SUGGESTED PROJECTS AND ACTIVITIES TO RECOVER BULL TROUT

INTRODUCTION

This report is one of several prepared as part of Montana's Bull Trout Restoration effort. Other reports include the Bull Trout Recovery Plan, the status reviews and risk assessments prepared for each of the twelve bull trout management areas and three topic specific issue papers (The Role of Hatcheries and Fish Transplants in Bull Trout Recovery, The Role of Removal or Suppression of Introduced Fish in Bull Trout Recovery and The Relationship Between Bull Trout Habitat Requirements and Land Management Activities).

These reports were prepared to provide guidance, background and technical assistance to watershed groups so these community based groups would have the tools to forge ahead with bull trout recovery. The Recovery Plan provides an overall recovery goal for Montana, putting the individual watershed recovery goals into an overall context. The status reviews describe the bull trout populations in each drainage and the risks to recovery they face. The three issue papers analyze important aspects of bull trout recovery in depth and provide guidance for the overall recovery effort on these subjects.

The purpose of this report is to help the watershed groups identify, in the general sense of a 'toolbox', projects and activities that will reduce or remove the risks to bull trout recovery. This report also includes suggestions for conducting activities in a way that will help prevent further declines in bull trout. It is the hope of the Bull Trout Restoration Team that with these reports in hand, the watershed groups will have an understanding of the overall recovery goal, how the recovery goal for their watershed fits into the statewide goal, the status of bull trout in their watershed and the risks to recovery they face and, with this report, general ideas of how to reduce those risks.

The role of the watershed groups is to use the information provided in these reports together with their knowledge of their watershed to identify specific threats or risks to bull trout recovery, discuss ways to reduce the risk and work with the help of natural resource professionals to put these ideas to work on the ground.

Each of the status reviews contains a table identifying the risks to bull trout recovery for that watershed. This report is organized along the same categories as the risk table to make it easy for the watershed groups to use.

BACKGROUND/OVERVIEW

The recovery of bull trout requires restoring the functional conditions that existed in watersheds prior to the arrival of European man to Montana some two hundred years ago. It is obvious that we cannot return to the conditions that existed in Montana before gold, timber and grass brought people here

looking to make a living. What we must try to restore are the **functional** conditions of watersheds.

Streams interact very intimately with the watershed they drain. These interactions create the environment in which bull trout, and other native fish and wildlife, have evolved. The geology, vegetation and climate all influence the stream conditions. Streamside, or riparian, vegetation plays a critical role in stream function. The riparian vegetation shades the water, keeping it cool. The leaves that fall from the vegetation helps form the basis of the food web within the stream. Microbes that feed on the leaf litter become the food for aquatic insects which in turn become the food for fish. The roots of the vegetation hold the stream banks together during high flows so the channel remains narrow and deep rather than becoming wide and shallow. The roots of the riparian vegetation, as well as the large pieces of vegetation that fall into the stream, combine with high spring flows to create the turbulence that digs the deep pools that are so important to bull and cutthroat trout. The roots and large woody debris also provide cover for fish to hide under. The spring floods not only provide the energy to dig pools, they also flush the fine sediments that accumulate during the low flow periods maintaining the clean substrates necessary for successful spawning. These are examples of the functional conditions that must be restored to recover bull trout.

Another aspect of the functional conditions within a drainage is the species that are found there. In many drainages the species assemblage has been changed since the arrival of European man. Many introduced species including brook, brown, rainbow and lake trout have been introduced into waters where bull and cutthroat trout and mountain whitefish were formally the only salmonids found. These introductions have changed the functional relationships within the aquatic community.

The purpose of this report is to provide watershed groups with an introduction to the types of activities that can reduce the risks to bull trout that were identified in the status reports prepared by the Bull Trout Scientific Group and restore the important functions of watersheds. For example, irrigation has been identified as a risk to bull trout in several drainages. Irrigation poses a risk to bull trout by causing stream dewatering which reduces habitat, raises water temperature and blocks spawning migration. In addition, irrigation diversions divert fish as well as water into ditches and onto fields losing them to the population. Irrigation diversions may also block passage of fish. This report will describe in general the types of activities that can and have been undertaken to reduce these effects and restore the functional characteristics of the watershed.

