2021

IMPLEMENTATION REPORT:

MULTI-SPECIES ACTION PLAN for Kejimkujik National Park and National Historic Site of Canada (2017-2022)

Parks Canada Parcs Canada

Canada

Recommended Citation

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For copies of the report, or for additional information on species at risk, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, recovery strategies, action plans and other related recovery documents, please visit the Species at Risk (SAR) Public Registry[1].

Photo credits:

Cover illustration, clockwise from top left: Channel Lake, Megan Gallant, Parks Canada Agency (PCA); Black foam lichen, Cody Chapman, PCA; Monarch butterfly, Cody Chapman, PCA. This page: Piping plover, Megan Gallant, PCA. Page i: Blanding's turtle, Lauren Lawrence, PCA. Page ii: Eastern ribbonsnake, Jeffie McNeil, Mersey Tobeatic Research Institute (MTRI). Page iii: Wrinkled shingle lichen, Troy McMullin, Canadian Museum of Nature (CMN).

Page 1, left to right: Blanding's turtle nest, Cody Chapman, PCA; Water pennywort, PCA; Barn swallow, Megan Gallant, PCA; Lichen foray, Matt Smith, PCA; Frosted glass whiskers lichen, Troy McMullin, CMN; Black foam lichen, Cody Chapman, PCA; Kejimkujik Lake, PCA; Barn swallow, Megan Gallant, PCA; Blue felt lichen, Troy McMullin, CMN. Page 13: Black Ash (Wisqoq), Matt Smith, PCA. Page 14: Blanding's turtle hatchling, Darrin Reid, PCA. Page 15, left to right: Vole ears lichen, Troy McMullin, CMN; Blue felt lichen, Troy McMullin, CMN; Wrinkled shingle lichen, Troy McMullin, CMN. Page 19: Blanding's turtle research, Megan Gallant, PCA. Page 20: Meadow Beach, Megan Gallant, PCA. Page 21: Ben Lake, Lauren Lawrence, PCA.

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[1] http://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

Preface

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996)[2] agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the Species at Risk Act (S.C. 2002, c.29) (SARA), one or more action plan(s) provides the detailed recovery planning that supports the strategic direction set out in the recovery strategy for SARA-listed Extirpated, Endangered and Threatened species. Parks Canada multi-species action plans address a suite of species of conservation concern within one or more Parks Canada managed areas, including species that require an action plan under SARA.

The Minister responsible for the Parks Canada Agency (the Minister of the Environment and Climate Change) is the competent minister under SARA for species found in Kejimkujik National Park and National Historic Site of Canada, and in 2017 published the Multi-species Action Plan for Kejimkujik National Park and National Historic Site of Canada.

Under section 55 of SARA, the competent minister must monitor the implementation of an action plan and the progress towards meeting its objectives, and assess and report on its implementation and its ecological and socio-economic impacts five years after the action plan comes into effect. A copy of the report must be included in the Species at Risk Public Registry. The Minister responsible for the Parks Canada Agency has prepared this Implementation Report: Multi-species Action Plan for Kejimkujik National Park and National Historic Site of Canada (2017-2022).

The achievement of population and distribution objectives identified within the recovery strategy or management plan for a species may require a long time frame. In these cases, a five-year reporting window may not be sufficient to show demonstrable progress towards meeting site-based population and distribution objectives identified for that species within a Parks Canada site-based action plan. Parks Canada monitors, evaluates and, as necessary, adapts measures taken to achieve species survival or recovery, and will report on progress towards meeting site-based population and distribution objectives every five years.

[2] http://www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding/protection-federal-provincial-territorial-accord.html

Acknowledgments

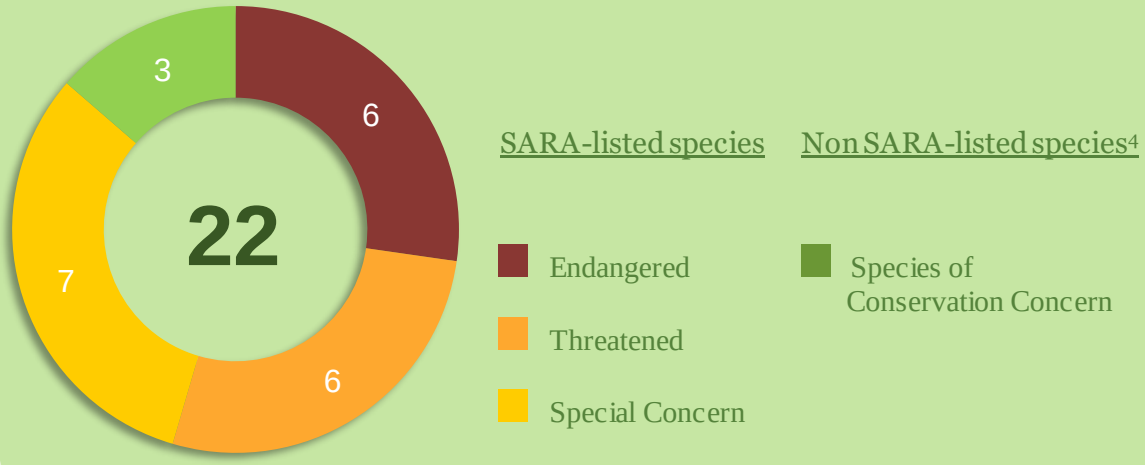
Parks Canada would like to acknowledge those who have contributed to implementation of the Multi-species Action Plan for Kejimkujik National Park and National Historic Site of Canada. Thanks are extended to: the staff of Kejimkujik and Parks Canada, Norm Green and the Friends of Keji Cooperative, Mersey Tobeatic Research Institute, Confederacy of Mainland Mi'kmaq, Acadia First Nations, Mi'kmaw Nuji Kelo-toqatijik Earth Keepers, Acadia University, Environment and Climate Change Canada, Troy McMullin and the Canadian Museum of Nature, University of Waterloo, Canadian Wildlife Service and all the Kejimkujik volunteers that have made much of this possible.

