

Action Plan for the Lake Utopia Rainbow Smelt (*Osmerus mordax*), Small-bodied Population (sympatric with the Large-bodied Population), in Canada



2020

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« Plan d'action pour l'éperlan arc-en-ciel (*Osmerus mordax*) du lac Utopia, population d'individus de petite taille (sympatrique avec la population d'individus de grande taille), au Canada. »

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Preface

The federal, provincial, and territorial government signatories under the [Accord for the Protection of Species at Risk \(1996\)](#) agreed to establish complementary legislation and programs that provide for the protection of species at risk throughout Canada. Under the [Species at Risk Act](#) (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of action plans for species listed as Extirpated, Endangered, and Threatened for which recovery has been deemed feasible. They are also required to report on progress five years after the publication of the final document on the Species at Risk Public Registry, and every subsequent five years following.

The Minister of Fisheries and Oceans Canada (DFO) is the competent minister under SARA for the Lake Utopia Rainbow Smelt (LURS) and has prepared this action plan to implement the [recovery strategy](#) (DFO 2016a) for the SARA-listed LURS Small-bodied Population (SbP), as per section 47 of SARA. This action plan also addresses the LURS Large-bodied Population (LbP), listed in August 2019 as Threatened under SARA, and which exists in sympatry with LURS-SbP and is identified in the LURS-SbP recovery strategy as a feature of its critical habitat. In preparing this action plan, the competent minister has considered, as per section 38 of SARA, the commitment of the Government of Canada to conserving biological diversity and to the principle that, if there are threats of serious or irreversible damage to the listed species, cost-effective measures to prevent the reduction or loss of the species should not be postponed for a lack of full scientific certainty. To the extent possible, this action plan has been prepared in cooperation with the Government of New Brunswick, and with input from those recognized in the “Acknowledgements” section and in collaboration with those listed in appendix A: “record of cooperation and consultation” as per section 48(1) of SARA.

As stated in the preamble to SARA, success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions and actions set out in this action plan and will not be achieved by DFO or any other jurisdiction alone. The cost of conserving species at risk is shared amongst different constituencies. All Canadians are invited to join in supporting and implementing this action plan for the benefit of the Lake Utopia Rainbow Smelt and Canadian society as a whole.

Under SARA, an action plan provides the detailed recovery planning that supports the strategic direction set out in the recovery strategy for the species. The plan outlines recovery measures to be taken by DFO and other jurisdictions and/or organizations to help achieve the population and distribution objectives identified in the recovery strategy. Implementation of this action plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

Acknowledgements

This document has been developed by DFO in cooperation with many other parties including provincial government departments of New Brunswick, Indigenous organizations, non-governmental organizations, and industry stakeholders. In particular, DFO wishes to acknowledge the valuable input provided by those who contributed to the development of this document and the commitment of the many groups and organizations who will collaborate in the implementation of this action plan. See appendix A for the record of cooperation and consultation in the development of this action plan.

Executive summary

The Small-bodied Population (SbP) and Large-bodied Population (LbP) of Lake Utopia Rainbow Smelt (*Osmerus mordax*) (LURS) are listed as Threatened under the *Species at Risk Act* (SARA). The Lake Utopia Rainbow Smelt Large-bodied Population (LURS-LbP) was listed under the Act in August 2019, and amendments to the existing recovery strategy are currently underway. This action plan is considered one in a series of documents that are linked and should be taken into consideration together, including the [Committee on the Status of Endangered Wildlife in Canada \(COSEWIC\) Status Report](#) (COSEWIC 2008), the [Science Advisory Report from the Recovery Potential Assessment](#) (DFO 2011), and the [recovery strategy for the SbP of LURS](#) (DFO 2016a).

LURS consists of two co-existing, morphologically, ecologically, and genetically differentiated populations of Rainbow Smelt, the SbP and the LbP, which together form a unique and interdependent sympatric species pair. LURS distribution is limited to a single lake in southwest New Brunswick, Lake Utopia, and some of its tributaries (Second Brook, Unnamed Brook, Smelt Brook, Mill Lake Stream, and Trout Lake Stream-Spear Brook). At the time of the COSEWIC assessment in 2008, there was no evidence of population decline in LURS, but both populations are subject to threats from human activities occurring in Lake Utopia and the surrounding area including: forestry, agriculture, a pulp mill, aquaculture, year-round human settlement, recreational use, linear developments, and water storage for hydroelectric power generation. Both populations have been assessed by COSEWIC as Threatened, and both are currently listed and protected under SARA. Legal applications of SARA, including the general prohibitions and the identification and protection of critical habitat, apply to both the LbP and SbP of LURS.

This Action Plan outlines the measures that provide the best chance of achieving the population objectives for the species, including the measures to be taken to address the threats and monitor the survival and recovery of the species.

Section 1.2 of this Action Plan includes the Implementation Schedule which outlines measures to be taken under the following broad strategies:

1. Conduct research and monitoring;
2. Protect the species and its habitat;
3. Promote, support, and undertake stewardship and education activities.

The Implementation Schedule lists 35 recovery measures to be undertaken by Fisheries and Oceans Canada (DFO) and/or other jurisdictions, organizations, and individuals to implement the Recovery Strategy, achieve the population objectives, address threats and information gaps, and implement aspects of the Critical Habitat Schedule of Studies.

For LURS-SbP, critical habitat was identified to the extent possible, using the best available information, in Section 8 of the recovery strategy. Protection of the species' critical habitat has been accomplished through a SARA Critical Habitat Order made under subsections 58(4) and (5), which invokes the prohibition in subsection 58(1) against the destruction of the identified critical habitat (section 2.3 of this action plan).

Due to the interdependence of both LURS populations, and given that LURS-LbP has been identified as a feature of LURS-SbP's critical habitat in the recovery strategy, this action plan follows the approach taken in the recovery strategy to address both populations.

An evaluation of the socio-economic costs of this action plan and the benefits to be derived from its implementation is provided in section 3.

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1. Recovery actions

1.1 Context and scope of the action plan

The Small-bodied Population and Large-bodied Population of Lake Utopia Rainbow Smelt (*Osmerus mordax*) was listed as Threatened under the [Species at Risk Act](#) (SARA) in 2003 and 2019, respectively. This action plan is part of a series of documents regarding Lake Utopia Rainbow Smelt, including the [Committee on the Status of Endangered Wildlife in Canada Status Report](#) (COSEWIC 2008), the [Science Advisory Report from the Recovery Potential Assessment](#) (DFO 2011), and the [recovery strategy](#) (DFO 2016a) that should be taken into consideration together. Under SARA, an action plan provides the detailed recovery planning that supports the strategic direction set out in a recovery strategy for the species. A recovery strategy also provides information about the species, its threats, and its critical habitat.

Rainbow Smelt are a relatively small and slender pelagic fish species capable of living in both fresh and salt water. The Lake Utopia Rainbow Smelt consists of two morphologically, ecologically, and genetically differentiated sympatric populations of Rainbow Smelt, a small-bodied form and a large-bodied form. The species pair is endemic to, and co-exists only in, Lake Utopia in southwestern New Brunswick. Throughout this document the two populations are referred to collectively as Lake Utopia Rainbow Smelt (LURS); and, when required they are referred to separately as the LURS Small-bodied Population (LURS-SbP) and the LURS Large-bodied Population (LURS-LbP). Together, these two populations of Rainbow Smelt represent an important and irreplaceable unit of biodiversity. Smelts also have cultural and socio-economic significance to Indigenous peoples. Specifically, the Maliseet people of New Brunswick have long had a relationship with the Rainbow Smelt in Lake Utopia (MNCC 2012). Although their co-existence is interdependent, the two populations behave as separate species; each spawning in different streams and feeding on different food sources, which promotes genetic divergence between them (COSEWIC 2008).