Another example is the recreational effects on the native aquatic community. Angling pressure, poaching and the introduction of introduced sport fish species have affected the productivity of the native aquatic community.

This report is general by design. Each situation is unique, which makes it impossible to write a cookbook for restoration. Using their knowledge of the watershed, the status review and this report, local groups can identify specific activities that threaten bull trout and general types of activities that can reduce the threat. Once specific activities and locations have been identified watershed groups will want to work with professionals to design and implement specific projects. Each project will probably require a team of experts that, depending upon the activity may include a hydrologist,

stream geomorphologist, fishery biologist, irrigation specialist, forester, engineer, soils scientist and vegetation reclamation specialist. The interdisciplinary team can design the project and, following the lead of the watershed group, oversee its implementation.

This report emphasizes restoration of watershed function for several reasons. The most important reason is that this approach addresses the problem rather than treating a symptom. Attempts to treat symptoms are seldom successful in the long term if the causative factor is not addressed. For example, attempts to mechanically narrow and deepen an overly wide and shallow stream will not be successful if the activities that led to the channel becoming wide and shallow are not changed. Having dealt with the cause of the problem, it may be useful to plant vegetation appropriate for the site and place logs in the stream to provide cover and a channel forming function until the planted vegetation grows, dies and falls into the stream.

The watershed function approach is also favored because it should be beneficial to all fish including native species, such as westslope cutthroat trout. One of the main themes of the Governor's Bull Trout Roundtable was that whatever actions are taken for bull trout should benefit other native species as well. The intent of the watershed function approach is to allow the stream and its drainage to work as it did over the years that bull trout and other native species evolved in these watersheds. Therefore, activities that help restore the watershed function should be just as beneficial to westslope and sculpin as they are to bull trout.

Risks to Recovery and Suggested Remedies

The list of risk factors found in the status reviews prepared by the bull trout scientific group included two categories, Environmental Instability and Population not found in this report. The Environmental Instability section deals with natural events such as drought, landslides and fire. Since the watershed groups can do little to control these natural events they are not covered here. The Population section describes risks due to life history, population trends, general abundance and fragmentation of the populations. These are existing characteristics of the populations which contribute to their likelihood of extinction. The watershed groups cannot directly affect these population characteristics. It will be important for the watershed groups to take these things into account in their deliberations. It is hoped that the actions the watershed groups take will correct some of these characteristics, such as population trend, general abundance and population fragmentation, and move these populations toward recovery.

Introduced Species

Private Ponds

Stocking of private ponds with introduced fish has not been a large problem in the past. However, with more people moving to the mountain valleys of western Montana, there has been an increasing

demand for private ponds. These ponds can be a source of introduced fish and disease. In addition, the cumulative affect of numerous ponds within a drainage can be a reduction of water quality and quantity within the drainage.

All private ponds must be licensed by Montana Fish, Wildlife and Parks before they are stocked (MCA 87-4-603). Some people are not aware of or try to circumvent this law.

Education of the public regarding the risk that private ponds pose to bull trout recovery can help to discourage the proliferation of ponds in areas where they are not appropriate. They can encourage those that do have ponds to stock them with native fish. The watershed group can encourage pond owners to minimize the risks of non-natives escaping from the ponds by constructing and maintaining screened inlets and outlets for the pond.

Illegal Introductions

Illegal introductions are not subjected to any environmental analysis, are almost always detrimental, generally involve warmwater species, and are increasing. Lake trout in Flathead Lake are believed by many biologists to have contributed to the decline of the bull trout population. There is international concern that the introduction of lake trout into Yellowstone Lake could lead to the extinction of westslope cutthroat in the lake. The introduction of northern pike into several of the Clearwater chain of lakes has created a situation that is significantly contributing to the demise of bull trout in this system. Pike are also found in the lower Blackfoot River.

Education and peer pressure are two potent tools the watershed groups can employ to help stop illegal introductions. The TIP*MONT hotline can be used to provide information regarding illegal introductions.

Fisheries Management

Fisheries management decisions, such as regulation setting, can affect native and non-native fisheries alike. While the importance of regulations is often over-stated by anglers, regulations can be an effective tool in species recovery in some instances. There are, for example, indications that the closure of most of western Montana waters to taking of bull trout has benefitted the species. The use of liberalized limits to encourage the taking of species that compete with or prey upon weak native stocks has not been effective in Montana or other western states.

