PROPOSED

Species at Risk Act
Action Plan Series

Action Plan for the Nooksack Dace (*Rhinichthys cataractae*) and the Salish Sucker (*Catostomus* sp. cf. *catostomus*) in Canada

Nooksack Dace and Salish Sucker

2016

Canada

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For copies of the recovery strategy, or for additional information on species at risk, including COSEWIC Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk Public Registry (www.sararegistry.gc.ca).

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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 effective 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 publication of the final document on the SAR public registry.

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 measures to help achieve the population and distribution objectives (previously referred to as recovery goals and objectives) identified in the recovery strategy, including the measures to be taken to address the threats and monitor the recovery of the species, as well as the proposed measures to protect critical habitat that has been identified for the species. The action plan also includes an evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation. The action plan is considered one in a series of documents, together with the COSEWIC status report and the recovery strategy, that are linked and should be read interdependently.

The Minister of Fisheries and Oceans is the competent minister under SARA for the recovery of the Nooksack Dace and Salish Sucker and has prepared this action plan to implement the recovery strategy, as per section 47 of SARA. It has been prepared in cooperation with the Province of British Columbia.

Success in the recovery of these 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 Fisheries and Oceans Canada, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this action plan for the benefit of the Nooksack Dace and Salish Sucker and Canadian society as a whole.

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

Acknowledgements

In January and February 2011, Fisheries and Oceans Canada (DFO) held a series of workshops and community open house sessions to gather input for the development of the action plan for Nooksack Dace and Salish Sucker, in conjunction with consultations on the Draft Recovery Strategy for Salish Sucker (*Catostomus* sp.) in Canada (2011). Various representatives from municipalities, regional districts, provincial ministries, federal agencies, First Nations, industry, agriculture, environmental non-governmental organizations and stewardship groups participated in these workshops and provided valuable input and ideas regarding actions that could be taken to support the survival and recovery of Nooksack Dace and Salish Sucker. Similarly, a number of landowners and members of the public provided ideas through community open house sessions. This input was used by Fisheries and Oceans Canada to guide the development of this action plan and will be used to help guide the implementation of the actions identified in the plan wherever possible. Nadine Pinnell (DFO) authored this Action Plan, with contributions from Martin Nantel and Tom Brown from DFO.

Executive Summary

This Action Plan addresses the entire distribution of the Nooksack Dace (*Rhinichtys cataractae*) and the Salish Sucker (*Catostomus* sp. cf. *catostomus*) in Canada.

Nooksack Dace are known from the Brunette River, Bertrand Creek, Fishtrap Creek and Pepin Brook watersheds in Canada. Section 1.3 and Appendix 2 of the *Recovery Strategy for the Nooksack Dace (Rhinichtys cataractae) in Canada* (Pearson et al., 2008) provide further information on the distribution of Nooksack Dace.

Salish Sucker are known from the Salwein Creek/Hopedale Slough, Atchelitz /Chilliwack /Semmihault Creek, Elk Creek / Hope Slough, Bertrand Creek, Fishtrap Creek, Pepin Brook, Salmon River, Mountain Slough, Agassiz Slough, Miami Creek and Little Campbell River watersheds in Canada. Section 1.3 and Appendix 2 of the *Recovery Strategy for the Salish Sucker (Catostomus sp. cf. catostomus) in Canada* (Fisheries and Oceans Canada, 2016) provide further information on the distribution of Salish Sucker.

The action plan identifies recovery measures to implement the broad approaches to recovery identified in the *Recovery Strategy for the Nooksack Dace (Rhinichtys cataractae) in Canada* (Pearson et al., 2008) and the *Recovery Strategy for the Salish Sucker (Catostomus sp cf. catostomus) in Canada* (Fisheries and Oceans Canada, 2016) and listed below. These measures are intended to support progress towards the population and distribution objectives identified for Nooksack Dace and Salish Sucker in Section 4.2 of both documents.

Critical habitat for Nooksack Dace was identified in the *Recovery Strategy for the Nooksack Dace (Rhinichtys cataractae) in Canada* (Pearson et al., 2008). Critical habitat for Salish Sucker was identified in the *Recovery Strategy for the Salish Sucker (Catostomus sp. cf. catostomus) in Canada* (Fisheries and Oceans Canada, 2016). Under SARA, critical habitat must be legally protected from destruction within 180 days of being identified in a recovery strategy or action plan. For Nooksack Dace and Salish Sucker, it is anticipated that critical habitat will be protected from destruction by SARA Critical Habitat Orders.

The action plan identifies recovery measures to be taken by Fisheries and Oceans Canada, in cooperation and consultation with other agencies, organizations and individuals as appropriate, to support the recovery of Nooksack Dace and Salish Sucker. As all Canadians are invited to join in supporting and implementing this action plan for the benefit of the Nooksack Dace and Salish Sucker and Canadian society as a whole, the action plan also identifies actions that would contribute to the recovery of Nooksack Dace and Salish Sucker that could be voluntarily undertaken by other jurisdictions, groups and individuals interested in participating in the recovery of these species.

These actions relate to the following broad strategies or approaches for recovery:

- Reduce incidence of severe hypoxia in in-stream critical habitats (Salish Sucker)
- Establish and maintain adequate base flow in all habitats with high potential productivity (Nooksack Dace)
- Protect existing habitat, restore lost or degraded habitat and create new habitat (both species)

- Ensure the integrity and proper function and reduce the fragmentation of riparian areas throughout watersheds (both species)
- Reduce sediment entry into creeks and in-stream habitats (both species)
- Encourage stewardship among private landowners, local government and agencies, and the general public (both species)
- Reduce fragmentation of in-stream habitats (both species)
- Reduce toxic contamination of in-stream habitats (both species)
- Prevent new introductions of predator species (both species)
- Monitor recovery of Nooksack Dace and Salish Sucker.

