



## RECOVERY POTENTIAL ASSESSMENT FOR SPECKLED DACE (*RHINICHTHYS OSCULUS*)



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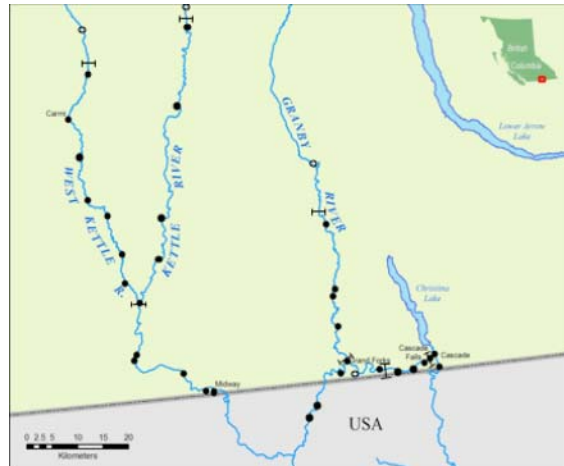


Figure 1: Geographic range of Speckled Dace. (Map Source: M. Bradford)

### Context

The Canadian population of speckled dace was designated Special Concern by COSEWIC in 1980, and upgraded to Endangered in 2002 based on that year's status report. Its status was further reconfirmed in 2006 (COSEWIC 2006). The species is not listed under SARA. The main reason for concern in Canada is its very limited geographic range in being restricted to a single catchment.

Our knowledge of the species within its Canadian range is fragmentary. However, the existence of the species in several better-studied locations in the western United States means that some inferences can be drawn concerning its behaviour and habitat requirements. Several of the many populations of speckled dace within the western U.S. are listed under that country's Endangered Species Act.

### SUMMARY

- Speckled dace is common in the western United States but its geographic range protrudes into Canada only in the Kettle-Granby River drainage in the west Kootenay area of southern B.C. The Canadian population of speckled dace was designated *Special Concern* by COSEWIC in 1980, and upgraded to *Endangered* in 2002 because of its isolation in a single drainage.
- The life history of the speckled dace in Canada is not well known. The species appears to prefer riffle or other faster water areas with a rocky bottom. Spawning has never been observed in nature, and survival of the various life stages is not known. There are large

knowledge gaps concerning habit use, and there has been no consistent census within its Canadian range.

- Human-induced threats are only quantifiable if we make assumptions about reproductive potential, habitat preference and distribution. Threats include water withdrawal for irrigation, a proposed 25-megawatt run-of-river hydroelectric generation project at Cascade Falls on the Kettle River, and watershed alteration by logging.
- The viability of the speckled dace population is not expected to be reduced by the planned hydroelectric development, and there are several tools that could be used to manage instream flow so as to protect dace habitat in the Kettle River.
- Quantitative estimates of its abundance by river reach, as well as studies of its habitat use by life stage and season, are required. This information will be necessary to evaluate future population status and the importance of specific habitat for survival and recovery. Given the data limitations, it is not possible to quantify the importance of specific habitat types. Based on the qualitative information available, the maintenance of adequate flow regimes in riffle habitat likely is an important strategy for ensuring population persistence. At present, there are insufficient data to quantify potential mortality related to reduced riffle flow. A target abundance for a healthy population of speckled dace cannot be established without better data on the current abundance and capacity of the system.
- In the absence of information that indicates the population has declined, the recovery goal to maintain the persistence and present range of the population in Canada is realistic from a biological perspective.

## BACKGROUND

Scientific information in support of this recovery potential assessment can be found in Harvey (2007). Dace are minnows belonging to the same family as chub, tench, carp, shiner and goldfish. Speckled dace *Rhinichthys osculus* is small (51-76 mm), with a prominent snout and a sucker-like mouth. While speckled dace are common in the western United States (there are hundreds of populations of the species from Washington to northern Mexico), its geographic range protrudes into Canada only in the Kettle-Granby River drainage in the west Kootenay area of southern B.C. The Canadian range of speckled dace is shared with other fish species including rainbow trout, brown trout, northern pikeminnow, redbelt shiner, largescale sucker, slimy sculpin, chiselmouth, chub and mountain whitefish. Its ecological interactions with these species are not well known. Speckled dace are probably an important link in aquatic and terrestrial food chains, as food for larger fish and birds.