EXECUTIVE SUMMARY

This document reports on implementation of the Multi-species Action Plan for Kejimkujik National Park and National Historic Site (KNPNHS) between 2017 and 2022. It reports on implementation of measures identified in the plan, assesses progress towards meeting site-based population and distribution objectives, and evaluates socio-economic impacts.

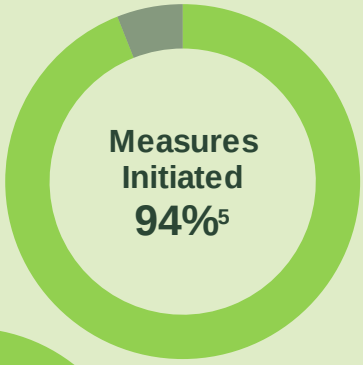
Species Addressed[3]

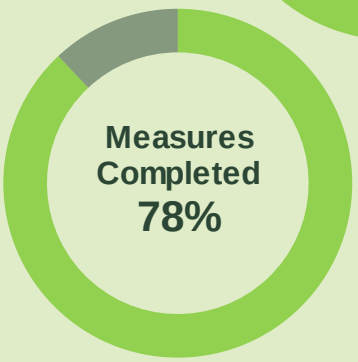
The action plan addressed 19 SARA-listed species and three species of conservation concern. Measures and site-based population and distribution objectives identified within the action plan were focused on four species, for which management actions within KNPNHS could have a substantive impact on species survival or recovery: Blanding's Turtle, Eastern Ribbonsnake, Water Pennywort, and Piping Plover.



[3] The SARA-listing classifications for the species in this report may differ from the Multi-species Action Plan due to changes made to Schedule 1 of the *Species at Risk Act* since the action plan was published.
[4] Including non SARA-listed species of conservation concern (COSEWIC assessed, provincially listed, culturally significant species) in addition to SARA listed species provides the Parks Canada Agency with a comprehensive plan for species conservation and recovery at the site.

Implementation of the Action Plan



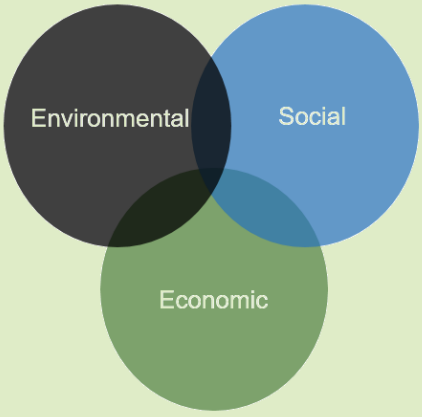


18 measures (recovery actions) were identified in the multi-species action plan. Implementation of the action plan is assessed by determining progress towards completing each measure, and is outlined in Section 2 of this report. During the five-year period, 17 committed measures were initiated[5] and 14 were completed. An additional 14 measures were implemented because resources and/or partnerships became available to support the work.

Ecological Impacts

4 site-based, population and distribution objectives (PDOs) were developed in the action plan. Ecological impacts are assessed by measuring progress towards achieving each of the site-based population and distribution objectives and are outlined in Section 4. Progress was made on all objectives including two that were fully achieved.

Socio-Economic Impacts



Direct costs of implementing this action plan were borne by Parks Canada. Indirect costs were minimal, while benefits included positive impacts on park ecological integrity, greater awareness of species and enhanced opportunities for engagement of visitors, local communities and Indigenous groups.

[5] Includes measures that are 100% completed.

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1. CONTEXT

This document reports on implementation of the Multi-species Action Plan for KNPNHS[6] between 2017 and 2022, assesses progress towards meeting its population and distribution objectives, and evaluates its socio-economic impacts. It addresses 22 species, including 12 SARA-listed Extirpated, Endangered, and Threatened species (for which an action plan is required) as well as 7 SARA-listed Special Concern species[7]. American Eel, Black Ash, and Mainland Moose are included in this action plan as they are indicated as culturally significant species for the Mi'kmaq of the Kespukwitk area and are provincially listed SAR.

Site-based population and distribution objectives were developed for four species for which implementation measures within KNPNHS could have a substantive impact on recovery: Blanding's Turtle, Piping Plover, Eastern Ribbonsnake, and Water Pennywort.

2. IMPLEMENTATION OF THE ACTION PLAN

Implementation of the Multi-Species Action Plan for KNPNHS of Canada is assessed by measuring progress towards completing the recovery measures identified in the action plan (Table 1). Refer to the original action plan[6] for a description of each measure, the desired outcomes, and the threats that each measure addresses.

In 2020 there were several restrictions put in place at KNPNHS to combat the spread of COVID-19, including temporary restriction of park management activities. This impacted the ability of the park to complete the implementation of some parts of the action plan during that year.

[6] Parks Canada Agency. 2017. Multi-species Action Plan for Kejimkujik National Park and National Historic Site of Canada. Species at Risk Act Action Plan Series. Parks Canada Agency, Ottawa. v + 28 pp.
[7] The status of these species may have changed over the reporting period.

