

Status of the Speckled Dace, *Rhinichthys osculus*, in Canada*

A. E. PEDEN and G. W. HUGHES

British Columbia Provincial Museum, Aquatic Zoology Division, Victoria, British Columbia V8V 1X4

Peden, A. E., and G. W. Hughes. 1984. Status of the Speckled Dace, *Rhinichthys osculus*, in Canada. *Canadian Field-Naturalist* 98(1): 98-103.

Speckled Dace (*Rhinichthys osculus*) have a restricted Canadian distribution along a 70 mile (112 km) section of the Kettle and Granby Rivers, British Columbia. Although the species is widely distributed in seven western American states, the species has differentiated into a number of distinct populations. Some populations are considered rare or endangered by the American Fisheries Society's Committee on Endangered Species. The Canadian population seems to have adequate reproductive capacity and is not endangered as long as its habitat in the Kettle River is not adversely altered. As yet, there are not enough observations to indicate cyclical fluctuation of population size as occurs in some American populations. The recent finding of another species of dace that apparently replaces Speckled Dace below Cascade, British Columbia, indicates that the Canadian population may be isolated from other American populations.

Au Canada, le naseux moucheté (*Rhinichthys osculus*) se retrouve sur 70 milles (112 km) dans les rivières Kettle et Granby, en Colombie-Britannique. Bien qu'elle soit largement répartie dans sept Etats de l'Ouest américain, l'espèce s'est différenciée en un certain nombre de populations distinctes dont quelques-unes sont considérées comme rares ou menacées d'extinction par les Comité sur les espèce menacées d'extinction de l'American Fisheries Society. Pour sa part, la population canadienne semble avoir une bonne capacité de reproduction et ne sera pas en danger tant que son habitat de la rivière Kettle sera maintenu en bon état. Les données actuellement disponibles ne sont pas suffisantes pour nous indiquer si le niveau de la population varie de manière cyclique, comme c'est le cas pour certaines population des Etats-Unis. [Traduit par R. R. Campbell]

Key Words: Pacific northwest, Columbia River, cyprinids, dace, rare, distribution, population size and trends

The Speckled Dace (*Rhinichthys osculus*) is a small cyprinid restricted to Western North America. In Canada it has been found only in the Kettle River of the Columbia system (Scott and Crossman 1973). These are elongate fish (Figure 1) of about 50-70 mm in length with bodies robust anteriorly and compressed laterally behind the dorsal fin. They are of grey or grey-brown colour with some darker flecks usually above the midline. There is a faint lateral band terminating in a diffuse spot at the base of the caudal fin. Vertically, the fish are lighter in colour, varying from creamy-white to yellow (Scott and Crossman 1973).

Speckled Dace enjoy some importance as a forage species and are often used as bait fish. In Canada, its importance is minimal due to its limited distribution.

Distribution

Speckled Dace are known as a number of highly variable populations distributed between the Colorado drainage in Arizona and the Columbia River system in the Pacific Northwest (Minckley 1973; Scott and Crossman 1973). The species has morphologically differentiated in many isolated river drainages. The Kettle River of the Columbia River system is the northern limit of the species, recorded geographic range (Figure 2). Within Canada, Speckled Dace have

been taken along a 112 km stretch of the East and West Kettle River from Carmi, British Columbia, to Cascade at the U.S./Canadian international border, and along a 27 km section of the Granby River above Grand Forks. Speckled Dace have not been found in other tributaries of the Kettle River system in Canada (Figure 3).

Our survey, made while drifting down the river across the international border at Cascade in 1980, suggests Speckled Dace do not occur much farther downstream. Below Cascade, waterfalls probably hinder upstream dispersal of fish. The habitat for the next couple of miles down the river changes from rocks and boulders to a finer-sedimented pebble, sand, or mud bottom on which adult dace were not found. Juvenile Speckled Dace were found, but they decreased in abundance and were replaced by juveniles of another species of dace, possibly *R. umatilla*. At the first rock or boulder habitat encountered, about 5 miles downstream in Washington State, large numbers of adults of this "umatilla" form were encountered and no Speckled Dace observed. Even though we did not go farther downstream in Washington, we believe the Canadian Speckled Dace population is largely isolated within Canada (except for the mid-portion of the Kettle River (Figure 3) which crisscrosses back into Washington State). It is unlikely to

*Rare status approved and assigned by COSEWIC 6 April 1983.