Speckled dace coexists with Umatilla dace *Rhinichthys umatilla* in a short section of the Canadian portion of the Columbia drainage; confirmation that the two forms are in fact separate species awaits further taxonomic research. The Canadian population of speckled dace is geographically isolated upstream of Cascade Falls because Umatilla dace cannot enter the Canadian portion of the Kettle system upstream of Cascade falls. The designation of Canadian speckled dace as *Endangered* reflects this isolation: if the population above Cascade Falls were to become extinct through some catastrophic event, re-colonization by other populations from below this 30-metre natural barrier would be impossible.

The life history of the speckled dace in Canada is not well known. The species appears to prefer riffle or other faster water areas with a rocky bottom. Speckled dace in the Kettle River system live approximately four years. Spawning has never been observed in nature. Survival at the various life stages is not known; this knowledge gap makes it hard to estimate recruitment.

While speckled dace seem widely distributed in the Kettle-Granby catchment, their occurrence is probably limited by the total amount of suitable or preferred habitat. Adult speckled dace seem to prefer areas with hiding places, especially between rocks in riffle areas. Such areas are thought to make up only 20-25% of the Kettle system; the presumed highest quality habitat is found in the 9 km reach immediately upstream of Cascade Falls.

Habitat use appears to vary with age and season. Males are collected much less frequently than females, and may prefer deeper, swifter water that is hard to sample with electro-fishing gear. Side channels are used throughout the year by juveniles, who prefer edge habitat in spring and fall; adults seem to use shallow waters mainly in summer. Protracted low water, which may be natural (drought) or caused by water withdrawal, may cause isolation or death. The body of quantitative information on optimal water flow for adult and juvenile speckled dace in Canada is very limited.

### **Core concept: Instream flow and MAD**

While there are limitations on our ability to quantify the levels of water discharge at which dace are harmed, there are several tools that could be used to manage instream flow so as to protect dace habitat in the Kettle River. The method of Tennant has been adapted to reflect the hydrologic regimes and fish periodicity in B.C. streams and proposed as a platform for instream flow standards for rivers like the Kettle. A flow of 10% mean annual discharge (MAD) has been proposed as the minimum necessary for maintenance of riffle width in B.C. streams; flows near 20% MAD are thought to be required to maintain riffle depth and velocity. The MAD at the Cascade recording station is 75 m<sup>3</sup>/s. Spring snowmelt freshet, which typically peaks in late May or early June, is the dominant hydrological event of the year, and flow at this time can exceed 200 m<sup>3</sup>/s. The low flow period can extend between August and March. Because reduction of late-summer flow below 7.5 m<sup>3</sup>/s (10% MAD) is not uncommon, any increase in water withdrawal is cause for concern. Water withdrawals affect stream flow throughout the Kettle system.

The rule-of-thumb method which prescribes a 10% MAD standard to maintain width coverage in riffles may not be appropriate for a river that flows through an arid region and is home to an endangered little-understood, flow-sensitive species. At present, there are insufficient data on habitat availability and speckled dace abundance to quantify the expected harm at any level of reduced flow. This is another knowledge gap that will need to be assessed if realistic discharge limits are to be set.

### **Threats**

#### **Water withdrawal**

As a stream-dwelling population that appears to prefer fast-water riffle habitat, the speckled dace in Canada could be affected by long-term changes in discharge. Water level in some portions of the Kettle can drop so far that dace become stranded in isolated pools. Riffle areas are more sensitive to flow reduction than other stream habitats such as glides, runs and pools. Increasing demands for water withdrawal pose a threat to components of the population

residing in areas where agricultural water use occurs. Water abstraction for irrigation in the Kettle basin has been identified as a conflict with fish habitat for many years.

