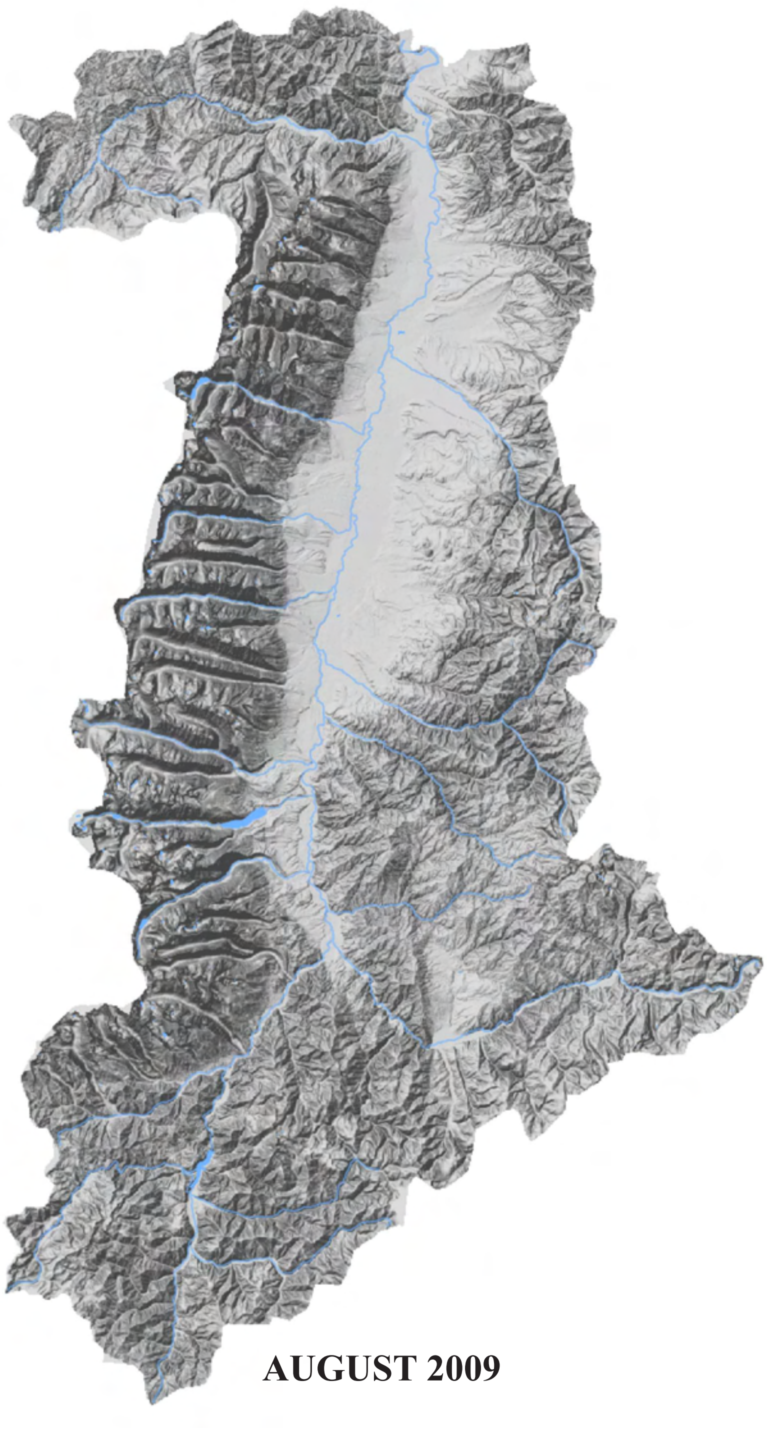
BITTERROOT RIVER SUBBASIN PLAN FOR FISH AND WILDLIFE CONSERVATION

APPENDICES



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List of Appendices

Appendix 1

Description of Plant Communities, Habitat Types, and Noxious Weeds Found in the Bitterroot Subbasin

Wetland Systems and Classes

The following wetland systems and classes are found in the Bitterroot subbasin. All descriptions are based on Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979).

Riverine System

Riverine systems are wetlands or deepwater habitats contained in a channel and not dominated by trees, shrubs, persistent emergents, emergent mosses, or lichen. The limits of the system are the banks of the channel where there is a transition to an upland or a wetland dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens. In braided streams, like portions of the Bitterroot River, the limits are the outermost banks of the depression where the stream braids occur. Riverine systems in the Bitterroot subbasin are divided into two classes, which are defined below: unconsolidated bottom and unconsolidated shore.