Table 1. Progress towards completing recovery measures committed to by Kejimkujik National Park and National Historic Site (* indicates an ongoing measure that may continue into a future multi-species action plan).

Species and measure	Desired outcome	Progress towards outcome	Progress (% complete)
1) Blanding's Turtle: Mitigate threats to Blanding's Turtles in KNPNHS through the nest protection program (predators, flooding) and road mortality mitigation measures (speed reduction, signage, education).	Decreased nest loss; reduction of mortality; increased awareness amongst road users about risks to turtles.	Nest protection efforts were maintained through a large volunteer program every year, with the exception of 2020 when COVID-19 restrictions were in place: 2017 – 26 nests protected, 216 hatchlings (72.7% emergence success) 2018 – 24 nests protected, 207 hatchlings (79.0% emergence success) 2019 – 20 nests protected, 137 hatchlings (58.55% emergence success) 2021 – 23 nests protected, 199 hatchlings (76.5% emergence success) In order to increase public awareness and mitigate road mortality of turtles nesting near roadways, road signage and speed bumps along park roadways were installed annually since 2006 and turtle caution signs were installed in new nesting areas along roadways. Since the addition of these road mitigation measures there have been no adult turtle mortalities. See Section 3 'Action Plan Highlights: Blanding's Turtle'.	80%*
2) Blanding's Turtle: Conduct systematic trapping and visual surveys in KNPNHS to locate juvenile and adult Blanding's Turtles and assess survivorship and recovery.	Long-term monitoring measure tied to KNPNHS's Blanding's Turtle Ecological Integrity monitoring measure. Data compiled in the central turtle database and periodically used to update the	Systematic trapping and visual surveys were conducted in KNPNHS every year except in 2020, when due to COVID-19 restrictions, only visual surveys were conducted. These data contributed to KNPNHS's long-term dataset on adult survivorship, effectiveness of the headstart program, and distribution. The PVA is currently in progress and being updated using data from 2021.	100%*

	population viability analysis (PVA).		
3) Blanding's Turtle: Photo document nesting site habitat over time to ensure that existing and emerging threats to nesting habitat are being identified and adequately mitigated.	Documentation of habitat changes to nesting beaches over time in KNPNHS following the developed protocol.	Habitat changes on nesting beaches were recorded through photo documentation each fall at all known sites and in the process of developing a modified protocol that will employ drones. One nesting site had become overgrown and cool due to shading. Vegetation was cleared in Winter of 2022.	100%*
4) Blanding's Turtle: Facilitate genetic analysis by collecting scute clipping samples during ongoing monitoring and research.	Further understanding of genetics to fill knowledge gaps.	Genetic material was collected in 2016 and will be analysed when funding becomes available.	50%
5) Blanding's Turtle, Eastern Ribbonsnake: Monitor for alien invasive fish (Smallmouth Bass, Chain Pickerel) and develop a response plan as required.	Maintain freshwater ecosystems that are free of alien invasive species[8].	Surveys for Smallmouth Bass and Chain Pickerel were completed for all monitored lakes in KNPNHS. Chain pickerel are now found throughout KNPNHS. A Conservation and Restoration funded project addressing invasive freshwater fish (PRO2099) is underway to mitigate risks in lakes with known Blanding's Turtle populations and understand the impact of invasive fish on food-webs.	25%*
6) Eastern Ribbonsnake:	Minimize incidental injury or mortality.	In order to mitigate threats, it was important to understand seasonal habitat use. From 2018-21, a pilot project to attach	100%

[8] The desired outcome for this recovery measure was amended from the original action plan to conduct monitoring efforts for presence/absence in all monitored lakes within KNPNHS.

Mitigate risks to Eastern Ribbonsnakes at known sites.		transmitters to snakes was initiated with the Mersey Tobeatic Research Institute to track spring and fall movements between summer sites (wetlands) and overwintering hibernacula sites (upland-forested). Through tracking 20 snakes, six new hibernaculum were found. In order to minimize incidental injury or mortality from radio tracking adjustments to the radio attachments were made: (i) Ensuring the leading edge on the duct tape is in the center of one ventral scale, thus reducing scale ripping when removing radios; and (ii) Ensuring the duct tape end is secured on the top (dorsal side) to reduce debris catching.	
7) Blanding's Turtle, Snapping Turtle, Common Nighthawk: Reduce predation by hyperabundant wildlife (i.e., raccoons, red squirrels) through improved food and garbage storage and by park visitors.	Visitors are aware of their potential impact on wildlife. Increased compliance with campground rules and regulations.	Ambassador patrols for unattended food items in campsites were increased to daily campground patrols. Education was provided to campers regarding proper food disposal. Additional animal proof garbage bins and signage were installed.	100%*
8) Snapping Turtle: Opportunistically cover nests along roadside and beaches as observed.	Decreased nest predation.	Snapping turtle nests were opportunistically covered along roadsides and beaches as observed every year. An average of four nests were opportunistically covered each year.	100%*
9) Piping Plover: Reduce human disturbance on nesting beaches.	Continue education and enforcement to ensure compliance with existing park regulations that help protect plovers.	Beach closures were in place each year during the nesting season until all chicks fledged. There was close collaboration with Park wardens and use of cellular trail cameras at the beginning of the restricted area to monitor compliance. In 2020, new signs were installed, improving overall signage, education, and awareness to visitors.	100%*

