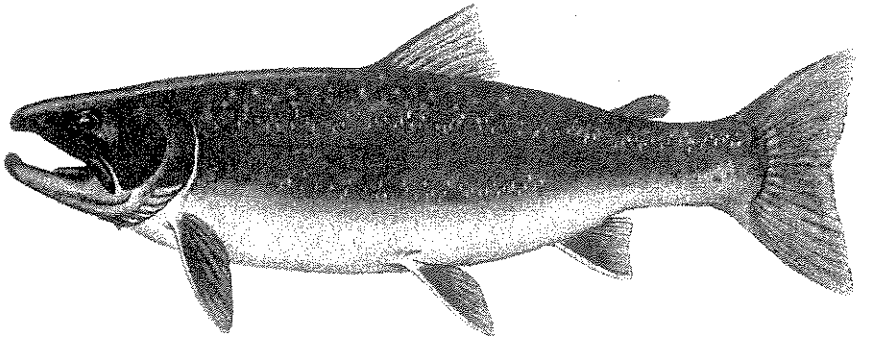
RESTORATION PLAN
FOR
BULL TROUT
IN THE
CLARK FORK RIVER BASIN
AND
KOOTENAI RIVER BASIN
MONTANA



Prepared by:

MONTANA BULL TROUT RESTORATION TEAM

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RESTORATION PLAN FOR BULL TROUT IN THE CLARK FORK RIVER BASIN AND KOOTENAI RIVER BASIN, MONTANA

This restoration plan for bull trout in Montana was developed collaboratively by, and is supported by, the Montana Bull Trout Restoration Team, appointed by Governor Marc Racicot. Restoration Team members represented the organizations listed below. All parties to this restoration plan recognize that they each have specific statutory responsibilities that cannot be abdicated, particularly with respect to the management and conservation of fish and wildlife, their habitat, and the management, development and allocation of land and water resources. Nothing in this plan is intended to abrogate any of the parties' respective responsibilities. Each party has final approval authority for any activities undertaken as a result of this agreement on the lands owned or administered by them.

The Restoration Plan was developed by the Montana Bull Trout Restoration Team, represented by the following organizations and agencies (arranged in alphabetical order by agency/organization):

American Fisheries Society

Bonneville Power Administration

Confederated Salish and Kootenai Tribes

Montana Department of Fish, Wildlife and Parks

Montana Department of Natural Resources and Conservation

National Wildlife Federation

Plum Creek Timber Company, L.P.

U.S. Fish and Wildlife Service

U.S. Forest Service

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EXECUTIVE SUMMARY

Purpose of the Bull Trout Restoration Plan

The purpose of this restoration plan is to provide the framework for a strategy to reverse or halt the decline of bull trout populations in western Montana, and restore populations in areas where they have declined. The plan provides general guidance for conservation and protection of those populations that are stable or increasing, as well as recommendations to restore populations that have declined. Its approach is to conserve the best remaining populations and restore diminished populations. This document is intended to guide state restoration efforts, and complement federal conservation and recovery processes. It is intended to be used by management agencies, watershed groups, and private landowners as a reference to conserve and recover bull trout throughout western Montana. The plan complements existing mandates and management objectives, such as forest plans, and should be adopted and incorporated into them.

Bull Trout Life History

Bull trout are native to the streams and rivers within the Columbia River basin in western Montana. They are found in all major river drainages including the Blackfoot, Clark Fork, Swan, Flathead, and Kootenai Rivers. Bull trout are generally migratory, spawning and rearing in smaller, higher order streams, and then later rearing and overwintering in larger rivers or lakes. They have very strict habitat requirements that are generally referred to as the four C's - clear, cold, complex, and connected. This includes clean, cold water; high levels of shade, undercut banks, and woody debris in streams; high levels of gravel in riffles and low levels of fine sediments; stable, complex stream channels; and connectivity among and between drainages. Connectedness between populations allows periodic genetic exchange, as well as founding of new populations and recolonization of extirpated populations by migrants. This variety of life history strategies and resulting habitat requirements is important to the stability and persistence of populations, but also complicates restoration and conservation because a diversity of high quality habitats are needed. When individual habitat components are altered, by human or natural events, bull trout populations may be negatively impacted.

Montana's Bull Trout Restoration Team

Bull trout populations have been harmed by (in no particular order) competition, hybridization, and predation by legally and illegally introduced fish; land management activities; fishing harvest; and loss of habitat connectivity. Since settlement of Montana by Europeans, the distribution of bull trout in Montana has declined, prompting the need for a formalized conservation strategy to protect and conserve the species. In response to the decline of the species, Governor Marc Racicot appointed an interdisciplinary Bull Trout Restoration Team in 1993 to "work in a cooperative fashion to produce a plan that maintains, protects, and increases bull trout populations" independent of the federal listing process. The restoration team consists

of nine members that represent state, federal, and tribal management agencies, industry, and conservation organizations. The team was chartered to produce a restoration plan that would: 1) include a process and timetable for recovery, 2) set specific restoration goals, resource management criteria, and methods to monitor results; and 3) identify the biological and habitat needs of bull trout.

Restoration/Conservation Areas for Bull Trout

The Restoration Team appointed a group of scientists to provide the technical expertise necessary for the restoration planning effort. The Scientific Group recognized 12 different restoration/conservation areas (RCAs) in four major drainages based on the current pattern of distribution and fragmentation of bull trout populations in Montana:

Major river drainages and respective restoration/conservation areas:

Clark Fork Basin

Clark Fork River drainage

Lower Clark Fork River (downstream from Thompson Falls Dam)
Middle Clark Fork River (Thompson Falls Dam to Milltown Dam)
Upper Clark Fork River (upstream from Milltown Dam)
Rock Creek (tributary to upper Clark Fork River)
Bitterroot River
Blackfoot River

Flathead River drainage upstream from Kerr Dam

Flathead River (North and Middle Fork Flathead River, Flathead Lake)
South Fork Flathead River (upstream from Hungry Horse Dam)

Swan River (upstream from Big Fork Dam)

Kootenai River Basin

Kootenai River drainage

Lower Kootenai River (downstream from Kootenai Falls)
Middle Kootenai River (between Kootenai Falls and Libby Dam)
Upper Kootenai River (upstream from Libby Dam).

These restoration/conservation areas largely represent fragmentation of the historic range of bull trout in Montana into isolated groups of populations mainly due to human alteration of the environment. Restoration of bull trout will require restoration of historical connectivity within and among these areas. Connectivity is achieved when fish can move between areas and interbreed. The more connectivity that can be restored within and among these areas, the greater

the likelihood of long-term survival. With this structure, a local population may go extinct, but through occasional straying of migrants from other populations, may be recolonized.

Status reports for each of the restoration conservation areas were prepared by the Scientific Group. Included in the status reports are a description of the status of bull trout in each of the areas, identification of threats to restoration, identification of core areas containing the best remaining spawning and early rearing habitat where recovery efforts should be focused, and a recovery or conservation goal for the watershed. The restoration plan is founded on these status reports, as well as technical reports on the role of stocking in bull trout recovery, the relationship between land management activities and habitat requirements of bull trout, and an assessment of methods for removal or suppression of introduced fish to aid in bull trout recovery.

Within each restoration/conservation area, core areas have been identified for bull trout (Appendix C, Figs. 5-16). Core areas are watersheds, including tributary drainages and adjoining uplands, used by migratory bull trout for spawning and early rearing, and by resident bull trout for all life history requirements. Core areas typically support the strongest remaining populations of spawning and early rearing bull trout in a restoration/conservation area, and are usually in relatively undisturbed habitat. Nodal habitats are those used by sub-adult and adult bull trout as migratory corridors, rearing areas, overwintering areas, and for other critical life history requirements.

The emphasis of restoration will be focused on protecting and restoring core areas that contain the best remaining spawning and early rearing habitat for bull trout in each restoration/conservation area, maintaining the genetic diversity represented by the remaining local populations, and reestablishing and maintaining historical connectivity within and between areas where and when possible. Because of the importance of core areas to conservation and restoration of bull trout in Montana, overall restoration will be based on protection of them. Since multiple populations are less likely to go extinct at the same time due to natural events, viability of bull trout will be greatly enhanced by maintaining multiple populations in multiple restoration/conservation areas. These considerations were used in development of the goal, objectives, and restoration criteria for restoration of bull trout in Montana.

This restoration plan is a voluntary effort on behalf of the State of Montana to restore bull trout populations to a sufficient level of abundance and distribution to allow for recreational utilization. Recreational utilization will be allowed for individual populations that meet specific criteria similar to that developed for Hungry Horse Reservoir and described on page 29. The restoration criteria contained herein may exceed those that are necessary to consider bull trout "recovered" under the ESA, and should not be construed as "recovery criteria" for the purposes of ESA delisting of bull trout. ESA recovery/delisting criteria will be developed independent of, but complementary to this plan as part of the federal recovery planning process.

Restoration Goal/Objectives

Goal: The goal of the Montana Bull Trout Restoration Plan is to ensure the long-term persistence of complex (all life histories represented), interacting groups of bull trout distributed across the species' range and manage for sufficient abundance within restored RCAs to allow for recreational utilization. To meet this goal, cooperative management, monitoring, and restoration among local, state, tribal and federal resource management agencies, as well as private citizens, conservation organizations, and industry will be necessary. Without such cooperation, it will not be possible to meet the goal and objectives of this plan.

Goal Objective 1 - Protect existing populations within all core areas and maintain the genetic diversity represented by those remaining local populations

Bull trout populations, including disconnected local populations, have substantial genetic divergence among them (Leary et al. 1993; Kanda et al. 1997, unpublished information). Therefore, each breeding population, roughly the equivalent to each core area, should be conserved. Each of the populations represented in the 115 core areas distributed throughout the 12 RCAs (Appendix C) must be protected, and if necessary, enhanced (expanded) in order to conserve the unique genetic diversity contained in those populations. Protection of populations within core areas also requires that nodal habitat be managed appropriately in order to maintain the complete life history of each unique population.

Goal Objective 2 - Maintain and restore connectivity among historically connected core areas

The effective population size of core area populations, and therefore the long-term persistence of bull trout within its native range in Montana will be enhanced by reconnecting historically connected core areas within RCAs to provide opportunity for genetic exchange between populations and refounding of new populations. Any measures to facilitate passage between populations must carefully consider how to best prevent the spread of whirling or other diseases or organisms throughout the watershed that may adversely affect bull trout or other species of native fish, such as westslope cutthroat trout.

Goal Objective 3 - Restore and maintain connectivity between historically connected Restoration/Conservation Areas (RCAs)

Fragmentation among populations is a serious threat at different geographic scales, from larger scale RCAs to smaller scale core areas (see number 2 above). Human-caused fragmentation of populations at the RCA level disrupts the migratory corridors historically used by bull trout. Fragmented bull trout populations have an increased risk of extinction (Gilpin 1997), because the effects of risk factors such as interactions with nonnative fish, mining, grazing, and forestry are locally exacerbated. Connectivity between RCAs is desirable when and where feasible to maintain/restore full migratory capacity and to help maintain viable populations, as long as doing so does not put a healthy population at risk. Potential risks versus

benefits must be carefully considered on a site-by-site basis when considering restoring connectivity.

Goal Objective 4 - Develop and implement a statistically valid population monitoring program.

An effective population monitoring program is necessary to assess the status of bull trout in core areas in all RCAs to determine progress towards meeting interim and overall restoration criteria of this plan.

Achievement of these objectives will be dependent upon the availability of resources to fully implement the plan. Ideally, 100% attainment of the objectives should occur. However, where resources are scarce, restoration efforts will be prioritized to achieve the greatest results based on available resources.

Although the goals and objectives are based on the best current scientific thought, the Bull Trout Restoration Team acknowledges that there remain sources of uncertainty about the habitat requirements and population dynamics of bull trout. This uncertainty may necessitate the goal or objectives being modified over time to reflect changes in current knowledge about bull trout.

If met, the above objectives will result in the protection of existing populations represented by core areas, expansion and connectivity of some of those populations to enhance long-term persistence, connectivity of several RCAs to enable full migratory capacity, and a monitoring program to assess success. To meet these objectives and achieve the overall restoration goal, it will be necessary to achieve specific restoration criteria. Meeting these criteria in a timely manner will require planning and prioritizing actions and locations. It is anticipated that the best way to do this will be to develop RCA management/restoration plans that identify specific threats, actions to address threats, and prioritize those actions. These plans could be expanded versions of existing status reports that include more site-specific descriptions of restoration opportunities.

Restoration Criteria:

The criteria below represent a desired future condition for bull trout by the State of Montana to ensure sufficient abundance and distribution to allow recreational utilization. Achievement of these criteria will require cooperation and resources of all entities involved in bull trout conservation. No single agency or individual can, or should accomplish them alone.

For purposes of this restoration plan, bull trout will be considered restored in the Kootenai and Clark Fork River basins when the following criteria are met.

1. Stable to increasing populations, as defined in the monitoring protocol developed per Objective 4, are documented in at least 67% of all core areas (pending completion of the

monitoring plan) by not later than 2014 in each of the RCAs according to established monitoring criteria. The required percentage of populations with stable to increasing populations and the target date will be finalized as part of the monitoring plan that will be developed per Criteria 3 below, and may change based on that analysis. The technical rationale for the percentage and target date will be included in the monitoring plan. If a monitoring plan is not developed, the default will remain 67%. The monitoring period could be reduced if modeling and statistical analysis completed per Criteria 3 indicate doing so would be appropriate, or if other monitoring indices are used in accordance with monitoring guidelines that will be established. Such indices could include juvenile abundance estimates, age/size class structure, or some other statistically valid index or combination of indices. Once a core area or RCA reaches its restoration goal, carefully monitored fishing should be allowed in that RCA.

2. Potential opportunities for fish passage (including fish ladders, trap and haul, etc.) need to be evaluated and pursued at Milltown, Thompson Falls, Cabinet Gorge, Noxon, and other dams as warranted. Evaluation of such passage opportunities is to be completed within 10 years after this plan is finalized. If determined feasible, passage should be incorporated into normal management and dam operation procedures. If not feasible, the rationale and analysis showing why such passage is not feasible must be documented.

3. A population monitoring plan is to be developed by not later than the end of 2002 outlining the types of monitoring that is to be done in each RCA to meet the above objectives, assess the status of bull trout within each, and to measure success towards achieving restoration criteria described above. Unless recommended differently by the population monitoring plan, interim population monitoring should be implemented at least according to the following schedule, if not sooner, to measure success towards meeting Criteria 1 above:

   - Population index monitoring should be occurring in at least 40% of the core areas of each RCA by not later than 2002.
   - Population index monitoring should be occurring in at least 50% of the core areas of each RCA by not later than 2004.
   - Population index monitoring should be occurring in at least 67% of the core areas of each RCA by not later than 2006.

Proposed Actions to Restore Bull Trout

The Restoration Plan recommends nearly 100 possible actions to conserve and restore bull trout populations in Montana (Appendix E). Possible actions to achieve these restoration goals/objectives are grouped into four general categories: 1) fisheries management, 2) habitat management, 3) genetics/population management, and 4) education and administration. Restoration efforts within individual watersheds must therefore address specific causes of decline

in each of these categories (fisheries, habitat, population management, and education) that apply to the watershed, particularly as they pertain to core and nodal areas. Recommendations to address threats to bull trout populations and achieve restoration have been developed as part of this plan. Following these recommendations, where applicable, should remove many of the threats affecting bull trout, and should meet restoration goals/objectives for bull trout throughout Montana.

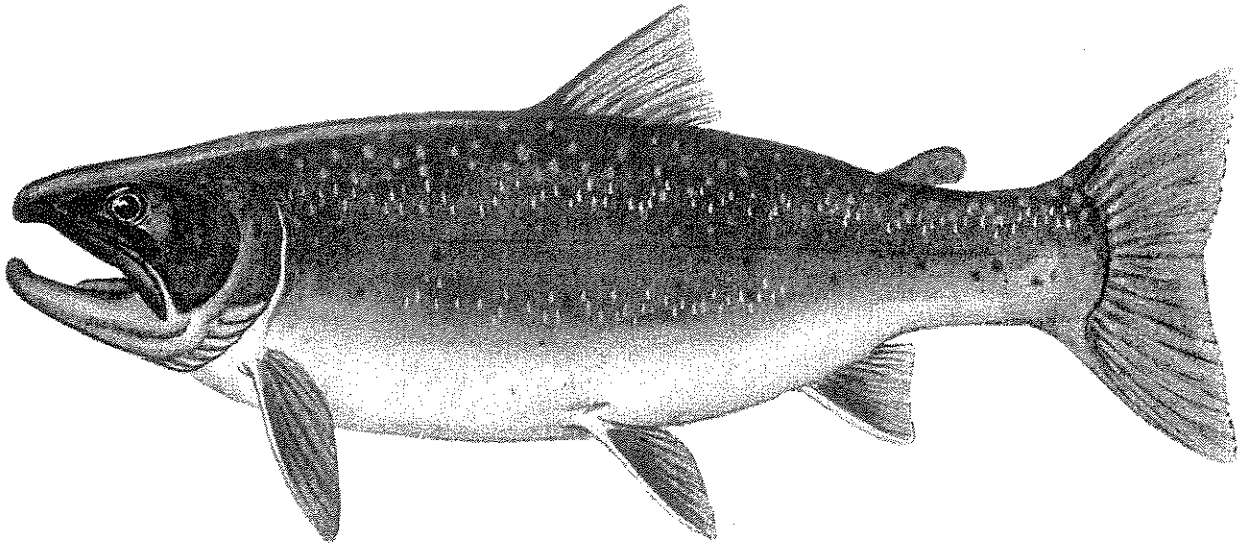
Restoration of bull trout in Montana requires addressing a variety of very complex, intertwined issues - some of which are policy-type issues and some of which are identifiable, measurable, on-the-ground issues; some of which must be addressed at a statewide level, and others that should be addressed at a local level or watershed level. Therefore, implementation of this plan must occur simultaneously at all levels - local, state, and federal, depending on their interest, agreements, mandates, and missions. Watershed groups (groups of citizens and agency representatives who work together to help bull trout in specific drainages) and management agencies working in conjunction with watershed groups will implement restoration actions outlined in this restoration plan. Where watershed groups do not form or do not adequately implement conservation strategies, management agencies shall fulfill their legal and regulatory responsibilities.

The restoration plan anticipates a variety of actions occurring throughout the range of bull trout in Montana, depending on available resources, local interest, and agency mandates. In many locations, resources are available for restoration activities for only that specific location, such as hydro dam mitigation in the Lower Clark Fork, Hungry Horse and Libby Dam mitigation, Kerr Dam mitigation, and the natural resource damage settlement in the Upper Clark Fork. In the instances where there are no earmarked resources, this plan relies on a strategy that will place priority on those restoration/conservation actions and areas that are currently in the most recoverable condition and which offer the greatest chance for success. In this way, the strongest populations will be preserved, and efforts will then build on that success to recover additional populations. Implementation of this plan should result in restoration of bull trout in Montana, as well as enhancement of other species of native fish, and the aquatic habitat upon which they depend. It is nonbinding, and relies on voluntary implementation by landowners, land managers, and local watershed groups.

How To Use This Plan

This plan is comprised of four main components: 1) background information on bull trout and the development of this plan, 2) a restoration goal, restoration objectives, and restoration criteria, 3) possible recommendations to achieve restoration, and 4) an implementation section. Additional technical information is contained in appendices. Readers should first thoroughly read this restoration plan to become familiar with it and its overall objective and purpose. Individuals or agencies contemplating land use, planning, or management activities within the range of bull trout should then review Appendix E - the narrative outline of possible actions to restore bull trout to ensure those activities are compatible with restoration of bull trout. Much of the specific information referenced in this plan and the narrative outline is contained in technical

reports prepared by the Scientific Team and referenced in the appendices. A tear-out order form for those reports is contained on the last page of this document.



RESTORATION PLAN FOR BULL TROUT
in the
CLARK FORK RIVER BASIN and KOOTENAI RIVER BASIN, MONTANA

PURPOSE

The purpose of this document is to provide a strategy to reverse or halt the decline of bull trout populations in western Montana, as well as to provide general guidance for conservation and protection of those populations that are stable or increasing. Its approach is to conserve the best remaining populations, and restore degraded or extirpated populations. This document is intended to guide State restoration efforts and complement federal conservation and recovery processes. It is intended to be used by management agencies, watershed groups, and private landowners as a reference to conserve and recover bull trout throughout western Montana. Where not already covered by existing processes, it is intended that conservation objectives and strategies contained in this plan be adopted and incorporated into other ongoing planning and conservation processes occurring throughout the range of bull trout in Montana, such as the Interior Columbia Basin Ecosystem Management Plan and forest planning processes. It is also intended that this plan be consistent with the overall federal recovery plan for bull trout.

The foundation of this strategy is a series of documents prepared by the Montana Bull Trout Scientific Group. These documents include status reports for 12 bull trout restoration/conservation areas (RCAs) in Montana (Rock Creek is included in the Upper Clark Fork RCA Status Report). Additionally, the Scientific Group has prepared reports on three of the most significant issues in bull trout restoration: the relationship between land management activities and habitat requirements of bull trout (MBTSG 1998); removal or suppression of introduced species (MBTSG 1996g); and the use of fish stocking in bull trout restoration (MBTSG 1996h). An additional status report for the one bull trout population in Montana east of the Continental Divide, the Oldman River RCA, was prepared by the Saint Mary, Belly, Waterton International Resource Team. This restoration plan covers those populations in western Montana within the Columbia River basin, and therefore does not contain specific

provisions for the Oldman River RCA. However, many of the conservation actions put fourth in this plan also apply to the Oldman River Restoration/Conservation Area.

INTRODUCTION

Bull trout (*Salvelinus confluentus*) are native to the upper Columbia River basin in northwest Montana. These fish have very specific habitat requirements generally described as the four C's - clean, cold, complex, and connected. These include clean, cold water; in-stream and overhead cover; gravelly stream bottoms with low sediment levels; and complex stream channels. Due to numerous factors, including disruptive land management practices, expansion of introduced fish (Shafland and Lewis 1984), non-sustainable harvest, and loss of habitat connectivity, bull trout have declined, and are now widely considered an imperiled species (Howell and Buchanan 1992; Thomas 1992; Rieman and McIntyre 1993; Lee et al. 1997; Rieman et al. 1997). Lee et al. (1997) suggest that bull trout populations in the upper Columbia River basin have declined by more than 50%. Bull trout are considered a Species of Special Concern by the Montana Department of Fish, Wildlife and Parks (FWP) and the Montana Chapter of the American Fisheries Society, and have been listed as threatened under the Endangered Species Act by the U.S. Fish and Wildlife Service (USFWS 1998; USFWS 1999).

Slobodkin (1986) reported that the likelihood of extinction is minimal for populations that are numerically large, with species that have a long breeding season, if the adults complete many breeding cycles, if the migratory rate between populations is relatively high, and if the species is not impacted by interspecific competition. Bull trout have a relatively short breeding season; now have numerous barriers to migration; the migratory rate between populations appears to be low (Kanda et al. 1997); and they are subject to hybridization with brook trout (Leary et al. 1983; 1993) and interspecific competition from brook trout, lake trout, and brown trout. Thus, they are more prone to extinction without implementation of immediate and long-term conservation and restoration measures.

In response to increasing concern about declining bull trout populations, the State of Montana initiated this bull trout restoration planning effort. Where resources are not already specifically allocated towards bull trout conservation, this restoration plan relies on a strategy

that places priority on those areas that are in the most recoverable condition, and that offer the greatest chance for success. In this way, the strongest populations will be preserved, and efforts will then build on that success to recover additional populations. Implementation of this plan should result in restoration of bull trout in Montana, as well as enhancement of other species of native fish, and the aquatic habitat upon which they depend. Other plant and animal species that depend upon a healthy aquatic and riparian ecosystem should also benefit from successful implementation of this plan.

COLLABORATIVE ARRANGEMENTS

Restoration Team

In 1993, following a facilitated roundtable discussion convened by Governor Marc Racicot to discuss the need for creating and implementing a bull trout restoration plan in Montana, an interdisciplinary Montana Bull Trout Restoration Team was appointed. The team was composed of individuals representing the U.S. Fish and Wildlife Service (USFWS), Montana Department of Fish, Wildlife and Parks (FWP), U.S. Forest Service (USFS), Confederated Salish & Kootenai Tribes (CSKT), Plum Creek Timber Company, L.P. (Plum Creek), Montana Department of State Lands (now Montana Department of Natural Resources and Conservation, DNRC), Montana Chapter American Fisheries Society (MCAFS), Bonneville Power Administration (BPA), and the National Wildlife Federation (NWF). This team was chartered by the State of Montana to develop a process to restore bull trout independent of (but possibly complementary to) the Endangered Species Act listing process. The charter for this group deemed it essential that bull trout conservation efforts employ a public participation process that would work closely with various public segments impacted by, and interested in, bull trout restoration (Appendix A).

Scientific Group

One of the Restoration Team's first acts was to appoint a Scientific Group to provide the technical expertise necessary for this restoration planning effort. Members of the group are from

universities, natural resource management agencies, and private industry, but were not chosen to serve as representing any organization or particular constituency.

Early in the restoration planning process, the Scientific Group recommended, for management purposes, that bull trout range in Montana be divided into 11 separate restoration/conservation areas (RCAs) based on patterns of distribution and fragmentation. The Scientific Group then developed status reports for each of the RCAs that describe distribution, risks and a restoration goal (MBTSG 1995a-e, 1996a-f). Rock Creek was later classified as a separate RCA, although its status is described in the Upper Clark Fork RCA status report (MBTSG 1995e). In addition to providing the Restoration Team with status reports for bull trout restoration/conservation areas in Montana, the Scientific Group also prepared three technical reports - *The Role of Stocking in Bull Trout Recovery*, *Assessment of Methods for Removal or Suppression of Introduced Fish to Aid in Bull Trout Recovery*, and *The Relationship Between Land Management Activities and Habitat Requirements of Bull Trout*. The Scientific Group also provides scientific review and recommendations on items that need to be addressed by the Restoration Team or other appropriate entities, and members serve as interim members of the Technical Advisory Committees for review of fish stocking projects and removal or suppression of non-native fish projects which may affect bull trout restoration.

Although members of the Scientific Group may change and the disciplines represented might be broadened, this group will continue to provide technical expertise and oversight to the Restoration Team, its successor Steering Committee, and watershed groups.

Local Watershed Groups

The Restoration Team recommends a watershed group approach utilizing local watershed groups where they exist and where practical to help implement restoration efforts and improve bull trout populations. Each watershed group should address specific problems affecting bull trout in their watershed. They will accomplish this by using this restoration plan, drainage-specific status reports, and the three technical reports (MBTSG 1996g-h, 1998) as the framework for their efforts. Resource management agencies will work with watershed groups, and will

maintain their responsibilities to restore bull trout. This approach will continue to be modified and adapted for each basin.

Because most bull trout habitat in the South Fork of the Flathead River drainage is within the boundaries of land administered by the USFS, and much of it is designated as wilderness, the South Fork Flathead Conservation Agreement Working Group was established. In 1996, the group developed a South Fork of the Flathead Conservation Agreement. The agreement was signed in May 1997 by representatives from the U.S. Fish and Wildlife Service, Bonneville Power Administration, Bureau of Reclamation, U.S. Forest Service, Confederated Salish and Kootenai Tribes, and Montana Department of Fish, Wildlife and Parks. The objectives of the Agreement are to 1) ensure proactive involvement of concerned agencies/entities in addressing factors affecting bull trout, 2) facilitate interagency communication and coordination for the identification, evaluation and resolution of factors affecting bull trout, and 3) provide a fishable population of bull trout in the South Fork drainage. As monitoring of the South Fork bull trout population continues, criteria developed by the South Fork Conservation Agreement Working Group will be used to determine the conditions under which a fishing season for bull trout can be reestablished.

In most RCAs, watershed or working groups will help develop local conservation strategies, as well as help implement conservation activities associated with restoring bull trout. The role of these groups is further described in the Implementation section of this plan. Where watershed groups do not form or do not adequately implement conservation strategies, management agencies shall fulfill their legal and regulatory responsibilities.

NATURAL HISTORY

Taxonomic Classification

Bull trout are members of the family Salmonidae. Although the char native to Montana were historically referred to as Dolly Varden or bull trout, they were formally described as bull trout in 1978, a species distinct from Dolly Varden, *S. malma* (Cavender 1978). Further investigations using morphological characteristics (Haas and McPhail 1991; Baxter et al. 1997), chromosomal comparisons (Cavender 1984; Phillips and Ihssen 1990), and biochemical genetics

(Pleyte et al. 1992; Crane et al. 1994; Phillips et al. 1994; Baxter et al. 1997; Leary and Allendorf 1997) have supported the species status of the bull trout. Bull trout are mainly an inland species, but may be anadromous when they exist in coastal streams. In contrast, Dolly Varden are mainly a coastal species and often are anadromous. The two species coexist with little hybridization (Baxter et al. 1997; Leary and Allendorf 1997) in drainages in British Columbia and at least as far south as the Puget Sound area of Washington.

Analysis of mitochondrial DNA allowed separation of bull trout into three evolutionary groups: Klamath River, lower Columbia River, and upper Columbia River (Williams et al. 1997). Within the Upper Columbia River, a high level of genetic diversity has been observed, indicating that bull trout populations in this region represent a substantial portion of the remaining genetic variation in the species (Williams et al. 1997). Further analysis indicated that within upper Columbia River drainages there is little genetic variation, but among different drainages within the upper Columbia River basin there is substantial genetic divergence (Kanda et al. 1997). Preservation of the high degree of genetic diversity among populations therefore requires the continued existence of many populations distributed throughout the upper Columbia River region (Kanda et al. 1997). In other words, each drainage seems to harbor its own unique "strain" of bull trout, whose preservation is important to the species as a whole.

Distribution

Bull trout are recognized as occurring in five population segments (Fig. 1) distributed in the states of Washington, Oregon, Nevada, Idaho and Montana, as well as the Canadian provinces of British Columbia and Alberta (Cavender 1978; Haas and McPhail 1991). They are most likely to occur in colder, higher elevation, low to mid-order watersheds with lower road densities (Rieman et al. 1997). Cavender (1978) suggests bull trout originated in the Columbia River system, and their dispersal has followed the deglaciation and climatic changes since the Pleistocene. During this period, migration to streams and rivers could have been facilitated by headwater transfers resulting from ice dams and post-glacial flooding, use of main streams to gain access to upper reaches, and entry into salt water allowing access to coastal streams (Goetz 1989; Bond 1992; Brown 1992).

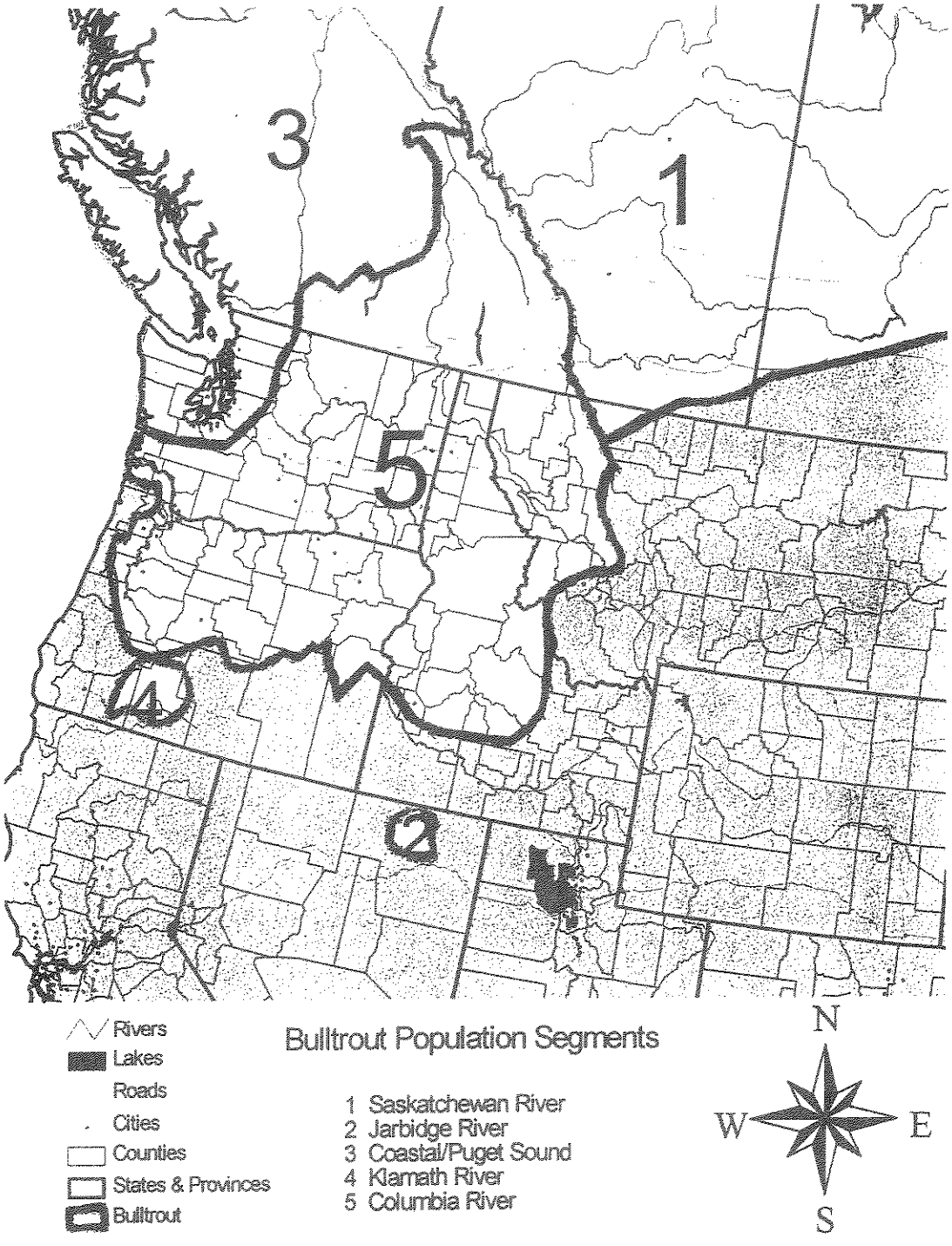


Fig. 1. Overall distribution of bull trout throughout its range.