Unconsolidated Bottom Class

The unconsolidated bottom class of wetlands includes areas where water is present above the surface for most, if not all, of the growing season. Unconsolidated bottom areas have less than 30 percent vegetative cover and at least 25 percent cover of material smaller than stones. Within the Bitterroot subbasin, the Unconsolidated Bottom class occurs within the base flow channel on streams and rivers, and includes sloughs and portions of shallow, open water wetlands.

Unconsolidated Shore Class

The unconsolidated shore class of wetlands encompasses areas adjacent to the unconsolidated bottom class in all systems. It has less than 75 percent aerial coverage of stones, boulders, or bedrock; less than 30 percent vegetative cover other than pioneering plants; and a water regime of irregularly exposed, regularly flooded, irregularly flooded, seasonally flooded, temporarily flooded, intermittently flooded, saturated, or artificially flooded. Beaches, bars, and flat are examples of unconsolidated shore landforms that form by the erosion and deposition of waves and currents. Within the Bitterroot subbasin, the Unconsolidated Shore class includes mainly depositional bars along the Bitterroot River and tributary streams.

Palustrine System

The palustrine system includes wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens. Wetlands lacking the vegetation listed above are included in this system if all of the following apply: (1) they are less than eight hectares

(20 acres) in size; (2) active wave-formed or bedrock shoreline features are not present; and (3) water is less than two meters (6.6 feet) deep in the deepest part of the basin at low water (Cowardin et al. 1979). Palustrine systems within the Bitterroot subbasin are divided into five classes: forested, scrub-shrub, emergent, aquatic bed, unconsolidated bottom, and unconsolidated shore.

Forested Class
Areas that fall within the forested class of wetlands have at least 30 percent vegetated cover of woody vegetation that is six meters (20 feet) tall or taller. Forested wetlands typically have an overstory of trees, an understory of young trees or shrubs, and an herbaceous layer.

Shrub Class
Areas that fall within the scrub-shrub class of wetlands have at least 30 percent vegetative cover dominated by woody vegetation less than six meters (20 feet) tall that is the uppermost layer of vegetation. This system can include shrubs and young trees and shrubs stunted due to environmental conditions.

Emergent Class
The emergent class of wetlands includes areas dominated by erect, rooted, herbaceous plants (excluding mosses and lichens), where vegetation is present for most of the growing season. Palustrine Emergent (PEM) wetlands are common in the Bitterroot subbasin and are usually associated with subirrigated fields, irrigation ditches, oxbows in the Bitterroot River floodplain or associated with tributaries, and other ponded areas both natural and artificial.

Aquatic Bed Class
Areas that fall within the aquatic bed class occur where water is present above the ground level for most, and sometimes all, of the growing season. Vegetation that typically grows on or below the surface of the water dominates this class. In the Bitterroot Valley, this is a minor wetland class that occurs in the transition between palustrine emergent and palustrine unconsolidated bottom.

Unconsolidated Bottom Class
The palustrine, unconsolidated bottom class is the same as the riverine, unconsolidated bottom class (above) except it does not occur within a flowing water (riverine) wetland system.

Riparian and Wetland Plant Community Associations

In western Montana, Classification and Management of Montana's Riparian and Wetland Sites (Hansen et al. 1995) is a habitat-typing manual that is commonly used to describe plant communities occupying the near-bank area, active floodplain zone, older floodplain terraces, and other wet areas. Plant communities described in Hansen et al. (1995) are discussed in terms of their relationship to plant community succession and their response to natural and human-caused disturbance processes. In addition, the Montana Natural Heritage Program (2003) maintains a plant community database focusing on plant communities that are significant from a conservation perspective. Information from this database is included here to supplement the information in Hansen et al. (1995).