10) Piping Plover: Enhance Piping Plover breeding habitat as required (nesting habitat, reduction of perches, etc.).	Increased and/or maintained amount of suitable nesting habitat for Piping Plovers at St. Catherine's River beach.	Amount of suitable nesting habitat was ground-truthed and mapped every year. Overall nesting habitat has decreased in part due to damage by hurricane Dorian, and in part due to observer bias during habitat surveys. The protocol is being modernized with standardized drone imaging to consistently measure the amount of plover habitat.	0%
11) Piping Plover: Contribute to regional monitoring and research initiatives including documenting evidence of predation at each life stage, recording stewardship indicators, and documenting marked birds during breeding and migration.	Knowledge gaps reduced, regional reporting and partnerships continued.	KNPNHS contributed to the Canadian Wildlife Service's Piping Plover banding project, facilitating the banding of 2 adults and 6 chicks (2014-2018), and the subsequent and ongoing re-sight reporting. An average of 3 banded birds were observed each year.	100%
12) Vole Ears Lichen, Blue Felt Lichen: Complete population and distribution inventory work at Kejimkujik Seaside to assess extent and occurrence of rare lichens.	Increased knowledge of rare lichen distribution at Kejimkujik Seaside.	Distribution and inventory of rare lichen at Kejimkujik Seaside was updated in 2018 by Troy McMullin (Canadian Museum of Nature). See section 3 'Action Plan Highlights: Lichen Inventory'.	100%
13) Barn Swallow: Place and maintain nest boxes at selected current and historical	Reduce disturbance and provide nesting habitat for successful nesting of the Barn Swallow.	Barn Swallow nesting habitat was maintained from 2017-2022. In 2017, several nest boxes were installed at the Eel Weir bridge after a construction of a new bridge, although these installations have yet to be successfully used by Barn Swallows.	100%*

Barn Swallow locations in KNPNHS.			
14) Black Ash: Inventory distribution of Black Ash occurrences in KNPNHS through compilation of observation records, traditional ecological knowledge, and surveys of potential habitat.	Improved knowledge of Black Ash distribution in KNPNHS.	An initial Black Ash inventory was completed in Summer of 2019. Using the database from Atlantic Conservation Data Centre (ACCDC), a total of 35 trees were identified. Since the initial survey, an additional 20 trees have been documented through joint efforts with Mi'kmaq, volunteers and partners. ACCDC is developing a habitat suitability layer for Black Ash within Kespukwitk. See section 3 'Action Plan Highlights: Black Ash (Wisqoq) Project'.	100%*
15) Water Pennywort, Long's Bulrush: Complete the Atlantic Coastal Plain Flora (ACPF) Atlas on Kejimkujik Lake to complete population mapping on lakes listed as High Priority in the Recovery Strategy.	Rare Atlantic Coastal Plain Flora occurrences documented and mapped around the shoreline of Kejimkujik Lake.	Atlantic Coastal Plain Flora inventory and mapping was completed during the summer of 2017.	100%
16) Water Pennywort: Seasonally protect Water Pennywort in the Jeremy's Bay campground using signs and barriers. observation records, traditional ecological knowledge, and surveys of potential habitat.	Reduced trampling by park visitors in campground locations where Water Pennywort occurs.	Barriers and signage were put up annually in places of high human activity in the Jeremy's Bay Campground to minimize trampling and create awareness of Water-pennywort to park visitors. The barriers and signs were damaged in 2020 as a result of Hurricane Storm Dorian. Although there was no increase in trampling noted in 2020 or 2021, a reimagining of barriers and signage will be undertaken in 2022.	100%*

17) All Species: Continue to involve the public in meaningful recovery actions for species at risk through collaboration with the KNPNHS volunteer program (recruitment, training, support, capacity, recognition).	Engagement of volunteers in hands-on recovery actions that benefit species at risk and provide memorable and empowering experiences.	A Volunteer Coordinator Position was created in 2019 as part of a Conservation and Restoration funded project (PRO2107). There has been active volunteer engagement in hands-on recovery actions for Blanding's Turtles, Black Ash, Eastern Ribbonsnake, Piping Plover, Monarchs, rare lichens, and Snapping Turtles.	100%*
18) Monarch: Continue Kejimkujik's tagging program and continue to promote the creation of butterfly gardens through "Butterfly Club" kits.	Contribution towards the understanding of Monarch migration pathways. Encouragement of the creation of chemical-free butterfly gardens.	A Monarch tagging program was implemented in 2019 to better understand Monarch movement and migration. Additionally, the creation of butterfly gardens was encouraged through selling of "Butterfly Club" kits at the Mersey River Gift Shop. KNPNHS created two new gardens; one outside the Resource Conservation Office with 50 milkweed plants, and the other within Jeremy's Bay Campground with 200 plants. These were created to increase Monarch habitat, engage visitors and increase awareness, and promote the creation of chemical-free butterfly gardens.	100%

Additional measures were identified in the action plan that would be beneficial to complete should resources become available. Table 2 describes the actions that KNPNHS was able to initiate between 2017 and 2022. Measures from the action plan that were not initiated will be carried forward for consideration in a revised action plan.

Table 2. Progress towards completing additional recovery measures implemented because partnerships and/or resources became available (progress is influenced by the amount of funding / support received); * indicates an ongoing measure that may continue into a future multi-species action plan.