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

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1. Recovery Actions

1.1 Scope of the Action Plan

This Action Plan addresses the entire distribution of the Nooksack Dace (*Rhinichtys cataractae*) and the Salish Sucker (*Catostomus* sp. cf. *catostomus*) in Canada.

Nooksack Dace are known from the Brunette River, Bertrand Creek, Fishtrap Creek and Pepin Brook watersheds in Canada. Section 1.3 and Appendix 2 of the *Recovery Strategy for the Nooksack Dace (Rhinichtys cataractae) in Canada* (Pearson et al., 2008) provide further information on the distribution of Nooksack Dace.

Salish Sucker are known from the Salwein Creek/Hopedale Slough, Atchelitz /Chilliwack /Semmihault Creek, Elk Creek / Hope Slough, Bertrand Creek, Fishtrap Creek, Pepin Brook, Salmon River, Mountain Slough, Agassiz Slough, Miami Creek and Little Campbell River watersheds in Canada. Section 1.3 and Appendix 2 of the *Recovery Strategy for the Salish Sucker (Catostomus sp. cf. catostomus) in Canada* (Fisheries and Oceans Canada, 2016) provide further information on the distribution of Salish Sucker.

This action plan identifies recovery measures to implement the broad approaches to recovery identified in the *Recovery Strategy for the Nooksack Dace (Rhinichtys cataractae) in Canada* (Pearson et al., 2008) and the *Recovery Strategy for the Salish Sucker (Catostomus sp. cf. catostomus) in Canada* (Fisheries and Oceans Canada, 2016). These measures are intended to support progress towards the population and distribution objectives that have been identified for Nooksack Dace and Salish Sucker.

Section 4.2 of the *Recovery Strategy for the Nooksack Dace (Rhinichtys cataractae) in Canada* (Pearson et al., 2008) lists the population and distribution objectives (previously referred to as recovery goal and objectives) for Nooksack Dace. Section 4.2 of the *Recovery Strategy for the Salish Sucker (Catostomus sp. cf. catostomus) in Canada* (Fisheries and Oceans Canada, 2016) lists the population and distribution objectives for Salish Sucker.

1.2 Critical Habitat

Critical habitat for Nooksack Dace is identified to the extent possible in section 3.2 of the *Recovery Strategy for the Nooksack Dace (Rhinichtys cataractae) in Canada* (Pearson et al., 2008). Critical habitat for Salish Sucker is identified to the extent possible in section 3.1 of the *Recovery Strategy for the Salish Sucker (Catostomus sp. cf. catostomus) in Canada* (Fisheries and Oceans Canada, 2016). The recovery strategies also contain details about the identified critical habitat including geographic extent and biophysical features, functions and attributes. Examples of activities likely to destroy critical habitat are included in section 3.4 of the Nooksack Dace Recovery Strategy and section 3.2 of the Salish Sucker Recovery Strategy.

1.3 Proposed Measures to Protect Critical Habitat

Under SARA, critical habitat must be legally protected from destruction within 180 days of being identified in a recovery strategy or action plan. For Nooksack Dace and Salish Sucker, it is anticipated that critical habitat will be protected from destruction by SARA Critical Habitat Orders.

1.4 Measures to be Taken and Implementation Schedule

Success in the recovery of these 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 Fisheries and Oceans Canada, or any other jurisdiction alone.

The purpose of this action plan is to outline what needs to be done to achieve the population and distribution objectives for the Nooksack Dace and Salish Sucker to guide not only activities to be undertaken by Fisheries and Oceans Canada, but those for which other jurisdictions, organizations and individuals have a role to play. Fisheries and Oceans Canada strongly encourages all Canadians to participate in the conservation of Nooksack Dace and Salish Sucker through undertaking priority recovery measures outlined in this action plan. In addition, where appropriate, Fisheries and Oceans Canada seeks to engage with organizations or individuals and enter into a Conservation Agreement under section 11 of SARA to implement the relevant conservation measures.

Table 1 identifies recovery measures to be led by Fisheries and Oceans Canada, in cooperation and consultation with other agencies, organizations and individuals as appropriate, to support the recovery of Nooksack Dace and Salish Sucker.

As all Canadians are invited to join in supporting and implementing this action plan for the benefit of the Nooksack Dace and Salish Sucker and Canadian society as a whole, Table 2 identifies measures that would support the recovery of Nooksack Dace and Salish Sucker that could be undertaken voluntarily by other jurisdictions, groups and individuals interested in participating in the recovery of these species. If your organization is interested in participating in one of these measures, please contact the Species at Risk Pacific regional office.

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

The broad strategies or approaches to recovery referenced in the tables below were outlined in the recovery strategies for Nooksack Dace and Salish Sucker. Where a particular strategy or approach and the associated recovery measures are specific to only one species, the name of that species is specified after the description of the broad strategy. Otherwise, the broad strategies and associated recovery actions are applicable to both species. It is important to note that many of the recovery measures relate to more than one broad strategy for recovery. Where this was the case, recovery measures were grouped under the broad strategy most related to the action in question.