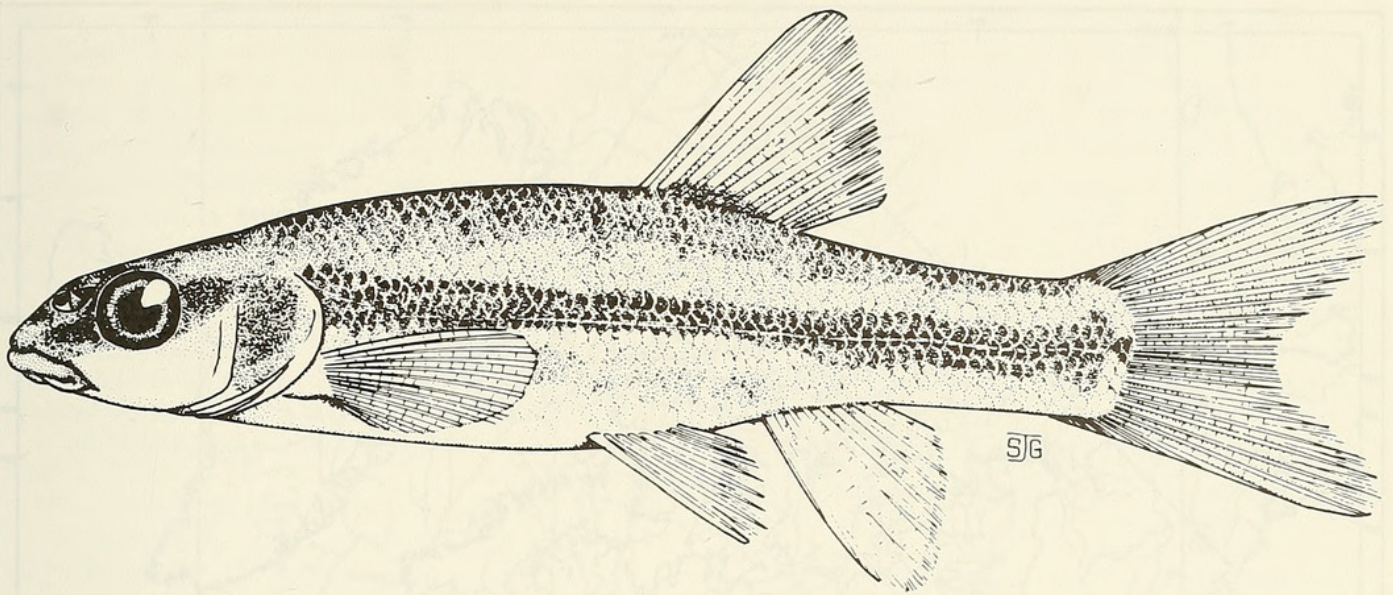


FIGURE 1. Speckled Dace (*Rhinichthys osculus*). Courtesy of D. E. McAllister, National Museum of Natural Sciences.

recover by upstream immigration or gene flow from Washington State if the Canadian population should be decimated. Similar forms of Speckled Dace might occur in downstream tributaries of the Kettle and Columbia Rivers; however, we have not investigated them. Quite possibly, ecological exclusion of Speckled Dace, through competition with the "umatilla"-like dace may prevent contact between Canadian and other American Speckled Dace populations. Speckled Dace would obviously be swept over the falls at Cascade during floods, etc., but we believe that waterfalls plus ecological exclusion are strong impediments to upstream dispersal.

Protection

There are no formal measures specifically administered or legislated to protect Speckled Dace. Maintenance of water quality standards and prevention of silting are the major factors of importance to its future survival.

