RECOVERY POTENTIAL ASSESSMENT FOR THE SALISH SUCKER IN CANADA

Salish Sucker. Photo credit: Mike Pearson

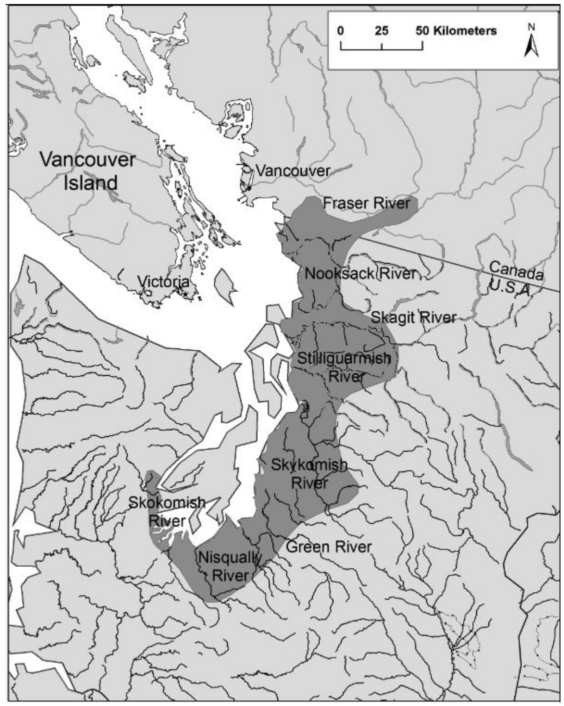

Figure 1. Global range of Salish Sucker.

Context:

After the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses an aquatic species as Threatened, Endangered or Extirpated, Fisheries and Oceans Canada (DFO) undertakes a number of actions required to support implementation of the Species at Risk Act (SARA). Many of these actions require scientific information on the current status of the wildlife species, threats to its survival and recovery, and the feasibility of recovery. Formulation of this scientific advice has typically been developed through a Recovery Potential Assessment (RPA) that is conducted shortly after the COSEWIC assessment. This timing allows for consideration of peer-reviewed scientific analyses into SARA processes, including recovery planning.

The Salish Sucker (Catostomus sp.) is a freshwater fish listed as Endangered under SARA. Salish Sucker was re-assessed as Threatened in 2012. In support of listing recommendations for Salish Sucker by the Minister, DFO Science has been asked to undertake an RPA, based on the national RPA Guidance.

This Science Advisory Report is from the March 23, 2015 Recovery Potential Assessment (RPA) for Salish Sucker. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

July 2015

SUMMARY

- The current Canadian distribution of Salish Sucker encompasses 11 watersheds (each supporting a population or meta-population) within the Fraser Valley. No extirpations are known to have occurred, but indirect evidence suggests that distributions and population sizes within watersheds have contracted.
- Current estimates of abundance, based on mark-recapture work, are available for parts of, or all of, seven of the eleven watersheds; there are no long term data to estimate trends in any of them.
- Salish Sucker life history characteristics (small body size, early maturation, protracted spawning period) are typical of species with high intrinsic rates of population growth, which facilitate rapid recovery from episodic mortality and colonization of newly available habitats. However, widespread habitat degradation and current habitat quality may have affected the species' vital rates. The potential for natural recovery is limited by habitat quality.
- Severe hypoxia in summer habitats is believed to limit recovery of all populations and threaten survival of some; it is considered the predominant threat.
- Most watershed population targets proposed herein have been reduced from those in the 2012 Proposed Recovery Strategy. Total population target is proposed at 31,500 adult fish.
- The recommended level of allowable harm is two adult fish, or two percent of the lower 95% confidence limit of the most recent population estimate, whichever is greater, to a maximum of 10 adult fish per watershed per annum.
- Information on habitat and land use trajectories is needed to infer future population recovery. Given that more habitat is being lost then gained every year, future work should be directed to model habitat changes and Salish Sucker population responses to those changes.