At the time of the COSEWIC assessment in 2008, there was no evidence of population decline in LURS and their distribution was considered stable. The uniqueness and limited distribution of LURS, as well as their vulnerability to a number of human activities occurring in and around Lake Utopia, resulted in the designation of both LURS-SbP and LURS-LbP as Threatened by COSEWIC (COSEWIC 2008). A variety of human activities occur in the Lake Utopia watershed including: forestry, agriculture, a pulp mill, aquaculture, year-round human settlement, recreational use, linear developments, and water storage for hydroelectric power generation. These activities, in addition to the potential for the introduction and naturalization of aquatic invasive species and large-scale drivers such as climate change, could result in singular and/or cumulative impacts to LURS and their habitat. The recovery strategy groups these threats into four categories based on their potential impact to LURS: threats of direct mortality, threats to habitat, threats to water quantity, and threats to water quality. The term recovery is used throughout the recovery strategy as well as this action plan to remain consistent with the SARA legislation and process. However, given the population status of LURS at present and the rationale for its assessment as Threatened by COSEWIC, the focus on LURS recovery may be more accurately described as ensuring the survival or conservation of the sympatric species pair.

LURS-SbP and LURS-LbP are currently included on Schedule 1 of SARA. Both populations continue to be afforded protection under the Fish and Fish Habitat Protection and Pollution Prevention provisions of the federal [Fisheries Act](#) and existing provincial environmental and

water quality regulations, and are currently subject to the legislative applications of SARA, including the general prohibitions and recovery planning requirements. Appendix B provides a summary of the distinguishing characteristics and differences between the two LURS populations, which are further detailed in the Recovery Potential Assessment and the recovery strategy.

In recognition of the interdependence of both LURS populations, the recovery strategy addresses both LURS populations and identifies LURS-LbP as a feature of LURS-SbP's critical habitat. This action plan presents the measures required to ensure the recovery of both populations of LURS, but distinguishes between the two populations on matters pertaining to the legislative application of SARA (for example, critical habitat). Now that LURS-LbP is listed on Schedule 1 of SARA, the relevant portions of the recovery strategy and this action plan will be amended as necessary.

The recovery strategy presents an overarching goal for the recovery of LURS across its entire distribution, which is to:

“Maintain the current population distribution and abundance of the Small-bodied and Large-bodied populations of Lake Utopia Rainbow Smelt and the genetic diversity of the Lake Utopia Rainbow Smelt sympatric pair.”

The recovery strategy defined genetic, abundance, and distribution objectives for LURS as:

Genetic objective:

- maintenance of the genetic diversity and genetic differentiation of LURS in the Lake Utopia system

Abundance objectives:

- small-bodied Population: 100,000 spawning fish distributed among Second Brook, Unnamed Brook, and Smelt Brook during nights of peak spawning
- large-bodied Population: 2,000 spawning fish in Mill Lake Stream during nights of peak spawning

Distribution objectives:

- Small-bodied Population: occupation of Lake Utopia year round and annual, synchronous occupation of Second Brook, Unnamed Brook, and Smelt Brook for spawning, with no individual stream to be unoccupied for two consecutive years
- Large-bodied Population: occupation of Lake Utopia year round and annual occupation of Mill Lake Stream for spawning

Under section 47 of SARA, the competent minister must prepare one or more action plans based on the recovery strategy. Therefore, action planning for species at risk recovery is an iterative process. The implementation schedule in this action plan may be modified in the future depending on the progression towards recovery.

1.2 Measures to be taken and implementation schedule

Success in the recovery of this species is dependent on the actions of many different jurisdictions; it requires the commitment and cooperation of the constituencies that will be involved in implementing the directions and measures set out in this action plan.

This action plan provides a description of the measures that provide the best chance of achieving the population objectives for LURS, including measures to be taken to address threats to the species and monitor its recovery, to guide not only activities to be undertaken by Fisheries and Oceans Canada (DFO), but also those for which other jurisdictions, organizations and individuals have a role to play. As new information becomes available, these measures and the priority of these measures may change. DFO strongly encourages all Canadians to participate in the conservation of LURS through undertaking measures outlined in this action plan.

The implementation schedule presents the recovery measures in three distinct tables, organized according to the lead jurisdiction(s), organization(s) and/or collaborator(s) carrying out the recovery measure. Table 1 identifies the measures to be undertaken by DFO to support the recovery of LURS. Table 2 identifies the measures to be undertaken collaboratively between DFO and its partners, other agencies, organizations or individuals. Implementation of these measures will be dependent on a collaborative approach, in which DFO is a partner in recovery efforts. DFO's support to its partners in the implementation of these collaborative recovery measures could include the provision of scientific information and/or technical assistance as necessary. As all Canadians are invited to join in supporting and implementing this action plan, table 3 identifies the remaining measures that represent opportunities for other jurisdictions, organizations or individuals to lead for the recovery of the species. If your organization is interested in participating in one of these measures, please contact the Species at Risk Maritimes Region office at 1-866-891-0771 or at SpeciesatRisk.XMAR@dfo-mpo.gc.ca.

Implementation of this action plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

1.2.1 Recovery measures to be implemented

The implementation schedule (tables 1, 2, and 3) lists a total of 35 recovery measures to be undertaken to implement the recovery strategy (DFO 2016a), achieve the population objectives, address threats and information gaps, and implement aspects of the Critical Habitat Schedule of Studies.

Broad strategy 1: conduct research and monitoring

The implementation schedule includes 16 recovery measures to address broad strategy 1: conduct research and monitoring. These include a number of high priority research activities to implement not yet completed studies of the recovery strategy's Critical Habitat Schedule of Studies (SoS) (see recovery measures 1 and 2 in table 1 and recovery measures 10, 11, and 14 in table 2). The undertaking of these measures will contribute to completing the identification and description of LURS-SbP critical habitat necessary to support the achievement of the LURS genetic, abundance, and distribution objectives.

During the 2013 and 2014 spawning seasons, LURS-SbP were observed in Mill Lake Stream after spawning activity by LURS-LbP appeared to be complete (IKANAWTIKET Environmental Incorporated 2014a, 2014b; DFO 2016b). Genetic analyses of samples taken from LURS in April 2014 confirmed the presence of LURS-SbP in Mill Lake Stream during their spawning period (Bentzen and Paterson 2016). Recovery measure 1(b) is intended to investigate this possible LURS-SbP spawning activity in Mill Lake Stream and further inform the identification of LURS-SbP critical habitat.

The recovery strategy identified the need to track progress toward achieving the genetic, abundance and distribution objectives for LURS. To address this need, the implementation schedule includes high priority measures designed to monitor the abundance and distribution of both LURS populations during spawning over time, and to monitor genetic discreteness of the two LURS populations and the frequency of LURS hybrids (that is, offspring resulting from crossbreeding between LURS-SbP and LURS-LbP; see recovery measure 4 in table 1 and recovery measures 12 and 13 in table 2).