Population Size and Trends

Peden and Hughes (1981) found Speckled Dace widely distributed between Carmi and Cascade, British Columbia, but juveniles far outnumbered adults in the samples taken. Adults were found in sections of river with rock habitat and moderately strong current where siltation and scouring of the river bottom was not excessive. Although small juveniles were widely distributed, concentrations of larger juveniles and adults were mostly found below the waterfalls at Cascade, in the Granby River at Grand Forks, and in a pile of boulders at Carmi. We believe that there is a high mortality of juveniles, particularly during the

period of spring floods, and only those fish finding suitable habitat survive to be adults. Early sampling has been insufficient to determine population trends, however, our surveys in 1978, 1979, and 1980, indicate the population to be stable. Even though we observed few adult habitats, we believe that there are many more in sections of the river to which we did not have access. In other parts of its geographic range, Speckled Dace are subjected, and apparently adapted, to irregular but severe flooding, and population size changes drastically with these catastrophies.

Habitat

During the spring of 1978, a large flood of melted snow-water characterized all Kettle River drainages, preventing us from observing or collecting *R. osculus*. With only about 3 per cent of this flow occurring in the fall (October), fish were much more easily caught and we believe that *R. osculus* must adapt to a general scouring of the river bed with each spring flood followed by a slow receding of the water at the river's edge during summer and fall. Most of the Granby River that is inhabited by juvenile dace is characterized by a clean sand bottom with little algae or other vegetation. In contrast, most of the Kettle River where juveniles were captured had innumerable smooth stones without extensive debris or organic growth and a slow to moderate flow of water. A very thin scum of algae covered the stones along the river's edge where the water was less than 0.25 m deep. Higher up the river banks, dried and encrusted algal mats were observed indicating some algal growth occurred earlier in the year before flood waters had receded. Such accumulations of vegetation and detritus are most likely swept away during each spring flood.



FIGURE 2. Canadian distribution of Speckled Dace (*Rhinichthys osculus*). Courtesy of D. E. McAllister, National Museum of Natural Sciences.

As might be expected of rivers which rise from mountainous areas and are fed by melting snow, gradual warming of the water occurs as it flows to lower elevations. Upstream, where Speckled Dace were found at Carmi (elevation approximately 884 m), average summer water temperatures reached 14°C, but downstream at Laurier, just across the international border from Cascade, British Columbia, (elevation approximately 457 m), water temperatures reached almost 18°C. Between 16 March 1965 and 25 September 1978, the Province of British Columbia's Water Investigation Branch (unpublished data) recorded very clear water in the Kettle River with

average Jackson Turbidity Units (on a scale of 0-1000) being between 1.0 and 4.0. Spring runoff, however, could be expected to be more turbid. Generally, dissolved solids (as indicated by alkalinity) increase (60 to 77.5 mg/L) and pH decreases (8.7 to 7.7), as water flows downstream. Small amounts of dissolved solids (e.g. average alkalinity 37.3 mg/L) characterize the entire study area of the Granby River.

For reasons to be described later, we believe the small fish under 40 mm S.L. (= Standard Length) are no more than 1½ years old. Larger and presumably older fish (above 40 mm) were infrequently seen and seemed to inhabit interspaces of large rocks of