BACKGROUND

The Salish Sucker was listed as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1986, and added to Schedule 1 of the *Species at Risk Act* (SARA) in 2005. A Recovery Potential Assessment (RPA) was conducted in 2009 and a proposed Recovery Strategy, including proposed Critical Habitat, was posted on the SARA Public Registry in 2012. In 2012, COSEWIC re-assessed the species as Threatened (COSEWIC 2012). In support of listing recommendations for Salish Sucker, Fisheries and Oceans Canada (DFO) has been asked to prepare a new RPA to update and consolidate information and advice.

A RPA is intended to provide the best possible advice on recovery potential and to identify information gaps. Relatively little data is available on the natural history, abundance, population trends, and habitat use of the Salish Sucker in Canada. Consequently, there are many uncertainties associated with the elements of the RPA.

ASSESSMENT

Biology, Abundance, Distribution and Life History Parameters

The Salish Sucker is a genetically and morphologically distinct taxon within the Longnose Sucker (*Catostomus catostomus*) genome (McPhail & Taylor 1999). Salish Suckers are short lived (to five years) and typically spawn between early April and early July. They spawn annually and females are likely able to spawn more than once in a single year (Pearson and Healey 2003). Adults feed on aquatic insects, but the diet of first-year juveniles is unknown. Adults are active throughout the night, but are most active at dawn and dusk. During the day adults rest in heavy cover, often among thick vegetation adjacent to an open channel. Salish suckers tend to return to the same resting location on successive days. Salish Suckers are active at temperatures as low as 6°C, and are commonly found in water exceeding 20°C (Pearson and Healey 2003). They are relatively tolerant of low dissolved oxygen levels (as low as 3.5mg/l). Within watersheds, populations are highly aggregated, with a small proportion of habitat supporting the great majority of individuals. Adults are preyed upon by Mink and River Otters. Juveniles are probably taken by a variety of fish and birds (Pearson 2004; Pearson & Healey 2003; Fisheries and Oceans Canada 2012).

The global distribution of Salish Sucker extends from the Fraser Valley through Washington State on the west side of the North Cascade Mountains to the southern end of Puget Sound (Figure 1). Within Canada, they are known to occupy 11 watersheds (Figure 2). There is no evidence that the number of Canadian watersheds occupied by Salish Sucker has changed since the taxon was first documented more than 50 years ago. Given that five of the known populations have been found since 2000, that a number of unconfirmed records of *C. catostomus* in other watersheds exist, and that some areas of the Fraser Valley have not been intensively surveyed using appropriate methods (e.g. Pitt Meadows and Hope areas), it is very possible that one or more Canadian populations remain undiscovered (COSEWIC 2012).

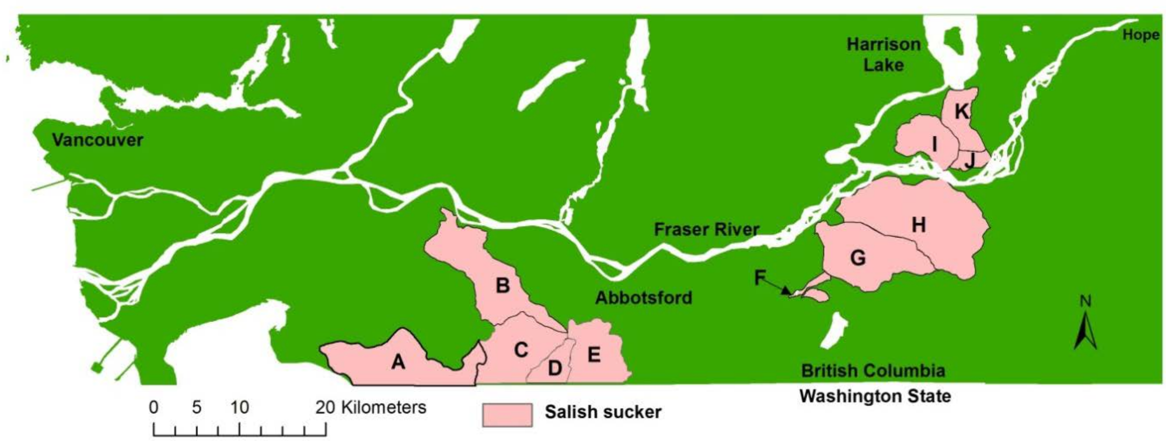

Figure 2. Salish Sucker populations are known from the Little Campbell River (A, 2014), the Salmon River (B 2013), Bertrand Creek (C, 2013), Pepin Creek (D, 2014), Fishtrap Creek (E, 2012), Salwein Creek and Hopedale Slough (F, 2013), the Chilliwack Delta streams (G, 2014), Elk Creek and Hope Slough (H, 2009), Mountain Slough (I, 2014), Agassiz Slough (J, 2014) and the Miami River (K, 2013). Years refer to the date of most recent capture (adapted from COSEWIC 2012).