Bull trout are a fish adapted to cold waters, and their distribution reflects this requirement. Their southern distribution is restricted and limited to headwaters, glacial-fed waters and spring-fed sections of streams (Bond 1992). Over the past 25 years, bull trout have become extirpated in the McCloud River in California and the upper Deschutes, the north Santiam and the Middle Fork of the Willamette River in Oregon (Goetz 1989; Rode 1990; Brown 1992; Ratliffe and Howell 1992).

In western Montana, bull trout are found within two major subbasins of the Columbia River basin, the Kootenai and the Clark Fork drainages (Fig. 2), as well as in the Saskatchewan River drainage east of the Continental Divide. Within these subbasins, they are found in several major river drainages including the Blackfoot, Clark Fork, Swan, Flathead, and Kootenai Rivers. Both the Clark Fork and the Kootenai River populations comprise discrete population segments. The Clark Fork population has been physically separated from the rest of the Columbia River population by Albeni Falls for at least 10,000 years. There were no historical barriers to fish movement upstream of Albeni Falls, thus bull trout in the Pend Oreille/Clark Fork drainage likely formed a large metapopulation. The Kootenai River population has been separated from the Columbia River population for a similar period by Bonnington Falls downstream of Kootenay Lake in British Columbia. Evidence of the separation of these populations includes lack of anadromous salmonids upstream of these falls.

The Clark Fork River population, which includes Lake Pend Oreille and the entire Clark Fork River drainage upstream, was once perhaps the largest metapopulation in the historic range of bull trout. This metapopulation used several major drainages, including the Bitterroot, Blackfoot, Flathead, upper Clark Fork and Rock Creek (Everman 1892). Bull trout from Lake Pend Oreille are known to have migrated upstream past Missoula to spawn, and likely also migrated up the Flathead, Bitterroot and Blackfoot drainages as well.

The Kootenai River population inhabits the Kootenai River and its tributaries, as well as Kootenay Lake and Lake Koocanusa. This population comprises a significant portion of the bull trout known within the upper Columbia River basin. Recent work indicates that the Lake Koocanusa population may be one of the healthier extant populations with over 800 redds counted in 1999 in the Wigwam River, a key spawning tributary that arises in Montana and flows north through British Columbia before entering the river/reservoir.

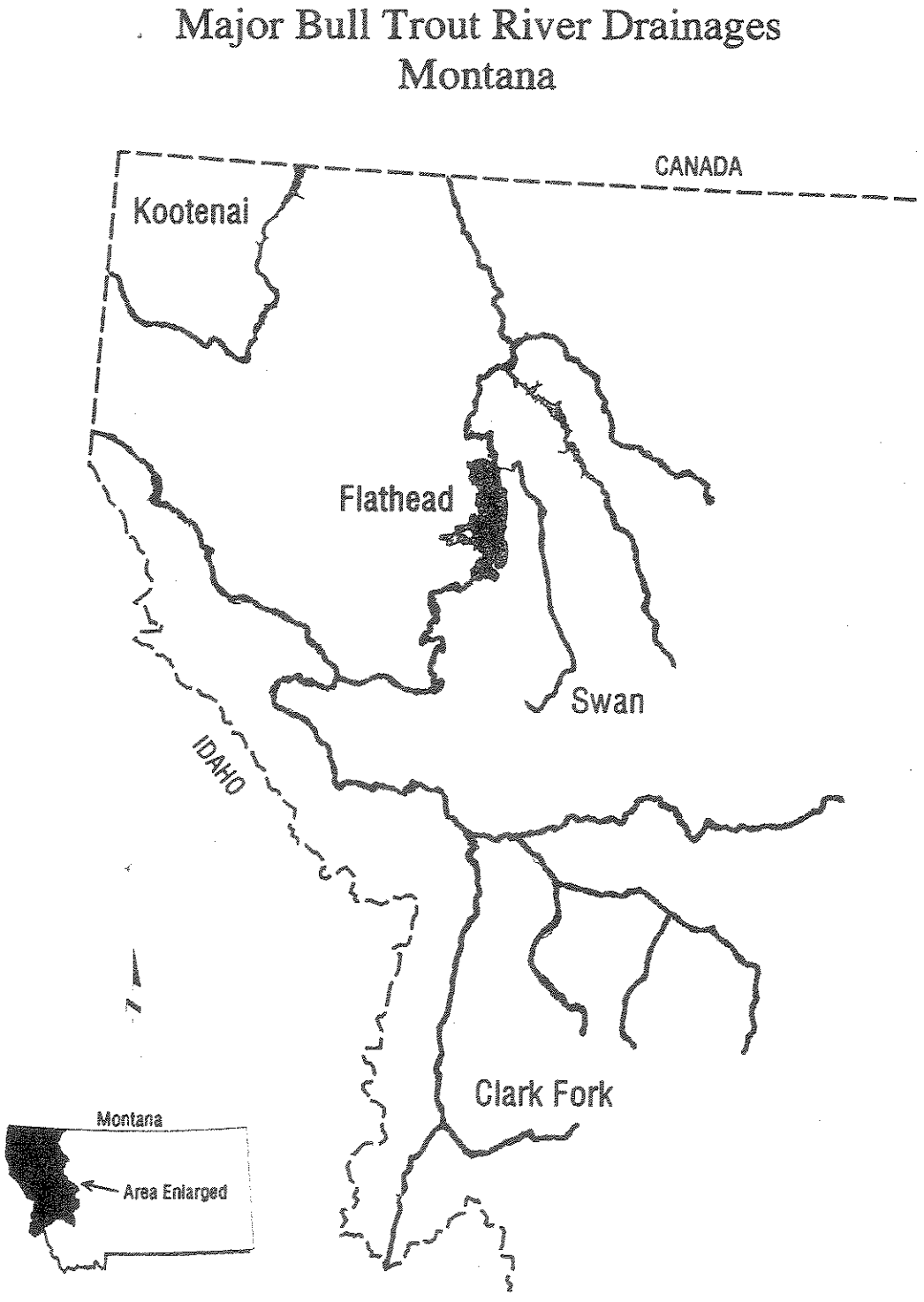


Fig. 2. Map showing major river basins (Clark Fork, Kootenai, Flathead, Swan) in Montana.

Life History and Habitat Requirements

Bull trout are native to streams, rivers, and lakes in northwestern Montana. They are long-lived fish that do not reach breeding age until at least five years of age. Sub-adult and adult bull trout feed primarily on other fish, resulting in their being dubbed the "cannibal of Montana's streams" (Anonymous 1929). Bull trout spawn in the fall, and their eggs remain up to six inches deep in spawning gravels until spring, when the fry emerge. Young bull trout remain in the stream for one to four years, huddled among bottom rocks and other cover. Bull trout grow up to lengths of 37 inches and weights as heavy as 20+ pounds. Sub-adult and adult fluvial bull trout reside in larger streams and rivers and spawn in smaller tributary streams, whereas adfluvial bull trout reside in lakes and spawn in tributaries.

Bull trout may have either a resident or migratory life history. Resident fish usually spend their entire lives in smaller tributaries and headwater streams. Migratory fish spawn and their progeny rear for one to several years in tributary streams before migrating downstream to larger rivers or lakes where they mature and spend most of their adult life. Adults migrate back to their natal tributaries to spawn, apparently with a high degree of fidelity (Swanberg 1996, Kanda et al. 1997; unpublished data). Bull trout also may migrate during the summer to seek colder water and during the winter to seek relatively ice free habitats (Jakober 1995). Resident and migratory bull trout can live together and one life history form can probably give rise to the other.

This variety of life history strategies is important to the stability and persistence of populations, but also complicates restoration and conservation because a diversity of high quality habitats are needed. When individual habitat components are altered, by human or natural events, bull trout populations may be negatively impacted.

The following summary accounts of life history and bull trout habitat requirements were derived from the report *The Relationship Between Land Management Activities and Habitat Requirements of Bull Trout* prepared by the Montana Bull Trout Scientific Group (MBTSG 1998 - Appendix F). More specific details and references are contained in that report.

Spawning

The majority of migratory bull trout spawning in Montana occurs in a small percentage of the total stream habitat available. Spawning takes place between late August and early November, principally in third and fourth order streams. Spawning adults use low gradient areas (less than 2%) with gravel/cobble substrate and water depths between 0.1 and 0.6 meters (4 to 24 inches; avg. = 0.3 m (12 inches)) and velocities from 0.09 to 0.61 m/sec (0.3 to 2.0 ft./sec; avg. = 0.31 m/sec (1.0 ft./sec)). Proximity of cover for adult fish before and during spawning is an important habitat component. Spawning tends to be concentrated in reaches influenced by groundwater, where temperature and flow conditions may be more stable. The relationship between groundwater exchange and migratory bull trout spawning, and the spawning habitat requirements of resident bull trout requires further investigation.

Incubation

Existing studies suggest that successful incubation of bull trout embryos requires cold water temperatures below 8° C (46 ° F), gravel/cobble substrate with high permeability to allow water to flow over incubating eggs, and low levels of fine sediment (sediment particles smaller than 6.35 mm (0.25 inches) in diameter) that smother eggs and fry. Eggs are deposited as deep as 25 cm (10 inches) below the streambed surface, and fry do not emerge until 7 to 8 months later, depending upon water temperature. Spawning adults alter streambed characteristics during redd construction to improve survival of embryos, but conditions in redds often degrade during the incubation period. Mortality of eggs or fry can be caused by scouring during high flows, freezing during low flows, superimposition of redds, or deposition of fine sediments or organic materials that smother the eggs or fry. A significant inverse relationship exists between the percentage of fine sediment in the incubation environment and bull trout survival to emergence. Entombment appeared to be the largest mortality factor in incubation studies in the Flathead drainage. Groundwater influence plays a large role in embryo development and survival by mitigating mortality factors.

Juvenile Rearing in Tributary Streams

Basic rearing habitat requirements for juvenile bull trout include cold summer water temperatures (< 15° C) with sufficient surface and groundwater flows. Warmer temperatures are associated with lower bull trout densities, and can increase the risk of invasion by other species that could displace, compete with, or prey on juvenile bull trout. Juvenile bull trout are generally bottom foragers and rarely stray from cover. They prefer complex forms of cover that include deep pools, large woody debris, rocky stream beds, and undercut banks. High sediment levels and embeddedness can result in decreased rearing densities. Unembedded cobble/rubble substrate is preferred for cover and feeding, and also provides invertebrate production. Highly variable streamflow, reduction in large woody debris, bedload movement, and other forms of channel instability can limit the distribution and abundance of juvenile bull trout.

Subadults and Adults in Tributary Streams

Habitat characteristics that are important for juvenile bull trout of migratory populations (low water temperatures, clean cobble-boulder substrates, and abundant cover) are also important for stream-resident subadults and adults. However, stream resident adults are more strongly associated with deep pool habitats than are migratory juveniles.

Movement and Migration in Tributary Streams

Both migratory and stream-resident bull trout move in response to developmental and seasonal habitat requirements. Migratory individuals can move great distances (up to 156 miles [250 km]) among lakes, rivers, and tributary streams in response to spawning, rearing, and adult habitat needs (Swanberg 1996). Stream-resident bull trout migrate within tributary stream networks for spawning purposes, as well as in response to changes in seasonal habitat requirements and conditions. Open migratory corridors, both within and among tributary streams, larger rivers and lake systems are critical for maintaining bull trout populations.

Subadults and Adults in Large Rivers

Most migratory bull trout remain in tributaries for one year or more before moving into large rivers downstream. After they reach large river habitats, bull trout can remain there for brief periods, or for as long as several years, before either moving into lakes or returning to tributary streams to spawn. During their river residency, bull trout commonly make long-distance annual or seasonal movements among various riverine habitats, apparently in search of foraging opportunities and refuge from warm, low-water conditions in mid-summer and ice in winter. Little is known about these movement patterns among basins, but it is likely that river residency and migratory behavior in each bull trout stock largely reflects local adaptation to the specific array of suitable habitats historically available in the basin. The degree of genetic control of migratory behavior in bull trout is unknown.

Subadults and Adults in Lakes

Lakes and reservoirs are critically important to adfluvial bull trout populations. In six of the 12 bull trout restoration/conservation areas (Flathead, Swan, South Fork Flathead, Upper Kootenai, Lower Kootenai, and Lower Clark Fork), large bodies of standing water form the primary habitat for rearing of subadult migratory bull trout and provide food and cover for fish to achieve rapid growth and maturation. Growth rates of juvenile bull trout increase substantially as they enter large river and lake environments and shift their diet from insects to fish. Despite the importance of lakes and reservoirs, very limited information is available range-wide on habitat use by bull trout in these waters. In general, bull trout appear to be bottom oriented in lakes, but use relatively shallow zones (less than 40 m; 130 ft), provided water temperatures there are less than 15° C (59° F). During summer, bull trout appear to primarily occupy the upper hypolimnion of deep lakes, but forage opportunistically in shallower waters. River/lake transition zones appear to be particularly important habitats. Introduced species, especially lake trout (*S. namaycush*) and Mysis shrimp (*Mysis relicta)* in combination, have been implicated in drastically altering the food web where they occur, which has led to declines or extinction of bull trout in many lakes (McIntyre 1998). Although poorly understood at this time, habitat conditions

in lakes and reservoirs are potentially critical to persistence of migratory bull trout populations and require additional investigation.

Status and Trends

Bull trout are still widely distributed, although declines in abundance, the loss of important life history forms, local extinctions, fragmentation, and isolation of high-quality habitats are apparent throughout the Columbia River basin (Lee et al. 1997, Rieman et al. 1997). Although still widespread, strong or protected populations are less common (Rieman et al. 1997). According to the assessment of aquatic species and resources prepared for the Interior Columbia River Basin Ecosystem Management Plan, areas supporting strong populations of bull trout occur in only six percent of available watersheds (Lee et al. 1997). Many formerly complex, diverse and connected river systems have been transformed into a patchwork of fragmented habitats with isolated populations. This isolation may place the remaining populations at a risk of extinction (Rieman and McIntyre 1993; Lee et al. 1997). Continued loss of habitat associated with detrimental land use practices further threatens remaining bull trout populations (Rieman et al. 1997).

In Montana, bull trout are still widely distributed throughout their historic range, although numbers and distribution have declined during the past century (Everman 1892; Thomas 1992; MBTSG 1995a-e; MBTSG 1996a-f; Peters 1990; Weaver 1997). The Swan River, South Fork Flathead, and upper Kootenai River populations appear to be stable or increasing. Migratory bull trout populations in the Clark Fork, Blackfoot, Flathead, and Bitterroot rivers have suffered large declines in abundance and distribution since European settlement, although intensive restoration efforts in the Blackfoot River drainage appear to have at least stabilized that population.

RESTORATION/CONSERVATION AREAS

Historically, in western Montana bull trout constituted two discrete population segments, the Kootenai and Clark Fork River metapopulations, and a number of isolated or disjunct populations in four major river drainages within these discrete population segments (Table 1). Humans have modified habitat and disrupted stream flows, thermal regimes, and migration routes throughout the bull trout's range in these drainages. This has eliminated connectivity within these major drainages, resulting in smaller fragments between which migration and straying is unlikely or can occur only downstream. Small, isolated populations are much more susceptible to environmental and human-caused threats, and thus have a greatly decreased probability of long-term persistence (Wilcox and Murphy 1985; Slobodkin 1986; Gilpin 1997). Loss of interconnectivity has resulted from migration barriers or habitat changes such as altered thermal regimes or dewatering.

Based on this existing pattern of distribution and fragmentation, and for organizational purposes, the Montana Bull Trout Scientific Group recognized 12 restoration/conservation areas (RCAs) for bull trout in western Montana within the two historic metapopulations (Table 1, Fig. 3). A metapopulation is a collection of geographically distinct populations interconnected by migration and straying. RCAs have been delineated largely due to fragmentation of historically connected systems. Because of fragmetation and loss of interconnectivity, RCAs now essentially function as smaller, individual metapopulations. Within each RCA, there are numerous local populations, each containing numerous individuals. The more connectivity that can be restored within and between these areas, the greater the likelihood of long-term persistence (Gilpin 1997) (Fig. 4).

2 METAPOPULATIONS

have been divided into

12 SMALLER RCAs

consisting of

NUMEROUS POPULATIONS AND CORE AREAS

Table 1. Major river drainages and respective restoration/conservation areas:

Clark Fork Basin

Clark Fork River drainage
- Lower Clark Fork River (downstream from Thompson Falls Dam)
- Middle Clark Fork River (Thompson Falls Dam to Milltown Dam)
- Upper Clark Fork River (upstream from Milltown Dam)
- Rock Creek (tributary to upper Clark Fork River)
- Bitterroot River
- Blackfoot River

Flathead River drainage upstream from Kerr Dam
- Flathead River (North and Middle Fork Flathead River, Flathead Lake)
- South Fork Flathead River (upstream from Hungry Horse Dam)

Swan River drainage
- Swan River (upstream from Big Fork Dam)

Kootenai River Basin

Kootenai River drainage
- Lower Kootenai River (downstream from Kootenai Falls)
- Middle Kootenai River (between Kootenai Falls and Libby Dam)
- Upper Kootenai River (upstream from Libby Dam)

Fig.3. Map showing location of Restoration/Conservation Areas in Montana.

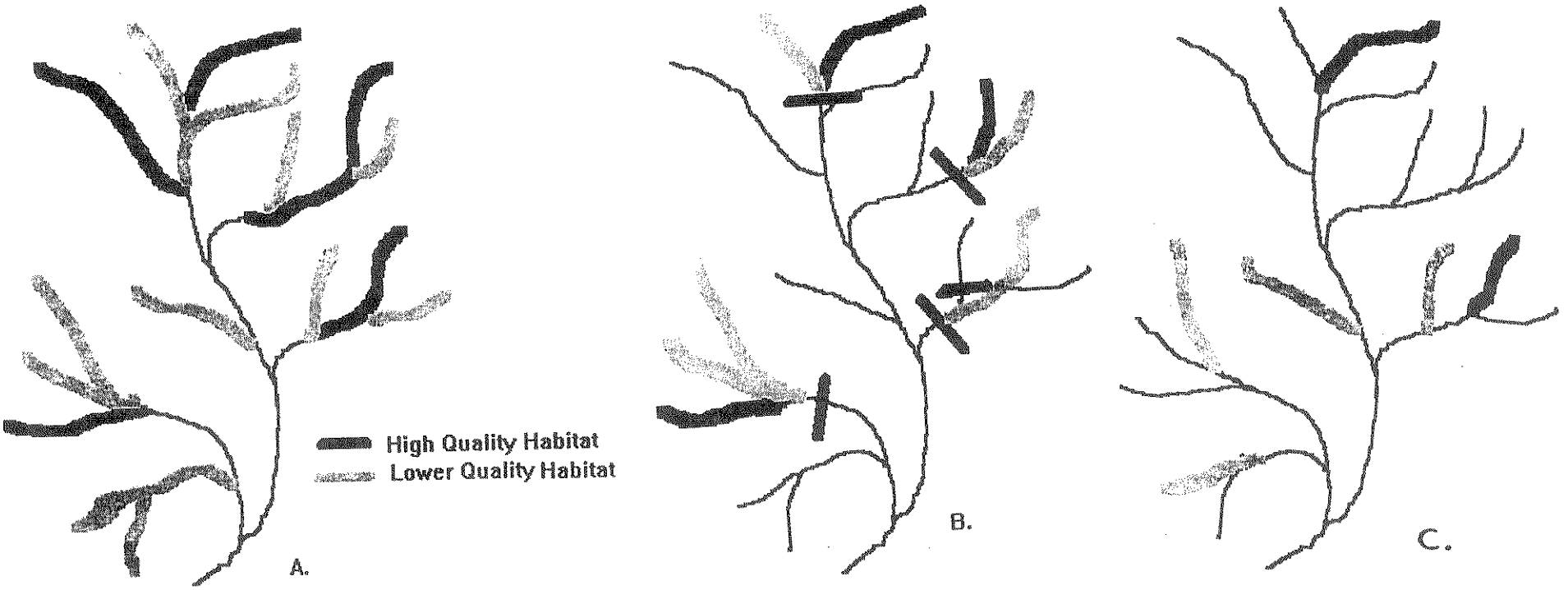


Fig. 4. Hypothetical example of a metapopulation (A). Each shaded drainage represents an individual metapopulation, which is a collection of localized populations that are geographically distinct, yet are genetically interconnected through movement of individuals among populations. Areas with higher habitat quality and strong populations (dark shading) provide surplus production and dispersing individual bull trout. Lighter shading represents lower quality habitat that still supports bull trout, but with little or no dispersal. If passage is blocked between populations (B), then dispersal and genetic exchange between most populations are stopped. Similarly, if the number of populations become greatly reduced (C), exchange between populations becomes less likely, and all populations become more susceptible to extirpation (adapted from Rieman and McIntyre 1993).

Separate status reports for each of the RCAs west of the Continental Divide have been prepared, except Rock Creek, which is included in the Upper Clark Fork report (MBTSG 1995a-e; MBTSG 1996a-f). Each status report describes historic distribution, current distribution, risks to bull trout in each watershed, and a restoration or conservation goal for each RCA. Status reports are the collaborative effort of biologists, hydrologists, and other scientists, and have drawn on information and research from a variety of sources in each management area. They include both quantitative and qualitative assessments based on the best available information, as well as professional judgement.

The Montana Bull Trout Scientific Group conducted a subjective process to identify risk factors to restoration in each RCA. Twenty-four different risk factors to restoration of bull trout in Montana were identified by the Scientific Group in the RCAs (MBTSG 1995a-e; MBTSG 1996a-f), and are summarized in Appendix B. These include threats from habitat alteration, fisheries management, barriers, introduced species, environmental instability, and demographic variables such as abundance, trend, and life forms. The primary threats to restoration of bull trout identified in the status reports for individual RCAs can be classified into two general areas: 1) effects of land management activities and 2) effects of fisheries management (legal and illegal) activities, including introduction and management of nonnative species and species management priorities (Appendix B). A weighted sum rank of the risks identified forestry practices as the greatest risk to restoration of bull trout, ranking as a very high risk threat in all RCAs. Legal fish introductions (historic and potential future) ranked closely behind, followed by illegal fish introductions, illegal harvest, dams, and agriculture/dewatering (Appendix B). Specific potential effects of land management activities on bull trout are described in detail in MBTSG (1998), as well as in USFWS (1997b). Specific potential effects of introduced species on bull trout are summarized in Appendix G and USFWS (1997b). Status reports will be updated with the most current information at least every five years to reflect current conditions and restoration progress.

Core Areas

Within each RCA, core and nodal habitats have been identified for bull trout (Appendix C). Core areas are watersheds, including tributary drainages and adjoining uplands, used by migratory bull trout for spawning and early rearing, and by resident bull trout for all life history requirements (Figs. 5-16). Core areas typically support the strongest remaining populations of spawning and early rearing bull trout in an RCA, and are usually in relatively undisturbed habitat. Nodal habitats are those used by sub-adult and adult bull trout as migratory corridors, rearing areas, overwintering areas, and for other critical life history requirements.

Restoration or conservation goals have been developed by the Scientific Group for each of the RCAs through a subjective process based on the best available scientific information and professional judgement. Emphasis of the individual RCA goals is to maintain the population genetic structure throughout the watershed, establish or maintain self-reproducing migratory populations of bull trout in all identified core area streams, establish or maintain connectivity within and among core areas and RCAs, and establish a goal of a minimum number of redds and individuals distributed throughout each watershed (Appendix D). These goals are considered a minimum for maintenance of long-term persistence of bull trout and genetic variation in each individual RCA, except in the Flathead RCA, where an extensive long-term data set exists, and the goal is set at a higher standard than what is thought to be required for long-term persistence. The individual goal for the Flathead RCA is based on the known potential of that watershed, determined through extensive monitoring, and is therefore at a higher standard than the other RCA goals. Fulfilling all of the individual RCA restoration goals is not required to consider the population restored.

Fig. 5. Map of the Upper Clark Fork Restoration/Conservation Area depicting core areas and nodal habitat.

Fig. 6. Map of the Rock Creek Restoration/Conservation Area depicting core areas and nodal habitat.

Fig. 7. Map of the Blackfoot Restoration/Conservation Area depicting core areas and nodal habitat.

Fig. 8. Map of the Middle Clark Fork Restoration/Conservation Area depicting core areas and nodal habitat.

Fig. 9. Maps of the Bitterroot Restoration/Conservation Area depicting core areas and nodal habitat.

Fig. 10. Map of the Lower Clark Fork Restoration/Conservation Area depicting core areas and nodal habitat.

Fig. 11. Map of the Flathead Restoration/Conservation Area depicting core areas and nodal habitat.

Fig. 12. Map of the South Fork Flathead Restoration/Conservation Area depicting core areas and nodal habitat.

Fig. 13. Map of the Swan Restoration/Conservation Area depicting core areas and nodal habitat.

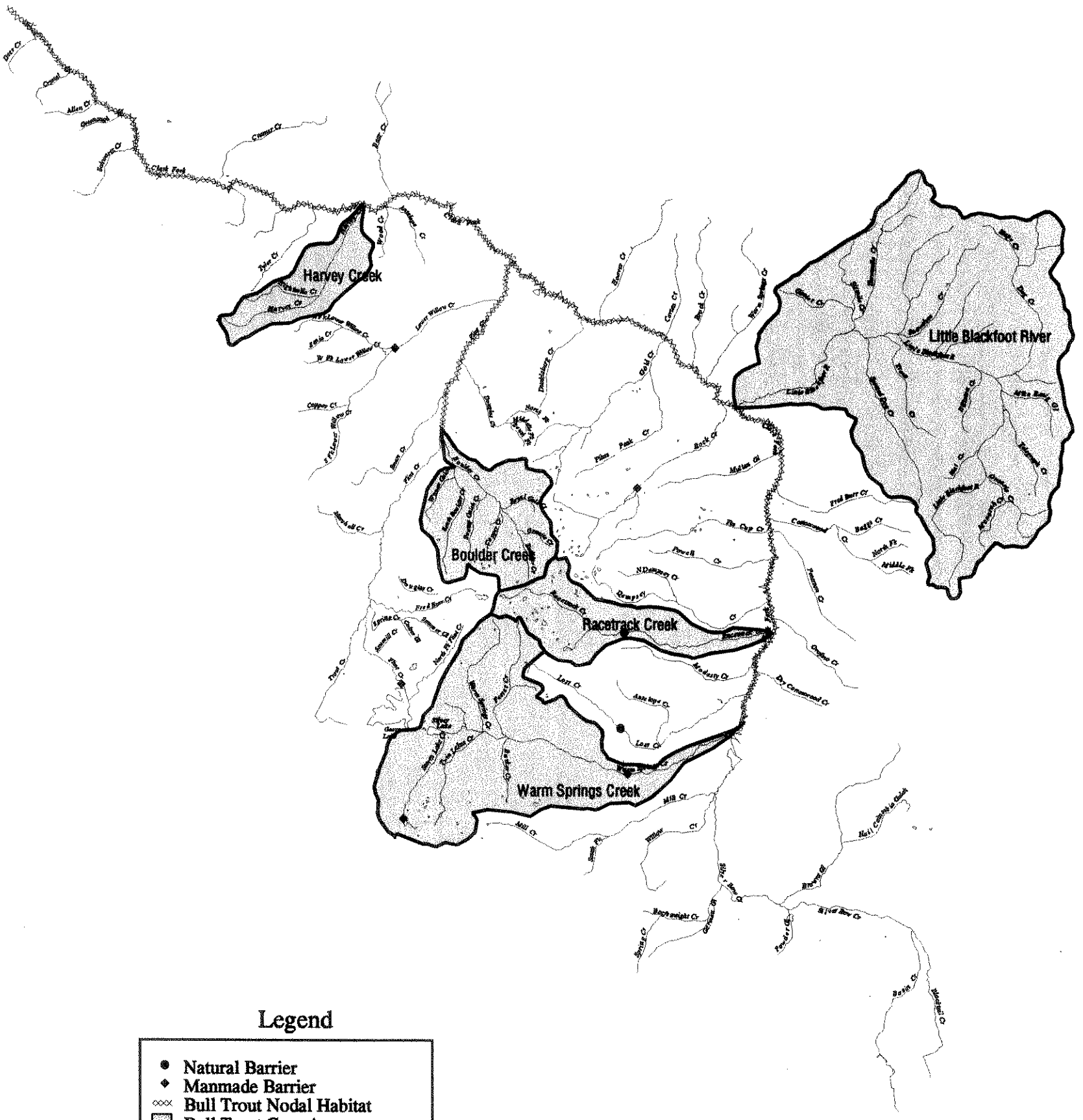
Fig. 14. Map of the Upper Kootenai Restoration/Conservation Area depicting core areas and nodal habitat.

Fig. 15. Maps of the Middle Kootenai Restoration/Conservation Area depicting core areas and nodal habitat.

Fig. 16. Map of the Lower Kootenai Restoration/Conservation Area depicting core areas and nodal habitat.

Bull Trout Core Habitat & Nodal Areas

Upper Clark Fork



Legend

- Natural Barrier
- Manmade Barrier
- Bull Trout Nodal Habitat
- Bull Trout Core Area
- Bull Trout Disjunct Population

Map produced by:
Jeffrey Hutten
Montana Fish, Wildlife & Parks
Information Services Unit
490 N. Meridian Road, Kalispell, MT 59901
406-751-4571

Bull trout distribution, core areas, and barriers information based on data collected up to November, 1999. Base layers from the Natural Resource Information System at the Montana State Library and digitized @ 1:100,000.

