop control strategy for backcountry campsites</td>
</tr>
<tr>
<td>5. develop control strategy for picnic sites</td>
</tr>
<tr>
<td>6. develop control strategy for outfitters and other commercial operators</td>
</tr>
<tr>
<td>7. develop control strategy for trailcrew camps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8. Human Activity Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and management policy</td>
</tr>
<tr>
<td>2. develop strategies by management zones</td>
</tr>
<tr>
<td>3. develop criteria to implement, monitor and remove closures, warnings and activity restrictions</td>
</tr>
<tr>
<td>4. identify implications of fire management policy</td>
</tr>
<tr>
<td>5. identify implications of EARP</td>
</tr>
<tr>
<td>6. develop trail and campsite standards</td>
</tr>
<tr>
<td>7. develop patrol system</td>
</tr>
<tr>
<td>8. identify enforcement policy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9. Problem Bear Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and management policy</td>
</tr>
<tr>
<td>2. identify promptness as priority</td>
</tr>
<tr>
<td>3. develop control strategies by management zone</td>
</tr>
<tr>
<td>4. develop criteria for capture, release and destroy</td>
</tr>
<tr>
<td>5. identify autopsy policy</td>
</tr>
<tr>
<td>6. identify marking system</td>
</tr>
<tr>
<td>7. develop release strategy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10. Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and management strategy</td>
</tr>
<tr>
<td>2. develop standards</td>
</tr>
<tr>
<td>3. identify needs</td>
</tr>
<tr>
<td>4. develop curriculum and methodology</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11. Emergency Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and management policy</td>
</tr>
<tr>
<td>2. identify basic principles</td>
</tr>
<tr>
<td>3. develop strategy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>12. Research Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and management policy</td>
</tr>
<tr>
<td>2. identify needs</td>
</tr>
<tr>
<td>3. develop strategy to encourage research on a regional ecosystem basis</td>
</tr>
<tr>
<td>4. develop strategy to access and integrate research findings</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>13. Regional Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. identify importance and management policy</td>
</tr>
<tr>
<td>2. identify existing agreements</td>
</tr>
<tr>
<td>3. identify needed agreements</td>
</tr>
<tr>
<td>4. develop strategies to reach agreements</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14. Fiscal/Person-Year Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. develop multiyear D&amp;M and Capital cost projections</td>
</tr>
<tr>
<td>2. develop multiyear person-year projections</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>15. Design Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. develop objectives of planning document</td>
</tr>
<tr>
<td>2. develop design to meet objectives</td>
</tr>
</tbody>
</table>
framework upon which managers can develop a bear management plan suitable to their park. While each element is presented as a separate entity, they are inextricably linked. For example, proper food storage and waste management are highly dependent upon the dispersal of information; management of problem bears relies heavily on an efficient monitoring system; evaluation criteria must be generated from objectives and so forth. Collectively the elements comprise an integrated system wherein an adjustment to one may cause a chain reaction affecting other elements. At this juncture I would like to make one point very clear. The fifteen elements are essential only in that each park should consider their applicability relative to the peculiarities of the individual park. While I strongly suspect that each of the elements and sub-elements is applicable, to some extent, in every Canadian National Park (with a bear population), I did not have the opportunity to make extensive visits to each park in order to draw definitive conclusions on this matter. Hence the elements and sub-elements represent a range of topics that each park should consider when drafting its bear management plan. The extent to which a particular element or sub-element is emphasized must be based upon the operational needs of the park. Obviously there will be certain parks which, due to operational demands, may wish to emphasize selected elements. The importance of element number 13, Regional Management, to those parks with grizzly populations, is a prime example. In this regard it is important that each park determine which elements are applicable to its present and future management efforts and that these elements are prioritized in terms of their overall importance. This is especially important for those elements such as
research, monitoring, waste management, food storage management or public information which, because of their fiscal and person-year requirements, may be the first program elements considered for cutbacks in times of monetary restraint. While it would be difficult to make a definitive priority list that would be applicable to all parks, I can offer several comments which might assist in the development of priorities. First is the fact that, due to the integrated and dependent nature of the elements, one must expect certain spin-off effects resulting from the emphasis or de-emphasis placed on a particular element. Second is the pervasive influence of both the monitoring and research elements. These are key elements that ought to be given high priority. And third is the fact that the well developed body of knowledge, which clearly establishes the adverse relationship between bears and human garbage/food, suggests that the waste management and food storage elements also ought to receive high priority.
CHAPTER IV  BEAR MANAGEMENT PLANS IN CANADIAN NATIONAL PARKS:

AN EVALUATION

A. METHODS

Each bear management plan from Canadian National Parks was thoroughly reviewed in respect to the 15 essential elements and their sub-elements shown in Table 29. If an element and its sub-elements were completely discussed within the plan a COMPLETE symbol - complete - was assigned. If all sub-elements except for minor omissions were discussed a MINOR symbol - minor - was assigned. MAJOR and EXTENSIVE categories of omissions were denoted by the symbols - major and - extensive - respectively. When an element was altogether missing an ABSENT symbol - absent - was assigned.

Several points must be kept in mind while analysing this evaluation. First and foremost is the fact that the evaluation is NOT an evaluation of the program's success or failure NOR is it an estimate of the plan's success or failure. It is simply an evaluation of a plan's contents relative to those elements and sub-elements set out in Table 29. Any inferences drawn from the data must be considered in this context. Secondly, is the fact that the evaluation is only as complete as the plan itself. A park might have a well developed food storage element but unless it was mentioned in the plan, an ABSENT value was assigned. Thirdly, the value assigned to each element is based solely on the author's reading of the plan and is therefore open to a certain amount of subjectivity and bias.
B. RESULTS

Of the 17 bear management plans received from Canadian National Parks only 13 could be evaluated. Although all plans in Prairie Region are undergoing a major revision (Leonard et al. 1983), plans from Kluane, Nahanni and Wood Buffalo were evaluated even though they are, or soon will be, out of date. Since only Part I of a two part plan for Prince Albert and Riding Mountain were prepared at time of writing, evaluations could not be made. Although a plan has been prepared for Auyuittuq, circumstances are so unique in this park that an evaluation would not be meaningful. Unique circumstances consist of: (1) a non-gazetted status (2) a polar bear population only (3) heavy Inuit hunting pressures (4) extreme isolation and (5) very low visitation. Finally, I felt that an evaluation of the La Mauricie plan would not be useful since the park has included bear management within a very generalized wildlife management plan that covers everything from mosquitoes to bears.

Table 30 graphically illustrates the results of the evaluation. An evaluation profile for each park can be seen by reading the table from left to right. Similarly an evaluation profile for each element can be seen by reading the table from top to bottom. In either axis the amount of shading indicates completeness: the greater the amount of shading the greater the completeness. Two conclusions are obvious. First, the plans of Banff and Waterton appear to be the most complete. Secondly, essential element number 6 (Waste Management), 5 (Public Information), 9 (Problem Bear Management) and 4 (Monitoring) appear to be the most complete. Essential
Table 30. Content analysis of bear management plans in Canadian National Parks.

**ESSENTIAL ELEMENTS**

<table>
<thead>
<tr>
<th>NATIONAL PARK</th>
<th>1 Del</th>
<th>2 Org-Str</th>
<th>3 Eval</th>
<th>4 Monitor</th>
<th>5 Pub Info</th>
<th>6 Waste Mgmt</th>
<th>7 Food Strg</th>
<th>8 Human Act</th>
<th>9 Prob Bear</th>
<th>10 Training</th>
<th>11 Emerg.</th>
<th>12 Research</th>
<th>13 Veg Mgmt</th>
<th>14 Fiscal</th>
<th>15 Design Char</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glac/Rev</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jasper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kootenay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pacific Rim</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waterton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yoho</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kluane</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nahanni</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood Buffalo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gros Morne</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terra Nova</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LEGEND**

The elements and sub-elements shown in Table 28 were used to perform each evaluation according to the following definitions:

- **Black square**: all sub-elements present
- **Lightly shaded**: minor omission of sub-elements
- **Darkly shaded**: major omission of sub-elements
- **White square**: extensive omission of sub-elements; often only the element is mentioned
- **White square (empty)**: no mention of either element or sub-element
element number 14 (Fiscal and Person-year Requirements), 7 (Food Storage Management), 3 (Evaluation), 12 (Research) and 13 (Regional Management) were the most incomplete.

Table 31 presents a summary analysis of the evaluation. A total of 195 elements were evaluated (15 essential elements x 13 plans). Five (3%) of the 195 elements fell in the COMPLETE category, 20 (10%) fell in the MINOR omissions category, 57 (29%) fell in the MAJOR omissions category, 49 (25%) fell in the EXTENSIVE omissions category and 64 (33%) fell in the ABSENT category.

If one arbitrarily combined the COMPLETE and MINOR categories to represent 'acceptable' elements and similarly combined the MAJOR, EXTENSIVE and ABSENT categories to represent 'unacceptable' elements, 25 (13%) of the elements evaluated would fall into the 'acceptable' category and 170 (87%) of the elements would fall in the 'unacceptable' category. With the exception of element number 6 (Waste Management) and number 9 (Problem Bear Management), all elements seemed to contribute equally to the 'unacceptable' category.

C. DISCUSSION

Judged against the criteria developed in this report, the bear management plans of Canadian National Parks seem to be lacking in many respects. The following is an element by element discussion of the results.

PROGRAM ELEMENT 1: PROGRAM OBJECTIVES

Not one of the plans contained management objectives that went beyond a general 'motherhood' statement. With few exceptions parks stated a dual
Table 31. Summary of the content analysis of bear management plans in Canadian National Parks

<table>
<thead>
<tr>
<th>EVALUATION CATEGORIES</th>
<th>Objective</th>
<th>Org</th>
<th>Str</th>
<th>Evaluation</th>
<th>Monitoring</th>
<th>Public Info</th>
<th>Waste Mgmt</th>
<th>Food Stg</th>
<th>Human Act</th>
<th>Prob Bears</th>
<th>Training</th>
<th>Emerg. Plan</th>
<th>Research</th>
<th>Reg Mgmt</th>
<th>Fiscal Py</th>
<th>Design Char</th>
<th>No. Elements per Each Category</th>
<th>% of Elements Each Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Minor</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>9</td>
<td>5</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>6</td>
<td>57</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Extensive</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>49</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Absent</td>
<td>0</td>
<td>6</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>13</td>
<td>0</td>
<td>64</td>
<td>33</td>
<td></td>
</tr>
</tbody>
</table>

No. of Non-Acceptable Elements 13 12 13 11 10 8 12 11 9 11 10 12 13 13 12

For example, a total of 5 or 3% of the 195 (15 essential elements x 13 plans) elements analyzed fell in the Complete category.
objective of protecting or promoting a 'natural' bear population and 'minimizing' or reducing bear/human conflict. While this may be an adequate regional or national objective, at the park level it lacks definition and must be refined in a realistic, non-ambiguous and measurable manner if the objective is to provide direction and serve as a touchstone for evaluative criteria.

RECOMMENDATION: The objectives of bear management plans must go beyond the general use-preservation objective of national parks. The objectives should be developed from a credible authority and should be written in a realistic, non-ambiguous and measurable fashion based on the operational contingencies of the park.

PROGRAM ELEMENT 2: ORGANIZATIONAL STRUCTURE AND RESPONSIBILITY ASSIGNMENT

In 12 of the 13 plans program element 2 fell in the 'unacceptable' category and in 6 plans the element was completely absent. The lack of a multidisciplinary team approach and strategies to develop or access expertise were common omissions.

RECOMMENDATION: All bear management plans should consider a detailed account of the organizational structure and responsibility assignments under which the plan is to be implemented.

PROGRAM ELEMENT 3: EVALUATION

This was one of the least complete elements. The evaluation element in all 13 plans fell within the 'unacceptable' category with 1 element in the major omissions category, 5 elements in the extensive omissions
category and 7 elements in the absent category. While it is likely that some form of informal 'tailgate' evaluations are performed periodically throughout the season in most parks, there is a universal lack of an organized evaluation system based on established criteria and conducted by unbiased multidisciplinary evaluation teams. It is difficult to imagine how the management process can progress in an objective, expedient fashion without due attention to this important element.

RECOMMENDATION: All bear management plans should consider an evaluation element that outlines the entire evaluation system including the evaluation criteria and the evaluation process.

PROGRAM ELEMENT 4: MONITORING

In 11 of 13 plans the monitoring element fell within the 'unacceptable' category. Two elements fell in the 'acceptable' category; one in the complete and one in the minor omissions category. While monitoring was, on the whole, one of the better detailed elements, the lack of identified data requirements, undefined terminology and standardized collection formats, will render much of the data currently being collected as incomplete, inconsistent and non-comparable.

RECOMMENDATION: All bear management plans must contain a comprehensive monitoring element which outlines data requirements, collection formats, defined terminology and collection/dispersal strategies.
PROGRAM ELEMENT 5: PUBLIC INFORMATION

In 10 of the 13 plans the public information element fell in the 'unacceptable' category. Generally the plans failed to depict a strategy more sophisticated than dispersement of one or two pamphlets. The almost total reliance on the You Are in Bear Country pamphlet as the main source of bear information is a major shortcoming and has certainly contributed to the lack of creativity in design and dispersement of bear information. Generally no provisions are made to disperse information at commonly used entry points such as bus depots, or train stations; multiple visitor entries (e.g. buses) are not given information distributed to single entrants; few campgrounds have bear information posted in high profile locations (washrooms, self-registration centres, etc.); other high profile space (garbage bags, outhouses, etc.) has not been utilized; information centres generally have little to add to the material found in pamphlets; computerized or even centralized monitoring systems are rare making the distribution of current information difficult; little attention has been paid to pre-visit contacts, self-operated audio-visual presentations, short range AM radio broadcasts or contacts at concessionaire operations. Finally overall strategies to identify content and design standards, target audiences, contact points and dispersal methods along with suitable evaluation techniques are absent in most plans.

RECOMMENDATION: All bear management plans should consider a systematic and creative strategy for the design, dispersal and evaluation of public information concerning bears. This is a key program element and should be given much greater emphasis than it currently receives.
PROGRAM ELEMENT 6: WASTE MANAGEMENT

In 8 of the 13 plans the waste management element fell in the unacceptable category. While there generally appears to be a fairly well defined strategy for controlling garbage at park operated facilities, strategies for commercial and residential garbage are lacking. Similarly, strategies for carrion and fish entrails are absent in most plans.

RECOMMENDATION: All management plans should consider a systematic strategy for the management of all wastes. Greater emphasis should be placed on those strategies applicable to commercial operations, residents, carrion and fish entrails.

PROGRAM ELEMENT 7: FOOD STORAGE MANAGEMENT

In 12 of the 13 plans the food storage element fell within the 'unacceptable' category and in 8 plans the element was completely absent. The lack of strategies to control bear access to human food is particularly surprising given the high number of food storage incidents that occur in parks and the current emphasis placed on this element by our southern neighbours. Only two Canadian parks have installed food storage facilities and even these are on a very limited basis.

RECOMMENDATION: All bear management plans should consider comprehensive food storage strategies for various site specific locations.

PROGRAM ELEMENT 8: HUMAN ACTIVITY MANAGEMENT

In 11 of the 13 plans the human activity element reviewed fell within
the 'unacceptable' category. In six plans the element was rated as having extensive omissions. While most parks have developed a system for closures and warnings, there seems to be little strategy developed beyond this point. Common omissions include a zoned management strategy, a recognition and integration of the implications of fire management, the importance of EARP or the development of trail and campsite standards.

RECOMMENDATION: Human activity management is an extremely important aspect of bear management and should receive far more attention than it currently does. Plans should consider comprehensive strategies to manage all types of human activities within the park. Strategies should consider both facility design and management techniques.

PROGRAM ELEMENT 9: PROBLEM BEAR MANAGEMENT

Direct control of problem bears through capture, or destruction has been, and continues to be, the prominent element in most management plans. In 9 of the 13 plans the problem bear element fell in the 'unacceptable' category with 7 of the 9 rated as having major omissions. Nevertheless, relative to other elements, problem bear management was one of the more complete elements. Common omissions include identification of action promptness as a priority and development of strategies according to management zones.

RECOMMENDATION: Notwithstanding the fact that control of problem bears must play a progressively less important role in modern bear management, plans must continue to pay considerable attention to this element as stipulated by existing regulations and directives. Improvements can be made however by inclusion of action promptness as a priority, and a management strategy that differentiates between the operational and ecological realities of various areas or zones such as frontcountry or backcountry.
PROGRAM ELEMENT 10: TRAINING

In 11 of 13 plans the training element fell within the 'unacceptable' category and in 5 plans the element was completely absent. To the vast majority of parks it would appear that bear management training is synonymous with immobilization training. Training does not seem to progress beyond this point. Banff's proposed large scale information/training program for Park and concessionaire employees is a noteworthy exception.

RECOMMENDATION: All bear management plans should consider the development of a comprehensive training plan which touches on all bear management topics. Training should not be limited to wardens but should include all park employees who have a role to play in monitoring or dispersing information. Particular emphasis should be placed on concessionaire employees.

PROGRAM ELEMENT 11: EMERGENCY PLANNING

In 10 of the 13 plans the emergency planning element fell in the 'unacceptable' category and in 8 plans the element was totally absent.

RECOMMENDATION: All bear management plans should consider the development of procedures to deal with bear related emergencies.

PROGRAM ELEMENT 12: RESEARCH PLANNING

In 12 of the 13 plans the research element fell within the 'unacceptable' category; moreover, the majority of plans (7) completely omitted any mention of research requirements.

RECOMMENDATION: All bear management plans should consider a comprehensive research strategy which identifies requirements, costs, time/action scheduling and methods of realizing the research.
On the whole, this was one of the most deficient elements. The regional ecosystem element in all plans fell within the 'unacceptable' category and in 8 plans the element was totally omitted. It would seem that as far as bears are concerned, management currently stops at park boundaries. The only positive steps that have been taken are the establishment of liaison contacts, usually at the level of field personnel, and in rare cases, provision to release bears on provincial lands. Surprisingly even the contiguous national parks (Banff, Jasper, Kootenay, Yoho) have not yet mounted a co-ordinated bear management effort amongst themselves.

RECOMMENDATION: All management plans should consider a strategy to develop and implement a concerted effort to manage bears, and particularly less viable populations of bears, on an ecosystem basis. Where ecosystems cross jurisdictional boundaries, Parks Canada officials should play a lead role in developing management strategies that take into account the whole ecosystem. Understandably, this is a major undertaking that will not happen overnight. Progress can be expected to be slow and tedious. While senior managers must play a major role in the negotiation process, field staff must be prepared to identify areas of concern and suggest ameliorative action. Management on a regional or ecosystem basis should not be limited to one or two particular facets of management but should involve the full gamut of management topics suggested by program elements 1 through 14. The Yellowstone approach should serve as a prime example of the efforts that can be made.
PROGRAM ELEMENT 14: FISCAL AND PERSON-YEAR REQUIREMENTS

Both the fiscal and person-year resources necessary to implement the management program were universally omitted from all plans. This is particularly odd given the fact that Management Directive 4.4.15 (Parks Canada 1978d) specifically calls for the inclusion of this element in the plan. Further it is difficult to understand how senior management could approve the plans without knowing what resources would be required.

RECOMMENDATION: All bear management plans should consider the fiscal and person-year resources necessary to implement the plan.

PROGRAM ELEMENT 15: DESIGN CHARACTERISTICS

In 12 of the 13 plans the design characteristics element fell within the 'unacceptable' category; six of the 12 elements fell within the extensive omissions category and an additional 6 fell within the major omissions category. Generally management plans in Western Region show a much higher level of detail than those of other regions. However they are extremely difficult to understand due to a cumbersome format and multitudinous cross referencing. Often minute detail such as immobilization procedures which would be better left to a procedural manual is included in the main text. Development of policy or general program directions is often omitted. A description of the park setting along with historical management data is omitted leaving the reader in a vacuum as to the importance of the bear management program. As one moves eastward the plans become progressively less detailed and deficient in many program elements. In several cases the
management plan essentially consists of a procedural outline for trapping and immobilization. Approval pages, glossaries and references are usually omitted. Graphic quality for all plans is generally low. Little use has been made of graphs, tables or figures.

