BIGHORN IN OUR BACKYARD: A COOPERATIVE ECOSYSTEM-BASED EDUCATION, RESEARCH AND MANAGEMENT PROJECT

Jennifer Dubois[1], Bill Swan[1] and Alan D. Dibb[2]

[1]Osprey Communications, Invermere, BC, V0A 1K5 Email: ospreyco@telus.net
[2]Parks Canada, Radium Hot Springs, BC, V0A 1M0 Email: alan.dibb@pc.gc.ca

SUMMARY
The Bighorn In Our Backyard (BIOB) project was initiated in 1997 by Osprey Communications with the support of Parks Canada in the Radium Hot Springs area at the southwestern edge of Kootenay National Park, British Columbia. The project's partners now include three levels of government, First Nations, industry, and locally based interest groups. Blue-listed Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) are used as an ambassador species to focus conservation attention on open forest and grassland ecosystems. These ecosystems are considered threatened in British Columbia. Two primary issues that affect bighorns are the loss and degradation of winter range due to forest ingrowth in historically fire-maintained ecosystems and human encroachment. Highway mortality, harassment from humans and dogs, noxious weeds and potential transmission of disease from livestock also affect bighorns in the Radium Hot Springs area. The project has four primary objectives pertaining to bighorns and their habitat: (1) raise public awareness and motivate positive action, (2) involve local residents in a bighorn community monitoring program, (3) prepare a multi-agency ecosystem restoration plan for bighorn winter range in the Radium Hot Springs area and undertake ecosystem research and restoration initiatives, and (4) assess and encourage potential community-based economic returns associated with the conservation of ecosystems and wildlife. In 1997-2000 the Bighorn In Our Backyard project was mainly active in stewardship, education and citizen monitoring activities. This fostered broad understanding and support within the community for conservation measures for bighorn, and set the stage for research and restoration activities beginning in 2001. The current focus of the project has shifted to ecosystem restoration and continued research to refine ecosystem restoration activities. These activities includes mechanical thinning of forest ingrowth on low elevation bighorn winter range within and adjacent to Kootenay National Park, and development of a restoration plan including use of fire for winter and transitional ranges.

1. INTRODUCTION

Bighorn In Our Backyard (BIOB) was born out of a growing concern for the Radium-Stoddart herd of Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) and their associated ecosystem near the Village of Radium Hot Springs, BC.

The Radium-Stoddart herd ranges in the alpine of Kootenay National Park in the summer where high quality range is plentiful (1). In winter, the Radium-Stoddart herd is concentrated on a relatively small range centred on the Village of Radium Hot Springs. The winter range for this herd can be a limiting factor with poorer quality and quantity of forage and exposure to the many hazards associated with human development and activity.

Historically, the herd utilized a larger critical winter range than at present (2,3,4). Changes in winter range use have been primarily attributed to encroachment of closed

coniferous forests on grasslands and open forest habitats and to human development of the winter range.

Prior to European settlement, much of the Rocky Mountain Trench was composed of open forest and grassland (5). This area was characterized by frequent low-intensity fires which maintained fire resistant, well-spaced veteran trees and healthy grasslands. Subsequent fire suppression associated with European settlement appears to have altered fire regimes in this area, with conifer ingrowth responsible for conversion of many open forests and grasslands to closed canopy stands and treed grasslands. Infrequent fires of potentially very high intensity characterize the present fire regime (5,6).

The Village of Radium Hot Springs is a small but fast growing community and serves as a gateway to the mountain national parks and the Columbia Valley. Residents and visitors are attracted to the area's natural beauty and diverse outdoor recreation opportunities. Continued development pressure and habitat fragmentation of bighorn winter range occur as the village expands to accommodate the needs of residents and visitors. Additionally, bighorns are affected by highway mortality, harassment from humans and dogs, noxious weeds and potential transmission of disease from livestock.

Recognizing the need to develop ecosystem-based management models that engaged non-traditional audiences, as well as the need to be more creative in addressing complex issues, Osprey Communications, an environmental education and communications firm and Parks Canada initiated the BIOB project in 1997. The project's overall goal is to ensure that Rocky Mountain bighorn sheep and their associated ecosystem processes are present in the Radium-Stoddart area in perpetuity.