Removal or Suppression of Introduced Fish

The principal concern about private ponds, agency stocking and management and illegal introductions is the introduction of introduced species that either compete with or prey upon bull trout and other native species. The previous paragraphs have discussed methods to attempt to keep these introductions from occurring. What, if anything, can be done to restore the native fish assemblage once the introduction has occurred?

The Bull Trout Scientific Group has dealt with this subject in detail in the issue paper titled The Role of Removal or Suppression of Introduced Fish in Bull Trout Recovery. They identify five situations where removal and suppression should be a priority:

- Where recent invasions of introduced species has occurred.
- Where it is necessary to protect core areas (those which currently support the strongest remaining populations of bull trout) and nodal habitats (waters containing migratory corridors and overwintering areas).
- Where a bull trout population is in immediate danger of extinction.
- Where preservation of native species is a priority.
- Where innovative experimental projects will further the knowledge of how this tool might be most effective.

A checklist of questions that should be answered before any suppression or removal program is attempted is included as an appendix to the issue paper.

BARRIERS

Culverts

Culverts are an inexpensive method for providing a road crossing of a stream. However, they often create barriers to movement of fish. Barriers to passage can be particularly threatening to fish, such as bull trout, which are known to make long migrations to spawn. Culverts become barriers when water velocities within the culvert are too high for fish to negotiate, when they are too steep or too long or when the downstream end is perched above the stream making entry into the culvert very difficult.

Culverts can be re-set to reduce steepness or to make them align better with the streambed. They can be retro-fitted with 'ladders' that provide resting areas for the fish to use as they move through the culvert. The best solution is simply to replace the culvert with a bridge. In addition to being the best passage solution, a well-designed bridge will pass a high flow that might tear out a culvert.

Diversions

Water diversions often block stream courses forming barriers to fish passage. In addition to blocking spawning runs, diversions can trap juvenile bull trout migrating downstream. These juvenile fish end up in an irrigated pasture rather than in the river where they belong.

There are solutions for passing fish both upstream and downstream of diversions. Small fish ladders can be used to provide passage around diversion structures. These have been used successfully on the Confederated Salish and Kootenai Reservation. One of these small ladders was installed on Cottonwood Creek, a tributary to the Blackfoot River, in 1995.

Screening of diversions is used to prevent fish from entering the irrigation system. Screens have been used extensively by the Confederated Salish and Kootenai Tribes. A large screen was installed on a diversion from the North Fork of the Blackfoot during 1994. These screens are usually self-cleaning to minimize maintenance requirements. However, regular maintenance of these screens is still required.

Alternative sources of water can eliminate the need for diversions. Shallow wells can be used in conjunction with stock tanks to provide stockwater without diverting water from the stream. This technique has been used successfully in the upper Big Hole River as part of the fluvial Arctic grayling recovery project.

Funding for these types of projects is available from a variety of sources including the Future Fisheries Improvement Program of Fish, Wildlife and Parks and the Partners in Wildlife Program of the U.S. Fish and Wildlife Service, among others.

Thermal

Relatively high water temperatures can create a thermal barrier to bull trout movements. Probable causes of thermal barriers include stream de-watering, lack of riparian vegetation to shade streams, warm irrigation return flows entering tributary streams and river, warm water releases from reservoirs and discharges from proliferating private fish ponds.

The effects of relatively high water temperatures on bull trout are poorly understood. Most of the causes of thermal problems are dealt with in other sections of this report.

Dams

Very few large dams have been built in western Montana in the last 25 years. Due to the economics of dam building, it is unlikely that any new dams will be built in the foreseeable future. It is also unlikely that any dams will be removed in the foreseeable future.

When they were constructed, dams created barriers to migrations that greatly affected bull trout spawning runs. The resulting fragmentation of populations has contributed to the decline of bull trout. Today some of these dams provide barriers to upstream movement of introduced fish species such as lake, brown, brook and rainbow trout that could adversely affect native fish species.

Passage can be provided at some of these dams and is being reviewed during the re-licensing of a number of them including Milltown, Noxon, Cabinet Gorge and Bigfork. However the decision to

provide passage is a complicated one and must be looked at in detail from a variety of angles.