Species and measure	Desired outcome	Progress towards outcome	Progress (% complete)
19) Blanding's Turtle Continued tracking studies of hatchlings and young juveniles to better understand their seasonal movements, survivorship and distribution. Track females to locate new nesting sites and distribution. Track females to locate new nesting sites and evaluate the need for nest protection efforts.	Increased knowledge of the survivorship rate of hatchlings and juveniles, seasonal movements, and habitat requirements.	The Blanding's turtle nest protection program, resulted in an average hatching success rate of 71.7% (from 2017-2021 excluding 2020 data). With no nest protection in 2020, hatchling success was 0% due to nest predation. Adult female tracking has resulted in: - Location of 2 new overwintering sites. - A new nesting female was discovered and tracked to an overwintering location. - A new adult male was also found at this location. - Five new nesting sites that have been added to the nest protection program.	100%*
20) Blanding's Turtle Assess the effectiveness of the turtle headstarting program.	Data has been compiled and analyzed and the effectiveness of the turtle headstarting program has been determined. Recommendations made for improvements if necessary.	Currently, between 16% to 29% of captured juvenile turtles are from the headstart program, highlighting its effectiveness in increasing hatchling/juvenile survivorship. A review and analysis of the headstart program was completed by MTRI in 2019, indicating overall greater survival of headstarted turtles than their wild counterparts.	100%

21) Eastern Ribbonsnake Investigate methods to overcome monitoring and research challenges (tracking movements, marking, etc.).	Efficient methods to track and identify individual Eastern Ribbonsnakes determined and employed.	In 2018-2021, a pilot project successfully tracked 20 Eastern Ribbonsnakes seasonal movements by attaching small transmitters to snakes using duct tape. The radios have a lifespan of 18-28 days once activated and are swapped out regularly. Snakes with transmitters are tracked daily in order to understand seasonal movements. Ventral scale clippings were used to mark individual snakes in areas of consistent monitoring. These individual ventral scale codes are effective in identifying recaptures within the year, but as the snake sheds its skin it becomes increasingly more difficult to identify.	100%
22) Eastern Ribbonsnake Locate and characterize the habitat of juveniles and adults and increase understanding of seasonal movements.	Key habitat requirements and seasonal movement patterns identified and used to inform threat mitigation and critical habitat identification.	Radio tracking efforts were implemented and used to understand the movements of Eastern Ribbonsnakes in Fall from wetland to hibernacula at 4 locations within KNPNHS.	100%*
23) Common Nighthawk, Olive-sided Flycatcher, Rusty Blackbird, Canada Warbler Conduct surveys to determine the extent and occurrence of at-risk birds at Kejimkujik Seaside.	Increased knowledge of at-risk bird distribution at Kejimkujik Seaside.	Inventory of SAR birds was completed in 2019. Additional surveys of Bank swallow habitat and Harlequin duck occurrence were conducted in Fall and Winter of 2021-22.	100%
24) Northern Myotis, Little Brown Myotis, Tri-colored Bat	Understanding of distribution and status of bat species in KNPNHS post-WNS is increased.	Annual acoustic monitoring has been carried out since 2018 by KNPNHS using the North American Bat Monitoring Program protocol. Additionally, KNPNHS partnered with the University of Waterloo on two Masters projects. One project compared baseline	100%*

Assess distribution and abundance of bat species in KNPNHS and compare with baseline data collected in the 2000s.		acoustic data prior to White-nose Syndrome to current acoustic data, showing that the decline of bats at KNPNHS (55% tri-coloured, 69% little brown), was lower than provincial declines of 95%. The other project tracked bat species from foraging sites to roosting sites, identifying several roosts in and around KNPNHS.	
25) Black Ash Investigate the need to protect Black Ash seedlings from impacts of ungulate herbivory (e.g., exclosures and/or enclosures).	Threats to Black Ash recruitment reduced. Number of seedlings protected.	In 2019, 205 Black Ash seedlings were planted and protected using 2m protective sleeves by park staff, volunteers, and local Mi'kmaq youth. Annual health checks are completed in order to determine the success of the protective sleeves. Seedling success has been above 85%. Unprotected seedlings were all heavily browsed by deer.	100%
26) All Species KNPNHS has species observation cards that visitors can fill out, and there has been work in the past few years to expand on this with a map at the VRC and other initiatives that will be rolled out.	Park staff and visitors easily report and share sighting information. Up-to-date database of species observations available.	Species observation cards were updated in 2020. A digital app was created to more easily allow staff to record species sightings, allowing for photo uploads and a map function. This app is currently undergoing revision in order to be accessible to the public. Initial public use test was limited to the 2021 volunteer Loon-Watch program. A 2017 Bioblitz using iNaturalist and ongoing iNaturalist promotion has resulted in over 6500 observations of 1222 species by 364 unique observers over the last 5 years.	100%
27) All Species Encourage and include local Mi'kmaq of Nova Scotia in species at risk recovery efforts.	Local Mi'kmaq are involved in species at risk recovery.	Local Mi'kmaq were involved in both on the ground fieldwork opportunities and knowledge sharing in order to sustain and build on our growing relationships. In 2020 and 2021, American Marten presence and absence surveys using baited camera traps were initiated in collaboration with the Confederacy of Mainland Mi'kmaq (CMM) and local Mi'kmaq. In 2021, Mi'kmaq Earth Keepers aided in Black Ash inventory work in the greater Kespukwitk area and Eastern Ribbonsnake surveys.	100%*