April 19, 2000

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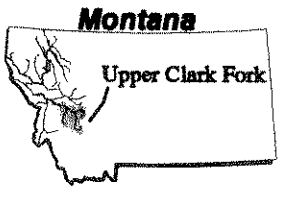
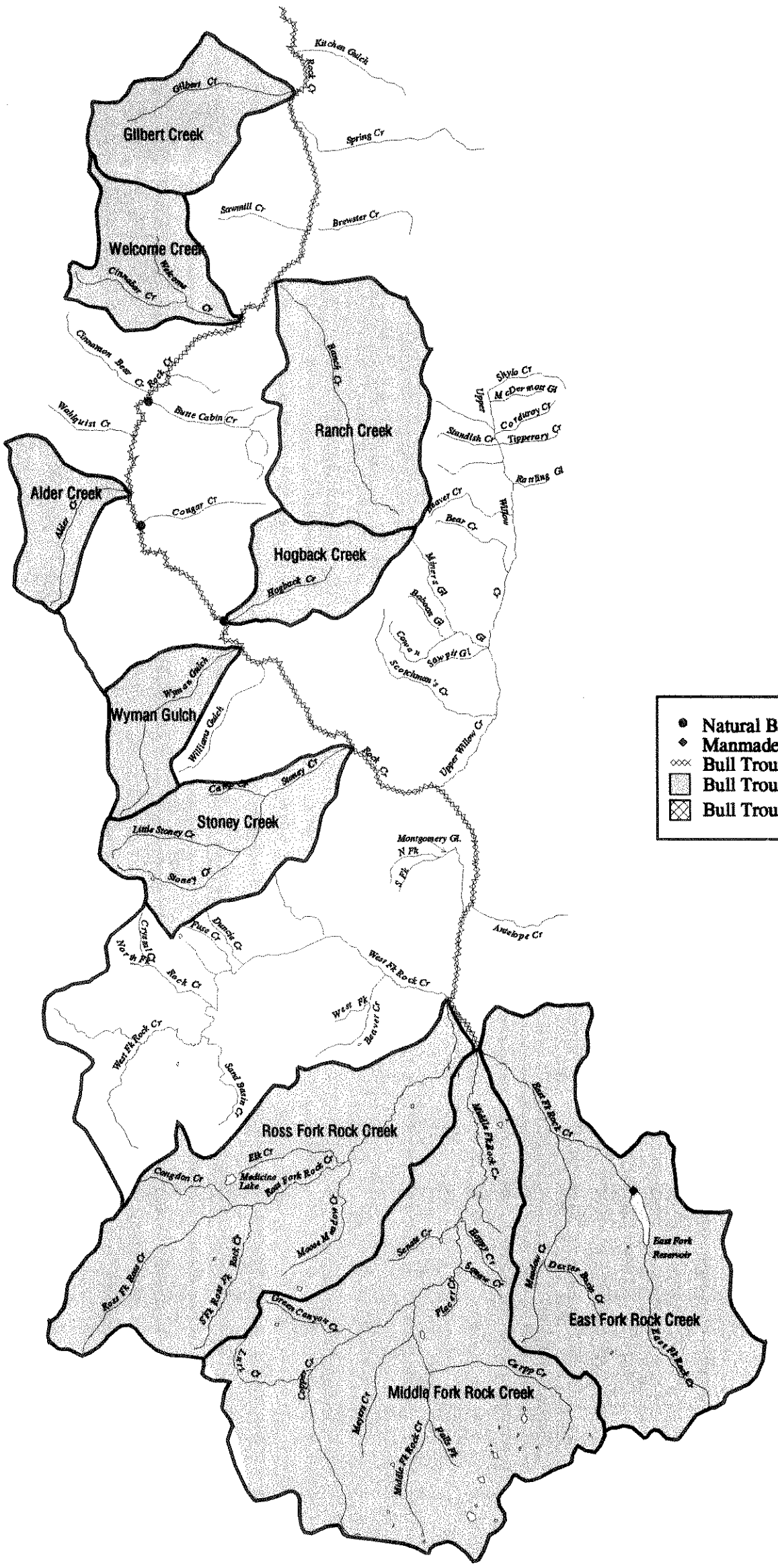
Miles

Albers Conic Equal-Area Projection



Bull Trout Core Habitat & Nodal Areas

Rock Creek



Legend

- Natural Barrier
- Manmade Barrier
- Bull Trout Nodal Habitat
- Bull Trout Core Area
- Bull Trout Disjunct Population

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April 18, 2000

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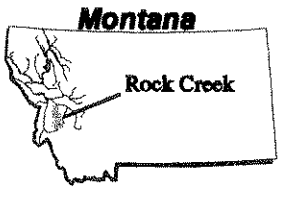
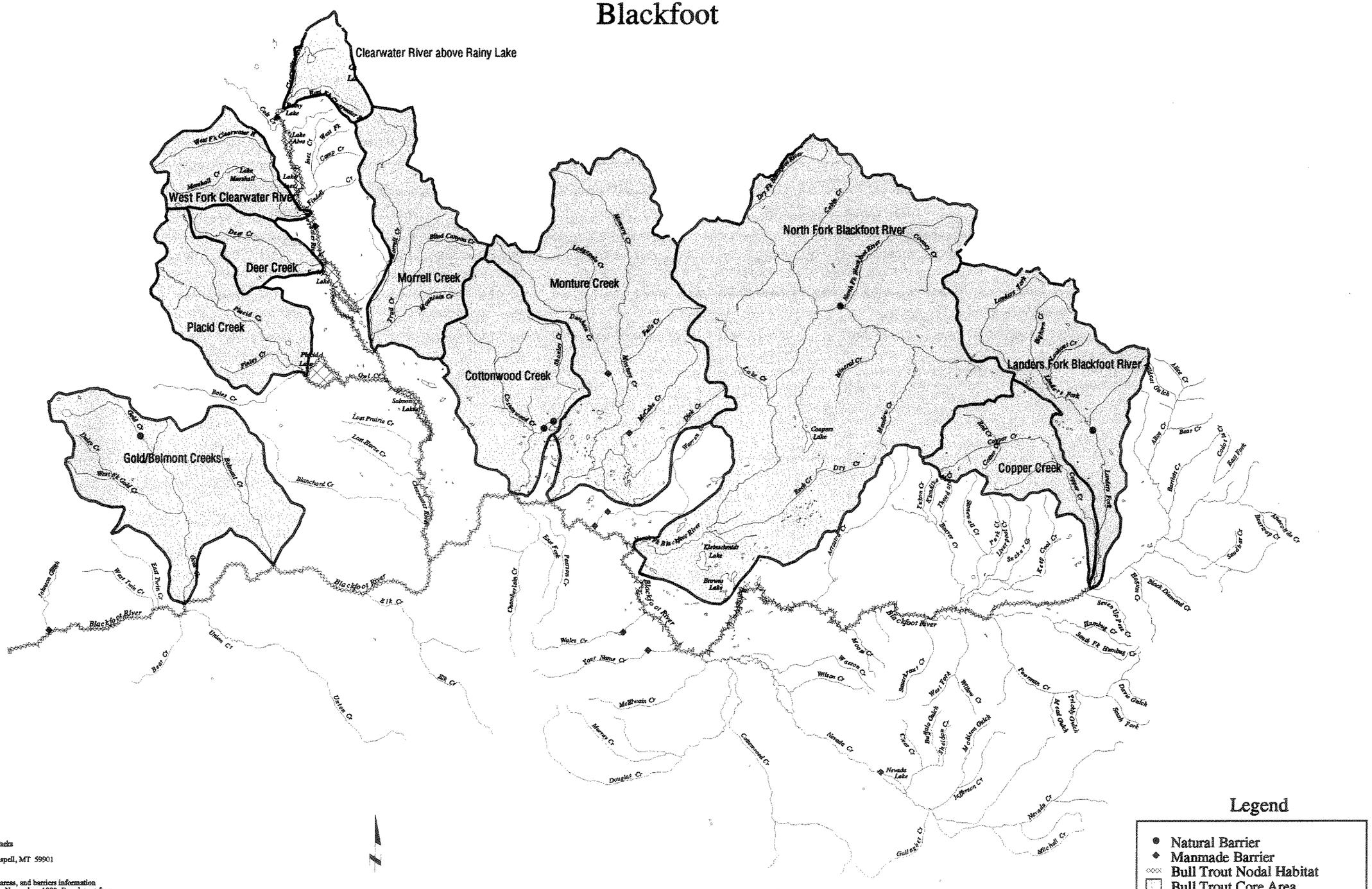
Miles

Albers Conic Equal-Area Projection



Bull Trout Core Habitat & Nodal Areas
Blackfoot



Legend

- Natural Barrier
- Manmade Barrier
- Bull Trout Nodal Habitat
- Bull Trout Core Area
- Bull Trout Disjunct Population

0 5 10

Miles

Albers Conic Equal-Area Projection

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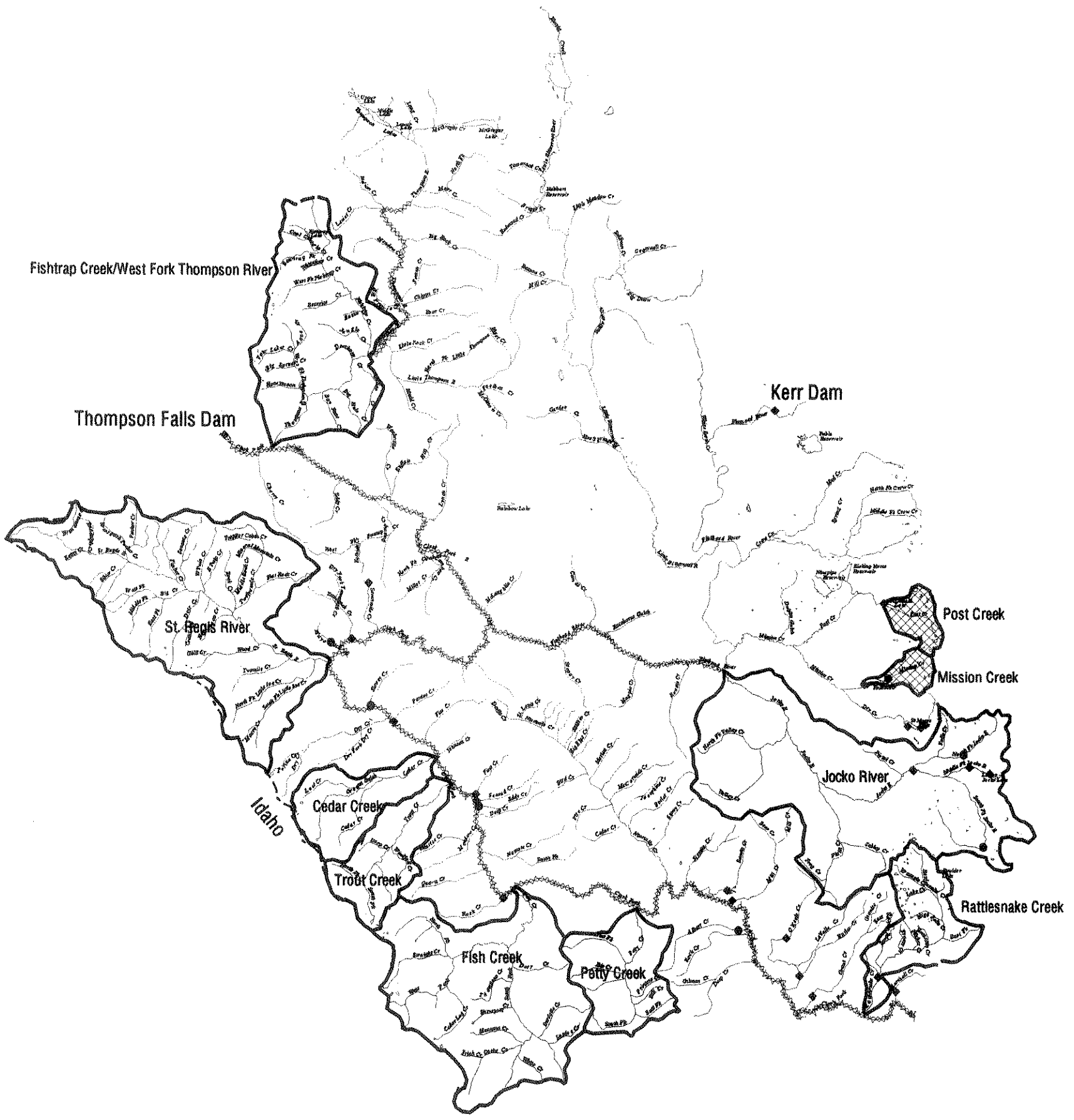
Bull Trout Core Habitat & Nodal Areas

Middle Clark Fork



Legend

- Natural Barrier
- Manmade Barrier
- Bull Trout Nodal Habitat
- Bull Trout Core Area
- Bull Trout Disjunct Population

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Bull trout distribution, core areas, and barriers information based on data collected up to November, 1999. Base layers from the Natural Resource Information System at the Montana State Library and digitized @ 1:100,000.

April 19, 2000
/fish/bulltrout/nodecore5.cmp

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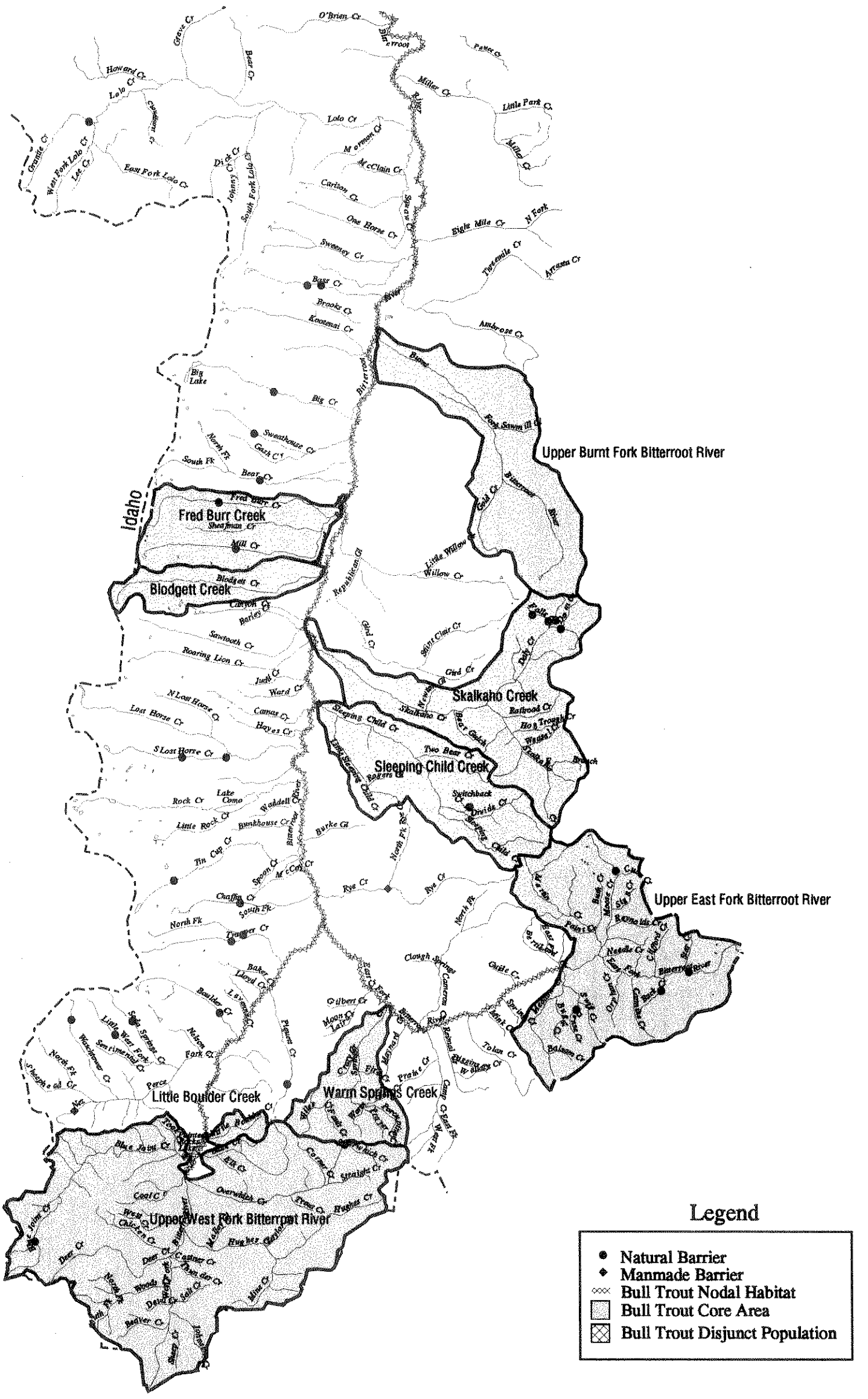
Albers Conic Equal-Area Projection

Montana

Middle Clark Fork

Bull Trout Core Habitat & Nodal Areas

Bitterroot



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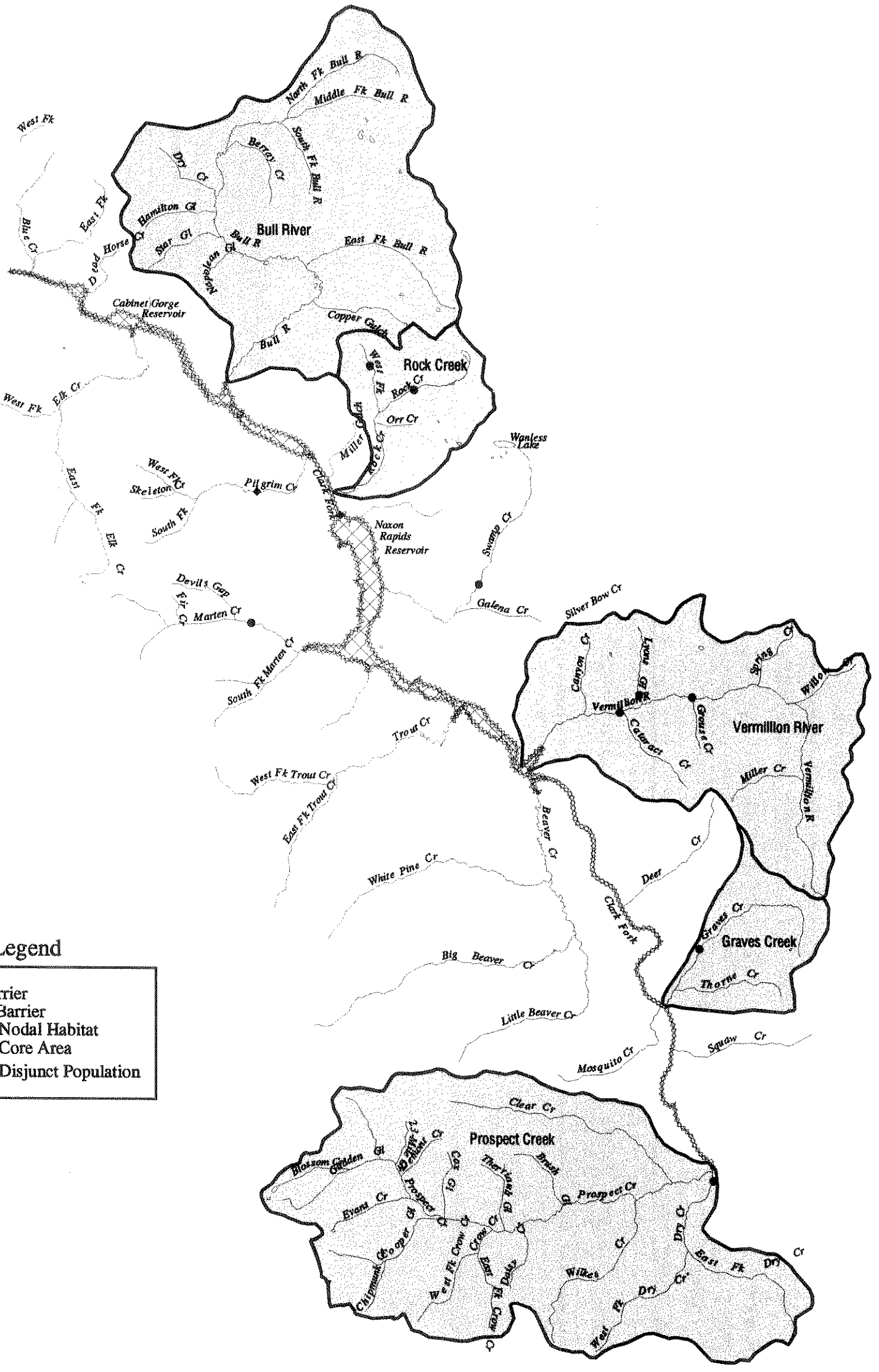
Bull Trout Core Habitat & Nodal Areas

Lower Clark Fork



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Bull trout distribution, core areas, and barriers information based on data collected up to November, 1999. Base layers from the Natural Resource Information System at the Montana State Library and digitized @ 1:100,000.

April 19, 2000

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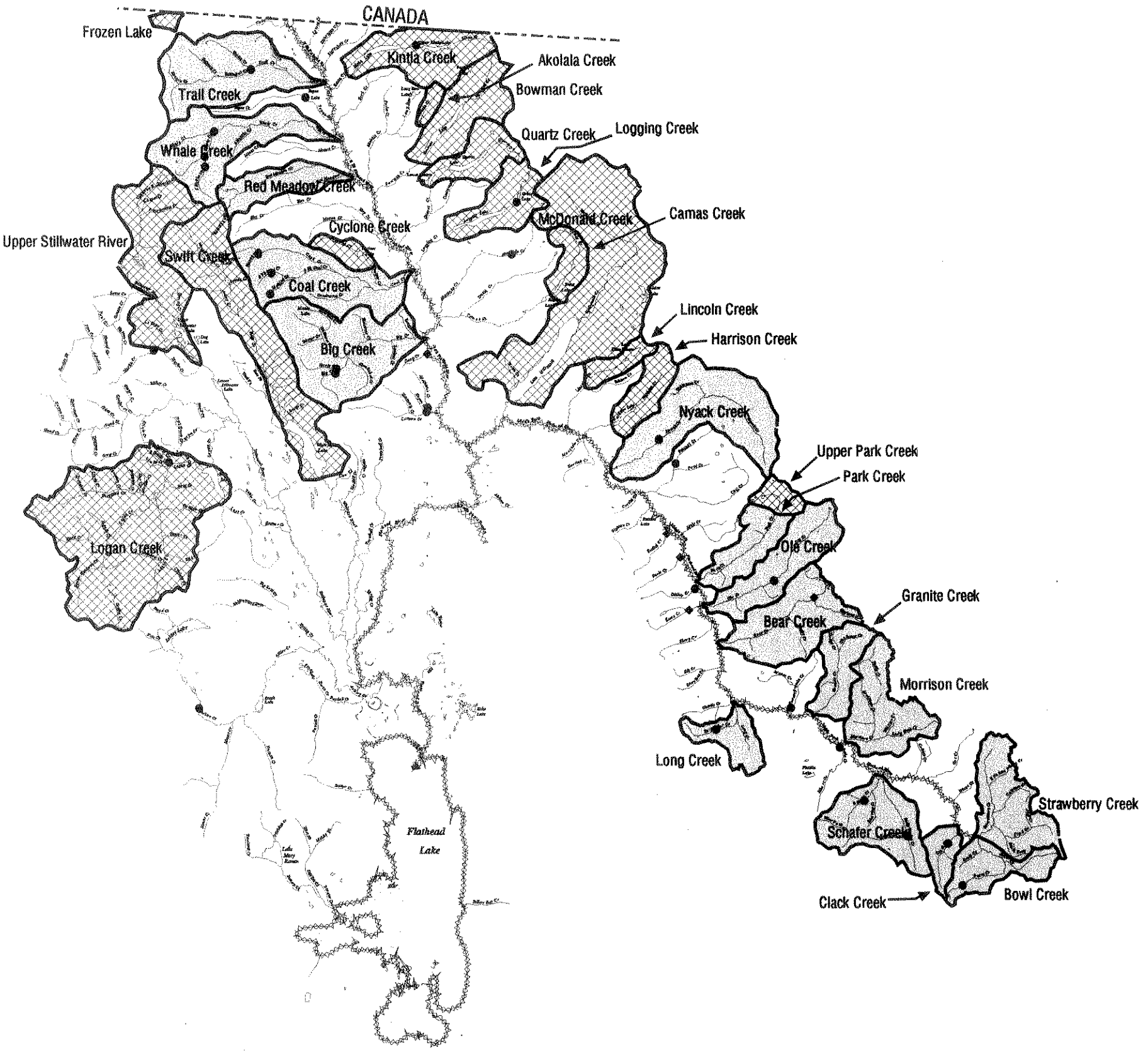
Albers Conic Equal-Area Projection

Bull Trout Core Habitat & Nodal Areas

Flathead



Legend

- Natural Barrier
- Manmade Barrier
- Bull Trout Nodal Habitat
- Bull Trout Core Area
- Bull Trout Disjunct Population

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Bull trout distribution, core areas, and barriers information based on data collected up to November, 1999. Base layers from the Natural Resource Information System at the Montana State Library and digitized @ 1:100,000.

April 21, 2000

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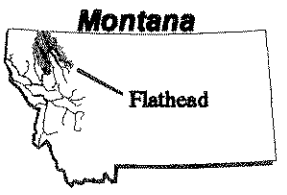
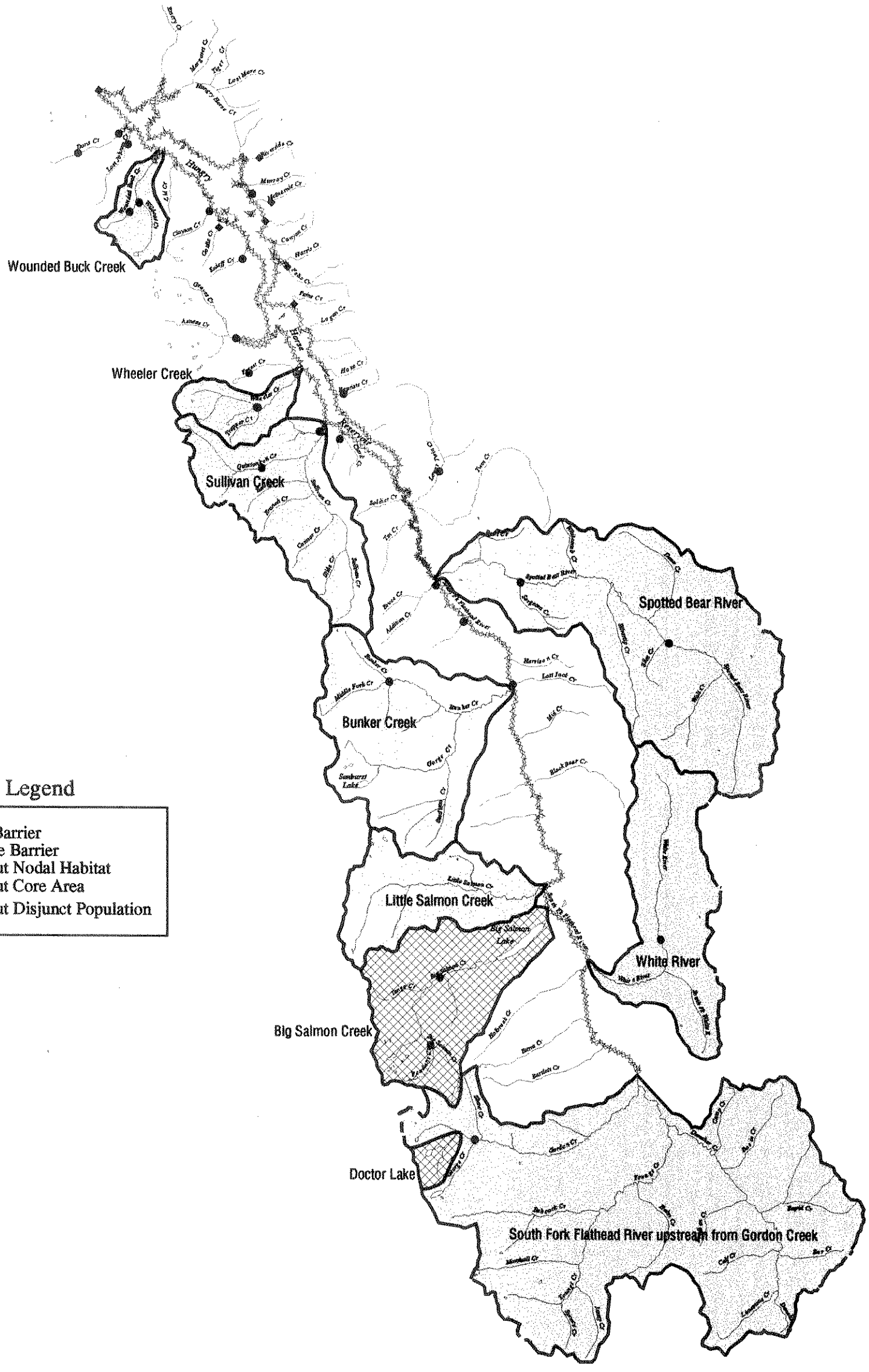
Miles

Albers Conic Equal-Area Projection



Bull Trout Core Habitat & Nodal Areas

South Fork Flathead



Legend

- Natural Barrier
- Manmade Barrier
- Bull Trout Nodal Habitat
- Bull Trout Core Area
- Bull Trout Disjunct Population

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Bull trout distribution, core areas, and barriers information based on data collected up to November, 1999. Base layers from the Natural Resource Information System at the Montana State Library and digitized @ 1:100,000.

April 21, 2000

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Montana Fish, Wildlife & Parks

0 5 10

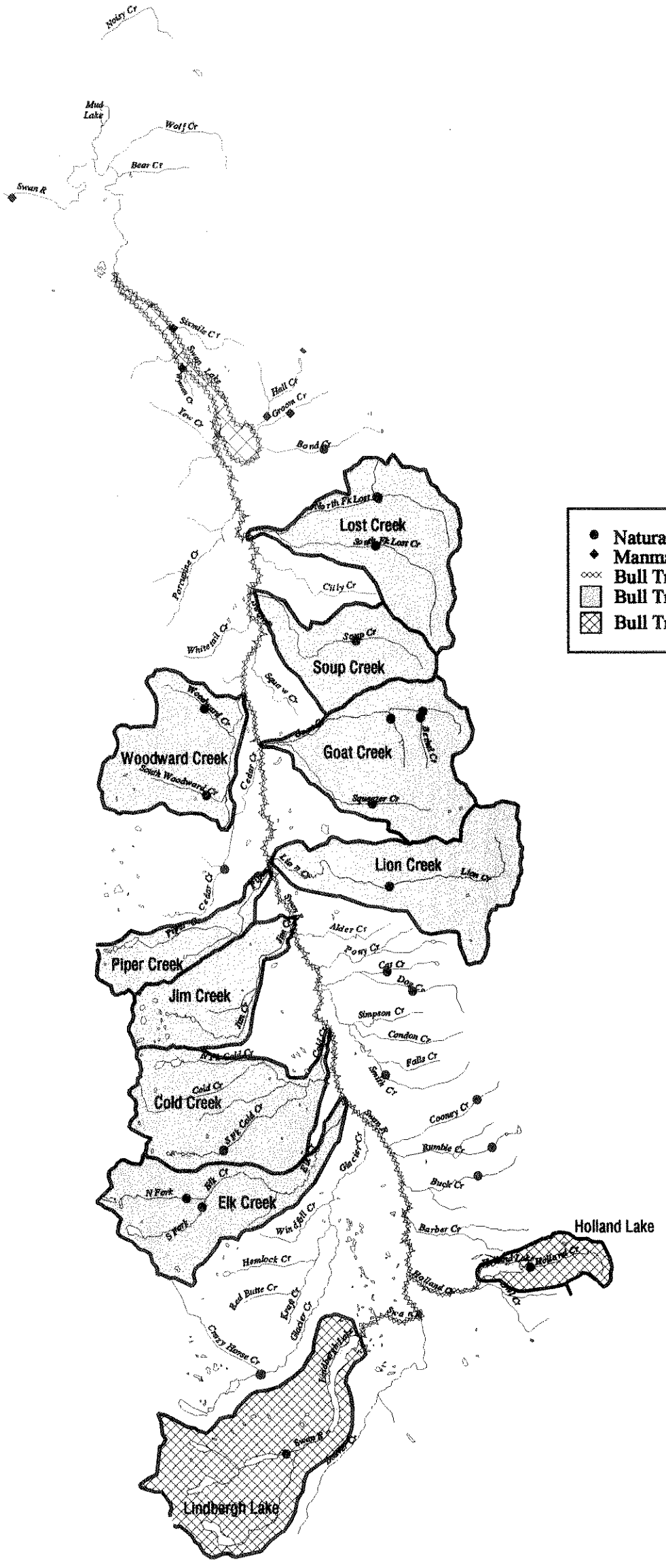
Miles

Albers Conic Equal-Area Projection

Montana
South Fork Flathead

Bull Trout Core Habitat & Nodal Areas

Swan



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406-751-4571

Bull trout distribution, core areas, and barriers information based on data collected up to November, 1999. Base layers from the Natural Resource Information System at the Montana State Library and digitized @ 1:100,000.