RECOMMENDATION: Managers must determine the purpose of the bear management plan per se and develop design characteristics accordingly within the guidelines established by Management Directive PRM 40-6 (Parks Canada 1980).

D. OTHER RECOMMENDATIONS

In addition to the element specific recommendations noted above, a number of general recommendations can be offered.

GENERAL RECOMMENDATION I. REGIONAL AND NATIONAL PROGRAM CO-ORDINATION

Although the series of policy statements and directives provide a measure of guidance to bear management practices they fall short in specifying a number of items essential to rigorous and consistent management on both a national and regional basis. The lack of a well defined terminology and monitoring techniques is a prime example (page 246). If we are ever going to develop meaningful consistency there has to be far greater dialogue between parks and between regions. In the vast majority of regions individual parks operate in a vacuum. Park A does not know what park B does and so forth. This is particularly evident in the contiguous mountain parks.
Headquarters and regional offices must play a much stronger role in facilitating dialogue between parks and between regions. A major step in this direction would be the formation of regional bear management committees consisting of one or two representatives from each park. The Committee could serve as a forum for information exchange and the development of regional consistency. If the initial success of Prairie Region vis-a-vis their Bear Management Working Group (Leonard et al. 1983) can be taken as an indication, this approach can be highly productive. Hopefully, nationwide co-ordination might be fostered through the development of a national committee consisting of representatives from each region.

While there is no doubt this recommendation would involve travel funding, the costs may be quickly recouped through increased management efficiency.

GENERAL RECOMMENDATION 2: DEVELOPMENT OF GREATER CONSISTENCY BETWEEN THE NATIONAL PARKS ACT, POLICY AND DIRECTIVES

At the moment managers are confronted with a very lengthy and somewhat confusing array of regulations, policies and directives related to bear management. At several points these documents are either contradictory or place unwarranted restrictions on management techniques. For example, one directive (Parks Canada 1971b) suggests that "animals found to be injured or disabled to the point where natural recovery is doubtful" should be destroyed. Section 4(a) of the National Parks Wildlife Regulations specifically prohibits this action (page 50). Western Region Directive No. 48 (Parks Canada 1983d) stipulates that closures "will only be instituted when there has been an encounter which has been considered by
the Warden Service to be aggression ... or when a female with cubs of the year are known to be in the area." One might reasonably ask -- what about bears feeding on carrion near backcountry facilities or what about the female grizzly with two year old cubs or a solitary grizzly frequenting a backcountry campsite. Surely closures would be warranted in any of these situations. The Directive on Humane Trapping (Parks Canada 1983g) prohibits bear managers from utilizing one of his most common tools -- the culvert trap. Further, trapping of bears, for any reason other than research is an illegal activity pursuant to section 4(a) and 15(1)(a) of the National Parks Wildlife Regulations (page 52).

The point to be made here is that if we are going to use directives and other documentation to provide direction and consistency then the authors of such documents must be certain that the document is consistent with other directives and conventional practices. Existing directives ought to be carefully reviewed and vetted for consistency. This is particularly true for the 6-8 national directives that have not been updated for the last 5-12 years. Unless these directives are kept up to date and made consistent they may very well become more of a liability than an asset.

GENERAL RECOMMENDATION 3: ACCESS TO LEGAL ADVICE

While managers need not become paranoid over the legal implications of bear management, they must nevertheless be fully aware of legalities. Access to legal advice must be readily available to bear managers if they are to develop a sound working knowledge of the law as it applies to bear
management. I sincerely hope that the difficulty that I experienced in trying to obtain legal information from the Department of Justice (page 82) was an exception and not the rule. Lines of communication between field staff and the Department of Justice must be established and readily used.89

GENERAL RECOMMENDATION 4: CENTRALIZED DATA STORAGE

The current state of bear management data leaves a great deal to be desired in respect to data storage technology. With the exception of routine observations which are stored by CANSIS, each park currently stores its management data individually, usually in a paper file format, at either park headquarters or the warden office. While this system can be awkward for park personnel, it is painfully awkward for anyone conducting multi-park, multi-year studies. A centralized computer format storage system operated on a regional or preferably national basis would remove much of this difficulty. The development of standardized terminology and reporting format would have to go hand in hand with this recommendation. Regional and Headquarters personnel ought to play a strong role in developing this capacity.

GENERAL RECOMMENDATION 5: MODIFICATIONS TO THE NATIONAL PARK ACT REGULATIONS

Difficulties associated with the enforcement of many regulations under the National Parks Act were discussed on pages 47 to 65.

89 Formal lines of communication with the Department of Justice have been established in Western Region via Western Region Directive Number 10 (Parks Canada 1983k).
Particular problems exist with the wording of garbage regulations applicable to residents and visitors. Other problems concern the convoluted and fractionated approach that must be taken to enforce proper food storage. A simplified set of regulations should be developed for both garbage and food storage. In respect to food storage the single regulation used by U.S. National Parks (page 122) seems like a logical approach that might be extended to include garbage storage.
CHAPTER V  CASE STUDY: KOOTENAY NATIONAL PARK

INTRODUCTION

In this chapter the 15 essential elements and associated sub-elements shown in Table 29 are utilized to develop a bear management plan for Kootenay National Park. The Plan is complete unto itself with its own table of contents, tables, figures, appendices, main body and references.
Bear Management Plan
Kootenay National Park
1984-1988

Prepared by: ___________________________ Date: ___________
Park Warden

Recommended by: ___________________________ Date: ___________
Superintendent

______________________________ Date: ___________
Chief Park Warden

______________________________ Date: ___________
Chief of Visitor Services

______________________________ Date: ___________
Chief Park Naturalist

______________________________ Date: ___________
General Works Manager

Approved by: ___________________________ Date: ___________
Director, Western Region
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Page No.</th>
<th>Section Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>APPROVAL</td>
</tr>
<tr>
<td>ii.</td>
<td>TABLE OF CONTENTS</td>
</tr>
<tr>
<td>v.</td>
<td>LIST OF TABLES</td>
</tr>
<tr>
<td>vii.</td>
<td>LIST OF FIGURES</td>
</tr>
<tr>
<td>ix.</td>
<td>LIST OF APPENDICES</td>
</tr>
<tr>
<td>x.</td>
<td>GLOSSARY</td>
</tr>
<tr>
<td>1.</td>
<td>BACKGROUND INFORMATION</td>
</tr>
<tr>
<td>1.</td>
<td>Park Objectives</td>
</tr>
<tr>
<td>1.</td>
<td>Park Setting</td>
</tr>
<tr>
<td>5.</td>
<td>Bear Population Estimates</td>
</tr>
<tr>
<td>10.</td>
<td>Future Management Directions 1984-88</td>
</tr>
<tr>
<td>12.</td>
<td>PROGRAM ELEMENT 1: PROGRAM OBJECTIVES</td>
</tr>
<tr>
<td>12.</td>
<td>Policy</td>
</tr>
<tr>
<td>12.</td>
<td>Action</td>
</tr>
<tr>
<td>14.</td>
<td>PROGRAM ELEMENT 2: ORGANIZATIONAL STRUCTURE</td>
</tr>
<tr>
<td>14.</td>
<td>Policy</td>
</tr>
<tr>
<td>14.</td>
<td>Action</td>
</tr>
<tr>
<td>16.</td>
<td>PROGRAM ELEMENT 3: PROGRAM EVALUATION</td>
</tr>
<tr>
<td>16.</td>
<td>Policy</td>
</tr>
<tr>
<td>19.</td>
<td>Action</td>
</tr>
<tr>
<td>23.</td>
<td>PROGRAM ELEMENT 4: MONITORING</td>
</tr>
<tr>
<td>23.</td>
<td>Policy</td>
</tr>
<tr>
<td>23.</td>
<td>Action</td>
</tr>
<tr>
<td>27.</td>
<td>PROGRAM ELEMENT 5: PUBLIC INFORMATION</td>
</tr>
<tr>
<td>27.</td>
<td>Policy</td>
</tr>
<tr>
<td>28.</td>
<td>Action</td>
</tr>
</tbody>
</table>
PROGRAM ELEMENT 6: WASTE MANAGEMENT

Policy
Action

Government Facilities
Commercial Facilities
Visitor Garbage at Campsites and Picnic Sites
Carrion Management
Fish Entrails Management

PROGRAM ELEMENT 7: FOOD STORAGE MANAGEMENT

Policy
Action

PROGRAM ELEMENT 8: HUMAN ACTIVITY MANAGEMENT

Policy
Action

PROGRAM ELEMENT 9: PROBLEM BEAR MANAGEMENT

Policy
Action

PROGRAM ELEMENT 10: TRAINING

Policy
Action

PROGRAM ELEMENT 11: EMERGENCY PLANNING

Policy
Action

PROGRAM ELEMENT 12: RESEARCH PLANNING

Policy
Action

PROGRAM ELEMENT 13: REGIONAL MANAGEMENT

Policy
Action
Page No.

66. PROGRAM ELEMENT 14: FISCAL AND PERSON-YEAR PLANNING

66. Policy
66. Action

71. References
73. Appendices
LIST OF TABLES

Page No.

7. Table 1. Historical summary of bear management data. KNP 1940-83.


17. Table 3. Staff responsibilities in the bear management program. KNP 1984-88.


22. Table 5. Composition and responsibilities of the bear management evaluation team. KNP 1984-88.

24. Table 6. Data requirements, collection format, storage location and reporting responsibilities for the bear monitoring system. KNP 1984-88.

29. Table 7. Categories of bear information for distribution to visitors. KNP 1984-88.


32. Table 10. Distribution of bear information by contact points. KNP 1984-88.


38. Table 14. Control strategy for garbage at campsites and picnic sites. KNP 1984-88.


41. Table 16. Fish entrails management strategy. KNP 1984-88.

43. Table 17. Time-action schedule for food storage facility installation. KNP 1984-88.
44. Table 18. Integration of the public information program with the food storage strategy KNP 1984-88.

45. Table 19. Monitoring and enforcement components of the food storage strategy. KNP 1984-88.


52. Table 24. Human activity management strategy component 5: development of a fire management policy. KNP 1984-88.


56. Table 27. Capture criteria for bears. KNP 1984-88.


60. Table 31. Bear management training requirements. KNP 1984-88.


65. Table 33. Potential mutual concerns of land jurisdictions contiguous with KNP.

67. Table 34. Initial strategy toward the development of regional ecosystem management. KNP 1984-88.
68. Table 35. Annual person-year requirements for the bear management program. KNP 1984-88.

69. Table 36. Annual O&M bear management costs. KNP 1984-88.

70. Table 37. Time-action schedule for non-recurring person-year and fiscal requirements for the bear management program. KNP 1984-88.
<table>
<thead>
<tr>
<th>Page No.</th>
<th>Figure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Figure 1.</td>
<td>Geographic location of Kootenay National Park.</td>
</tr>
<tr>
<td>15.</td>
<td>Figure 2.</td>
<td>Organization of staff with respect to bear management. KNP 1984-88.</td>
</tr>
<tr>
<td>18.</td>
<td>Figure 3.</td>
<td>Approval process for bear management plans. KNP 1984-88.</td>
</tr>
<tr>
<td>21.</td>
<td>Figure 4.</td>
<td>Evaluation process for the bear management program. KNP 1984-88.</td>
</tr>
<tr>
<td>26.</td>
<td>Figure 5.</td>
<td>Bear monitoring system. KNP 1984-88.</td>
</tr>
</tbody>
</table>
LIST OF APPENDICES

Page No.


77. Appendix 5. Estimated number of garbage storage deficiencies.
   KNP 1984-88

GLOSSARY

INCIDENTS

Garbage Storage Incident: used to describe any interaction between bears and garbage wherein the bear gains access to improperly stored garbage; human presence at the time of the incident is not necessary. Garbage storage incidents should be classified as either government, commercial, residential or visitor dependent on the ownership of the garbage.

Food Storage Incident: used to describe any interaction between bears and human food wherein the bear gains access to improperly stored human food; human presence at the time of the incident is not necessary. Food storage incidents should be classified as either government, commercial, residential or visitor according to food ownership at the time of the incident. Food storage incidents do not include those situations wherein a bear forces tourists to surrender their food.

Property Damage Incident: used to describe any interaction between bears and human property wherein the property is damaged in any way; human presence at the time of the incident is not necessary. Property damage incidents will normally be accompanied by either a garbage or food storage incident or one or more encounter categories. Property damage incidents should be classified as either government, commercial, residential or visitor according to property ownership.

NON-AGGRESSIVE ENCOUNTERS

No Change Encounter: used to describe an interaction between a bear and human wherein the bear gives no indication of being aware of the human and continues its normal routine.

Flight Encounter: used to describe an interaction between a bear and human wherein the bear departs the area at the time of the encounter or soon after; no aversive conditioning is applied.

Aversive Conditioning Encounter: used to describe an interaction between a bear and human wherein the bear departs the area immediately after the human applies some form of aversive conditioning (e.g. shout, throw rock, etc.). This type of encounter may be very common in campgrounds. A Type I aversive conditioning encounter implies that the aversive conditioning was effective and the bear moves away although it may soon return. A Type II encounter implies that the aversive conditioning technique has no effect and the bear remains in the area.

Neutral Encounter: used to describe an interaction between a bear and human wherein the bear indicates that it is aware of the human presence (e.g. pauses, orients towards the human, etc.) but continues its pre-encounter behaviour.

Curiosity Encounter: used to describe an interaction between a bear and human wherein the bear makes physical contact with a human; inadvertent injuries of a minor nature may occur (e.g. a bear steps on a sleeping camper). This type of encounter will probably occur in conjunction with a food seeking encounter.

AGGRESSIVE ENCOUNTERS

Threat Encounter: used to describe an interaction between a bear and human wherein the bear either growls, huffs, slaps, paws, pops jaws, pants loudly or shows other signs of aggressive intent.

Bluff Charge Encounter: used to describe an interaction between a bear and human wherein the bear charges toward the human but stops short of making physical contact; the bear stops the charge or veers off on its own volition or after the human applies some form of aversive conditioning (shout, wave, etc.). In the latter case an aversive conditioning encounter should be noted also. A Type I encounter implies that the bear stopped the charge on its own volition - no aversive conditioning is applied. A Type II encounter implies that the bear stopped the charge after aversive conditioning was applied.
Thwarted Charge Encounter: used to describe an interaction between a bear and human wherein the bear charges but is unable to make physical contact because of some evasive action (climb tree, enter vehicle, the bear is shot, etc.) on the part of the human.

Injury Encounter: used to describe an interaction between a bear and human wherein the bear purposely makes physical contact with the human and in so doing inflicts injuries.

CONTROL ACTIONS

Capture: used to describe a management action wherein a bear is physically captured by means of traps or drugs; this category does not include captures made for research purposes. Captures should be classified as to method used - culvert, snare, free ranging immobilization.

Release/In Park: used to describe a management action wherein a bear is released within the park in which it was captured.

Release/In Ecosystem: used to describe a management action wherein a bear is released outside the park in which it was captured but within its known or suspected ecosystem (e.g. a bear is released in an area 10 km beyond the boundary and no impassable barriers exist).

Release/Out of Ecosystem: used to describe a management action wherein a bear is released outside of its known or suspected ecosystem and there is no reason to believe the animal will be able to return to its former ecosystem (e.g. a bear is transferred from Montana to Alaska). This classification poses the obvious problem of delineating the ecosystem.

Release/Institution: used to describe a management action wherein a bear is transferred to a zoo, game farm, etc. where there is no possibility of return to its former ecosystem.

Destruction: used to describe a management action wherein a bear is purposely destroyed for management reasons; mercy killing of injured animals is excluded except where prior plans had indicated the bear was to be destroyed.

STORAGE DEFICIENCIES

Garbage Storage Deficiency: used to describe a situation wherein garbage is accessible to bears due to the use of improper storage techniques. Garbage storage deficiencies should be reported on a site-day basis i.e. one deficient site for 5 days would constitute 5 site-days of deficiency. Responsibility for the deficient site should be classified as either government, commercial, residential or visitor according to ownership.

Food Storage Deficiency: used to describe a situation wherein human food is accessible to bears due to the use of improper storage techniques. Food storage deficiencies should be reported on a site-day basis i.e. one deficient site for 5 days would constitute 5 site-days of deficiency. Responsibility for the deficient site should be classified as either government, commercial, residential or visitor according to ownership.

MISSCELLANEOUS

Other Population Losses: used to describe other population losses resulting from poaching, roadkill, a drug overdose or hunter kills within the ecosystem.

Total Ecosystem Loss: used to describe the total number of bears lost from the ecosystem; this would constitute the sum of Releases/Out of Ecosystem, Release/Institution, Destruction and Other Population Losses.

Ecosystem: must be defined within the context of the specific park. Due to a lack of specific data, most parks will have to draw operationally based boundaries rather than boundaries dictated by ecological parameters.

Frontcountry: used to describe areas that are generally developed and accessible by motor vehicle. Since the area is used by a relatively large percentage of park visitors, closures are not realistic except in extreme emergencies. Examples of frontcountry areas include the MCC, Redstreak Trail, and autocampgrounds.

Backcountry: used to describe areas that are generally undeveloped and inaccessible by motor vehicle. Since the area is used by a relatively small percentage of park visitors, closures are realistic and could be applied to prevent bear problems.

Note: There is no distinct boundary delineating frontcountry and backcountry areas. A certain amount of field discretion must be used to classify certain 'grey' areas.

Problem Bear: any bear that may require management action

Bear Season: May 1 - Oct 30

a One or more incidents or encounters often occur almost simultaneously. For example: A warden finds a bear breaking into garbage container; the bear orient toward the approaching warden and then continues foraging in the garbage; the warden throws several rocks and the bear runs. This series of events might be classified as three separate interactions: (1) a bear/garbage incident; (2) a neutral encounter; and finally (3) an aversel conditioning encounter.

b Black, grizzly or unidentified bear data should always be reported separately.
BACKGROUND INFORMATION

PARK OBJECTIVES

A ministerially approved objective of Kootenay National Park can be found in the Purpose and Objectives statement of the Four Mountain Parks Planning Program (Parks Canada 1983c:10).

• To protect and preserve the natural resources and processes of Banff, Jasper, Kootenay, and Yoho national parks associated with the Rocky Mountains Natural Region.

• To provide the highest level of protection or, where appropriate, preservation to resources and processes which are:
  • nationally or internationally significant;
  • unique, rare, or endangered;
  • good examples of the natural resources and processes of the Canadian Rocky Mountains; and
  • important for the retention of the parks' wildland character.

The bear management program in Kootenay National Park is consistent with this objective.

PARK SETTING

Kootenay National Park (KNP) is situated in the southeastern portion of British Columbia (Fig. 1). Established in 1919, the Park now encompasses 1406 km² (540 mi²) of rugged mountainous terrain in the Continental Ranges of the Rocky Mountains. The Park is bounded by the Continental Divide in the northeast and the southern Rocky Mountain Trench in the
Figure 1. Geographic location of Kootenay National Park.
southwest. Between these lay three main valleys, all running parallel in a general northwest-southwest orientation. In the north, the Vermilion Valley and its secondary drainages comprise ca. 50% of the park area. In the south, ca. 10% of the Park area lies within the Columbia Valley. Sandwiched between these two lies the Kootenay Valley representing ca. 40% of the Park. The Park is long and narrow in shape stretching over a length of ca 104 km and varying in width from ca. 12-24 km.

KNP is part of the contiguous four mountain block comprised of Banff, Jasper, Yoho and Kootenay National Parks. Boundaries are shared with Yoho in the northwest, Banff in the northeast and Mount Assiniboine Provincial Park on the west. The remainder of the Park is contiguous with B.C. Provincial Crown Land except for a small section along the southwestern flank which abuts the Village of Radium Hot Springs and several private land holdings.