28) All Species Promote species at risk messaging through news media, web content, social media and the KNPNHS visitor guide.	Media content developed and shared.	Team members from External Relations and Resource Conservation worked together to promote species at risk in KNPNHS, reaching over 75,000 people through various social media posts and traditional media (e.g., CBC Land and Sea episode on Blanding's turtle volunteer work https://gem.cbc.ca/media/land-and-sea-network/s19e09). Beginning in 2020, the Volunteer coordinator was interviewed monthly on CBC radio mornings, highlighting Species at Risk education and opportunities to help.	100%*
29) All Species Collaborate with recovery teams and partners to support an ecosystem based approach to recovery, and on projects that are beneficial to recovery in KNPNHS.	Collaboration, efficiencies and sharing are fostered.	KNPNHS collaborates with numerous partners to support the recovery of species at risk, including Mersey Tobeatic Research Institute, Kespukwitk Conservation Collaborative, and Mi'kmaq Earth Keepers. Kejimkujik staff are members of several provincial SAR Recovery Teams and met regularly with them during the implementation period of this action plan.	100%
30) All Species Participate in sharing circles and cultural retreats with interested Mi'kmaq people, to discuss and exchange knowledge about species at risk.	Knowledge is shared in non-conventional ways and understanding between different communities and organizations is increased.	Two separate sharing circle/cultural retreats (one SAR focussed, one Kespukwitk focused) were hosted by local Mi'kmaw communities and attended by several Kejimkujik staff. KNPNHS adapted their annual ash tree health assessment datasheet with local Mi'kmaq knowledge holders to weave both Indigenous knowledge and Western science together, in a two-eyed seeing approach, focusing on optimal basketry traits. Traits included; bark texture, bark color, and a straight section of greater than six feet.	100%
31) All Species Highlight KNPNHS's significance as a National Historic Site by addressing culturally	Park visitors understand connections between culturally important species at risk and KNPNHS's role as a	Black Ash monitoring has been ongoing since 2019. Volunteers from Muin Sipu School in Bear River First Nation aided in the planting Black Ash seedlings. A predictive habitat model has been developed in order to	100%

significant species at risk.	cultural and natural environment.	better understand potential Black Ash occurrences throughout Kespukwitk. A Sweetgrass survey was conducted at Kejimkujik Seaside with an elder and knowledge holders in 2021.	
32) All Species Incorporate species at risk messaging and monitoring into interpretive programming, products, and special events.	Park visitors are increasingly aware of species at risk in KNPNHS and how they can help with protection and recovery.	KNPNHS hosted a number of events and programs and developed several products over the last 5 years to highlight SAR and opportunities for the public to contribute to their recovery. For example: - Monarch butterfly interpretive program (2018) - Black Ash volunteer planting event (2021) - Blanding's Turtle Nest Protection Program - Upgraded Piping plover signage - Friends of Keji gift shop - Butterfly kits, "adopt a Blanding's turtle" - Ongoing outreach and education with the novel 'Learning on the Land' program at the local North Queens School	100%

3. ACTION PLAN HIGHLIGHT:

Black Ash (Wisqoq) Project

Black Ash (Wisqoq in Mi'kmaq), is a Threatened species and culturally important to Mi'kmaq with traditional uses including snowshoe frames, canoe ribs and basket weaving. Park staff worked closely with experts, volunteers, local Mi'kmaq and Mi'kmaw Earth Keepers to improve the understanding of Wisqoq distribution in Kejimkujik and throughout Kespukwitk (Southwest Nova Scotia).

The first targeted survey of Wisqoq was completed in 2019, during which 46 trees were found. In 2020 an additional 5 mature trees and 2 seedlings were found and another 2 in 2021 for a total of 55 mature Black Ash. Mi'kmaw Earth Keepers assisted with these surveys and conducted surveys outside of Kejimkujik. Annual health surveys of the trees will continue in order to detect early presence of and decline due to the Emerald Ash Borer, which has now been detected in Nova Scotia. Working with the Confederacy of Mainland Mi'kmaw and Earth Keepers, an updated annual health assessment datasheet was developed that better weaves Indigenous knowledge with western science.

In 2019, 205 Wisqoq seedlings were planted in two locations within Kejimkujik, including a day of planting with Mi'kmaw youth from Bear River (Lsitkuk) community. Since then the Earth Keepers have expanded this planting to include planting of Wisqoq in local Mi'kmaq communities. The relationships created with local Mi'kmaq communities through the Wisqoq project have benefitted each of us and have expanded to include monitoring and assessment of additional culturally important species (e.g., sweetgrass - welim'qewe'l msiku) as well as additional species at risk (e.g., American marten - Apistane'wj) and invasive species (e.g., Hemlock Woolly Adelgid).

ACTION PLAN HIGHLIGHT:

Blanding's turtle

Blanding's turtle recovery work at KNPNHS has been very successful, and especially over the last five years, with 8 new nesting females discovered, 2 new overwintering sites, an average of 23 nests protected, 263 eggs, 190 hatchings, with an overall hatch success of 71.7% over the 5 year period, and the first ever nesting female that had been hatched from a protected nest. The Blanding's turtle nest protection program, which is run almost exclusively by highly dedicated volunteers, has been ongoing since 1987 and proven to be extremely effective in improving nesting success, public education and engagement as well as providing population data vital to the understanding of this species and its recovery. Restricted access for staff and volunteers in 2020 prevented the nest protection program from being completed. In order to still gain valuable data and help understand the fate of nests, through collaboration with the Mersey Tobeatic Research Institute, a nest predation study was conducted in the 3 local populations. Of the 25 nests monitored, 20 were predated (5/7 in KNPNHS), with an additional 19 unknown Blanding's nests found predated while on surveys, highlighting the importance of continuing the nest protection program in the future.

