

# **“Westslope” Cutthroat Trout**

*Oncorhynchus clarki lewisi*

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*Disclaimer: The following document was based on the Ministry of Environment “Westslope” Cutthroat Trout Accounts and Measures for Managing Identified Wildlife in addition to a review of information currently available for this species as of January 11, 2006. This document can be used to assist with the identification of this species and to support the development of management recommendations as they relate to forestry activities. For more information on this species, please refer to the reference section or consult with a Species at Risk specialist.*

## **Description**

Cutthroat trout get their common name from a distinctive red slash that occurs just below both sides of the lower jaw. Westslope cutthroat trout have small irregular-shaped spots along their back, dorsal, and caudal fins. Few spots occur below the lateral line on the anterior of the body. Adults typically exhibit bright yellow, orange, and/or red colours along the ventral area, especially among males during the spawning season. Typically they are silver with yellow, green, blue, or brown hints on the back; however, overall body colour can vary widely and reflects the colour of the substrate and water. Fish in turbid and/or glacial fed streams with moderate to high gradients (e.g., Akolkolex River) tend to be paler and have fewer but larger spots with narrow body profiles, while fish in clear streams with low gradients (e.g., St. Mary River) have heavier smaller spotting and rounder body profiles<sup>1</sup>.

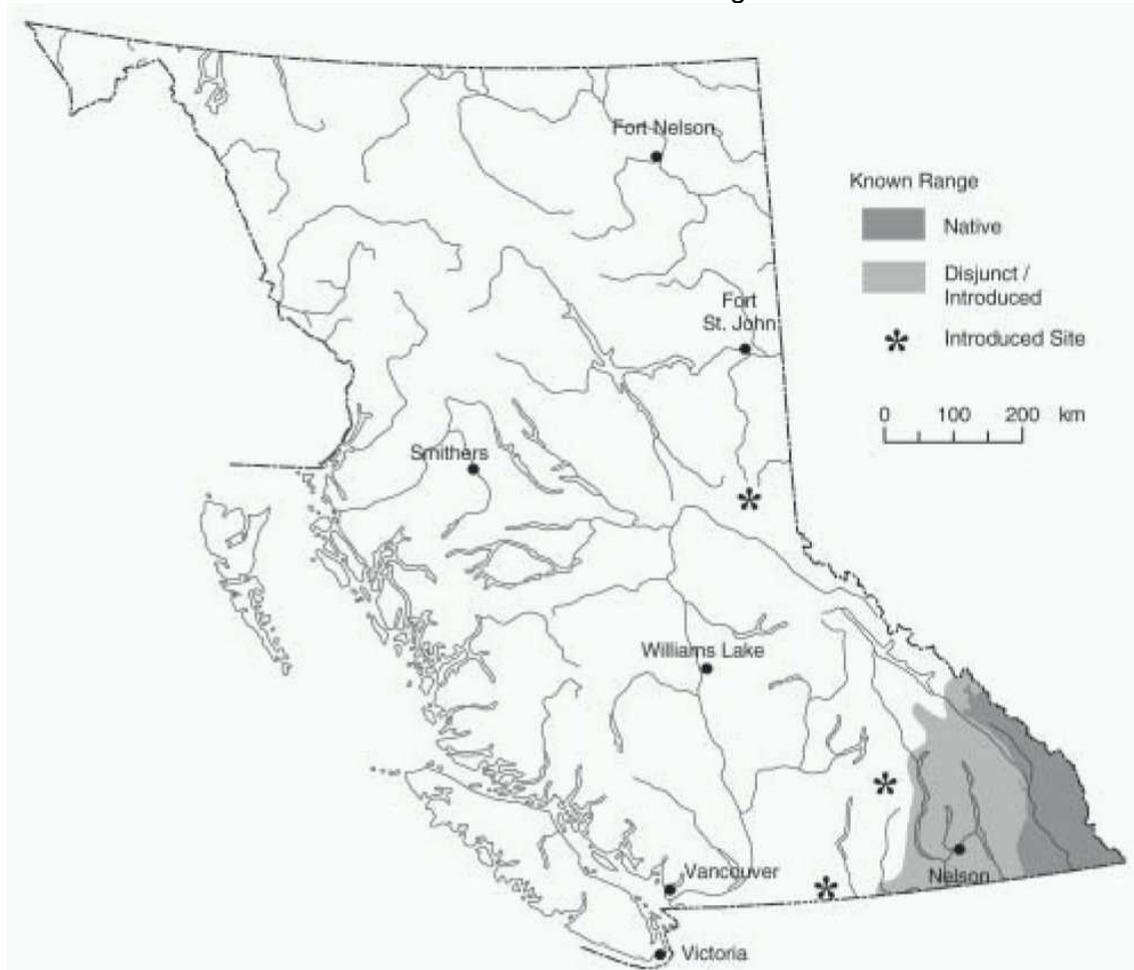
Distinguishing characteristics include the presence of basibranchial teeth (teeth which are present behind the tongue and between the gills) which rainbow trout, a similar species, lack, and the upper jaw extends back past the hind margin of the eye<sup>2</sup>. Westslope cutthroat trout adults rarely exceed an overall length of 500 mm in lake- or stream-dwelling populations<sup>3</sup>.