If watershed groups are interested in providing passage at a dam they should consider what fish species, other than the target species, may also use the passage. Perhaps there are different ways to provide passage that are selective for a particular species. The 'trap and carry' technique that was used at Milltown was effective although costly in man-hours. The possibility that providing passage for fish may also provide passage for disease is another consideration. The presence of whirling disease downstream of Milltown dam led to the suspension of this project.

HABITAT

Rural Residential Development

The mountain valleys of western Montana have seen tremendous rural residential development over the last decade. The principal concerns regarding this development as it affects bull trout are removal of riparian vegetation and other stream channel alterations, road building and maintenance and increased nutrient loading from septic systems. The issue of private ponds, which is closely related to rural residential development, is described above.

Watershed groups can work with the local planning boards and county commissioners to ensure that rural residential subdivisions include provisions that protect riparian vegetation. Riparian vegetation should not be removed and replaced with lawns. It should be maintained in a natural state. Houses should be located well back from the stream and out of the floodplain. This will protect the riparian areas, the house from future flood events and the stream from habitat modifications when the landowner takes action to protect his house from flooding. This should also reduce nutrient loading from septic systems.

Roads for these developments should be constructed and maintained to minimize transport of sediments, oil and grease, lawn and yard chemicals and fertilizers and road de-icers from reaching the streams. Bridges and culverts should be well-designed and properly placed.

Mining

Past mining practices have resulted in severely degraded water quality in a number of western Montana drainages. The Montana Department of Health and Environmental Sciences lists 11 streams that suffer water quality impairment as a result of mining activities in the Blackfoot drainage alone. Mining activity can greatly alter stream habitat as well. Entire reaches of stream can be obliterated or moved in order to provide access to ore bodies.

Restoring water quality to pre-mining, non-toxic levels can be challenging. It usually involves removing the mining waste rock from contact with surface and ground water. This can be a very expensive and technically rigorous effort requiring specialized expertise. The state of Montana has

expertise in this area in the Department of Environmental Quality Abandoned Mine Bureau. This would be a good place for a watershed group interested in rehabilitating an abandoned mine site to start looking for technical and financial assistance.

Rehabilitating stream channels that have been altered by placer and other mining activities is also very challenging and expensive. Mining related alterations may be so extensive that it is necessary to literally re-build the channel. In other cases less radical treatments, such as road closures, replacement of culverts, topsoil replacement and planting and fencing of riparian areas, may be sufficient to jump start the natural recovery process. Sources of expertise and possible funding include the U.S. Forest Service, Montana Department of Fish, Wildlife and Parks and the Bureau of Land Management. Private consultants also can provide expertise in these areas.

Mining is such a potentially disruptive activity compared to farming, ranching and timber harvesting, that it is far better to avoid or minimize the impacts resulting from new mining activity rather than try to rely on expensive and technically difficult post-mining reclamation efforts. Watershed groups should be involved in the planning of any mining activity slated for their drainage. They should work with the mining company and the state and federal regulatory agencies to ensure that stream habitat and water quality is not adversely affected by the proposed mining activity.

Grazing

Grazing, particularly season-long access to riparian areas, can adversely affect and greatly alter riparian vegetation with serious implications for stream habitat, water quality and water temperatures. Cattle tend to concentrate in riparian areas and graze them heavily while upland grass remains underutilized. In some instances cattle stream crossing areas coincide with bull trout spawning areas leading to trampling of redds by cattle.

Fencing riparian areas and closely managing grazing in them can greatly alleviate the impacts to riparian areas and stream habitat. Off stream watering and salt blocks can also help re-distribute cattle across a pasture. However, experience has shown these are not nearly as effective as fencing with management.

There are several agencies with expertise in grazing systems that will protect riparian habitats. The Natural Resource Conservation Service, Forest Service, Bureau of Land Management all provide grazing expertise. Funds to help defray the cost of riparian fencing can be obtained from Montana Fish, Wildlife and Parks (Future Fisheries Program), Fish and Wildlife Service (Partners in Wildlife) as well as the above mentioned agencies.