A number of the research and monitoring measures listed in the implementation schedule are intended to address information gaps pertaining to the hydrology of the Lake Utopia watershed and the impact of current and potential threats to LURS and their habitat (for example, aquatic invasive species, forestry and land-alteration activities, algal blooms; see recovery measures 31 to 34 in table 3). Water levels in spawning streams must be sufficient for LURS to successfully carry out their life processes and threats to water quantity in spawning streams were identified as being a high level of concern in the recovery strategy. Therefore, the implementation schedule includes several high priority measures needed to better understand the relationship between water levels in Lake Utopia and LURS spawning streams, and to monitor water levels over time (see recovery measures 14 and 15 in table 2).

The implementation schedule also includes recovery measure 17 (table 2), designed to identify and monitor indicators relating to water quality. Monitoring trends in water quality over time is needed to better understand current and potential threats to LURS and their habitat. This measure has been assigned a low to medium priority because threats to water quality were not identified in the recovery strategy as being a high level of concern at present. Implementation of this measure will build on previous and existing water quality monitoring efforts being undertaken in the Lake Utopia watershed by recovery partners. The New Brunswick Department of Environment and Local Government (NBDELG) monitors general water chemistry and nutrients at two stations in Lake Utopia twice annually. Eastern Charlotte Waterways (ECW) monitored a range of water quality parameters in Lake Utopia (dissolved oxygen, pH, temperature, conductivity, turbidity, nutrients, blue-green algae) during the spring, summer and fall of 2011, 2012, and 2013; and in LURS spawning streams (temperature, dissolved oxygen, conductivity, inorganic contaminants, nutrients) during the LURS spawning period in 2012. ECW intends to continue water quality monitoring in LURS spawning streams (ECW 2014).

Broad strategy 2: protect the species and its habitat

There are 10 recovery measures listed in the implementation schedule to address broad strategy 2: protect the species and its habitat. The protection of LURS and its habitat will largely be accomplished through the implementation of existing regulatory, policy, management, and voluntary instruments administered by federal and provincial government agencies and industry, such as: SARA, the Fish and Fish Habitat Protection and Pollution Prevention provisions and [Aquatic Invasive Species Regulations](#) under the *Fisheries Act*, New Brunswick's [Species at Risk Act](#) and [Watercourse and Wetland Alteration Regulation](#), the New Brunswick Department of

Transportation and Infrastructure's Environmental Management Manual (NBDTI 2010), and St. George Power Limited Partnership's (SGPLP) Fisheries Management Plan (SGPLP 2012). The implementation schedule includes measures to promote compliance with these instruments (see recovery measures 7 and 8 in table 1 and recovery measures 21 to 23 in table 2). In some instances, these instruments may need to be adapted or strengthened to address threats to LURS and to achieve the genetic, abundance, and distribution objectives. As such, the implementation schedule includes measures designed to evaluate the effectiveness of these existing instruments and revise them as required to enhance protection of LURS and its habitat (see recovery measures 5 and 6 in table 1 and recovery measures 18 and 19 in table 2).

In 2013, both populations of LURS were listed as Threatened under New Brunswick's *Species at Risk Act*. Under the Act, the New Brunswick Department of Energy and Resource Development (NBDERD) is responsible for undertaking a protection assessment for species listed as Extirpated, Endangered, or Threatened to determine whether protection measures will need to be applied. The implementation schedule includes recovery measure 21 (table 2) for the NBDERD to undertake this protection assessment in collaboration with DFO and apply any relevant protection measures as appropriate pending the outcomes of the assessment. If requested, DFO will provide scientific information throughout this process.

SGPLP (a subsidiary of J.D. Irving) operates a hydroelectric facility and dam at First Falls near the town of St. George, New Brunswick which creates a head pond that includes Lake Utopia. Water levels in the head pond vary according to the operational practices of the facility which are described in SGPLP's Fisheries Management Plan (SGPLP 2012). The Plan guides compliance with SARA and the *Fisheries Act* through informed operational management and the implementation of best management practices. The implementation schedule includes recovery measure 22 (table 2) to evaluate the effectiveness of the Fisheries Management Plan and associated best management practices at protecting LURS and its habitat and, if required, to make modifications to the Plan to enhance protection. Recovery measures 14 and 15 (table 2) listed under broad strategy 1 are intended to inform this evaluation by undertaking studies to characterize the relationship between water levels in Lake Utopia and LURS spawning streams, and by monitoring water levels during LURS spawning, egg incubation, and larval dispersal periods.

Chain Pickerel have recently been observed in Lake Utopia (NBDERD unpublished data). The implementation schedule includes recovery measure 20 (table 2) to identify and implement measures to mitigate the impact of Chain Pickerel on LURS. This could include increasing or removing recreational angling bag limits for Chain Pickerel and conducting targeted angling for Chain Pickerel. Recovery measure 31 involves undertaking studies to improve understanding of the abundance, distribution, and biological traits of Chain Pickerel in Lake Utopia to inform mitigation options and impacts to LURS survival and recovery.

Broad strategy 3: Promote, support and undertake stewardship and education activities

The implementation schedule includes nine recovery measures to address broad strategy 3: promote, support, and undertake stewardship and education activities. These measures will increase local awareness of LURS and its threats and engage residents and landowners, Indigenous organizations, recreational users, industry, non-governmental organizations, and others in stewardship activities that contribute to recovery of LURS. A number of these measures promote the use of best management practices by local residents and recreational users (for example, releasing LURS bycatch, low impact all-terrain vehicle use, well and septic

maintenance) to help conserve LURS and its habitat and to complement regulatory and policy instruments (see recovery measures 24 and 25 in table 2 and recovery measure 35 in table 3).

To foster participation in stewardship activities in support of LURS survival and recovery and the implementation of this action plan, the implementation schedule includes recovery measure 29 (table 2) for DFO to promote federal stewardship funding sources including the [Habitat Stewardship Program for Species at Risk](#), the [Aboriginal Fund for Species at Risk](#), and the [Interdepartmental Recovery Fund Program](#).

Barriers and obstructions to fish passage in LURS spawning streams have the potential to limit or diminish the ability of LURS to carry out their life processes. For example, barriers and obstructions caused by rock debris and beaver dams have been a recurring issue at the Mill Lake Stream culvert (DFO 2011, ECW 2013, IKANAWTIKET Environmental Incorporated 2014a). The implementation schedule includes recovery measure 26 (table 2) to address this threat to LURS habitat. Local partners are well situated to regularly monitor LURS spawning streams prior to and during the spawning period to identify barriers and obstructions to fish passage, and to remove them when appropriate. It is important to note that permits or regulatory reviews (for example, authorization under paragraph 35(2)(b) of the *Fisheries Act*, Wetland and Watercourse Alteration Permit, etc.) may be required prior to removal of barriers and obstructions depending on the specific circumstances.

An annual Aboriginal Food, Social, and Ceremonial Fishery (FSC) smelt fishery is carried out in areas of New Brunswick, including Lake Utopia, under the authority of a licence issued under the [Aboriginal Communal Fishing Licences Regulations](#). This fishery is managed cooperatively between DFO and the New Brunswick Aboriginal Peoples Council (NBAPC). The recovery strategy exempts this FSC fishery for LURS-SbP from the prohibitions under section 32 of SARA because the abundance of LURS-SbP is currently sufficient to sustain some directed fishing without jeopardizing its survival or recovery (DFO 2013). Under the FSC licence, NBAPC is required to report the total smelt catch pooled across all locations in New Brunswick to DFO but is not required to report smelt catch by individual lake or stream. To improve monitoring of the levels of direct mortality to both LURS-SbP and LURS-LbP in the FSC smelt fishery, the implementation schedule includes recovery measure 27 (table 2) to work collaboratively with the NBAPC to encourage the collection and reporting of data about smelt harvested from LURS spawning streams (that is, number of fish, size, spawning stream). This catch data, along with data from the spawner abundance monitoring described above under broad strategy 1 (see recovery measure 6 in table 1), will be used to regularly assess the level of direct mortality that LURS-SbP and LURS-LbP can sustain without jeopardizing survival of the species pair.

