

Lesson 3

Bull Trout Recovery and Watershed Restoration

Time Needed: A one hour session

GOAL To understand the basic framework for Bull Trout recovery and key actions for watershed restoration and water quality improvement.

OBJECTIVES Students will:

- Learn the basics of Bull Trout recovery efforts and concepts
- Learn about the historic removal of Milltown Dam and restoration project
- Learn key actions and techniques for watershed restoration

MATERIALS

- Powerpoint Program, Part III
- Handout materials from U.S. Fish & Wildlife Service

VOCABULARY Bull Trout, conservation, Core Habitat Areas, critical habitat, culvert, distribution area, fish passage, gene flow, habitat connectivity, heavy metals, historically occupied habitat, instream flows, large woody debris (LWD), metapopulation, migration, Milltown Dam, native vegetation, non-point pollution, point pollution, pool habitat, recovery, recovery plan, redevelopment, redd counts, remediation, restoration, riparian area, Superfund, threatened species, unoccupied suitable habitat, watershed, watershed restoration

TEACHER INPUT

[key words are typed in bold, questions for the students to answer are underlined, and *actions* to take are typed in italics]

Begin Part III of the powerpoint program.

As a **threatened species** protected under the Endangered Species Act, **recovery** of Bull Trout and their habitat is legally mandated. Recovery is synonymous with **conservation**, which is legally defined as "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided under this Act are no

longer necessary." Central goals are to increase both the numbers and **distribution area** of Bull Trout.

The first step in the recovery process is the identification of **critical habitat** necessary for the survival and recovery of the species. Ideally this takes place in tandem with a **Recovery Plan**. For example, the U.S. Fish & Wildlife Service has published a Draft Recovery Plan and Proposed Critical Habitat for Bull Trout. Similarly, the Montana Department of Fish, Wildlife & Parks, acting through its Montana Bull Trout Scientific Group, has identified and mapped **core habitat areas** for Bull Trout, where it will focus its actions for Bull Trout recovery. They represent areas where viable **metapopulations** of Bull Trout will be maintained and restored.

An important aspect of critical habitat and recovery is reestablishment of Bull Trout within some areas of **historically occupied habitat**.

The next step is identification of problem areas in the watersheds. These can come in many forms including **point** and **non-point pollution** sources, blockages to migration, degraded habitat, improper culverts and so on. These problems are then prioritized for active **restoration** actions, which are implemented on the ground.

Watershed restoration is a process similar to recovery. It embodies the **Three Rs**, representing **remediation, restoration** and **redevelopment**.

The legacy of large-scale mining is the dominant cause of water quality degradation in the Upper Clark Fork Watershed and cleanup of mining wastes is a top priority. The area from Butte to the Milltown Dam is designated as a **Superfund Site** by the U.S. Environmental Protection Area and is the largest Superfund site in the nation. Central to the restoration plan is the historic \$100 million removal of **Milltown Dam** at the confluence of the Clark Fork and Blackfoot Rivers, along with thousands of tons of **heavy metals** deposits that have become trapped behind the dam.

The listing of the Bull Trout was a key factor in the decision to remove the dam, as the U.S. Fish & Wildlife Service concluded the dam was an ongoing, "illegal **taking** of Bull Trout," by blocking their spawning migrations.

The site plan includes excavating a bypass channel, so the river can be temporarily diverted so that the heavy metals can be removed from behind the dam. These polluted soils are being trucked to a site near Opportunity and other polluted soils are being moved on-site above the floodplain. After this phase is complete, the dam and turbines will be completely removed. The river will then be restored to its natural course, and **riparian** habitat also restored. The final phase is redevelopment, which includes the design and creation of public parks and recreation areas,

fishing access sites, trails and interpretive displays. The plan also includes new bridges over the Blackfoot River and new sidewalks.

Since dams and associated **habitat fragmentation** and genetic isolation are a leading threat to survival and recovery of Bull Trout, **fish passage** is a key element of Bull Trout recovery and watershed restoration. Benefits include reestablishing **habitat connectivity** and **gene flow**. This process can be accomplished through installation of fish passage structures, like the one at Rattlesnake Creek in Missoula, or through complete removal of the dams themselves, as is being done at Milltown.

A highly successful fish passage was constructed at Rattlesnake Dam in Missoula. Even this relatively small dam has blocked spawning migrations for Bull Trout and Cutthroat Trout. The number of Bull Trout redds counted above the dam has increased significantly since the fish ladder was installed. Some fish are captured by biologists and implanted with transmitters, so the fish can be tracked and monitored.

Another major threat to Bull Trout survival and recovery is the damage and loss of **riparian areas**. Two primary methods for restoring riparian areas include the planting of **native vegetation**, including willows and cottonwoods, and fencing cattle out of the riparian area. For example, the U.S. Fish & Wildlife Service has provided funding to ranchers so they can install fences. With healthy riparian areas restored, the streams can once again support populations of native fish. Riparian habitat is central to the **complex** habitat requirements of Bull Trout, which include overhanging vegetation and shade. These help keep stream temperatures cooler.