Agriculture

Dewatering of streams reduces habitat, increases water temperatures and blocks spawning migrations. In some valleys, streams that once supported bull trout spawning have very low flows or are dry during the summer and early fall when bull trout should be migrating to spawning areas.

This blockage of spawning migrations is probably one of the primary causes for the loss of mainstem river bull trout populations.

Farming practices that encroach on riparian zones, increase sediment, agricultural chemicals and nutrients entering streams or channelize streams all contribute to the degradation of aquatic habitat and ultimately the decline in bull trout populations.

Montana Fish, Wildlife and Parks is able to lease water to provide instream flows to protect and enhance fishery resources. The 1995 legislature amended the water leasing law to allow private individuals and organizations to obtain leases for instream flow. Watershed groups could pursue leases on their own, with other private partners or with the department.

Several of the water leases obtained by the department have resulted from water conservation projects. In these cases, irrigators have converted from flood to sprinkler irrigation. Because sprinkler irrigation is more efficient, water has been 'saved' by these projects. The 'saved' water has been leased to the department. The leases help pay for the sprinkler project.

There are other benefits from these projects. The elimination of irrigation return flows to the streams reduces the transport of nutrients and agricultural chemicals to the stream. In addition the elimination of warm and sediment laden irrigation return flows helps maintain the cool water temperatures of these streams.

The water leasing process often takes over a year to complete. In some situations, it is possible for water users to simply make arrangements between themselves that provide similar benefits to instream flows and fish without becoming involved in potentially bureaucratic water leasing process. Montanan's have been making these informal arrangements between water users for many years to help each other out. The watershed groups could encourage water users to make similar arrangements to benefit native fish.

The importance of healthy riparian zones has been mentioned several times in this report. In addition to the stream function benefits mentioned earlier, riparian areas are water treatment areas. Runoff and irrigation return flow water carrying sediment, agricultural chemicals and nutrients can be 'treated' by the riparian vegetation and soils to remove these pollutants before they reach the stream. The watershed groups could undertake an educational program regarding riparian zones for all land owners/managers. Protection of these areas is important for all land managers whether they graze cattle, farm, harvest timber or develop subdivisions.

Dam Operations

Dams can be operated either to the benefit or detriment of bull trout and other fish species. Painted Rocks Reservoir is a good example. The department purchases 10,000 acre feet of stored water annually from Painted Rocks. This water is released as requested by the department to augment low summertime flows in the Bitterroot River. This increased summer flow is beneficial to bull trout and

other fish in the West Fork of the Bitterroot River.

On the other hand, the reservoir is annually drawn down by releases for instream flow and irrigation. Very little water remains in the reservoir during the fall and winter months. It is likely that a defined minimum pool would benefit the bull trout population that lives in the reservoir.

Generally speaking, bull trout residing in the river below a dam will benefit if the dam is operated to a natural runoff pattern and natural temperature regime. Bull trout living in the reservoir will benefit from a fairly stable lake level. Providing a spring rise in pool elevation and adequate minimum pool through the winter are important.

Forestry

Past forestry practices (road construction, log skidding, riparian harvest, clearcutting, burning and terracing) were often damaging to watershed conditions and contributed to the decline of bull trout. In fact, many of these past practices continue to affect bull trout. One of the primary activities that must be undertaken to recover bull trout is to rehabilitate the damage caused by past practices.

Past forestry practices affected watershed function and bull trout in a variety of ways. Perhaps the biggest problem has been road construction. The cut and fill slopes along roadways are sources of sediment. In addition, roads became avenues for delivery of sediment to streams during runoff. Culverts that were too small are torn out by high flows cutting at the roadway and delivering more sediment to the stream. Removal of riparian vegetation led to warming of water temperatures and contributed to the destabilization of stream banks. As more of a watershed was cut, the annual runoff increased. The increased runoff had to cut a larger channel, which exacerbated erosion of destabilized banks. Increased sediment delivery and deposition led to the filling of pools, these pools were critical habitat for bull trout. Sediment also filled the spaces between grapefruit sized rocks as well as gravels. The smothered gravels were no longer suitable for spawning. And the spaces between the larger rocks, that were favored places for juvenile bull trout were lost. All of this contributed to the decline of bull trout.