April 19, 2000
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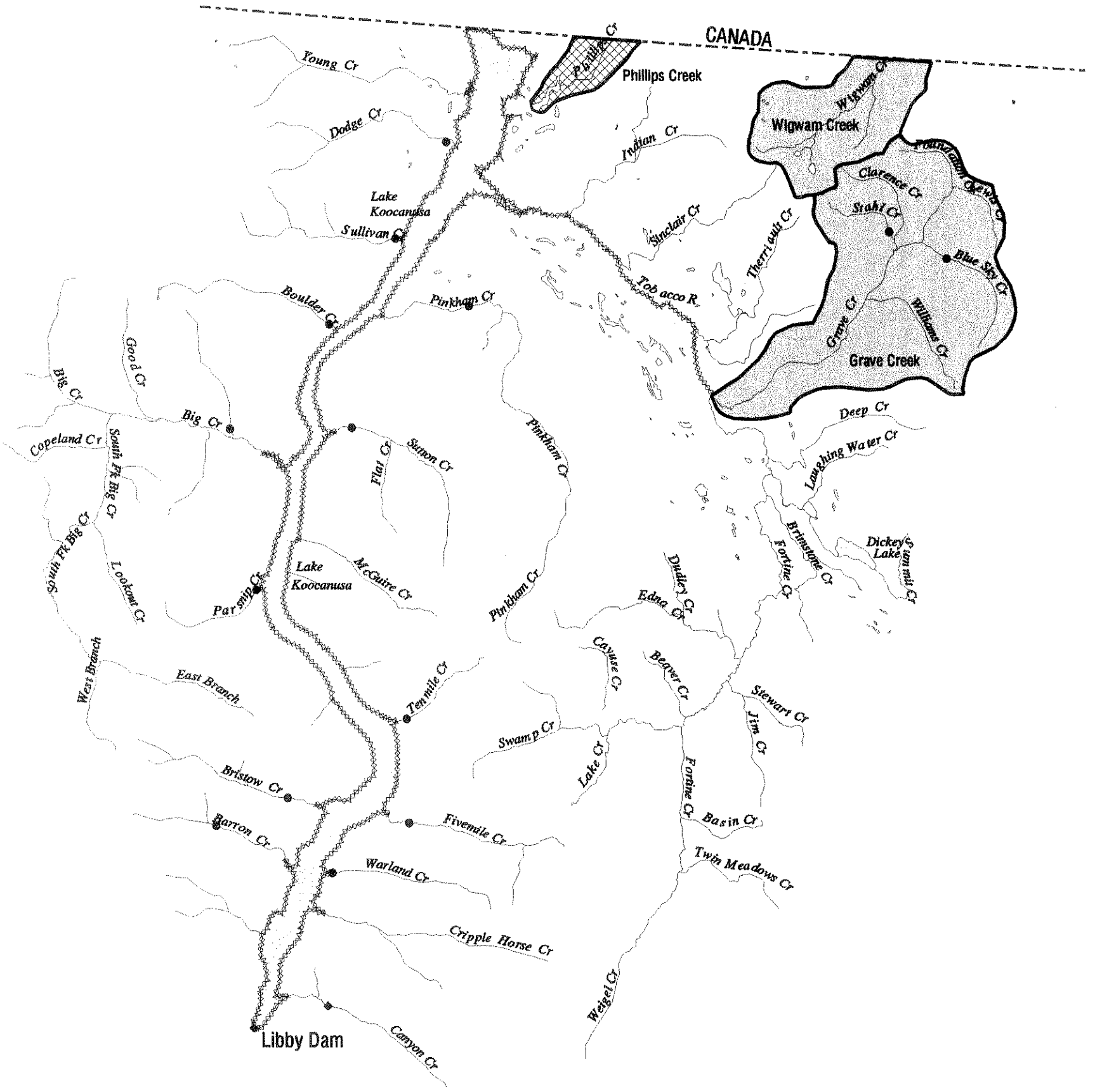
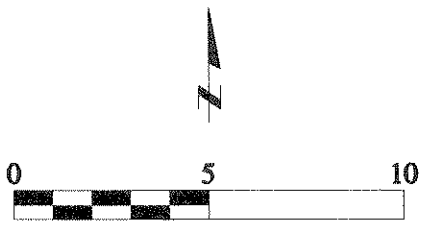
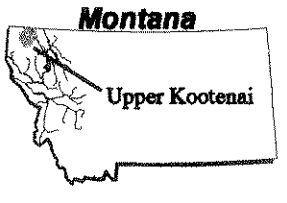
Bull Trout Core Habitat & Nodal Areas

Upper Kootenai





Albers Conic Equal-Area Projection

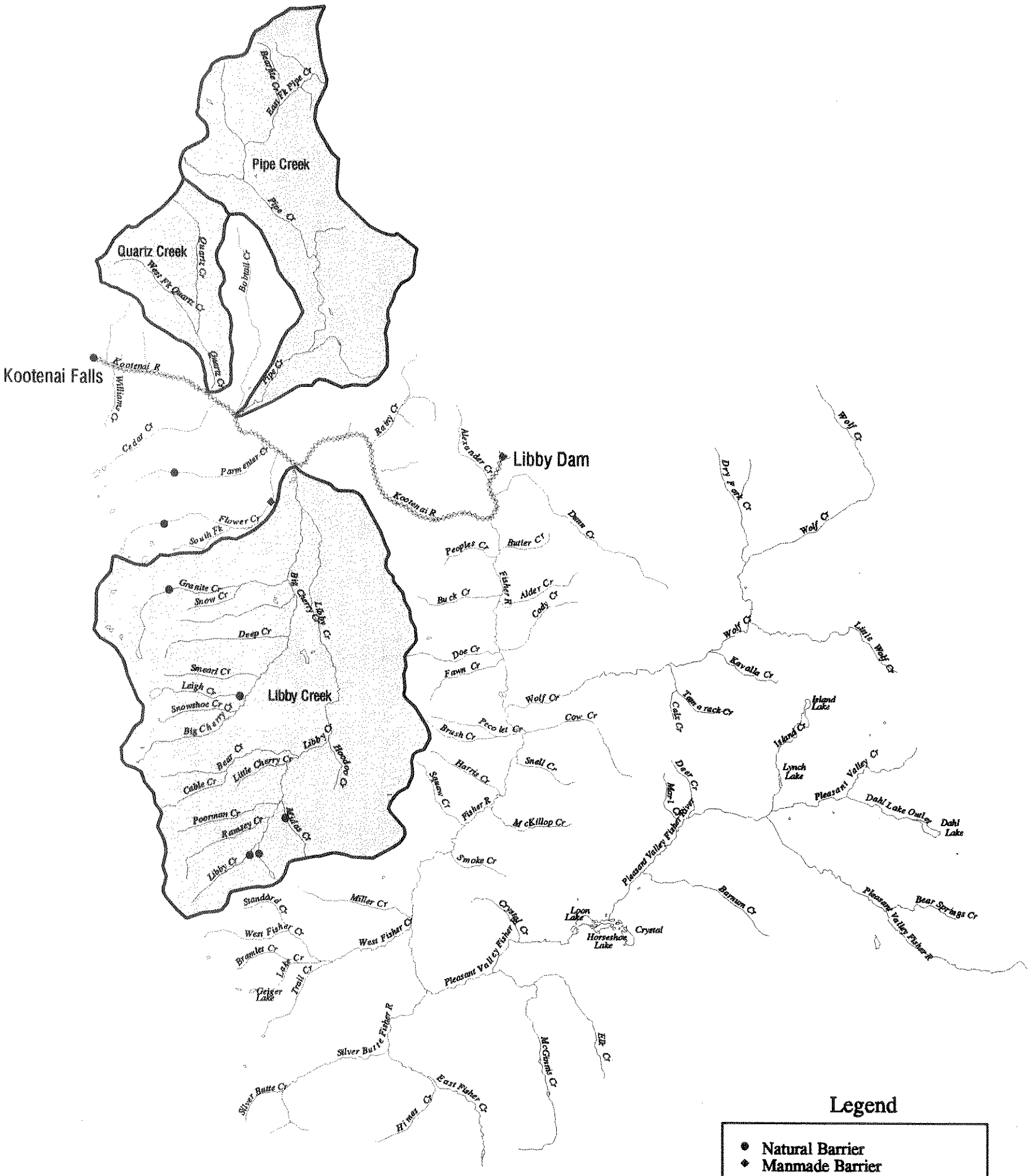


Montana Fish, Wildlife & Parks

STREAMNET

Bull Trout Core Habitat & Nodal Areas

Middle Kootenai



Legend

- Natural Barrier
- Manmade Barrier
- Bull Trout Nodal Habitat
- Bull Trout Core Area
- Bull Trout Disjunct Population

Map produced by:
Jeffrey Hatten
Montana Fish, Wildlife & Parks
Information Services Unit
490 N. Meridian Road, Kalispell, MT 59901
406-751-4571

Bull trout distribution, core areas, and barriers information based on data collected up to November, 1999. Base layers from the Natural Resource Information System at the Montana State Library and digitized @ 1:100,000.

April 19, 2000
/fish/bulltrout/nodecore2.cmp

Montana Fish, Wildlife & Parks

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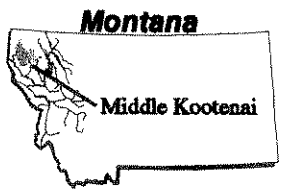
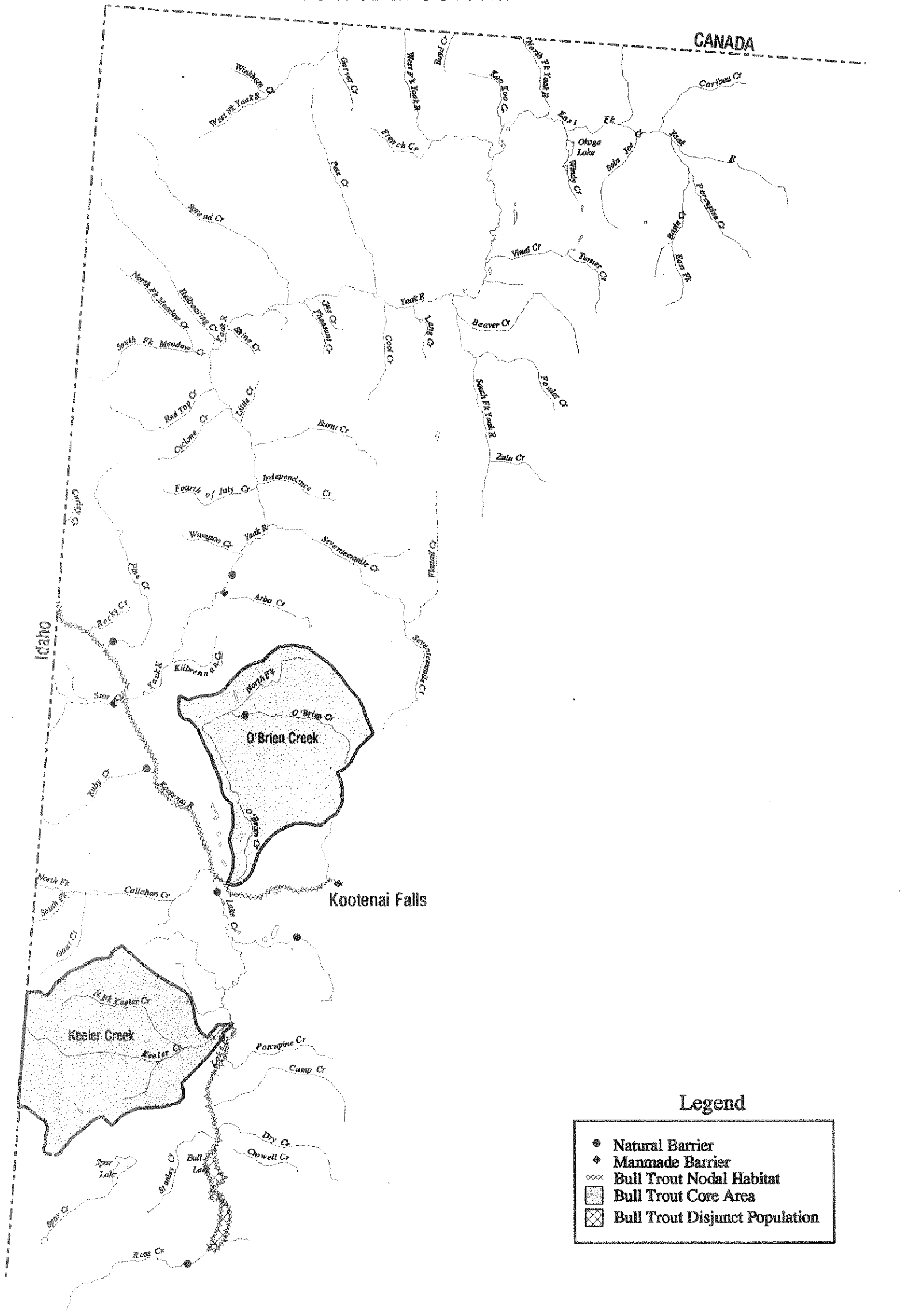
Miles

Albers Conic Equal-Area Projection



Bull Trout Core Habitat & Nodal Areas

Lower Kootenai



Legend

- Natural Barrier
- Manmade Barrier
- Bull Trout Nodal Habitat
- Bull Trout Core Area
- Bull Trout Disjunct Population

Map produced by:
Jeffrey Hutten
Montana Fish, Wildlife & Parks
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490 N. Meridian Road, Kalispell, MT 59901
406-751-4571

Bull trout distribution, core areas, and barriers information based on data collected up to November, 1999. Base layers from the Natural Resource Information System at the Montana State Library and digitized @ 1:100,000.

April 19, 2000

/fish/bulltrout/nodecore3.cmp

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Miles

Albers Conic Equal-Area Projection

Montana

Lower Kootenai

CONSERVATION STRATEGY FOR RESTORATION AND RECOVERY

Restoration of bull trout in Montana will require maintenance of complex habitats and networks of those habitats along a continuum of scales, from a broad, basin-wide scale to a mid, watershed-level scale to a fine, stream-specific scale. Therefore, this restoration plan employs a multi-tier strategy, as described by Lee et al. (1997), that addresses restoration at several levels of scale. The basic approach of this recovery strategy, at all scales, is to protect the best remaining populations and habitats, usually core areas, and restore degraded or extirpated populations such that the long-term viability of bull trout in Montana is assured. Where resources are not already dedicated to restoration of bull trout, this strategy will place priority on those restoration/conservation actions and areas that are currently in the most recoverable condition and that offer the greatest chance for success. In this way, the strongest populations will be preserved, and efforts will then build on that success to recover weaker populations.

At the broad scale level, this plan calls for establishing a network of well connected restoration/conservation areas that contain all of the necessary life history and dispersal requirements of bull trout, as well as the genetic diversity necessary for long-term persistence and adaptation to a variable environment. Restoration must emphasize connectivity between historically connected RCAs where appropriate, and overall health of the aquatic ecosystem of western Montana.

The emphasis of restoration at the watershed-level scale is to maintain complex habitats and conserve bull trout populations within RCAs by protecting remaining stronghold drainages and addressing and fixing existing threats while minimizing or preventing additional new threats. This involves identifying and protecting existing high quality streams, conserving and rehabilitating important degraded streams, and managing watersheds to maintain natural structure, function, and processes. Initial efforts should emphasize protection and restoration of important core and nodal areas so that life history requirements of all age and size classes are met. Core areas need to have the most stringent levels of protection, as they currently meet the bull trout's specific spawning and early rearing habitat requirements, and will provide the stock for recolonization of other areas within a watershed as restoration efforts proceed. The

conservation approach for core areas should be to maintain the factors and all habitat elements that contribute to success of those populations. Restoration at the watershed-level scale will provide the size and diversity of habitats within the watershed to support viable metapopulations, as well as positively influence conditions in important mainstem habitats downstream.

Restoration at the fine, stream-specific scale involves addressing specific actions and threats in specific streams that are important to, or influence, bull trout habitat. It is expected that restoration efforts by watershed groups will occur primarily at the stream-specific and watershed-level scales.

RESTORATION and CONSERVATION GOAL

Background

The specific habitat requirements of bull trout, the diversity of life history strategies, and their use of relatively long migratory corridors complicates restoration and conservation efforts, and illustrates the need for connectedness between populations. Connectedness within and between populations allows periodic genetic exchange, as well as founding of new populations and recolonization of extirpated populations by migrants. With this structure, a local population may go extinct, but through straying of migrants from other populations, may be recolonized. Since multiple populations are less likely to go extinct at the same time due to natural phenomenon (see Fig. 4), viability of bull trout will be greatly enhanced by maintaining connected populations.

The rate of straying is an important aspect of metapopulation dynamics because it influences the likelihood of recolonization (Rieman and McIntyre 1993). For bull trout, the rate of straying is generally low (Kanda et al. 1997; unpublished data), so recolonization may take a long time. Because of the importance of core areas to conservation and recovery of bull trout in Montana, recovery will be based on protection of core areas and reestablishment of connectivity between associated core areas.

This restoration plan is a voluntary effort on behalf of the State of Montana to restore bull trout populations to a sufficient level of abundance and distribution to allow for recreational utilization. The restoration criteria contained herein may exceed those that are

necessary to consider bull trout "recovered" under the ESA, and should not be construed as "recovery criteria" for the purposes of ESA delisting of bull trout. ESA recovery/delisting criteria will be developed independent of, but complimentary to this plan as part of the federal recovery planning process.

Restoration Goal/Objectives

Goal: The goal of the Montana Bull Trout Restoration Plan is to ensure the long-term persistence of complex (all life histories represented), interacting groups of bull trout distributed across the species' range and manage for sufficient abundance within restored RCAs to allow for recreational utilization. To meet this goal, cooperative management, monitoring, and restoration among local, state, tribal and federal resource management agencies, as well as private citizens, conservation organizations, and industry will be necessary. Bull trout will be considered restored in the Kootenai and Clark Fork River basins when the following objectives are met:

Goal Objective 1 - Protect existing populations within all core areas and maintain the genetic diversity represented by those remaining local populations

Bull trout populations, including disconnected local populations, have substantial genetic divergence among them (Leary et al. 1993; Kanda et al. 1997, unpublished information). Therefore, each core area population should be conserved. Each of the populations represented in the 115 core areas distributed throughout the 12 RCAs (Appendix C) must be protected, and if necessary, enhanced (expanded) in order to conserve the genetic diversity contained in those populations. Protection of populations within core areas also requires that nodal habitat be appropriately managed in order to maintain the complete life history of each population.

Criteria for Adding or Deleting Core Areas

Core areas are a central feature of the conservation strategy represented by this plan. A list of core areas is contained in Appendix C. Because scientific understanding of the distribution and specific importance of certain populations of bull trout is changing, the

plan provides for additions or deletions to the list of core areas identified for conservation.

Adding Core Areas: For a watershed to be added as a core area under the Montana Bull Trout Restoration Plan, it must meet all of the following criteria:

· There is documented bull trout spawning and rearing use according to monitoring protocols accepted by Montana Fish Wildlife and Parks.

· It is a third or fourth order watershed.

· The scientific judgment of the Montana Bull Trout Scientific Group or Montana Fish Wildlife and Parks determines that the core area contains among the strongest remaining populations of bull trout in an RCA, usually in a relatively undisturbed area.

Deleting Core Areas: For a watershed to be deleted as a core area, it must have any one of the following criteria:

· The population of bull trout has been extirpated.

· The scientific judgment of the Montana Bull Trout Scientific Group or Montana Fish Wildlife and Parks determines that the core area is no longer a stronghold in the RCA that warrants the prioritization afforded a core area.

Secondary Core Watersheds

Secondary core watersheds are third or fourth order watersheds identified by the Montana Bull Trout Scientific Group or Montana Fish Wildlife and Parks that are not core areas but support some use of bull trout and could become important in the future. These secondary streams do not support as much spawning or as dense of populations as the core areas, but warrant broad screen observation under the population monitoring protocol as potential core area additions or other reasons important to bull trout restoration. A list of secondary core watersheds is located at the end of Appendix C.

Goal Objective 2 - Maintain and restore connectivity among historically connected core areas

The effective population size of core area populations, and therefore the long-term persistence of bull trout within its native range in Montana will be enhanced by reconnecting historically connected core areas within RCAs to provide opportunity for genetic exchange between populations and refounding of new populations. Any measures to facilitate passage between populations must carefully consider how to best prevent the spread of whirling disease, other fish diseases, or undesirable aquatic organisms throughout the watershed that may adversely affect bull trout or other species of native fish, such as westslope cutthroat trout.

Goal Objective 3 - Restore and maintain connectivity between historically connected Restoration/Conservation Areas (RCAs)

Fragmentation among populations is a serious threat at different geographic scales, from larger scale RCAs to smaller scale core areas (see number 2 above). Human-caused fragmentation of populations at the RCA level disrupts the migratory corridors historically used by migratory bull trout. Because they are smaller and isolated, fragmented bull trout populations are at higher risk of extinction (Gilpin 1997). The effects of other risk factors to small, isolated populations, such as interactions with nonnative fish, mining, grazing, and forestry, may be locally exacerbated. Connectivity between RCAs is desirable when and where feasible to maintain/restore full migratory capacity and to help maintain viable populations, as long as doing so does not put a healthy population at risk. Potential risks versus benefits must be carefully considered on a site by site basis when considering restoring connectivity.

Goal Objective 4 - Develop and implement a statistically valid population monitoring program

An effective population monitoring program is necessary to assess the status of bull trout in core areas in all RCAs to determine progress towards meeting interim and overall restoration criteria of this plan.

It is important that these objectives be read together and are not considered independent of one another. Achievement of these objectives will be dependent upon the availability of resources to fully implement the plan. Ideally, 100% attainment of the objectives should occur. However, where resources are scarce, restoration efforts will be prioritized to achieve the greatest results based on available resources.

Although the goals and objectives are based on the best current scientific thought, the Bull Trout Restoration Team acknowledges that there remain sources of uncertainty about the habitat requirements and population dynamics of bull trout. This uncertainty may necessitate the goal or objectives being modified over time to reflect changes in current knowledge about bull trout.

If met, the above objectives will result in the protection of existing populations represented by core areas, expansion and connectivity of some of those populations to enhance long-term persistence, connectivity of several RCAs to enable full migratory capacity, and a monitoring program to assess success. To meet these objectives and achieve the overall restoration goal, it will be necessary to achieve specific restoration criteria. Meeting these criteria in a timely manner will require planning and prioritizing actions and locations. It is anticipated that the best way to do this will be to develop RCA management/restoration plans that identify specific threats, actions to address threats, and prioritization of those actions. These plans could be expanded versions of existing status reports that include more site-specific descriptions of restoration opportunities.

Restoration Criteria:

The criteria below represent a desired future condition for bull trout by the State of Montana to ensure sufficient abundance and distribution to allow recreational utilization. Achievement of these criteria will require cooperation and resources of all entities involved in bull trout conservation. No single agency or individual can, or should have to accomplish them alone.

For purposes of this restoration plan, bull trout will be considered restored in the Kootenai and Clark Fork River basins when the following criteria are met.

1. Stable to increasing populations, as defined in the monitoring protocol developed per Objective 4, are documented in at least 67% of all core areas (pending completion of the monitoring plan) by not later than 2014 in each of the RCAs according to established monitoring criteria. The required percentage of populations with stable to increasing populations and the target date will be finalized as part of the monitoring plan that will be developed per Criteria 3 below, and may change based on that analysis. The technical rationale for the percentage and target date will be included in the monitoring plan. If a monitoring plan is not developed, the default monitoring requirement will remain 67% of all core areas. The monitoring period could be reduced if modeling and statistical analysis completed per Criteria 3 indicate doing so would be appropriate, or if other monitoring indices are used in accordance with monitoring guidelines that will be established. Such indices could include juvenile abundance estimates, age/size class structure, or some other statistically valid index or combination of indices.

   Where monitoring demonstrates that bull trout are sufficiently recovered in a waterbody or drainage, and meet criteria developed by FWP for that waterbody to allow angling for bull trout, opening of that waterbody to bull trout angling will be considered. Before a waterbody is opened to angling for bull trout, the proposed regulation will be subject to normal regulation setting procedures, will undergo MEPA analysis, and will require FWP Commission approval. Criteria for opening and for future closures of waterbodies for

angling may be similar to that developed by the South Fork (Flathead) Conservation Agreement group for Hungry Horse Reservoir:

> The proposed regulation for a daily and possession limit of one bull trout from Hungry Horse Reservoir shall remain in effect as long as the bull trout catch per net in fall gill nets and the annual bull trout redd counts in the Hungry Horse Reservoir annually monitored tributaries remain above 70% of the long-term averages. The fishery will be closed if the values fall below 70% of the long-term averages for two consecutive years. If the fishery is closed because it fails to meet these criteria, it will not be re-opened until the bull trout catch per net in fall gill nets and the annual bull trout redd counts in the Hungry Horse Reservoir annually monitored tributaries reach or exceed the long-term average values for two successive years. If illegally introduced species appear in the Hungry Horse Reservoir fish assemblage, or if the reservoir fails to refill to elevation 3559 msl for two successive years, the harvest regulation will be reviewed.

2. Potential opportunities for fish passage (including fish ladders, trap and haul, etc.) need to be evaluated and pursued at Milltown, Thompson Falls, Cabinet Gorge, Noxon, and other dams as warranted. Evaluation of such passage opportunities is to be completed within 10 years after this plan is finalized. If determined feasible, passage should be incorporated into normal management and dam operation procedures. If not feasible, the rationale and analysis showing why such passage in not feasible must be documented.

3. A population monitoring plan is to be developed by not later than the end of 2003 outlining the types of monitoring that is to be done in each RCA to meet the above objectives, assess the status of bull trout within each, and to measure success towards achieving restoration criteria described above. Unless recommended differently by the population monitoring plan, interim population monitoring should be implemented at least according to the following schedule, if not sooner, to measure success towards meeting Criteria 1 above:

   - Population index monitoring should be occurring in at least 40% of the core areas of each RCA by not later than 2002.

- Population index monitoring should be occurring in at least 50% of the core areas of each RCA by not later than 2004.
- Population index monitoring should be occurring in at least 67% of the core areas of each RCA by not later than 2006.

It should be noted that individual restoration goals have been developed for each RCA (Appendix D). Fulfilling all aspects of the individual RCA restoration goals is not required to consider bull trout in Montana restored, since the overall goal above supersedes the individual goals. However, to maintain the long-term persistence of bull trout in all RCA's, resource managers should strive to also meet those individual RCA restoration goals.

ACTIONS TO ACHIEVE RESTORATION GOALS

There has been considerable debate about the cause of bull trout decline. Causes of decline are many and varied, and often act in a synergistic manner to magnify smaller causes. Because of the complex interaction of causes of decline, and in order to achieve restoration, these causes and threats must be identified and corrected. Addressing individual symptoms will be insufficient for long-term persistence of local populations. For example, installing instream habitat structures to temporarily provide for a variety of degraded hydrologic functions may not be as beneficial as implementing restoration measures on the land (Frissell and Nawa 1992; Chapman 1996) that would provide a long-term solution to the cause of such problems.

Threats to bull trout, and thus restoration and recovery of bull trout, can be grouped into three general categories: fisheries management, habitat management, and genetics/population management (Fig 17). Some or all may apply in each watershed.

Components of these three categories can be further classified into the five factors considered by the U.S. Fish and Wildlife Service when evaluating the status of threatened or endangered species. Those five factors are:

(A) the present or threatened destruction, modification, or curtailment of its habitat or range;

(B) overutilization for commercial, recreational, scientific, or educational purposes;

(C) disease or predation;

(D) the inadequacy of existing regulatory mechanisms;

(E) other natural or manmade factors affecting its continued existence.

Restoration efforts within individual watersheds must therefore address specific causes of decline in each of the three general categories (habitat, fisheries, and population management) that apply to a watershed, particularly as they pertain to core and nodal areas. Examples of the type of actions that should be reviewed and addressed in each watershed, by category, include:

Habitat Management

* Protect core and nodal habitats from additional degradation
* Restore degraded bull trout habitat to meet the requirements of bull trout
* Adopt land management guidelines and practices that maintain or improve important bull trout habitat processes
* Maintain/restore physical integrity of habitat
* Reduce point and nonpoint pollution
* Determine effectiveness of existing habitat protection regulations and BMPs
* Restore and maintain natural hydrologic conditions (flow, timing, duration)
* Operate dams to minimize impacts

Fisheries Management

* Implement angling regulations to prevent overharvest and minimize incidental catch of bull trout
* Educate anglers about fishing regulations and proper identification of bull trout
* Develop/implement fish stocking policies
* Develop/implement fish management goals that emphasize bull trout in core areas
* Where feasible, suppress or eradicate introduced species that compete with, hybridize with, or prey on bull trout
* Limit scientific collection of bull trout
* Regulate collection methods
* Regulate private ponds/preclude stocking of fish that compete with, prey on, or hybridize with bull trout in bull trout watersheds
* Monitor and prevent spread of fish diseases
* Prevent illegal introductions of nonnative aquatic flora and fauna

Population/Genetics Management

* Maintain sufficient population size in watersheds
* Prevent hybridization with brook trout
* Maintain/restore connectivity between populations - prevent fragmentation
* Determine genetic baselines in each watershed
* Maintain locally adapted, genetically pure populations
* Manage populations (numbers and life forms) for long-term viability
* Develop fish stocking and reintroduction policy for bull trout

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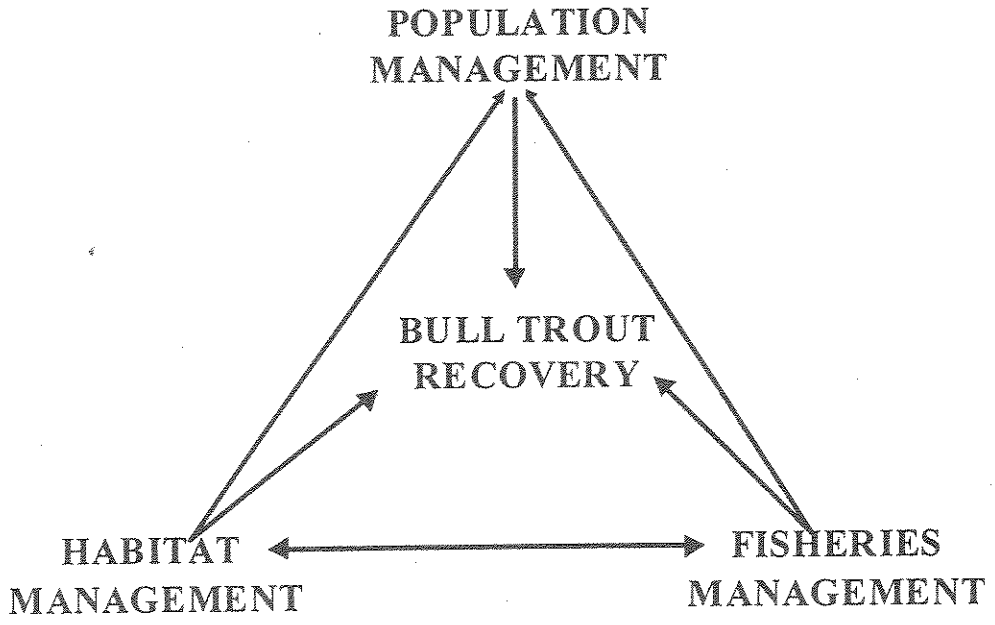


Fig. 17. Factors influencing bull trout restoration.

RECOMMENDATIONS TO ADDRESS THREATS/ACHIEVE RESTORATION

The actions described above are further detailed in a narrative outline (Appendix E) which may be used as a tool in the development of specific conservation implementation plans to identify specific threats to bull trout restoration in each watershed, and to develop strategies to address those threats. Not all apply to each watershed. Other recommendations for addressing threats to bull trout populations and achieve restoration have been prepared by the Bull Trout Scientific Group and include: *The Relationship Between Land Management Activities and Habitat Requirements of Bull Trout* (Appendix F), *Assessment of Methods for Removal or Suppression of Introduced Fish to Aid in Bull Trout Recovery* (Appendix G), and *The Role of Fish Stocking in Bull Trout Recovery* (Appendix H). These recommendations are meant to complement other existing resources and approaches, not replace them. For example, the monitoring based strategy in the technical report *The Relationship Between Land Management Activities and Habitat Requirements of Bull Trout* (Appendix F) is not meant to replace other existing approaches for protecting and conserving bull trout. The report, and its monitoring-based strategy, represent an important body of science that should be incorporated into public and private resource management processes. The selected approach should balance cost effectiveness and biological benefits to bull trout.