### Hydroelectric development

A proposal for a 25-megawatt run-of-river hydroelectric generation project at Cascade Falls on the Kettle River (about 2.5 km south of the community of Christina Lake) was submitted in 1999 and approved in August, 2006 by the B.C. Environmental Assessment Office (EAO), after modification based on analysis of its potential fish habitat impacts.

### Watershed alteration by logging

Infestation by mountain pine beetle *Dendroctonus ponderosae* has the potential to degrade stream habitat in many areas of interior B.C., including the Kettle-Granby watershed. The first effect will be a gradual, natural one, in which trees lose their branches and eventually collapse, reducing stream canopy and allowing understory vegetation to increase. Death of lodgepole pine in the watershed will result in deeper snow pack and faster snowmelt; the overall result will be earlier, bigger and more frequent floods. The bigger risk, however, would come from increased salvage logging, which can be twice the normal allowable cut. Damage to stream habitat can be minimized through a variety of practices.

## **ANALYSIS**

Designation of the speckled dace population in Canada as *Endangered* reflects its isolation in a single drainage. While there are concerns about the potential impact of water withdrawal and other human-induced activities, the population is widespread and likely abundant enough not to be at immediate risk. The best estimates of speckled dace population abundance, however, rest on assumptions about habitat suitability and estimates of the amount of suitable habitat; they are not supported by systematic sampling.

Habitat trends in the Kettle-Granby watershed reflect the historic development of mining and rail transportation, and the more recent dependence on agriculture, timber harvest, ranching and tourism. Availability of suitable habitat in the Kettle-Granby system has been identified as the main factor limiting abundance of freshwater fish in general and speckled dace in particular. The large knowledge gaps concerning habitat use by speckled dace in Canada cannot be filled simply by extrapolating from studies on the species in the southern part of its range, where temperature and water flow are different from conditions in the Kettle system.

Low water flow conditions can be expected to further reduce the already limited amount of habitat. As a general rule, reduction of streamflow to less than 10% of the mean annual discharge severely degrades water depth, velocity and riffle size, and likely increases risks to aquatic biota. Unfortunately, the licensed withdrawal of surface water is not the only cause of decrease in flow, so ensuring that discharge does not fall below some agreed-upon figure will not be straightforward. Unlicensed withdrawal of ground water is occurring more frequently in the watershed. While we don't adequately understand the connection between surface water and aquifers, further groundwater extraction in the Kettle basin poses a risk, as it does elsewhere in Canada. Licensing of groundwater extraction and further research to determine the connection between surface and ground waters could be useful to prevent water withdrawal from exceeding any specified limits. A ban on surface water abstraction in a drought season, under the Provincial Fish Protection Act (1997), is a third option.

There are alternative agricultural practices that would reduce extraction of surface and ground water in the basin. Current irrigation methods rely mainly on above-ground sprinkler guns and centre pivot systems that permit rapid and substantial evaporation and runoff. While irrigation method varies with the crop grown in the Kettle Valley (primarily fruit and forage), trickle irrigation can reduce evaporation and runoff, and requires less water.

The site chosen for the Cascade Heritage Hydroelectric Project was based on its suitability for a small run-of-river facility. The measures taken to minimize its effects on speckled dace habitat include reducing the size of the headpond, identifying habitat restoration opportunities, and setting up a speckled dace monitoring program. The expected harm for the present design is a possible impact on less than 2% of speckled dace habitat, confined to the immediate vicinity of the headpond and represented mainly by reduction of productive capacity due to inundation of riffle areas. The viability of the speckled dace population is not expected to be reduced. Nevertheless, in the light of our poor understanding of the species' biology and natural history, quantitative estimates of its abundance by river reach, as well as studies of its habitat use by life stage and season, are recommended.