The implementation schedule includes recovery measure 30 (table 2) for DFO to work collaboratively with partners to implement the Magaguadavic River Watershed Management Plan (ECW 2014) and support implementation of aspects of the Plan related to LURS survival and recovery. ECW led the development of the Management Plan which identifies a number of actions to address issues related to fish habitat and fish passage in Lake Utopia that will support the recovery of LURS, including:

- monitoring of temperature and water levels in LURS spawning streams
- sampling for the invasive Chain Pickerel (*Esox niger*) in Lake Utopia and, if found, examining the contribution of LURS to its diet
- promoting best land management practices among residents of Lake Utopia and the Magaguadavic River watershed

1.2.2 Implementation schedule

Explanation of column headings in implementation schedule

Recovery measures: this column lists the activities or actions that will be taken to implement the recovery strategy, including those to achieve the genetic, abundance, and distribution objectives, address threats, or undertake uncompleted aspects of the SoS. They are linked directly to the broad strategies and approaches provided in the recovery strategy and are relevant to the geographic scope of the action plan.

Approach: this column lists the numbered approach(es) associated with each recovery measure. The numbers correspond to those outlined below and correspond directly to the broad strategies and approaches provided in the recovery strategy:

Broad strategy 1: conduct research and monitoring

- Approach 1.1: improve understanding of LURS-SbP critical habitat
- Approach 1.2: characterize spatial and temporal habitat use of Lake Utopia at all life-stages by the LURS species pair
- Approach 1.3: examine the abundance and biological requirements for LURS-SbP and LURS-LbP
- Approach 1.4: track progress toward achieving the population objectives for the species
- Approach 1.5: improve understanding of the hydrology and trophic status of Lake Utopia and its watershed
- Approach 1.6: identify and monitor indicators relating to water quantity and water quality of the lake and its tributaries
- Approach 1.7: evaluate the relationship between the identified threats to Lake Utopia and its tributaries and their parameters related to the achievement of the population objectives

Broad strategy 2: protect the species and its habitat

- Approach 2.1: evaluate the effectiveness of existing regulatory, policy, management, and voluntary instruments in promoting and protecting the conditions required to achieve the population objectives
- Approach 2.2: adapt and strengthen regulatory, policy, management and voluntary frameworks and tools to better protect LURS and LURS habitat when new information suggests it is required to meet the population objectives
- Approach 2.3: promote and enforce compliance with the regulations, best management practices, management plans and operational guidelines pertaining to activities having an impact on LURS or LURS habitat

Broad strategy 3: promote, support and undertake stewardship and education activities

- Approach 3.1: promote the use of best management practices
- Approach 3.2: Implement targeted public awareness and education initiatives (for example, landowners)
- Approach 3.3: engage stakeholders and partners in selected monitoring and management activities
- Approach 3.4: promote and support stewardship program

Priority: priority levels (low, medium, or high) are assigned to reflect the direct contribution a recovery measure is expected to have on addressing the stated threat or concern under the

relevant broad strategy, and thus the degree to which the activity is expected to contribute to the survival or recovery of LURS. It does not take into account the priorities and budgetary constraints of the participating jurisdictions and organizations, but may be used to inform decisions on funding as well as departmental and conservation priorities:

- High priority recovery measures are considered those most likely to have an immediate and/or direct influence on attaining the genetic, abundance, and/or distribution objectives for LURS and are thus considered to be most urgently needed to ensure the recovery of both LURS populations. In some cases, a high priority action may be an essential precursor to another measure that contributes to the survival and recovery of LURS.
- Medium priority recovery measures may have an indirect or less immediate influence on achieving the genetic, abundance, and/or distribution objectives, but are still important for ensuring the survival and recovery of LURS.
- Low priority recovery measures will likely have an indirect or gradual influence on achieving the genetic, abundance, and distribution objectives, but are considered important contributions to the knowledge base and/or public involvement in, and acceptance of, other measures required for LURS recovery.

Threats or objectives addressed: this column identifies the main threat(s) to the survival and recovery of LURS or the genetic, abundance, and/or distribution objective(s) being addressed by the stated recovery measure. Measures that address the SoS are also identified.

Status/timeline: this column reflects whether an activity has been initiated or is a new activity, with two status categories:

- not started
- underway

This column also indicates the estimated approximate timeline to complete the stated recovery measure from the date of publication of this action plan as final, with the following categories:

- < 2 years
- 2 to 5 years
- > 5 years
- continuous (that is, the activity will be ongoing over time with some periodicity)

Partners: the partners column in table 2 lists the jurisdictions, organizations, and other parties currently or potentially involved in undertaking the stated recovery measure, either independently or collaboratively with involvement from DFO. This action plan is also intended to encourage other groups to become involved, and these future partnerships may not be completely captured within this document at this time.

Suggested other jurisdictions or organizations: The suggested other jurisdictions or organizations column in table 3 lists jurisdictions and organizations that have indicated an interest or ability to undertake the stated recovery measure (identified as “Lead”), or suggests jurisdictions and organizations that are well suited to undertake the stated recovery measure if no lead has been identified (identified as “Undetermined, Potential Leads”).

Below is a list of acronyms used in the partners column (table 2) and suggested other jurisdictions or organizations column (table 3) of the implementation schedule.

CRI	Canadian Rivers Institute
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
ECW	Eastern Charlotte Waterways Inc.
JDI	J. D. Irving ¹
LUPA	Lake Utopia Preservation Association
MAPC	Maritime Aboriginal Peoples Council
MNCC	Maliseet Nation Conservation Council
NBAPC	New Brunswick Aboriginal Peoples Council
NBATVF	New Brunswick All Terrain Vehicle Federation Inc.
NBDELG	New Brunswick Department of the Environment and Local Government
NBDERD	New Brunswick Energy and Resource Development
NBDTI	New Brunswick Department of Transportation and Infrastructure
WNNB	Wolastoqey Nation in New Brunswick

¹ J.D. Irving operations relevant to this action plan include forestry operations in the province of NB, the St. George Power Hydro-electric Dam, and the Lake Utopia Pulp and Paper Mill.