IMPLEMENTATION

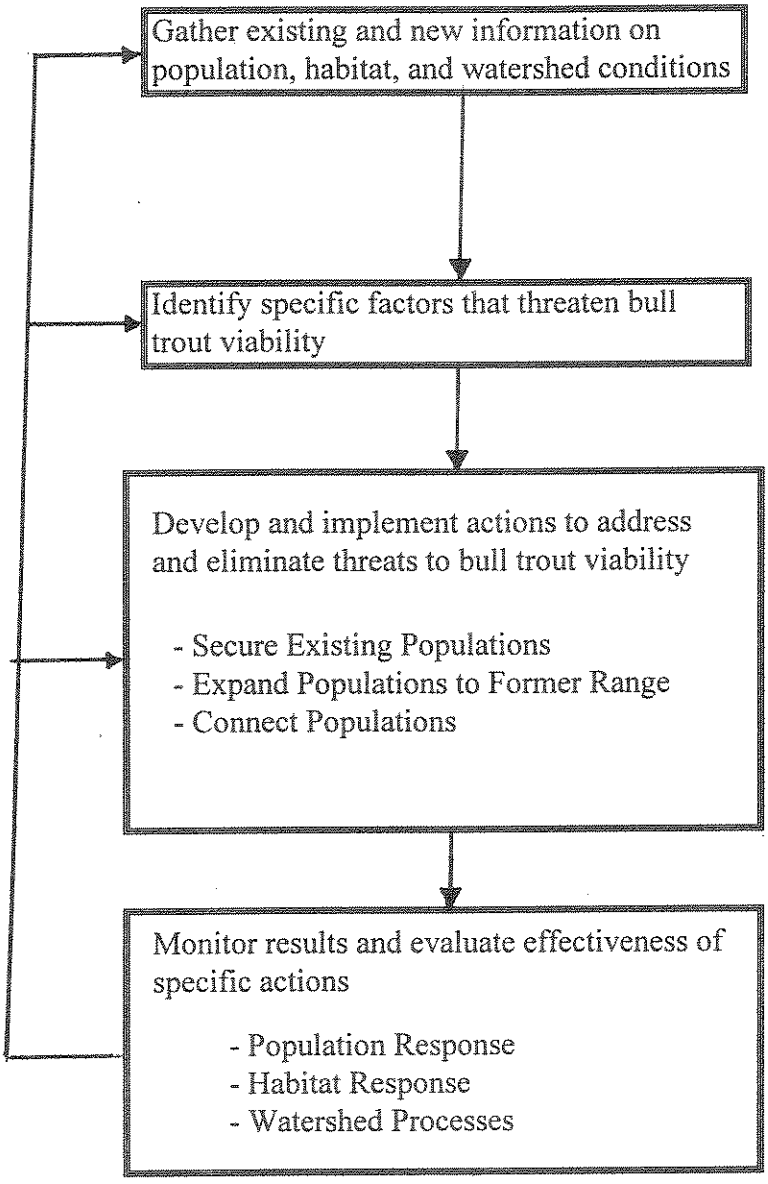
Many actions are already underway to conserve and restore bull trout in Montana (Appendix I). Implementing this plan will simply be a continuation of already existing actions in many areas. It is expected that implementation will occur in a variety manners and levels by the different involved/affected interests, depending on their interest, agreements, mandates, and missions. The primary avenue for implementation of habitat restoration will be land and fisheries management agencies working in conjunction with local watershed groups under the umbrella of this restoration plan. Restoration and conservation goals and actions are conceived as occurring at several scales, from landscape-wide to site-specific. It is through a series of

conservation actions by both public and private landowners that a regional or watershed conservation plan will be effective in restoring bull trout in a naturally functioning landscape.

As evident from prior sections, restoration of bull trout in Montana requires addressing a variety of very complex, intertwined policy-type issues and identifiable, measurable, on-the-ground issues; some of which must be addressed at a statewide level, and others that should be addressed at a local or watershed level. Therefore, implementation of this plan must occur simultaneously at local, state, and federal levels. Adoption of more specific conservation implementation plans by private landowners and state and federal management agencies is necessary to complement on-the-ground restoration activities being undertaken by local watershed groups. Relevant elements of this plan should also be incorporated into pertinent policies and regulations (e.g., fish stocking, management guidelines) affecting all watersheds.

Implementation needs to be science-based, include a monitoring component, and coordinate agency and private efforts to change current practices in order to restore bull trout. Implementation must also be adaptive to use new information and processes. An example of such an approach is the monitoring based strategy presented in the technical report *The Relationship Between Land Management Practices and Habitat Requirements of Bull Trout* (MBTSG 1998). That report advocates monitoring baseline habitat conditions prior to initiating land management activities in the caution zones of core and nodal areas, designing the activities to minimize risks to bull trout, monitoring habitat components during and after the activity to determine if impacts occurred, and adapting future projects based on information learned from the monitoring of previous projects. Another example is the Adaptive Management Commitment proposed by Plum Creek Timber Company in their Native Fish Habitat Conservation Plan (USFWS 1999).

It is anticipated that implementation will follow the model presented in the Upper Klamath Basin Conservation Strategy (Light et al. 1996):



Steering Committee

An interdisciplinary Steering Committee comprised of representatives of state, federal, and tribal management agencies with management authority for bull trout or bull trout habitat, as well as conservation organizations and industry representatives will oversee and monitor implementation of this plan, and evaluate overall effectiveness of restoration efforts, as summarized in annual monitoring reports compiled by the Bull Trout Coordinator. The team will meet at lest annually to review progress reports, discuss issues, prioritize statewide issues and actions, evaluate effectiveness of the plan towards achieving restoration, and serve as an umbrella to coordinate local watershed groups. In essence, this committee will function as a state recovery implementation committee.

Scientific Group

A Montana Bull Trout Scientific Group, appointed by the Steering Committee, will remain in place to provide scientific input and review for the Steering Committee. The Scientific Group needs to remain interdisciplinary, and should continue to be comprised of individuals from a diversity of agencies and institutions. Participation on the Scientific Group should be a part of that individual's job responsibilities rather than an addition to them, and should be funded and given high priority accordingly. The Scientific Group will review annual monitoring reports, provide technical input to the Steering Committee and other entities regarding issues affecting bull trout restoration, and will evaluate overall effectiveness of restoration efforts.

Technical Advisory Committees

The Scientific Group technical papers addressing introduced species and fish stocking recommended the formation of a technical advisory committee (TAC) to review projects involving hatchery or transplanted bull trout and suppression and removal of introduced fish that might affect bull trout restoration. Such a committee will function on an ad hoc basis as needed. They will be using the checklist and criteria provided in the reports for screening proposed stocking and suppression projects.

Watershed Groups

Watershed groups were identified early in Restoration Team meetings as being a cornerstone of the Montana bull trout restoration/conservation strategy. Watershed groups are broader in scope and seek a more diverse, less structured membership than the Technical Advisory Committees.

The role of watershed groups is to use the information provided in this plan, together with their knowledge of the watershed and input from technical experts, to determine ways to reduce risks to bull trout, to restore degraded habitat, to evaluate proposed activities in the drainage, and to work together to put these ideas into action. While watershed groups may make recommendations regarding state or private land activities, implementation of these recommendations is voluntary. However, in some instances activities may ultimately be legally guided under the Endangered Species Act through Habitat Conservation Plans or other conservation plans and agreements. Many activities affecting bull trout in Montana occur on National Forest Service lands, and these actions are legally guided by Forest Plans, all of which have adopted INFISH (U.S. Forest Service 1995) standards, guidelines and procedures, which should be replaced by the adopted Record of Decision for the Interior Columbia Basin Ecosystem Management Project when that document is finalized.

Objectives of watershed groups will include:

1) Provide a process for interagency coordination and participation by interested groups and individuals in bull trout restoration; this might include developing a local drainage conservation strategy and prioritizing actions for restoration.

2) Facilitate the exchange of information on bull trout distribution, population trends, and factors precluding or limiting productivity.

3) Develop action-oriented management plans for watersheds, outlining current status of bull trout in the watershed, specific threats, and actions to address threats.

4) Improve public awareness of bull trout value and importance of protection and restoration efforts.

5) Incorporate westslope cutthroat trout and other native fish management into their restoration and conservation activities.

Where possible, bull trout watershed groups can be coordinated with, or included in other efforts to develop watershed restoration processes that involve both agency personnel and citizen participation. House Bill 546, passed by the 1997 Legislature, strengthened the state's authority to develop Total Maximum Daily Loads (TMDLs) (water quality improvement strategies). The Department of Environmental Quality (DEQ) has been directed to lead the process with guidance from a statewide advisory group, local conservation districts, watershed groups and other interested parties. In several drainages, DEQ will be setting up watershed advisory groups to address impaired waterbodies. Bull trout conservation could be addressed through these groups or sub-committees of them.

While implementation and monitoring of different restoration techniques will need to continue, it may be most productive and prudent to combine these techniques with improved land and water stewardship within the watershed. Local watershed-based groups typically favor resource stewardship, and can offer the combination of local residents, fish biologists and other resource professionals, and interested individuals working to improve land management practices. These watershed groups also provide an opportunity to develop participatory, cooperative monitoring programs.

Drainage Specific Restoration and Conservation Strategies

To effectively and efficiently implement restoration strategies for bull trout in each watershed, drainage-specific restoration strategies outlining specific threats and specific actions to address those threats must be developed for each RCA. These strategies should follow the format of the status reviews, but contain more site-specific information so that specific threats can be prioritized and corrected. These restoration strategies must be science-based, and tied to the concepts and principles outlined in this restoration plan. Technical specialists appointed by MFWP will serve as the lead entity in drafting these. Other State, federal, or Tribal management agency, nongovernmental organization, watershed group, or other appropriate entities may assist FWP in completing these plans. Development of such strategies should incorporate as much local expertise as possible and should be developed in conjunction with watershed groups to ensure the necessary information is included. Strategies will include, but not be limited to, an

update of the current status in each watershed, identification of key waters in each watershed, identification of specific threats in each key water and watershed, an assessment of methods and cost estimates to address specific threats, prioritization of restoration actions, and implementation of watershed management/restoration plans and restoration actions. These plans will serve to prioritize and guide restoration efforts, and will be the foundation upon which annual work planning and reporting will be based. They will serve as a reference, but will not be binding.

Coordination

It is expected that the Bull Trout Coordinator position currently housed in the Montana Department of Fish, Wildlife and Parks will remain on a half-time basis to serve as staff to the Steering Committee and as liaison between the Steering Committee, Scientific Group, and watershed groups. The Coordinator will compile annual status and monitoring reports for review by the Steering Committee, and also will ensure all of these groups, as well as any other interested parties, are provided the most current and available information regarding bull trout restoration efforts. It is expected that funding and staffing for coordination of watershed groups and implementation of restoration efforts will be shared by agency and corporate interests involved in activities in the different drainages.

Monitoring

A key component of this restoration plan is to monitor implementation, compliance with, and effectiveness of conservation measures contained in the plan. This will be enabled through continued population and habitat monitoring. A summary of monitoring results and evaluation documents for each RCA will be prepared annually by the Bull Trout Coordinator, and will be provided to the Scientific Group and Steering Committee. The summary will include a summary of the most recent population and habitat monitoring results, as well as an overall assessment of the status of bull trout and bull trout habitat in each RCA. Monitoring will enable adaptive feedback to agencies and watershed groups to ensure restoration actions are effective and consistent with this Restoration Plan.

Because of the scale and complexity of monitoring required, a cooperative monitoring effort will be required. No single agency or entity can complete the required monitoring individually.

Coordination with other plans, strategies, mandates, and missions

Bull trout habitat occurs over a wide range of ownerships and jurisdictions, each of which operate under different laws, regulations, policies, and mandates, some of which supersede others. For federal lands, laws and implementing regulations that direct management include the Clean Water Act, National Environmental Policy Act, Endangered Species Act, National Forest Management Act, and Power Planning Act; state lands are administered under legislation and policies such as the Montana Environmental Policy Act, School Trust Lands Administration, and FWP and DNRC enabling legislation. Laws that govern administration of private lands are more flexible, with management primarily at the discretion of the landowner. In addition to existing mandates and policies, various other conservation strategies, including species and habitat conservation plans, federal recovery plans for ESA listed species, land allocation decisions in Forest Service Land and Resource Management Plans, management guidelines, and interagency Memorandums Of Understanding (MOUs) direct management of habitat containing bull trout.

It is the intent of the Restoration Team that this plan not supersede existing laws, regulations, mandates, and agreements, but rather the results of this effort be adopted and incorporated into them. As previously stated, the restoration plan is intended to be used by local watershed groups and land managers as a guideline for developing and implementing more specific, local conservation strategies for bull trout in local watersheds. For example, where not already addressed by Forest Land and Resources Management Plans, as amended by INFISH (U.S. Forest Service 1995) or the Interior Columbia River Basin preferred alternative (ICBEMP EIS Team 1997), the conservation objectives and standards and guidelines outlined in this plan should be amended to Forest Service Regional Guides and U.S. Forest Service Forest Land and Resource Management Plans. Similarly, the conservation objectives and measures outlined in this plan should provide sideboards for ESA consultation and when developing fisheries management and waterbody (e.g., lake, river or stream) management plans.

FUNDS POTENTIALLY AVAILABLE FOR IMPLEMENTATION

Full implementation of this plan will require financial support and resources to achieve the desired goal and objectives. However, because of budgeting processes and budgetary constraints, it is not possible for agencies to obligate funds in advance for the term necessary to fully restore bull trout. However, management agencies are allocating, and will continue to allocate resources towards bull trout conservation. In addition, numerous other funding sources are potentially available for bull trout conservation (Table 2). Although many of these funds are dedicated for specific geographic areas, cumulatively they encompass a large portion of the range of bull trout covered by this plan. Use of these funding sources to implement this restoration plan (where applicable) should greatly increase the likelihood of restoration of bull trout in Montana.

Table 2. Funds potentially available for bull trout restoration

- **FUTURE FISHERIES IMPROVEMENT PROGRAM** (FWP)
  - ANNUAL FUNDING: APPROXIMATELY $750,000 FOR PROJECTS THAT RESTORE OR ENHANCE HABITAT FOR WILD FISH. PREFERENCE IS GIVEN FOR PROJECTS THAT RESTORE HABITAT FOR NATIVE FISH
- **HB 647 - BULL TROUT AND CUTTHROAT TROUT ENHANCEMENT PROGRAM** (FWP)
  - ANNUAL FUNDING: $750,000 DURING 2000-2001 BIENNIEUM; $500,000/YEAR THEREAFTER FROM RIT FUND
  - FUNDING WILL BE INCORPORATED INTO AND ADMINISTERED BY THE FUTURE FISHERIES PROGRAM, BUT MAY ONLY BE USED FOR PROJECTS THAT BENEFIT BULL TROUT AND/OR CUTTHROAT TROUT
  - FUNDS MAY BE USED FOR HABITAT ENHANCEMENT AND FOR REDUCTIONS IN SPECIES COMPETITION
- **PARTNERS FOR FISH AND WILDLIFE PROGRAM** (U.S. FISH & WILDLIFE SERVICE)
  - ANNUAL FUNDING APPROXIMATELY $175,000 FOR BULL TROUT HABITAT RESTORATION: FUNDS ARE USED IN CONJUNCTION WITH OTHER FUNDING SOURCES FOR PROJECTS THAT ENHANCE OR RESTORE HABITAT FOR NATIVE FISH
- **NATURAL RESOURCE DAMAGE SETTLEMENT WITH ARCO**
  - REQUIRES THAT AT LEAST $500,000 OF NRD CONSENT DECREE BE SPENT ON BULL TROUT RECOVERY PROJECTS OVER THE NEXT 10 YEARS
  - APPROXIMATELY $10 MILLION AVAILABLE ANNUALLY (THROUGH A COMPETITIVE GRANT BASIS) TO RESTORE, REPLACE, REHABILITATE, OR ACQUIRE THE EQUIVALENT OF NATURAL RESOURCES THAT WERE INJURED AS A RESULT OF MINING AND SMELTING IN THE UPPER CLARK FORK BASIN.
  - IN ADDITION, 5% OF CLARK FORK RIVER SETTLEMENT (CURRENTLY IN NEGOTIATION) THAT EXCEEDS $10 MILLION (UP TO MAXIMUM OF $5 MILLION) MUST BE SPENT ON BULL TROUT RESTORATION

- **MILLTOWN DAM MITIGATION** (MONTANA POWER COMPANY)
  - $60,000/YEAR AVAILABLE FOR HABITAT RESTORATION

- **AVISTA (WASHINGTON WATER POWER) RELICENSING AGREEMENT**

  - NATIVE SALMONID (BULL TROUT AND WESTSLOPE CUTTHROAT TROUT) RESTORATION PLAN

    $1.3 MILLION AVAILABLE 1999

    $500,000 ANNUALLY OVER THE NEXT 40 YEARS

  - TRIBUTARY ENHANCEMENT FUND FOR LOWER CLARK FORK RIVER AND THOMPSON RIVERS

    $487,500 AVAILABLE FOR BULL TROUT HABITAT RESTORATION IN 1999

    $237,500 AVAILABLE FOR BULL TROUT HABITAT RESTORATION ANNUALLY THEREAFTER FOR 40 YEARS

  - FISH PASSAGE FUNDING

    $400,000/YEAR DEPOSITED INTO FISH PASSAGE FACILITIES FUND AT CABINET GORGE AND/OR NOXON DAM. SHOULD FACILITIES NOT BE CONSTRUCTED, FUNDS BECOME AVAILABLE FOR ADDITIONAL HABITAT RESTORATION.

- **NORTHWEST POWER PLANNING COUNCIL'S FISH AND WILDLIFE PROGRAM**

  - APPROXIMATELY $600,000/YEAR (based on an annual selection process) APPLIED DIRECTLY TO BULL TROUT HABITAT RESTORATION AND MONITORING

  - HIGHEST PRIORITY GIVEN TO REBUILDING NATIVE FISH STOCKS (BULL TROUT AND WESTSLOPE CUTTHROAT)

- **KERR DAM MITIGATION** (Payments to the Confederated Salish and Kootenai Tribes)

  - $17 MILLION FOR FISH AND WILDLIFE HABITAT ACQUISITION ON THE FLATHEAD RESERVATION

  - $10.75 MILLION FOR FISH AND WILDLIFE HABITAT RESTORATION ON THE FLATHEAD RESERVATION

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GLOSSARY

adfluvial:	fish that spawn in tributary streams where the young rear from 1-4 years before migrating to a lake, where they grow to maturity
aggrade:	raise the grade or level of a river valley or streambed by depositing streambed material or material or debris
connected:	populations between which both upstream and downstream movements of all life stages of individuals is possible and can occur
core area:	core areas are watersheds, including tributary drainages and adjoining uplands, used by migratory bull trout for spawning and early rearing, and by resident bull trout for all life history requirements
cover:	anything that provides visual isolation or physical protection for a fish, including vegetation that overhangs the water, undercut banks, rocks, logs and other woody debris, turbulent water surfaces, and deep water
disjunct population:	a population found in a headwater lake, that is self-reproducing, but is functionally isolated from the rest of the system due to barriers, thermal conditions, etc.
drainage:	an area (basin) mostly bounded upstream by ridges or other topographic features, encompassing part or all of a watershed
entrainment:	displacement of fish from a reservoir through an outlet from a dam or from a river into an irrigation ditch
escapement:	adult fish which return to spawn
fluvial:	fish that spawn in tributary streams where the young rear from 1-4 years before migrating to a river system, where they grow to maturity
fragmentation:	the breaking up of a larger population of fish into smaller disconnected subpopulations
fry:	first-year fish
local population:	a population occurring in a specific portion of a drainage, usually a tributary, that is adapted to that specific location, and that is usually separated from other populations within a drainage.
metapopulation:	a collection of localized populations that are geographically distinct, yet are genetically interconnected through movement of individuals among populations
migratory:	describes the life history pattern in which fish spawn and spend their early rearing years in specific tributaries, but migrate to larger rivers, lakes or reservoirs as adults during their non-spawning time
nodal habitat:	waters which provide migratory corridors, overwintering areas, or other critical life history requirements
population:	an interbreeding group of fish that spawn in a particular river system (or part of it)

redd: a disturbed area in the gravel, or a nest, constructed by spawning fish in order to bury the fertilized eggs

resident: fish that spend their entire life cycle usually in tributary or small headwater streams in which they were hatched

restoration: the process by which the decline of a species is stopped or reversed, and threats to its survival are removed or decreased, so that its long-term survival in nature can be ensured

Restoration/Conservation Areas (RCAs): portions of major drainages between which migration and straying is unlikely or can occur only downstream. It is within or between these restoration/conservation areas that bull trout will need to function as metapopulations.

Restoration Team: a policy-level group with representatives from State, Tribal, and federal agencies, conservation organizations and private industry; appointed by Governor Racicot to establish a Bull Trout Restoration Plan for Montana

riparian area: lands adjacent to water such as creeks, streams and rivers and, where vegetation is strongly influenced by the presence of water

risk: a factor which has contributed to the past or current decline of the species

Scientific Group: composed of agency, private and university scientists appointed by the Restoration Team to conduct technical analysis

strategy: planning, directing, and implementation of projects for achieving specific objectives

threat: a factor which jeopardizes the future conservation of the species

watershed: a drainage basin which contributes water, organic matter, dissolved nutrients, and sediments to a river, stream or lake

Watershed Group: a group of agency representatives, landowners and recreational and commercial users of a watershed, plus a liaison from the Scientific Group; created by the Restoration Team and charged with developing restoration actions to help restore bull trout

ACRONYMS

AFS	**American Fisheries Society**
BPA	**Bonneville Power Administration**
CSKT	**Consolidated Salish and Kootenai Tribes**
DNRC	**Montana Department of Natural Resources and Conservation**
ESA	**Endangered Species Act**
FERC	**Federal Energy Regulatory Commission**
FWP	**Montana Department of Fish, Wildlife and Parks**
ICBEMP	**Interior Columbia Basin Ecosystem Management Project**
RCA	**Restoration/Conservation Area**
RT	**Montana Bull Trout Restoration Team**
SG	**Montana Bull Trout Scientific Group**
TMDL	**Total Mean Daily Load**
US EPA	**United States Environmental Protection Agency**
USGS	**United States Geological Survey**
USFWS	**United States Fish and Wildlife Service**

APPENDICES

Appendix A. Restoration Team Charter

Appendix B. Risk factors to bull trout in Montana Restoration/Conservation Areas (RCAs), and the threat the risk factor poses to future restoration of the bull trout.

Appendix C. Summary of core areas identified in Montana RCA status reports

Appendix D. Summary of restoration goals for Bull Trout RCAs in Montana

Appendix E. Narrative outline of possible recovery actions to restore bull trout

Appendix F. Executive Summary - The Relationship Between Land Management Activities and Habitat Requirements of Bull Trout

Appendix G. Executive Summary - Assessment of Methods for Removal or Suppression of Introduced Fish to Aid in Bull Trout Recovery

Appendix H. Executive Summary - The Role of Stocking in Bull Trout Recovery

Appendix I. Description of current conservation measures.

Bull Trout Restoration Plan

Restoration Team Charter

February 1994

Introduction

In October of 1992, the U.S. Fish & Wildlife Service received a petition to place the bull trout on the Endangered Species List. In May of 1993, the Service determined the petition had merit, and began a status review of bull trout.

On December 1 and 2, 1993, in Missoula, Montana, the Governor's Bull Trout Roundtable was convened to discuss the possibility of creating and implementing a bull trout restoration plan in Montana.

The Roundtable consisted of sixteen members invited by Montana Governor Marc Racicot, and represented federal and state water, land and wildlife managers as well as tribal governments, private land managers, agricultural water users and recreation/conservation interests.

During the first day of the Roundtable conference, a broad array of public and private panelists discussed bull trout population status, biological and lifecycle needs, habitat requirements, threats to bull trout populations, and possible recovery strategies for the bull trout.

It became apparent from panelist presentations that bull trout populations have declined in Montana, the historic range of bull trout has diminished and existing bull trout populations are threatened by habitat destruction, water impoundments, land management activities, exotic fish species and other problems.

On the second day of the conference, Roundtable membership, and members of the public participated in a facilitated discussion that sought to determine a consensus approach for bull trout restoration efforts. That discussion led to an agreement among Roundtable members that a working group be established to work cooperatively and collaboratively on a bull trout restoration plan.

In his speech to the Roundtable, Governor Racicot issued a strong recommendation that a bull trout restoration plan move forward, saying that "progressive governments in states can play a crucial role as a catalyst in preventing the needless loss of precious resources like the bull trout and build public trust and confidence, plus encourage increased cooperation among state and federal agencies."

Agreement

As a result of complex and diverse problems facing Montana's bull trout, it is apparent that multiple resource entities, using a broad spectrum of experience, expertise and management authority, must work together to maintain and restore bull trout populations in Montana. In addition, it is essential that bull trout conservation efforts employ a public participation process which works closely with various public segments impacted by, and interested in, bull trout restoration.

The undersigned participants, as active members of the Montana Bull Trout Restoration Team, agree to work in cooperative fashion to produce a plan that maintains, protects and increases bull trout populations:

1) which includes a process and timetable for recovery;
2) that uses shared research, appropriate information and resources, as agreed upon by Restoration Team members;
3) that sets specific restoration goals, resource management criteria (such as standards and guidelines) and methods to monitor results;
4) that complies with the Montana Environmental Policy Act (MEPA) and all relevant and applicable state, federal and tribal statutes and regulations;
5) that is based upon the best available current information, and that identifies the biological habitat and needs of bull trout;
6) which recognizes that nothing in this agreement shall be construed as obligating Restoration Team members to expend funds or make future payment of funds in excess of authorized appropriations.

US FISH & WILDLIFE SERVICE

MONTANA DEPT. FISH, WILDLIFE & PARKS

US FOREST SERVICE

CONFEDERATED SALISH & KOOTENAI TRIBES

PLUM CREEK TIMBER COMPANY, L.P.

DEPARTMENT OF STATE LANDS

MONTANA CHAPTER/AMERICAN FISHERIES SOCIETY

BONNEVILLE POWER ADMINISTRATION

NATIONAL WILDLIFE FEDERATION

Appendix B. Risk factors to bull trout in Montana Restoration/Conservation Areas (RCAs), and the threat the risk factor poses to future restoration of the bull trout. The description of threats and risks to the fish are the best scientific judgment of the Scientific Group and local resource experts/professionals. Those risks which are of greatest concern are noted with a double asterisk.

RISK	BITTER ROOT	BLACK FOOT	L.CLK FORK	M.CLK FORK	U.CLK FORK	FLAT HEAD	S. FK FLAT HEAD	SWAN	LOW KOOT	MID KOOT	UPP KOOT	SUM RANK
Environmental Instability												
Drought	*				*				*	*		4
Landslide/Geology	*		*							*		3
Flood/Rain on Snow	*		*						*	*		4
Fire	*				*					*		3
Introduced Species												
Private Ponds											*	1
Legal Introductions	**	**	**	**	**	**		**	*	**	*	18
Illegal Introductions	*	*	*	*	*		**	**	*	*	**	13
Fisheries Management	*	*	*	*		**						6
Barriers												
Culverts												0
Diversions	**	**			*						*	6
Thermal	*	*		*?	**					*		6
Dams		**	**	*	**					**		9

RISK	BITTER ROOT	BLACK FOOT	L.CLK FORK	M.CLK FORK	U.CLK FORK	FLAT HEAD	S. FK FLAT HEAD	SWAN	LOW KOOT	MID KOOT	UPP KOOT	SUM RANK
Habitat												
Grazing	**	**			**							6
Agriculture and Dewatering	**	*		**(Flat head)	**						*	8
Dam Operations				*(Flat head)			**		*	**	*	7
Forestry Practices	**	**	**	**	**	**	**	**	*	**	**	21
Recreational Develop.												0
Transportation				* (St Regis)					*	*		3
Population												
Population Trend	*	*	*	*	*	*						6
Distribution/Fragment.	*		**	*	*							5
Abundance	*		*	*	*	*			*	*		7
Biological Sampling												0
Angling		*		*				*		*		4
Illegal Harvest		*	**	**	*		*	*	*		*	10
TOTAL	22	20	18	19	21	9	7	9	10	18	11	

Appendix C. Summary of core areas and ownership, identified in Montana RCA status reports.

Core Area	Ownership	Area (ac)	Percent
BITTERROOT DRAINAGE (Total)	National Forest Lands	519498.2	88.2%
	Private Lands	65554.3	11.1%
	State Lands	3841.1	0.6%
	National Wildlife Ref.	211.8	<0.1%
Upper East Fork Bitterroot River	National Forest Lands	97364.9	99.1%
	Private Lands	853.2	0.9%
Warm Springs Creek Drainage	National Forest Lands	28191.1	98.9%
	Private Lands	313.7	1.1%
Sleeping Child Creek Drainage	National Forest Lands	49124.4	84.3%
	Private Lands	8656.4	14.9%
	State Lands	499.9	0.9%
Shalkaho Creek Drainage	National Forest Lands	64702.4	83.8%
	Private Lands	11977.7	15.5%
	State Lands	489.6	0.6%
Fred Burr Creek Drainage	National Forest Lands	29569.0	72.4%
	Private Lands	11263.5	27.6%
W. Fork Bitterroot above Painted Rocks Res.	National Forest Lands	187073.3	98.0%
	Private Lands	3615.2	1.9%
	State Lands	281.4	0.1%
Upper Burnt Fork Creek Drainage	National Forest Lands	41844.9	61.0%
	Private Lands	24586.9	35.8%
	State Lands	1965.4	2.9%
	National Wildlife Ref.	211.8	0.3%
Blodgett Creek	National Forest Lands	17436.4	78.1%
	Private Lands	4286.6	19.2%
	State Lands	604.8	2.7%
Little Boulder Creek	National Forest Lands	4191.8	100.0%
	Private Lands	1.1	<1.0%
BLACKFOOT (Total)	National Forest Lands	399255.5	66.8%
	Private Lands	175423.8	29.3%
	State Lands	21418.7	3.6%
	National Wildlife Ref.	204.9	<0.1%
	BLM	1409.9	0.2%
N. Fork Blackfoot River	National Forest Lands	157794.4	79.2%
	Private Lands	33399.3	16.8%
	State Lands	6547.9	3.3%
	National Wildlife Ref.	204.9	0.1%
	Bureau Land Manage.	1174.0	0.6%

Core Area	Ownership	Area (ac)	Percent
Monture Creek Drainage	National Forest Lands Private Lands State Lands	73472.1 17917.4 5603.7	75.7% 18.5% 5.8%
Copper Creek Drainage - Tributary of Landers Fork	National Forest Lands Private Lands State Lands	25501.3 1468.4 232.3	93.7% 5.4% 0.9%
Cottonwood Creek Drainage	National Forest Lands Private Lands State Lands Bureau Land Manage.	17753.6 21655.9 4306.4 74.7	40.5% 49.5% 9.8% 0.2%
Clearwater River above Rainy Lake (Includes E. Fork Stillwater River)	National Forest Lands Private Lands	10918.0 50.8	99.5% 0.5%
Deer Creek Drainage	National Forest Lands Private Lands	2424.2 10859.2	18.2% 81.8%
Placid Creek Drainage	National Forest Lands Private Lands State Lands	15155.5 16949.8 1724.6	44.8% 50.1% 5.1%
Belmont/Gold Creek Drainage	National Forest Lands Private Lands State Lands	15184.2 43314.5 1100.8	25.5% 72.7% 1.8%
Landers Fork Drainage	National Forest Lands Private Lands State Lands	44135.1 6866.9 834.2	85.1% 13.2% 1.6%
W. Fork Clearwater Drainage	National Forest Lands Private Lands	9230.0 12384.1	42.7% 57.3%
Morrell Creek Drainage	National Forest Lands Private Lands State Lands BLM Lands	27687.1 10557.3 1068.7 161.2	70.1% 26.7% 2.7% 0.4%
LOWER CLARK FORK DRAINAGE (Total)	National Forest Lands Private Lands State Lands	285526.7 24078.2 633.6	92.0% 7.8% 0.2%
Prospect Creek Drainage	National Forest Lands Private Lands State Lands	108403.8 6726.7 624.3	93.6% 5.8% 0.5%
Rock Creek Drainage	National Forest Lands Private Lands	19287.7 1310.3	93.6% 6.4%

Core Area	Ownership	Area (ac)	Percent
	State Lands	9.3	<0.1%
Vermillion River Drainage	National Forest Lands Private Lands	58062.0 9872.3	85.5% 14.5%
Bull River Drainage	National Forest Lands Private Lands	82786.9 5068.4	94.2% 5.8%
Graves Creek	National Forest Lands Private Lands	16986.2 1100.6	93.9% 6.1%
MIDDLE CLARK FORK DRAINAGE (Total)	National Forest Lands Private Lands State Lands Indian Lands or Res. National Wildlife Ref.	594975.9 137957.4 23229.8 203758.6 6441.1	61.6% 14.3% 2.4% 21.1% 0.7%
Fish Creek Drainage	National Forest Lands Private Lands State Lands	127884.5 27758.4 6571.3	78.8% 17.1% 4.1%
St. Regis River Drainage	National Forest Lands Private Lands State Lands	203586.0 15196.3 3140.9	91.7% 6.8% 1.4%
Trout Creek Drainage	National Forest Lands Private Lands	44784.9 641.0	98.6% 1.4%
Cedar Creek Drainage	National Forest Lands Private Lands	42895.6 2038.1	95.5% 4.5%
Petty Creek Drainage	National Forest Lands Private Lands State Lands	35717.9 16509.0 604.5	67.6% 31.2% 1.1%
Rattlesnake Creek Drainage	National Forest Lands Private Lands State Lands	44028.5 5151.0 259.5	89.1% 10.4% 0.5%
W. Fork Thompson River Drainage/Fishtrap Creek	National Forest Lands Private Lands State Lands	96078.4 27384.2 4410.8	75.1% 21.4% 3.4%
Jocko River Drainage	Indian Lands or Res. Private Lands State Lands National Wildlife Ref.	182184.2 43196.9 8242.7 6441.1	75.9% 18.0% 3.4% 2.7%
Mission Creek above Mission Dam	Indian Lands or Res. Private Lands	8838.8 82.5	99.1% 0.9%