Rehabilitation of these watersheds will be an important aspect of bull trout recovery. There are many things that can be done. Closing, contouring and revegetating roads is a simple step that can have great benefits. As the road begins to revegetate, it delivers less sediment to the stream. Actively restoring sediment sources (raw, eroding banks) and providing sediment storage away from the channel (downed logs on slopes that contribute sediment) will reduce sediment delivery to the stream. Replacing undersized culverts with bridges or larger culverts will help. Planting vegetation may be helpful to stabilize banks and shorten the time until the canopy cover is restored. As sediment sources are dealt with and the vegetation begins to recover, the natural stream processes can begin to work to remove sediment from pools, gravels and important rearing substrates. This process can be accelerated somewhat by the addition of large woody debris to the stream and perhaps other instream habitat manipulation as well if necessary.

Current forestry practices are substantially better than historic. However there is continuing controversy over the level of protection that should be provided riparian areas during timber harvest activities. The state of Montana has adopted a Streamside Management Zone (SMZ) law. The width of the streamside management zone and the restrictions on activities vary according to stream class. The most stringent requirements are for Class I streams where the management zone width is 50-100 feet wide. Within this zone 50% of the trees greater than 8 inches in diameter at chest height, or 10 trees for every 100 feet on each side, whichever is greater, within 50 feet of the stream, must be left. In addition, tracked or wheeled equipment use within the management zone is prohibited. No road construction is permitted except for approaches to stream crossings. Voluntary best management practices are recommended for timber harvesting activities outside the boundaries of the management zone.

This regulation can be contrasted to the management guidelines adopted by the US Forest Service and Bureau of Land Management for timber harvesting and other activities (Inland Native Fish Strategy, 1995). These guidelines were adopted to protect native resident fish such as bull trout and westslope cutthroat. The most stringent of these guidelines applies to Category 1 streams which are defined as fish bearing streams. The management zone for these streams runs to the outer edges of the 100 year floodplain or to the outer edge of the riparian vegetation or 300 feet on each side of the stream, whichever is greatest. The harvest of timber, including fuelwood cutting, is prohibited within this zone except where catastrophic events such as fire, flooding or wind result in degraded riparian conditions and present and future woody debris needs are met. In these areas salvage and fuelwood cutting may be permitted.

There are other guidelines for road, grazing, recreation, minerals, fire/fuels and general riparian area management. However, the contrast in the width of the management zone and the level of timber harvest activity permitted within this zone serves to demonstrate the wide difference in these two sets of management guidelines.

During the course of the development of the bull trout restoration plan, representatives of the timber industry have stated their belief that the protection afforded to bull trout by the Montana SMZ law is adequate. Fish advocates have stated the belief that the guidelines adopted by the Forest Service and Bureau of Land Management are appropriately conservative and necessary to protect bull trout and other native fish species.

The watershed groups will not be adopting timber management guidelines. However, the watershed groups may find themselves working with private landowners on projects to restore and enhance bull trout populations that may involve timbered ground. The watershed groups should be aware of the range of opinion regarding this topic, which is why this section of the report has been included. Additional information about the SMZ law can be obtained from the Montana Department of Environmental Quality, Forestry Division, 2795 Spurgin Road, Missoula, 59701. For more information regarding the Inland Native Fish Strategy management guidelines contact the US Forest Service, Northern Region Office, PO Box 7669, Missoula, MT 59807.

Recreational Development

Montana has seen a boom in recreational development over the last ten years. Ski areas, streamside hunting and fishing lodges, golf courses and other developments can all affect bull trout habitat. Ski areas create large, permanent clear cuts that can increase sediment loads and water yields. Golf courses, hunting and fishing lodges and other streamside developments may remove riparian vegetation, riprap stream banks and take other actions that will degrade bull trout habitat.

The regulatory control over these types of developments will rest with entities such as the US Forest Service and city-county planning boards. Although the watershed groups will not have regulatory control, their input to the regulatory agencies regarding potential developments will be given due consideration.

Transportation

Forest roads, county roads, highways and rail lines have all affected bull trout habitat. Maintenance of these roads can also have create continuing impacts. Watershed groups can contact the appropriate entity (county commissioners, Forest Service, Montana Department of Transportation) if they feel that maintenance activities are creating a problem and ask that the activity be conducted in a different manner.