*Photo courtesy of Ernest Keeley, Idaho State University*

## Distribution

The largest contiguous range of native westslope cutthroat trout is in the upper Kootenay and Flathead River systems with disjunct populations scattered throughout the lower Kootenay, lower Columbia watersheds. The species has been widely introduced in small headwater lakes throughout the upper Columbia and Arrow Lakes region of the lower Columbia watershed and the upper and lower Kootenay river systems. Other scattered introductions have occurred in the Kettle River system, the upper Shuswap river system and the upper Murray River system (Peace drainage). Other unconfirmed introductions have likely occurred<sup>2</sup>. Westslope cutthroat trout have also been introduced into the Similkameen drainage<sup>1,2</sup>.



*Known range of Westslope cutthroat trout in British Columbia<sup>1</sup>*

### **Forest Districts<sup>1,4</sup>**

- Peace Forest District (introduced population in Murray River) (DPC)
- Arrow Boundary Forest District (scattered/introduced) (DAB)
- Columbia Forest District (isolated/introduced) (DCO)
- Kootenay Lake Forest District (scattered/introduced) (DKL)
- Okanagan Shuswap Forest District (isolated/introduced) (DOS)
- Rocky Mountain Forest District (native/introduced) (DRM)
- **Headwaters Forest District (DHW)**

### **Ecoprovinces and ecosections<sup>1</sup>**

- SBI: SHR (introduced)
- SIM: BBT, CCM, COC, CPK, EKT, ELV, EPM, FLV, MCR, NKM, SCM, SFH, SHH, SPK, SPM, UCV
- SOI: OKR (introduced)

### **Biogeoclimatic Units<sup>1</sup>**

- AT - Alpine Tundra - all
- BG - Bunchgrass - all
- ESSF - Engelmann Spruce – Subalpine Fir - all
- ICH - Interior Cedar – Hemlock - all
- IDF - Interior Douglas-fir
- MS - Montane Spruce - all

### **Broad ecosystem units<sup>1</sup>**

FS, IN, LL, LS, OW, SP, WL

### **Elevation<sup>1</sup>**

450–2300 m

### **Map of Known Locations**

Although this species is known to occur in the Headwaters Forest District, occurrence data from the Conservation Data Centre is not available. For the most recent information about British Columbia lakes and streams and the fish in them, please refer to FishWizard, a database maintained by BC Fisheries and Fisheries and Oceans Canada at <http://pisces.env.gov.bc.ca>. Additionally, stream surveys are recommended for streams with characteristics outlined in this report to determine presence or absence of this species.

## **Biology**

### **Diet and foraging behaviour**

Like most trout, the westslope cutthroat trout is an opportunistic forager and, without competition from other trout species, they feed on the most abundant food sources available. In general, they feed on aquatic and terrestrial macro-invertebrates such as chironomids, caddisflies, mayflies, stoneflies, water boatmen (Corixidae), ants, and grasshoppers<sup>5,6</sup>. In lakes, zooplankton also make up an important component of their diet<sup>5</sup>. Other fish and even small mammals can be preyed upon opportunistically<sup>1</sup>.