Table 1. Measures to be undertaken by Fisheries and Oceans Canada

#	Recovery measures	Approach	Priority ²	Threats or objective addressed	Timeline
1	Undertake studies to improve understanding of LURS-SbP critical habitat, including studies to: <ol style="list-style-type: none"> identify and describe the specific attributes (for example, substrate type, stream width, flow rate, water temperature, water level) of Lake Utopia and spawning streams associated with successful completion of LURS-SbP life processes investigate possible LURS-SbP spawning activity in Mill Lake Stream 	1.1	High	Critical Habitat Schedule of Studies (SoS)	Status: underway Timeline: 2 to 5 years
2	Undertake monitoring to determine whether there are LURS-LbP spawning locations other than Mill Lake Stream (for example, Trout Lake Stream-Spear Brook, Lake Utopia shoreline)	1.2	High	SoS, LURS-LbP abundance and distribution objectives	Status: underway Timeline: > 5 years
3	Estimate the level of direct mortality that LURS-SbP and LURS-LbP can sustain without jeopardizing their survival or recovery.	1.3	High	Threats of direct mortality	Status: underway Timeline: 2 to 5 years
4	Assess LURS-SbP spawner abundance (Second Brook, Unnamed Brook, and Smelt Brook) and LURS-LbP spawner abundance (Mill Lake Stream), collect information about their life history parameters (that is, size, sex ratio, growth rates), and analyze the data to measure progress on the abundance objectives defined in the recovery strategy.	1.4	High	LURS-SbP and LURS-LbP abundance objectives	Status: underway Timeline: continuous (every 3 years)

² Priority² reflects the degree to which the measure contributes directly to the recovery of the species or is an essential precursor to a measure that contributes to the recovery of the species:

- "high" priority measures are considered likely to have an immediate and/or direct influence on the recovery of the species
- "medium" priority measures are important but considered to have an indirect or less immediate influence on the recovery of the species
- "low" priority measures are considered important contributions to the knowledge base about the species and mitigation of threats

#	Recovery measures	Approach	Priority ²	Threats or objective addressed	Timeline
5	<p>Undertake a gap analysis to evaluate the effectiveness of existing federal regulatory, policy, and management instruments at protecting LURS and LURS habitat against threats identified as having a medium or high level of concern in the recovery strategy, such as:</p> <ul style="list-style-type: none"> • Fisheries Protection and Pollution Prevention Provisions under the <i>Fisheries Act</i> and associated policies • <i>Aquatic Invasive Species Regulations</i> under the <i>Fisheries Act</i> • Renewed National Code on Introductions and Transfers <p>Use the findings of the gap analysis to inform recovery measure 6.</p>	2.1	High	All threats	Status: not started Timeline: < 2 years
6	Based on the findings of the gap analysis (see recovery measure 5), adapt and strengthen federal regulatory, policy, and management instruments as required to enhance protection of LURS and LURS habitat against identified threats.	2.2	High	All threats and genetic, abundance, and distribution objectives	Status: not started Timeline: 2 to 5 years
7	Promote compliance with the <i>Species at Risk Act</i> , the <i>Fisheries Act</i> and any associated management plans or guidelines prepared by, or agreed to by, DFO among individuals, organizations, and industries undertaking activities in the Lake Utopia watershed.	2.3	High	All threats	Status: underway Timeline: continuous
8	Promote awareness of threats to LURS and activities likely to destroy critical habitat internally among DFO regulators and managers across all sectors.	2.3	Medium	All threats	Status: underway Timeline: continuous
9	Share and promote the use of DFO's protocols for monitoring spawning populations of LURS (MacDonald and Burbidge 2017) by partner organizations (see recovery measures 12, 16, and 26).	3.4	Medium	Genetic, abundance, and distribution objectives	Status: underway Timeline: continuous

Table 2. Measures to be undertaken collaboratively between Fisheries and Oceans Canada and its partners. Where there is more than one partner associated with a recovery measure, partners are listed in alphabetical order.

#	Recovery measures	Approach	Priority ³	Threats or objective addressed	Timeline	Partner(s)
10	Conduct studies to identify spatial and temporal habitat use of Lake Utopia at all life stages by the LURS species pair including: <ol style="list-style-type: none"> acoustic surveys of Lake Utopia to identify spatial and seasonal use by LURS juveniles and adults ichthyoplankton survey of Lake Utopia following emergence to identify which areas support larval fish 	1.2	High	SoS	Status: not started Timeline: 2 to 5 years	Co-leads: CRI, DFO
11	Collect and document Indigenous Traditional Knowledge related to LURS and LURS habitat and encourage the sharing and integration of Indigenous Traditional Knowledge in the implementation of the recovery strategy and this action plan.	1.2	Medium	SoS, All threats and genetic, abundance, and distribution objectives	Status: not started Timeline: < 2 years	Lead: MAPC, NBAPC, MNCC, WNNB, and other Indigenous organizations Partner: DFO
12	Annually monitor known LURS spawning streams during the spawning period to confirm	1.4	High	LURS distribution objectives	Status: underway	Partners: CRI, DFO,

³ "Priority" reflects the degree to which the measure contributes directly to the recovery of the species or is an essential precursor to a measure that contributes to the recovery of the species:

- "high" priority measures are considered likely to have an immediate and/or direct influence on the recovery of the species
- "medium" priority measures are important but considered to have an indirect or less immediate influence on the recovery of the species
- "low" priority measures are considered important contributions to the knowledge base about the species and mitigation of threats

#	Recovery measures	Approach	Priority ³	Threats or objective addressed	Timeline	Partner(s)
	presence/absence of LURS-SbP (Second Brook, Unnamed Brook, and Smelt Brook) and LURS-LbP (Mill Lake Stream).				Timeline: continuous	ECW, MAPC, NBAPC, WNNB
13	Collect samples (fin clips) from LURS-SbP and LURS-LbP during abundance assessments (see recovery measure 4) and analyze the samples to inform the progress indicators for the genetic objective defined in the recovery strategy: <ul style="list-style-type: none"> genetic discreteness between the two LURS populations Frequency of LURS hybrids.	1.4	High	LURS genetic objective	Status: not started Timeline: continuous	Lead: DFO Partner: CRI, Dalhousie University
14	Undertake research to characterize the relationship between water levels in Lake Utopia and LURS spawning streams. Use results to inform implementation of St. George Power Limited Partnership's (SGPLP) Fisheries Management Plan (SGPLP 2012; see recovery measure 21).	1.5	High	SoS, Threats to water quantity	Status: not started Timeline: < 2 years	Lead: JDI Partners: DFO, ECW, NBDELG
15	Annually monitor water levels in Lake Utopia and LURS spawning streams during LURS spawning, egg incubation, and larval dispersal to confirm water levels are adequate for successful completion of LURS life processes. Use results to inform implementation of SGPLP's Fisheries Management Plan (SGPLP 2012; see recovery measure 22).	1.6	High	Threats to water quantity	Status: not started Timeline: continuous	Lead: JDI Partners: CRI, DFO, ECW, MAPC, NBAPC, NBDELG, WNNB
16	Monitor water flows through the Mill Lake Stream culvert during LURS spawning period to help determine whether the culvert is adversely affecting	1.6	High	Threats to habitat	Status: underway	Lead: DFO Partners: ECW,

#	Recovery measures	Approach	Priority ³	Threats or objective addressed	Timeline	Partner(s)
	the ability of LURS to access and use spawning habitat under present conditions. Use results to inform recovery measure 23.				Timeline: < 2 years	MAPC, NBAPC, NBDTI, WNNB
17	Monitor water quality (for example, temperature, pH, dissolved oxygen, turbidity, inorganic contaminants, nutrients, etc.) in Lake Utopia and all known LURS spawning streams. Analyze data to identify trends, correlations, and issues.	1.6	Medium	Threats to water quality	Status: underway Timeline: continuous	Co-leads: ECW, NBDELG Partner: DFO, WNNB
18	Evaluate the permit application review process under the provincial <i>Watercourse and Wetland Alteration Regulation</i> to determine whether the protection of LURS and LURS habitat provided under SARA and the <i>Fisheries Act</i> are considered appropriately. Use the findings of this evaluation to inform recovery measure 19.	2.1	Medium	Threats to habitat, threats to water quality	Status: underway Timeline: < 2 years	Co-leads: DFO, NBDELG Partner: NBDERD
19	If warranted, use the findings from recovery measure 18 to adapt and strengthen the permit application review process under the provincial <i>Watercourse and Wetland Alteration Regulation</i> to enhance protection of LURS and LURS habitat.	2.2	Medium	Threats to habitat, threats to water quality	Status: not started Timeline: 2 to 5 years	Co-leads: DFO, NBDELG Partner: NBDERD
20	Identify and implement measures to mitigate the impact of invasive fish species on LURS.	2.2	High	Threats of direct mortality	Status: not started Timeline: continuous	Co-leads: DFO, NBDERD Partners: ECW, LUPA, MAPC, NBAPC