No quantitative abundance trajectory information exists. The few older estimates of abundance, including those in the proposed Recovery Strategy (Fisheries and Oceans Canada 2012) utilized a catch-per-unit-effort (CPUE) based method now known to be unreliable, because CPUE has a weak relationship with fish density (COSEWIC 2012). Recent mark-recapture studies have provided more robust estimates of current population size (Table 1). Range-wide abundance, however, has likely declined considerably over the past half-century given the widespread reductions in habitat quality and quantity within watersheds. The section on Recovery Targets (below) provides further detail on the rationale for abundance estimates.

Table 1. Population estimates of Salish Sucker made using mark-recapture. Bracketed years indicate the year of completed, attempted, or scheduled estimate. 'X' indicates an attempt in which too few fish were captured to make an estimate.

Population	Subwatershed	Mean population estimate (95% CI)
Little Campbell River	Little Campbell River (2014)	X
Bertrand Creek	Bertrand mainstem (2013)*	735 (638-862)
	Perry Homestead (2016)	-
	Howe's Creek (2012)**	329 (206-711)
Pepin Creek	Pepin Creek (2012)**	1754 (1318-2900)
Fishtrap Creek	Fishtrap Creek (2013)	X
Salmon River	Upper Salmon River (2013)*	751 (649-915)
	Lower Salmon River (2013)	X
Salwein Street	Salwein Creek (2012)*	288 (191-635)
	Hopedale Slough (2012)*	469 (346-712)
Chilliwack Delta	Luckakuck Creek (2014)*	378 (345-416)
	Semmihault Creek (2015)	-
	Atchelitz Creek (2015)	-
	Little Chilliwack Creek (2015)	-
Elk/Hope Slough	Elk Creek/Hope Slough (2006)	X
Mountain Slough	Mountain Slough (2016)	-
Miami River	Miami River (2012)**	102 (67-193)
Agassiz Slough	Agassiz Slough (2012)**	253 (203-354)

*Mike Pearson 2015. Pearson Ecological, Aggassiz, BC.unpub. reports to BC Ministry of Environment and Fisheries and Oceans Canada
**Jill Miners 2015. Department of Geography, University of British Columbia (UBC) unpub. data

Habitat Requirements and Residence

All known Canadian populations occupy small lowland streams and sloughs. Essential properties of each of these habitat features are listed in Table 2. Detailed rationale for the inclusion of each habitat feature and its properties can be found in the Proposed Recovery Strategy (Fisheries and Oceans Canada 2012).

Table 2. Habitat properties for all life history stages of Salish Sucker.

Habitat Features	**Properties**	**Life History Stage(s)**	**Comments**
Deep Pools	• >70 cm depth • >50 m long • Adequate food supply of terrestrial and aquatic insects • Dissolved oxygen >3.5 mg/l • Temperature between 6 and 23 ^oC • Absence of harmful pollutants	Adults Yearlings	Primary feeding and rearing habitat
Riffles	• Often in small tributary streams • Cobble or gravel substrate • Low proportion of fine sediment • Sufficient flow to maintain riffles • Sufficient intra-gravel flow to maintain eggs • Adequate food supply of terrestrial and aquatic insects • Temperatures between 6 and 23 ^oC • Dissolved oxygen >7mg/l • Absence of harmful pollutants	Adults Eggs	Primary spawning habitat
Shallow Pools and Glides	• < 40 cm depth • Adequate food supply of terrestrial and aquatic insects • Dissolved oxygen >3.5 mg/l • Temperature between 6 and 23 ^oC • Absence of harmful pollutants	Young of the Year	Nursery Habitat
Riparian	• Native riparian species, typically trees and shrubs • Continuous • Extends inland from top of bank 5 to 30 m depending on stream characteristics • Provides adequate food supply of terrestrial insects • Provides bank stability, shade and woody debris • Provides adequate buffer from impacts of adjacent land uses	All Stages	Maintains the integrity of aquatic habitat and augment food supply

Known areas with physically suitable aquatic habitat have been identified and proposed as Critical Habitat in the proposed Recovery Strategy (Fisheries and Oceans Canada 2012), and in Pearson (2014). The extent of this habitat is summarized in Table 3.