The BIOB project takes an ecosystem-based approach and uses blue-listed bighorn sheep as an ambassador species to explore issues around open forest and grassland habitats, which are considered threatened in British Columbia (7,8). Osprey Communications coordinates the BIOB project, which is supported by a multi-agency Working Group. The Radium-Stoddart Bighorn Sheep Working Group helps direct the monitoring, research and management of the Radium-Stoddart herd. This group includes representation of three levels of government, First Nations, land management agencies responsible for bighorn sheep management, as well as private and public interests.

2. BIOB PROJECT OBJECTIVES

BIOB takes a four-pronged approach by focusing on education and outreach, stewardship, research and restoration, and sustainable community development to address issues on the critical winter range.

Efforts over the first three years of the BIOB project endeavored to raise the level of ecological literacy within the community, and to build stewardship through a program of education and outreach and citizen monitoring activities. This fostered broad understanding and support within the community for conservation measures for bighorn, and set the stage for research and restoration activities, which are the current thrust of the project.

See Figure 1.

2.1 Education and Outreach

A critical component of the BIOB project is education and outreach. By building ecological literacy within the community and investing in developing relationships with the stakeholders and non-traditional audiences over the long-term, a foundation of support for management action is laid.

2.1.1 Objective

"To raise public awareness and motivate positive action about issues facing bighorn sheep and their associated ecosystem in the Radium-Stoddart area."

2.1.2 Methods

BIOB delivers education and outreach through regional slide presentations, participation in local, regional and national conferences, staging open houses, public events and field tours, publishing a quarterly newsletter and maintaining a web site (http://www.radiumhotsprings.com/village/bighorn/index_new.htm). Slide presentations focusing on the biology and ecology of bighorn, the Radium-Stoddart herd case study, fire-maintained ecosystems and ecosystem restoration in the Rocky Mountain Trench help set the ecological context and build support for the project and its goals. Field tours are used with a broad range of audiences to interpret and illustrate the need for the project within bighorn sheep range.

2.1.3 Results

The BIOB project has been presented in over 12 communities in the region, as well as provincially and internationally at conferences. The profile of the project has been raised through media attention at local to national levels, including a feature display and video vignette at the new Parks Canada Discovery Centre in Hamilton, Ontario. Consequently, broad support for BIOB has been established and, we believe, has been responsible for a significant change in human behaviour towards bighorns and their ecosystems. The Village of Radium Hot Springs incorporated many of the project research outcomes in its updated Official Community Plan in 2001 demonstrating a significant level of commitment to the project and its objectives.

2.2 Bighorn Community Monitoring Program

Through hands-on community stewardship, the Bighorn Community Monitoring Program has helped the BIOB project to document physical and temporal changes in the use of winter range by the Radium-Stoddart herd. Not only do these results provide a benchmark against which future bighorn winter range use patterns can be compared, they help assist in community planning and in the formulation, conducting and evaluation of treed and open grassland ecosystem restoration initiatives in the Radium-Stoddart bighorn winter range. Equally important, the program helps develop life-long community stewards.

2.2.1 Objective

"To involve local residents in a bighorn community monitoring program."

2.2.2 Methods

At the start of each winter, 15 or more volunteers from the community of Radium Hot Springs, BC and area begin their season of bighorn sheep monitoring. Many volunteers

return year after year, and new volunteers learn of the program through the local media and presentations on the BIOB project, as well as through word of mouth.

The Bighorn Community Monitoring program coordinator enlists, trains and motivates the volunteers as well as manages the resulting data. The program coordinator works closely with the BIOB project coordinator to maintain a steady flow of information between the volunteers and the project as a whole.

The monitoring season runs from November to April, during which the volunteers systematically collect occurrence and behavioural data on the Radium-Stoddart Rocky Mountain bighorn sheep herd throughout its current and former critical winter range.

The critical winter range is divided into 14 survey units and the volunteers are responsible for conducting a thorough survey of their chosen unit on a weekly basis. Observations are indicated on individual survey unit maps, and corresponding data such as total number, age class and sex of sheep are recorded. These observation forms are then compiled into a digital database and mapped with a Geographic Information System.

On a monthly basis, the Bighorn Community Monitoring program coordinator and the volunteers meet after an all units survey, where each survey unit is monitored simultaneously to estimate minimum population size and distribution on the landscape.