The macroclimate is generally continental with short cool summers interspersed with occasional hot spells and long winters with intermittent cold spells (Walker et al. 1983:3). Three vegetation units or ecoregions have been identified. The montane ecoregion is the driest and warmest and is characterized by stands of Douglas Fir, White Spruce and Trembling Aspen. Above the montane lies the lower subalpine ecoregion characterized
by Engleman Spruce, Alpine Fir and Lodgepole Pine. In the upper subalpine ecoregion, the Lodgepole Pine is generally replaced by stands of Whitebark Pine and Alpine larch mixed with the Engleman Spruce and Alpine Fir. Finally at the highest elevation, the treeless alpine ecoregion is characterized by a complex mosaic of small ground hugging plants.

The Park supports a diverse array of wildlife. Ungulates such as elk, whitetail deer, mule deer, moose, mountain goat and bighorn sheep are commonly observed in many areas. Carnivores include cougar, lynx, bobcat, wolf, coyote, along with grizzly and black bear. In addition over 152 resident bird species have been identified (Poll 1982).

Since the Park's inception, man has had a marked influence on the landscape. Predominant man-made features include: a 104 km highway bisecting the entire length of the park; 70 km of fire roads; 3 auto campgrounds with a total of 402 sites; a 100 site group auto campground; 11 picnic sites; 3 warden stations; a trades compound; an aquacourt complex; 4 commercial bungalow camps; 1 commercial motel; 200 km of hiking trails; 12 backcountry campground with a total of 114 sites and 4 warden patrol cabins (Enderwick 1981).

Annual visitation during the 1980-82 period averaged ca. 2.4 million (Parks Canada 1983:307). Autocampgrounds annually provide ca. 40,000 party-nights (1980-83) during the May-September period of operation (Park files); and backcountry campgrounds support ca. 3,300 user-nights per annum (1982-83) the vast majority of which occurs during the months of June through September (Bjorgan 1983:5).
BEAR POPULATION ESTIMATES

The only source of information on KNP's black bear (*Ursus americanus*) population comes from warden observation cards. Black bear population research in KNP, or for that matter the Rocky Mountain National Parks is non-existent. Between 1951-77 there were 676 observations: 319 observations from the 1950's, 99 observations from the 1960's and 258 observations from 1970-77 (Poll 1982:59). Most of these observations were for bears located near open dumps. Several highway observations are noteworthy: on June 15, 1959, 21 black bears were observed between Radium and Vermilion Crossing (a distance of 52 km); on June 5, 1960 17 black bears were observed between McLeod Meadows and Vermilion Crossing (a distance of 35 km); and 9 black bears were observed during the 1981 highway survey (Poll 1982:59-60).

The only tentative conclusions that might be drawn from these figures are that black bears appear abundant and widespread in KNP.

Lack of research on KNP grizzly bears (*Ursus arctos*) places heavy reliance on observations to estimate population numbers. A 1939 warden observation reported 11 grizzlies in the Tumbling Valley during one day. For the period 1951-77 there were a total of 50 observations: 7 observations from the 1950's, 13 observations from the 1960's and 40 observations from 1970-77. Many of these observations came from areas in the upper Vermilion Valleys. For the period 1977-83 grizzly observations have totalled 57 (Unpubl. data. Kootenay National Park). Several observations are noteworthy: 5 grizzlies were observed during one day in Tokumm Valley in 1981; a sow and 2 cubs were observed repeatedly in Kimpton Valley in
1982 (Poll 1982:61-62); and 9 grizzlies were observed throughout KNP during an aerial goat survey in 1983 (Sheehan 1984).

Again, the only tentative conclusion that might be drawn from this data is that there appears to be a number of grizzlies using KNP for at least a portion of the year. Although the number of observations seems to be increasing this may simply represent a more concerted monitoring effort.

BEAR MANAGEMENT HISTORY 1940-1980

Virtually all management actions during this period were directed at black bears in frontcountry areas. Problems involving backcountry areas or grizzlies were non-existent. As in many national parks, bear management in Kootenay has changed drastically over the last 65 years. Prior to the early 60's there were at least 11 motor campgrounds, 3 bungalow camps and a number of construction and maintenance camps scattered over the length of the highway (Enderwick 1981). Associated with these facilities were at least 12 open garbage dumps. Needless to say bears, particularly blacks, were frequent visitors to these areas. However, relocation/destruction records (Table 1) indicate that bears posed few management problems during the period. Park officials were content to allow bears to feed on human garbage, in fact, the activity might even have been encouraged, as it was in other parks, as a means of attracting tourists. Nevertheless management philosophy swung 180° towards the end of the 50's.

Bears were to lead a more 'natural' life and therefor had to be weaned and separated from human food sources. A series of supposedly bear proof garbage storage structures were installed. Most were abysmal failures and for a number of years the park reverted to open dumps. Simultan-
Table 1. A historical summary of bear management data in Kootenay National Park 1940-1983.

<table>
<thead>
<tr>
<th>Year</th>
<th>Visitation (No. Visitors)</th>
<th>Auto Campgrounds (No. camper-nights)</th>
<th>Backcountry Campgrounds (No. camper-nights)</th>
<th>Garbage Storage Incidents</th>
<th>Incidents Food Storage Incidents</th>
<th>Property Damage Incidents</th>
<th>Threat Encounters</th>
<th>Aggressive Encounters Bluff Charge Encounters</th>
<th>Human Encounters</th>
<th>Relocations in Ecosystem</th>
<th>Management Actions</th>
<th>Storage Deficiencies</th>
<th>Food Deficiencies (site-days)</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940-49</td>
<td>1,869,288</td>
<td>121,673</td>
<td>2759</td>
<td>11</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>7</td>
<td>4</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>1950-59</td>
<td>1,993,769</td>
<td>126,416</td>
<td>2658</td>
<td>12</td>
<td>13</td>
<td>6(G,bc)</td>
<td>1</td>
<td>2(G,bc)</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>25</td>
<td>12</td>
</tr>
<tr>
<td>1960-69</td>
<td>1,875,861</td>
<td>130,300</td>
<td>2973</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>1970-79</td>
<td>129,641</td>
<td>3694</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>11(G,bc)</td>
<td>2(G,bc)</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>28</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>129,008</td>
<td>3021</td>
<td>7.25</td>
<td>8.25</td>
<td>5.0</td>
<td>1.0</td>
<td>2.0</td>
<td>1.25</td>
<td>0</td>
<td>4.0</td>
<td>2.5</td>
<td>17.0</td>
<td>11.25</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>1,869,288</td>
<td>121,673</td>
<td>2759</td>
<td>11</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>7</td>
<td>4</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>1982</td>
<td>1,993,769</td>
<td>126,416</td>
<td>2658</td>
<td>12</td>
<td>13</td>
<td>6(G,bc)</td>
<td>1</td>
<td>2(G,bc)</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>25</td>
<td>12</td>
</tr>
<tr>
<td>1983</td>
<td>1,875,861</td>
<td>130,300</td>
<td>2973</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>1984</td>
<td>129,641</td>
<td>3694</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>11(G,bc)</td>
<td>2(G,bc)</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>28</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>129,008</td>
<td>3021</td>
<td>7.25</td>
<td>8.25</td>
<td>5.0</td>
<td>1.0</td>
<td>2.0</td>
<td>1.25</td>
<td>0</td>
<td>4.0</td>
<td>2.5</td>
<td>17.0</td>
<td>11.25</td>
<td></td>
</tr>
</tbody>
</table>

1983 BASELINE RATE (per 100,000 user-nights) 5.49 6.24 3.78 0.75 1.51 0.94 0.0 3.02 1.89 12.87 8.25


b Incidents, encounters, control actions and deficiencies are defined in the glossary. Data for incidents, encounters and control actions refers to black bears (B) except where indicated as grizzly (G) or unknown (U).

Data refers to backcountry areas except where indicated as backcountry (bc).

Pre-1980 injury encounter, relocation and destruction data should be viewed with a certain amount of suspicion due to reporting irregularities.

d Autocampground visitation figures were converted from party-nights to user-nights using a conversion factor of 3.75 after L.A.N.A. (1965).

e Incident, encounter and deficiency data was not purposely collected and categorized as such during the 1980-83 period. Narrative style occurrence reports were analyzed and subsequently categorized to obtain this data.

f The 113 storage deficiencies reported in occurrence reports grossly underestimates the more realistic figure of 8016 deficient site-days (Appendix 6).

g Data is stored on the Canis computer system but requires considerable manipulation before it can be differentiated into backcountry and frontcountry observations.

h The Baseline Rate represents the average number of incidents, encounters, management actions or deficiencies per 100,000 camper-nights.
eously the growing number of bear inflicted human injuries (Table 1) promp-
ted officials to start enforcing a 1959 regulation which made feeding bears
illegal. With the advent of more effective traps and immobilizing drugs in
the late 60's and early 70's the Park began an earnest program of trapping
and relocating 'nuisance' bears. When the animal returned, as it usually
did, it was destroyed. Table 1 indicates that 179 black bears were relo-
cated and an additional 97 black bears were destroyed during the 20 year
period 1960-1979. In 1962 alone there were 30 black bears relocated and 31
black bears destroyed.

In 1973 an agreement was reached with the Regional District of East
Kootenay whereby all park garbage could be deposited at the Edgewater dump
located ca. 8 km from the park entrance. At about the same time, letter
box style garbage containers were installed at all picnic sites and view-
points along the highway. In 1976 bear-proof garbage storage buildings
were erected in all autocampgrounds. Both the letter box containers and
storage buildings have proven successful in that there has been only one
bear entry to date.

CURRENT MANAGEMENT PRACTICES AND CONCERNS 1980 - 1983

In 1980, two initiatives were introduced which have had a signifi-
cant impact on bear management practices in Kootenay. First was the intro-
duction of a standardized reporting form, the Occurrence Report. Although
it was simply an open narrative style form, it provided field staff with a
means of documenting bear incidents. As a result, the volume of bear-
related information has grown steadily since 1980.
The second initiative was the introduction of a management plan (Parks Canada 1981) outlining a uniform and systematic approach for a variety of management techniques. Although soon outdated, the plan had the single major influence of creating, amongst managers, an awareness of the park's bears and how they were being managed. Existing practices were examined and, in many circumstances, modified to conform with conventional techniques. For example, random release of unmarked bears was curtailed by the inclusion of an eartagging requirement; release sites were predetermined and subject to approval; a carrion management system was introduced; capture and destruction criteria were outlined; and procedures for effecting area closures or warning notices were outlined.

Despite these changes substantial management problems remain. In the frontcountry areas, access to improperly stored garbage and food continue to be the main cause of incidents and property damage. Moreover the high number of garbage and food storage deficiencies indicate a high potential for escalation of incidents. The letterbox containers are limited by their capacity and opening dimensions. Large bags of garbage are often left beside the containers because either the container is full or the bag will not fit through the door slot. Commercial facilities have not installed bear proof enclosures. Food storage facilities are non-existent.

In backcountry areas there appears to be an increasing number of bear observations, particularly grizzly observations, associated with increasing visitor pressures. Although grizzly incidents and encounters are relatively low they seem to be increasing. The first two property damage incidents and bluff charge encounters by grizzlies were reported in
10.

1981 and 1983 respectively. Food storage facilities are also non-existent in this area. The potential for serious problems in backcountry areas is substantial.

Common to both front and backcountry is a generally low profile public information system, a less than satisfactory monitoring system, and a complete lack of research. In addition an undeveloped regional or ecosystem management strategy leaves transient bear populations in a state of management limbo. This is particularly applicable to the KNP grizzly population which, due to the size and shape of the park, must range beyond the boundaries.

Future Management Directions 1984-88

Three alternative courses of action were considered for future bear management programs in KNP. Alternative 1 involved decreasing management efforts and accepting the risk of increasing all baseline rates (Table 1). Alternative 2 involved continuing with the existing management program and accepting the current baseline rates. Alternative 3 called for an intensified management program which attempts to reduce or maintain baseline rates. Alternatives 1 and 2 were found to be unacceptable in light of Parks Canada's legislated mandate (National Parks Act, Section 4), Parks Canada Policy (Parks Canada 1979), Management Directive 4.4.15 (Parks Canada 1978), Western Region Directive No. 48 (Parks Canada 1983d) and approved objectives for KNP (Parks Canada 1983c:10). Accordingly, alternative 3 was chosen as the preferred course of action.

The following document outlines the management program for both black and grizzly bears over the 5 year period 1984-88. The main emphasis
is on **anticipatory** management - in other words - a management style de-
signed to anticipate potential problems and to take action before the prob-
lem develops or escalates. The key to this approach is a well developed
monitoring system designed to detect potential conflicts and relay this
information to field staff for **prompt** action. In frontcountry areas mana-
gement actions are directed at controlling problem bears, whereas in back-
country areas the emphasis is placed on controlling human activities.
Throughout the program a concerted effort is directed at proper storage of
garbage and food through a program of high quality public information. The
program is broken down into 14 elements as follows:

- program objectives
- organization and responsibilities
- program evaluation
- monitoring
- public information
- waste management
- food storage management
- human activity management
- problem bear management
- training
- emergencies planning
- research planning
- regional management
- fiscal and person-year planning

Although the fiscal and person-year resources necessary to implement this
plan have been approved in principle, unforeseen monetary restraints may
impose restrictions. In this event, resources will be allocated to selec-
ted elements on a priority basis to reflect the more urgent needs of bear
management in KNP. Program elements identified to receive priority are (in order of merit) monitoring, waste management, food storage management, research, public information and regional management.

PROGRAM ELEMENT 1: Program Objectives

POLICY

The following objectives recognize the importance of providing realistic, non-ambiguous, measurable direction to the bear management program. Moreover the objectives are recognized as the source of evaluative criteria which will be used in determining the overall effectiveness of the program.

Section 4.0 of the National Parks Act sets the general objective of national parks.

The National Parks of Canada are hereby dedicated to the people of Canada for their benefit, education and enjoyment, subject to this Act and the regulations, and the National Parks shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations (National Parks Act. Section 4.)

Hence the program must attempt to preserve bear populations (presumably in a natural state) while at the same time allowing for the (presumably safe) use of parklands by visitors.

ACTION

This broadly worded legislated objective can be refined and operationalized for the purpose of bear management. The objectives of KNP's bear management program are shown in Table 2. The entire management program will be oriented to achieve these objectives. Several points should be clarified. First, the target figures shown in Table 2 represent levels
The objective of the bear management program for the 5 year period 1984-88 is to provide sufficient measures for the preservation of bears in their natural habitat and the safe human use of parklands as evidenced by the following criteria.

- A 50% reduction, relative to the 1983 Baseline Rate, in the average (1984-88) rate of all incident categories. Achievement of this criteria will require 5 year average rates of 2.75, 3.12, and 1.89 for the garbage storage, food storage, and property damage categories respectively.

- A zero % increase, relative to the 1983 Baseline Rate, in the average (1984-88) rate of all aggressive encounter categories. Achievement of this criteria will require 5 year average rates of 0.75, 1.51, 0.94 and 0 for the growl, bluff charge, thwarted charge and human injury categories respectively.

- A 50% reduction, relative to the 1983 Baseline Rate, in the average (1984-88) rate of all management action categories. Achievement of this criteria will require 5 year average rates of 1.51 and 0.95 for relocations (in the ecosystem) and destruction categories respectively.

- A 75% reduction, relative to the 1983 Baseline Rate, in the average (1984-88) rate of all deficiency categories. Achievement of this criteria will require 5 year average rates of 3.22 and 2.06 for garbage and food storage deficiency categories respectively.

- A 50% reduction, relative to the 1983 Baseline Rate, in the average (1984-88) rate of all frontcountry observations and a corresponding 50% increase in the average (1984-88) rate of all backcountry observations. Achievement of this criteria will require 5 year average rates of and for frontcountry and backcountry observations respectively.

---

* The Baseline Rate refers to the average (1980-83) figure developed in Table 1.
of incidents, encounters, control actions, storage deficiencies and observations that management is willing to accept only insofar as they represent reasonable and realistic values given the 5 year term of the plan and limited fiscal and manpower resources available. Secondly, it is recognized that the 1983 Baseline Rates used to develop the target figures are very crude. Planned improvements in the monitoring system may, in 2-3 years time, provide more precise figures that can be used to establish new Base Line Rates.

PROGRAM ELEMENT 2: Organizational Structure

Policy

Bear management is recognized as a complex task requiring input from many individuals functioning in many different capacities. Hence KNP will pursue a multifunctional approach in the planning, implementation and evaluation phases of the bear management program. In an operational sense this will require the general involvement of most park employees and a major involvement for several key employees. In addition the advice and resources of Regional Office, other parks and the academic and private community will be sought occasionally.

ACTION

Figure 2 depicts a simple organization chart with respect to bear management in KNP. Park operations are divided among 5 sub-activities. Each sub-activity is co-ordinated by a sub-activity head who controls the budget and person-years within the sub-activity. All sub-activity heads report to the Superintendent who reports to the Director of Western Region who, in turn, reports to the Director General at Headquarters. Central to Kootenay's management program is the operation of the Bear Management
Fig. 2 The organization of staff with respect to bear management KNP 1984-88.
Committee (BMC) and the Bear Management Warden (BMW). The BMC is composed of (1) the Chief Park Warden (chairman), (2) the Chief of Visitor Services, (3) the General Works Manager and (4) the Chief Park Naturalist. The Committee's purpose is to provide overall co-ordination, direction and approval to the program insofar as the fiscal and manpower resources under the control of each sub-activity head will allow. The BMC must convene at least once per year to review the previous season's activities and draw up recommendations for the following year's program. The BMW is the warden designated by the Chief Park Warden to play the key role in co-ordinating the day to day implementation of the program and in preparing Annual Summaries and draft revisions of the Bear Management Plan (BMP). Table 3 elaborates on the responsibilities of those individuals who will play a major role in the program.

Before a management plan can be implemented it must first be approved. Figure 3 illustrates the approval process for KNP. The BMW submits a draft BMP to the BMC. The BMC may recommend changes and return the draft to the BMW or find it satisfactory and submit it to the Superintendent. In turn the Superintendent may recommend changes and return the draft to the BMC or approve the draft and forward it to the Director Western Region for final approval. Here the draft is either returned for revision or given final approval. Once approved all bear management must proceed in strict accordance with the plan.

PROGRAM ELEMENT 3: Program Evaluation

POLICY

A comprehensive system to constructively evaluate the overall program and its constituent elements is recognized as a vital ingredient to
Table 3. Staff responsibilities in the bear management program. KNP 1984-88.

