FEATURE FISH

the

Speckled dace

Rhinichthys osculus

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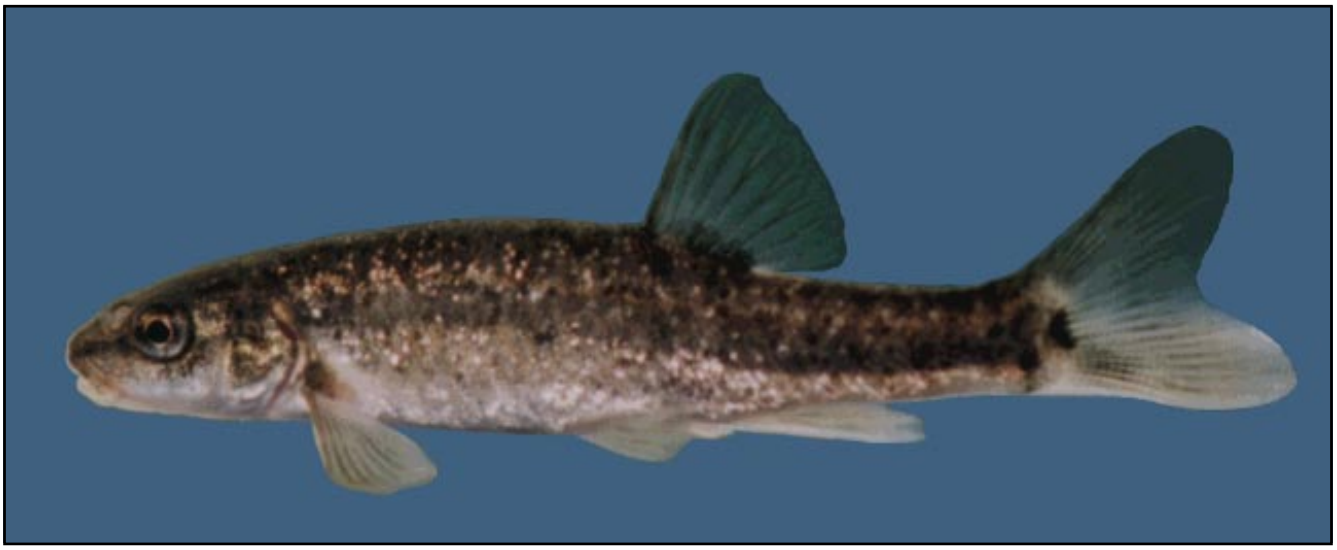

Figure 1 - Speckled dace, *Rhinichthys osculus*.

Photograph by Peter Mylechreest

The speckled dace is a drab little fish (Fig. 1) of special concern in British Columbia. It is red-listed in B.C. and listed as vulnerable by COSEWIC (Committee On the Status of Endangered Wildlife In Canada). Why? The answer is its restricted geographic distribution in Canada. Here, it occurs only in B.C. and, within B.C., it is restricted to one river system: the Kettle River in the west Kootenays (Fig. 2). Like many warm-adapted animals and plants the speckled dace reaches the extreme northern limit of its geographic range in southcentral B.C.; however, just a few kilometers to the south it is widely distributed in Washington State. Indeed, the speckled dace is one of the most abundant and wide spread fishes in the western United States. In inland waters it ranges from the Columbia south to the Colorado River system with hundreds of isolated populations scattered throughout the arid regions of Washington, Idaho, Oregon, Utah, Nevada, Arizona, New Mexico, and California (Hubbs and Miller 1948; Hubbs et al. 1974). Additionally, a complex series of morphological forms (subspecies?) of speckled dace occur in many of the isolated coastal drainages that lie between the Olympic Peninsula and southern California (Fig. 3).