Core Area	Ownership	Area (ac)	Percent
Post Creek above McDonald Dam	Indian Lands or Res.	12735.6	100%
UPPER CLARK FORK DRAINAGE (Total)	National Forest Lands Private Lands State Lands BLM Lands	180715.1 217302.2 18369.6 4182.1	43.0% 51.6% 4.4% 1.0%
Boulder Creek Drainage	National Forest Lands Private Lands State Lands BLM Lands	42875.9 2379.4 18.4 144.1	94.4% 5.2% 0.3% <0.1%
Warm Springs Creek Drainage	National Forest Lands Private Lands State Lands	47906.5 63807.1 2233.2	42.0% 56.0% 2.0%
Harvey Creek Drainage	National Forest Lands Private Lands State Lands BLM Lands	19506.2 5275.2 244.4 89.1	77.7% 21.0% 1.0% 0.4%
Racetrack Creek Drainage	National Forest Lands Private Lands State Lands	26285.5 10692.1 901.1	69.4% 28.2% 2.4%
Little Blackfoot River Drainage	National Forest Lands Private Lands State Lands BLM Lands	44141.0 135148.4 14972.5 3948.9	80.9% 18.7% 0.3% 0.1%
ROCK CREEK DRAINAGE (Total)	National Forest Lands Private Lands State Lands BLM Lands	311558.7 37447.7 1764.8 1000.2	88.6% 10.6% 0.5% 0.3%
East Fork Rock Creek above E. Fk. Reservoir Dam	National Forest Lands Private Lands State Lands	37566.3 12900.4 1035.6	72.9% 25.0% 2.0%
Middle Fork Rock Creek	National Forest Lands Private Lands State Lands BLM Lands	70108.8 7642.6 77.3 133.8	89.9% 9.8% 0.1% 0.2%
Stony Creek	National Forest Lands Private Lands	18727.2 235.0	98.8% 1.2%
Wyman Creek	National Forest Lands	10392.4	100%

Core Area	Ownership	Area (ac)	Percent
Hogback Creek	National Forest Lands Private Lands	10148.7 6.8	99.9% 0.1%
Alder Creek	National Forest Lands Private Lands	8848.2 0.5	100.0% <0.1%
Welcome Creek	National Forest Lands Private Lands	12732.2 6.6	99.9% 0.1%
Ranch Creek	National Forest Lands Private Lands	27680.9 240.3	99.1% 0.9%
Gilbert Creek	National Forest Lands Private Lands State Lands	10422.0 3997.7 4.5	72.3% 27.7% <0.1%
Walquist Creek			
FLATHEAD RIVER DRAINAGE (Total)	National Forest Lands Private Lands State Lands National Park Lands	499382.2 37348.5 79922.7 346738.7	51.8% 3.9% 8.3% 36.0%
Big Creek Drainage	National Forest Lands Private Lands State Lands	51352.0 1321.4 489.1	96.6% 2.5% 0.9%
Coal Creek Drainage	National Forest Lands Private Lands State Lands	35162.5 590.6 9141.3	78.3% 1.3% 20.4%
Whale Creek Drainage	National Forest Lands Private Lands State Lands	40456.4 233.5 519.7	98.2% 0.6% 1.3%
Trail Creek Drainage	National Forest Lands Private Lands State Lands	42201.0 2038.4 183.9	95.0% 4.6% 0.4%
Red Meadow Creek Drainage	National Forest Lands Private Lands	17611.5 687.4	96.2% 3.8%
Howell Creek Drainage (Canada)			
Cabin Creek Drainage (Canada)			
Nyack Creek Drainage	National Park Lands Private Lands	52045.3 2142.9	96.0% 4.0%
Park Creek Drainage	National Park Lands	18458.7	100%

Core Area	Ownership	Area (ac)	Percent
	Private Lands	4.2	<0.1%
Ole Creek Drainage	National Park Lands	29868.7	100%
Bear Creek Drainage	National Forest Lands Private Lands National Park Lands	24185.5 817.0 11185.3	66.8% 2.3% 30.9%
Long Creek Drainage	National Forest Lands Private Lands	13922.6 3.0	100.0% <0.1%
Granite Creek Drainage	National Forest Lands	18764.3	100.0%
Morrison Creek Drainage	National Forest Lands	30935.4	100.0%
Schafer Creek Drainage	National Forest Lands	32734.0	100.0%
Clack Creek Drainage	National Forest Lands	8562.1	100.0%
Strawberry Creek Drainage	National Forest Lands	31984.3	100.0%
Bowl Creek Drainage	National Forest Lands	19116.7	100.0%
Akolala Creek (Disjunct)	National Park Lands	3454.9	100.0%
Bowman Creek (Disjunct)	National Park Lands	26496.8	100.0%
Camas Creek (Disjunct)	National Park Lands Private Lands	10251.6 0.9	100.0% <0.1%
Cyclone Creek (Disjunct)	National Forest Lands State Lands	3807.0 2462.9	60.7% 39.3%
Harrison Creek (Disjunct)	National Park Lands	14301.1	100.0%
Kintla Creek (Disjunct)	National Park Lands	28192.2	100.0%
Lincoln Creek (Disjunct)	National Park Lands	7889.0	100.0%
Logan Creek (Disjunct)	National Forest Lands Private Lands State Lands	97865.2 12944.8 1330.3	87.3% 11.5% 1.2%
Logging Creek (Disjunct	National Park Lands	19811.4	100.0%
McDonald Creek (Disjunct)	National Park Lands Private Lands	101572.5 735.0	99.3% 0.7%
Quartz Creek (Disjunct)	National Park Lands	16645.3	100.0%
Swift Creek (Disjunct)	National Forest Lands Private Lands State Lands	11302.2 14150.1 36823.2	18.1% 22.7% 59.1%

Core Area	Ownership	Area (ac)	Percent
Upper Park Creek (Disjunct)	National Park Lands	6565.2	100.0%
Upper Stillwater River (Disjunct)	National Forest Lands Private Lands State Lands	17250.0 1679.2 28972.5	36.0% 3.5% 60.5%
Frozen Lake + inlet and outlet (Disjunct)	National Forest Lands	2169.6	100.0%
SOUTH FORK FLATHEAD DRAINAGE (Total)	National Forest	605616.7	100.0%
Wounded Buck Creek Drainage	National Forest	10909.1	100.0%
Wheeler Creek Drainage	National Forest	13564.2	100.0%
Sullivan Creek Drainage	National Forest	48995.0	100.0%
Spotted Bear River Drainage	National Forest	118633.6	100.0%
Bunker Creek Drainage	National Forest	66143.1	100.0%
Little Salmon Creek Drainage	National Forest	36255.9	100.0%
White River Drainage	National Forest	55154.2	100.0%
South Fork upstream from Gordon Creek	National Forest	202754.7	100.0%
Big Salmon Creek (Disjunct)	National Forest	49196.4	100.0%
Doctor Lake (Disjunct)	National Forest	4010.3	100.0%
SWAN RIVER DRAINAGE (Total)	National Forest Lands Private Lands State Lands	118978.7 36094.2 23316.3	66.7% 20.2% 13.1%
Elk Creek Drainage	National Forest Lands Private Lands	13832.4 3375.6	80.4% 19.6%
Goat Creek Drainage	National Forest Lands Private Lands State Lands	14314.7 4644.5 3210.4	64.6% 20.9% 14.5%
Lion Creek Drainage	National Forest Lands Private Lands	16946.3 3425.8	83.2% 16.8%
Piper Creek Drainage	National Forest Lands Private Lands	6328.5 1631.2	79.5% 20.5%
Jim Creek Drainage	National Forest Lands Private Lands	7240.9 4795.5	60.2% 39.8%

Core Area	Ownership	Area (ac)	Percent
Lost Creek Drainage	National Forest Lands State Lands	15517.8 4358.6	78.1% 21.9%
Woodward Creek Drainage	National Forest Lands Private Lands State Lands	3439.1 6084.7 6447.7	21.5% 38.1% 40.4%
Cold Creek Drainage	National Forest Lands Private Lands	12490.3 7947.5	61.1% 38.9%
Lindbergh Lake (Disjunct)	National Forest Lands Private Lands	21388.0 3627.1	85.5% 14.5%
Holland Lake (Disjunct)	National Forest Lands	4883.3	100.0%
Soup Creek	National Forest Lands Private Lands State Lands	2597.4 562.2 9299.6	20.8% 4.5% 74.6%
LOWER KOOTENAI DRAINAGE (Total)	National Forest Lands Private Lands State Lands	56512.2 4859.2 651.2	91.1% 7.8% 1.0%
O'Brien Creek Drainage	National Forest Lands Private Lands State Lands	26106.6 4042.8 330.3	85.7% 13.3% 1.1%
Keeler Creek (disjunct)	National Forest Lands Private Lands State Lands	30405.7 816.4 320.9	96.4% 2.6% 1.0%
Long Creek, Idaho			
Fisher/Parker Creeks, Idaho			
Stanley Creek (disjunct)			
MIDDLE KOOTENAI DRAINAGE (Total)	National Forest Lands Private Lands State Lands	201418.4 37753.6 4295.2	82.7% 15.5% 1.8%
Quartz Creek Drainage	National Forest Lands Private Lands	22663.0 855.7	96.4% 3.6%
Pipe Creek Drainage	National Forest Lands Private Lands State Lands	55012.9 12347.0 627.9	80.9% 18.2% 0.9%

Core Area	Ownership	Area (ac)	Percent
Libby Creek Drainage	National Forest Lands Private Lands State Lands	123742.5 24551.0 3667.4	81.4% 16.2% 2.4%
UPPER KOOTENAI RIVER DRAINAGE	National Forest Lands Private Lands State Lands	59598.4 7436.9 438.6	88.3% 11.0% 0.6%
Grave Creek Drainage	National Forest Lands Private Lands State Lands	43820.8 4191.3 123.7	91.0% 8.7% 0.3%
Wig Wam River (Montana Portion)	National Forest Lands Private Lands	15575.6 30.9	99.8% 0.2%
Phillips Creek (disjunct)	National Forest Lands Private Lands State Lands	202.1 3214.7 314.8	5.4% 86.1% 8.4%
Total of ALL Core Areas in All RCAs in Montana	National Forest Lands Private Lands National Park Lands Indian Reservation State Lands BLM Lands National Wildlife Ref. TOTAL	3833037.7 781255.9 346738.7 203758.6 177881.6 6592.2 6857.8 5,356,121.5	71.6% 14.6% 6.5% 3.8% 3.3% 0.1% 0.1% 100%

SECONDARY CORE STREAMS			
Bitterroot	Little Boulder Creek		
	Blodgett Creek		
Blackfoot	Alice Creek		
	Hogum Creek		
	Arastra Creek		
	Poorman Creek		
	Beaver Creek		
Lower Clark Fork	Swamp Creek		
	Martin Creek		
Rock Creek	West Fork Rock Creek		
	Cinnamon Bear Creek		
South Fork Flathead	Felix Creek		
Lower Kootenai	Callahan Creek		
Middle Kootenai	West Fisher		
	Fisher River		
Upper Kootenai	Canadian tribs. to the Wigwam River and Kootenay River		

Appendix D. Summary of restoration goals for Bull Trout RCAs in Montana, as listed in individual status reports (MBTSG 1995 a-e, 1996a-f)

BITTERROOT

- Maintain self-sustaining bull trout populations in all the watersheds where they presently exist
- Maintain the population genetic structure throughout the watershed
- Reestablish connectivity between the Bitterroot River and its tributaries
- Establish a self-reproducing migratory population in the Bitterroot River which spawns in all identified core area tributary streams
- Maintain a count of at least 100 redds or 2,000 total individuals in the migratory population over a period of 15 years (3 generations), with spawning distributed among all identified core watersheds

BLACKFOOT

- Maintain the self-reproducing migratory life form in the Blackfoot River which have access to tributary streams and spawn in all core watersheds
- Maintain the population genetic structure throughout the watershed
- Maintain and increase the connectivity between the Blackfoot River and its tributaries
- Establish a baseline of redd counts in all drainages that presently support spawning migratory bull trout
- Maintain a count of at least 100 redds or 2,000 individuals in the Blackfoot drainage, with an increasing trend thereafter

LOWER CLARK FORK

- Maintain self-sustaining bull trout populations in all watersheds where they presently exist
- Maintain the population genetic structure throughout the watershed
- Reestablish the historic bull trout migratory corridor in the Clark Fork River-Lake Pend Oreille system
- Establish baseline redd surveys in all drainages that presently support spawning migratory bull trout
- Maintain a count of at least 100 redds or 2,000 total individuals in the migratory population sustained over a period of 15 years (3 generations), with spawning well distributed within identified core areas
- Assess the feasibility of providing fish passage

MIDDLE CLARK FORK

- Maintain self-sustaining bull trout populations in all the core areas where they presently exist
- Maintain the population genetic structure throughout the watershed
- Reestablish connectivity within the Clark Fork River and between the Clark Fork and Flathead rivers and their tributaries.
- In the Clark Fork River above the St. Regis River: Maintain a count of at least 100 redds or 2,000 total individuals in the migratory populations over a period of 15 years (or at least three generations), with spawning distributed among all identified core areas

- In the Clark Fork River from Thompson Falls Dam up to, and including, the St. Regis River: maintain a count of at least 100 redds or 2,000 total individuals in the migratory population over a period of 15 years (or at least three generations), with spawning distributed among all identified core areas
- In the Flathead River portion of the drainage: maintain a count of at least 100 redds or 2,000 total individuals in the migratory populations over a period of 15 years (or at least three generations), with spawning distributed among all identified core areas

UPPER CLARK FORK
- Maintain self-sustaining bull trout populations in all the watersheds where they presently exist
- Maintain the population genetic structure throughout the watershed
- Reestablish a migratory corridor through Milltown Dam between the upper Clark Fork and middle Clark Fork
- Restore the connectivity within the Clark Fork River
- Establish a self-reproducing migratory population in the Clark Fork River which is connected to, and spawns in, tributary streams
- Maintain a count of at least 100 redds or 2,000 total individuals in the migratory population over a period of 15 years (at least three generations), with spawning distributed among all identified core areas

ROCK CREEK
- Maintain self-sustaining bull trout populations in all the watersheds where they presently exist
- Maintain the population genetic structure throughout the watershed
- Maintain a count of at least 100 redds or 2,000 total individuals over a period of 15 years (3 generations) in the Rock Creek Watershed

FLATHEAD
- Maintain or restore self-sustaining populations in the core areas
- Protect the integrity of the population genetic structure
- Enhance the migratory component of the population
- Increase bull trout spawners to attain the average redd count level of the 1980's, and maintain this level for 15 years (3 generations) in the North Fork and Middle Fork monitoring areas. The average 1980's redd counts in index streams were 240 in the North Fork (Whale, Trail, Coal and Big creeks) and 151 in the Middle Fork (Morrison, Granite, Lodgepole, and Ole creeks)
- Provide a long-term stable or increasing trend in overall population.
- Provide for spawning in all core areas

SOUTH FORK FLATHEAD
- Maintain the population's genetic structure and do not allow loss of the existing diversity
- Protect and maintain the existing native species complex through natural reproduction
- Determine the age structure of the spawning population and ensure it remains healthy

- Establish a baseline population index and develop population goals that will maintain or improve those baseline levels

SWAN

- Maintain the population genetic structure both within and between tributaries in the Swan River drainage (the genetic effects of an expanding Swan bull trout population on Flathead Lake populations is unknown)
- Maintain a self-sustaining bull trout population dominated by the migratory life form
- Maintain stable population levels within the current bull trout distribution, especially in all core areas
- Maintain the age structure of the spawning population
- Maintain the existing high degree of connectivity within the Swan River drainage
- Quantify and maintain the existing pattern of inter-annual variation in spawner escapement between streams (currently, some go up while others go down - if these patterns begin to occur in synchrony, the likelihood of extinction is increased)
- Minimize the opportunity for movement of introduced species into the drainage above Bigfork Dam, but explore options for upstream migration of native species from Flathead Lake [Currently there is no upstream passage at Bigfork Dam, and lake trout and lake whitefish are present below the dam. If lake trout are established in the Swan drainage, the bull trout population will be negatively impacted. However, this lack of connectivity with the Flathead drainage may be detrimental to bull trout and cutthroat trout in both the Flathead and the Swan drainages. Selective passage of bull trout and westslope cutthroat trout at Bigfork Dam may be desirable at some point in the future but there is great concern that human error or equipment failure could result in inadvertent transport of lake trout upstream. Many do not believe the risk is worth taking.]

LOWER KOOTENAI

- Maintain existing self-sustaining populations with stable age structure and distribution
- Protect the integrity of the population genetic structure
- Improve current habitat conditions in O'Brien Creek
- Establish a protocol for information exchange with Idaho and British Columbia
- Establish a baseline of redd counts in all drainages that presently support spawning migratory fish (O'Brien Creek, possibly Callahan Creek, and the Yaak river below Yaak Falls)
- Maintain a count of at least 100 redds or 2,000 individuals over a period of 15 years (or at least three generations), with spawning distributed among all identified core areas, and an increasing trend thereafter
- For the disjunct Bull Lake population: maintain the population genetic structure, improve habitat conditions in the core areas (Stanley and Keeler Creeks), and maintain the migratory component of the population. Establish a baseline of redd counts in all drainages that presently support spawning migratory fish. At least 100 redds or 2,000 individuals over a period of 15 years (or at least three generations), with spawning distributed among all identified core areas, and an increasing trend thereafter.

MIDDLE KOOTENAI

- Maintain the population genetic structure by ensuring that all existing populations will remain stable or increase from current numbers in the future
- Maintain the self-reproducing migratory life form in the Kootenai River which has access to tributary streams and spawns in core areas
- Maintain and increase the connectivity between the Middle Kootenai River and its tributaries
- Increase the number of quality spawning tributaries
- Establish a baseline of redd counts in all drainages that presently support spawning migratory bull trout
- Maintain a count of at least 100 redds or 2,000 individuals in the middle Kootenai drainage over a period of 15 years (or at least three generations), with spawning distributed among all identified core areas
- Maintain and improve habitat conditions in Quartz Creek
- Increase spawning in the Fisher River and Libby Creek

UPPER KOOTENAI

Due to the existing uncertainties and data needs, the following restoration goal should be considered interim pending further study and better coordination with British Columbia:.

- Maintain a self-sustaining population dominated by the migratory life form
- Maintain the population genetic structure
- Maintain a stable or increasing trend in spawning escapement (redd counts) for three generations (15 years)
- Stabilize and improve habitat in core areas. Initial efforts should focus on documenting current distribution and abundance so core areas can be reevaluated
- Coordinate actions with British Columbia to accomplish restoration goals

Appendix E. Outline Narrative of possible processes and actions that could aid in the restoration of bull trout in Montana. This section borrows from several works of Rieman and McIntyre (1993, 1995, 1996), Frissell and Nawa (1992), Frissell (1993), and Utah Department of Natural Resources (1997) (**Note**: Not all items apply to all watersheds).

A. Habitat Management

1.0. Characterize physical processes that affect suitable habitat

Physical processes such as geomorphology, groundwater influence, and gradient significantly affect bull trout distribution and abundance across their range, and the effects vary by site (Watson and Hillman 1997). A thorough understanding of the interaction of these physical processes is necessary to fully understand the factors affecting bull trout distribution and abundance, particularly when developing land management protection and enhancement programs.

1.1. Geomorphology
1.2. Ground water influence
1.3. Gradient

2.0. Delineate suitable habitat within each watershed

Bull trout habitat that is occupied during parts or all of the year should be delineated within each watershed. Potential and previously occupied suitable habitat similarly should be delineated, with emphasis on areas where connectivity is lacking.

2.1. Delineate additional habitat as survey, inventory, and restoration efforts justify

Additional suitable habitat should be delineated as survey and inventory efforts increase the known distribution of bull trout, and as restoration efforts lead to expansion of currently occupied range.

3.0. Categorize and prioritize drainages suitable for bull trout in each watershed

Delineated bull trout habitat should be categorized into different management categories, and within each category, those drainages should be ranked and prioritized in order of importance to restoration of bull trout.

3.1. Define different habitat types/categories

Within each watershed, bull trout habitat will be categorized into each of the following habitat types:

3.1.1. Core habitat

Because of their importance to individual populations, the statewide population, and RCA and statewide restoration goals, identification of important core areas is essential. Core areas in each RCA will be identified, and should be identified

strictly on their biological capacity to function as core areas, independent of existing or planned land uses.

3.1.2. Nodal habitat

Nodal habitat includes waters that provide migratory corridors, overwintering areas, or other critical life history requirements for sub-adult and adult overwintering and migrating bull trout. Identification and protection of nodal habitat is important for maintaining proper metapopulation function.

3.1.3. Other occupied habitat

3.1.4. Important potential habitat

3.2. Develop criteria to prioritize drainages for protection and/or restoration within each habitat type

Criteria to prioritize drainages for protection and/or restoration within each habitat type should be developed for each watershed. Criteria emphasis will be on those habitats that contain the strongest populations, and those that would contribute most to restoration of the species in the watershed and overall.

3.3. Prioritize habitats in order of importance for protection and/or restoration

Within each watershed, delineated habitat types will be prioritized based on criteria developed for the watershed, as well as the importance of the habitat to restoration of bull trout in the watershed and overall.

4.0. Maintain existing high priority habitat types

Quality bull trout habitat and habitat processes must be maintained to ensure long-term viability of bull trout populations. Successful conservation of bull trout depends on maintaining existing locally adapted and diverse bull trout populations through protection of those habitats in the best condition with the strongest populations. Management actions in these areas should minimize risks that might result in the alteration of the quality, complexity or ecological and hydrological processes in these areas (Rieman and McIntyre 1993). Management recommendations for the different habitat types delineated in each watershed are described below.

4.1. Core Areas

Core areas are watersheds, including tributary drainages and adjoining uplands, used by migratory bull trout for spawning and early rearing, and by resident bull trout for all life history requirements. Core areas typically support the strongest remaining populations of spawning and early rearing bull trout in an RCA, and are usually in relatively undisturbed habitat.

4.1.1. Ensure core areas remain intact, and management actions do not significantly alter the quality, complexity, or ecological or hydrological processes in core areas.

Core areas typically contain the strongest remaining spawning and early rearing populations of bull trout, and are usually in relatively undisturbed habitat. These areas need to have the most stringent levels of protection as they currently meet the specific habitat requirements of spawning and early rearing bull trout, and will potentially provide the stock for recolonization of adjacent drainages. It is essential to identify and protect these habitats to facilitate population expansion and restoration. Management activities should be carefully planned and implemented in core areas. Conservation strategies developed by land management entities for these areas should recognize the importance of maintaining the integrity of essential habitat components:

a. Water temperature - Water temperature requirements for bull trout vary for different life stages. Management actions should maintain or enhance water temperature requirements for bull trout in sensitive reaches of bull trout core areas.

b. Substrate and sediment regime - Bull trout embryo survival, fry emergence, and overwinter survival, as well as habitat productivity, are very sensitive to increases in fine sediments in the substrate. The sediment regime in which the aquatic system evolved should be maintained or restored to reduce input of fines. Actions that alter the natural timing, volume, input, rate, storage, and transport of sediments in important bull trout habitat should be avoided.

c. Habitat complexity - including cover, sinuosity, gradient, and substrate is required for proper functioning of bull trout habitat. Complexity should be maintained in all important bull trout habitat, and restored where appropriate.

d. Streamflow (maintain natural hydrologic conditions such as flow quantity, timing, duration to maintain natural channel and floodplain features) - Important hydrologic conditions should be maintained or mimicked through maintenance of instream flows, reservoir operations, timing and duration of diversions, and management of runoff to ensure necessary hydrologic conditions meet the requirements of different life stages of bull trout at required times and locations of those life stages.

e. Channel stability - The stability and physical integrity of the aquatic habitat used by bull trout, including stream banks, shorelines, and bottom configuration, should be maintained or restored to ensure proper function and optimal conditions for bull trout.

f. Connectivity - Connectedness within and among metapopulations is necessary for long-term viability of bull trout populations. Where possible and appropriate, physical barriers such as dams, diversions, and culverts should be removed or modified to allow passage. Fish passage structures should be built where barriers cannot be removed. Sources and causes of other types of barriers such as dewatered portions of

stream, chemical barriers resulting from runoff, and thermal barriers should be identified, evaluated, and corrected to restore connectivity.

g. Stable, vegetated banks

h. Chemical water quality - Bull trout require clean, cool water. Point and nonpoint sources of runoff have been identified as threats to bull trout habitat is several watersheds. Sewage effluent from Butte, Missoula, and Deer Lodge contributes to poor water quality and algal growth in the Clark Fork River. Excessive agricultural runoff similarly leads to poor water quality and algal growth in some areas. Contaminated mine runoff has immediate and chronic toxic effects that negatively impact bull trout. Actions that negatively affect water quality parameters such as temperature, pH, dissolved oxygen, nutrient input, and chemical composition should be avoided, and factors already negatively impacting water quality should be remediated.

i. In-stream cover such as boulders, woody debris, and undercut banks are necessary and should be maintained. Sources of instream cover must also be maintained, including recruitment of large woody debris. Coarse woody debris in streams has been correlated with bull trout distribution and abundance. Woody debris should be left in stream channels, and the riparian corridor and associated uplands should be managed to allow continual recruitment of woody debris in habitats where woody debris comprise the primary type of cover.

4.1.2. Designate additional core areas as additional inventory and monitoring data justify

Additional areas meeting requirements of a core area should emerge as restoration efforts become implemented, habitat conditions improve, and survey and inventory data accumulate. Important bull trout habitat should be evaluated periodically to determine if it meets the requirements of a core area. If so, it should be considered as, and managed as already delineated core areas.

4.2. Nodal Areas

"Nodal" habitats are critical for maintaining existing populations, life histories, and metapopulation function. Migratory corridors and overwintering areas should be managed to retain natural physical and biological conditions that enable migration and gene flow. Additional nodal habitat should be identified as survey and inventory data increase and restoration efforts are completed.

4.2.1. Ensure important habitat processes in nodal habitats meet the requirements of sub-adult and adult overwintering, rearing, and migrating bull trout

Migratory corridors between core areas, spawning sites, and overwintering areas are critical for maintaining viable metapopulation function. Because of their importance to the population and restoration efforts, important nodal areas should receive a high level of protection from detrimental impacts. Management activities must be carefully planned and implemented in important nodal habitat to

maintain its ability to meet the life history needs of bull trout. Activities that could result in impacts to habitat criteria important in nodal areas should be rigorously scrutinized to ensure nodal habitat is not degraded. All habitat functioning as a migratory corridor to connect sites important to different life stages must be identified and managed to meet the requirements of bull trout. Rivers and water bodies that function as overwintering habitat for adult bull trout should be identified, and managed to ensure important biological processes are maintained such that they continue to function as overwintering habitat. Conservation strategies developed by land management entities for these areas should recognize the importance of maintaining the integrity of essential habitat components:

a. Water temperature
b. Habitat complexity
c. Streamflow (maintain natural hydrologic conditions to maintain natural channel and floodplain features)
d. Connectivity
e. Stable, vegetated banks
f. Chemical water quality
g. Instream cover

4.2.2. Designate additional nodal area habitat as additional inventory and monitoring data justify

As restoration efforts become effective, management practices change, and inventory and monitoring data accumulate, new areas should be designated and managed appropriately as nodal habitat. As additional core areas are identified, additional nodal habitat connecting core areas must also be identified and designated.

4.3. Potential habitat

Habitat that has potential to support bull trout, especially that which connects existing occupied, fragmented habitat, is important to the eventual restoration of viable bull trout populations. High priority potential habitat should be protected from further degradation, and where necessary, restored to make it suitable for bull trout. Survey and inventory of potential bull trout habitat should continue where the presence/absence and status of bull trout is unknown. All bull trout distribution and population data collection should be standardized, and located in a centralized database repository available to authorized scientists, researchers, and managers.

5.0. Restore high priority core area habitat, nodal area habitat, and potential habitat such that it meets the requirements of bull trout, as described in Appendix F *(The Relationship Between Land Management Activities and Habitat Requirements of Bull Trout)*

Restoration of degraded high priority habitat to proper functioning conditions, and elimination of factors limiting recovery of bull trout in each watershed, will enable restoration of viable

populations of bull trout. Restoration includes restoring hydrologic function, removing barriers, correcting existing limiting factors, and reducing or eliminating threats.

5.1. Evaluate past and present conditions in each habitat type by watershed

Past and present conditions should be compared where possible to identify "historical" conditions and specific degradation factors, and to plan restoration efforts. Aerial photography, old management records and plans, and other historical data should be compared against current conditions to assess factors resulting in current conditions.

5.2. Identify existing specific threats in each habitat type and watershed that may be limiting bull trout

Many habitats are being limited by one or more impacts such as barriers, degraded habitat, or introduced fishes. Site specific and rangewide threats that are limiting restoration and the long-term viability of populations should be identified by waterbody, watershed, and/or recovery basin.

5.3. Implement restoration efforts to enhance suitability of habitat for bull trout

Once factors limiting an area's suitability as bull trout habitat are identified, and where possible, restoration efforts should be planned and implemented to alleviate the limiting factor(s) and restore suitability of the habitat for bull trout, and to improve ecological function and value of the area. Site specific restoration processes might include:

a. Redcue management induced sediment delivery
b. Control industrial, agricultural, and sewage effluent runoff
c. Screen water diversions and irrigation ditches
d. Secure instream flows/water rights from willing sellers
e. Install appropriate fish passage structures where needed
f. Riparian fencing
g. Bank stabilization
h. Runoff control structures
I. Remove barriers where appropriate
j. Stream channel restoration
k. Provide instream-structure
l. Restore recruitment of large woody debris to the stream channel
m. Restore connectedness and opportunities for migration where possible and desirable
n. Other specific items as identified in each watershed

6.0. Continue to implement existing habitat protection standards and regulations, encourage voluntary conservation standards, and determine their effectiveness towards conservation of bull trout

Several regulatory practices are in place that address some of the issues that have been identified as threats to bull trout in Montana, particularly habitat management, land use practices, and streamside protection regulations. Existing regulations, such as SMZ regulations, should be

thoroughly reviewed to ensure they are achieving the desired results. Other regulatory stipulations such as the Stream Protection Act and the Natural Streambed Protection Act should also be reviewed to determine effectiveness at protecting important bull trout habitat. Additional necessary regulations should be considered when and where necessary.

6.1. Implement and enforce existing regulatory requirements

Existing state and federal regulatory requirements including the Montana Stream Protection Act, Streamside Management Zone Law, and Montana Natural Streambed and Land Preservation Act, Federal Cleanwater Act, etc. serve to various degrees to protect stream bed, banks, adjoining riparian habitat, and water quality. These regulatory mechanisms should continue to be implemented and enforced throughout bull trout habitat to ensure projects they permit minimize impacts to important bull trout habitat requirements.

6.1.1. Montana Stream Protection Act
6.1.2. Streamside Management Zone Law
6.1.3. Montana Natural Streamside and Land Preservation Act
6.1.4. INFISH and other appropriate guidelines

Forest management policies and guidelines, including INFISH, Forest Management Plans, Resource Management Plans, and other appropriate guiding policies should be fully implemented and adhered to on federal lands containing bull trout habitat. If these guidelines are insufficient to protect bull trout habitat, modifications should be enacted to address the insufficiencies.

6.2. Review implementation compliance and effectiveness of existing regulatory laws towards maintaining bull trout habitat components (as described in Appendix F - *The Relationship Between Land Management Activities and Habitat Requirements of Bull Trout*) necessary for bull trout restoration and conservation, and make recommendations to minimize impacts to bull trout as part of the permitting process

To determine the effectiveness of existing regulatory laws towards maintaining necessary bull trout habitat components, audits of compliance and effectiveness should be conducted. Audits should include long-term habitat monitoring to determine the effectiveness of existing regulations towards meeting and maintaining habitat criteria necessary for bull trout.

6.2.1. Review applications for regulatory permits and make recommendations to minimize impacts to bull trout habitat

Applications for permits to alter stream channels, stream banks, or associated riparian habitat regulated by the Montana Stream Protection Act, Streamside Management Zone Law, and Montana Natural Streambed and Land Preservation Act should be thoroughly reviewed by personnel from the Department of Environmental Quality, Department of Natural Resources and Conservation,

and/or Department of Fish, Wildlife & Parks. Recommendations specific to bull trout conservation for the activity will be made as part of the permit application and review process.