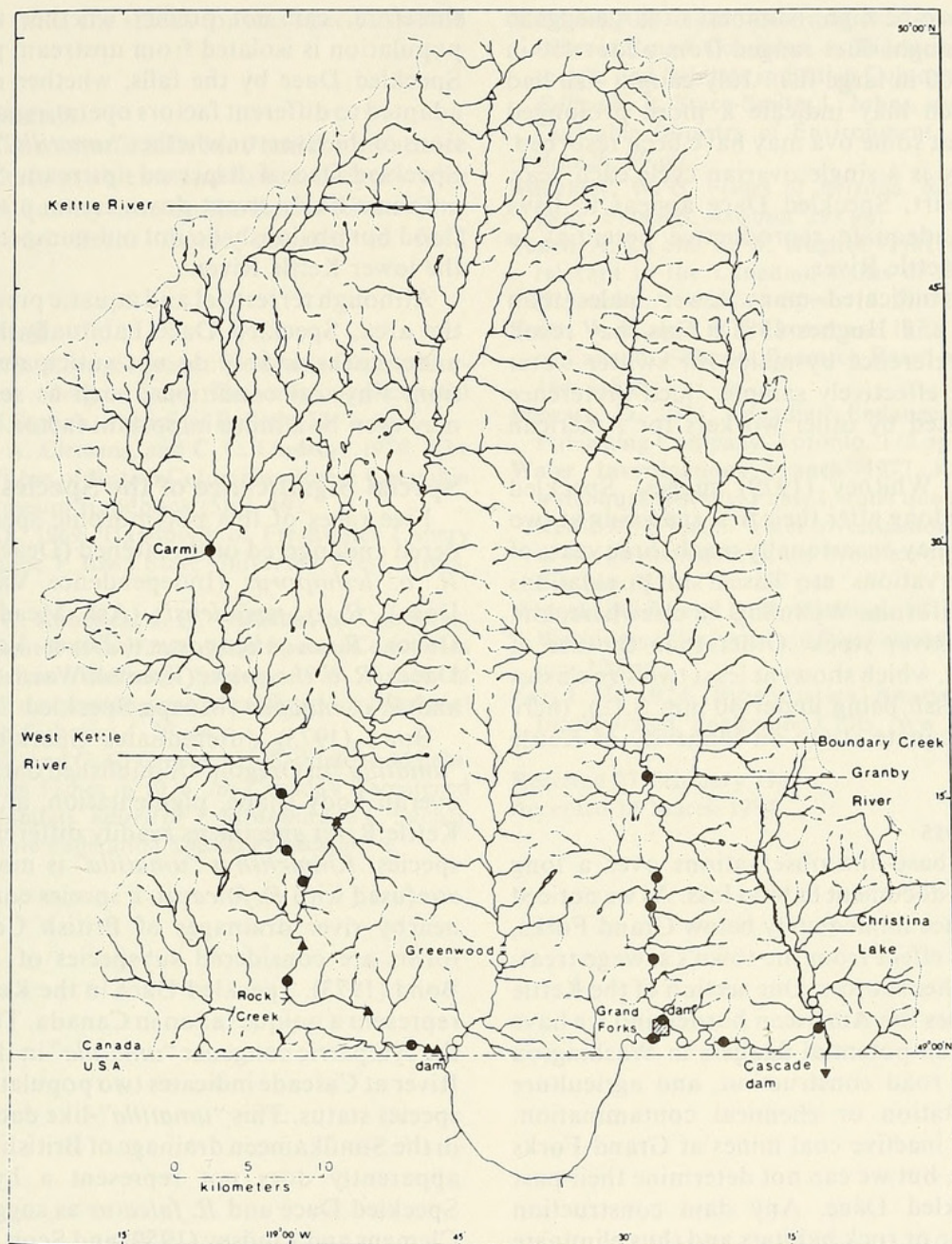


FIGURE 3. Map of Kettle River drainage showing five major tributaries. Collections made by the authors in 1977 are indicated by circles and those from other institutions by triangles. Solid circles or triangles indicate presence of *R. osculus* in a sample and hollow circles or triangles indicate their absence.

approximately 40+ cm diameter where there was a moderate current. Adults were taken in October of 1978, 1979, and 1980, at the mouth of the Granby River in Grand Forks where electrofishing forced fish from an overhanging shaded bank with thick growths of an aquatic moss *Fontinalis sp.*, and where the current was much stronger than that frequented by juveniles. Adults were also taken from amongst large rocks below the falls at Cascade and more were found in a large mound of stones near Carmi where the current was similarly swift.

General Biology

Our examination of length frequencies indicates that fall-caught specimens were smaller than those caught in spring (Peden and Hughes 1981) and corresponding study of egg sizes indicates that Speckled Dace do not mature at least until they are 40, possibly not until 50 mm, in standard length. The data also suggests that Speckled Dace probably spawn in summer (July?) and juveniles hatched in summer probably do not breed until they are two years of age.

Judging by prevalence of young fish, reproductive

potential seems to be high. Numbers of large eggs in ovaries of fall-caught dace ranged from about 450 in small fish to 2000 in large fish. July-caught fish had fewer eggs which may indicate a more prolonged spawning, or that some ova may have been resorbed. We believe there is a single ovarian cycle each year. For the most part, Speckled Dace appear to have more than an adequate reproductive potential to repopulate the Kettle River.

Our samples indicated many fewer males than females (Peden and Hughes 1981). This may result from habitat preference by males for swifter water that we did not effectively sample. Such preference has been suggested by other workers for American populations.