Table 1. Implementation Schedule – Measures to be led by Fisheries and Oceans Canada

#	Recovery Measures	Priority	Threats or concerns addressed	Timeline
Broad Strategy: Reduce incidence of severe hypoxia in in-stream critical habitats (Salish Sucker)				
1	Work with interested researchers to analyze, and re-assess as needed, data on the extent and severity of hypoxia, its relationship with in-stream flows, land use and Salish Sucker population levels. Ensure research results are shared with interested groups.	High	Hypoxia	Underway – anticipated completion by 2020
2	In conjunction with relevant agencies and organizations, support and encourage the development and implementation of projects that promote the adoption of practices and tools that reduce or eliminate sources of nutrient loading in watersheds where Salish Sucker is present, including beneficial nutrient management practices[1], relevant urban design practices and water management practices.	High	Hypoxia	Ongoing
Broad Strategy: Establish and maintain adequate base flow in all habitats with high potential productivity (Nooksack Dace)				
3	Support the identification of biologically based minimum in-stream flows for Nooksack Dace in habitats with high potential productivity.	High	Seasonal lack of water	Underway – anticipated completion by 2017
4	Identify watersheds vulnerable to inadequate base flow for Nooksack Dace.	High	Seasonal lack of water, habitat fragmentation	Underway – anticipated completion by 2020
5	Engage interested agencies, groups and individuals regarding the development and negotiation of conservation agreements under SARA or other management agreements to ensure that minimum in-stream flow requirements for Nooksack Dace are met in habitats with high potential productivity.	High	Seasonal lack of water, habitat fragmentation	2020-2025

[1] Beneficial management practices can be defined as "science-based farm practices that minimize environmental risk while ensuring the long-term sustainability of the land and the economic viability of the producer." (Agriculture and Agrifood Canada, 2007)

#	Recovery Measures	Priority	Threats or concerns addressed	Timeline
Broad Strategy: Protect existing habitat, restore lost or degraded habitat and create new habitat (Nooksack Dace and Salish Sucker) **Broad Strategy: Ensure the integrity and proper function and reduce the fragmentation of riparian areas throughout watersheds (Nooksack Dace and Salish Sucker)**				
6	Identify high priority areas in watersheds where Nooksack Dace or Salish Sucker are present for in-stream habitat restoration or creation projects and riparian planting projects that would benefit Nooksack Dace, Salish Sucker or both species.	High	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity	Ongoing
7	Where Nooksack Dace or Salish Sucker co-occur with other species at risk, work with other responsible agencies to identify habitat management guidelines and best practices that will address the needs of all species.	High	Physical destruction of habitat, habitat fragmentation	2017-2019
8	Facilitate and support the development and implementation of in-stream habitat creation and restoration projects, riparian planting projects and monitoring and assessment of the results of such projects for Nooksack Dace and Salish Sucker by stewardship groups, willing landowners, government agencies and other interested groups.	High	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity riffle loss to beaver ponds (ND)	Ongoing
9	In consultation with interested stewardship groups and researchers, analyze results from monitoring of past habitat restoration and riffle creation projects to identify key elements of in-stream habitat restoration projects and riparian planting projects that contributed to increased Nooksack Dace or Salish Sucker habitat use or density. Make this information and advice available to stewardship groups, agencies and consultants involved in in-stream habitat creation and restoration and riparian planting projects in order to increase the value of such projects for both species and ensure that features that benefit either or both species can be incorporated into habitat projects directed at other species.	High	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity riffle loss to beaver ponds (ND)	Ongoing

#	Recovery Measures	Priority	Threats or concerns addressed	Timeline
10	Work with interested municipalities and government agencies to facilitate the identification of beaver management protocols and practices that increase flow without degrading or physically destroying pool or riffle habitats used by Salish Sucker and Nooksack Dace in watersheds where they are present.	Medium	Physical destruction of habitat, habitat fragmentation, sediment deposition, riffle loss to beaver ponds (ND)	2020-2022
11	Work cooperatively with interested organizations, stewardship groups, agencies and landowners to: o ensure that Nooksack Dace and Salish Sucker needs are included as targets of existing incentive programs that support and promote riparian planting, in-stream habitat restoration projects and the voluntary adoption of beneficial land management practices by private landowners and/or farmers; o explore possible mechanisms for additional incentives to encourage private landowners and farmers to undertake riparian planting or in-stream habitat restoration projects that benefit Nooksack Dace or Salish Sucker; and o explore options for overcoming barriers that may reduce landowners' willingness to undertake such actions and projects.	High	Hypoxia, habitat fragmentation, sediment deposition, toxicity	2019-2024
Broad Strategy: Reduce sediment entry into creeks and in-stream habitats (Nooksack Dace and Salish Sucker)				
12	Support research to determine levels and types of sediment in riffles that are harmful to Nooksack Dace and Salish Sucker. Ensure research results are shared with interested groups.	High (ND) Medium (SS)	Sediment deposition	Nooksack Dace: Underway – anticipated completion by 2017 Salish Sucker: 2020-2022

#	Recovery Measures	Priority	Threats or concerns addressed	Timeline
13	Identify sediment sources and high priority sites for mitigating riffle sedimentation in watersheds containing Nooksack Dace or Salish Sucker.	High (ND) Medium (SS)	Sediment deposition	2016-2020
14	Support and encourage the development of projects to prevent and mitigate sedimentation of riffles from urban, agricultural and industrial sources in cooperation with interested landowners, municipalities, industry organizations and stewardship groups.	High (ND) Medium (SS)	Sediment deposition	As opportunities arise
Broad Strategy: Encourage stewardship among private landowners, local government and agencies, and the general public (Nooksack Dace and Salish Sucker)				
15	As opportunities arise, work with others to develop a stewardship and engagement strategy for Nooksack Dace and Salish Sucker to increase efficiency and effectiveness of stewardship actions, including the identification of opportunities for incorporating information about Nooksack Dace and Salish Sucker into existing stewardship initiatives, including initiatives that include urban, agricultural and industry organizations in cooperation with interested landowners.	High	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity, seasonal lack of water, increased predation, riffle loss to beaver ponds (ND)	2019 - 2024

