

# 9. Aquatic Life

## More Than Just Fish

The wild, free-flowing rivers and deep, clean lakes of the Crown of the Continent host a unique and important aquatic ecosystem. The waters include choice habitat for imperiled varieties of trout. For example, virtually all the genetically pure westslope cutthroat in the world exist in the Crown of the Continent.



greater diversity of aquatic invertebrates than either Banff or Jasper national parks to the north and Yellowstone National Park to the south. In addition, there are some species of aquatic insects

Microscopic plants (*phytoplankton*) float in the water, fed by sunlight. Algae is one form of phytoplankton, but there are many others. (Flathead Lake, for example, has more than 500 species.) Microscopic plants feed microscopic animals, called *zooplankton*, which often appear bizarre and transparent when viewed in a microscope. These organisms are the source of energy consumed by small fish and aquatic insects. Although phytoplankton and zooplankton are microscopic, they are the foundation upon which the aquatic ecology of the Crown of the Continent rests.



The Flathead Basin alone has at least 300 species of aquatic insects. Crown of the Continent waters contain aquatic insect species

common in waters to the north and to the south. For example, Waterton-Glacier has a

that are only found in the Crown of the Continent. For example, the stonefly species, *Lednia tumana*, has only been collected in two mountain streams in Glacier National Park.

The mix of fish in the Crown of the Continent includes about twenty-seven native species. Only 10,000 years ago, when the Crown was smothered under ice, it had no fish. After the glaciers receded, birds flew in to colonize the Crown. Most mammals arrived by foot. The glaciers cut waterfalls and left earthen dams as they retreated, forming barriers to fish. As a result, there has been less time and opportunity for fish to colonize these waters. As a result, many smaller lakes and isolated drainages naturally had no fish.

During the early half of the twentieth century, white settlers thought this a fault that should be remedied and lobbied governments to stock these lakes. As such, even remote wilderness lakes have been stocked, first by packtrain and later by helicopter. Only a few waters, isolated by waterfalls and missed by fish importers, have a completely natural mix of fish species or are fishless. One lake in Glacier National Park is believed to be the

only large lake in the entire Columbia drainage with a completely natural mix of native fish without any exotics. (Researchers have requested that the name of that lake not be publicized.) Other lakes, such as Upper Kintla Lake, have populations of native fish that have been isolated for perhaps 10,000 years.

The shorelines of rivers and streams (called riparian areas) are among the richest and most diverse portions of the Crown of the Continent. The aquatic ecosystem contributes greatly to this biodiversity. Insects that spend their larval stages in water often hatch and take to the land and air, feeding a host of birds and bats.

Midges, mayflies, riffle beetles, and water mites live not only in the stream, but spend much of their lives underground alongside streams. These organisms can be found many meters away from surface water, underground in the floodplains. The same is true of primitive worms and crustaceans. Waters host

stoneflies, caddisflies, mayflies, dragon flies, springtails, water beetles, and, of course, mosquitoes. The camper tormented by hungry mosquitoes is taking an active role in this vibrant aquatic ecosystem.

While the insect life of this ecosystem is quite robust, it does have its limits. Because of the composition of rocks in the Crown of the Continent, the water is poor in nutrients. The growing season is also short and the water cold. Organisms have adapted strategies to deal with these challenges. Some insects, for example, spend up to three years slowly growing as larvae, and then spend perhaps three weeks as adults. On the other end of the food chain, bull trout grow slowly, live a long time, and mature late. Bull trout typically live six years before they spawn. (A rainbow trout from another ecosystem may be mature in three years.) Bull trout and cutthroat trout also often hatch in mountain streams, but travel to



large rivers and lakes as adults, taking advantage of larger, more productive water bodies. Fish like the bull trout and westslope cutthroat trout need clean, clear, and cold water to spawn and are thus indicators of high water quality.

Native fishes of the Crown include cutthroat trout, bull trout, lake trout, lake whitefish, mountain whitefish, pygmy whitefish, grayling, and northern pike. However, it is important to understand that not all those species are native to every lake or stream in the Crown. The northern pike is the namesake native fish of Maskinonge Lake in Waterton Lakes National Park, but is a disruptive exotic in Flathead Lake.