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibilities</th>
</tr>
</thead>
</table>
| **Superintendent**          | oversees and directs all aspects of the program  
                             | • reviews BMP drafts  
                             | • establishes the BMC  
                             | • negotiates agreements with regional land jurisdictions  
                             | • applies appropriate sections of the National Parks Regulations to effect area closures and activity restrictions; provide proper garbage and food storage measures; remove persons from the Park; refuse issuance of camping permits  
                             | • controls the release of all information to the media  
                             | • directs incoming bear management information to the Chief Park Warden  
| **Bear Management Committee** | oversees and directs all aspects of the program  
                             | • reviews Annual Summaries and BMP drafts and recommends modifications to the program  
                             | • ensures that fiscal and person-year resources are available  
                             | • designates members of the Garbage Inspection Committee  
| **Bear Management Warden**   | organizes, co-ordinates and generally implements the approved BMP  
                             | • makes day to day field decisions and/or recommendations pertaining to the: capture, identification, release, destruction of bears; posting of warnings or area closures; disposal of carrion; emergency responses  
                             | • gathers and collates all monitoring data and prepares an Annual Summary for submission to the BMC  
                             | • incorporates recommendations of the BMC into annual drafts of the BMP  
                             | • oversees the proper functioning of the monitoring system  
                             | • organizes and conducts the training program for all park staff and concession employees  
                             | • ensures that all observations and reports are properly filed  
                             | • conducts monthly garbage inspections and periodic garbage and food storage deficiency surveys  
                             | • conducts periodic literature reviews  
                             | • assumes responsibility for the requisitioning, storage, use and maintenance of all capture and handling equipment including the security of immobilizing drugs  
                             | • supplies the BMC, Chief Park Warden and where relevant other wardens and staff with accurate, current information on the interpretation of all matters pertaining to bear management.  
| **Chief Park Naturalist**    | acts as a member of the BMC  
                             | • provides the manpower and fiscal resources to fulfill the Interpretation sub-activity commitment to the BMP  
| **General Works Manager**    | acts as a member of the BMC  
                             | • provides the manpower and fiscal resources to fulfill the General Works sub-activity commitment to the BMP  
| **Information Centre Attendents** | acts as a clearing house for all bear observations and reports  
                             | • compiles daily and weekly summaries and completes Wildlife Observation Cards for certain observations (West Gate Information Centre)  
                             | • ensures that proper bear information is dispensed  
| **West Gate Kiosk Attendents** | performs duties of West Gate Information Centre between the hours of 20:00 - 08:00  
                             | • ensures that proper bear information is dispensed  
| **Autocampground Attendents** | performs duties of West Gate Information Centre between the hours of 20:00 - 08:00  
                             | • ensures that proper bear information is dispensed  
| **Duty Warden**              | participates as required in all field operations  
                             | • investigates incidents, encounters or storage deficiencies, takes management action and completes Occurrence Reports  
| **Garbage Pick-up Crew**     | completes daily Garbage Storage Deficiency Report and submits same to the trades supervisor.  
| **Trades Supervisor**        | receives daily Garbage Storage Deficiency Reports and completes work orders to correct the deficiency  
| **Park Naturalist**          | ensures that proper bear management information is dispensed  
                             | • reports all observations, incidents, encounters, deficiencies to West Gate Information  
                             | • completes Wildlife Observation Cards for non-aggressive encounters  
| **All Wardens**              | report observations, incidents, encounters, deficiencies, management actions to West Gate Information  
                             | • complete Wildlife Observation Cards and Occurrence Reports  
| **Garbage Inspection Committee (GIC)** | conducts annual inspections of all garbage holding facilities and submits work orders to correct deficiencies  

**Chief of Visitor Services**  
• acts as a member of the BMC  
• provides the manpower and fiscal resources to fulfill the Visitor Services sub-activity commitment to the BMP  
• provides accurate visitor use data for front and backcountry areas.
Fig. 3 The approval process for bear management plans. KNP 1984-88

BMW → BMC → SUPERINTENDENT → DIRECTOR WESTERN REGION → APPROVED BMP

Submits draft BMP

recommends changes to draft BMP

Submits draft BMP

recommends changes to draft BMP

Submits draft BMP

recommends changes to draft BMP

IMPLEMENTATION
KNP's bear management program. The evaluation process is premised on periodic reviews by an impartial team of knowledgeable evaluators using formalized criteria derived from program objectives.

**ACTION**

Table 4 indicates the criteria that will be used to evaluate KNP's bear management program over the 1984-88 period. Figure 4 illustrates the evaluation process. At the conclusion of each 'bear season' the BMW will prepare an Annual Summary of all data categories listed in Table 6 (page 24). The Summary will also include an analysis of the data and recommendations for the following year. Each December the Bear Management Committee will review the Summary fine-tuning the analysis and recommendations. On the basis of the Committee's recommendations the BMW will then draft the following year's management plan and submit it to the approval process (Fig. 3). Once the Director has approved the draft it becomes the approved Plan for the ensuing season and must be implemented. Inherent in the approval is the confirmation that the fiscal and person-year resources will be available to implement the plan. At the conclusion of years 2 (1985) and 5 (1988) an additional evaluation step will be included. The Annual Summary is reviewed by the Bear Management Evaluation Team (BMET) composed of knowledgeable outside persons from a variety of applicable disciplines. Table 5 indicates the composition and responsibilities of the BMET. The BMET submits its evaluation report to the Bear Management Committee and the process continues as in other years.
Table 4. Evaluation criteria for the bear management program. KNP 1984-88

- Average Baseline Rates developed by analysis of occurrence reports submitted during the 4 year period 1980-84 are shown in Table 1. All evaluation criteria are set in reference to these values.

Criteria 1. The average rate for each category of incident recorded during the 5 year period 1984-88 must show a 50% reduction relative to the 1983 Baseline Rate. Therefore, the 5 year average rate for garbage, food and property damage incident categories must reach values of 2.75, 3.12 and 1.89 respectively, by year end 1988.

Criteria 2. The average rate for each category of aggressive encounter recorded during the 5 year period 1984-88 must show a zero percent increase relative to the 1983 Baseline Rate. Therefore, the 5 year average rate for growl, bluff charge, thwarted charge and injury encounter classes must not exceed values of 0.75, 1.51, 0.94 and 0 respectively by year end 1988.

Criteria 3. The average rate for each category of management action recorded during the 5 year period 1984-88 must show a 50% reduction relative to the 1983 Baseline Rate. Therefore, the 5 year average rate for relocations and destructions must reach values of 1.51 and 0.95 respectively by year end 1988.

Criteria 4. The average rate for each category of storage deficiency recorded during the 5 year period 1984-88 must show a 75% reduction relative to the 1983 Baseline Rate. Therefore, the 5 year average rate for garbage storage and food storage deficiencies must reach values of 3.22 and 2.06 respectively by year end 1988.

Criteria 5. The average rate for each category of observation location recorded during the 5 year period 1984-88 must show a 50% decrease (frontcountry) and a 50% increase (backcountry) relative to the 1983 Baseline Rate. Therefore, the 5 year average rate for frontcountry and backcountry observations must reach values of respectively by year end 1988.
Fig. 4. The evaluation process for the bear management program. KNP 1984-88

YEAR END 1 ➔ BMW prepares Annual Summary

BMC reviews Annual Summary & recommends improvement to the BMP

BMW drafts BMP

Approval Process (Fig. 3)

Approved BMP implemented

YEAR END 2 ➔ BMW prepares Annual Summary

BMET reviews Annual Summary and prepares Evaluation Report

BMC reviews Annual Summary & Evaluation Report & recommends improvements to BMP

BMW drafts BMP

Approval process (Fig. 3)

Approved BMP implemented

YEAR END 3 ➔ Same process as Year End 1

YEAR END 4 ➔ Same process as Year End 1

YEAR END 5 ➔ Same process as Year End 2
Table 5. The composition and responsibilities of the bear management evaluation team. KNP 1984-88.

<table>
<thead>
<tr>
<th>Area of Expertise</th>
<th>Potential Evaluators</th>
<th>Evaluation Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>biological/behavioural/research</td>
<td>Dr. S. Herrero, U. of Calgary or Dr. J. Nolan, Alberta Fish &amp; Wildlife</td>
<td>provides overall evaluation of all elements with special emphasis on research planning, and population and behavioural dynamics; and makes recommendations for improvement; coordinates preparation of Evaluation Reports</td>
</tr>
<tr>
<td>information/communications</td>
<td>one Chief Park Naturalist from either Banff, Yoho, Jasper or Glacier/Revelstoke N.P.</td>
<td>provides indepth evaluation of the public information element; its contents, dispersal systems and effectiveness; and makes recommendations for improvement</td>
</tr>
<tr>
<td>mechanical design</td>
<td>one mechanical engineer from WRO(^a) with specialization in waste management systems</td>
<td>provides indepth evaluation of the waste management and food storage elements; makes recommendations for improvement</td>
</tr>
<tr>
<td>managerial/administrative</td>
<td>Chief Park Warden or Assistant Chief Park Warden, Banff N.P.</td>
<td>provides overall evaluation with special emphasis on human activity management, emergency planning, training, organizational structure and fiscal manpower planning and the evaluation system; and makes recommendations for improvement</td>
</tr>
<tr>
<td>computer programming</td>
<td>Ms P. Benson, WRO or Mr. L. Sinkey, U. of Calgary</td>
<td>provides indepth evaluation of the monitoring element with special emphasis on input/output software, procedures and dispersal systems; and makes recommendations for improvement</td>
</tr>
<tr>
<td>field operations</td>
<td>Mr. A. Westhaver, Banff N.P. or Mr. P. Jacobsen, Banff N.P.</td>
<td>provides overall evaluation of all elements; and makes recommendations for improvement</td>
</tr>
</tbody>
</table>

\(^a\) WRO = Western Region Office
The development and implementation of an effective monitoring system is recognized as the key to the operational success of Kootenay's bear management program. Over the long term the monitoring system will provide the data base upon which to: (1) evaluate the entire program and many of its elements, (2) ascertain long term trends and adjust management strategies, (3) substantiate person-years and funding requests, (4) develop accurate and complete public information programs, and (5) corroborate and assist research endeavors. In the short term the monitoring system must provide a means of rapidly alerting field staff to actual or potential conflict situations.

The system is based on three underlying principles. (1) Team effort: although the Warden Service assumes overall responsibility for the program, data input must come from a wide range of park employees, concessionaire employees and visitors. Moreover many of the monitoring tasks must be performed by a variety of park staff. If the system is to engender this type of support, credible output must be readily available. (2) Simplicity: the number of reporting forms have been reduced to an absolute minimum of 2 for the vast majority of data requirements. (3) Rapid information transfer: the use of a centralized 'clearing house' to handle all data input provides the means to quickly transfer important information to the field level.

Table 6 lists the data requirement, collection format, storage location and reporting responsibilities. Data will be collated on 49 separate
Table 6. Data requirements, collection format, storage location, and reporting responsibilities for the bear monitoring system. KNP 1984-88.

<table>
<thead>
<tr>
<th>Data Requirements</th>
<th>Input Format</th>
<th>Storage Location</th>
<th>Reporting Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INCIDENTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garbage Storage Inc</td>
<td>OR(WC)</td>
<td>OR files (Cansis)</td>
<td>PW</td>
</tr>
<tr>
<td>Food Storage Inc</td>
<td>OR(WC)</td>
<td>OR files (Cansis)</td>
<td>PW</td>
</tr>
<tr>
<td>Property Damage Inc</td>
<td>OR(WC)</td>
<td>OR files (Cansis)</td>
<td>PW</td>
</tr>
<tr>
<td><strong>ENCOUNTERS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Change Enc</td>
<td>WC</td>
<td>Cansis</td>
<td>PW PN IA</td>
</tr>
<tr>
<td>Flight Enc</td>
<td>WC</td>
<td>Cansis</td>
<td>PW PN IA</td>
</tr>
<tr>
<td>Neutral Enc</td>
<td>WC</td>
<td>Cansis</td>
<td>PW PN IA</td>
</tr>
<tr>
<td>Adverse Conditioning Enc I</td>
<td>WC</td>
<td>Cansis</td>
<td>PW PN IA</td>
</tr>
<tr>
<td>Adverse Conditioning Enc II</td>
<td>WC</td>
<td>Cansis</td>
<td>PW PN IA</td>
</tr>
<tr>
<td>Curiosity Enc</td>
<td>WC</td>
<td>Cansis</td>
<td>PW PN IA</td>
</tr>
<tr>
<td>Illegal Feeding Enc I</td>
<td>OR/WC</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Illegal Feeding Enc II</td>
<td>OR/WC</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Food Seeking Enc I</td>
<td>OR/WC</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Food Seeking Enc II</td>
<td>OR/WC</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Inadvertent Contact Enc</td>
<td>OR/WC</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Threat Enc</td>
<td>OR/WC/GBAEQ</td>
<td>OR files/Cansis/ BMF</td>
<td>PW</td>
</tr>
<tr>
<td>Bluff Charge Enc I</td>
<td>OR/WC/GBAEQ</td>
<td>OR files/Cansis/ BMF</td>
<td>PW</td>
</tr>
<tr>
<td>Bluff Charge Enc II</td>
<td>OR/WC/GBAEQ</td>
<td>OR files/Cansis/ BMF</td>
<td>PW</td>
</tr>
<tr>
<td>Thwarted Charge Enc</td>
<td>OR/WC/GBAEQ</td>
<td>OR files/Cansis/ BMF</td>
<td>PW</td>
</tr>
<tr>
<td>Injury Enc</td>
<td>OR/WC/GBAEQ</td>
<td>OR files/Cansis/ BMF</td>
<td>PW</td>
</tr>
<tr>
<td><strong>MANAGEMENT ACTIONS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trap set</td>
<td>Trap Register</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Captures</td>
<td>OR/WC</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Immobilization</td>
<td>OR</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Destructions</td>
<td>OR/WC</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Autopsy</td>
<td>OR</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Release</td>
<td>OR</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Warning Posted</td>
<td>OR</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Closure Posted</td>
<td>OR</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Enforcement Charges</td>
<td>OR</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td><strong>STORAGE DEFICIENCIES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garbage Storage Def</td>
<td>OR</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td>Food Storage Def</td>
<td>OR</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td><strong>REGIONAL ECOSYSTEM DATA</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hunting Harvest</td>
<td>OR</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td>Destruction</td>
<td>OR</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td>Roadkills</td>
<td>OR</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td>Natural Mortality</td>
<td>OR</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td>Poaching</td>
<td>OR</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td>Warnings</td>
<td>OR</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td>Closures</td>
<td>OR</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td>All Incident Categories</td>
<td>OR</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td>All Encounter Categories</td>
<td>OR</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td><strong>MISCELLANEOUS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roadkills</td>
<td>WC(OR)</td>
<td>OR files</td>
<td>PW</td>
</tr>
<tr>
<td>Natural Mortality</td>
<td>WC</td>
<td>Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Poaching</td>
<td>OR/WC</td>
<td>OR files/Cansis</td>
<td>PW</td>
</tr>
<tr>
<td>Emergency Responses</td>
<td>Ind. Reports</td>
<td>BMF-Emerg.Rep.</td>
<td>BMF</td>
</tr>
<tr>
<td>Visitor Use Data</td>
<td>Ind. Reports</td>
<td>BMF-Visitor Use</td>
<td>CVS</td>
</tr>
<tr>
<td>Research Papers</td>
<td>Ind. Reports</td>
<td>Warden Library</td>
<td>BMF</td>
</tr>
<tr>
<td>Minutes</td>
<td>Ind. Reports</td>
<td>BMF - Minutes</td>
<td>BMF</td>
</tr>
<tr>
<td>Budgets</td>
<td>Ind. Reports</td>
<td>BMF - Budgets</td>
<td>BMF</td>
</tr>
<tr>
<td>General Correspondence</td>
<td>Ind. Reports</td>
<td>BMF - Gen. Corresp.</td>
<td>BMF</td>
</tr>
<tr>
<td>Annual Summary</td>
<td>Ind. Reports</td>
<td>BMF - Ann Sum</td>
<td>BMF</td>
</tr>
<tr>
<td>Evaluation Reports</td>
<td>Ind. Reports</td>
<td>BMF - Eval. Rep.</td>
<td>BMET</td>
</tr>
</tbody>
</table>

a Terminology is defined in the glossary
b OR = Occurrence Report; WC = Wildlife Observation Card; GBAEQ = Grizzly Bear Aggressive Encounter Questionaire (U of Calgary); Ind. = Individual
c Cansis = Canadian Soil Information System BMF = Bear Management Files held at Warden Headquarters KNP
d PW = Park Warden; PN = Park Naturalist; IA = Information Centre Attendant; CVS = Chief of Visitor Services; BMET = Bear Management Evaluation Team
topics grouped into 6 major categories. Most data will be collected on either the Occurrence Report (Appendix 1) or the Wildlife Observation Card (Appendix 2). Selected aggressive encounters will also be recorded on the Grizzly Bear Aggressive Encounter Questionnaire which was developed at the University of Calgary. Certain miscellaneous topics will be collected in the form of individual reports usually consisting of memorandums and other narrative style reports. All Occurrence Reports will be stored on the occurrence report file at Warden Headquarters. Wildlife Observation Cards will be forwarded to Cansis\textsuperscript{1} for data processing. Individual reports will be stored in appropriate sections of the Bear Management File held at Warden Headquarters. Reporting responsibilities lie mainly with park wardens although limited responsibilities are assigned to park naturalists and information centre attendants.

The Occurrence Report form is an easy to use checklist style form that can handle 34 of the 49 data topics. The design allows for the collection of all pertinent information on each of the 34 topics. Determination of causative factors is emphasized for selected data topics.

Figure 5 illustrates the monitoring system. All bear reports from any source are relayed to the Information Centre. Incoming reports are immediately classified into 4 major categories by the Information Centre Attendant and recorded on the Daily Input Sheet (Appendix 3). Non-aggressive encounters from sources other than wardens or naturalists are then recorded on a Wildlife Observation Card (Wardens and naturalists

\textsuperscript{1} CANSIS = Canadian Soil Information System
Figure 5. Bear monitoring system. KNP 1984-88.

**WILDLIFE OBSER. CARD**

ALL BEAR REPORTS — radio/phone

1. Non-aggressive encounters
2. Storage deficiencies
3. Incidents
4. Aggressive encounters

**WEST GATE INFORMATION CENTRE**

- Daily Input Sheet (courier)
- Fatalities, Injuries
- Warnings, Closures
- (phoned/radioed immediately)
- Weekly Input Summary (Courier)

**DUTY WARDEN**

- DUTY WARDEN

**MANAGEMENT ACTIONS**

- Set trap
- Capture/Relocation
- Destruction
- Warning posted/removed
- Closure posted/removed
- Garbage/Food storage deficiency
- Law enforcement warning/charge
- Aversive conditioning

**SUPERINTENDENT**

- Chief Park Warden
- Marble Info Center
- Redstreak Campgrd
- McLeod Meadows Campgrd
- Marble Canyon Campgrd
- Kootenay Crossing
- Warden Hqtrs

**Sup. & all section heads**

- Redstreak Campgrd
- RCMP
- West Gate
- West Gate Info
- Aquacourt
- Warden Hqtrs
- Trades Shop
- Garage
- Stores
- Trail Crew
- Nlupa
- McLeod Meadows Campgrd
- Kootenay Crossing
- Marble Warden Station
- Marble Campgrd
- Marble Info Centre
- Banff Warden Office
- Yoho Warden Office
complete their own cards). Storage deficiencies, incidents or aggressive encounters are immediately reported to the Duty Warden who after consulting with the BMW (if necessary) may take one or more management actions. The management action is immediately relayed to the Information Centre and recorded on the Daily Input Sheet. Fatalities, injuries, or warning/closure postings are immediately relayed to the Chief Park Warden and high visitor use areas. The Duty Warden is responsible for completing an Occurrence Report and Wildlife Observation Card for all deficiencies, incidents, encounters and management actions. Once a week the Information Centre compiles a Weekly Input Summary (Appendix 4) which is circulated to 19 different centres. Detailed monitoring instructions are outlined in the Bear Management Procedural Manual.

PROGRAM ELEMENT 5: Public Information

POLICY

The general lack of public knowledge concerning bear behaviour, habitat requirements and relationships with man is recognized as the 'root cause' of the vast majority of bear/human conflicts. An obvious corollary to this theory is the belief that once the visiting public is provided with quality information, conflicts will be greatly reduced. Therefore, Kootenay's public information element will attempt to present high quality bear information to a wide cross-section of park visitors at specific contact points using a variety of information modes. Implementation of this policy requires a recognition that the existing information program has certain limitations that must be upgraded in order to give bear management a higher public profile.
The strategy will consist of (1) setting content and design standards for all information modes, (2) determining what information will be presented at various contact points and (3) planning a gradual phase in of new or improved information modes.

**ACTION**

Table 7 outlines 30 categories of bear information that will be distributed to visitors in KNP. Table 8 lists general design standards for all information modes. Table 9 lists the information modes to be used along with their existing and proposed content standards. Finally, Table 10 outlines a distribution strategy for all information modes.

**PROGRAM ELEMENT 6: Waste Management**

**POLICY**

The relationship between bears and garbage has been well documented (Tracy et al. 1982a and 1982b). In fact there may even be a positive correlation between garbage habituated grizzly bears and human injuries inflicted by grizzly bears (Herrero 1976).