When feeding in streams, westslope cutthroat trout usually depend on drifting aquatic insect larvae. They often feed most at dawn and dusk which corresponds to an increased density of downstream invertebrate drift. Adult fish tend to occupy the best habitat such as deep pools and runs where there is abundant cover and low to moderate gradients. Juvenile fish are usually forced to feed in less optimal habitat such as shallow riffles and glides<sup>1</sup>.

### **Reproduction**

Westslope cutthroat trout typically reach maturity at different ages depending on local conditions and genetic stock. Age at sexual maturity has been reported from 2 to 6 years<sup>5,7</sup>. Males tend to mature a year sooner than females. Length, however, may be a better predictor of maturity than age which suggests that in streams with higher growth rates, fish mature earlier<sup>8</sup>.

Adults begin to display spawning colours in March and April and disperse to spawning streams in May and June. Spawning can occur from April through August but tends to peak in late May through to mid-June<sup>9</sup>. Populations in headwater streams spawn later, usually peaking in mid

July<sup>10,11</sup>. They may repeat spawning in successive years depending on local conditions and repeat spawners can be upwards of 70% of the spawning population<sup>5</sup>.

Spawning redds (a nest consisting of a hollow in the stream gravel) are constructed by the female who is attended by one or more males. Once the eggs are fertilized, they are covered by the female and the redd is not protected by the adults. The eggs incubate in the gravel for 6–7 weeks. They spend an additional 1–2 weeks in the interstitial space in the gravel before the fry emerge from the gravel usually peaking in mid-July through early August<sup>11</sup>. The fry then either migrate to other habitat or rear in their natal stream<sup>1</sup>.

### ***Site fidelity***

Site fidelity is poorly understood for most British Columbia populations. It is generally accepted that most adults return to the natal stream to spawn and then return to a relatively small home range area in either a large stream or lake for the remainder of the year<sup>7</sup>. However, there appears to be a wide variety of site fidelity strategies between disjunct populations and some times within individuals of the same population<sup>1</sup>.

### ***Home range***

Home range size is highly variable and dependent on life style (i.e., adfluvial - living in lakes and migrating into streams to spawn, fluvial - living in or migrating between main rivers and tributaries, or resident). In general, resident fish would have smaller home ranges than adfluvial or fluvial forms. Spawning migrations can exceed 150 km<sup>12</sup>. The mean home range of Elk River fish based on year 2000 radio-telemetry results was 6.19 km (range: 1.6–16.9). More recent observations on the Elk River have discovered adults moving more than 50 km upstream during the fall from summer feeding areas to wintering pools<sup>1</sup>.

## **Habitat**

### ***Structural stage***

Generally, structural stages 5–7 produce greater amounts of large organic debris (LOD) which has an important influence on stream channel development; sediment trapping and storage; nutrient cycling; and fish habitat structure<sup>1,13,14</sup>.

### ***Important Habitats and Habitat Features***

#### ***Spawning***

Spawning habitat for this species varies depending on the available habitat and presence of competitors, but usually occurs in low-gradient stream reaches that have gravel substrate ranging from 2 to 75 mm in diameter, water depths near 0.2–0.40 m, and mean water velocities from 0.25 to 1.05 m/s. Cover near spawning habitat is important for adult fish to hold in before beginning spawning and to escape predators<sup>3,9</sup>.

Westslope cutthroat trout often spawn in small clear tributaries with low-gradients, gravel substrates, stable flows, low sediment loads, and temperatures around 7–10°C<sup>15</sup>. However, 13 of 20 fish tagged in the Elk River in 2001 (65%) spawned in the main Elk River. The 2001 spring runoff was significantly lower than normal which may have influenced the selection of spawning areas. Newly deposited gravel substrate, in either tributaries or mainstems, may be critical for spawning success<sup>3</sup>. In the Wigwam River, mainstem habitat was used almost exclusively for spawning, and stream margins and/or side channels were of particular importance<sup>1</sup>.