An appropriate abundance target for the recovery of an unknown population that may not even be in decline is "maintenance of a self-supporting population;" in the case of speckled dace this must allow for the natural fluctuations common in fish that inhabit rivers of widely varying flow. A conservation risk threshold (lower limit) of 2,500 individuals reflects COSEWIC's small-population risk criterion of decline to 10% of the carrying capacity of the environment. Another possible generic minimum viable population size could be several thousand mature individuals (Reed *et al.* 2003).

A quantitative target abundance for a healthy population of speckled dace cannot be established without better census data. An appropriate distribution target for recovery should, in the absence of any evidence that distribution has changed significantly, reflect the need to maintain the status quo, namely to preserve the current distribution in the West Kettle, Kettle and Granby Rivers and their side channels.

### **Sources of uncertainties**

There has been no consistent census of speckled dace within its Canadian range. Our present knowledge of the abundance and natural history of speckled dace in Canada is based on observations made by the Royal British Columbia Museum between 1977 and 1990, and studies done in the course of an environmental impact assessment regarding the proposed Cascade dam. The latter occurred mostly in the portion of the river upstream of the dam site. Using limited density data for the 9 km immediately upstream of the dam site, abundance was estimated at roughly five times that in the remainder of the system, reflecting the much greater amount of suitable habitat near Cascade Falls. Over the total 284 km of assumed useable habitat within the system, estimates for total adult abundance range from 11,500 to 22,500 fish. We have no way of knowing whether their present abundance represents a decline or increase over historical numbers. Speckled dace abundance appears to vary dramatically with time of year and water flow and may reflect seasonal flooding in a snowmelt river like the Kettle.

While water withdrawal for irrigation is expected to increase and there may be climate change-related increases in drought frequency, there are two sources of uncertainty that make regulation difficult. First, the amount of water actually withdrawn from the river can either exceed the amount licensed (illegal withdrawal), or it can be less (in 2003, for example, water rights were twice the estimated usage). Either situation can make it hard to ensure adequate instream flow. Second, much of the water used for irrigation along the Kettle River, and for towns such

as Midway and Grand Forks, comes from aquifers. Some of the connections between ground and surface water in the area are known (for example, the Grand Forks aquifer is connected to the Kettle and Granby rivers), but in general the connection between underground aquifers and surface water is poorly understood. Diverting demand from one water source to the other may have little effect on overall supply. These uncertainties, combined with our lack of knowledge of the distribution of the speckled dace population in the basin and the capability of speckled dace to adapt to changes in water flow, provide additional support for the idea of monitoring abundance in selected reaches of the river.

The human-induced threats identified in the previous section are only quantifiable if we make assumptions about speckled dace life history including mortality rates, recruitment, habitat preference and distribution. Such assumptions would have to be based on what is currently a weak data set. Little would be gained from quantitative models of population viability that rest on such assumptions given the high degree of uncertainty in life history parameters.

## ADDITIONAL STAKEHOLDER PERSPECTIVES

Although speckled dace is not known to migrate, it is technically a transboundary species; pollution or severe flow alteration in the 47 km of the Kettle River that flow through the U.S. could potentially affect the downstream population in Canada.

## CONCLUSIONS AND ADVICE

- A target abundance for a healthy population of speckled dace cannot be established without better data on the current abundance and capacity of the system.
- In the absence of information that indicates the population has declined, the recovery goal to maintain the persistence and present range of the population in Canada is biologically realistic.
- Given the low data quality, it is not possible to quantify the importance of specific habitat types. Based on the qualitative information available, the maintenance of adequate flow regimes in riffle habitat is likely an important strategy for ensuring population persistence. At present, there are insufficient data to quantify potential mortality related to reduced riffle flow. Any evaluation of potential critical habitat should assess the biological consequence of alternative habitat configurations in a risk management context and considering the high uncertainty in the data.
- In light of our poor understanding of the species' biology and natural history, quantitative estimates of its abundance by river reach, as well as studies of its habitat use by life stage and season are recommended. This information will be important to evaluate future population status and the importance (value) of specific habitat for survival and recovery.

## SOURCES OF INFORMATION

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