The garbage situation in KNP is far from satisfactory. In the four year period 1980-83 there were 23 reported garbage storage incidents (Table 1). Sixteen incidents involved visitor garbage, 4 incidents involved government facilities and 3 incidents involved commercial facilities. During the same period there were ca. 8900 deficient site-days, the majority of which involved government facilities (Appendix 5). However only 53 deficient site-days were recorded (Table 1). Of these 27 involved government facilities, 9 involved commercial facilities and 22 involved visitor
Table 7. Categories of bear information for distribution to visitors.  
KNP 1984-88.

<table>
<thead>
<tr>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All bears are a natural part of KNP</td>
</tr>
<tr>
<td>2. All bears can be dangerous.</td>
</tr>
<tr>
<td>3. Reference to other information sources.</td>
</tr>
<tr>
<td>4. Please report all observations and incidents.</td>
</tr>
<tr>
<td>5. Check for current bear information.</td>
</tr>
<tr>
<td>6. The potential for a dangerous or fatal encounter is always present although remote.</td>
</tr>
<tr>
<td>7. The probability of an encounter can be reduced but cannot be eliminated.</td>
</tr>
<tr>
<td>8. Identification of bear species.</td>
</tr>
<tr>
<td>10. Identification of bear habitat including preferred foods.</td>
</tr>
<tr>
<td>11. The most dangerous situations.</td>
</tr>
<tr>
<td>12. Avoidance techniques while hiking or observing bears.</td>
</tr>
<tr>
<td>13. Avoidance techniques while autocamping.</td>
</tr>
<tr>
<td>15. Avoidance techniques while fishing.</td>
</tr>
<tr>
<td>17. Food storage techniques in frontcountry.</td>
</tr>
<tr>
<td>18. Garbage storage techniques in backcountry.</td>
</tr>
<tr>
<td>19. Food storage techniques in backcountry.</td>
</tr>
<tr>
<td>20. What to do if you meet a bear.</td>
</tr>
<tr>
<td>21. What to do if you are threatened by a bear.</td>
</tr>
<tr>
<td>22. What to do if you are attacked by a bear.</td>
</tr>
<tr>
<td>23. Importance of bears to the visitor experience.</td>
</tr>
<tr>
<td>24. Management problems created by improper garbage and food storage.</td>
</tr>
<tr>
<td>25. Management history past, present and future.</td>
</tr>
<tr>
<td>26. Warning Notice - its importance.</td>
</tr>
<tr>
<td>27. Closure Notice - its importance and legal implication.</td>
</tr>
<tr>
<td>28. Natural history of bears, behaviour differences, habitat preferences.</td>
</tr>
<tr>
<td>29. Penalty for removing sign.</td>
</tr>
<tr>
<td>30. Current observations, incidents/encounters, warnings/closures and management actions.</td>
</tr>
</tbody>
</table>
Table 8. Design standards for bear information modes. KNP 1984-89.

- Information modes are to be maximized in frontcountry areas and minimized in backcountry areas
- Information content is to be 'personalized' to KNP
- Where possible information modes will be situated in high profile yet discrete locations such as washroom or outhouse interiors
Table 9. Bear management information mode and their current and proposed content. KNP 1984-88

<table>
<thead>
<tr>
<th>INFORMATION MODE</th>
<th>CURRENT CONTENT</th>
<th>PROPOSED CONTENT</th>
<th>EFFECTIVE DATE FOR PROPOSALS/UPGRADING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pamphlets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pamphlet 1</td>
<td>Kootenay National Park (QS-W048-000-BB-A3)</td>
<td>2,3</td>
<td>1-5</td>
</tr>
<tr>
<td>Pamphlet 2</td>
<td>You Are in Bear Country (QS-W004-000-BB-A7)</td>
<td>1,2,(8),(9),12,14 20,21,22,24,28</td>
<td>1-28</td>
</tr>
<tr>
<td>Pamphlet 3</td>
<td>Warning (QS-W092-000-BB-A1)</td>
<td>12,16,17,24</td>
<td>delete</td>
</tr>
<tr>
<td>Pamphlet 4</td>
<td>Bears. Kootenay National Park (no number)</td>
<td>8,23,24,28</td>
<td>1-28 with emphasis on KNP</td>
</tr>
<tr>
<td>Pamphlet 5</td>
<td>Fishing Regulations Summary Mountain National Parks in Alberta and British Columbia (QS-W061-000-BB-A3)</td>
<td>2-5, 15</td>
<td>1984</td>
</tr>
<tr>
<td>Pamphlet 6</td>
<td>Trail Guide: Kootenay National Park (no number)</td>
<td>2,3,5,18</td>
<td>1-7</td>
</tr>
<tr>
<td>Pamphlet 7</td>
<td>A Special Place. Kootenay National Park (QS-W014-001-BB-BOA4)</td>
<td>2,3</td>
<td>1-5</td>
</tr>
<tr>
<td>Pamphlet 8</td>
<td>Welcome to Redstreak Campground (QS-W016-000-BB-A3)</td>
<td>3,16,17</td>
<td>1-5</td>
</tr>
<tr>
<td>Pamphlet 9</td>
<td>Welcome to McLeod Meadows Campground</td>
<td>3,16,17</td>
<td>1-5</td>
</tr>
<tr>
<td>Pamphlet 10</td>
<td>Welcome to Marble Canyon Campground</td>
<td>3,16,17</td>
<td>1,2,3,4,5</td>
</tr>
<tr>
<td>Pamphlet 11</td>
<td>Fireweed Trail</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Pamphlet 12</td>
<td>Paint Pots</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Pamphlet 13</td>
<td>A Place of Silence</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Pamphlet 14</td>
<td>Bird Checklist</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Pamphlet 15</td>
<td>Interpretive Bulletin</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Signs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sign 1</td>
<td>Wildlife and Natural Areas Can be Hazardous</td>
<td>2,3</td>
<td>2,3</td>
</tr>
<tr>
<td>Sign 2</td>
<td>It is illegal to feed or entice wildlife</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Sign 3</td>
<td>Garbage and Food Storage Regulations in Autocampgrounds (proposed)</td>
<td>3,4,16,17,29</td>
<td>1985</td>
</tr>
<tr>
<td>Sign 4</td>
<td>Warning. Bear Danger. Travel with Caution</td>
<td>Bear danger. Travel with caution.</td>
<td>4,29 Explanation Message</td>
</tr>
<tr>
<td>Sign 5</td>
<td>Area Closed</td>
<td>Area Closed</td>
<td>4,29 Explanation Message</td>
</tr>
<tr>
<td>Sign 6</td>
<td>Backcountry Food and Garbage Storage Directional Sign (proposed)</td>
<td></td>
<td>direction to facility</td>
</tr>
<tr>
<td>Sign 7</td>
<td>Backcountry Food and Garbage Storage Instructional Sign (proposed)</td>
<td></td>
<td>facility instructions</td>
</tr>
<tr>
<td>Sign 8</td>
<td>Letter Box Container Stick on Sign (proposed)</td>
<td>(Bear symbol)</td>
<td>Please do not leave garbage beside this container. Put it inside.</td>
</tr>
</tbody>
</table>
Table 9 (Cont'd). Bear management information modes and their current and proposed content. KNP 1984-88.

<table>
<thead>
<tr>
<th>POSTERS</th>
<th>CURRENT CONTENT</th>
<th>PROPOSED CONTENT</th>
<th>EFFECTIVE DATE FOR PROPOSALS/UPGRADING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poster 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kootenay National Park.</td>
<td>16, 17</td>
<td>4, 16, 17, 29</td>
<td>1985</td>
</tr>
<tr>
<td>Campground Rules</td>
<td></td>
<td>Sup. Signature</td>
<td></td>
</tr>
<tr>
<td>Poster 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backcountry Camping Rules</td>
<td>(proposed)</td>
<td>1-5, 29</td>
<td>1985</td>
</tr>
<tr>
<td>Poster 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outhouse Sign</td>
<td>(proposed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Bear symbol)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Please do not</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>throw garbage in</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>outhouse hole.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Poster 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bears and Vermilion Crossing</td>
<td>(proposed)</td>
<td>1-5, 16, 17, 29</td>
<td>1984</td>
</tr>
<tr>
<td>Poster 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picnic Shelter Rules</td>
<td>(proposed)</td>
<td>1-7, 16, 17</td>
<td>1985</td>
</tr>
<tr>
<td>EXHIBITS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exhibit 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McLeod Meadows</td>
<td>24</td>
<td>1-5, 16, 17, 24</td>
<td>1985</td>
</tr>
<tr>
<td>Exhibit 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Gate Information Centre</td>
<td>(proposed)</td>
<td>1-5, 8, 10</td>
<td>1985</td>
</tr>
<tr>
<td>Exhibit 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marble Information Centre</td>
<td>(proposed)</td>
<td>1-5, 8, 9, 10, 16, 19, 24</td>
<td>1985</td>
</tr>
<tr>
<td>Exhibit 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Redstreak Campground</td>
<td>(proposed)</td>
<td>1-5, 16, 17, 24</td>
<td>1986</td>
</tr>
<tr>
<td>Exhibit 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kootenay Crossing</td>
<td>(proposed)</td>
<td>1-5, 9, 10</td>
<td>1986</td>
</tr>
<tr>
<td>Exhibit 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquacourt</td>
<td>(proposed)</td>
<td>1-5, 24, 25</td>
<td>1986</td>
</tr>
<tr>
<td>Exhibit 7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marble Canyon Campground</td>
<td>(proposed)</td>
<td>1-5, 16, 17</td>
<td>1986</td>
</tr>
<tr>
<td>MISCELLANEOUS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garbage Bag</td>
<td>18</td>
<td>1-5, 18, 19</td>
<td>1986</td>
</tr>
<tr>
<td>Audio-visual Program</td>
<td>3</td>
<td>1-11, 18, 19</td>
<td>1985</td>
</tr>
<tr>
<td>Park Use Permit</td>
<td></td>
<td>Pack-out garbage</td>
<td>3, 4</td>
</tr>
<tr>
<td>Interpretive Programs</td>
<td>1-28</td>
<td>1-28</td>
<td></td>
</tr>
<tr>
<td>Interpretive 'Blurbs'</td>
<td>4</td>
<td>1-7</td>
<td>1984</td>
</tr>
<tr>
<td>Media Releases</td>
<td>25</td>
<td>25</td>
<td>1984</td>
</tr>
<tr>
<td>Bear Management Plan &amp;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluations</td>
<td>25</td>
<td>25</td>
<td>1984</td>
</tr>
<tr>
<td>Personal Contacts</td>
<td>1-28</td>
<td>1-28</td>
<td>1984</td>
</tr>
</tbody>
</table>

*All figures refer to the information categories set out in Table 7.*
### Table 10. Distribution of bear information by contact points. KNP 1984-88.

<table>
<thead>
<tr>
<th>CONTACT POINT</th>
<th>INFORMATION MODE</th>
<th>RESPONSIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-visit Correspondence</td>
<td>• pamphlets 1 &amp; 2 included with all replies (1984)</td>
<td>respondent</td>
</tr>
<tr>
<td></td>
<td>• pamphlets 1 &amp; 4 included with all replies (1985-88)</td>
<td>respondent</td>
</tr>
<tr>
<td>West Gate Kiosk</td>
<td>• pamphlets 1 &amp; 2 given to all purchasers of Motor Veh. lic. and each adult in multiple commercial entry (e.g. bus) stopping in Park.</td>
<td>gate attendant</td>
</tr>
<tr>
<td></td>
<td>• signs 1 &amp; 2 located near park entrance</td>
<td>general works</td>
</tr>
<tr>
<td>Great Divide Entrance</td>
<td>• signs 1 &amp; 2 located near entrance</td>
<td>general works</td>
</tr>
<tr>
<td>Settlers Road Entrance</td>
<td>• signs 1 &amp; 2 located near entrance</td>
<td>general works</td>
</tr>
<tr>
<td>Information Centres</td>
<td>• pamphlets 1-7 &amp; 10-15 on display &amp; available gratis</td>
<td>info attendant</td>
</tr>
<tr>
<td></td>
<td>• current BMP &amp; Annual Summary on display</td>
<td>info attendant</td>
</tr>
<tr>
<td></td>
<td>• Bear Monitoring Daily &amp; Weekly Summaries on display</td>
<td>info attendant</td>
</tr>
<tr>
<td></td>
<td>• exhibits 2 &amp; 3 in operation (1985)</td>
<td>BMC</td>
</tr>
<tr>
<td></td>
<td>• user-operated A-V slide show in operation (1985)</td>
<td>info attendant</td>
</tr>
<tr>
<td></td>
<td>• high quality literature for sale at cost (1985)</td>
<td></td>
</tr>
<tr>
<td>Kootenay Crossing Warden Station</td>
<td>• pamphlets 1-7 &amp; 10-15 on display &amp; available</td>
<td>park warden</td>
</tr>
<tr>
<td></td>
<td>• current BMP &amp; Annual Summary on display</td>
<td>park warden</td>
</tr>
<tr>
<td></td>
<td>• Bear Monitoring Daily &amp; Weekly Summaries on display</td>
<td>park warden</td>
</tr>
<tr>
<td></td>
<td>• exhibit 5 in operation (1986)</td>
<td>BMC</td>
</tr>
<tr>
<td>Park Use Permittees</td>
<td>• pamphlet 2 &amp; 6 given to each permittee (1984)</td>
<td>permit issuer</td>
</tr>
<tr>
<td></td>
<td>• pamphlet 4 &amp; 6 given to each permittee (1985)</td>
<td>permit issuer</td>
</tr>
<tr>
<td></td>
<td>• each permit stamped 'Report all bear sightings and incidents'</td>
<td>permit issuer</td>
</tr>
<tr>
<td></td>
<td>• each permittee given Park garbage bag</td>
<td>permit issuer</td>
</tr>
<tr>
<td></td>
<td>• each permittee verbally asked to store garbage and food properly</td>
<td>permit issuer</td>
</tr>
<tr>
<td></td>
<td>• sheet containing backcountry camping rules given to each permittee</td>
<td></td>
</tr>
<tr>
<td>Fishing Permittees</td>
<td>• pamphlet 5 given to each permittee</td>
<td>permit issuer</td>
</tr>
<tr>
<td>Autocampground Kiosks</td>
<td>• sign 3 posted (1985)</td>
<td>campground attendant</td>
</tr>
<tr>
<td></td>
<td>• pamphlets 2 &amp; 3 and either 8, 9, or 10 issued to each permittee</td>
<td>campground attendant</td>
</tr>
<tr>
<td></td>
<td>• poster 1 posted</td>
<td>campground attendant</td>
</tr>
<tr>
<td>Autocampground Washrooms</td>
<td>• sign 3 posted (1985)</td>
<td>campground attendant</td>
</tr>
<tr>
<td>Autocampground Self-Registration Centres</td>
<td>• sign 3 posted (1985)</td>
<td>campground attendant</td>
</tr>
<tr>
<td></td>
<td>• pamphlets 2 &amp; 3 posted &amp; available (1984)</td>
<td>campground attendant</td>
</tr>
<tr>
<td></td>
<td>• pamphlet 4 posted &amp; available (1985)</td>
<td>campground attendant</td>
</tr>
<tr>
<td>Autocampground Bulletin Boards</td>
<td>• sign 3 posted</td>
<td>campground attendant</td>
</tr>
<tr>
<td>Trailhead Kiosks</td>
<td>• pamphlet 2 posted (1984)</td>
<td>BMW</td>
</tr>
<tr>
<td></td>
<td>• poster 2 posted (1985)</td>
<td>general works</td>
</tr>
<tr>
<td>Picnic Shelters</td>
<td>• poster 5 posted (1985)</td>
<td>general works</td>
</tr>
<tr>
<td>Backcountry Campgrounds</td>
<td>• signs 6 &amp; 7 posted in selected campgrounds (1984)</td>
<td>trail crew</td>
</tr>
<tr>
<td></td>
<td>• poster 3 posted in all outhouses (1985)</td>
<td>trail crew</td>
</tr>
<tr>
<td>Interpretive Programs</td>
<td>• at least 1 program/week devoted to bear management</td>
<td>park naturalists</td>
</tr>
<tr>
<td></td>
<td>• a 2-3 minute 'blurb' concerning bear management at the beginning of all programs</td>
<td>park naturalists</td>
</tr>
<tr>
<td></td>
<td>• a short 'blurb' at the beginning of each interpretive hike outlining what to do if a bear is encountered.</td>
<td>park naturalists</td>
</tr>
<tr>
<td>All Bungalow Camp Operators</td>
<td>• pamphlets 2 &amp; 3 to be given to each overnight registrant as stipulated by endorsement on current business licence</td>
<td>owner/manager</td>
</tr>
<tr>
<td>Vermilion Crossing Bungalows</td>
<td>• poster 4 posted in all cabins (1984) as stipulated by endorsement on current business licence</td>
<td>BMW</td>
</tr>
<tr>
<td></td>
<td>• interpretive program per month dealing with bear mont as stipulated by endorsement on current business licence</td>
<td>park naturalists</td>
</tr>
<tr>
<td>Media</td>
<td>• a summary of year end management data including historical and evaluative figures to be released annually to the Calgary Herald &amp; Columbia Valley Echo</td>
<td>BMW</td>
</tr>
</tbody>
</table>
facilities. Although the number of incidents is relatively moderate, the high number of deficiencies suggest that the potential for incidents is very high.

Both the number of incidents and deficiencies are recognized as being unacceptably high and as noted in the objectives of this Plan must be reduced by 50 and 75% respectively by year end 1988. The waste management program is designed to realize this objective. The strategy employs a park wide team effort with systematic daily and monthly monitoring followed by prompt correction of storage deficiencies.

**ACTION**

**Government Facilities**

The Park currently operates 7 different styles of garbage containers spread over 56 different sites. Table 11 shows these facilities. With the exception of the wooden storage buildings and the open garbage cans, each container style is considered bear-proof if it is maintained in full operating condition. Hence the primary strategy is aimed at proper use and maintenance of these facilities plus replacement of the wooden buildings and open cans. Table 12 outlines the strategy for the management of government operated garbage facilities.

**Commercial Facilities**

Garbage holding facilities at all commercial facilities are currently deficient. For some reason however there has been a lack of incidents at all these facilities with the exception of Vermilion Crossing Bungalows which has a long history of garbage related incidents. Table 13 outlines the strategy for controlling commercial garbage facilities.

<table>
<thead>
<tr>
<th>Facility Style</th>
<th>No. of Facilities</th>
<th>No. of Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open cans</td>
<td>8</td>
<td>1 (Aquacourt Deck)</td>
</tr>
<tr>
<td>letter box</td>
<td>91</td>
<td>40</td>
</tr>
<tr>
<td>cement block bldg.</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>wooden bldg.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>cement bunker</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Neufeldt</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 12. A control strategy for government operated garbage facilities. KNP 1984-88.

- In March 1984 the BMC will appoint one member from the Resource Conservation and General Works subactivities to act as the Garbage Inspection Committee.

  In early April of each year the Committee will conduct a thorough inspection of all garbage holding facilities noting any deficiencies by way of work orders calling for a May 1 completion date.

- Commencing in 1984 a daily garbage facility monitoring system will be initiated whereby garbage pick-up crews will be required to complete a daily checklist style Garbage Storage Deficiency Report (Appendix 6). The report will be forwarded daily to the Trades Supervisor who will complete the necessary work orders. All daily reports will be collated and stored. At the end of the season the BMW will summarize the reports and enter the summary figures on an Occurrence Report.

- Commencing in June 1984 the BMW will, on a once/month basis, inspect all garbage holding facilities noting any deficiencies by way of work orders and Occurrence Report.

- Deficiencies noted on random warden patrols will be reported to the West Gate Information Centre and subsequently recorded in an Occurrence Report and Work Order.

- Commencing in 1984 the stick-on Sign 8 (Table 9) will be applied to any letter box site where garbage is noted to be repeatedly left outside the container.