Table 3. Channel length, by system, of known Salish Sucker proposed and potential critical habitat.

Watershed	**Channel Length (km)**
Agassiz Slough	7.69
Miami River	7.83
Mountain Slough	9.83
Chilliwack Delta	34.30
Elk Creek / Hope Slough	23.68
Salwein Creek / Hopedale Slough	10.73
Bertrand Creek	23.11

Watershed	Channel Length (km)
Pepin Creek	11.02
Fishtrap Creek	6.52
Salmon River	22.60
Little Campbell River	22.80
All Watersheds	**180.11**

Seven of the eleven populations are effectively isolated from one another by dykes, flood-gates, highways, and the historical draining of Sumas Lake and various wetlands. The likelihood of a rescue effect is low. The only populations between which migration is possible are Miami River/Mountain Slough, which are joined in a headwater pond that drains to both, and Salmon River/Bertrand Creek, which are connected at high water through a headwater wetland. In both cases, connections are associated with high streamflow conditions or beaver activity.

Access to parts of smaller tributaries is prevented by perched, or hung, culverts in many locations across the range. These installations have not been inventoried to date, but may prevent access to suitable spawning and nursery habitats.

Residence

SARA defines a residence as “a dwelling place, such as a den, nest or other similar area or place that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating” (S.C. 2002, c.29). The residence must support a life cycle function, there must be an element of investment in the creation or modification of the structure, and it must be occupied by one or more individuals. Salish Suckers are broadcast spawners, and they do not modify their environment for the purpose of “breeding, rearing, staging, wintering, feeding or hibernating”. The concept of residence therefore does not apply.

Threats and Limiting Factors to Survival and Recovery

Seven threats impact Salish Sucker populations (Table 4). Episodes of extreme hypoxia have been identified as the most prevalent and serious threat, as they can cause acute mortality or reduced fitness through impairment of key life history functions. Actual impacts of a given dissolved oxygen concentration will vary with water temperature, duration of exposure, body size, health prior to exposure and interactions with other environmental factors. Salish Suckers are tolerant of low levels of oxygen, as they are regularly captured in waters containing less than 3.5 mg/l dissolved oxygen, suggesting that they may be tolerant of mild hypoxia, but are occasionally found dead in traps set in near-anoxic water (<1 mg/l; Pearson 2004, Jill Miners, Department of Geography, UBC, unpub. data). Risk of hypoxia varies seasonally and annually where it occurs, but is generally highest in late summer and early fall, when temperatures and oxygen demand are highest and water levels are lowest.

Aquatic or riparian habitat is degraded or destroyed by works including, but not limited to, draining, dyking, channelization, infilling, vegetation removal, or removal of large woody debris.

Loss and degradation of habitat continues to occur annually in most watersheds, including permitted works such as channel dredging for flood control, drainage maintenance by local governments, and unauthorized/illegal alterations to habitat.

An eighth threat, *Riffle loss to Beaver Ponds* was included in the Proposed Recovery Strategy, but was excluded from this analysis based on the small area of riffle required for spawning, the limited extent of riffle habitat lost to beaver ponds, and evidence that Salish Suckers will migrate several kilometres to spawning sites (Pearson 2004, Jill Miners, Department of Geography, UBC, unpub. data). Thus, it now appears unlikely that riffle loss to beaver ponds is a significant threat in any of the surveyed watersheds

All identified threats to Salish Sucker affect the amount or quality of available habitat, and can be expected to affect many or most native species that share this available habitat. Table 5 provides the pathways of effects of known threats in Salish Sucker habitat.

Table 4. Threats to Salish Sucker listed in descending order of importance. Darker shading indicates increasing vulnerability and extent of range affected. This ranking is subjective, based on expert opinion.