#	Recovery Measures	Priority	Threats or concerns addressed	Timeline
16	Support and encourage stewardship projects that include: o the development and distribution of public education materials and information to landowners on actions that they can take to benefit Nooksack Dace and Salish Sucker o the distribution of information on Nooksack Dace, Salish Sucker, watershed ecology and actions that individuals and groups can take to benefit both species through presentations, field tours, landowner contact programs and other outreach tools o the development of pilot projects to demonstrate to landowners the broader benefits of stewardship actions such as riparian planting and habitat restoration that benefit Nooksack Dace and Salish Sucker Specific topics that could be covered include riparian planting, nutrient loading, in-stream habitat restoration, impacts of excessive stream and ground water use on fish and wildlife, sedimentation, impacts of pesticides / herbicides, impacts of introduced predators on native species and conservation covenants. Materials and outreach actions should highlight how such actions will contribute to healthy watersheds that provide benefits such as ecological services to landowners. Where possible, provide support for such projects via the Habitat Stewardship Program, Aboriginal Funds for Species at Risk or other funding mechanisms.	Medium	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity, seasonal lack of water, increased predation, riffle loss to beaver ponds (ND)	Ongoing
17	As opportunities arise, pursue the negotiation of stewardship agreements under SARA or other forms of conservation agreements with interested agencies, organizations or individuals regarding actions that will support the recovery of Nooksack Dace and/or Salish Sucker, including habitat restoration and management.	Medium	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity, seasonal lack of water, increased predation, riffle loss to beaver ponds (ND)	2019 - 2024

#	Recovery Measures	Priority	Threats or concerns addressed	Timeline
Broad Strategy: Reduce fragmentation of in-stream habitats (Nooksack Dace and Salish Sucker)				
18	As opportunities arise, work with interested landowners, municipalities and government agencies to facilitate mitigation of permanent and/or seasonal barriers such as perched or undersized culverts that may prevent Nooksack Dace or Salish Sucker movement.	Medium	Habitat fragmentation	Ongoing
Broad Strategy: Reduce toxic contamination of in-stream habitats (Nooksack Dace and Salish Sucker)				
19	In cooperation with interested municipalities or other governments, estimate the extent and severity of toxic contamination in watersheds where Nooksack Dace or Salish Sucker are present. Where possible, identify possible sources of contamination and engage relevant agencies, stewardship groups and landowners regarding reducing or eliminating these sources.	Medium	Toxicity	Ongoing
20	In cooperation with interested municipalities, support and encourage the development of projects to improve storm water quality and management.	Medium	Toxicity	Ongoing

Broad Strategy: Prevent new introductions of predator species (Nooksack Dace and Salish Sucker)				
21	Support stewardship projects that include the development and distribution of public education materials and information to recreational fishers and other relevant groups on the impacts that introduced predators can have on Nooksack Dace, Salish Sucker and local watershed ecology.	Low	Increased predation by introduced species	As opportunities arise
Broad Strategy: Monitor recovery of Nooksack Dace and Salish Sucker				
22	Develop and implement protocols for monitoring Nooksack Dace and Salish Sucker recovery, including watershed-level assessments of the populations of both species as needed. Explore options for incorporating any available information on ecological benefits provided to other species by Nooksack Dace and Salish Sucker recovery efforts into monitoring reports.	High	Need to monitor species recovery and long-term viability	2017 - 2021
23	Explore opportunities for coordinating population assessment and recovery efforts for Nooksack Dace and Salish Sucker with interested groups in the United States.	Medium	Need to monitor species recovery and long-term viability	As opportunities arise

As described above, Table 2 identifies measures that would support the recovery of Nooksack Dace and Salish Sucker that could be undertaken voluntarily by other jurisdictions, groups and individuals interested in participating in the recovery of these species. Relevant government agencies, organizations and individuals interested in contributing to the recovery of Nooksack Dace and Salish Sucker may choose to undertake these or any other actions that could support the recovery of both species on a voluntary basis.

Table 2. Actions that could be taken voluntarily by other agencies, organizations and individuals who wish to contribute to the recovery of Nooksack Dace and Salish Sucker

#	Recovery Action	Relative Priority	Threats or concerns addressed
Broad Strategy: Reduce incidence of severe hypoxia in in-stream critical habitats (Salish Sucker)			
1	Adopt or continue to apply beneficial nutrient management practices, urban design practices and/or water management practices that reduce nutrient loading in watersheds where Salish Sucker are present	High	Hypoxia
2	Promote and support the adoption of beneficial management practices, urban design practices and/or water management practices that reduce nutrient loading in watersheds where Salish Sucker are present.	High	Hypoxia
Broad Strategy: Establish and maintain adequate base flow in all habitats with high potential productivity (Nooksack Dace)			
3	Voluntarily enter into conservation agreements under SARA or other management agreements to ensure that minimum in-stream flow requirements for Nooksack Dace are met in habitats with high potential productivity.	High	Seasonal lack of water, habitat fragmentation
4	Develop and implement wetland restoration projects in watersheds containing Nooksack Dace, particularly in upstream portions of these watersheds.	High	Seasonal lack of water
5	Recommend or support the addition of storm water management measures (with respect to infiltration) to Official Community Plans.	High	Seasonal lack of water
Broad Strategy: Protect existing habitat, restore lost or degraded habitat and create new habitat (Nooksack Dace and Salish Sucker)			
6	Develop, implement and monitor in-stream habitat restoration or creation projects that will benefit Nooksack Dace, Salish Sucker or both species. Projects should be developed and implemented in cooperation with interested and willing	High	Physical destruction of habitat, habitat fragmentation, riffle loss to beaver ponds (ND)