Highlights over the last 5 years include:

- 2100 volunteer hours per year dedicated to Blanding's turtle protection and recovery
- 80-400 trap nights annually by staff and partners
- Headstarted turtles accounted for 16% (2017), 29% (2018), 25% (2019) and 22% (2021) of captured individuals
- 2 new overwintering sites discovered, increasing known critical habitat
- 8 new nesting females identified
- 5 new nesting sites found, one discovered through tracking a female (Willa) with a satellite tag
- The first nesting female (2017; Dillon-Lorraine) to hatch from one of the first protected nests (1998)

ACTION PLAN HIGHLIGHT:

Lichen Inventory

Lichenologist Dr. Troy McMullin from the Canadian Museum of Nature completed rare lichen inventory work at Kejimkujik Seaside in 2018. The intent of this work was to assess the extent and occurrence of rare lichen species. Limited surveys at the park in recent years located one record of Vole Ears Lichen (Endangered) and a few Blue Felt Lichen records (Special Concern) and it was suspected that more individuals would be located with additional expert search effort. A three-day extensive search was coordinated from Dec 4-6, 2018 and involved eight lichen experts (Dr. Troy McMullin, Frances Anderson, Harold Clapp, John Gallop, Tom Neily, Chris Pepper, Brad Toms and Neils van Miltenberg) and Park Ecologist Matthew Smith. These individuals separated into teams to increase search effort in suitable lichen habitat and spent 157 search hours surveying for lichens.

Highlights from the survey included:

- 15 new records (on 6 trees) of the Endangered Vole Ears Lichen
- 280+ additional records (on 38 trees) of Blue Felt Lichen (Special Concern)
- A new lichen species for the park, Frosted Glass-whiskers (Special Concern) was observed on two trees.
- Another lichen, White-rimmed Shingle Lichen (*Fuscopannaria leucosticte*, Threatened), was also observed along with a number of other regionally rare lichens

4. ECOLOGICAL IMPACTS

Ecological impacts of the action plan are assessed by measuring progress towards meeting the site-based population and distribution objectives described in the action plan (Table 3). See the original action plan for national Population and Distribution Objectives (where available) and General Information and Broad Park Approach for each species.

Table 3. Progress towards achieving site-based population and distribution objectives for species at risk in Kejimkujik National Park and National Historic Site of Canada

Species	Site-based population & distribution objectives	Population monitoring	Progress towards site-based population and distribution objectives	Progress (% achieved)
Blanding's Turtle	A. Maintain or increase adult survivorship at or above 98.56%. Average survival is calculated as a running average over the past five years.	Blanding's Turtles are assessed as part of the ecological integrity monitoring program at KNPNHS. Monitoring data is derived from nest protection, trapping, tracking, visual surveys, and hatchling emergence.	A. Adult survival was 99.8% over the last 5 years	100%
	B. Maintain recruitment at or above four new nesting females every five years, on average.		B. 8 new nesting females have been recruited since 2017.	100%

Eastern Ribbonsnake	Maintain occupancy at known Eastern Ribbonsnake locations in KNPNHS.	Eastern Ribbonsnakes are surveyed at key locations in KNPNHS through visual and conservation canine surveys. Known locations in the park were grouped into four areas: Kejimkujik/George/Snake Lakes; Cobrielle/Peskowesk Lakes; Grafton Lake complex; and North Cranberry Lake.	Visual surveys were conducted in all four areas of the recovery strategy, and Eastern Ribbonsnake presence was confirmed at all areas except North Cranberry Lake.	75%
Water Pennywort	Maintain presence of Water Pennywort at seven known locations in KNPNHS.	Water Pennywort is annually monitored at known locations on Kejimkujik Lake. The population is currently assessed to be stable.	Water Pennywort presence was confirmed and density measured at all 7 locations. Three additional sites were found within KNPNHS over the last 5 years. Beginning in 2021 only presence/absence is monitored in known locations.	100%
Piping Plover	A. Maintain productivity of at least 1.65 fledglings per pair per year.	As part of the ecological integrity monitoring program at KNPNHS, Piping Plover nesting habitat is surveyed from May-August and pairs are monitored following a standardized plover monitoring protocol. KNPNHS participates in the International Piping Plover Census, held every 5 years.	A. Productivity was low in 2017, but has increased since then. The overall 5 year productivity between 2017 and 2021 was 1.58 fledged chicks/pair. 2017 - 0.8 fl/pr; 2018 - 2 fl/pr; 2019 - 1.5 fl/pr; 2020 - Not assessed 2021 - 2 fl/pr. NOTE: Not possible to implement in 2020, due to COVID-19 restrictions.	50%
	B. Maintain at least 4 pairs on St. Catherine's and Little Port Joli beaches.		B. The minimum of 4 pairs was achieved in 3 of 4 years. 2017 – 5 breeding pairs 2018 – 3 breeding pairs	80%

			2019 – 4 breeding pairs 2021 – 4 breeding pairs NOTE: Not possible to implement in 2020, due to COVID-19 restrictions.

5. SOCIO-ECONOMIC IMPACTS

The Species at Risk Act requires the responsible federal minister to report on the socio-economic costs of the multi-species action plan and the benefits derived from its implementation. The MSAP only applies to protected lands and waters under the authority of the Parks Canada Agency, which are often subject to fewer threats (e.g., industrial activities) compared to other areas as the lands are managed to preserve ecological and commemorative integrity. This section does not include socio-economic impacts of existing permitted activities that may be occurring in Parks Canada places as those have been addressed through other processes (e.g., impact assessments). This socio-economic assessment is narrow in scope, as it is focused on the measures implemented within the action plan, and primarily focuses on Indigenous partners, leaseholders, licensees, residents and visitors. The overall socio-economic impacts of the multi-species action plan for KNPNHS, described as costs and benefits, are outlined below.