- During the Fall/Winter of 1984-85 the Garbage Inspection Committee will conduct a thorough cost/benefit analysis of existing garbage management practices with particular attention given to the feasibility of Neufeldt container installation. A final report will be completed by February 1985.
The Garbage Inspection Committee will inspect all commercial garbage facilities in April 1984 and immediately report deficiencies to the Superintendent.

- A letter outlining deficiencies, the bear/garbage relationship, applicable sections of the National Parks Garbage Regulations, and alternatives and deadlines for the installation of approved enclosures will be sent to each operator with deficient facilities. The letter will also note that conditions related to garbage holding facilities will be endorsed upon the 1984 Business Licence pursuant to Section 5(5) of the National Parks Businesses Regulations. The provisions for failing to comply with these conditions should also be noted. (Vermilion Crossing was sent such a letter in September 1983).

- The nature of the approved facilities for each operator will be noted on the Garbage Storage Deficiency Form so that garbage pick-up staff can note deficiencies. The Duty Warden will be informed of a commercial deficiency as soon as possible.

- The BMW will conduct monthly inspections of all commercial facilities during the May-October period.

- Compliance failures will result in the operator's licence being revoked pursuant to section 9(a) of the National Parks Businesses Regulations.

- A $500.00 performance bond will be required from repeat offenders pursuant to section 7(b) of the National Parks Businesses Regulations.

- All deficiencies will be reported to the West Gate Information Centre and subsequently recorded on an Occurrence Report.
Visitor Garbage at Campsites and Picnic Sites

Improper storage of garbage by visitors at auto campgrounds, predominantly McLeod and Redstreak, has been a major source of garbage deficiencies and a major cause of bear incidents. Although there have been no backcountry garbage incidents or deficiencies reported to date, it is anticipated that conscientious backcountry inspection will reveal numerous deficiencies. Table 14 outlines the strategy for the control of garbage at campsites and picnic sites.

Carrion Management

The ability of bears to locate carrion from great distances (up to 30 airline km in 36 hrs.) has been documented (Craighead 1976:104). In addition Herrero (1976:127) has pointed out that a significant number of aggressive encounters in national parks and several serious injuries outside national parks have been the result of suddenly surprising a grizzly feeding on carrion.

For the 5 year period 1978-82 KNP recorded an average of 44 large mammal road kills per year. Many of these occurred during the May through October bear season. Prior to 1981 most carcasses were simply pulled into the treeline at the accident site. In 1981 a program of carrion management was initiated. This program will be continued through 1984 and perhaps subsequent years. Table 15 outlines the carrion management strategy for KNP.

Fish Entrails Management

KNP supports good quality fishing opportunities along the Vermilion and Kootenay Rivers, at Cobb Lake, Dog Lake, and to a lesser extent Floe
Table 14. A control strategy for garbage at campsites and picnic sites.
KNP 1984-88.

- Autocampground attendents will make random patrols of the campground and report storage deficiencies to the West Gate Information Centre. Where possible, the attendant will take corrective action and report same.

- The Duty Warden will make random patrols of all autocampgrounds and picnic sites noting deficiencies and taking corrective action. All deficiencies and management actions will be reported to the West Gate Information Centre and subsequently recorded in an Occurrence Report. Backcountry wardens will follow the same procedures at primitive campgrounds.

- Once Sign 3 (Table 9) is in place in all autocampground washrooms, laying of charges under section 9 of the National Parks Camping Regulations will be the preferred course of action for all garbage storage offenders. Prior to that time warnings will be the preferred course of action.

- Once pamphlets 2 & 4 (Table 9) are modified to include instructions for proper garbage storage in backcountry areas laying of charges under section 9 of the National Parks Camping Regulations will be the preferred course of action for garbage storage offenders in the backcountry. Prior to that time warnings will be the preferred course of action.

- In 1984 the Warden Service will initiate a series of post-midnight autocampground visitor garbage storage efficiency surveys. This will involve at least 2 wardens who will systematically inspect every campsite and note garbage (and food) storage deficiencies. Campers with deficiencies will be awakened and warned (1984) or charged (1985-88). A similar survey will be performed in backcountry sites just after nightfall. All findings will be relayed to the Information Centre and subsequently reported on an Occurrence Report. Because of the time required for each survey they will be conducted only 3 times per season preferably during full capacity nights (Saturday morn of Victoria Day, Dominion Day and Civic Day long weekends). Backcountry surveys should be conducted 3 times per season at the 3 most heavily used sites (Floe Lake, Tumbling Creek and Helmet Falls) during full capacity nites. Information gathered by these means should be used to provide baseline data for evaluation purposes.
Table 15. A carrion management strategy. KNP 1984-88.

This strategy will apply for the period May 1 through October 31, 1984-88

**Frontcountry**

- Large mammal carcasses found in or adjacent to frontcountry areas will be removed as soon as possible by the Warden Service and deposited in one of 4 approved carrion deposit sites.

- The approved sites for 1984 are: (1) the old '4 Mile Dump' site, (2) mile 1.0 Hector Gorge Fire Road, (3) Mile 6.0 Cross River Fire Road and (4) the Revelstoke Saw Mill beehive incinerator.

- Sites 1-3 will be legally closed by posting Area Closure signs at the access points to each site. Only persons authorized by the Superintendent may enter these areas.

- Use of sites 1-3 will be on a rotational basis. If all 3 sites are full (i.e. scavengers have not 'cleaned up' the carcass) then use of site 4 will be considered.

- If site 4 is used a park warden will remain at the site until the carcass has entered the beehive.

- Use of all carrion sites will be recorded on an Occurrence Report.

- Wardens will periodically monitor recently used sites to ascertain the rate of removal and the scavenger species. Observations will be reported by way of the Wildlife Observation Card.

- Experiments to test the feasibility of using explosives to remove carrion from backcountry areas may be undertaken from time to time.

**Backcountry**

- Large mammal carrion found in backcountry areas that are likely to be frequented by visitors will be removed if possible. Helicopter or pack horse removal methods will be considered. If the carrion cannot be removed, the surrounding area will be legally closed until the carrion has been 'cleaned up' by scavengers.

- Costs involved in the removal of domestic stock carrion will be done by the owner of the stock.

- The Occurrence Report will be used to report all backcountry carrion actions.
Lake, Kaufmann Lake and a number of unnamed ponds. The question of what to do with entrails of fish caught at these sites has received little attention. Obviously the proper disposal of entrails could have an influence on potential bear incidents and encounters. Merrill (1978) found significantly higher numbers of bear incidents at backcountry campgrounds where fishing quality was highest. Improper disposal of entrails appeared to be the causative factor.

Lacking any national or regional direction as to the disposition of entrails, KNP staff have for years advised fishermen to dispose of entrails by incineration or to pack them out in a securely enclosed plastic bag. While incineration is a reasonable approach for those areas where fires are allowed, the pack out advice may predispose the fisherman to bear encounters.

Preliminary experiments in Glacier National Park, Montana (U.S.D.I. 1982) have indicated that, under certain conditions, throwing entrails back into the waters from which they were taken may be the most expeditious disposal technique from both a biological and bear/human safety point of view. Disposal by this method is prohibited in Canada's National Parks pursuant to section 26 of the National Parks Fishing Regulations.

Table 16 outlines a fish entrail management strategy for KNP.

PROGRAM ELEMENT 7: Food Storage Management

POLICY

In the four year period 1980-83 there were 33 recorded food storage incidents (Table 1). All but one incident involved visitor foods. Many of
Table 16. A fish entrails management strategy. KNP 1984-88.

The following information will be stamped on all Fishing Summary Regulations, pamphlet 5 (Table 9) once section 26 of the National Parks Fishing Regulations is amended to allow the disposal of fish entrails in park waters. Pamphlet 5 must be issued simultaneously with each Fishing Permit.

<table>
<thead>
<tr>
<th>Fish Entrails Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floe Lake</td>
</tr>
<tr>
<td>clean fish on small flat rock</td>
</tr>
<tr>
<td>near shoreline; puncture air</td>
</tr>
<tr>
<td>bladder &amp; throw entrails and</td>
</tr>
<tr>
<td>rock far out into lake; wash</td>
</tr>
<tr>
<td>down cleaning area</td>
</tr>
<tr>
<td>All other areas</td>
</tr>
<tr>
<td>pack out whole fish in sealed</td>
</tr>
<tr>
<td>plastic bag OR clean on</td>
</tr>
<tr>
<td>burnable wooden block or paper;</td>
</tr>
<tr>
<td>place block/paper and entrails</td>
</tr>
<tr>
<td>in hot fire and burn completely</td>
</tr>
<tr>
<td>or place block/paper in bear</td>
</tr>
<tr>
<td>proof garbage container</td>
</tr>
</tbody>
</table>
the 16 relocations and 10 destructions performed during the same period can be directly related to these incidents. In addition, there were 41 food storage deficiencies recorded in the same period. Due to varying degrees of reporting emphasis, this figure probably grossly underestimates the actual number of deficiencies.

Both the number of incidents and deficiencies are recognized as being unacceptably high and, as noted in the objectives of this plan, must be reduced by 50% and 75% respectively by year end 1988. Accordingly a strategy consisting of facility provision, public information, monitoring, and enforcement will be phased in over the next few years.

**ACTION**

Likely sites of food storage incidents or deficiencies include the 4 autocampgrounds (502 sites), 12 primitive campgrounds (114 sites) and to a lesser extent the 11 picnic sites (114 tables), 4 bungalow camps (70 cabins) and trail crew camps.

Table 17 indicates a time-action schedule for the installation of food storage facilities in various campsites. Table 18 illustrates how the public information element will be integrated with the food storage strategy. Table 19 outlines the monitoring and enforcement components of the food storage strategy.

**PROGRAM ELEMENT 8: Human Activity Management**

**POLICY**

Regulation of human activity within the Park is recognized as the primary means of preventing and resolving bear/human conflicts. However it
Table 17. Time/action schedule for food storage facility installations. KNP 1984-88.

<table>
<thead>
<tr>
<th>Location</th>
<th>Installation Date</th>
<th>Type of Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floe Lake</td>
<td>July 1984</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Tumbling Creek</td>
<td>July 1984</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Helmet Falls</td>
<td>July 1984</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Numa Creek</td>
<td>Sept. 1984</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Floe Switchbacks</td>
<td>Sept. 1984</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Kaufman Lake</td>
<td>Sept. 1984</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Ottertail Pass</td>
<td>July 1985</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Tokumm Creek</td>
<td>July 1985</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Helmet/Ochre Jct</td>
<td>July 1985</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Tumbling/Ochre Jct</td>
<td>July 1985</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Verdant Creek</td>
<td>July 1986</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>July 1986</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Redstreak Campground</td>
<td>May 1985</td>
<td>Cement Block Bldg.</td>
</tr>
<tr>
<td>McLeod Meadows Campground</td>
<td>May 1986</td>
<td>Cement Block Bldg.</td>
</tr>
<tr>
<td>Marble Canyon Campground</td>
<td>May 1986</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Crooks Meadow Campground</td>
<td>May 1986</td>
<td>Bear Pole</td>
</tr>
<tr>
<td>Trail Crew Camps</td>
<td>May 1984</td>
<td>Steel Food Boxes</td>
</tr>
</tbody>
</table>
Table 18. Integration of the public information program\textsuperscript{a} with the food storage strategy. KNP 1984-88.

<table>
<thead>
<tr>
<th>Sources of Frontcountry Food Storage Information (Information Category 17)</th>
<th>Sources of Backcountry Food Storage Information (Information Category 19)</th>
<th>Sources of Mgmt Problems Related to Food Storage (Information Category 24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Sources</td>
<td>Proposed Sources</td>
<td>Existing Sources</td>
</tr>
<tr>
<td>Pamphlet No.</td>
<td>3,8,9,10</td>
<td>2,4</td>
</tr>
<tr>
<td>Sign No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poster No.</td>
<td>1</td>
<td>1,6</td>
</tr>
<tr>
<td>Exhibit No.</td>
<td>1,4,7</td>
<td>3</td>
</tr>
<tr>
<td>Garbage Bag No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audio-Visual No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretive Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretive 'Blurbs'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Contacts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a} All figures refer to the information modes outlined in Table 7.
Table 19. The monitoring and enforcement components of the food storage strategy. KNP 1984-88.

- Autocampground attendents will make random patrols of the campground and report food storage incidents or deficiencies to the West Gate Information Centre. Where possible the attendant will take corrective action and report this to the Information Centre.

- The Duty Warden will make random patrols of all autocampgrounds noting deficiencies and taking corrective action. All deficiencies and management actions will be reported to the Information Centre and subsequently recorded on the Occurrence Report. Backcountry wardens will follow the same procedures at primitive campsites.

- Once Sign 3 (Table 9) is in place in all autocampground washrooms laying of a charge under section 9 of the National Parks Camping Regulations will be the preferred course of action. Prior to that time seizure of unattended food and follow-up warnings will be the preferred course of action.

- Post midnight food storage deficiency surveys will be conducted in conjunction with the garbage storage deficiency surveys (Table 14) and recorded on an Occurrence Report.

---

3 The Occurrence Report format stresses the determination of causative factors.
is also recognized that there are certain areas within the Park where visitor use must be given priority over the habitat requirements of bears. Therefore a zoned management strategy will be implemented.

For the purposes of bear management, KNP will be divided into two management zones - frontcountry and backcountry - each with a distinctly different management strategy. Generally, in frontcountry areas the presence of bears will be considered inappropriate and necessitate their removal. In backcountry areas however the presence of bears and protection of habitat will take precedence over visitor use. When actual or potential conflicts develop management actions will, wherever feasible, be directed at restriction of human use in the area. Removal of the bear will be a last order alternative.

The Hwy 93 right of way in KNP presents a management anomaly. Black bears frequently graze on dandelions and lush grasses found along the right of way. Since they are highly visible the bears attract considerable attention from passing motorists. In most instances the bear seems content to graze while the visitor has the opportunity to observe and photograph a free ranging animal. Inevitably however some bears are enticed by handouts or harassed by photographers and a bear/human conflict soon arises. In order to manage this area, a variable zone system will be used. So long as the bear continues to exhibit natural behaviour patterns the right of way will be classified as backcountry and the bear managed accordingly. As soon as the bear begins to exhibit unnatural behaviour, such as approaching vehicles, the right of way will be classified as frontcountry and the bear managed accordingly.
ACTION

The strategy for controlling human activities in KNP will consist of six components: (1) backcountry use restrictions, (2) posting warning notices, (3) area closures, (4) development of design and maintenance standards for backcountry facilities, (5) development of a 'natural' fire management policy and (6) strict enforcement of regulations. Each component is detailed in Tables 20 through 25.

PROGRAM ELEMENT 9: Problem Bear Management

POLICY

Like many other animal species, bear behaviour can be easily conditioned by one or more rewards. A bear which just happens to find a cooler during its first haphazard meander through a campground is very likely to return to the campground many times to continue its cooler search and in doing so becomes a 'problem bear'. Soon the bear becomes 'conditioned' to human foods and often develops bolder foraging techniques some of which may present a threat to property and public safety. Each time the bear is rewarded, the campground foraging behaviour is reinforced and strengthened making it more difficult to break. Well conditioned bears captured in campgrounds and released many miles away often return quickly to continue their search for human food.

The main purpose of this program element is to (1) prevent the development of the conditioned behaviour by removing bears from front-country areas where they will undoubtedly happen upon human food and (2) prevent an escalation of conditioned behaviour and the associated risk to property and public safety by removing the bear as soon as possible. Inherent in this purpose is the recognition that management action must be

- A Park Use Permit will be required by each leader of a group intending to camp overnight in the backcountry.

- The existing backcountry campsite quotas will continue to be applied. Any proposed changes will be reviewed by the Bear Management Committee. Quotas are as follows.

<table>
<thead>
<tr>
<th>Campsite</th>
<th>Quota (Tents/Night)a</th>
<th>Campsite</th>
<th>Quota (Tents/night)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaufman Lake</td>
<td>6</td>
<td>Tumbling Creek</td>
<td>18</td>
</tr>
<tr>
<td>Tokumm Creek</td>
<td>6</td>
<td>Numa Creek</td>
<td>18</td>
</tr>
<tr>
<td>Ottertail Pass</td>
<td>6</td>
<td>Floe Lake</td>
<td>12</td>
</tr>
<tr>
<td>Helmet/Ochre Jct</td>
<td>6</td>
<td>Floe Switchbacks</td>
<td>6</td>
</tr>
<tr>
<td>Helmet Falls</td>
<td>18</td>
<td>Verdant</td>
<td>6</td>
</tr>
<tr>
<td>Tumbling/Ochre Jct</td>
<td>6</td>
<td>Dolly Varden</td>
<td>6</td>
</tr>
</tbody>
</table>

- Visitor services staff will continue to compile year end reports detailing both the number of tent/nights and person/nights for each campsite.

- Random camping will not be permitted except in unusual circumstances such as the necessity of climbing parties to establish high camps. Requests for random camping will be evaluated on an individual basis.

- Fires will only be allowed at those campsites with government installed fire boxes.

- Lack of day use data is recognized as a significant knowledge gap that must be addressed by the BMC.

- Although restricting pets from backcountry areas is viewed as desirable, KNP cannot, due to the presence of contiguous national parks, unilaterally implement this restriction. Continued consultation with Banff, Jasper and Yoho National Parks, through the Four Mountain Park Planning process may soon resolve this issue.

- The desirability of locating trails and campsites a distance from important bear habitat is recognized as a long term goal. At present there is no data base upon which to ascertain the acceptability of existing trail alignments or campground locations. Research resources identified under Program Element 12 should provide data upon which to evaluate the acceptability of existing facilities and select alternative alignments or sites.

Expression of the quota unit as tents/night presents several difficulties in terms of controlling the number of people using the area. However, at this time tents/night is considered to be the most logistically meaningful unit. Person/nights can be determined via the Park Use Permit.

- All decisions and management actions related to the posting, monitoring, and removal of warning notices will be the responsibility of the BMW.

- Situations which may require posting of a warning notice may include, but are not limited to, the following.
  - Any situation wherein there is a known yet unusual danger and an area closure is not effected. For example, the continued presence of a grizzly bear in an area proximal to a hiking trail.
  - Any situation wherein a non-aggressive encounter occurs and an area closure is not effected. For example, a grizzly bear follows a hiker for some distance and then departs.
  - Any situation wherein it is necessary to 'phase in' the opening of a formerly closed area.

- Warnings will be effected through the use of Sign 4 (Table 9) which should include a typed message that fully explains the circumstances prompting the warning and thereby allowing the visitor to make an informed decision as to whether he wishes to travel through the area. The message should be signed and dated by a park warden. Changes in circumstances should be noted via an updated message.

- Warning notices will be placed on all normal access routes to the area effected. Pre-warning notices may be placed at selected trailheads.

- The warden posting warning notices must immediately notify the West Gate Information Centre and subsequently record the action on an Occurrence Report.

- Areas posted with warning notices will be monitored on a frequency determined by the BMW.

- The BMW will determine the necessity to continue or remove the warning notice. Removal actions will be reported to the West Gate Information Centre and subsequently recorded on an Occurrence Report.

- The BMW will make recommendations to implement or remove area closures to the Superintendent via the Chief Park Warden.

- Once the action is approved all decisions pertaining to closing, monitoring or opening the area will be made by the BMW in consultation with the Chief Park Warden.

- Situations which may require area closures may include, but are not limited to the following:
  - Any situation involving an aggressive encounter.
  - Any situation wherein a bear is continuously utilizing habitat in close proximity to a hiking trail or backcountry campsite.
  - Any area considered to be of critical habitat.
  - Any situation wherein a leg hold snare is set.

- Area closures will be effected through use of Sign 5 (Table 9) which should include a typed message explaining the circumstances prompting the closure, the affected area, and the length of closure. The message should be dated and signed in the Superintendent's name.

- Area closure signs will be placed on all normal access routes to the affected area. Pre-area closure notices may be placed at selected trailheads.

- The warden who erects area closure must immediately notify West Gate Information Centre and subsequently record the action on an Occurrence Report.

- Closed areas will be monitored on a frequency determined by the BMW.