Improperly designed and/or placed **culverts** can be a major source of sediments as well as blockages to **migration**. Common problems include culverts that are undersized for the amount of water that flows through them at high water. Others are placed too high so that at low water fish cannot jump high enough to migrate. During high water there is too much velocity. Replacing and/or fixing these culverts is a major recovery action.

Agriculture in our dry climate requires irrigation and water diversions and dewatering of streams has been cited by the U.S. Fish & Wildlife Service as a threat to Bull Trout populations. There are two primary methods that are used to reduce impacts on native fish. One are fish screens, which prevent Bull Trout from entering the irrigation ditches, where they become trapped in inhospitable habitat and sometimes even sprayed out onto the fields. These ditches become dry in the Fall when the head gates are closed, often claiming fish. Another method is negotiating **in-stream flows** with water users to guarantee an adequate amount of water will remain to support native fish. The Montana Department of Fish, Wildlife & Parks and private organizations have been negotiating agreements with ranchers to protect adequate flows.

The Montana Department of Fish, Wildlife & Parks and other state agencies and conservation organizations have carried out numerous Habitat Improvement Projects, which often focus on improving in-stream habitat by placing **large woody debris** within streams to create **pool habitats**.

Restoring the Upper Clark Fork Watershed will require maintenance of the high water quality tributaries and spawning habitats. These include the Rock Creek watershed, the Blackfoot River and Warm Springs Creek.

Agriculture, recreation and other industries will remain a central element of our region. These uses can continue in harmony with the river environment when just a few simple changes are made.

EDUCATION IS THE KEY TO WATERSHED RESTORATION.

Place-based scientific education programs like the Clark Fork Watershed Education Program are serving as a model that can be replicated across the country and even the world. Understanding the many important uses that clean water supports is fundamental to good decision-making. If we maintain and restore our watersheds, they will be there for us, and future generations, to enjoy.

END OF PART III OF POWERPOINT PROGRAM

Ask some Qs of the students.

Why would it be important to restore Bull Trout to areas they once lived?

Why do biologists place large logs in a stream?

What caused the biggest water quality impacts in the Upper Clark Fork Watershed?

Why is it important to re-connect Bull Trout habitat and populations?

What is a Superfund Site?

How are riparian areas restored?

What is critical habitat?

Can you name the Three Rs?

GLOSSARY

Bull Trout are a large migratory fish native to the Northern Rockies and Pacific Northwest. They are actually a member of the **Char** family of fishes, related to the Arctic Char.

Core Habitat Areas are areas identified by the Montana Department of Fish, Wildlife & Parks where they will focus their Bull trout recovery actions.

Critical habitat is a component of the Endangered Species Act and is defined as specific geographic areas, whether occupied by listed species or not, that are determined to be essential for the conservation and management of listed species, and that have been formally described in the Federal Register.

Culverts are rounded, metal structures placed underneath where a road crosses a stream.

Distribution area is the geographic area occupied by a species.

Foraging, Migrating, Overwintering (FMO) Habitat is typically downstream from spawning and rearing habitat and contains all the physical elements to meet critical overwintering, spawning migration, and subadult and adult rearing needs.

Gene flow is the uni- or bi-directional exchange of genes between populations due to migration of individuals and subsequent successful reproduction in the new population.

Habitat Connectivity refers to habitat that is linked together whereby Bull Trout have free access of movement from one area to another.

Heavy metals and toxic metals, including "heavy metals," are individual metals and metal compounds that negatively affect people's health. In very small amounts, many of these metals are necessary to support life. However, in larger amounts, they become toxic.

Historically occupied habitat refers to areas where Bull Trout were once present, but have been extirpated from that portion of their range.

An **Indicator Species** is a species used as a gauge for the conditions of a particular habitat, community, or ecosystem. For example, due to their stringent habitat needs, Bull Trout are an indicator of water quality and watershed health.

In-stream flows are the amount of water that remains in the streambed after water withdrawals for irrigation.

Large Woody Debris (LWD) refers to large pieces of wood within the stream, usually logs or root wads. These create deep pools.

A **metapopulation** is a network of semi-isolated populations with some level of regular or intermittent migration and gene flow among them, in which individual populations may be extirpated, but then be recolonized from other populations.

Migration is a life history strategy whereby fluvial, adfluvial and anadromous Bull Trout move back and forth from feeding, migrating and overwintering habitats to spawning and rearing habitats.

Milltown Dam is located on the Clark Fork River just above Missoula, Montana. This dam has been in operation for approximately 100 years.

Native vegetation refers to species which are endemic to the Upper Clark Fork Watershed.

Non-point source pollution is from diffuse pollution sources. The pollutants are generally carried off the land by runoff. Common non-point sources include agriculture, forestry and mining.

Point source refers to a discharge point subject to Clean Water Act regulations. It is any discernable, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, and well.

Pool habitat refers to deep pools within a stream. These pools contain colder water and provide resting and hiding habitat for native salmonids. Pool habitat is often associated with large woody debris and large rocks or boulders in the stream.