Costs

The majority of costs to implement this action plan were borne by Parks Canada out of existing salaries and goods and services dollars. This includes incremental salary costs, materials, equipment, and contracting of professional services for measures outlined in Appendix B (Recovery measures that will be conducted by KNPNHS) and Appendix C (Other recovery measures that will be encouraged through partnerships or when additional resources become available) of the action plan. Action plan measures were integrated into the operational management of KNPNHS. These costs to the Parks

Canada Agency were covered by prioritization of existing funds and salary dollars and did not result in additional costs to society. No major socio-economic costs to partners, stakeholders or Indigenous groups were incurred as a result of this action plan.

Additional partnerships and resources included Mersey Tobeatic Research Institute (Eastern ribbonsnake, Blanding's turtle, bats), The Friends of Keji (Blanding's turtle, Monarch butterfly), The Confederacy of Mainland Mi'kmaq (Black ash, American marten), Mi'kmaq Earth Keepers (Black ash, American marten, Eastern ribbonsnake), Kespukwitk Conservation Collaborative, University of Waterloo (bats), Canadian Wildlife Service / Birds Canada (Piping plover, swallows) and Atlantic Canada Conservation Data Centre (ACPF, lichens, Black ash). These partnerships contributed through in-kind support, assistance with monitoring and research in the field, planning, data handling and knowledge sharing.

The action plan applies only to lands and waters in KNPNHS, and did not bring any restrictions to land use outside the sites. As such, this action plan placed no additional socio-economic costs on the public. However, some restrictions were placed on visitors to KNPNHS. The majority of St. Catherine's beach at Kejimkujik Seaside was closed to visitors from May to August each year to reduce disturbance to nesting Piping Plovers. Closures were supported through visitor engagement and education by Parks Canada staff and enforcement personnel.

Benefits

Measures presented in this action plan for KNPNHS contributed to meeting population and distribution objectives for Threatened and Endangered species, and also contributed to meeting management objectives for species of Special Concern. These measures had an overall positive impact on ecological integrity and biodiversity, while also contributing to efforts to increase visitor and public awareness.

Potential economic benefits of the recovery of the species at risk found in these sites cannot be easily quantified, as many of the values derived from wildlife are non-market commodities that are difficult to appraise in financial terms. Wildlife, in all its forms, has value in and of itself, and is valued by Canadians for aesthetic, cultural, spiritual, recreational, educational, historical, economic, medical, ecological and scientific reasons. The conservation of wildlife at risk is an important component of the Government of Canada's commitment to conserving biological diversity, and is important to Canada's current and future economic and natural wealth.

This action plan included measures that likely resulted in benefits to Canadians such as positive impacts on biodiversity and the value individuals place on preserving biodiversity. The measures sought a balanced approach to reducing or eliminating threats to species at risk populations and habitats, and included protection of individuals and their habitat, species re-establishment, and increasing public awareness and stewardship.

Working with partners, volunteers and Mi'kmaq, KNPNHS was able to complete recovery actions benefiting Species at Risk, biodiversity, ecosystem and cultural integrity as well as protecting visitors' appreciation of cultural and natural heritage.

Some specific Species at Risk outcomes have included:

1. The Blanding's turtle nest protection program is undertaken yearly, primarily by volunteers, to reduce predation of turtle nests. KNPNHS also reduces the risk of vehicular mortality by installing road signage, speed bumps, and reducing speed limits, particularly during nesting and hatchling emergence.
2. Expanded knowledge of rare lichens through expert lichen forays at both seaside and mainland portions of KNPNHS.
3. Developed novel methods for radio tracking Eastern ribbonsnake in order to determine habitat use and in particular identifying overwintering hibernaculum, critical habitat for this difficult to study species.
4. Worked closely with local Mi'kmaq on Black ash recovery efforts including inventory, health assessment, predictive modelling and planting seedlings within KNPNHS. This knowledge was then taken back to Mi'kmaw communities for expansion of Black ash recovery efforts regionally.
5. Worked with Mi'kmaq Earth Keepers and knowledge holders to share and weave Mi'kmaw ways of knowing with western science for a more holistic approach to species conservation.
6. Expanded our work on species of cultural importance, including Sweetgrass forays with an elder, adopting Confederacy of Mainland Mi'kmaq's American marten monitoring protocols and cooperative work on Black ash monitoring and recovery.

Implementing this action plan had positive benefits for park visitors, local residents, and Mi'kmaq. Activities in the plan created opportunities for Mi'kmaq, local residents and visitors to become involved in the recovery of species at risk and for cooperation and community partnerships in species recovery. As a result of this Action Plan, two cultural retreats (Stone Bear) and an Elder meeting were hosted by partners within the Kespukwitk Conservation Collaborative in order to braid Mi'kmaw Knowledge with current and new recovery measures for SAR, allowing for relationship building, and a holistic approach to SAR recovery throughout Kespukwitk. Indigenous partners were involved in the implementation of recovery measures in this Action Plan, specifically Eastern Ribbonsnake and Black Ash.

Summary

The measures proposed in the action plan had limited socio-economic impact and placed no restrictions on land outside the boundary of the KNPNHS. Direct costs of implementing this action plan were borne by Parks Canada. Indirect costs were minimal and were limited to restrictions to visitor access, while benefits included positive impacts on park ecological integrity, greater awareness of species and enhanced opportunities for engagement of visitors, local communities and strengthening of our relationship with Mi'kmaq, through shared priorities, two-eyed seeing and knowledge sharing.