#	Recovery measures	Approach	Priority ³	Threats or objective addressed	Timeline	Partner(s)
21	Undertake a protection assessment for both LURS-SbP and LURS-LbP as required under section 25 of New Brunswick's <i>Species at Risk Act</i> . If warranted, apply protection measures under sections 28 and 29 of the Act.	2.3	Medium	Threats to habitat, threats of direct mortality	Status: not started Timeline: > 5 years	Lead: NBDERD Partner: DFO
22	Implement, evaluate, and modify (as required) SGPLP's Fisheries Management Plan (SGPLP 2012) to provide and maintain sufficient water levels in Lake Utopia and LURS spawning streams for LURS to carry out its life processes. Use information from recovery measures 14 and 15 to measure performance.	2.3	High	Threats to water quantity	Status: underway Timeline: continuous	Co-leads: DFO, JDI
23	Operate, maintain and rehabilitate roadways and associated structures in LURS habitat such that the ability of LURS to access and use spawning habitat is not adversely affected. In particular, use information from recovery measure 16 to determine whether the Mill Lake Stream culvert needs to be modified or replaced.	2.3	High	Threats to habitat	Status: underway Timeline: continuous	Lead: NBDTI Partner: DFO, NBDELG
24	Promote best angling practices for releasing LURS bycatch in the recreational angling fishery with minimal harm, such as those described in the section titled "Attention: Tips on Releasing Fish" in the New Brunswick Energy and Resource Development's annual Fish Book – Summary of Regulations provided with the New Brunswick Angling Licence.	3.1	Medium	Threats of direct mortality	Status: underway Timeline: continuous	Lead: NBDERD Partners: DFO, NGOs
25	Implement targeted education initiatives (for example, websites, newsletters, booklets, local meetings) to raise awareness among residents and	3.2	Low	All threats	Status: not started	Partners: DFO, ECW, LUPA,

#	Recovery measures	Approach	Priority ³	Threats or objective addressed	Timeline	Partner(s)
	landowners, Indigenous organizations, recreational users, and industry in the Lake Utopia watershed about LURS, threats to LURS, and stewardship activities that can help protect LURS.				Timeline: continuous	MAPC, NBAPC, NBDERD, WNNB
26	Monitor LURS spawning streams to identify and remove barriers and obstructions to fish passage prior to and throughout the LURS spawning period (for example, beaver dams, debris), with authorizations and permits as necessary.	3.3	High	Threats to habitat	Status: underway Timeline: continuous	Partners: DFO, ECW, LUPA, MAPC, NBAPC, NBDTI, NBDELG, NBDERD, WNNB
27	Work collaboratively with Indigenous fishers to encourage the collection and reporting of data about smelt harvested from LURS spawning streams in the Food, Social, and Ceremonial smelt fishery (that is, number of fish, size, spawning stream).	3.3	Medium	Threats of direct mortality	Status: not started Timeline: continuous	Co-leads: DFO, NBAPC, WNNB
28	Create a network for sharing information about LURS research, monitoring, management, and stewardship activities among DFO and its partners (for example, implementation network).	3.3	Medium	All threats and genetic, abundance, and distribution objectives	Status: not started Timeline: < 2 years	Lead: DFO Partners: all parties involved in LURS recovery activities.
29	Promote federal stewardship funding sources for individuals, community and non-governmental organizations, businesses, and government agencies to encourage participation in the implementation of recovery measures (for example,	3.4	Medium	All threats and genetic, abundance, and distribution objectives	Status: underway Timeline: continuous	Leads: DFO, ECCC

#	Recovery measures	Approach	Priority ³	Threats or objective addressed	Timeline	Partner(s)
	Habitat Stewardship Program for Species at Risk, Aboriginal Fund for Species at Risk, Interdepartmental Recovery Fund Program).					Partners: all interested parties
30	Work collaboratively with partners to implement the Magaguadavic River Watershed Management Plan (ECW 2014) and support aspects of the Plan related to LURS survival and recovery.	3.4	Medium	All threats	Status: underway Timeline: continuous	Lead: ECW Partners: DFO, ECCC, JDI, NBDELG, NBDERD

Table 3. Measures that represent opportunities for other jurisdictions, organizations or individuals to lead. Proposed participants are presented in alphabetical order.

#	Recovery measures	Approach	Priority ⁴	Threats or objective Addressed	Suggested other jurisdictions or organizations
31	Undertake studies to improve understanding of the abundance, distribution, and biological traits (length, weight, sex) of Chain Pickerel in Lake Utopia, particularly in the vicinity of LURS spawning streams.	1.7	Medium	Threats of direct mortality	Lead: ECW Potential partners: WNNB
32	Assess the current and potential impact of forestry and land-alteration activities on the hydrology of Lake Utopia and LURS-SbP spawning streams.	1.7	Low	Threats to habitat, threats to water quality	Undetermined, potential leads/partners: CRI, ECW, JDI, NBDELG, NBDERD, WNNB
33	Undertake studies to assess the effects of algal blooms in Lake Utopia on LURS and their habitat (for example, physiology, life processes, water quality).	1.7	Low	Threats to water quality	Undetermined, potential leads/partners: CRI, ECW, NBDELG, WNNB
34	Undertake follow up studies recommended in NBDELG's Lake Utopia Water Quality Assessment Report (Brylinsky	1.7	Low	Threats to water quality	Undetermined, potential

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- "high" priority measures are considered likely to have an immediate and/or direct influence on the recovery of the species
- "medium" priority measures are important but considered to have an indirect or less immediate influence on the recovery of the species
- "low" priority measures are considered important contributions to the knowledge base about the species and mitigation of threats

#	Recovery measures	Approach	Priority ⁴	Threats or objective Addressed	Suggested other jurisdictions or organizations
	2009) to examine the transport and fate of phosphorous in Lake Utopia from key point sources (that is, fish hatchery), to examine its contribution to the observed algal blooms, and to inform potential mitigation measures to address impacts to LURS and LURS habitat from algal blooms.				leads/partners: Cooke Aquaculture, CRI, NBDELG, WNNB
35	Promote low-impact practices for all-terrain vehicle use that mitigate or avoid impacts to LURS and LURS habitat, particularly during their spawning period.	3.2	Medium	Threats to habitat, threats of direct mortality	Undetermined, potential leads: NBATVF, community and non-governmental organizations

2. Critical habitat

2.1 Identification of the species' critical habitat

Critical habitat is defined in SARA as “...*the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in a recovery strategy or in an action plan for the species.*” [s. 2(1)]

Also, SARA defines habitat for aquatic species as “... *spawning grounds and nursery, rearing, food supply, migration and any other areas on which aquatic species depend directly or indirectly in order to carry out their life processes, or areas where aquatic species formerly occurred and have the potential to be reintroduced.*” [s. 2(1)]

Critical habitat for the LURS-SbP is identified to the extent possible in section 8 of the recovery strategy (DFO 2016a). The recovery strategy contains details about the identified critical habitat including its geographic location and its biophysical functions, features and attributes. LURS-LbP was only recently listed under SARA in August 2019, and its critical habitat has not yet been identified. However, the fundamental interdependence and sympatric dynamic between the two populations of LURS means that the survival of LURS-LbP is an important feature of LURS-SbP critical habitat. Based on this premise, the recovery strategy identifies LURS-LbP as a feature of LURS-SbP critical habitat and therefore will be protected as such under SARA.