	organizations, agencies and landowners.		
7	Promote or support the incorporation of features that will benefit Nooksack Dace or Salish Sucker into in-stream habitat creation or restoration projects undertaken for other purposes.		Physical destruction of habitat, habitat fragmentation, riffle loss to beaver ponds (ND)
Broad Strategy: Ensure the integrity and proper function and reduce the fragmentation of riparian areas throughout watersheds (Nooksack Dace and Salish Sucker)			
8	Develop, implement and monitor riparian planting projects that will benefit Nooksack Dace, Salish Sucker or both species. Projects should be developed and implemented in cooperation with interested and willing organizations, agencies and landowners.	High	Hypoxia, sediment deposition, habitat fragmentation, toxicity
9	Voluntarily undertake riparian planting projects that will benefit Nooksack Dace, Salish Sucker or both species on lands you own or manage.	High	Hypoxia, sediment deposition, habitat fragmentation, toxicity
10	Promote or support the inclusion of Nooksack Dace and Salish Sucker habitat needs in existing incentive programs that support and promote riparian planting, in-stream habitat restoration projects and the adoption of land management practices by private landowners and/or farmers.	High	Physical destruction of habitat, hypoxia, sediment deposition, habitat fragmentation, toxicity, riffle loss to beaver ponds (ND)
11	Develop projects or programs that will provide incentives to encourage private landowners and farmers to undertake riparian planting or in-stream habitat restoration projects that benefit Nooksack Dace or Salish Sucker or to address disincentives that may reduce landowners' willingness to undertake such actions.	High	Physical destruction of habitat, hypoxia, sediment deposition, habitat fragmentation, toxicity, riffle loss to beaver ponds (ND)
Broad Strategy: Reduce sediment entry into creeks and in-stream habitats (Nooksack Dace and Salish Sucker)			
12	Voluntarily undertake projects to prevent and mitigate sedimentation of riffles from urban, agricultural and industrial sources in cooperation with other relevant partners including landowners, municipalities, industry organizations and stewardship groups.	High (ND) Medium (SS)	Sediment deposition
Broad Strategy: Encourage stewardship among private landowners, local government and agencies, and the general public (Nooksack Dace and Salish Sucker)			
13	Develop and distribute public education materials and information to landowners or other relevant groups on actions that they can take to benefit Nooksack Dace and Salish Sucker. Relevant topics could include nutrient loading, in-stream habitat restoration, riparian planting, impacts of excessive stream and ground water use on fish and wildlife, sedimentation, impacts of pesticides/herbicides and impacts of introduced predators on native species. Where possible, materials should highlight	Medium	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity, seasonal lack of water, increased predation, riffle loss to beaver ponds (ND)

	how such actions will contribute to healthy watersheds that provide benefits such as ecological services to landowners.		
14	Provide information on Nooksack Dace, Salish Sucker, watershed ecology and actions that individuals and groups can take to benefit both species to landowners, members of the public and interested groups through presentations, field tours, landowner contact programs or other outreach tools.	Medium	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity, seasonal lack of water, increased predation, riffle loss to beaver ponds (ND)
15	Consider entering into a stewardship agreement under SARA or another type of conservation agreement regarding actions that will support the recovery of Nooksack Dace and/or Salish Sucker, including habitat restoration and management.	Medium	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity, seasonal lack of water, increased predation, riffle loss to beaver ponds (ND)
16	Where opportunities arise, develop pilot projects to showcase the broader benefits of stewardship actions such as riparian planting and habitat restoration that benefit Nooksack Dace and Salish Sucker to landowners.	Medium	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity, seasonal lack of water, increased predation, riffle loss to beaver ponds (ND)
17	Consider and incorporate Nooksack Dace and Salish Sucker needs in new and existing plans, programs and strategies for the management of watersheds where either or both species is present.	Medium	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity, seasonal lack of water, increased predation, riffle loss to beaver ponds (ND)
18	Incorporate information about Nooksack Dace and Salish Sucker needs into existing stewardship initiatives and programs in watersheds where either or both species are present.	Medium	Physical destruction of habitat, habitat fragmentation, hypoxia, sediment deposition, toxicity, seasonal lack of water, increased predation, riffle loss to beaver ponds (ND)
Broad Strategy: Reduce fragmentation of in-stream habitats (Nooksack Dace and Salish Sucker)			
19	Voluntarily undertake mitigation for barriers to Nooksack Dace and Salish Sucker movement such as perched or undersize culverts.	Medium	Habitat fragmentation
Broad Strategy: Reduce toxic contamination of in-stream habitats (Nooksack Dace and Salish Sucker)			
20	Voluntarily undertake projects to reduce toxic contamination of local watersheds by stormwater or other sources, including development of settling ponds in urban areas.	Medium	Toxicity
21	Voluntarily adopt practices to reduce or eliminate sources of toxic contamination for local watersheds, including practices related to pesticide and herbicide application and use and spill response planning.	Medium	Toxicity
Broad Strategy: Prevent new introductions of predator species			

22	Develop and implement stewardship projects that include the development and distribution of public education materials and information to recreational fishers and other relevant groups on the impacts that introduced predators can have on Nooksack Dace, Salish Sucker and local watershed ecology.	Low	Increased predation by introduced species
Broad Strategy: Monitor recovery of Nooksack Dace and Salish Sucker			
23	Voluntarily contribute relevant information and participate as needed in monitoring efforts for Nooksack Dace and Salish Sucker.	High	Need to monitor species' recovery and long-term viability

2. Socio-Economic Evaluation

The *Species at Risk Act* requires that an action plan include an evaluation of the socioeconomic costs of the action plan and the benefits to be derived from its implementation (SARA 2003). This evaluation addresses only the incremental socio-economic costs of implementing this action plan from a national perspective as well as the social and environmental benefits that would occur if the action plan were implemented in its entirety, recognizing that not all aspects of its implementation are under the jurisdiction of the federal government. It does not address cumulative costs of species recovery in general nor does it attempt a cost-benefit analysis. Its intent is to inform the public and to guide decision making on implementation of the action plan by partners.