Threat	**Contributing Factors**	**Extent of Range Affected**	**Vulnerability To Threat**			
			Eggs/ Spawning	***Young of Year***	***Adult/ Yearling Summer***	***All Ages Winter***
Hypoxia	Nutrient loading Lack of riparian vegetation (shade) Seasonal lack of water					
Habitat damage or destruction	Drainage works Infilling channels and floodplains Removal of riparian vegetation					
Seasonal lack of water	Ground and surface water withdrawals Increased impervious area Wetland loss					
Deleterious substances	Agricultural runoff and sprays Urban storm water Creosote structures Spills (road, rail, pipeline) Lack of riparian vegetation (filtration and buffer)					
Habitat fragmentation	Dykes, dams, floodgates Perched culverts Poor water quality Seasonal lack of water					
Increased predation	Introduced predatory species Increased vulnerability due to hypoxia or seasonal lack of water					
Sediment deposition	Urban stormwater Failure of sediment control measures in construction or gravel mining. Lack of riparian vegetation (filtration)					

Table 5. Summary of nature and extent of activities likely to damage or destroy required habitat features for Salish Sucker.

Activity	**Pathways of Effects**	**Effects**	**Extent of Impacts on Habitat**
Over-application or poor storage of manure.	Nutrients enter aquatic habitat via overland runoff or by groundwater transport, which may be exacerbated by drain tile. Exacerbated by excess production of manure over what is required to fertilize land base.	Eutrophication resulting in hypoxia. Overgrowth of habitat with invasive plants, particularly reed canary grass (*Phalarus arunindacea*). Increased need for drainage maintenance works.	Occurs in all watersheds and is widespread.
Drainage maintenance works	Physical removal of vegetation, organic debris and/or silt/sediment. Mowing of banks and riparian areas. Organic debris and riffles (‘high spots’) are typically targeted.	Destroys habitat features and complexity. Periodic nature of work prevents development of habitat complexity. Temporary increase in dissolved oxygen levels caused by reduced biological oxygen demand and increased flow.	Extensive in Mountain Slough, Chilliwack Delta, Elk Creek/Hope Slough. Occasional in Miami River, Salmon River, Bertrand Creek, Rare in Agassiz Slough, Pepin Creek, Fishtrap Creek, Little Campbell River, and Salwein Creek/Hopedale Slough
Removal of riparian vegetation	Landowners seeking to increase usable land area. Landowners clearing for aesthetic reasons. Road/utility maintenance work.	Increase in summer water temperature. Increased erosion and reduced bank stability. Increased risk of deleterious substances entering water from adjacent lands. Exacerbated consequences of nutrient loading.	Occurs regularly in all watersheds.
Pesticide/herbicide application near water	Drift from application to adjacent lands into riparian or aquatic habitats. Direct application to riparian or aquatic habitats to kill vegetation for aesthetic or drainage improvement purposes.	Potential toxicity to Salish Suckers. Potential reduction in food availability. Potential degradation of habitat from loss of riparian or aquatic plants.	Common in most watersheds.
Urban storm drainage	Changes in stream hydrograph and increased pollutant entry to water via storm drains.	Channel incision leading to reduced habitat complexity	Level of activity varies among watersheds, but is

Activity	Pathways of Effects	Effects	Extent of Impacts on Habitat
		Impaired water quality including hypoxia. Reduced baseflow, leading to increased water temperature and increased hypoxia risk. Reduced habitat volume and area leading to increased competition and/or predation risk. Increased risk of habitat dewatering.	significant in Agassiz Slough, Miami River, Chilliwack Delta, Hope Slough, Fishtrap Creek, and Bertrand Creek
Livestock access	Commercial livestock operations. Hobby farms.	Increased erosion, bank failure and sediment deposition in aquatic habitats. Nutrient loading from defecation in habitat. Trampling of eggs in riffles.	Still occurs in Fishtrap Creek, Bertrand Creek, Salmon River, Little Campbell River, Salwein Creek/Hopedale Slough.
Water extraction or diversion	Surface withdrawals for irrigation. Municipal wells. Private wells.	Reduced baseflow, leading to increased water temperature and increased hypoxia risk. Reduced habitat volume and area leading to increased competition and/or predation risk. Increased risk of habitat dewatering.	Widespread across range. Watersheds range widely in vulnerability.
Spills	Road and rail crossings. Pipelines. Illegal dumping.	Dependent on quantity and properties of substance spilled. Risk of fish kill caused by harmful substances. Risk of persistent toxic effects. Risk of habitat damage during cleanup activities.	All watersheds are at some risk, but level varies with the nature and number of crossings and access points.
Gravel mining	Failure of water control structures during storm event.	Risk of massive sediment deposition as occurred in Pepin Creek in 1997, 1999, and 2008	Risk in Fishtrap Creek and Pepin Creek.