2.2.3 Results

Over the five years of the Bighorn Community Monitoring program, over 9000 bighorn observations have been compiled into a master database (9). These observations demonstrate a continued trend towards use of human dominated landscapes such as golf courses and highway margins, which emulate natural habitats of grassland and open forests. As well, sheep are returning earlier to their winter range and leaving later, thereby spending more time on the winter range where human-caused impacts such as highway mortality can take a significant toll on population numbers (9). From January 2003 to April 2003, for example, three sheep from the Radium-Stoddart herd have been killed on the Mile Hill, a 2 km section of the main highway immediately south of Radium Hot Springs (4). Community monitoring data for the winter of 2002-03 showed a minimum population size of 180, although a high count of 217 was obtained in February 2002 using telemetry to locate sheep (4). As well as providing a valuable benchmark, the Bighorn Community Monitoring program data are being used to help determine potential sites for ecosystem restoration and to evaluate the use of sites where ecosystem restoration has been initiated.

The Bighorn Community Monitoring program has enjoyed great success and high levels of participation and commitment. Over the years, three Village of Radium Hot Springs councillors have participated in the program along with many volunteers from diverse backgrounds. This fosters cooperation and understanding among groups and individuals who traditionally may be on opposite sides of environmental issues. The resulting community support furthers the ability of land managers, working with the BIOB project, to carry out management action on the ground.

2.3 Research and Restoration

Restoration priorities for the Radium-Stoddart bighorns are determined using a program of scientific research on bighorn ecology and habitat. Research and restoration plans are vetted through the multi-agency Radium-Stoddart Bighorn Sheep Working Group, and unique partnerships between government, industry and public interests have developed to achieve the goals of the project.

2.3.1 Objective

"Prepare a multi-agency ecosystem restoration plan for bighorn winter range in the Radium Hot Springs area and undertake ecosystem research and restoration initiatives."

2.3.2 Methods

The jurisdictional complexity of bighorn range at Radium Hot Springs necessitates cooperative, multi-partner approaches to research and restoration. Diverse mechanisms for fund-raising, and participation of scientists and managers from many cooperating agencies and organizations are essential elements of these programs. BIOB conducts and collaborates on research using an adaptive management approach to support and refine restoration and management objectives and actions.

2.3.3 Results

2.3.3.1 Restoration: To date, ecosystem restoration to reduce conifer ingrowth has been initiated on 240 hectares within the critical winter range, with two parcels on provincial crown land and two parcels on federal land within or adjacent to Kootenay National Park. In October 2000, the BC Ministry of Forests and the Radium-Stoddart Bighorn Sheep Working Group laid out a 54-hectare parcel at Stoddart Creek within an area that historically was primary winter range for bighorns but which has seen declining use in the last 15 years (4). The area was selectively logged and brushed by the end of January 2001, and the logging slash was later burnt in fall 2002. A second block of approximately 60 hectares adjacent to Kootenay National Park was treated in one pass during winter 2002.

In order to assess the effectiveness of the ecosystem restoration on provincial crown land for bighorn sheep sight lines, pre and post treatment habitat visibility testing was conducted as described by Smith et al. (10). Since treatment on the Stoddart Creek and Radium sites, a noticeable increase in sheep observations has been recorded by Bighorn Community Monitors, BIOB staff and Parks Canada personnel (4,9).

Restoration activities have also taken place on Kootenay National Park lands. In 2002 Parks Canada purchased and removed three sets of commercial cabins, totaling 53 units, in Sinclair Canyon. This site is part of bighorn winter range, is near bighorn mineral licks, and is part of what is believed to be a major travel corridor for bighorns between their seasonal ranges (11).

The second restoration site in Kootenay National Park, at the foot of Redstreak Mountain, is on the edge of the historic winter range for the Radium-Stoddart bighorns and was identified by Tremblay (11) as part of a potential movement corridor. For a more complete description of the restoration treatments see Tremblay and Dibb (12).

2.3.3.2 Research: In summer 2001 Bob Gray of R.W.Gray Consulting Ltd. completed a fire history and stand reconstruction study within the critical historic winter range of the Radium-Stoddart bighorn sheep herd. The fire history study objective was to determine the pre-settlement fire regime, while the stand reconstruction study objectives were to describe the present forest structure, determine and describe the pre-European settlement forest structure, and compare the two in regards to bighorn sheep habitat requirements (5). Results from the study assisted the Radium-Stoddart Bighorn Sheep Working Group in the formulation of a long-term ecosystem restoration plan.