The SoS provided in section 8.3 of the recovery strategy outlines the research activities required to identify any additional areas of critical habitat, and to further describe the current identification of critical habitat. Depending on the results of this work, additional critical habitat, or changes to the current description of critical habitat, may be included in future amendments to the recovery strategy.

2.2 Examples of activities likely to result in destruction of critical habitat

Examples of activities likely to result in the destruction of critical habitat are outlined in section 8.4 of the recovery strategy (DFO 2016a).

2.3 Measures to protect critical habitat

Under SARA, critical habitat must be legally protected from destruction within 180 days of being identified in a final recovery strategy or action plan and included in the Species at Risk Public Registry. For the LURS-SbP critical habitat, this has been accomplished through a SARA Critical Habitat Order made under subsections 58(4) and (5), which invokes the prohibition in subsection 58(1) against the destruction of the identified critical habitat. The Order will enhance the protection already afforded to the LURS-SbP habitat under existing federal, provincial, and municipal legislation, to support efforts towards the recovery of the species.

3. Evaluation of socio-economic costs and of benefits

SARA requires the competent minister to undertake “*an evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation*” [s. 49(1)(e)]. This section identifies the anticipated socio-economic impacts associated with the measures listed in this action plan. The analysis only considers costs and benefits associated with new activities or enhancements to existing activities that are above-and-beyond current practices or formal commitments. The socio-economic analysis does not address the cumulative costs of species recovery in general nor does it attempt a full cost-benefit analysis.

3.1 Socio-economic costs of implementing this action plan

Much of the progress towards survival and recovery of LURS to date, including recovery activities currently in progress, has been made possible by significant collaborations and contributions from governments, industry, environmental organizations, universities and other organizations and groups. Many of the measures listed in this action plan represent a continuation of these activities (that is, designated as “underway” in the implementation schedule) and unless there is an indication that these activities would cease in the absence of this action plan, their costs would not be considered towards the overall cost of the action plan.

A number of the new and yet to be started recovery measures listed in the implementation schedule (that is, incremental measures) are anticipated to have little to no cost associated with them. These include measures aimed at reviewing and strengthening current policies and processes (for example, recovery measures 6 and 19) and measures to promote compliance and awareness (for example, recovery measures 7 and 28). In addition, some measures associated with undertaking potential studies (for example, recovery measure 34) contain insufficient details at this time and thus have an unknown cost associated with them. Still, given that all of the other incremental measures listed in the implementation schedule are anticipated to cost less than \$50,000 each to complete, the overall magnitude of the investment that would be required in order to implement this action plan is low, estimated to be less than \$1 million.

3.2 Benefits of implementing this action plan

The implementation of this action plan is anticipated to benefit LURS and contribute to the broad recovery goal for the species (that is, maintain the current population, distribution and abundance of the small-bodied and large-bodied populations of LURS and the genetic diversity of the LURS sympatric species pair). Recovery will be facilitated by undertaking the recovery measures outlined in the implementation schedule, namely by conducting research and monitoring, by protecting the species and its habitat, by promoting, supporting and undertaking stewardship and education activities.

In addition to the anticipated benefits to LURS, this action plan may also result in benefits to other components of the local environment. In particular, many of the stated measures are likely to be beneficial to other freshwater species and habitats in Lake Utopia as new research and capacity could be used to improve management and stewardship. The preservation and conservation of LURS could generate significant additional benefits to Indigenous peoples, due to the special importance placed on LURS (including the FSC fishery), its role in the ecosystem, and its importance to future generations.

Many of the benefits derived from the action plan are difficult to quantify or attribute a monetary value. SARA recognizes that 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. A review of the literature confirms that Canadians value the preservation and conservation of species in and of themselves and actions taken to preserve a species, such as habitat protection and restoration, are also valued. In addition, the more an action contributes to the recovery of a species, the higher the likely value the public places on such actions. Although benefits are anticipated as a result of this action plan, the exact magnitude of these benefits is unknown at this time.

3.3 Distributional impacts

Implementation of this action plan will require collaboration among many organizations and groups including, among others, DFO, Indigenous peoples and organizations, the industry, academics, non-governmental organizations, and other government departments. At this time it is not possible to determine the extent to which each of these groups would contribute financially or otherwise to this action plan; however, given the location of the species in southwestern New Brunswick, it is anticipated that many of the impacts would be concentrated in this region.

4. Measuring progress

The recovery measures outlined in this action plan will help to achieve the genetic, abundance, and distribution objectives described in the recovery strategy. When implemented, the measures are expected to advance the recovery of LURS in Canada. The performance indicators presented in the recovery strategy provide a way to define and measure progress toward achieving the genetic, abundance, and distribution objectives. Recovery measure 4 (table 1) and recovery measures 12 and 13 (table 2) in this action plan will increase our understanding of the species and its status and contribute to monitoring of LURS in Canada. This monitoring information will be used to report on the performance indicators and progress towards recovery in future reports on recovery strategy implementation.

Reporting on implementation of this action plan (under section 55 of SARA) will be done by assessing progress towards completing the recovery measures identified after five years.

The broader ecological impacts of the implementation of this action plan have been considered in its development. As described in appendix C: effects on the environment and other species, implementation of this action plan is expected to benefit other aquatic species and habitats in the Lake Utopia watershed and no significant adverse ecological impacts are anticipated. To report on the ecological impacts of implementation (under section 55 of SARA), monitoring data for other ecological components have been identified, including: water quality data collected by NBDELG and ECW, data on water levels in Lake Utopia and LURS spawning streams collected by J.D. Irving as part of their Fisheries Management Plan, and reports of barriers and obstructions in LURS spawning streams identified by DFO and its partners.

Reporting on the socio-economic impacts of the action plan (under s. 55 of SARA) will be carried out by collecting data on the costs incurred to implement the action plan.

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Appendix A: record of cooperation and consultation

Action plans are to be prepared in cooperation and consultation with other jurisdictions, organizations, affected parties and others as outlined in SARA section 48.

The Lake Utopia Rainbow Smelt (LURS) represent a unique, sympatric species pair with a distribution limited to Lake Utopia and several of its tributaries in southwestern New Brunswick, Canada. Given this limited distribution, there are few people in Canada with scientific, traditional, or local knowledge of the LURS populations.

Fisheries and Oceans Canada (DFO) undertook an early engagement process to solicit the participation of and to acquire input into the LURS action plan from existing knowledge sources. This early engagement process included targeted outreach in December 2013 in order to gather initial input into the recovery measures that could be implemented to support the strategic direction set in the [recovery strategy](#) (DFO 2016a). This targeted outreach was followed by a one-day workshop held in Saint John, New Brunswick on February 26, 2014 to review and provide further input on potential recovery measures and the implementation schedule for the LURS action plan. Workshop attendees included representatives from relevant DFO sectors, Indigenous organizations, industry, academia, the New Brunswick provincial government, and non-government organizations (table 4).