The protection and recovery of species at risk can result in both benefits and costs. The Act 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*" (SARA 2003). Self-sustaining and healthy ecosystems with their various elements in place, including species at risk, contribute positively to the livelihoods and the quality of life of all Canadians. A review of the literature confirms that Canadians value the preservation and conservation of species in and of themselves. 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 value the public places on such actions (Loomis and White, 1996; Fisheries and Oceans Canada, 2008). Furthermore, the conservation of species at risk is an important component of the Government of Canada's commitment to conserving biological diversity under the *International Convention on Biological Diversity*. The Government of Canada has also made a commitment to protect and recover species at risk through the Accord for the Protection of Species at Risk.

The following evaluation describes, to the extent possible, the benefits that may accrue, as well as the costs that governments, industry and/or Canadians may incur due to activities identified in this action plan. As well, this evaluation uses the time of listing as the baseline. The overall impacts (costs and benefits) of this Action Plan cannot be assessed with any level of certainty as several identified actions have yet to be negotiated.

This evaluation does not address the socio-economic impacts of protecting critical habitat for either species. Under SARA, DFO must ensure that critical habitat is legally protected within 180 days of the final posting of the recovery strategy or action plan. Where a SARA Critical Habitat Order will be used for critical habitat protection, the development of the Order will follow a regulatory process in compliance with the Cabinet Directive on Streamlining Regulations (CDSR), including an analysis of the incremental impacts of the SARA Critical Habitat Orders that will be included in the Regulatory Impact Analysis Statement (RIAS) (Government of Canada, 2007). As a consequence, no additional analysis of the critical habitat protection has been undertaken for the assessment of costs and benefits of the Action Plan.

Recovery actions for Nooksack Dace and Salish Sucker began with their legal listing under SARA in 2005. These actions include various projects funded by Fisheries and Oceans Canada (DFO) under the Habitat Stewardship Program (HSP), partnering with the province of British

Columbia, universities and stewardship groups. To date, it is estimated that almost $1M in direct costs have been spent through HSP, SARA program funding and through stakeholder cash contributions on habitat identification research, habitat restoration and enhancement and encouraging stewardship actions for Salish Sucker and Nooksack Dace. Additional in-kind costs of approximately $1m related to delivering these projects have also been incurred by DFO, the Province of British Columbia, Fraser Valley Conservancy, Langley Environmental Partners Society and other partners and stakeholders.

Benefits

The benefits of recovery actions to maintain Nooksack Dace and Salish Sucker populations outlined in this Action Plan are unknown but likely positive. Beyond the unquantifiable non-market benefits mentioned above, the recovery actions are also likely to provide broader ecosystem benefits, which in turn provide non-market benefits. Salish Sucker recovery actions that increase oxygen levels in the water and create complex deep pool habitats may also benefit two SARA listed species, Oregon Spotted Frog and Western Painted Turtle (Fisheries and Oceans Canada, 2012). Actions to protect and restore native riparian vegetation may also benefit other SARA-listed species, including the Pacific Water Shrew, Red-legged Frog, Western Toad, Mountain Beaver, Oregon Forestsnail, Vancouver Island Beggarticks, and Great Blue Heron (Pearson et al., 2008; Fisheries and Oceans Canada, 2016). Finally, Nooksack Dace and Salish Sucker recovery actions will benefit co-occurring native species including Steelhead, Cutthroat Trout, and Coho Salmon (Pearson et al., 2008; Fisheries and Oceans Canada, 2016).

Costs

Longer-term activities within this Plan cannot be assessed with any level of certainty. However, there is more certainty around the majority of the measures identified as on-going or short-term (2016 – 2021). Most of these activities focus on stewardship, research, and development of monitoring and assessment protocols. Overall, the costs (direct and in-kind) associated with these short-term actions will likely be low and spread over the next five years. The actions are primarily one-time projects, likely funded from existing federal resources or annual programs such as HSP or Aboriginal Fund for Species at Risk (AFSAR).

Ongoing activity costs are mainly related to engagement, promotion and support of stewardship, as well as public education activities. Future expenditures cannot be determined as it is expected these activities would continue to be funded through existing annually funded government programs, where support is determined on a priority basis and based on availability of resources. However, based on past submissions and the types of projects this Plan incorporates, the direct costs would likely be low with some in-kind staff support from DFO, the province of BC and stewardship groups. In addition, most programs require a level of direct or in-kind support costs from the applicants as matching funds. The ongoing public education activities in the Plan would likely consist of development and dissemination of communication materials or engagement activities such as travel costs and workshops, with low direct costs anticipated.

It is anticipated that, the research projects would be contracts funded through existing government programs and carried out through in-kind support from partner agencies such as the province of British Columbia, universities and stewardship groups. Finally, development of monitoring protocols will be low cost; however, implementation costs cannot be determined until

protocols are finalized with detail on the level and frequency of monitoring activities to be undertaken.