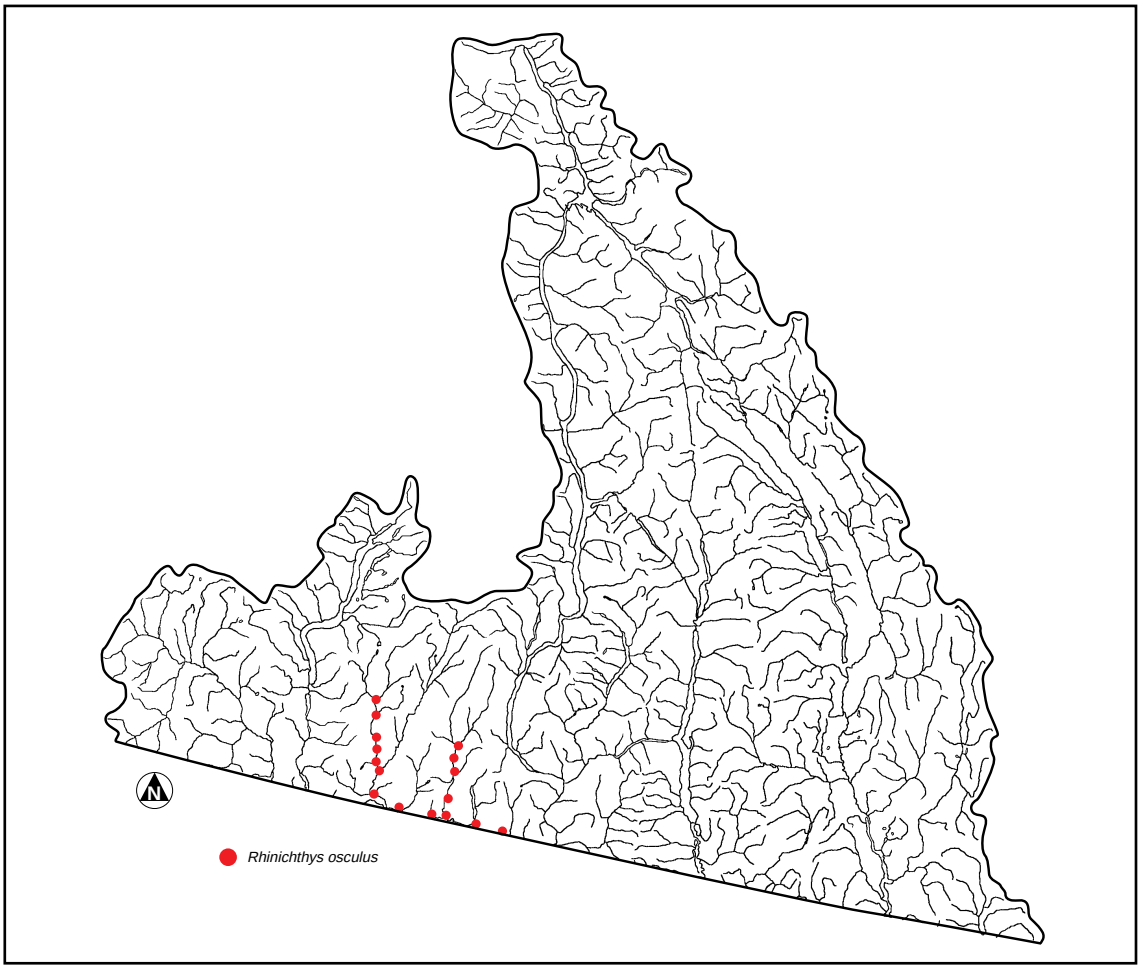

Figure 2 - Columbia drainage system showing the Canadian distribution of the speckled dace, *Rhinichthys osculus*.

Given this vast geographic distribution, the speckled dace is in no immediate danger of extinction; however, the bulk of the Canadian population resides in the Kettle River system above Cascade Falls. These falls are close to the US border and are a barrier to upstream dispersal by fish. Consequently, most of the Canadian population has no contact with the continuous distribution of the species and represents an isolated, peripheral population. If some natural or man-made disaster were to destroy the populations above Cascade Falls, there is no possibility of natural recolonization from below the barrier. For this reason, the speckled dace in B.C. is considered especially vulnerable to habitat disturbance.

Ah, but now we come to the bitter bit. Like most fish of no direct use to man, we are ignorant about the basic biology of the speckled dace. Clearly, we should preserve suitable habitat but we don't know what constitutes suitable habitat. We do know, however, that habitat is a slippery concept in fish. Unlike most birds and mammals, size-related shifts in behaviour, diet, and habitat are a normal part of the normal life cycle of most fish and what constitutes suitable habitat for one life history stage may be inadequate for some other stage. Given our ignorance, and the complexity of habitat use by fish, the only rational conservation strategy is to protect entire sections of the Kettle drainage system above Cascade Falls.

Figure 3 - outline of the distribution of the speckled dace, *Rhinichthys osculus*.