Recovery is the process by which the decline of an endangered or threatened species is arrested or reversed, or threats to its survival neutralized so that its long-term survival in nature can be ensured. It is synonymous with the definition of **Conservation** in the Endangered Species Act: "The terms "conserve," "conserving," and "conservation" mean to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided under this Act are no longer necessary.

Recovery Plans are mandated by the Endangered Species Act and defined as a "basic road map to recovery, i.e. the process that stops or reverses the decline of a species and neutralizes threats to its existence." The Recovery Plan is intended to provide a means for achieving the species' long term survival in nature. A document drafted by the Service or other knowledgeable individual or group, that serves as a guide for activities to be undertaken by Federal, State, or private entities in helping to recover and conserve endangered or threatened species.

Redevelopment includes development of public parks and recreation areas, access points, trails, interpretive displays and upgraded infrastructure.

Redd counts are annual counts made by biologists to track Bull Trout population trends and reproductive success.

Remediation is the correction of something bad or defective.

Restoration is the process of returning a species or habitat to a former, original, normal or unimpaired condition.

A **Riparian Area** is defined as the area adjacent to or beside a river, stream or lake. Riparian areas also include a variety of different types. Willows, alder, sedges and rushes are typically found within a riparian area but seldom found in upland areas.

Source population is a population in a high-quality environment where the birth rate exceeds the death rate and excess individuals leave as migrants.

Spawning & Rearing (SR) Habitat is typically headwaters streams where spawning and rearing of migratory or resident fish occurs. These areas contain the physical elements for Bull Trout (cold, clean, complex habitat) necessary to meet critical egg incubation and juvenile rearing needs.

Superfund is the federal program operated under the legislative authority of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Superfund Amendments and Reauthorization (SARA) that funds and carries out the U.S. Environmental Protection Agency's solid waste emergency and long-term removal and remedial activities. This includes establishing the National Priorities List and conducting and/or supervising cleanup and other remedial activities.

Take is defined in the Endangered Species Act as: "The term 'take' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

Threatened Species is a legal designation under the federal Endangered Species Act. It means that any species listed as Threatened is a species that is likely to become endangered in the foreseeable future throughout all or a significant portion of its range.

Unoccupied suitable habitat is habitat that contains all the essential habitat requirements of Bull trout, but is no longer occupied, often due to blockages to migration and/or the absence of nearby source populations.

Watershed is an area of land from which rainfall (and/or snow melt) drains into a stream or other water body. Watersheds are also referred to as drainage basins or drainage areas. Ridges of higher ground generally form the boundaries between watersheds.

Watershed restoration is the process of returning habitat and water quality to a normal or unimpaired condition that supports viable populations of native species.

Bibliography of Scientific Reports on Bull Trout Biology, Status and Threats

Hauer, F.R., G.C. Poole, J.T. Gangemi and C.V. Baxter. 1999. Large woody debris in bull trout (*Salvelinus confluentus*) spawning streams of logged and wilderness watersheds in northwest Montana. Canadian Journal of Fisheries and Aquatic Science. 56:915-924.

Montana Bull Trout Restoration Team. 2000. Restoration Plan for Bull Trout in the Clark Fork River Basin and Kootenai River Basin, Montana. Montana Department of Fish, Wildlife & Parks. Helena, MT. 114p.

Montana Bull Trout Scientific Group. 1998. The relationship between land management activities and habitat requirements of bull trout. Report prepared for the Montana Bull Trout Restoration Team, Montana Department of Fish, Wildlife & Parks, Helena. 78p.

Montana Bull Trout Scientific Group. 1995. Upper Clark Fork River Drainage Bull Trout Status Report. Montana Department of Fish, Wildlife & Parks, Helena. 40p.

Rieman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of Bull Trout. Gen. Tech. Rep. INT-302. Ogden, UT. U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 38 p.

Rieman, B.E. and F.W. Allendorf. 2001. Effective population size and genetic conservation criteria for bull trout. North American Journal of Fisheries Management 21: 756-764.

U.S. Environmental Protection Agency. 2007. Weekly Update Reports on the Milltown Dam Project.

U.S. Fish & Wildlife Service. 2002. Draft Bull Trout Recovery Plans for the Columbia and Klamath Basins, and the Coastal-Puget Sound. <http://www.fws.gov/pacific/bulltrout/>

U.S. Fish & Wildlife Service. 2002. Proposed critical habitat. www.fws.gov/pacific/bulltrout/

Links to Bull Trout & Watershed Education Information

<http://www.cfwep.org/>

<http://www.fws.gov/pacific/bulltrout/>

<http://www.fws.gov/midwest/endangered/glossary/index.html>

<http://fwp.mt.gov/education/fishingeducation/default.html>

<http://www.streamnet.org/>

<http://www.epa.gov/Region8/sf/mt/milltown/>

<http://www.doj.mt.gov/lands/naturalresource/>

<http://www.swrcb.ca.gov/waterwords.html>