Some fish, like westslope cutthroat trout, are naturally found on all sides of the Crown's Triple Divide. Other fish, like northern pike and lake trout, are native east of the divide in the Crown, but have been introduced west of the divide. Others, like grayling, are native in the Missouri drainage and have been introduced elsewhere.

### Issues in Managing Aquatic Ecosystems

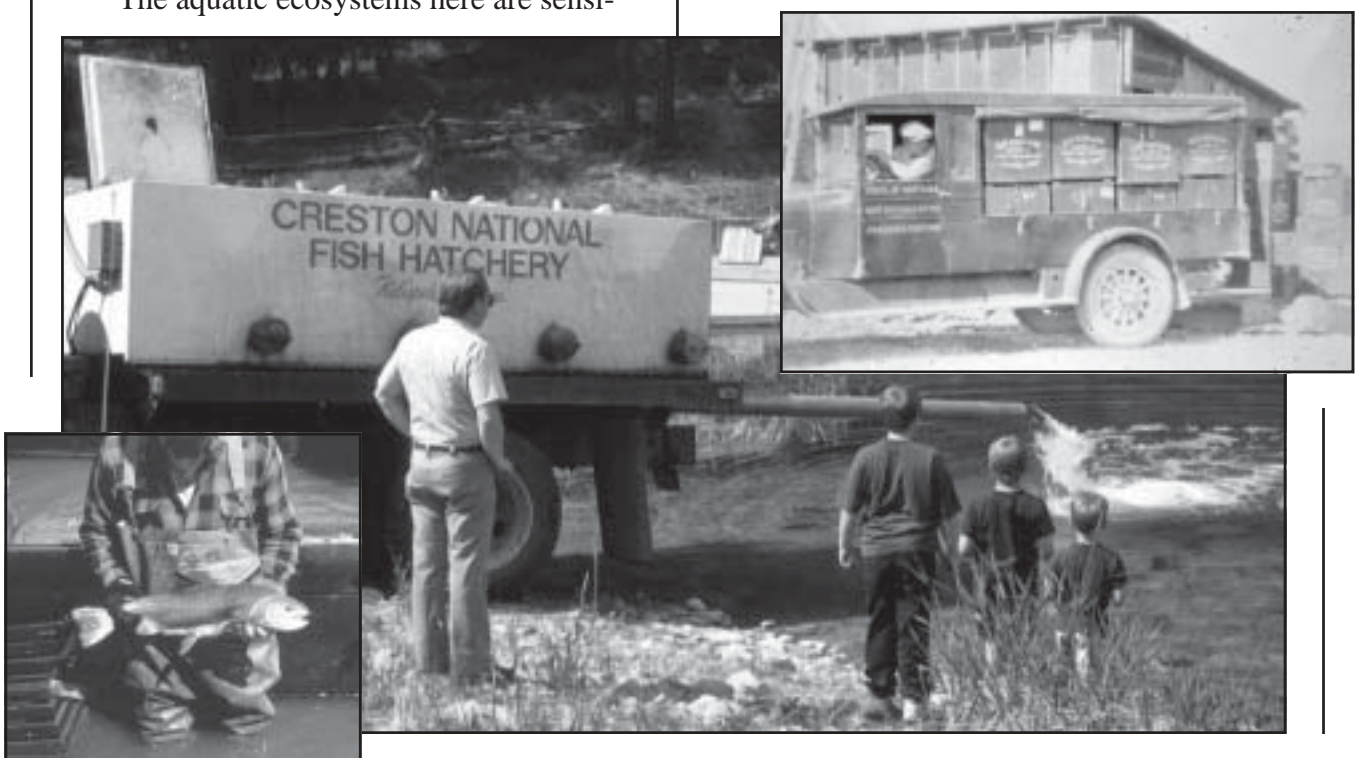
The aquatic ecosystems here are sensi-

tive. By nature, most of the water of the Crown is cold and clear, with low levels of phosphorus and nitrogen. They cannot support the volume of aquatic life that flourish in warmer, more productive waters elsewhere. Native species are adapted to clear water and frigid temperatures. Even relatively slight habitat degradation can result in profound problems for native species.