- When the BMW determines that the reason for the closure no longer exists he will request approval to re-open the area. Re-opening should not take place until at least 2 consecutive warden patrols indicate the reason prompting closure no longer exists. Re-opening will be reported immediately to the West Gate Information Centre and subsequently recorded on an Occurrence Report.

---

A Western Region Directive (Parks Canada 1983d) limits closure to (1) aggressive encounters threatening human life and (2) when a female bear with cubs of the year are known to be in the area. Obviously the restrictions place serious limitations on the spirit of anticipatory management. Modifications have been requested.
Design and maintenance standards for KNP backcountry facilities are generally lacking. This must be corrected over the next several years.

The following points might be considered when developing standards.

- locating campgrounds out of prime bear habitat or travel routes
- campground design to separate sleeping areas from cooking and food storage areas
- providing bear proof casements on outhouse facilities
- providing bear proof food storage facilities at each campground
- trail alignment to minimize intrusion into prime or critical bear habitat
- trail alignment and maintenance to provide long range vision
- trailhead design standards
- maintenance schedules and maintenance content
A fire management policy that allows wildfires to run their natural course is recognized as an important facet in preserving bear habitat and hence preserving 'natural' bear population.

For a number of reasons KNP has followed a policy which required extinguishment of all fires with the result that at least 108 forest fires have been fought in the period 1925-79. Had these fires been allowed to run their course, the Park might have a somewhat different vegetation mosaic than what currently exists. Accordingly the bear population might be quite different.

Although the Park now recognizes the desirability of allowing a natural fire regime, it (the Park) is, at the same time, forced to continue with the 'fight 'em all' strategy simply because it lacks the ability to stop wildfire at park boundaries or park infrastructures.

Nevertheless development of a more 'natural' fire management policy will be the goal of KNP. Development of this policy will be contingent upon acquiring a factual data base (fuel loading, etc.) and suppression expertise. Hence the immediate actions must be directed at research and training.
Law enforcement in relation to bear management has usually involved enforcement of the anti-feeding regulation, or the proper storage of food and garbage. While instances involving the feeding of bears have invariably resulted in charges being laid, food and garbage storage violations have normally been dealt with by way of a warning. The low profile given to proper storage techniques in Park literature and the lack of adequate storage facilities justifies this approach. This is particularly true for backcountry areas.

However once improvements are made in the dispersement of high profile storage information the policy will shift to the predominance of charges rather than warnings.

All other regulations pertaining to bear management will be strictly enforced through either warnings or charges.

Duty wardens and wardens on evening shift will attempt to make at least one patrol per shift through both Redstreak and McLeod Meadows campground. Due to its remoteness, and almost negligible bear problems, Marble Canyon campground will be secondary in patrol importance to both Redstreak and McLeod Meadows.

Backcountry patrols will be scheduled so that, whenever possible, each campground on the Floe Lake to Helmet Falls route will be patrolled at least once per week. Every effort will be made to have a warden assigned to the Floe-Helmet route on all weekends.

All charges or warnings will be reported immediately to the West Gate Information Centre and subsequently recorded on an Occurrence Report.
prompt. The longer a bear remains in an area where human food is available the greater the probability the bear will become conditioned or the conditioned behaviour will be strengthened.

**ACTION**

A program of aversive conditioning, relocation, and destruction of problem bears will be implemented. Table 26 outlines conditions where aversive conditioning will be applied. Tables 27 and 28 indicate when and how a capture attempt will be made. Table 29 details when and where bears will be released and Table 30 states the conditions under which a bear may be destroyed.

**PROGRAM ELEMENT 10: Training**

**POLICY**

The development of a graduated training program for park and concessionaire employees is recognized as an integral component of the overall program. Each employee has a role to play in the management program and must be supplied with commensurate training.

**ACTION**

Table 31 indicates the training requirements of each employee group and the means by which those requirements will be met.

**PROGRAM ELEMENT 11: Emergency Planning**

**POLICY**

As indicated in Table 1 KNP has experienced a number of human injuries inflicted by bears. All injuries were inflicted by black bears,
• Aversive conditioning is recognized as a logical first order deterrent for problem bears.

• Approved forms of aversive conditioning are as follows:
  • loud noises (shout, horn, siren etc.)
  • threatening gestures (short noisy run at bear)
  • throwing rocks
  • bird shot
  • rubber bullets

• Bird shot or rubber bullets may be applied only by senior permanent wardens. These techniques may be used only under very controlled and limited situations wherein the safety of the visitor and bear can be reasonably assured. Close attention should be given to the results of research dealing with the effects of these (and other) forms of aversive conditioning.

• At no time will visitors be advised or encouraged to use any form of aversive conditioning.

• Application of all methods of aversive conditioning except loud noise will be restricted to park wardens and used with discretion.

• Application of aversive conditioning will be reported as a management action to the West Gate Information Centre and subsequently recorded on an Occurrence Report.
Table 27. Capture criteria for bears. KNP 1984-88.

- An attempt may be made to capture a bear only if one or more of the following criteria are met.
  - A bear persists in a frontcountry area even though there is no indication that it has gained access to human food or garbage.
  - A bear causes property damage in a frontcountry area.
  - A bear gains access to human food or garbage in either a frontcountry or backcountry area.
  - A bear is involved in an aggressive encounter in a frontcountry or backcountry area.
  - A bear is required for authorized research.
- A final decision pertaining to capture attempts will be made by the BMW.

• Only park wardens or authorized researchers accompanied by a park warden will attempt to effect a capture.

• The BMW will determine when, where and how a capture will be attempted.

• Capture may be effected via the use of either a culvert style whole body trap, an Aldrich style leghold snare or an immobilizing drug.

• Wherever feasible a culvert style whole body trap will be the preferred capture technique.

• Only wardens qualified by special training in the use of immobilizing equipment and drugs, the safe and proper handling and transportation of immobilized animals, as well as special first aid training will be permitted to use immobilizing drugs and equipment.

• Only drugs under the trade name of Rompun, Ketaset or Anatran will be used for immobilization. Other drugs may be used subsequent to WRO approval.

• The BMW will be responsible for the procurement, storage, inventory and handling of all immobilizing drugs used for bear management.

• All trap sets or captures will be reported to the West Gate Information Centre and subsequently recorded on an Occurrence Report.

• Detailed procedures for the use of traps, snares and immobilizing drugs are outlined in the Bear Management Procedural Manual.
Table 29. Release of captured bears. KNP 1984-88.

- Due to the relatively small size and narrow configuration of KNP there is very little chance of successfully relocating either species within the Park. Although no grizzlies have been captured or released to date, the vast majority of all black bears released within the Park have returned to frontcountry areas to cause further incidents. Hence the usefulness of a relocation program in KNP is extremely limited.

- A grizzly bear purposely captured in the Park for any reason other than research will not be released within the Park. The Province of B.C. has tentatively agreed to accept grizzly bear relocations to provincial lands and at the present time this is the only approved course of action. However efforts will be made to develop arrangements enabling release of KNP grizzlies in other national parks or other lands under Parks Canada jurisdiction.

- Grizzlies captured inadvertently or for research purposes will be released at point of capture or another suitable location at the discretion of the BMW.

- The Province of B.C. has refused to accept black bear relocations to provincial lands. Hence until other arrangements can be developed all black bear releases must be made at one of two approved release sites within KNP. The two sites are:
  - Mount Shanks Fire Tower
  - Cross River Fire Road at km 10-15

- Whenever possible the release sites will be used alternately.

- In situations wherein either a black or grizzly bear is to be destroyed, live release to either a zoo or other approved institution will be considered.

- Prior to being released within the Park all bears will be ear tagged according to the following system.
  - all grizzly bears marked with a red ear tag
  - all black bears marked with a yellow ear tag
  - all females tagged on the left ear
  - all males tagged on the right ear

  Numbered Jumbo Rototags will be used. Each tag will be etched with the symbol KNP.

- The BMW will be responsible for all operations involving the tagging and release of bears.

- All releases will be reported to the West Gate Information Centre and subsequently recorded on an Occurrence Report.

- Detailed procedures for the tagging and release of captured bears are outlined in the Bear Management Procedural Manual.
The destruction of a problem bear is considered to be the last resort and accordingly should be used only when all other techniques have failed or are not feasible.

A bear may be destroyed only if one or more of the following criteria are met.

- The bear presents both an imminent and immediate threat to human life.

- The bear has attacked, mauled or killed a human for reasons that cannot be attributed to (1) sudden surprise at close range, (2) protection of young, (3) protection of food sources, (4) physical taunting.

- The bear's dossier indicates that it has been captured and released on at least one previous occasion and has subsequently been involved in an incident or aggressive encounter. Females and females with cubs may be afforded additional relocations depending on the nature of the incident or encounter.

- The destruction of a bear will be accomplished in the most human and unobtrusive manner possible. Currently destruction via a well placed rifle shot is the only approved technique. Wherever possible the bear will be captured and shot rather than being shot while free ranging.

- Live release to a zoo or other approved institution may be considered as an alternative to destroying a bear.

- The remains of a destroyed bear will be autopsied and disposed of in one of the approved carrion deposit sites.

- All matters pertaining to the destruction of bears will be the responsibility of the BMW in consultation with the Chief Park Warden.

- All destructions will be reported to the West Gate Information Centre and subsequently recorded on an Occurrence Report.

Table 31. Bear management training requirements. KNP 1984-88.

<table>
<thead>
<tr>
<th>EMPLOYEE GROUP* and TRAINING REQUIREMENTSb</th>
<th>METHODS</th>
<th>TRAINING RESPONSIBILITY</th>
</tr>
</thead>
</table>
| Road Crews (13), Trades (8), Trail Crews (5) | •letter sent to each employee  
•attendance at general training session | BMW |
| Garbage Pick-up Crew (3) | •letter sent to each employee  
•informal discussions with each employee  
•attendance at general training session | BMW |
| Campground Attendents (17), Concession Staff (14) | •letter sent to each employee  
•attendance at general training session | BMW |
| Information Centre Staff (5.5), West Gate Attendents (5) | •letter sent to each employee  
•attendance at general training session | BMW |
| Park Naturalists (7) | •letter sent to each employee  
•attendance at general training session | BMW |
| Park Wardens (8) | •letter sent to each employee  
•attendance at general training session | BMW |
| Bear Management Warden (1) | •attendance at regional, national & international conferences, symposiums & workshops  
•periodic inter-park travel to survey current mgmt practices  
•provision of time & funds to access literature  
•development of a bear mgmt component within the park library  
•periodic access to academic expertise  
•membership in the Bear Biology Association & other appropriate organizations | Chief Park Warden |

a Figures in parenthesis indicates the approximate number of employees in each group.  
b Training requirements are cumulative from top to bottom, i.e. the training requirements for the BMW consists of all training requirements listed for all staff.  
c These specific training requirements apply only to the employee group in which they appear.
usually in association with roadside feeding and with one exception, all injuries were of a minor nature. Nevertheless the potential for a serious mauling is real and may increase with increased park visitation. Accordingly the development of an organized emergency response is recognized as an important element of KNP's bear management program.

ACTION

Response to situations wherein a human is seriously or fatally injured by a bear will proceed according to a predetermined set of actions which are based on the seven major principles shown in Table 32. Specific procedures are outlined in the Bear Management Procedural Manual.

PROGRAM ELEMENT 12: Research Planning

POLICY

The need for a comprehensive data base upon which to establish enlightened management actions and public information programs is recognized as an integral part of bear management. To date there has been no formal research conducted in KNP on either the bear population or their habitats. While some information may be extrapolated from research in similar areas and the recently completed biophysical inventory, park specific knowledge gaps will persist.

In 1982 KNP contracted Dr. S. Herrero of the University of Calgary to examine the Park's bear management program and determine its research requirements. Herrero (1982:5) pointed to the fact that "a knowledge of how (grizzly) bears use their environment is fundamental to managing the species" and recommended that research be oriented toward an understanding
Table 32. Strategy principles\(^a\) for responding to bear emergencies. KNP 1984-88.

- Response to all bear emergencies will be based upon the following basic principles
  - Immediate, safe evacuation and treatment of victims
  - Safe removal and exclusion of visitors from the emergency area
  - Rapid containment of the offending bear(s)
  - Determination of causative factors
  - Disposition of the offending bear based on causative factors
  - Safety of staff
  - Collection, preservation and/or documentation of all evidence and management actions

\(^a\) Adapted from Parks Canada 1982a:Appendix 8.
of bear food habitats and habitat relationships. Radio collaring and scat analysis studies requiring approximately 3 person-years and $25K (for grizzlies) and 3 person-years and $15K (for blacks) were suggested. Also noted were the potentially adverse effects the Park’s past and current fire management policy could have on both bear species. Research leading to a more natural fire management policy was also suggested. The Park accepts both suggestions as high priority research topics and accordingly will attempt to allocate the necessary fiscal and person-year resources.

Research topics in order of priority are, (1) grizzly bear habitat analysis (2) black bear habitat analysis (3) trail alignments and campground locations in relation to bear habitat analysis and (4) the effectiveness of the Park’s aversive conditioning actions on bear behaviour.

ACTION

The Conservation Plan for KNP (Parks Canada 1983) has identified bear management and fire management as the number 3 and 1 resource priorities, respectively. Accordingly 30K and 4PY have been requested for bear research and 20K and 3PY have been requested for fire management research. Annual fiscal and person-year resources necessary for bear research are set out in Table 37 (page 70).

PROGRAM ELEMENT 13: Regional Management

POLICY

The home range of bears, especially grizzlies, may extend over vast tracts of land. Often only a portion of the home range may lay within a particular national park. Bears found in KNP may move between 5 adjacent
land jurisdictions including Banff and Yoho National Parks, Mount Assiniboine Provincial Park, the Village of Radium Hot Springs and B.C. Crown land. Each jurisdiction has a different management strategy. While within the boundaries of a national park, the bear and its habitat are protected by an array of preservation oriented regulations and management actions. Once on provincial lands the bear becomes the subject of an entirely different management strategy - usually a strategy aimed at perpetuating a sustained harvest. Often these management strategies are mutually detrimental. For instance; the efforts of KNP to provide bear proof garbage facilities are greatly undermined by the close proximity of open garbage containers in the Village of Radium. Similarly the quality of a provincial hunting territory can be influenced by the Park's backcountry quotas, carrion disposal methods or release sites. Opportunities to enhance management practices also exist between contiguous national parks sharing essentially the same management strategy.

The development of a regional or ecosystem approach to managing bears is recognized as a critical ingredient to the Park's overall management strategy. The KNP along with each of its contiguous land jurisdictions share a number of mutual management concerns the resolution of which may lead to more effective management.

Table 33 indicates each of the land jurisdictions adjoining KNP along with a number of items that may be of mutual concern. It is the intention of the Park to pursue a program which will initiate and encourage dialogue with each of these neighbours in order to resolve areas of concern.
Table 33. Potential mutual concerns of land jurisdictions contiguous with KNP.

<table>
<thead>
<tr>
<th>CONTIGUOUS LAND JURISDICTION</th>
<th>POTENTIAL MUTUAL CONCERNS</th>
</tr>
</thead>
</table>
| Banff and Yoho National Parks | • development of a regional mgmt concept through the formation of a Regional Bear Management Committee  
                                 • development of an integrated monitoring system  
                                 • development of consistency in public information content  
                                 • development of consistent terminology  
                                 • development of consistent warning/closure signs and procedures  
                                 • development of consistent ear tag coding  
                                 • development of training programs and a regional resource expertise  
                                 • development of co-ordinated emergency response  
                                 • development of a forum to exchange mgmt data and information |
| Province of British Columbia Crown Land including Mount Assiniboine Provincial Park | • development of a system to exchange information with particular reference to grizzly bear management  
                                                                                       • development of co-operative research efforts  
                                                                                       • management of peripheral hunting zones  
                                                                                       • regional garbage management  
                                                                                       • co-operative law enforcement activities  
                                                                                       • co-ordinated emergency responses  
                                                                                       • development of buffer zones |
| Village of Radium Hot Springs (Regional District of East Kootenay) | • garbage management |
ACTION

Table 34 outlines the initial steps that will be taken in an attempt to develop a regional ecosystem approach to bear management.

PROGRAM ELEMENT 14: Fiscal and Person-Year Planning

POLICY

Bear management is recognized as an expensive undertaking both in terms of manpower and fiscal requirements. Careful administrative planning is tantamount to success.

ACTION

Tables 35 through 37 indicate the manpower and fiscal requirements necessary to implement all components of this plan. Tables 35 and 36 list the annual manpower and fiscal requirements. Table 37 lists non-recurring manpower and fiscal requirements.
Table 34. Initial strategy toward the development of regional management.  
KNP 1984-88.

- Western Region Office will be requested to develop and co-ordinate a Regional Bear Management Committee consisting of at least one field level representative from each of the parks with bear populations. The Committee's initial purpose will be to act as a forum for the exchange of information and the discussion of common management concerns.

- As an initial step, meetings will be arranged with the Provincial Regional Biologist (Cranbrook) via the local Conservation Officer to explore the potential for co-operative efforts between the Park and Province. A primary purpose of initial meetings will be to identify liaison persons and lines of communication.

- Meetings will also be arranged with the Regional District of East Kootenay and the Radium Business Association in order to convey the Park's concerns about garbage management in the area and to explore potential solutions.

- All arrangements will be made by the BMW in consultation with the Chief Park Warden.

- Minutes of all meetings will be placed on the Bear Management File.
Table 35. Annual person-year requirements for the bear management program. KNP 1984-88.

<table>
<thead>
<tr>
<th>Role</th>
<th>Person-Days</th>
<th>Person-Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superintendent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• review BMP</td>
<td>0.5</td>
<td>0.008</td>
</tr>
<tr>
<td>• negotiate regional agreements</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>• application of regulations</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Bear Management Warden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• preparation of Annual Summary</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>• preparation of BMP</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>• preparation &amp; delivery of training</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>• requisition of equipment &amp; supplies</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>• day to day field operations</td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>• participation in regional mgmt</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>• literature review</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>• attend training courses, workshops</td>
<td>10.0</td>
<td>0.340</td>
</tr>
<tr>
<td>Chief Park Warden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• participation in BMC (Chairman)</td>
<td>1.0</td>
<td>0.019</td>
</tr>
<tr>
<td>• development of regional management</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>• day to day operations</td>
<td>2.0</td>
<td>0.004</td>
</tr>
<tr>
<td>Chief of Visitor Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• participation in BMC</td>
<td>0.5</td>
<td>0.004</td>
</tr>
<tr>
<td>• day to day operations</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Chief Park Naturalist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• participation in BMC</td>
<td>0.5</td>
<td>0.004</td>
</tr>
<tr>
<td>• day to day operations</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>General Works Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• participation in BMC</td>
<td>0.5</td>
<td>0.004</td>
</tr>
<tr>
<td>• day to day operations</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>West Gate Information Centre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• daily monitoring (1 hr/da x 75 da)</td>
<td>10.0</td>
<td>0.057</td>
</tr>
<tr>
<td>• dispense bear information (0.5 hr/da x 75da)</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>Marble Information Centre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• dispense bear information (0.5 hr/da x 75 da)</td>
<td>5.0</td>
<td>0.019</td>
</tr>
<tr>
<td>Duty Warden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Investigation, mgmt action, reports</td>
<td>10.0</td>
<td>0.038</td>
</tr>
<tr>
<td>• dispense bear information (0.25 hr/da x 100 da)</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>• patrols (0.5 hr/da x 100 da) x 3 campgrounds</td>
<td>20.0</td>
<td>0.115</td>
</tr>
<tr>
<td>Autocampground Attendants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• dispense bear information (0.5 hr/da x 184 da)</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>Garbage Pick-up Crews</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• completes Daily Garbage Storage Deficiency Report (0.5 hr/da x 184 da)</td>
<td>12.0</td>
<td>0.046</td>
</tr>
<tr>
<td>General Works</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• participation in Garbage Inspection Committee</td>
<td>1.0</td>
<td>0.004</td>
</tr>
<tr>
<td>Park Naturalists</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• bear programs (7.5 hr/wk x 10 wk)</td>
<td>10.0</td>
<td>0.004</td>
</tr>
<tr>
<td>• bear 'blurbs' (5 min/da x 70 da) x 2 naturalists/da</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Wardens</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• participation in garbage/food storage mini surveys:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>frontcountry (7.5 hr x 2 wardens x 3 times/yr x 3 campgrounds)</td>
<td>18.0</td>
<td>0.079</td>
</tr>
<tr>
<td>backcountry (2.0 x 1 warden x 3 times / yr x 3 campgrounds)</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Total person-days</td>
<td>204.0</td>
<td></td>
</tr>
<tr>
<td>Total person-years</td>
<td>0.781</td>
<td></td>
</tr>
<tr>
<td>Service Description</td>
<td>O&amp;M Costs $1000</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>-----------------</td>
<td></td>
</tr>
<tr>
<td>Food Storage Facility Maintenance (Frontcountry)</td>
<td>(.10)(^b)</td>
<td></td>
</tr>
<tr>
<td>Food Storage Facility Maintenance (Backcountry)</td>
<td>(.20)</td>
<td></td>
</tr>
<tr>
<td>Slide replacement &amp; updating</td>
<td>(.05)</td>
<td></td>
</tr>
<tr>
<td>Pamphlet 2 (You Are in Bear Country)</td>
<td>NIL</td>
<td></td>
</tr>
<tr>
<td>Pamphlet 3 (Warning)</td>
<td>NIL</td>
<td></td>
</tr>
<tr>
<td>Pamphlet 4 (Bear. Kootenay National Park)</td>
<td>(.50)</td>
<td></td>
</tr>
<tr>
<td>Sign maintenance &amp; replacement</td>
<td>(.05)</td>
<td></td>
</tr>
<tr>
<td>Poster maintenance &amp; replacement</td>
<td>(.10)</td>
<td></td>
</tr>
<tr>
<td>Exhibit maintenance &amp; updating (post 1984)</td>
<td>(.20)</td>
<td></td>
</tr>
<tr>
<td>Trap maintenance &amp; modification</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td>Ammunition</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td>Targets</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>Immobilization Equipment</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>Drugs</td>
<td>.05</td>
<td></td>
</tr>
<tr>
<td>Occurrence Reports</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Memberships</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>Literature Acquisition</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td>Computer Processing</td>
<td>(.50)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>0.88 (1.70)</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) O&M = Operations and Maintenance costs.