There is a lack of certainty around the longer-term actions identified in the Plan. Discussions of the costs of implementation of monitoring protocols (Table 1) and voluntary stewardship (Table 2) would be speculative at this time and would depend on the willingness of other organizations to negotiate and enter into agreements with DFO. In the absence of any information on the potential contents of the plans and agreements, it is not possible to provide an estimate of the overall long-term costs should these actions be carried out by stakeholders on a voluntary basis. The Plan suggests that these agreements and recovery activities will be developed through a cooperative approach following discussion and negotiations across other agencies, levels of government, stewardship groups and stakeholders allowing for consideration of costs and benefits during the process.

Finally, the distribution of costs associated with the long-term activities (Table 1) and voluntary activities (Table 2) cannot be undertaken at this time as there has not been an assignment of responsibility by stakeholders, stewardship groups or agencies.

3. Measuring Progress

The performance indicators presented in the associated recovery strategies provide a way to define and measure progress toward achieving the population and distribution objectives.

Reporting on the implementation of the action plan, under s.55 of SARA will be done by assessing progress towards implementing the broad strategies.

Reporting on the ecological and socio-economic impacts of the action plan, under s. 55 of SARA, will be done by assessing the results of monitoring the recovery of the species and its long term viability, and by assessing the implementation of the action plan. Recovery measures 22 and 23 in Table 1 outline measures to monitor the recovery of Nooksack Dace and Salish Sucker.

4. Associated Plans

No other action plans have been developed for Salish Sucker or Nooksack Dace or are associated with this plan.

5. References

Agriculture and Agrifood Canada. 2007. Soil and Land. http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1195497988026&lang=eng

Fisheries and Oceans Canada. 2008. Estimation of the Economic Benefits of Marine Mammal Recovery in the St. Lawrence Estuary. Policy and Economics Regional Branch, Quebec 2008.

Fisheries and Oceans Canada. 2016. Recovery Strategy for the Salish Sucker (*Catostomus* sp. cf. *catostomus*) in Canada [Final]. *Species at Risk Act* Recovery Strategy Series, Fisheries and Oceans Canada, Vancouver. ix + 64 pp.

Government of Canada. 2005. Canada – British Columbia Agreement on Species at Risk. http://www.sararegistry.gc.ca/virtual_sara/files/agreements/aa_Canada-British_Columbia_agreement_on_species_at_risk_0805_e.pdf

Government of Canada. 2007. Cabinet Directive on Streamlining Regulation. Ottawa, Ontario.

Loomis, J.B. & White, D.S. 1996. Economic Benefits of Rare and Endangered Species: Summary and Meta-analysis. Ecological Economics, 18: 197-206.

Pearson, M.P., T. Hatfield, J.D. McPhail, J.S. Richardson, J.S. Rosenfeld, H. Schreier, D. Schluter, D.J. Sneep, M. Stejpovic, E.B. Taylor, and P.M. Wood. 2008. Recovery Strategy for the Nooksack Dace (Rhinichthys cataractae) in Canada. Species at Risk Act Recovery Strategy Series, Fisheries and Oceans Canada, Vancouver. vi + 29 pp.

Stewardship Centre for British Columbia. 2013. Species at risk voluntary stewardship practices (Pilot Edition). Species at Risk a primer for British Columbia. Available online at: http://www.speciesatriskbc.ca/guides [accessed November 2015].

APPENDIX A: Effects on the Environment and Other Species

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*. 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 plan could affect any component of the environment or any of the Federal Sustainable Development Strategy's[2] goals and targets.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that implementation of action plans may 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 the action plan itself, but are also summarized below in this statement.

This action plan will benefit the environment by contributing to the recovery of Nooksack Dace and Salish Sucker. However, effects on other species were also considered. Action 7 in Table 1 refers to the identification of habitat management practices or guidelines that consider other species at risk in areas where Nooksack Dace and Salish Sucker co-occur with other species at risk. This will help ensure that actions that are taken to benefit Nooksack Dace and Salish Sucker do not have negative impacts on other species at risk.

The beaver management practices and guidelines referenced in Action 10 in Table 1 would impact American Beaver (*Castor canadensis*); however, care would be taken to reduce negative effects from the implementation of this recovery measure.

Generally, many of the actions identified in this plan address threats such as hypoxia, sediment deposition, toxicity, habitat fragmentation and introduced predators which negatively impact many aquatic species and amphibians. By addressing these threats, these actions will provide benefits to any such species that are present in watersheds where Nooksack Dace and Salish Sucker are present.

Fish species that co-occur with Salish Sucker and / or Nooksack Dace and may benefit from these actions include Steelhead (*Oncorhynchus mykiss*), Cutthroat Trout (*Oncorhynchus clarkii clarkii*) and Coho Salmon (*Oncorhynchus kisutch*).

SARA-listed species that co-occur with Salish Sucker and / or Nooksack Dace and may benefit from recovery actions for Nooksack Dace and Salish Sucker include Oregon Spotted Frog (*Rana pretiosa*), Western Painted Turtle (*Chrysemys picta*), Pacific Water Shrew (*Sorex bendirii*), Red-legged Frog (*Rana aurora*), Western Toad (*Bufo boreas*), Mountain Beaver (*Aplodontia rufa*), Oregon Forestsnail (*Allogona townsendiana*), Vancouver Island Beggarticks (*Bidens amplissima*), and Great Blue Heron (*Ardea herodias fannini*).

These actions will also contribute to overall ecosystem and watershed health, which will provide benefits to many species and ecological services to Canadians living in these areas.