In addition to moving native fishes to waters where they did not naturally exist, people have introduced bass, perch, kokanee salmon, walleye, brook, brown, and rainbow trout from other areas, even other continents, for their fishing pleasure. The Crown's naturally simple and stable aquatic environments have been altered by these introductions.

Stocking efforts date back 100 years. Largemouth bass were introduced in Flathead Lake in 1898. Before 1920, a federal fish hatchery at Creston was built to keep Glacier National Park visitors happy with stocked fish. In 1933, Glacier Park was stocked with 2,000 exotic brook trout to please visiting U.S. President, Herbert Hoover.

Fish stocking in Waterton Lakes National



Park began in the 1920s and was discontinued in 1988. Fish are still introduced to waters in and around the Crown of the Continent via both authorized actions by trained biologists and illegal introductions by individuals. The difference is, now biologists attempt to make wise decisions that will provide recreation, yet protect ecosystems. While people fish primarily for recreation in the Crown of the Continent, there are also some commercial opportunities, such as the whitefish fishery in Flathead Lake. Harvest is managed by state and provincial agencies to prevent depleting the resource.

The Crown of the Continent includes three major drainages of the continental scale: Columbia, Hudson Bay, and Missouri. Each of these has unique components, both in native organisms and in the qualities of the water. The following section illustrates how the ecosystems of those drainages have changed in recent centuries.

### **Columbia**

The Flathead drainage is home to bull trout, which grow large in Flathead Lake and swim scores of miles to spawn in mountain tributaries. Flathead Lake bull trout spawn both in Montana and British Columbia.

Lake trout, Lake Superior whitefish, yellow perch, and kokanee salmon were introduced to the Flathead to provide recreation and food for people. Another exotic species—the mysis shrimp—was introduced to the Flathead drainage in the 1970s, eventu-

ally washing into the lake.

The managers' goal was to give kokanee salmon and other popular sport fish more food, so the fish would grow bigger. The results were catastrophic. The new shrimp fortified lake trout, instead of the intended kokanee. Booming lake trout populations out-competed kokanee salmon and bull and cutthroat trout and also ate their young. Kokanee, once a popular fish to catch, crashed to local extinction. Bald eagles that once congregated by the score to feed on spawning

kokanee in McDonald Creek were forced to find food elsewhere. Native trout numbers also dropped substantially, due to this and other factors.

Fortunately, there is evidence that Flathead Lake may be stabilizing. Bull trout spawning has improved since lows recorded in the 1990s. However, it remains to be seen if the Flathead Lake ecosystem can support two top-level predators, both lake and bull trout. Bull trout are a threatened species, and Flathead Lake cutthroat exist at low, but stable, numbers.

Bull trout are a threatened species under the U.S. Endangered Species Act, and the only place in Montana where it is legal to fish for them is Swan Lake. The dams at Hungry Horse Reservoir and Swan River have protected bull trout populations in those subdrainages from the ecological convulsions triggered by mysis and lake trout. Swan Lake and Hungry Horse



Reservoir continue to be the strongest bull trout fisheries anywhere in Montana. The three forks of the Flathead River also have strong numbers of westslope cutthroat trout.

### **Hudson Bay**

St. Mary lakes, Waterton lakes, and the southern Alberta tributaries of the Saskatchewan River represent a very different aquatic community. Lake trout, a fish of the Canadian shield waterways, is native only to



this drainage of the Crown.

Two native fish—pygmy whitefish and the deepwater sculpin—of Upper Waterton Lake are relict species; they occur only because the lake offered a refuge dating back to pre-glacial eras. Today, Waterton Lake is the only place in Alberta with deepwater sculpin. Mysis shrimp (which caused such havoc when introduced to Flathead Lake) also naturally occur in Waterton Lake, left behind by the pattern of glaciers millions of years ago. This tiny, freshwater shrimp lives almost its entire life in darkness, rising to the surface to feed on plankton in the nighttime, then retreating to the dark depths of the lake during daylight hours.