\(^b\) Figures in parenthesis represent post 1984 estimates.
Table 37. Time-action schedule for non-recurring person-year and fiscal requirements for the bear management program. KNP 1984-88.

<table>
<thead>
<tr>
<th>TIME</th>
<th>ACTION</th>
<th>PERSON-YEARS</th>
<th>O &amp; M</th>
<th>CAPITAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>Design Pamphlet 4</td>
<td>0.16</td>
<td>.60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Signs 3-8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Posters 1-5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Exhibits 1-7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Letter Bag</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design A-V programs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design Backcountry Food Storage Facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Review Garbage Management Program</td>
<td>0.08</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 20 Sign 6 (Food Storage Directional)</td>
<td></td>
<td>.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 14 Sign 7 (Food Storage Instructional)</td>
<td></td>
<td>.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 15 Poster 4 (Vermilion Crossing &amp; Bears)</td>
<td></td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 1 Sign 1 (Wildlife &amp; Other Natural Hazards)</td>
<td></td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 1 Sign 2 (Unlawful to Feed or Entice)</td>
<td></td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Install 6 Backcountry Food Storage Facilities</td>
<td>.09</td>
<td></td>
<td>3.00 (PIP)</td>
</tr>
<tr>
<td></td>
<td>Construct Trail Crew Food Storage Boxes</td>
<td>.02</td>
<td>.40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Repair Doors On All Cement Block Bldgs. in Redstreak &amp; Kootenay Crossing</td>
<td>.04</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>Print 2000 Pamphlet 4 (1985 supply only)</td>
<td></td>
<td>.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 50 Sign 3 (Garbage &amp; Food Storage Instructions)</td>
<td></td>
<td>.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 10 Sign 4 (Warning)</td>
<td></td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 10 Sign 5 (Area Closure)</td>
<td></td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 50 Sign 8 (Letter box sticker)</td>
<td></td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 20 Poster 1 (Autocamp rules)</td>
<td></td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 20 Poster 2 (Backcountry Camp rules)</td>
<td></td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 20 Poster 3 (Outhouse)</td>
<td></td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Print 20 Poster 5 (Picnic Shelter Rules)</td>
<td></td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Additions to Exhibit 1 (McLeod Meadows)</td>
<td></td>
<td>.01</td>
<td>.50</td>
</tr>
<tr>
<td></td>
<td>Construct Exhibit 2 (West Gate Info Centre)</td>
<td></td>
<td>.02</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Construct Exhibit 3 (Marble Info Centre)</td>
<td></td>
<td>.02</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Contract 1 Academic Expert (re. BMET)</td>
<td></td>
<td></td>
<td>.30</td>
</tr>
<tr>
<td></td>
<td>Update A-V program (Marble Info Centre)</td>
<td></td>
<td>.03</td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>Construct A-V program (West Gate Info Centre)</td>
<td></td>
<td>.04</td>
<td>.50</td>
</tr>
<tr>
<td></td>
<td>Install 4 Backcountry Food Storage Facilities</td>
<td></td>
<td>.06</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Construct 1 Cement Block Food Storage Facility (Redstreak)</td>
<td></td>
<td>.04</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Replace Aquacourt Deck Cans with Letter Box Containers or Neufeldt</td>
<td></td>
<td>.04(Letter Box)</td>
<td>2.50(either)</td>
</tr>
<tr>
<td></td>
<td>Replace McLeod Meadows Wooden Garbage Shed with Cement Block Bldg. or Neufeldt</td>
<td></td>
<td>.04(Block Bldg.)</td>
<td>2.50(either)</td>
</tr>
<tr>
<td></td>
<td>Initiate Year 1 Grizzly Bear Research</td>
<td></td>
<td>(1.00)C</td>
<td>8.30</td>
</tr>
<tr>
<td></td>
<td>Install Trail Use Counters</td>
<td></td>
<td>.50</td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>Construct Exhibit 4 (Redstreak)</td>
<td></td>
<td>.04</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Construct Exhibit 5 (Kootenay Crossing)</td>
<td></td>
<td>.02</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Construct Exhibit 6 (Aquacourt)</td>
<td></td>
<td>.03</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Install 2 Backcountry Food Storage Facilities</td>
<td></td>
<td>.03</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Install 2 Frontcountry Food Storage Facilities</td>
<td></td>
<td>.03</td>
<td>.50</td>
</tr>
<tr>
<td></td>
<td>Construct 1 Cement Block Food Storage Bldg. (McLeod Meadows)</td>
<td></td>
<td>.04</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Continue Year 2 Grizzly Bear Research</td>
<td></td>
<td>(1.00)C</td>
<td>8.30</td>
</tr>
<tr>
<td>1987</td>
<td>Complete Year 3 Grizzly Bear Research</td>
<td></td>
<td>(1.00)C</td>
<td>8.30</td>
</tr>
<tr>
<td></td>
<td>Construct Exhibit 8 (Marble Canyon)</td>
<td></td>
<td>.04</td>
<td>2.00</td>
</tr>
<tr>
<td>1988</td>
<td>Contract 1 Academic Expert (re. BMET)</td>
<td></td>
<td></td>
<td>.50</td>
</tr>
<tr>
<td></td>
<td>Initiate Year 1 Black Bear Research</td>
<td></td>
<td>(1.00)C</td>
<td>5.00</td>
</tr>
</tbody>
</table>

a O & M = Operation and Maintenance Budget
b PIP = Project Initiation Planning
c Person-year figures in parenthesis represent non-Park person-years. Additional funding will be required for these person-years.
71.

REFERENCES


This form is currently being developed.

### Side 1

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hour DAY MON YEAR OFFICER PARK OBS #</td>
</tr>
<tr>
<td>16</td>
<td>Watershed ASP ELEV TOPO ft</td>
</tr>
<tr>
<td>17</td>
<td>UTM COORDS east north</td>
</tr>
<tr>
<td>32</td>
<td>Total UNK ADULT unk yov yov</td>
</tr>
<tr>
<td>50</td>
<td>MARKED: Yes No</td>
</tr>
<tr>
<td>66</td>
<td>Behavior: Feed Hunt Best Drink Travel/migrate Other Lick mMate uAfraid/encounter dEn/nest</td>
</tr>
<tr>
<td>68</td>
<td>Snow Crust: None Light Medium Hard</td>
</tr>
<tr>
<td>69</td>
<td>Captured: Yes No</td>
</tr>
<tr>
<td>70</td>
<td>Action: Autopsy mOVE Tranquillize trp&amp;mvoe other</td>
</tr>
<tr>
<td>71</td>
<td>Sign: None One Few Mod Abund Unk</td>
</tr>
<tr>
<td>72</td>
<td>Food Type: Brow Forb Grass Mix Aqua gabbage mEat/carrion Unk/other</td>
</tr>
<tr>
<td>73</td>
<td>Mortality: Rr Hwy Pred Dis Winter pOach dEs Unk/other</td>
</tr>
<tr>
<td>12/82</td>
<td>M, P, 1, 7</td>
</tr>
</tbody>
</table>

### Side 2

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Notes 1</td>
</tr>
<tr>
<td>76</td>
<td>Field 1</td>
</tr>
<tr>
<td>32</td>
<td>Notes 2</td>
</tr>
<tr>
<td>76</td>
<td>Field 2</td>
</tr>
<tr>
<td>50</td>
<td>Notes 3</td>
</tr>
<tr>
<td>76</td>
<td>Field 3</td>
</tr>
<tr>
<td>80</td>
<td>Notes 4</td>
</tr>
<tr>
<td>76</td>
<td>Field 4</td>
</tr>
</tbody>
</table>
### Appendix 3. West Gate Information Centre - Daily Bear Monitoring Input Sheet. KNP June 5, 1984

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Obser.</th>
<th>Species</th>
<th># Adult Bears</th>
<th># Cubs yo,yoly</th>
<th>Location</th>
<th>Behaviour</th>
<th>Comments</th>
<th>Wildlife Card</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 5</td>
<td>0730</td>
<td>XXX</td>
<td>B</td>
<td>1</td>
<td>1/2 mi. N.VXing</td>
<td>grazing</td>
<td></td>
<td>bear paid no attention</td>
<td>Info Centre</td>
<td></td>
</tr>
<tr>
<td>June 5</td>
<td>0830</td>
<td>JST</td>
<td>G</td>
<td>1</td>
<td>1</td>
<td>Goodsir Pass</td>
<td>grazing</td>
<td>bears ran up slope</td>
<td>JST</td>
<td></td>
</tr>
</tbody>
</table>

**OTHER REPORTS**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Obser.</th>
<th>Species</th>
<th># Adult Bears</th>
<th># Cubs yo,yoly</th>
<th>Location</th>
<th>Behaviour</th>
<th>Comments</th>
<th>DW notified</th>
<th>Management Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 5</td>
<td>1200</td>
<td>JST</td>
<td>U</td>
<td>—</td>
<td>MM-K6</td>
<td></td>
<td>got into cooler</td>
<td>cooler left out</td>
<td>—</td>
<td>set trap; charged camper</td>
</tr>
<tr>
<td>June 5</td>
<td>1500</td>
<td>XXX</td>
<td>B</td>
<td></td>
<td>RD-G5</td>
<td></td>
<td>got into cooler</td>
<td>cooler left out</td>
<td>JST</td>
<td>set trap; notified gate, warned camper, complete OR</td>
</tr>
<tr>
<td>June 5</td>
<td>1400</td>
<td>DW</td>
<td>G</td>
<td></td>
<td>Floe L. Basin</td>
<td>Bluff charge</td>
<td></td>
<td>surprised bear</td>
<td>BRS</td>
<td>will post warnings, notify Banff &amp; Yoho warden offices, OR</td>
</tr>
<tr>
<td>June 5</td>
<td>1430</td>
<td>BRS</td>
<td>G</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>posted warnings at trailhead coolers seized to Wd.Hdqtrs, OR</td>
</tr>
<tr>
<td>June 5</td>
<td>1700</td>
<td>B1</td>
<td></td>
<td></td>
<td>RD-E5,E7</td>
<td>cooler left out</td>
<td></td>
<td></td>
<td></td>
<td>completed WO; notified WG to info. trades in AM.</td>
</tr>
<tr>
<td>June 5</td>
<td>1730</td>
<td>B1</td>
<td></td>
<td></td>
<td>RD-B section</td>
<td>garbage shed door open not closing properly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix 4. West Gate Information Centre - Weekly Bear Monitoring Input Summary. KNP. For the week ending June 6, 1984

### NON-AGGRESSIVE ENCOUNTERS

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Obser.</th>
<th>Species</th>
<th># Adults</th>
<th># Cubs</th>
<th>Location</th>
<th>Behaviour</th>
<th>Comments</th>
</tr>
</thead>
</table>

### INCIDENTS

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Obser.</th>
<th>Species</th>
<th># Adults</th>
<th># Cubs</th>
<th>Location</th>
<th>Details of Incident</th>
<th>Comments (include mgmt action)</th>
</tr>
</thead>
</table>

### AGGRESSIVE ENCOUNTERS

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Obser.</th>
<th>Species</th>
<th># Adults</th>
<th># Cubs</th>
<th>Location</th>
<th>Details of Incident</th>
<th>Comments (include mgmt action)</th>
</tr>
</thead>
</table>

### GARBAGE STORAGE DEFICIENCIES

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Details</th>
<th>Management Action</th>
</tr>
</thead>
</table>

### FOOD STORAGE DEFICIENCIES

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Details</th>
<th>Management Action</th>
</tr>
</thead>
</table>

### WARNINGS POSTED

<table>
<thead>
<tr>
<th>Effective Date</th>
<th>Location</th>
<th>Reason</th>
</tr>
</thead>
</table>

### AREA CLOSURES

<table>
<thead>
<tr>
<th>Effective Date</th>
<th>Location</th>
<th>Reason</th>
</tr>
</thead>
</table>
Appendix 5. Estimated number of garbage storage deficiencies. KNP 1980-83

<table>
<thead>
<tr>
<th>Site Location</th>
<th>Number of Deficient Site-Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Gate Information</td>
<td></td>
</tr>
<tr>
<td>(garbage piled beside letter box containers)</td>
<td></td>
</tr>
<tr>
<td>1 site x 50 da/yr x 1980-83</td>
<td>200</td>
</tr>
<tr>
<td>Aquacourt Neufeldt</td>
<td></td>
</tr>
<tr>
<td>(garbage piled beside container)</td>
<td></td>
</tr>
<tr>
<td>1 site x 50 da/yr x 1982-83</td>
<td>100</td>
</tr>
<tr>
<td>Aquacourt Deck</td>
<td></td>
</tr>
<tr>
<td>(6 non-bearproof containers)</td>
<td></td>
</tr>
<tr>
<td>1 site x 184 da/yr x 1980-83</td>
<td>736</td>
</tr>
<tr>
<td>Redstreak Campground</td>
<td></td>
</tr>
<tr>
<td>(garbage building doors non-functional)</td>
<td></td>
</tr>
<tr>
<td>8 buildings x 184 da/yr x 1983</td>
<td>1472</td>
</tr>
<tr>
<td>McLeod Meadows</td>
<td></td>
</tr>
<tr>
<td>(poorly constructed wooden garbage building)</td>
<td></td>
</tr>
<tr>
<td>1 building x 184 da/yr x 1980-83</td>
<td>736</td>
</tr>
<tr>
<td>Kootenay Crossing</td>
<td></td>
</tr>
<tr>
<td>(garbage building door non-functional)</td>
<td></td>
</tr>
<tr>
<td>1 building x 184 da/yr x 1983</td>
<td>184</td>
</tr>
<tr>
<td>Redstreak Warden Residences</td>
<td></td>
</tr>
<tr>
<td>(no facilities other than open cans)</td>
<td></td>
</tr>
<tr>
<td>2 sites x 184 day/yr x 1980-81</td>
<td>736</td>
</tr>
<tr>
<td>Paint Pots Nature Trail</td>
<td></td>
</tr>
<tr>
<td>(open garbage container)</td>
<td></td>
</tr>
<tr>
<td>1 site x 184 da/yr x 1980-82</td>
<td>552</td>
</tr>
<tr>
<td>Juniper Trailhead</td>
<td></td>
</tr>
<tr>
<td>(open garbage container)</td>
<td></td>
</tr>
<tr>
<td>1 site x 184 da/yr x 1980-82</td>
<td>552</td>
</tr>
<tr>
<td>Radium Lodge</td>
<td></td>
</tr>
<tr>
<td>(open garbage can plus non-functional building)</td>
<td></td>
</tr>
<tr>
<td>2 sites x 184 da/yr x 1980-83</td>
<td>1472</td>
</tr>
<tr>
<td>Mount Farnham Bungalows</td>
<td></td>
</tr>
<tr>
<td>(non bear proof garbage shed)</td>
<td></td>
</tr>
<tr>
<td>1 site x 184 da/yr x 1980-83</td>
<td>736</td>
</tr>
<tr>
<td>Vermilion Crossing Bungalows</td>
<td></td>
</tr>
<tr>
<td>(no garbage facilities; cesspool covers non bear proof)</td>
<td></td>
</tr>
<tr>
<td>3 sites x 120 da/yr x 1980-83</td>
<td>1440</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8916</td>
</tr>
</tbody>
</table>

a Estimates based on the author’s field observations.
<table>
<thead>
<tr>
<th>Date</th>
<th>Site No.</th>
<th>Location</th>
<th>Garbage Left Out Can Not Full</th>
<th>Garbage Left Out Can Full</th>
<th>Repairs Needed</th>
<th>Report by</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 5/83</td>
<td>5</td>
<td>Cobb L.</td>
<td>X</td>
<td></td>
<td></td>
<td>ERT</td>
<td>big bags</td>
</tr>
<tr>
<td>June 5/83</td>
<td>15</td>
<td>Koot. Pond</td>
<td></td>
<td>X</td>
<td></td>
<td>ERT</td>
<td></td>
</tr>
<tr>
<td>June 5/83</td>
<td>35</td>
<td>Paint Pots</td>
<td></td>
<td></td>
<td>base loose</td>
<td>ERT</td>
<td></td>
</tr>
<tr>
<td>June 5/83</td>
<td>38</td>
<td>Divide</td>
<td>X</td>
<td></td>
<td></td>
<td>ERT</td>
<td>big bags</td>
</tr>
<tr>
<td>June 5/83</td>
<td>18</td>
<td>Redstreak</td>
<td></td>
<td></td>
<td>door not closing</td>
<td>ERT</td>
<td>warped door</td>
</tr>
<tr>
<td>June 5/83</td>
<td>23</td>
<td>Aquacourt</td>
<td>X</td>
<td></td>
<td></td>
<td>ERT</td>
<td></td>
</tr>
<tr>
<td>June 5/83</td>
<td>24</td>
<td>Aquacourt</td>
<td>X</td>
<td></td>
<td></td>
<td>ERT</td>
<td>2nd time this week.</td>
</tr>
</tbody>
</table>

INSTRUCTIONS: Please complete on the same day that the deficiency is first noticed. Forward report to Trades Supervisor at end of day shift. Trades Supervisor to complete work orders where necessary and file all original reports.
LITERATURE CITED


STATUTES CITED

Occupier's Liability Act, S.A. 1973, c.79.
Occupier's Liability Act, S.B.C. 1974, c.60.

REGULATIONS CITED

National Parks Act, National Parks Businesses Regulations, Canada Gazette, Chapter 1115.
REGULATIONS CITED (Cont'd)


National Parks Act, National Parks Fishing Regulations, Canada Gazette, chapter 1120.

CASES CITED

Ashley v. United States. 326 F.2d 499 (1964).


Intermaur v. Dames, 1866. L.R.I.C.P. 274.