The only published sources of life-history information on the B.C. population of speckled dace are those of Peden and Hughes (1981, 1984) and Peden (1994). What follows is a summary of their biology derived from these and other sources, supplemented in a few places with personal observations.

Apparently, a number of environmental cues can trigger spawning. Kaya (1991) indicates that both increasing photoperiod and increasing water temperature release spawning behaviour in speckled dace. In Arizona, John (1963) found spawning peaks associated with seasonal rains and flooding. Also, the spawning period can be protracted (Kaya 1991) and may include more than one spawning peak (John 1963; Kaya 1991). When the Canadian population spawns is unknown, but spawning probably starts in mid-July (individuals collected in early July were almost in spawning condition). At this time, water levels are high but receding and water temperatures are rising. Interestingly, in mid-July Kettle River females that were close to spawning contained relatively few (usually <500) eggs about 1.5 mm in diameter.

Although there is no published information on either their spawning sites or spawning behaviour in British Columbia, John (1963) and Mueller (1984) described speckled dace spawning in Arizona and New Mexico. Except for a few minor details their accounts are similar and probably reflect most basic aspects of speckled dace spawning sites and spawning behaviour. In both cases, spawning occurred over clean gravel (about 1.0-5.5 cm in diameter) in shallow (2.5-10 cm deep) water. John (1963) observed some site preparation by males (described as a nest) and, at the beginning of spawning activity, evidence of a dominance hierarchy among males. As activity increased, however, nest defense broke down and up to 60 males occupied a single nest site (about 30 cm in diameter). In contrast, Mueller (1984) observed no evidence of site preparation but describes several spawning clusters (each containing over 25 fish) in an area of about 1 m^2. Both authors indicate that females aggregate in deeper quiet water near the spawning sites and that when a female enters the spawning site she is "swarmed" by males. Apparently, once ovulated, females enter spawning sites repeatedly and deposit a few eggs on each visit.

Newly fertilized eggs are about 1.8 mm in diameter, denser than water, and adhesive. In aquaria they are deposited in corners, on filters, and at the base of any available stones (Kaya 1991). In the laboratory, and in nature, egg cannibalism is intense and only those eggs that are swept under rocks or fall into crannies between rocks are likely to survive. Development is rapid: 4-5 days at 24∞C and 6-7 days at 18∞C. Newly-hatched larvae average about 6 mm in length and, depending on temperature, become free swimming about 5 days to a week after hatching. At about 8 mm they emerge from the substrate and begin exogenous feeding.

Newly-emerged fry (about 9 mm long) appear in the Kettle River in early August. By the end of the growing season (late-October) the young-of-the-year usually are 20-30 mm in fork length. Most males attain sexual maturity at the end of their second summer (1^+) and spawn for the first time during their third summer. Typically, females mature a year later than males. No detailed data exists on the age structure of the B.C. population, but the adult population is dominated by individuals in their second or third summer (<60 mm in fork length). Occasional individuals (all females), reach fork lengths of over 90 mm and are in their fourth summer (3^+).

Adults feed mainly on the larvae of aquatic insects, but also include significant amounts of filamentous algae in their diets. A few specimens collected in the early fall (September) contained winged insects. The few juveniles and young-of-the-year examined for stomach contents suggest a diet similar to that of adults, but with a higher proportion of periphyton (algae and diatoms) and Chironomids in the diet.

Because of the strong spring-summer (May to July) peak of discharge in the Kettle River (and its major tributary, the Granby River), adult speckled dace are difficult to collect during most of the summer. In the early spring (March), they are found in deep (>1.0 m) runs often in the lee of large rocks, logs, and bridge abutments. Later in the year (August to October), adults are usually found in mid-stream over cobble and boulder substrates in areas of moderate surface currents (about 0.5 $m \cdot s^{-1}$). Occasionally they are taken under cutbanks. There may be some difference in micro-habitat between males and females. Males are rare in most collections and, perhaps, occupy deeper and swifter water than females. In contrast, juvenile commonly are caught in shallow water (<0.3 m) in areas of slow (about 0.1 $m \cdot s^{-1}$) current over substrates of coarse gravel or small stones. During freshet they commonly shelter in flooded vegetation. In early August, fry (about 10 mm in length) were dip-netted from shallow (<2 cm), still water over silt or sand substrates.

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