### *Rearing and Foraging*

For stream resident fish, optimal foraging habitat usually consists of a series of riffles and pools with excellent cover in the form of undercut banks, log jams, boulders, and/or deep pools. Depths of pools have been positively correlated to the age of fish and large adults usually occupy the deepest pools with the best cover<sup>16</sup>. Young fish, in particular fry, rear and forage along the margins of streams, in off-channel habitat, and in small tributaries. Lower reaches of streams that are susceptible to warming in the summer are typically avoided or activity is curtailed as Westslope Cutthroat Trout are less tolerant than other salmonids to warm water temperatures (i.e.,  $>20^{\circ}\text{C}$ )<sup>15</sup>. Young fish use a variety of habitats depending on the life history of the population they belong to (i.e., adfluvial, fluvial, or lake resident populations). For adfluvial and fluvial populations fry often use habitat where water velocities are very low ( $<1$  cm/s) and water depths often do not exceed 20 cm<sup>17</sup>. Gravel and cobble substrates are also important as cover for fry<sup>17</sup>. Age 1+ and 2+ tend to use areas with higher velocities (maximum of 22 cm/s) and deeper water<sup>10</sup>. Natural lake resident populations are rare in British Columbia although there are numerous stocked mountain lakes. Young lake resident fish rear mainly in the littoral zone<sup>1</sup>.



*Cutthroat trout stream. Photo courtesy of Stacey Tress*

### *Overwintering*

Overwintering pools may contain large numbers of mature adults throughout the fall and winter<sup>3</sup>. These pools usually exist in large mainstem streams (order 4 and up) and have features that provide deep water ( $>2$  m deep), slower water velocity, and optimal cover. Large boulders, bedrock, or large organic debris are often associated with these pools<sup>1</sup>.

### *Staging*

Prior to entering a spawning tributary in the spring adults can congregate at the mouth of spawning tributaries for several days or even weeks<sup>18</sup>. Adults begin to display spawning colours early in the spring (February through May) and move to the mouths of tributary streams prior to spawning. One study observed maturing males in April even though no spawning was observed until mid-July in small tributaries to Kootenay Lake<sup>19</sup>. The habitat of staging areas has not been well defined. It likely varies depending on local conditions but generally would consist of pool habitat with good cover.

## Conservation and Management

### **Status<sup>1</sup>**

Provincial Rank: S3 (Special Concern)

BC Rank: Blue (Special Concern)

COSEWIC Status: SC (May 2005) (Special Concern)

### **Threats**

The vast increase in the number of roads in previously unroaded watersheds is a major concern because it is allowing anglers unprecedented access to streams. Westslope cutthroat trout are particularly sensitive to angling pressure because they are readily caught even by novice anglers. Poaching can also increase if access to previously roadless areas is developed and the number of enforcement personnel is not also increased<sup>1</sup>.

Westslope cutthroat trout has been classified as a species that requires “special forestry consideration” because they exhibit the following life history and ecological characteristics that make them susceptible to forestry and other development activities<sup>20</sup>:

- often found in the headwaters and small streams;
- most populations are stream resident;
- dependent on riparian and instream cover;
- dependent on natural flow and stream hydrological features;
- require clean, well-oxygenated, unembedded gravel substrate for spawning;
- repeat spawners;
- sport species that is easily angled; and
- intolerant of high temperatures.

### **Habitat threats**

Forest harvesting, mining, agriculture, hydroelectric development, urban development, and livestock grazing have all impacted westslope cutthroat habitat in the past and may continue to do so. These threats influence fish habitat in the following general categories<sup>1</sup>:

- elimination of habitat or restriction of fish access;
- sedimentation and erosion; and
- alteration or loss of required habitat characteristics.

#### *Elimination or restriction*

Forestry can impede fish movement if proper road building practices are not followed. Perched culverts, debris, channelization, and increased water velocities are a common source of barriers to adfluvial, fluvial, and resident populations preventing populations from accessing key habitats<sup>15</sup>. The isolation and restriction of populations can compromise the gene flow within and between populations and negatively affect the long-term persistence of the species<sup>1,15</sup>.

#### *Sedimentation and erosion*

Forest harvesting can contribute to increased sedimentation and nutrient loading through the increased runoff, debris torrents, and slides. Increased sedimentation and erosion (above natural background levels) are undesirable as they can degrade spawning and rearing habitat and cause direct injury to fish by<sup>1, 21, 22, 23, 24, 25</sup>:

- embedding (infilling gravel substrate);
- infilling pool and riffle habitat;
- clogging and abrading fish gills;
- increasing turbidity, impairing feeding ability; and
- smothering aquatic insects, reducing food availability and lowering stream productivity

### *Alteration of habitat characteristics*

During forest harvesting, riparian vegetation is sometimes removed or degraded. Loss of riparian vegetation can have adverse impacts on fish habitat because it can be critical in the maintenance of many important habitat features required by westslope cutthroat trout.