The streams in the Castle River drainage host native bull and cutthroat trout and introduced species such as rainbows and brook trout.

As in other parts of the Crown, bull trout were purposefully removed from rivers in the

1930s-1950s, to make room for exotic trout species that were more eagerly sought by anglers. In Alberta, bull trout are found in 31% of their historic native distribution, but have a stronghold in the Castle drainage and in Waterton Lakes National Park. Bull trout, the official provincial fish of Alberta, are protected by catch-and-release regulations and a bait ban throughout the province.

### **Missouri River Headwaters**

The Missouri River drainage includes the Two Medicine and Cut Bank Creek drainages of Glacier National Park and the Sun and Teton rivers and continues to the south, east of the Continental Divide. Arctic grayling, another ice age relict, clings to existence in the upper reaches of the Sun River because of restocking efforts in the late 1990s.

Grayling are easy to catch, and thus susceptible to overharvest. Like cutthroat trout, they are sensitive to habitat degradation, such as siltation from roads or streambank trampling by livestock. In lower elevations, irrigation practices have also reduced grayling numbers by rerouting streams into ditches and dewatering sections of streams.

Beyond the mountains and into the prairie, the tributaries of the Missouri River slow down, and temperatures become too warm for grayling and cutthroat trout. These streams host warm water fish species such as sauger and goldeye.

### **Popular, Man-Made Fisheries**

Even in wilderness areas, local aquatic ecosystems have been changed by human actions, sometimes radically. One of the largest impacts people have had on the Crown of the Continent ecosystems is planting exotic fish. There is a reason why fish stocking has a long history in the Crown of the Continent: people love it. However, they did not always appreciate its implications.

Even high, alpine lakes in wilderness have been stocked, often via helicopter.

Fishing continues to draw people to backcountry lakes. Today, alpine stocking efforts tend to focus on genetically pure cutthroat trout. Alpine lakes in high mountain cirques were often naturally devoid of fish,



because of downstream waterfalls. There is an ecological cost to stocking fishless, so-called barren lakes. Fish can disrupt the life-web in these waters, for example removing certain micro invertebrates, or even amphibians. Once fish were added to lakes, the natural balance of species and the number of invertebrates changed. Because these creatures are tiny, these changes were not readily apparent. Stocked lakes also attract more people than unstocked lakes. Lakes without fish generally have less litter and fewer trampled areas compared to more popular stocked lakes.

Fishing for non-native lake trout, perch, and pike is very popular in places like Flat-

head Lake. In the 1960s and 1970s, spawning runs of non-native kokanee salmon in Glacier Park's McDonald Creek once attracted spectacular concentrations of bald eagles. This ended in the late 1980s, when the kokanee died out because of the introduction of mysis shrimp to the Flathead watershed.

### **Basin Food Web**

Another famous (but artificial) fishery is Duck Lake, on the Blackfoot Indian Reservation. Duck Lake is known for producing rainbow trout in the six pound range. This large glacial pothole was naturally fishless, but has a wide reputation for trophy fish and is an economic asset for the reservation. The lake is highly productive, stocked frequently, and fishing pressure is managed to allow trout to grow to trophy size.

At the same time, the Elk River in British Columbia has a growing reputation for blue-ribbon trout fishing. The action there is for bull and cutthroat trout—both natives which appear to be thriving under careful regulation.

National parks in both Canada and the United States allow fishing as a traditional visitor activity. This is inconsistent with parks policy, since hunting and other consumptive uses of birds and mammals in national parks is unheard of. However, the policy is unlikely to change in the near future, as fishing remains a very popular way to enjoy the Crown's waters, both in and outside national parks. In Waterton Lakes National Park and Glacier National Park, fishing regulations have shifted to protect native species, while encouraging selective removal of non-native fish. Catch and possession limits for native fish are conservative. Angling is encouraged as a means of managing non-native fish and to educate visitors about aquatic ecosystems.



## Sources

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