Table 4. Lake Utopia Rainbow Smelt Action Plan workshop attendee list, February 26, 2014.

Organization	Attendee
Canadian Rivers Institute	Mark Gautreau
Cooke Aquaculture	Mitchell Dickie
DFO, Fisheries Protection Program (Gulf Region)	Carole Godin
DFO, Resource Management (Southwest New Brunswick)	Sarah K. Cheney
DFO, Resource Management (Southwest New Brunswick)	Gerald Cline
DFO, Science	Rod Bradford
DFO, Science	Lei Harris
DFO, Species at Risk Management Division (Gulf Region)	Amélie Rondeau
DFO, Species at Risk Management Division (Maritimes Region)	Jessica Corkum
DFO, Species at Risk Management Division (Maritimes Region)	Heidi Schafer
Eastern Charlotte Waterways	Donald Killorn
J. D. Irving	John Gilbert
J. D. Irving	Renée Morais
Lake Utopia Preservation Association	Shirlee Coleman
New Brunswick Aboriginal Peoples Council	Barry Labillois
New Brunswick Aboriginal Peoples Council	Nathalie Wysote
New Brunswick Department of Environment and Local Government	Don Fox

Organization	Attendee
New Brunswick Department of Transportation and Infrastructure	Ed Torenvliet
New Brunswick Energy and Resource Development	Mary Sabine

In addition to the workshop, a bi-lateral meeting was held on May 21, 2014 with representatives from the Assembly of First Nations' Chiefs in New Brunswick Inc. to discuss their input and to encourage and facilitate input from First Nations communities in New Brunswick on the draft action plan. The draft action plan was also reviewed by relevant DFO sector representatives in the Maritimes, Gulf, and National Capital Regions.

The draft action plan was shared with targeted groups for a jurisdictional review and external comment period from June 16 to August 31, 2017. Feedback from these targeted groups was considered in the development of this proposed action plan. Input from Indigenous groups, stakeholders, and the public was sought through the publication of the proposed action plan on the Species at Risk Public Registry in October 2018. No comments were received.

Appendix B: summary of distinguishing traits, spawning habitat and legal status of Small and Large-bodied Lake Utopia Rainbow Smelt

Table 5. Summary of distinguishing traits, spawning habitat and legal status of Small and Large-bodied Lake Utopia Rainbow Smelt

LURS population	Distinguishing traits	Spawning habitat	COSEWIC designation	SARA status and application
Small-bodied Population	<ul style="list-style-type: none"> • Relatively shorter body length (<170mm FL) • Relatively larger eyes and smaller upper jaw • More gill rakers (33 to 38) 	Second Brook, Unnamed Brook, Smelt Brook	Threatened (1998, confirmed in 2000 and 2008)	Listed as Threatened under SARA (2003). SARA prohibitions apply. Critical habitat identified in recovery strategy.
Large-bodied Population	<ul style="list-style-type: none"> • Relatively longer body length (≥ 170 mm FL) • Relatively smaller eyes and larger upper jaw • Less gill rakers (31 to 34) 	Mill Lake Stream, Trout Lake Stream-Spear Brook	Threatened (2008)	Listed as Threatened under SARA (2019). SARA prohibitions apply. No critical habitat identified.

FL = fork length; length of the body from tip of the nose to fork in the caudal tail.

Appendix C: effects on the environment and other species

In accordance with the [Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals](#) (2010), SARA recovery planning documents incorporate strategic environmental assessment (SEA) considerations throughout the document. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or achievement of any of the [Federal Sustainable Development Strategy](#)'s goals and targets.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that strategies may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into this action plan itself, but are also summarized below in this statement.

The scope and nature of potential environmental effects that could arise from implementation of the Action Plan for the Lake Utopia Rainbow Smelt (*Osmerus mordax*) (LURS), Small-bodied Population (SbP) (sympatric with the Large-bodied Population (LbP)), in Canada were considered throughout the recovery planning process. Potential effects of LURS recovery measures on the environment and other species are listed in table 6.

Implementation of the action plan is not anticipated to result in any significant adverse environmental effects and a need for mitigation measures has not been identified. The action plan is anticipated to benefit the environment by promoting the survival and recovery of LURS and the protection of this species pair and its habitat. In addition, a number of the recovery measures included in the action plan are expected to benefit other aquatic species and habitats by addressing information gaps about the structure and function of the local ecosystem, monitoring water quality and water quantity and tracking trends, and addressing broad threats to habitats, water quality, and water quantity within the Lake Utopia watershed. Implementation of the recovery measures in this action plan will contribute to achieving the following goal identified in the Federal Sustainable Development Strategy: *"Conserving and Restoring Ecosystems, Wildlife and Habitat, and Protecting Canadians – Resilient ecosystems with healthy wildlife populations so Canadians can enjoy benefits from natural spaces, resources, and ecological services for generations to come"*.

Table 6. Potential effects of Lake Utopia Rainbow Smelt recovery measures on the environment and other species

Broad strategy	Potential impact	Probability and direction of impact
1. Conduct research and monitoring	<p>Research and monitoring will address information gaps and support the implementation of effective mitigation and protection measures required to achieve the LURS genetic, abundance, and distribution objectives.</p> <p>Research and monitoring may result in low levels of incidental mortality to other fish species.</p>	<p>High : beneficial</p> <p>Low : adverse</p>
2. Protect the species and its habitat	Promoting and enforcing compliance with existing regulations, best management practices, management plans and operational guidelines will avoid or concurrently mitigate impacts to other aquatic species and habitats.	High : beneficial
3. Promote, support and undertake stewardship and education activities	Increasing awareness and education, engaging stakeholders and partners in monitoring and management activities, and promoting and supporting stewardship programs will benefit other aquatic species and habitats.	Medium : beneficial

Appendix D: glossary

Aquatic invasive species: a non-native species, whose introduction will likely cause (or has already caused) damage to the host ecosystem, existing species therein, the economy or human well-being.

Critical habitat of the Lake Utopia Rainbow Smelt, Small-bodied Population (LURS-SbP): habitat meeting the definition of “critical habitat” under subsection 2(1) of the *Species at Risk Act* (that is, the habitat necessary for the survival or recovery of LURS-SbP, a listed wildlife species under the Act, identified as critical habitat in the recovery strategy for the species).

Endemic: being unique to a particular geographic location, such as a specific island, habitat type, nation, or other defined zone; found only in that part of the world and nowhere else.

Genetic divergence: the process in which two or more populations of an ancestral species accumulate independent genetic changes through time, often after the populations have become reproductively isolated for some period of time.

Gill rakers: bony or cartilaginous, finger-like projections off the gill arch of a fish which allow filter-feeders to retain prey.

Ichthyoplankton: the eggs and larvae of fish.

Morphological: the visible, physical characteristics of an organism.

Naturalization: the process by which a non-native organism spreads into an area and attains a sufficient level of reproduction to maintain it within that area.

Pelagic: associated with surface or middle depths of a body of water.

Sympatric: two populations living in the same territory without interbreeding.

Trophic status: the level of growth or productivity of a lake as measured by phosphorus content, algae abundance, and depth of light penetration.