Work from Tremblay (11), focusing on the modeling and management of potential movement corridors for bighorn sheep, elk and grizzly bear also contributed to the identification of potential restoration sites. Her research identified potential corridors for bighorn sheep in the greater Radium Hot Springs area as well as potential corridors in the immediate vicinity of the Village.

In order to guide and evaluate habitat restoration and test theorized travel corridors between seasonal ranges, as well as to address other bighorn sheep ecology and habitat questions, a radio telemetry study was initiated in 2001. The broad goals of this study are to determine location and characteristics of bighorn movement routes, to evaluate bighorn response to restoration work, to identify sites of concentrated bighorn activity, and to investigate whether there is population interchange with neighbouring herds. This study is described in more detail in Tremblay and Dibb, and Kinley (12,13).

2.4 Sustainable Community Development

Recognition of the link between healthy ecosystems and healthy communities is critical to the success of sustainable community development initiatives. The overall prosperity of communities is positively correlated with the overall health of the ecosystems on which they are based. The BIOB project incorporates environmental, social and economic considerations in its project planning.

2.4.1 Objective

"Assess and encourage potential community-based economic returns associated with the conservation of ecosystems and wildlife."

2.4.2 Methods

The BIOB project continues to develop and strengthen its partnerships with the Village of Radium Hot Springs, the Radium Chamber of Commerce, the Friends of Kootenay National Park and other private and public interests. Together with these groups, BIOB has worked to educate residents and visitors about the benefits of healthy ecosystems to communities.

2.4.3 Results

The Village of Radium Hot Springs demonstrated its understanding of the importance of linking economic and ecological prosperity by incorporating many of the BIOB project's results and recommendations in its updated Official Community Plan (OCP) (14).

By planning for some of the needs of bighorn sheep in the OCP, Radium makes a strong statement about its values as a community. A life size statue of a Rocky Mountain bighorn ram, ewe and lamb, created by noted wildlife sculptor Rick Taylor, has been placed outside the Radium Chamber of Commerce and Kootenay National Park Visitor Centre, and serves as a prominent symbol of the importance of bighorns to the community.

The monument also attracts visitors to further explore the Radium Visitor Centre. In collaboration with Parks Canada, Friends of Kootenay National Park and the Ktunaxa-Kinbasket Tribal Council, BIOB has been actively developing project specific content for a series of new displays that will make up the revitalized Radium Visitor Centre. One third of the display space in the Centre will be devoted to the BIOB project.

The Visitor Centre also acts as a meeting point for field trips and outings associated with the annual Living With Wildlife Conference. In cooperation with Friends of Kootenay National Park, Parks Canada and a number of other parties, BIOB has been active in organizing and participating in this three day conference, which focuses on the regional ecosystems, their species and the communities that depend on them. The conference has received a positive response both locally and regionally, and is another means to both educate and engage residents in stewardship and community involvement.

The BIOB project has acted as a catalyst to help demonstrate the link between healthy ecosystems and healthy sustainable communities. By managing for environmental, social and economic needs simultaneously, communities gain a strong competitive edge in economic development.

3. CONCLUSIONS

Since its inception in 1997 the Bighorn In Our Backyard Project coordinated by Osprey Communications has worked along with other members of the Radium-Stoddart Bighorn Sheep Working Group to ensure that Rocky Mountain bighorn sheep and their associated ecosystem processes are present in the Radium-Stoddart area in perpetuity.

The Radium-Stoddart herd of Rocky Mountain bighorn sheep is a transboundary herd moving between Kootenay National Park in summer and into and around the Village of Radium Hot Springs in winter. Historically the herd used a much larger winter range, however due to fire suppression and subsequent conifer ingrowth in combination with habitat fragmentation from increased development, the herd concentrates winter activity on artificial grasslands near the Village of Radium Hot Springs.

The BIOB project employs a four-pronged approach of education and outreach, citizen involvement through a bighorn community monitoring program, research and restoration and sustainable community development in order to realize a high level of support and success in achieving conservation of fire-maintained ecosystems in the Radium Hot Springs area.

Complex issues require greater participation of individuals, stakeholders and agencies and more creativity when developing management solutions. The cooperative approach used by BIOB to build long-term relationships with stakeholders and non-traditional audiences and raise the ecological literacy of the community while engaging citizens in meaningful research yields a sound foundation of support and understanding when applying these management strategies.

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