Widoski and Whitney (1979) suggest Speckled Dace do not live long after their first spawning at two years of age but may occasionally reach three years of age. Such observations are based on populations occurring in California, Wyoming, or elsewhere, and not the Kettle River stock. Other than the use of length frequency, which shows at least two size classes (with first-year fish being under 40 mm S.L.), there has been no adequate study on longevity of Kettle River stocks.

Limiting Factors

We have no base-line observations over a long period of time to document habitat loss. As we noticed an absence of dace immediately below Grand Forks, there may be an effect from the town's sewage treatment plant or other sources. One section of the Kettle River criss-crosses the American border and we have no information on potential dangers in Washington State. Logging, road construction, and agriculture could cause siltation or chemical contamination. There are many inactive coal mines at Grand Forks and Greenwood, but we can not determine their past effect on Speckled Dace. Any dam construction would flood riffle or rock habitats and thus eliminate habitat.

Except for sculpins (Cottidae) and juvenile suckers (Catostomidae), we believe there are relatively few competitors with the essentially bottom-living Speckled Dace; however, large numbers of the schooling and presumably mid-water-feeding Red Shiner (*Richardsonius balteatus*) and Northern Squawfish (*Ptychocheilus oregonensis*) were also taken in the same samples. The strongest potential competition is probably from the "umatilla"-like dace (*Rhinichthys* sp.) which seem to replace Speckled Dace below Cascade.

The effectiveness of waterfalls at Cascade in preventing upstream migration is not yet documented although we believe it is a strong impediment. We,

therefore, can not predict whether the "umatilla" population is isolated from upstream populations of Speckled Dace by the falls, whether each species is adapted to different factors operating in different sections of the river, or whether "umatilla" would replace Speckled Dace if dispersed upstream. Speckled Dace are most likely swept downstream after each spring flood but obviously do not out-compete "umatilla" in the lower Kettle River.

Although terrestrial and aquatic predators occur in the area, Speckled Dace habitually hide or retreat under rocks and we do not anticipate severe predation. Physical conditions, such as severe flooding, may even be a more important factor.

Special Significance of the Species

Five races of this polymorphic species are considered endangered or threatened (Deacon et al. 1979): *R. o. lethoporus* (Independence Valley Speckled Dace), *R. o. nevadensis* (Ash Meadows Speckled Dace), *R. o. oligoporus* (Clover Valley Speckled Dace), *R. o. thermalis* (Kendall Warm Springs Dace), and *R. o. moapae* (Moapa Speckled Dace).

Bond (1973) differentiates Speckled Dace from "umatilla" in Oregon. Unpublished data indicates that overall body shape, pigmentation, and fin shape of Kettle River specimens readily differentiates the two species. *Rhinichthys* "umatilla" is more likely to be confused with *R. falcatus*, a species common in other nearby river drainages of British Columbia. Both forms are considered subspecies of *R. falcatus* by Bond (1973). Speckled Dace in the Kettle River may represent a unique taxon in Canada. The discovery of the sympatric congener "umatilla" in the lower Kettle River at Cascade indicates two populations of distinct species status. This "umatilla"-like dace is also found in the Similkameen drainage of British Columbia and apparently does not represent a hybrid between Speckled Dace and *R. falcatus* as suggested by Carl, Clemens and Lindsey (1959) and Scott and Crossman (1973), although sympatry and relationships of "umatilla" with *R. falcatus* in Canada has not yet been determined.

Evaluation

We consider Speckled Dace could be threatened in Canada only because its restricted distribution leaves it vulnerable to any catastrophic event affecting a single drainage system. If present habitat and water quality is maintained, there should not be any unnatural decline in the population. Because the population could go through natural population cycles due to different levels of spring flooding, monitoring of population size after unusual flood conditions, etc., would be useful in predicting the population's future status.

At the present time, the status for this species should be "rare".

Acknowledgments

We would like to thank J.D. McPhail for his advice on Speckled Dace problems and Linda Gregory who provided water quality data on the Kettle River. Gordon Greese and Brent Coole assisted in field collections.

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Received 27 February 1984

Accepted 14 March 1984



Peden, Alex E. and Hughes, G. W. 1984. "Status of the Speckled Dace, *Rhinichthys osculus*, in Canada." *The Canadian field-naturalist* 98(1), 98–103.
<https://doi.org/10.5962/p.355099>.

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