Recovery Targets

A minimum viable population (MVP) analysis was not conducted due to lack of known life history parameters. Proposed recovery targets are instead based on mean and median values from a literature review of several large-sample meta-analyses of MVP estimates in vertebrates. These analyses collectively suggest that interim targets in the range of 1375-7000 adults are suitable in the absence of specific data (Reed et al. 2003; Brook et al. 2006; Traill et al. 2007). In most cases, newly proposed recovery targets have been reduced from those of the proposed Recovery Strategy, which are based on an assumed density of 0.05 adult/m^2 in all deep pool habitat. Recent studies indicate, however, that Salish Suckers routinely make seasonal movements of several kilometres (Jill Miners, Department of Geography, UBC unpub. data; Mike Pearson, Pearson Ecological, Agassiz, BC, unpub. data), and that they are usually clustered in a few traps when caught. This suggests that they move widely over their range over the course of the year, and that they either move in groups or congregate in specific areas. Due to the potential aggregating behaviour the use of simple area/density relationships is inappropriate.

Recent studies also indicate that fish are rarely caught in wide slough channels (i.e. > 20 m) near the Fraser River. These areas are likely important movement corridors between the smaller tributaries that are the primary habitat, but are unlikely to contribute directly to productivity. They do, however, have very large surface areas; their inclusion would greatly inflate area-based estimates of carrying capacity. Eliminating them as productive areas results in significant target reductions for Elk Creek/Hope Slough, Chilliwack Delta, and Salmon River compared to those in the proposed Recovery Strategy.

The targets proposed herein are now based on channel length rather than area (Table 6). A target of 1375 adults was assigned to Agassiz Slough (Length 4.35 km excluding wide slough habitats near the Fraser). Targets for other watersheds were calculated proportionally by length and rounded to the nearest 500 fish. The numbers correspond to mean densities ranging from 0.014 to 0.038 adults per square metre of deep pool exclusive of wide sloughs near the Fraser River.

Table 6. Abundance targets in relation to recent abundance estimates for Canadian Salish Sucker populations. Most proposed targets herein have been reduced from those in the Recovery Strategy.

Population	Mark-Recapture Estimate	Proposed 2012 Recovery Strategy Target	Proposed 2015 Target	Current population Estimate as % of Proposed 2015 Target
Agassiz Slough	253	2000	1500	17
Miami River	102	1500	1500	6.8
Mountain Slough		4400	3000	
Chilliwack Delta Luckakuck Creek	 378	7000	5500	
Elk Creek / Hope Slough		8000	2500	
Salwein Creek Hopedale Slough	288 469	2700	2500	30
Bertrand Creek	1064	7000	4000	27

Population	Mark-Recapture Estimate	Proposed 2012 Recovery Strategy Target	Proposed 2015 Target	Current population Estimate as % of Proposed 2015 Target
Mainstem Howe's Creek	735 329			
Pepin Creek	1754	1200	2500	70
Fishtrap Creek	X	4700	1500	
Salmon River Upper River	 751	8200	 2000	 38
Little Campbell River	X	NA	5,000	
All Watersheds		46,700	31,500	

Scenarios for Mitigation of Threats and Alternatives to Activities

Quantitative projections of population trajectories are not possible due to the lack of estimates of population dynamic parameters, particularly fecundity and recruitment rates. As a result, scenarios were not explored. It is clear, however, that Salish Sucker populations are limited by the quantity of suitable habitat, particularly by hypoxia during the summer season. It is currently unlikely that any of the watersheds have a sufficient supply of habitat to support potential recovery target abundances during the summer and early fall, when hypoxia is most prevalent.