[2] www.ec.gc.ca/dd-sd/default.asp?lang=En&n=F93CD795-1

Given the considerations outlined above, the benefits of this action plan to the environment and other species are expected to far outweigh any adverse effects that may occur.

APPENDIX B: Record of Cooperation and Consultation

The Nooksack Dace and Salish Sucker are listed as Endangered species on Schedule 1 of the *Species at Risk Act* (SARA). As aquatic species, they fall under federal jurisdiction, and are managed by Fisheries and Oceans Canada (DFO).

DFO and the Province of British Columbia cooperated on the development of this document. Processes for coordination and consultation between the federal and British Columbian governments on management and protection of species at risk are outlined in the Canada-B.C. Agreement on Species at Risk (Government of Canada, 2005).

Consultations on the draft action plan occurred between February 6 and March 12, 2012. Consultation activities included:

- online posting of the draft action plan, a fact sheet on critical habitat protection and comment form;
- letters, emails and faxes with information on the draft action plan consultations and offering opportunities for bilateral meetings sent to 30 First Nations and aboriginal organizations;
- letters regarding the draft action plan consultations sent to over 3000 private landowners;
- emails regarding the action plan consultations sent to over 300 stakeholders including agriculture associations, the agricultural industry, industry (such as the aggregate mining industry), utility companies, environmental non-government organizations, community stewardship groups, municipal governments, and representatives from the provincial and federal government;
- four face to face workshops held in Chilliwack and Burnaby with agriculture, local government, stewardship group, utility companies and federal and provincial government representatives;
- four community open house sessions held in Burnaby, Chilliwack, Aldergrove and Harrison Hot Springs;
- public notices regarding the community open houses and action plan consultations published in local papers; and
- distribution of feedback forms and fact sheets on critical habitat protection at workshops and open house sessions.

Approximately 160 people participated in the community open houses and face to face workshops held in Burnaby, Chilliwack, Harrison Hot Springs and Aldergrove. Twenty-two people submitted comments and feedback on elements of the draft action plan via email, mail and the online comment form. Seven people or organizations submitted comments and expressed their thoughts via letters to the Minister of Fisheries and Oceans.

Table 3 below provides an overview of some of the key concerns or issues brought up during consultations. Please note that different participants expressed different concerns and perspectives; the issues and opinions summarized below may not be shared by everyone who participated in consultations.

All comments received were considered in the finalization of the action plan. The second column in Table 3 indicates how the comment relates to the finalized action plan.

Table 3: Summary of key concerns or issues raised during consultation and responses in relation to the action plan

Key concern or comment	Response
Desire for pilot 'showcase' projects and financial incentives for landowners to promote stewardship actions such as habitat restoration that will support species recovery	Action 14 in Table 1 and Actions 11 and 16 in Table 2 address the development of pilot projects and financial incentives for habitat restoration.
Various suggestions for how different recovery measures or voluntary actions should be implemented	Suggestions will be taken into consideration during implementation of the relevant recovery measures
Desire for involvement in action plan implementation	As indicated on page 3, all Canadians are invited to participate in the implementation of this action plan, either by undertaking some of the voluntary actions listed in Table 2 or by partnering with DFO to implement actions identified in Table 1.
Concern that organizations outside DFO will not commit to take actions to benefit Nooksack Dace or Salish Sucker	The development of a stewardship and engagement strategy (Table 1, #15) and the development of stewardship agreements (Table 1, #17) could help address this concern.
Desire for watershed scale planning of recovery actions, so that actions taken to benefit one species do not result in harm to other species.	The action plan addresses two species in order to ensure that actions taken to benefit Nooksack Dace do not harm Salish Sucker. Actions 7 and 22 in Table 1 specifically address the consideration of the needs of other species at risk. The need for any additional planning at a scale different from that used in this action plan will be considered during action plan implementation.
Various questions and requests for more specific guidance around critical habitat protection	Consultation results and comments related to critical habitat protection will also be reflected in the Regulatory Impact Analysis Statements for the SARA Critical Habitat Orders to protect critical habitat for Nooksack Dace and Salish Sucker. Additional guidance will be developed where needed, to inform landowners and others around management practices that could help avoid the destruction of critical habitat.
Desire for additional communication with the public regarding regulatory requirements and compliance promotion efforts	Several actions in both tables address communication and education with landowners and other members of the public. This desire will be considered in implementation of these actions.

Desire for increased enforcement to encourage compliance with existing regulations and with the SARA Critical Habitat Orders once they are in place	Enforcement requirements for SARA Critical Habitat Orders will be considered and reflected in the Regulatory Impact Analysis Statements for each Order. Comments regarding enforcement of other regulations received during consultations will be shared with relevant DFO sectors and other agencies as appropriate.
Concerns related to the identification of critical habitat	The identification of critical habitat is outside the scope of the action plan. Critical habitat for each species was identified in the recovery strategy for the species. If new scientific information supporting changes to this critical habitat becomes available at some point in the future, the recovery strategy will be updated as appropriate.
Various concerns related to ditch and drainage maintenance	The Stewardship Centre for British Columbia (2013) and partners developed "Species at Risk Voluntary Stewardship Practices" for drainage maintenance in agricultural waterways, among others, which are expected to minimize harm to Nooksack Dace and Salish Sucker habitat. Several actions in Table 1 and 2 also address the issue of nutrient management and riparian planting, which can help address some of the underlying causes of drainage maintenance issues. Other broader concerns related to ditch and drainage maintenance raised during consultations are outside the scope of the action plan. Where possible, comments and concerns have been shared with relevant DFO staff.