6.2.2. Monitor compliance with regulations and permit stipulations

Compliance with existing habitat protection regulations and effectiveness towards meeting and maintaining desired habitat conditions for bull trout should be evaluated, and weaknesses elucidated.

6.2.3. Determine deficiencies of existing regulations towards maintaining habitat processes necessary for bull trout restoration and conservation

In addition to audits of compliance, long-term monitoring should be conducted to determine if existing regulations are effective towards maintaining necessary habitat conditions for bull trout. Recommendations to address deficiencies and improve such regulations to benefit bull trout should be developed and enacted. Examples of habitat components that should be monitored are described in Appendix F (*The Relationship Between Land Management Activities and Habitat Requirements of Bull Trout*).

6.2.4. Implement additional local, state, and federal regulatory practices as necessary and applicable to maintain habitat processes necessary for bull trout restoration

Modification of existing requirements, as well as implementation of additional regulatory requirements, should be enacted and implemented as necessary to protect important bull trout habitat from specific identified threats and degradation. Examples of such laws might be stricter SMZ requirements if it is determined current requirements are insufficient.

6.3. Develop and evaluate BMPs for a variety of activities and encourage land management entities to develop conservation strategies that are consistent with the needs of bull trout and with this restoration plan

6.3.1. Continue to conduct and evaluate forestry BMP audits; tie to fish monitoring to determine effectiveness

Forestry best management practices (BMPs) should continue to be implemented for timber sales and related activities. Compliance audits should be completed at a selected number of randomly picked sites where timber sales have occurred to determine compliance. Repeat audits and long-term monitoring should be established to determine long-term effectiveness of BMP practices towards conservation of bull trout, and modifications to BMPs should be made as data supports.

6.3.2. Conduct and evaluate grazing BMP audits; tie to fish monitoring to determine effectiveness

Grazing best management practices (BMPs) should be implemented at a selected number of representative allotments in bull trout habitat. Compliance audits should be completed to determine compliance. Repeat audits and long-term monitoring should be established to determine long-term effectiveness of BMPs, and modifications to recommended BMPs should be made as data supports.

6.3.3. Encourage stricter zoning/building requirements for developments near stream banks to reduce cumulative impacts from housing developments

Commercial and recreational developments along streams may impact bull trout by modification of stream channels, increased sedimentation, loss of riparian cover, and nonpoint pollution runoff. Zoning guidelines to reduce impacts of development would help to reduce impacts.

6.3.4. Prevent sediment delivery to streams

BMP standards that currently are applied to logging roads to reduce sediment delivery to streams should also be applied where roads are constructed for other purposes in bull trout core and nodal habitat.

7.0. Operate reservoirs to minimize impacts on bull trout

Resident bull trout occur in some reservoirs, and migratory bull trout use reservoirs as important nodal and overwintering habitat. In some areas, reservoirs and reservoir operations may be the most significant factor limiting the restoration and long-term viability of bull trout. Dams serve as passage barriers to bull trout, and dam operations may severely impact critical life stages of bull trout in an entire watershed. Storage of water and reservoir operations affect floodplain dynamics, sediment regimes, habitat complexity, water temperatures, and bull trout migration. However, dams may also have beneficial impacts by restricting movement of introduced species such as brook trout that may compete with, hybridize with, or prey on bull trout, or carry disease that may infect bull trout. Reservoirs should be operated to protect and maintain conditions for bull trout and other native species.

Dams considered major barriers to fish movement include:

Dam	Separates	From
Kerr	Lower Flathead/Clark Fork	Flathead Lake
Milltown	Middle Clark Fork	Upper Clark Fork
Thompson Falls	Lower Clark Fork	Lake Pend Oreille
Noxon	Lower Clark Fork	Lake Pend Oreille
Cabinet Gorge	Lower Clark Fork	Lake Pend Oreille
Bigfork	Flathead Lake	Swan River
Libby	Upper Kootenai River	Lower Kootenai River

7.1. Develop operational rules that protect and maintain conditions for bull trout, with consideration that they must also serve the multi-use purposes of dams and adhere to specific operational requirements

Management of reservoirs is complex due to multiple ownerships with multiple operation considerations and requirements, including power generation, flood control, water delivery, and flow regulation. Some operational parameters that may be contradictory to this plan are mandated, such as federal flood control requirements and other endangered species requirements. However, whenever and wherever possible, operational rules that protect and maintain conditions for bull trout should be followed so such operations minimally impact bull trout.

7.1.1. Implement integrated rule curves (IRCs)

Integrated rule curves developed for Libby and Hungry Horse reservoirs should be implemented to ensure flow timing, quantity, and duration are sufficient to meet the needs of bull trout and other species, and maintain a healthy, functional aquatic ecosystem.

7.1.1.a. Implement Integrated Rule Curves for operation of Libby Dam, and adhere to the 90-110' recommended drawdown limit until this occurs, allowing for variances needed for flood control requirements.

7.1.1.b. Implement Integrated Rule Curves for operation of Hungry Horse Dam, and adhere to the 85' recommended drawdown limit until this occurs, allowing for variances needed for flood control requirements.

7.2. Review reservoir operations in bull trout RCAs

Overall operation of reservoirs should be reviewed to evaluate specific positive and negative impacts to all life stages of bull trout affected by the reservoir.

7.2.1. Provide recommendations through FERC relicensing process

Several dams are currently undergoing, or soon will be undergoing federal relicensing by FERC. Recommendations for operational rules that protect and maintain conditions for bull trout, passage issues, and other operational issues should be developed and mandated through this process.

7.2.1.a. Recommendations to reduce negative impacts of reservoir operations on bull trout will be made during FERC relicensing of hydroelectric dams.

7.2.1.b. Recommendations resulting from FERC relicensing of hydroelectric dams should be implemented.

7.3. Avoid excessive drawdown

As part of the evaluation of reservoir operations, recommendations for maximum allowable drawdown should be developed and followed, along with the conditions under which those recommendations could be exceeded, such as for federal flood control requirements. Reservoir operators should avoid exceeding the recommended drawdown limit in order to minimize potential impacts to bull trout, habitat, and proper ecosystem functioning.

7.4. Maintain necessary flows below reservoirs during critical life stages of bull trout

Different life stages of bull trout have different flow requirements during different times of the year. It is essential that proper flow quantity, timing, and duration occur below reservoirs to accommodate the different needs. For example, staging adults may need higher flows for upstream movements at certain locations during late summer than they would in early spring or at other locations. Reservoir operations should attempt to mimic the natural hydrograph during critical life history stages.

7.5. Stabilize flow regimes at "load-following" facilities

Load following facilities are those where releases occur in response to electricity demands. This often results in dramatically changing flows from hour to hour and day to day, depending on electricity demands, and leads to an unstable aquatic ecosystem below the reservoir. Flows at these facilities should be evaluated, and where supported by specific evaluations, flow regimes should be modified to reduce impacts associated with currently fluctuating flow regimes.

7.6. Allow peak flows that simulate natural peak flows to prevent delta formation at the mouths of tributaries

In some areas, such as below Libby Dam, lack of flushing action as a result of constant, regulated flows has led to accumulation of sediments at tributary mouths, and formation of deltas. High releases to simulate natural peak flows should occur periodically from reservoirs to flush sediments and mimic and restore natural conditions below the reservoirs.

7.7. Allow for fish passage where necessary and feasible

Fish passage has been identified as an important factor limiting proper metapopulation function in some RCAs. Methods to allow passage should be developed on a site-by-site basis where feasible and appropriate. Potential for upstream migration of introduced species and disease must be considered when evaluating specific dams for fish passage.

7.7.1. At Lower Clark Fork Dams (Cabinet Gorge, Noxon Rapids, Thompson Falls):

a. Determine genetic baseline of bull trout blocked by Cabinet Gorge Dam
b. Determine genetic baseline of bull trout collected from tributaries upstream of Cabinet Gorge, Noxon Rapids, Thompson Falls, and Milltown Dams
c. Compare genetic baselines of blocked fish with tributary fish to determine proportion of blocked fish that originated in each tributary (spawning) stream
d. Conduct telemetry studies in conjunction with genetic baseline studies to determine spawning locations of blocked fish
e. Implement methods to allow passage of blocked fish to historical spawning tributaries

8.0. Protect habitat through purchase, conservation easements, management plans, etc.

Important habitat and habitat processes should be protected for long-term benefit through purchase of habitat, purchase of conservation easements, and adherence to management plans for that habitat. These types of measures should be considered on a site-by-site basis, and implemented where necessary to ensure the long-term protection of important bull trout habitat.

9.0. Monitor baseline habitat conditions and habitat restoration progress, and implement an adaptive management feedback loop

In order to determine the effectiveness of habitat protection and restoration techniques and efforts, a monitoring program exhibiting appropriate statistical rigor should be implemented. Baseline habitat conditions should be described quantitatively and qualitatively in bull trout watersheds to monitor effects of land management practices, effects of specific restoration efforts, and results of overall habitat restoration efforts. A rigorous sampling of habitat parameters that capture spatial and temporal variation should be completed in conjunction with ongoing restoration efforts. An example of baseline parameters that might be measured are identified in Appendix F (*The Relationship Between Land Management Activities and Habitat Requirements of Bull Trout).*

9.1. Establish index reaches in streams in each 4th code HUC watershed

Index reaches in different habitat types should be established to enable long term monitoring of habitat conditions and criteria in each watershed.

9.2. Determine specific baseline habitat conditions in index reaches in each 4th code HUC watershed

Specific baseline habitat criteria should be monitored in index reaches of streams in different habitat types in each watershed to determine long-term trends.

9.2.1. Water temperature

9.2.2. Substrate

a. Substrate scores provide an overall assessment of streambed particle size and quality. Higher substrate scores reflect a situation in which large particles are not

covered by finer material and therefore provide more spaces between the rocks which are favored by juvenile bull trout. This is important because juvenile bull trout are extremely substrate oriented, and changes in substrate can affect the number of bull trout in the stream. Substrate scoring involves visually assessing the dominant and subdominant streambed substrate particles, along with embeddedness in a series of cells across transects.

b. Hollow core sampling measures the size range of materials in the streambed. Research has shown an inverse relationship between incubation success and fine sediment in redds (Chapman 1988). A similar negative correlation has been found for emergence success (Weaver and Fraley 1991, 1993). Monitoring both streambed substrate score and streambed composition in spawning areas provides information pertinent to land management decisions that might affect bull trout.

9.2.3. Habitat Complexity
9.2.4. Stream flow, timing, and duration
9.2.5. Channel stability and condition
9.2.6. Chemical water quality

9.3 Monitor effects of habitat restoration efforts and techniques on bull trout habitat integrity

The effectiveness of habitat restoration and conservation efforts and techniques on bull trout habitat components should be monitored. Monitoring should include both establishing baseline conditions and determining the effectiveness of proposed conservation measures and techniques to ensure they maintain or enhance bull trout habitat.

9.4. Incorporate an adaptive management feedback mechanism to integrate knowledge learned from monitoring into implementation of conservation measures to minimize risks to bull trout

Knowledge gained through monitoring should be incorporated through an adaptive management process to increase knowledge on the effects of various conservation measures. Conservation measures that are not effective will then be modified using information gained in monitoring to achieve intended effectiveness.

10.0. Identify habitat management research needs

Many questions remain to be answered regarding different aspects of the life history, ecological associations, and habitat needs of bull trout in Montana. Research is needed to improve knowledge to develop, improve, and implement specific management practices to ensure the long-term viability of bull trout in Montana.

10.1. Determine life history requirements of resident and migratory bull trout through study of hydrologic, hydraulic, biologic, and watershed features

10.2. Determine effectiveness of different habitat restoration techniques (e.g., instream structures)

10.3. Determine temperature regimes in bull trout drainages, and suitability of temperature regimes for restoration

10.4. Evaluate effects of hydropower operations and methods to optimize reservoir operations to benefit bull trout

10.5. Determine range of temperature tolerance for bull trout life stages in different habitats

11.0. Evaluate implementation of, and compliance with, habitat protection and restoration strategies outlined in restoration plan

B. FISHERIES MANAGEMENT

1.0. Prevent overharvest and incidental mortality of bull trout

Sport fishing for bull trout and other species in bull trout habitat has been identified as potentially negatively impacting bull trout in Montana. Management should be thoroughly reviewed, and modified or implemented where necessary, to conserve bull trout. Fishing regulations should include an angler education component, and must be enforced. Sport fishery management goals directed at recreational fishing should be evaluated. In waters where sport fish management goals are in conflict with bull trout restoration goals, sport fish goals should be modified to emphasize protection and restoration of bull trout. Scientific collection permits and collection methods should be closely scrutinized to prevent overcollection, or collection in sensitive areas.

1.1. Implement sport angling regulations that prevent overharvest of bull trout; modify as necessary

Sport fishing regulations should prevent direct mortality of bull trout in unrestored populations. Regulations should be continually evaluated to determine their effectiveness at conserving bull trout populations, and compliance by the public. They should be modified as necessary to address specific threats associated with sport fishing for bull trout or other species.

1.1.1. Strictly manage or eliminate harvest of bull trout

Angling regulations should be instituted and continually evaluated to prevent direct mortality of bull trout in unrestored areas. If populations become recovered according to specified criteria, angling should be allowed, but closely monitored.

1.1.2. Close important spawning and staging to all fishing during critical periods

Angling should be restricted in important staging and spawning areas during the time of year bull trout are vulnerable in these areas to reduce impacts such as unintentional capture by anglers fishing for other species.

1.1.3. Regulate bag limits and slot limits on potential competitors and predators

In core areas and other important waters, angling regulations should be instituted to manage introduced species to the benefit of bull trout. Such regulations may include liberalizing seasons and bag limits on species that compete with, prey on, or hybridize with bull trout; modifying or eliminating slot limits that benefit such species; and allowing techniques that improve harvest of such species.

1.2. Reduce angler pressure in areas where incidental catch mortality may be detrimental

In certain locations, angler pressure for other fish species may result in unacceptable incidental mortality to bull trout. In such cases, methods to reduce overall angling pressure, and thus incidental mortality, should be explored and implemented.

1.2.1. Seasonal or permanent road closures

In important bull trout habitat where easy access promotes heavy fishing pressure, seasonal or year-round road closures could be evaluated as a method to reduce angler access and pressure.

1.2.2. Conservative bag limits for other species

Reduction in the bag limits of target species responsible for heavy angling pressure could be considered in areas where incidental catch of bull trout is unacceptable.

1.3. Educate anglers to identify bull trout and about bull trout regulations

Misidentification and subsequent possession of bull trout by anglers may be a source of significant mortality of bull trout in certain areas. Efforts to educate anglers about bull trout and other trout identification is necessary and should be ongoing. Education materials for anglers on bull trout identification and information about fishing regulations and closures should be developed and made readily available.

1.4. Discourage recreational anglers and commercial guides from targeting bull trout in waters closed to bull trout fishing

Because of their large trophy size, relative scarcity, and ease of capture, bull trout may be targeted by commercial guides and recreational anglers. Education and enforcement efforts should be directed at these anglers to prevent unacceptable injury and mortality to bull trout.

1.5. Limit scientific collection and regulate collection methods (techniques, intensity, timing, duration)

Scientific collection, location and timing of collection, and approved collection techniques should be closely regulated and controlled. Collection of bull trout should require strong justification, and should be permitted for valid research purposes only. Impacts of

collection will be minimized by restrictions on the locations of collection and time of year. Collection techniques also will be closely scrutinized and regulated.

1.6. Implement guidelines and techniques to minimize risks of electrofishing in waters containing bull trout

Electrofishing guidelines will be required to be followed by management agencies and researchers as part of standard management practices, and as a stipulation on collection permits to minimize risks to bull trout. Guidelines will dictate timing, location, and intensity of electrofishing practices, and will be strictly followed.

2.0. Prevent introduction of nonnative fishes that compete with, prey on, or hybridize with bull trout in bull trout habitat

Brook trout, lake trout, northern pike, and other introduced fishes have been identified as a potential serious threat to bull trout in many important bull trout waters. Policies and enforcement actions must be implemented to prevent intentional or unintentional release of introduced fishes that may compete with, prey on, or hybridize with bull trout.

2.1. Develop and implement fish stocking policies to reduce threats of stocking introduced fishes that compete with, prey on, or hybridize with bull trout

Policies to reduce threats of stocking introduced fishes in important bull trout habitat should be adopted and implemented. Examples include not stocking brook trout (which hybridize with bull trout) in waters containing bull trout, not stocking piscivorous fishes in waters where bull trout would be susceptible to predation, and not stocking other introduced species that compete with bull trout for food, shelter, or space.

2.2. Develop and implement policies and procedures for responding to illegal introductions of live fish and other aquatic flora and fauna

2.3. Review all pond permit applications; preclude stocking of introduced species that compete with, prey on, or hybridize with bull trout in bull trout habitat

Applications for private pond permits should be thoroughly reviewed for potential threats to bull trout. Stocking of introduced species that may be detrimental to bull trout should not be allowed in bull trout habitat. Applicants will be encouraged to stock private ponds with native species such as westslope cutthroat trout. In some instances, introduced species will be removed and native fishes stocked in existing ponds.

3.0. Suppress or remove introduced fishes that compete with, prey on, or hybridize with bull trout where appropriate

Nonnative fishes are a limiting factor to certain bull trout populations, and contribute to the factors limiting bull trout in other populations. Suppression or removal of introduced species should be evaluated and implemented on a case by case basis according to recommendations in Appendix G (*Assessment of Methods for Removal or Suppression of Introduced Fish to Aid in Bull Trout Recovery)*.

3.1. Evaluate presence/absence of introduced fishes in bull trout habitat

Legal and illegal introductions of introduced aquatic predators into bull trout habitat have led to species such as brook trout, northern pike, and lake trout becoming established in many bull trout waters. Illegal introductions continue to occur. Monitoring for the presence/absence of lake trout, northern pike, and other introduced fishes in likely locations should occur to allow a quick response to reduce or eradicate those fish before they become firmly established. Determination of population trend and abundance of introduced fishes and their prey should continue, as well, to better understand the factors impacting bull trout populations.

3.2. Determine site-specific impacts of introduced fishes where such species are suspected to be causing negative impacts to bull trout, and review methods to reduce or eliminate impacts of those fishes

Introduced fishes may significantly impact a local bull trout population or an entire watershed. Impacts from introduced fishes in bull trout habitat must be evaluated, and where significant, those impacts must be reduced or eliminated. If not possible to reduce or eliminate impacts, then such impacts should be accounted for in overall management and restoration progress of bull trout in the basin in which the impacts are occurring. An evaluation should include a cost/benefit analysis, probability of success, and overall benefit to the bull trout population.

3.2.1. Flathead Lake, a key portion of the Flathead River Drainage RCA, has become dominated by lake trout, to the point where they have become the top predator in that system, and may be contributing to the decline of bull trout. Impacts to bull trout by lake trout in Flathead Lake and possible methods to reduce impacts should be reviewed and incorporated into a management plan for the lake.

3.2.1.a. Evaluate biological, economical, and sociological impacts of suppressing lake trout to enhance bull trout.

3.2.1.b. Implement management recommendations to reduce impacts of lake trout on bull trout in Flathead Lake.

3.3. Suppress or remove introduced fishes in areas where appropriate, according to guidelines in Appendix G (*Assessment of Methods for Removal or Suppression of Introduced Fish to Aid in Bull Trout Recovery)*

In waters where it is feasible, introduced fishes should be suppressed or eliminated to remove that threat to bull trout, particularly where a recent illegal introduction has been detected. In some waters, it may not be feasible, or the management goal for that water may be such that it is not appropriate to remove introduced aquatic predators. In such cases, the presence and threat posed by such introduced fishes will be accounted for in overall management of the stream, RCA, and basin.

3.3.1. Suppress or eradicate
3.3.2. Liberalize harvest regulations
3.3.3. Establish barriers to upstream movement

4.0. Establish fish species goals and fisheries management goals in waters within the range of bull trout, and ensure bull trout populations are not adversely impacted by fisheries management activities

In some waters, fisheries management goals are not consistent with, or are in conflict with bull trout management needs and goals and may favor introduced fishes over bull trout. Management goals in all bull trout waters should be evaluated on a site-by-site basis, and modified if necessary if it is determined the management goal conflicts with, or is detrimental to, bull trout restoration goals.

5.0. Ensure compliance with regulations and policies

5.1. Enforce angling regulations; target problem areas

Enforcement of angling regulations should occur throughout bull trout habitat. Additional enforcement efforts should occur in problem areas and in response to specific complaints.

5.2. Strictly enforce state laws preventing illegal transport and introduction of live fish

Illegal introduction of live fish is one of the greatest and most difficult problems associated with management of native fish. Enforcement of State laws governing the transport and introduction of live fish should be prosecuted to the fullest extent possible.

5.3. Enforce pond permit regulations

Rules governing private ponds should be treated and enforced as strictly as other rules related to illegal stocking of introduced fish.

5.4. Comply with management guidelines and policies

Policies and guidelines governing the collection and management of bull trout and other fishes should be followed, and modified as necessary to appropriately conserve bull trout.

6.0. Evaluate and assess impacts of disease and parasites on bull trout populations

Disease and parasites have the potential to have a catastrophic impact on bull trout populations. Efforts to minimize exposure to, and transmission of, disease to bull trout must be implemented. Effects of disease and minimization of those effects must be understood.

6.1. Determine effects of whirling disease on bull trout

Whirling disease has recently become established in Montana waters. Impacts of whirling disease on bull trout must be determined, and management efforts undertaken to limit spread of whirling disease into important bull trout spawning and juvenile rearing habitats.

6.2. Monitor for presence of whirling disease in important bull trout spawning and rearing areas

The extent of the distribution and expansion of whirling disease should be continually studied and monitored to understand potential implications of its presence in important spawning and rearing habitat.

6.3. Implement methods and practices to reduce factors that increase risk of disease transmission

Practices to reduce factors that increase risk of disease transmission should be instituted. This includes adoption of a fish transfer policy, installation of barriers to prevent upstream movement of diseased fishes, and eradication of diseased fishes in areas where such action is feasible.

6.4. Maintain fish health screening and transplant protocols to reduce risk of disease transmission

Fish health screening procedures and transplant protocols will be implemented to ensure only disease-free fish are stocked in bull trout habitat.

6.5. Use knowledge gained from whirling disease monitoring to prevent, control, and/or eradicate other diseases that may impact bull trout

7.0. Identify fish management research needs

7.1. Continue to evaluate impact of whirling disease on bull trout growth and survival

7.2. Determine level and impacts of competition and hybridization with introduced salmonids

7.2.1. Lake Trout
7.2.2. Kamloops Rainbow Trout (Kootenai)
7.2.3. Brook Trout

7.3. Determine impacts of predation on different life stages of bull trout in different watersheds

7.4. Determine movements, habitat use, and season of use of adult and sub-adult migratory bull trout in different drainages

7.5. Evaluate food web interactions in different drainages affected by introduced fishes, *Mysis*, reservoir operations, etc.

7.6. Determine whether integrated rule curves (IRCs) may be favoring other fish species over bull trout

8.0. Evaluate implementation of, and compliance with, fisheries management strategies outlined in this restoration plan

The effects of different fisheries management goals and techniques on bull trout populations, including restoration techniques and goals, sport fish goals, fisheries management techniques, and water body goals should be continually monitored to ensure they are compatible with conservation and restoration of bull trout.

C. GENETICS/POPULATION MANAGEMENT

1.0. Maintain locally adapted and diverse bull trout populations

Maintenance of locally adapted genetic strains of bull trout in individual drainages is necessary for long-term conservation of the species. Locally adapted strains have genotypic and phenotypic traits that are ecologically and evolutionarily important to the long-term persistence of the species in that drainage, and that result in populations that are behaviorally, physiologically, and morphologically adapted to the local environment. Maintenance of genetic integrity of bull trout in individual drainages also results in increased genetic diversity among connected metapopulations, resulting in increased probability of persistence of the species across its range. Unique local bull trout populations should be managed at least to the extent that genetic diversity is maintained and preserved.

1.1. Determine purity and uniqueness of bull trout populations and extent of hybridization with brook trout

Genetic testing utilizing the most current genetic analysis techniques should be conducted in areas where bull trout overlap with brook trout. Genetic analysis should determine the genetic purity of bull trout populations and the amount and extent of hybridization with brook trout. Genetic testing should also be done in other areas to determine the uniqueness of local bull trout populations. This information will be used to assess feasibility of transplanting fish to extirpated areas and in establishment of hatchery broodstock if it is necessary.

1.2. Establish genetic baselines in each RCA

Genetic baselines should be developed in each RCA to enable determination of loss of genetic diversity, and to maximize conservation integrity of transplanted bull trout if such action is deemed necessary in an RCA or portion thereof.

1.3. Monitor genetic status of existing populations

The genetic status of existing populations where baseline information has been collected should be monitored to ensure genetic integrity and diversity is being maintained.

1.4. Manage localized populations (numbers and life forms) and habitat to maintain long-term viability

Local populations of bull trout should be managed such that sufficient numbers of individuals are maintained throughout a dispersed geographical area to ensure long-term persistence and viability. Management should include ensuring factors limiting to different life forms and life stages are addressed and eliminated.

2.0. Maintain genetic integrity of populations and proper metapopulation function

Maintenance of genetic integrity and proper metapopulation function is necessary for restoration and long-term viability of the species. Maintenance of genetic integrity involves reducing the amount of hybridization with other species, relying on natural reproduction and population expansion, and maintaining connectivity between populations. A metapopulation is a collection of geographically distinct populations that are genetically interconnected through movement of individuals among populations. The collection of smaller, geographically distinct but interconnected populations essentially forms a single, larger population. Therefore, proper metapopulation function includes interconnectedness between local populations to maintain genetic exchange between populations over time (Hanski and Gilpin 1991). Properly functioning metapopulations stabilize local population dynamics by allowing genetic exchange between populations, increasing heterozygosity, reducing vulnerability to losses incurred through environmental and demographic stochasticity (Wilcox and Murphy 1985), stabilizing demographic variables such as birth and death rates, and allowing recolonization of locally extirpated populations. The key to maintaining proper metapopulation function is to maintain high quality habitat and geographically distinct populations, as well as connectivity between those locally distinct populations.

2.1. Establish introduction and transplant protocols that maximize genetic variability and viability of bull trout populations

Introduction and transplant protocols should be developed and followed utilizing the best available genetic information regarding the purity and uniqueness of local populations, and following the recommended guidelines contained in Appendix H (*The Role of Fish Stocking in Bull Trout Recovery*).

2.2. Expand existing populations where feasible and appropriate

Many existing populations are small and isolated, and therefore face a higher probability of extinction. In order to increase the viability and reduce the probability of extinction, existing population numbers and range should be increased wherever possible.

2.2.1. Habitat restoration

2.2.2. Suppression or removal of introduced species

2.2.3. Restoration of connectivity between local populations

Barriers resulting in loss of connectivity and genetic exchange between populations should be eliminated. Existing connectivity should be maintained to allow genetic exchange and proper metapopulation function.

2.2.4. Prevent further fragmentation of existing populations

Further fragmentation of habitat and loss of connectivity should be avoided by implementation of appropriate land management practices, regulatory stipulations, zoning practices, and elimination of threats that result in fragmentation of habitat.

3.0. Continue to improve knowledge of status and distribution of bull trout populations in Montana

In many areas, the status and distribution of bull trout is not completely known. As restoration efforts continue and are completed, it is expected that the distribution of bull trout will expand from present levels. Therefore, survey and inventory efforts should continue throughout the range of bull trout in Montana.

3.1. Review databases for bull trout distribution records

State, federal, and tribal management agency databases should be searched for records indicating the presence of bull trout. This baseline information will provide a foundation of knowledge about known distribution and recent historical occupancy by bull trout in different waters. It will also be useful for prioritizing locations of future survey and inventory efforts.

Data on the distribution and status of bull trout in the Kootenai River basin and Lower Clark Fork River basin will be obtained from Idaho and British Columbia for the portion of those basins within their respective jurisdictions.

3.2. Identify potential habitat

Rather than only identifying locations where bull trout currently exist, it is important to identify potential habitat where they once likely occurred. Potential habitat should be identified and surveyed for suitability for bull trout. It is restoration and management of these areas that will allow expansion of current populations, restore connectivity, and help enable restoration goals to be met.

3.3. Conduct surveys in potential habitat where bull trout status is unknown

Once potential habitat has been identified, survey and inventory efforts should be initiated to determine occupancy by bull trout.

3.4. Develop regular schedule for follow-up surveys in potential habitat to determine recolonization

Follow-up surveys should be scheduled in potential habitat to monitor recolonization by recovering bull trout populations.

4.0. Implement standardized monitoring program in all RCAs to assess bull trout population status

Standardized monitoring of population numbers and trends is necessary, and should occur to evaluate effectiveness of restoration efforts and progress towards meeting restoration objectives.

4.1. Design a standardized, statistically sound bull trout population monitoring program for all RCAs

A statistically sound, standardized survey and monitoring program should be designed to allow collection of compatible data, comparison of results from different areas, and to ensure a sufficient sample size to assess population status and restoration progress in RCAs and rangewide. The monitoring procedures should be adopted and used by all entities collecting population and habitat data.

4.2. Implement standardized monitoring program in all RCAs

A monitoring program should be implemented in all RCAs to monitor population trends and habitat conditions. Monitoring results should be used to assess progress towards meeting restoration goals in RCAs and restoration basins.

4.2.1. Redd surveys will be the primary method used to acquire information on trends in adult bull trout abundance. The number of spawning sites (redds) should be monitored annually in index stream sections. These counts provide information on the number of adult fish spawning in upper basin tributaries.

4.2.2. Juvenile abundance estimates are a valuable tool for monitoring changes in population due to changes in substrate quality or water quality during incubation, emergence and early rearing. These estimates will be made annually either by snorkeling and counting fish by species and age class or by electrofishing and using two-catch or mark-recapture estimators.

4.2.3. Gill netting surveys of lakes and reservoirs, done as part of overall fisheries population monitoring, provides information about the status and overall condition of adult bull trout inhabiting reservoirs, as well as other species of interest such as lake trout, brook trout, and northern pike.

4.2.4. River monitoring, done as part of overall fisheries population monitoring, provides information about the status and overall condition of adult bull trout inhabiting mainstem rivers, as well as other species of interest.

5.0. Identify population and genetic research needs

Many questions need to be answered about specific population and genetics questions regarding bull trout. Research should be conducted to answer questions that will lead to a better understanding of bull trout life history and habitat requirements, and also lead to better management of bull trout.

5.1. Determine if resident bull trout can refound a migratory life form in areas that have been isolated
5.2. Determine mechanism by which migratory life forms undergo transition to resident forms, and how long this might take.
5.3. Determine consequences of genetic fragmentation/isolation due to human-made barriers

6.0. Evaluate implementation of, and compliance with, population and genetics management strategies outlined in this restoration plan

D. ADMINISTRATION, EVALUATION, AND INFORMATION MANAGEMENT

1.0. Promote collaborative efforts to garner support at a local level

Because bull trout occur over a large geographical range in a myriad of land ownerships, a collaborative approach to implement this restoration plan should be used to ensure it has local acceptance and support. Cooperative management, restoration, and monitoring of bull trout is necessary at all levels. Cooperative management must include land owners, land users, management agencies, and other interested publics. Partnerships, formal and informal agreements, and cooperative development of management plans will lead to greater acceptance and support of restoration efforts, and increase the efficiency and probability of restoration.

1.1. Encourage establishment of local watershed groups in each recovery area and assist them to implement restoration actions

Restoration and maintenance of bull trout should occur at a watershed level, using input from local landowners, managers, and other interested publics. Such watershed groups, comprised of landowners, management agency personnel, university faculty, conservation group members, representatives from private industry, local government officials, and other interested publics, need to work in a collaborative manner to implement and achieve restoration. Collaborative efforts should include using local watershed groups to jointly develop and implement specific restoration actions for local watersheds. Restoration should include enhancement of degraded habitat to support well distributed populations of bull trout, as well as populations of other native flora and fauna associated with high quality bull trout habitat. Watershed groups may be established in conjunction with other watershed groups such as DEQ TMDL watershed groups.

1.2. Develop outline of implementation plan for each watershed

In order to effectively and efficiently implement restoration strategies for bull trout in each watershed, implementation plans outlining specific threats and specific actions to address those threats should be developed. Specific watershed implementation plans should utilize local knowledge and expertise to implement restoration, and should utilize this restoration plan as a guide to develop such management plans. Watershed restoration/implementation plans must also consider other existing recovery and management plans so that restoration occurs at an ecosystem approach. This will likely occur as part of the federal recovery planning process.