Riparian vegetation is important as it<sup>1, 13, 14, 26, 27, 28, 29</sup>:

1. provides short- and long-term recruitment of LOD for the creation of optimal salmonid habitat such as pools and cover;
2. provides shade which cools streams significantly more than streams without riparian vegetation;
3. increases bank stability and maintains channel morphology;
4. acts as a substrate for many terrestrial insects, which in turn are an important food source, and provides organic matter (in the form of leaf litter) that supports the aquatic food chain; and
5. intercepts runoff and acts as a filter for sediment and pollutants.

## Management Recommendations

- Identify locations where westslope cutthroat trout occur: for the most recent information about British Columbia lakes and streams and the fish in them, please refer to FishWizard, a database maintained by BC Fisheries and Fisheries and Oceans Canada at <http://pisces.env.gov.bc.ca>. Additionally, stream surveys are recommended for streams with characteristics outlined in this report to determine presence or absence of this species.
- Maintain sufficient riparian vegetation to maintain stream temperatures within the natural range of variability and provide nutrient input, cover, stream bank stability, and shade. Local managers should determine the appropriate size of the riparian zone on all order 3 and smaller streams with pure Westslope cutthroat trout populations based on the potential for impacts on the stream due to development. Low elevation streams susceptible to warming in the summer and any stream with naturally unstable banks or temperature sensitive streams should have minimum riparian management reserve zone of 20 m<sup>1</sup>.
- Limit access to undisturbed Westslope cutthroat trout populations. Westslope cutthroat trout are susceptible to overfishing; therefore, future road building in sub-basins with Westslope cutthroat trout populations should be located in upslope positions to avoid providing easy access for fishing. Maintenance of restrictive fishing regulations will help to limit some impacts from the extensive existing access. Consider the following access management recommendations<sup>1</sup>:
  - When planning new road development keep roads  $\geq 1$  km from mainstem streams (order 4 and greater).
  - In previously developed drainages, assess the percentage of the streamside paralleled by roads and the number of access points provided by crossings, spur roads, etc.
  - If  $<25\%$  of the mainstem stream is  $>1$  km beyond a known access point, consider removing some access points.
- Maximize connectivity of native, non-hybridized populations. Movement of individuals (gene flow) between subpopulations in the same watershed may be an important way for populations to rebound after natural catastrophic events and limiting this movement could decrease the likelihood of local populations persisting over time. Therefore,

obstructions should not be created by in-stream structures such as culverts and bridges, and construction of dams and weirs should be strongly discouraged in westslope cutthroat trout habitat<sup>1</sup>.

- In sub-basins where westslope cutthroat trout spawning or rearing are known to occur or where they likely occur and forest activities are planned in the next 5 years, any of the following criteria are recommended as supplementary triggers for the watershed assessment procedure (WAP) <sup>1</sup>:
  - more than 10% of the watershed has been logged in the 20 years prior to the start of the proposed development plan, or will be logged in the 25 years prior to the end of the proposed development plan.
  - sub-basins where a significant number of mass wasting events have occurred (i.e., more than one landslide/km<sup>2</sup> and more than two events reaching the mainstem);
  - sub-basins where there is either high road density (i.e., >150 m of road/km<sup>2</sup>) or high stream density (i.e., >1 km of channel/km<sup>2</sup>) or a significant number of stream crossings (i.e., >0.6/km<sup>2</sup>); and
  - evidence of significant stream channel stability problems.
- Prevent disturbance of Westslope cutthroat trout particularly during spawning and overwintering periods when adults tend to be congregated. Limit access through road closures, deactivation, or seasonal closures during critical times (e.g., overwintering and staging – 30 September to 15 April; spawning – 15 April to 15 July; rearing – 15 July to 31 March).
- Maintain critical instream habitats including spawning and rearing habitat.
- Do not place roads or crossing structures in areas where cutthroat trout have been identified.
- Do not use pesticides.

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