Recent surveys indicate, however, that small areas of high quality habitat can support relatively large numbers of fish. In Hopedale Slough, an estimated 500 fish were found in a pond complex of less than $9000 m^2$ (Pearson 2013), and in Luckakuck Creek an estimated 378 Salish Suckers of all age classes are isolated in a groundwater-fed pond of $4150 m^2$ (Mike Pearson, Pearson Ecological, Agassiz, BC, unpub. data). There is both indirect (Pearson and Healey 2003) and observational evidence that the intrinsic rate of population growth in Salish Sucker is high. Reductions in mortality from acute hypoxia, habitat dewatering (in some cases) and increased productivity through improved water quality, are likely to be sufficient for most populations to reach the newly proposed target abundances.

Allowable Harm Assessment

The aforementioned lack of known life history parameters prevented the calculation of population trajectories. Further, it is believed that persistent hypoxia and range-wide habitat degradation are having a negative impact on vital rates. Finally, human population in the Fraser Valley is expected to increase by over 800,000 in the next 20 years (BC Stats 2015). This will apply significant development pressure on already compromised Salish Sucker habitat. As a result, a subjective, conservative approach was used to recommend allowable harm levels. Proposed allowable harm to individuals comprises two adult Salish Sucker or two percent of the lower 95% confidence limit of the most recent population estimate, whichever is greater, to a maximum of 10 adults per annum. These values appear in Table 7.

Table 7. Estimates of annual allowable human-induced mortality of Salish Sucker. In cases where metapopulations are expected, figures are provided for each occupied subwatershed.

Population	Lower 95% CL of Abundance	Allowable Harm Estimate (per annum)
Agassiz Slough	203	4
Miami River	67	2
Mountain Slough	?	2
Chilliwack Delta		
Luckakuck Creek	345	6
Atchelitz Creek	?	2
Semmihault Creek	?	2
Little Chilliwack Creek	?	2
Elk Creek / Hope Slough	?	2
Salwein Creek	191	4
Hopedale Slough	346	7
Bertrand Creek		
Mainstem	638	10
Howe's Creek	206	4
Perry Homestead Creek		2
Pepin Creek	1318	10
Fishtrap Creek	?	2
Salmon River		10
Upper River		
Lower River	649	
	?	
Little Campbell River	?	2

Given currently low abundance across the Canadian range of Salish Sucker, and that habitat integrity is already compromised, habitat destruction should only be allowed under extraordinary circumstances as a last resort. If, following the application of feasible mitigation measures, habitat destruction is unavoidable, then compensatory habitat should be constructed or enhanced and subsequently monitored for effectiveness.

CONCLUSIONS AND ADVICE

- Severe hypoxia in summer habitats is believed to limit recovery of all populations and to threaten survival in some watersheds. It is considered the predominant threat.
- Based on an alternative method for estimating recovery targets by watershed, most population targets derived in the current RPA are lower than those reported in the proposed Recovery Strategy. Using the more current estimation method, the total proposed population target is 31,500 adult fish.
- Population survival and recovery depends upon halting and reversing degradation of Salish Sucker habitat, particularly the alleviation of severe hypoxia in otherwise suitable habitat.
- There is a need to continue population monitoring and exploratory surveys to determine population size and seasonal distribution.

- Better information is required to characterize life history parameters, for which there are no direct estimates. Reliable parameter estimates (recruitment, fecundity, survival, etc.) would be applicable to population and recovery modelling, which could also be used to consider impacts on habitat quality, quantity and fragmentation.
- Proposed allowable harm by watershed is two adult fish or two percent of the lower 95% confidence limit of the most recent population estimate, whichever is greater, to a maximum of 10 adult fish per watershed.
- Information on habitat and land use trajectories is needed to infer future population recovery. Given that more habitat is being lost then gained every year, future work should be directed to model habitat changes and Salish Sucker population responses to those changes.

SOURCES OF INFORMATION

This Science Advisory Report is from the March 23, 2015 Recovery Potential Assessment (RPA) for Salish Sucker. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

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