1.2.1. Identify key waters in each watershed
1.2.2. Identify specific threats in each key water and watershed
1.2.3. Develop methods and cost estimates to address specific threats
1.2.4. Prioritize actions
1.2.5. Implement watershed management/restoration plans and restoration actions

1.3. Enter into cooperative management agreements with landowners and management agencies to protect and enhance habitat and ensure restoration strategies are implemented

Because bull trout habitat crosses numerous landowner and jurisdictional boundaries, it is most effective to protect, manage, and restore habitat in a cooperative manner with all affected parties. Site specific, drainage specific, and basin-wide management plans and agreements should be developed, entered into, and implemented to ensure habitat is restored, maintained, and properly managed, and other restoration strategies are implemented. Local watershed groups will play a key role developing management plans, prioritizing and implementing restoration actions, and ensuring restoration occurs at the local level.

1.4. Work cooperatively with British Columbia and Idaho in watersheds that include these areas

Portions of the Kootenai and Clark Fork Rivers flow into or through Idaho and British Columbia. Coordinated management, data collection, monitoring, and conservation efforts should occur to ensure management of bull trout and bull trout habitat in these areas and to increase efficiency and cooperation.

1.5. Where watershed groups do not form or do not adequately implement conservation strategies, management agencies shall fulfill their legal and regulatory responsibilities

2.0. Implement restoration plan

Implementation of this restoration plan at a local and statewide level by private landowners and state and federal management agencies should lead to eventual restoration of bull trout in Montana. Because of the complexity and size of the issues regarding bull trout restoration, the collaborative watershed-based restoration approach must include sufficient technical assistance and regulatory assistance to ensure success.

2.1. Provide technical assistance to watershed groups

Technical assistance and expertise regarding habitat restoration, monitoring, and data sharing must occur, and must be a priority among agencies with such expertise.

2.2. Assist private landowners with development of acceptable Habitat Conservation Plans or other conservation plans

To encourage private landowners to do good things for bull trout and help provide assurances that those actions will not result in further regulatory restrictions, management agencies must assist private landowners with development of individual conservation plans that will provide those necessary assurances.

3.0. Ensure restoration strategies are included as part of, and coordinated with, other recovery efforts, management plans, and cooperative agreements

Numerous other recovery plans, management plans, and conservation agreements have been, or are being, developed for other species occurring in the same range as bull trout. These include the Kootenai White Sturgeon Recovery Plan, Swan Valley Grizzly Bear Conservation Agreement, and Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout in Montana (FWP 1999b). Restoration goals and conservation efforts for all of these and other species should be coordinated to ensure one is not undermining others, to increase efficiency of restoration efforts, and to implement restoration actions for all species at an ecosystem level. Components of this restoration plan should be included in other planning efforts such as land management plans, forest plans, Upper Columbia River Basin Environmental Impact Statement, and other management planning efforts.

4.0. Develop and implement education actions to garner support for bull trout restoration

Education actions to garner and maintain support of bull trout restoration efforts are needed at several levels. School education programs are needed to educate youth about the importance of bull trout, native species, and aquatic ecosystems. Media support is critical for reaching a large segment of the public. Collaborative efforts with landowners, user groups, conservation clubs, and local governments are necessary to ensure support for bull trout restoration and management is achieved. Education actions to garner support for bull trout and bull trout restoration should be a cooperative effort between local, state, federal, private, and non-profit organizations, and will occur at local, regional, and nationwide levels.

4.1. Develop school education programs and materials

Education programs about bull trout and their value as a component of Montana's native fauna will be presented to schools as part of the Project Wild curriculum and through other aquatic education programs. Materials about natural history, conservation efforts, and the restoration program should be provided to schools through such presentations.

4.2. Effectively utilize written and electronic media

Electronic and written media sources should be provided regular updates about bull trout restoration efforts and conservation issues, and will be provided necessary background materials to accurately report about bull trout restoration and conservation efforts. Media organizations will be added to mailing lists to receive new and pertinent information as it becomes available.

4.3. Create and make available education materials

Education materials about bull trout and bull trout restoration efforts, such as videotapes, posters, leaflets, signs, and handouts, will be developed and distributed to appropriate audiences. Materials will include information for anglers on bull trout identification; information about fishing regulations and closures; materials for schools about the importance of bull trout, native fishes, and aquatic ecosystems; information for the public about status of restoration efforts; increased personal contact by law enforcement personnel; and materials for watershed groups and management agencies regarding the latest information about bull trout management.

4.4. Make public presentations to civic groups, conservation organizations, and other interested publics

Presentations about bull trout and bull trout restoration efforts should be made to local civic groups and organizations on a regular basis to directly educate those potentially impacted by bull trout restoration efforts, to alleviate fears and misconceptions about restoration efforts, and to garner support for restoration efforts from those groups and individuals.

4.5. Implement internal education program among management agencies

Because management agencies are comprised of numerous individuals that have a variety of responsibilities and values, it is important to develop an internal education program within agencies to ensure the agency message and motives are consistent, and so all portions of an agency's operations are consistent with restoration efforts.

5.0. Secure funding and cooperation to implement restoration strategies

Funding and commitment to implement restoration actions in each of the watersheds, and cooperation among and between affected private and governmental entities is imperative. Actions that combine funding opportunities with landowner cooperation should be emphasized since actions that involve cooperative funding opportunities and support of landowners stand the greatest chance of producing measurable improvements. Such cooperation and funding will be sought for all phases of restoration.

5.1. Garner financial and personnel support from management agencies

Federal, state, and tribal land and wildlife management agencies will have primary lead for implementing bull trout restoration efforts. A commitment of funds and personnel to

implement restoration strategies should be sought from these management agencies to restore bull trout.

5.2. Seek state and federal legislative appropriations to implement restoration strategies

Appropriations from state and federal legislatures will be sought to provide funding for immediate implementation of restoration strategies.

5.3. Pursue cooperative funding, partnerships, challenge cost share opportunities, and other private and governmental grants

Agency funding and legislative appropriations will be used to match funding available through cooperative funding opportunities and partnerships. Examples include funding opportunities through the National Fish and Wildlife Foundation, Partners for Wildlife, Future Fisheries Program, and other private and government funding sources. Applications for grants to fund specific restoration efforts will be submitted when possible and appropriate.

5.4. Use mitigation funds as available

In some watersheds, mitigation funds for past and future land use activities that have resulted in degradation of bull trout habitat have been allocated. Mitigation funds should be used to implement restoration strategies that are consistent with the intent of the mitigation funds, and to match other possible private and government funding sources.

6.0. Develop and maintain a centralized database repository for all bull trout distribution and monitoring data

Collection of bull trout population and habitat data is being conducted by state, federal, and tribal agencies, as well as by private industry and consulting firms. Certain data parameters should be collected and reported in a standardized format to allow compilation and analysis at a variety of different levels.

6.1. Develop and use standardized data collection reporting forms and develop procedures for reporting data from all sources

Use of standardized data reporting forms will facilitate standardized collection of important data parameters, and will allow reporting and entry of common data variables that will lead to increased efficiency in entering, summarizing, and analyzing bull trout data. Procedures for reporting data and submitting data collection forms should be developed to facilitate data entry and storage.

6.2. Maintain a centralized data repository for bull trout distribution and monitoring data, and develop procedures for accessing and utilizing the database

A centralized data repository, maintained by the State, has been established (MRIS). Bull trout distribution and monitoring data should be entered into the database annually, and

data will be made available to authorized individuals for analysis. Procedures and requirements for accessing the database and certain data fields will be developed.

7.0. Evaluate implementation of, and compliance with, restoration strategies

Implementation of restoration strategies, particularly those ranked as high priority, should be monitored and evaluated annually, and recommendations regarding restoration progress should be provided in a progress report at least once every five years

7.1. Prepare status report every five years

A status report of bull trout distribution, population trends, and restoration efforts should be prepared at least every five years utilizing the information contained in the database.

Appendix F. Executive Summary - The Relationship Between Land Management Activities and Habitat Requirements of Bull Trout (MBTSG 1998)

The Scientific Group report "The Relationship Between Land Management Activities and Habitat Requirements of Bull Trout" provides a summary review of scientific information about habitat requirements of bull trout, and the relationship between effects of land management activities and bull trout habitat. It also provides a framework for a criteria-based strategy to maintain quality bull trout habitats in Montana through reducing impacts from land management activities. To accomplish the latter, a set of criteria-based standards for maintaining and improving bull trout habitat is proposed.

The strategy incorporates establishing a baseline of existing conditions and monitoring to ensure those conditions are improved or maintained. Proposed activities which will further jeopardize the viability of bull trout can be screened and subsequently modified or deferred. In addition, the process will provide some impetus for improvements in areas which are currently contributing to a reduction in bull trout viability. This proposed strategy is not meant to replace existing mechanisms for protecting stream systems. Rather, it will compliment existing mechanisms by increasing our understanding of the effects of land management activities on stream systems and bull trout populations.

The proposed strategy is not based upon setting specific numeric targets or thresholds. Instead, narrative criteria are used to describe an objective for several of the most important physical parameters required by bull trout. In place of strict numeric thresholds or restrictions on specific activities, this approach attempts to foster an environment of responsibility. In the event that this fails, a more restrictive approach may be promulgated by regulatory agencies to ensure bull trout persistence.

Appendix G. Executive Summary - Assessment of Methods for Removal or Suppression of Introduced Fish to Aid in Bull Trout Recovery (MBTSG 1996g)

Introduced brook, brown and lake trout have contributed to the decline of bull trout in Montana. Removal or suppression of these introduced species may play a role in recovery of bull trout in some circumstances. This paper discusses the removal or suppression of introduced fish as one aspect of the recovery process for bull trout in Montana.

The protection of habitats supporting bull trout will be the most effective means of maintaining a competitive advantage for bull trout over introduced species. Habitat protection in core areas and nodal habitats should be a primary emphasis of any bull trout restoration program. While this does not assure the exclusion of introduced species, it is a logical first step in bull trout restoration. Before removal or suppression of introduced species should be undertaken, further introductions of these species should be discontinued.

Goals of the removal or suppression projects should be well developed and should include a determination of whether the effort will attempt to totally remove or just suppress the target species. A panel should be established to review all proposed suppression and removal projects.

A review of the use of toxicants, trapping and netting, electrofishing, and angling as removal agents indicates that they may help in site-specific situations such as small streams and lakes. But none, even in combination, will be practical on a large scale for bull trout recovery under most circumstances. Complete removal of introduced fishes will be possible in only a few site specific instances. Even if total removal of introduced species is achieved, it may not result in bull trout recovery.

Habitat manipulation to favor bull trout is probably not possible when introduced species are present and habitat restoration probably would aid in bull trout recovery.

Five situations are identified where removal and suppression should be considered. They are not listed in order of priority:

1. Where recent invasions of introduced species have occurred or when the target species is restricted to a small area or is not well established but has a high potential for spreading.

2. Where it is necessary to protect core areas and nodal habitats.

3. Where a bull trout population is in immediate danger of extinction.

4. Where preservation of native species is a priority.

5. Where innovative experimental projects will further the knowledge of how this tool might be most effective. While all removal projects are experimental in nature, this refers to innovative projects that attempt to learn more about techniques and population effects of projects. New and innovative ideas and methods will have to be developed before introduced species control will be successful, particularly in large, complex lakes and streams.

The potential for negative impacts on non-target fauna is discussed and a checklist is included that should be reviewed before any suppression or removal project is undertaken.

Appendix H. Executive Summary - The Role of Stocking in Bull Trout Recovery (MBTSG 1996h)

This issue paper addresses the role of bull trout stocking, whether from hatcheries and/or fish transplants, in Montana's bull trout recovery effort. The appropriate use of hatcheries in fisheries management, including native species recovery, is currently under debate. In consideration of this ongoing controversy, we believe it important to discuss the distinction between traditional fish stocking and the hatchery uses discussed here. Introductory and background information is presented to define key terms and familiarize the reader with the subject matter, including historical information on bull trout culture, the Endangered Species Act (ESA) perspective, and the changing role of hatcheries. We described and evaluated potential strategies involving the use of hatcheries or transplants in bull trout recovery. We accepted or rejected each strategy based on screening criteria.

The Scientific Group views stocking as one of many potential tools in the recovery of bull trout. We approved a strategy to create genetic reserves for seriously declining populations. We approved restoration stocking as a recovery strategy **only if** the actual cause of extirpation is identified and corrected first. We conditionally approved research strategies. These do not meet the criteria for restoration, but information gained through experiments may benefit restoration efforts. The Scientific Group rejected strategies using supplementation, new introductions outside the native range of bull trout, and put, grow and take as recovery efforts.

Approved strategies focus on protecting unique stocks and restoration stocking, with the primary objective of establishing viable, self-sustaining bull trout populations. We recognize that these measures will not substitute for correction of the factors causing or contributing to present declines. Secondarily, we identified areas of research that might be useful in the recovery process.

It is our opinion that the approved strategies should be considered among several potential tools available for bull trout recovery in Montana. While we differ in our individual opinions on implementation, we all agree that any projects involving stocking must be appropriate in scope, judiciously applied, rigorously designed, and thoroughly monitored. To ensure that this occurs, we recommend the Restoration Team appoint a technical advisory committee (TAC) to screen all projects involving the use of hatchery or transplanted bull trout. Ultimately, our goal is full recovery of naturally-reproducing, wild bull trout populations.

Appendix I. Description of Current Conservation Measures

There are many conservation measures that have already been undertaken or are underway to address causes of decline and methods for restoration of bull trout in Montana, including expanded population, distribution and habitat surveys; research projects; improved land management; habitat restoration; implementation of management guidelines; and development of regulatory mechanisms. These actions have included efforts by federal, state and tribal governments as well as private entities and individuals, and are expected to continue and expand.

Population and Habitat Survey and Inventory

Different types of survey and inventory efforts have been, or are being, conducted in all bull trout RCAs, with the most extensive bull trout survey efforts being in the Swan and Flathead River basins. Survey and inventory efforts include creel census along Rock Creek, Blackfoot River, Clark Fork River, and Swan Lake; spawning site inventories (redd surveys) along numerous streams and rivers throughout the range of bull trout in western Montana; electrofishing and gill net surveys throughout Montana in association with other fish management activities; and presence/absence surveys for juvenile bull trout in numerous smaller tributary streams. These efforts are expected to continue.

Habitat Restoration

Numerous habitat restoration projects have been undertaken throughout the range of bull trout in Montana, including the removal of artificial barriers, streambank stabilization, stream channel restoration, riparian fencing and enhancement, sediment source reduction projects, and installation of irrigation diversion screens (ALCON Ecological Consulting 1994; FWP 1996, 1999; Montana Bull Trout Restoration Team 1997; Pierce et al.1997). These types of projects are cooperative efforts between local, state, and federal management agencies, private industry, conservation groups, and individual landowners, and are expected to continue.

Connectivity

Lack of connectivity has been identified as a major threat to restoration in several watersheds in Montana. Connectivity in and among these watersheds is broken by a variety of factors including dams, diversions, culverts, barriers, dewatering, and stretches of unsuitable or inhospitable habitat. In some instances, barriers to connectivity may actually benefit bull trout by preventing the upstream migration of introduced species (e.g., Hungry Horse Dam) and prevent the upstream spread of disease such as

whirling disease. Therefore, barriers to connectivity are being evaluated on a case by case basis. Positive and negative aspects of restoring passage of bull trout and other fish species (native and introduced) are being evaluated at Milltown, Thompson Falls, Noxon, Cabinet Gorge, and Rattlesnake dams. A study conducted to evaluate movement of bull trout transported above Milltown dam indicates the benefits derived from restoring passage for adult bull trout is potentially great (Swanberg 1997). Additional studies are being conducted or are planned for Thompson Falls, Noxon, Cabinet Gorge, and Milltown Dams.

Barriers such as water diversion structures and impassable culverts are being evaluated on a case by case basis, and recommendations to address such barriers are being developed. In several instances, fish ladders have been installed at irrigation diversions, and impassable culverts have been replaced, allowing passage of fish over the diversion.

Management

Habitat

Management activities include actions by federal, state and tribal governments, as well as private landowner initiatives. Within the upper Columbia River basin, 93% of the remaining bull trout watersheds with known or predicted strong populations are on Forest Service and Bureau of Land Management (BLM) administered lands. In Montana, 80.5% of the area within core area watersheds is federally administered, 3% are state-owned, and 12.6% are private (Appendix C). Consideration of bull trout is now mandated for Forest Service and BLM actions through land use management plans and site-specific activity plans, as well as ESA Section 7 requirements.

In 1995, the Inland Native Fish Strategy (INFISH) was adopted by the Forest Service and used to amend Regional Guides and Forest Plans to include interim direction in the form of riparian management objectives, standards and guidelines, and monitoring requirements (U.S. Forest Service 1995). INFISH standards can only be modified following a watershed analysis or site specific evaluation. While an important component of INFISH is flexibility, compliance with INFISH has varied both among Forests and among Ranger Districts, and there is no implementation monitoring built into the plan. INFISH is an interim measure until the Interior Columbia Basin Ecosystem Management Plan is finalized (ICBEMP EIS Team 1997).

Montana adopted a Streamside Management Zone (SMZ) law in 1991 to address water quality issues related to forest practices. A SMZ is a buffer strip that serves as a natural filter that helps to keep sediment out of the stream. SMZ rules were adopted in 1993 to help define and clarify the SMZ law.

In 1994, the Montana Department of Natural Resources and Conservation (DNRC) agreed to go beyond SMZ rules and adopted additional practices to protect riparian areas along streams containing bull trout. DNRC defers all timber harvest within SMZs in these streams, unless a fisheries biologist agrees that some trees for a specific sale can be harvested without impact. DNRC also inspects the condition of the SMZ at the time of grazing lease renewals and takes necessary steps to exclude cattle from the SMZs unless informed by a FWP fisheries biologist that cattle will not have a detrimental impact. Plum Creek Timber Company requires its grazing lessee s to implement specific Best Management Practices (BMPs) as well as complete an approved Range Management Plan. Leaseholders are also required to complete an end of year report summarizing how compliance performance standards were complied with and whether the range management plan was effective, and changes that should be made the following year.

Forestry Best Management Practices (BMPs) have been developed to reduce impacts from forest management activities and to prevent sedimentation of streams (Logan and Clinch 1991). An audit process is used to evaluate whether BMPs are being applied and if they are effectively limiting non-point source pollution. Audit cycles have been completed in 1992, 1994, 1996, and 1998, with over 90% compliance ratings (MT DSL 1994; Mathieus 1996, Fortunate 1998). The Restoration Team has recommended an evaluation of forestry BMP compliance, as well as initiation of long-term monitoring at selected audit sites to determine long-term effectiveness. Such monitoring efforts begain in 1999.

It has also been recommended that recently developed grazing BMPs (MDNRC 1999) be implemented and audited.

Fisheries

Fish population management activities also have been undertaken to benefit bull trout. FWP has initiated a policy requiring an environmental assessment on all brook trout stocking, and confining these plants to waters currently harboring brook trout, but not bull trout. Experimental brook trout removal projects have been conducted and are ongoing. Electrofishing is prohibited where bull trout are spawning, and FWP electrofishing guidelines to minimize injury to fish must be followed as a condition of collection permits.

Collection permits for bull trout and other species in bull trout habitat are carefully scrutinized to ensure minimal impacts on bull trout populations through restrictions on locations, timing, and methods that are approved. Private pond permits are also carefully reviewed for impacts to bull trout. In some situations, native cutthroat are substituted for other introduced species previously stocked in private ponds.

Fishing for bull trout is prohibited in all Montana waters except Swan Lake. In order to reduce impacts from targeting bull trout for catch-and-release, there is no *intentional* fishing allowed for bull trout except in Swan Lake. To further protect spawning bull trout, several important spawning streams have been closed to all fishing, and the mouths of several tributaries where bull trout stage have been closed to all fishing from June 1 through August 30 to eliminate hook and release mortality to bull trout in these staging areas.

In 1995 the Montana State Legislature increased the penalty for possession of bull trout greater than 18 inches up to $500 per fish; two fish comprise a penalty of up to $1,000 and can be prosecuted as a felony. Smaller bull trout were not targeted because they are easily confused with brook trout. Enforcement of, and education about, bull trout regulations has been increased, particularly in problem areas, to ensure compliance (Long 1997). Enforcement of bull trout fishing regulations has been made a high priority for FWP wardens (Long and Kelly 1998).

Regulatory

Several state and federal land-use regulations exist that, if properly applied, may benefit bull trout. State regulations include: the Montana Stream Protection Act that requires a permit be obtained for any project that may affect the natural and existing shape and form of any stream or its banks or tributaries; the Streamside Management Zone Law that permits only selective logging within at least 50 feet of any lake, stream, or other body of water, but prohibits other activities such as clearcutting and heavy equipment operation; the Montana Natural Streambed and Land Preservation Act (310 permit) that requires private, nongovernmental entities to obtain a permit for any activity that physically alters or modifies the bed or banks of a perennially-flowing stream; and the Montana Pollutant Discharge Elimination System that applies to all discharges to surface water or groundwater, including those related to construction, dewatering, suction dredges, and placer mining. Before permits allowing activities covered under these regulations are issued, applications are regularly reviewed by personnel from FWP, Montana Department of Natural Resources and Conservation, and the Montana Department of Environmental Quality. Recommendations to limit impacts to bull trout are mandated through the permitting process.

Federal regulations that work to conserve bull trout habitat include the Clean Water Act (including 401 and 404 permits) that regulates discharge or placement of dredged or fill material into waters of the United States; Federal Land Management Protection Act (FLPMA); and internal agency management guidelines and policies such as Forest Management Plans. Activities that may impact bull

trout on federal lands, or covered under federal regulation, will continue to undergo a review process under the National Environmental Protection Act (NEPA), at which time alternatives to minimize impacts are considered.

In June, 1998, bull trout in the Columbia basin were listed as threatened under the Endangered Species Act. As such, they are afforded the regulatory protections of the ESA (USFWS 1998). This includes a consultation requirement for federal actions, as well as protection from "take" as defined in the ESA. In the final rule listing bull trout as threatened, the U.S. Fish and Wildlife Service identified several items that would be considered "take" - any action that might result in take is required to be permitted by the U.S. Fish and Wildlife Service. Items identified as take include (USFWS 1998):

1. Take of bull trout without a permit, which includes harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or attempting any of these actions, except in accordance with applicable State fish and wildlife conservation laws and regulations within the Columbia River bull trout population segment;

2. To possess, sell, deliver, carry, transport, or ship illegally taken bull trout;

3. Unauthorized interstate and foreign commerce (commerce across State and international boundaries) and import/export of bull trout (as discussed in the prohibition discussion earlier in this section);

4. Introduction of non-native fish species that compete or hybridize with, or prey on bull trout;

5. Destruction or alteration of bull trout habitat by dredging, channelization, diversion, in-stream vehicle operation or rock removal, or other activities that result in the destruction or significant degradation of cover, channel stability, substrate composition, temperature, and migratory corridors used by the species for foraging, cover, migration, and spawning;

6. Discharges or dumping of toxic chemicals, silt, or other pollutants into waters supporting bull trout that result in death or injury of the species; and

7. Destruction or alteration of riparian or lakeshore habitat and adjoining uplands of waters supporting bull trout by timber harvest, grazing, mining, hydropower development, or other developmental activities that result in destruction or significant degradation of cover, channel stability, substrate composition, temperature, and migratory corridors used by the species for foraging, cover, migration, and spawning.

Other activities not identified above will be reviewed on a case-by-case basis to determine if a violation of section 9 of the Act may be likely to result from such activity. The Service does not consider these lists to be exhaustive and provides them as information to the public.

Reservoir Operations

Reservoir operations affecting bull trout consist primarily of the timing, duration, and volume of water releases from reservoirs; downstream flows and water temperatures; and remaining pool depths and associated limnological characteristics of the reservoirs themselves. Recommendations for operation of reservoirs to maintain and protect conditions for bull trout, and minimize negative impacts to bull trout and other native fishes will be developed through the relicensing processes, biological opinions, and other processes. The settlement agreement for Noxon Rapids and Cabinet Gorge Dams includes a commitment and funding to evaluate, and if feasible, implement passage for bull trout and other native salmonids. The agreement also includes funding for a native salmonid restoration plan (see Table 2).

FWP has developed integrated rule curves (IRCs) for the operation of Hungry Horse and Libby Dams that integrate operations for resident fish, anadromous fish, power generation, and flood control (Chilsom et al. 1989; Marotz et al. 1988; May et al. 1988; Skaar et al. 1996). These rule curves have been developed based on ten years of empirical data collection and analysis and sophisticated modeling techniques. The IRCs were adopted by the NWPCC and incorporated into their Fish and Wildlife Program in 1994. However, they have not been implemented, as the reservoirs are being operated in accordance with a National Marine Fisheries Service Biological Opinion for endangered Snake River salmon. The flood control provisions of the IRCs (Variable Flow or VAR-Q approach) have not been adopted by the U.S. Army Corps of Engineers, and also limit the full implementation of the IRCs. Implementation of Integrated Rule Curves for Libby and Hungry Horse reservoirs is essential to restoration, and will continue to be pursued through various forums in the Pacific Northwest.

Genetic Integrity

Maintenance of genetic integrity has been identified as a top priority in each of the RCAs. Towards that end, the Montana Department of Fish, Wildlife and Parks implemented a policy in 1996 to not stock brook trout, which hybridize with bull trout, into waters containing bull trout without first conducting a thorough environmental analysis. Investigations to determine the genetic diversity of bull trout populations have been conducted in some drainages in Montana, especially in the Flathead River drainage (Kanda et al. 1997), and are expected to continue in additional drainages in the Clark Fork drainage. A strategy to create genetic reserves for seriously declining populations has been developed by the Scientific Group, but stocking as a restoration strategy will be approved only if the actual cause of

extirpation is first identified and corrected. Any projects involving stocking must be appropriate in scope, judiciously applied, rigorously designed, and thoroughly monitored. To ensure this occurs, a technical advisory committee (TAC) appointed by the Director of MFWP will first screen all projects involving the use of hatchery or transplanted bull trout. Strategies that will not be allowed for restoration include using supplementation, new introductions outside the native range of bull trout, and put, grow and take.

Monitoring

The purpose of monitoring is two-fold: 1) to acquire tools for management of bull trout and their habitat; and 2) to evaluate the effectiveness of this strategy in making progress towards achievement of the state-wide restoration goal. The requirements of monitoring are also two-fold: 1) variables must be measurable, and 2) it must be repeatable. Three types of monitoring are identified for this restoration and conservation strategy: 1) population status and evaluation of trends in population abundance; 2) baseline habitat condition and evaluation of habitat response to land management activities in bull trout core and nodal areas; and 3) evaluation of implementation and compliance with strategies developed in this Plan. Existing ongoing monitoring includes population and habitat monitoring:

1. Population status and evaluation of trends in population abundance.

A monitoring program should result in determination of bull trout presence/absence, relative abundance, and changes in population size in each of the bull trout RCAs. Methods being used to monitor population status and trends include conducting redd surveys, juvenile abundance estimates, and trapping of upstream migrating adults or downstream migrating juveniles. Specific methodology follows that described by Shepard and Graham (1983) and Weaver (1997) that has been conducted, with few modifications, for 18 years in the upper Flathead basin.

Population and habitat monitoring, as described above, are being conducted throughout the range of the bull trout in western Montana (see Montana Bull Trout Restoration Team 1997). In many areas, index reaches have been established for repeated, annual monitoring. In addition to redd surveys and juvenile abundance surveys, long-term river monitoring electrofishing surveys, lake/reservoir gill net surveys, and creel census surveys are being conducted to determine the status and trend of bull trout populations.

2. Describe baseline habitat condition and evaluate habitat response to land management activities in bull trout core and nodal areas. To determine the effectiveness of restoration and conservation efforts,

it is necessary to establish baseline habitat data. Except in the Flathead Basin, there currently is no standardized rangewide monitoring program to assess overall baseline habitat conditions. There are extensive site-specific habitat monitoring programs being implemented associated with ongoing and planned restoration and mitigation projects. Sediment source surveys and water temperature monitoring have been or are being conducted in several RCAs. Baseline stream habitat inventories have been completed in several National Forest streams, as well as streams owned by Plum Creek Timber Company. McNeil core samples and substrate scores are also being conducted at certain areas throughout the range. Continued baseline habitat monitoring, as well as effectiveness monitoring of land management and restoration techniques must continue, in conjunction with adaptive management feedback.

Data Management

Management of bull trout abundance and distribution data has been centralized at the Kalispell office of the Montana Department of Fish, Wildlife and Parks Information Services Unit since 1993. Bull trout data are stored as part of the fish species database in the Montana Rivers Information System (MRIS). These data are stored by the EPA River Reach Numbering System and include the following fields: stream use, relative abundance, genetic status, habitat value, survey date, population status, and a data quality rating. The tabular data can be geographically displayed in a Geographic Information System (GIS) using an event table that includes a to and a from field which more accurately describes the upper and lower extent of bull trout presence in a river reach. Data are updated annually through a process that includes all FWP and federal fisheries biologists. Biologists are sent a tabular printout of all data for each bull trout record in the database as well as a GIS plot displaying bull trout abundance. One packet is sent to the lead FWP fisheries biologist for an area, who in turn sends it to the other state and/or federal biologists with management responsibilities for the area to review. These changes are incorporated into the MRIS fish species database.

Education

FWP information/education officers have developed a coordinated education effort to increase public awareness and concern for the plight of the bull trout (MBTRT 1997). Education efforts include public outreach through Project WILD, Project WET and other school programs; coordination with local and national media to develop press releases, radio talk shows, television spots, and news stories about bull trout and bull trout issues; public meetings to advise local citizens of management strategies for bull

trout; development and distribution of identification cards to assist anglers to identify bull trout; development and posting of signs informing anglers of bull trout fishing regulations and how to identify bull trout; development of a video All About Bull Trout targeted at fourth graders to be distributed to schools throughout Montana; development and presentation of a major fair display that is exhibited at county and regional fairs in Montana; and presentations to civic groups about bull trout and native fish management. Other state and federal management agencies, conservation organizations, and private industry, including the Montana Wood Products Association, also have implemented aggressive educational campaigns to promote bull trout conservation. It is expected that this level of effort will continue.

Research

Research needed to increase knowledge about bull trout, as well as to evaluate current management and regulatory practices, has been identified in status reports for each RCA, and is summarized in the stepdown outline (Appendix E). Many phases of identified research topics have already been initiated, and it is expected that research will be ongoing. Completion of this research will greatly enhance understanding, management, and conservation of bull trout within and among individual RCAs.

Coordination

A great deal of coordination has been, and will continue to be, required to develop and implement restoration actions. The interdisciplinary Restoration Team has been actively developing this restoration plan and overseeing restoration efforts since 1994. A coordinator has been hired to serve as staff to the Restoration Team, act as liaison between the Restoration Team and Scientific Group, coordinate with local watershed groups, and ensure all of these groups, as well as any other interested parties, are provided the most current and available information regarding bull trout. Interdisciplinary watershed groups comprised of landowners, agency personnel, industry representatives, and concerned citizens have been developing restoration projects, securing funding through partnerships, and implementing on-the-ground habitat restoration. Management agencies have been working cooperatively through watershed groups, partnerships, and policy-level meetings to implement restoration actions. This type of coordination, as well as establishment of technical advisory groups to oversee stocking proposals, screen land management activities, and evaluate effectiveness of restoration efforts, is expected to continue to occur at local, regional, and statewide levels.

TECHNICAL REPORT ORDER FORM

Send to: Bull Trout Coordinator
Montana Department of Fish, Wildlife and Parks
P.O. Box 200701
Helena, MT 59620

	Title (Place an X next to those titles you are requesting)	
	The Relationship between Land Management Activities and Habitat Requirements of Bull Trout (1998)	
	The Role of Stocking in Bull Trout Recovery (1996)	
	Assessment of Methods for Removal or Suppression of Introduced Fish to Aid in Bull Trout Recovery (1996)	
	Bull Trout Status Report - Bitterroot River Drainage (1995)	
	Bull Trout Status Report - Blackfoot River Drainage (1995)	
	Bull Trout Status Report - Swan River Drainage (1996)	
	Bull Trout Status Report - S. Fork Flathead River Drainage (1995)	
	Bull Trout Status Report - Flathead River Drainage (1995)	
	Bull Trout Status Report - Lower Clark Fork River Drainage (1996)	
	Bull Trout Status Report - Middle Clark Fork River Drainage (1996)	
	Bull Trout Status Report - Upper Clark Fork River Drainage (1995)	
	Bull Trout Status Report - Lower Kootenai River Drainage (1996)	
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	Bull Trout Restoration Plan (2000)	

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