Palustrine Forested Wetland Riparian and Wetland Plant Communities

Black cottonwood/red-osier dogwood (Populus trichocarpa/ Cornus stolonifera) Community Type

Black cottonwood, (synonym *Populus balsamifera ssp. trichocarpa*) is the dominant native cottonwood in Montana west of the continental divide. Along the Bitterroot River the black cottonwood/red-osier dogwood type occupies portions of the active floodplain and adjacent alluvial terraces. In addition, this community type is common along many tributary streams, particularly those on the west side and along the East and West Forks of the Bitterroot River. The Montana Natural Heritage Program (2003) summarizes the type as follows:

> This forest type occupies alluvial terraces of major rivers and streams, point bars, side bars, mid-channel bars, delta bars, an occasional lake or pond margin, and even creeps onto footslopes and lower subirrigated slopes of hilly or mountainous terrain. Many of these sites are flooded in the spring and dry deeply by summer's end; capillary action keeps upper portions of soil profile moist. Other sites are merely subirrigated. *Populus balsamifera ssp. trichocarpa* dominates the overstory with cover values ranging from approximately 12-90 percent, though the modal range, at least in Montana is 40-60 percent. *Populus angustifolia* is a subordinate canopy species in the eastern portion of the range, and *Populus tremuloides* and *Betula papyrifera* occur as subordinates in the western portion. The shrub layer comprises at least 25 percent cover with *Cornus sericea* diagnostic for the type and having anywhere from 1-90 percent cover; other shrub taxa with high constancy include *Symphoricarpos* spp., *Rosa* spp., *Salix* spp., *Crataegus* spp., *Amelanchier alnifolia*, and *Alnus incana*. There are no graminoids exhibiting high constancy, though any one of a number of disturbance-associated exotics can manifest high coverages. *Maianthemum stellatum, Galium triflorum, Solidago canadensis*, and *Equisetum* spp. are the only forbs that exhibit even relatively high constancy across the range of the type. This is a successional community that colonizes moist, newly deposited alluvium exposed to full sunlight; in the absence of fluvial disturbance it is capable of developing into conifer-dominated communities belonging to alliances as diverse as *Thuja plicata, Picea* spp. and *Juniperus scopulorum*. Adjacent wetter sites are dominated by a suite of wetland *Salix* spp., *Alnus incana*, wetland-associated *Carex* spp. often including *Carex utriculata, Carex aquatilis* and *Carex buxbaumii* or *Typha latifolia*-dominated communities. Adjacent drier sites are dominated by *Populus balsamifera ssp. trichocarpa* or *Populus tremuloides* types or any of a vast array of conifer-dominated types that are capable of growing within the elevational zone occupied by the *Populus balsamifera ssp. trichocarpa / Cornus sericea* Forest (MNHP 2003).

Ponderosa pine/red-osier dogwood (Pinus ponderosa/Cornus stolonifera) habitat type

The ponderosa pine/red-osier dogwood habitat type occurs on alluvial benches or terraces of major streams and rivers (Hansen et al. 1995). It is probably a late successional stage of the black cottonwood/red-osier dogwood habitat type in areas where there is enough time between disturbances to allow black cottonwoods to senesce and create openings for ponderosa pine seedlings.

Associated shrubs include, but are not limited to, western serviceberry (*Amelanchier alnifolia*), red-osier dogwood, common chokecherry (*Prunus virginiana*) and western snowberry (*Symphoricarpos occidentalis*). Because the ponderosa pine/red-osier dogwood habitat type occupies a similar landform to that of the black cottonwood/red-osier dogwood community type, many of the species present in one occur in the other.

Douglas-fir/red-osier dogwood (Pseudotsuga menziesii/Cornus stolonifera) habitat type

This habitat type occurs on well-drained alluvial benches or terraces of major streams and rivers and along smaller streams and creeks (Hansen et al. 1995). This habitat type is one of the most common along tributary streams between the valley bottom and higher elevation conifer riparian habitat types such as those dominated by spruce (*Picea* spp), western redcedar (*Thuja plicata*) and subalpine fir (*Abies lasiocarpa*).

Quaking Aspen/red-osier dogwood (Populus tremuloides/Cornus stolonifera) Habitat Type

This habitat type occurs on alluvial terraces adjacent to the Bitterroot River, near springs and seeps, or as a component of slope wetlands on the west side of the Bitterroot Valley. Plant species richness is high. An overstory of quaking aspen typically dominates an understory of willows and other shrubs. Dominant mid-story shrubs include red-osier dogwood, western serviceberry, Rocky Mountain maple (*Acer glabrum*), birch (*Betula* spp.), alder (*Alnus incana*), common chokecherry, currant (*Ribes* spp.), and several species of willow. Understory species composition varies widely depending upon soil moisture.

Other quaking aspen-dominated ecological types occupy isolated areas. The quaking aspen/bluejoint reedgrass (*Populus tremuloides*/*Calamagrostis canadensis*) habitat type may occur where quaking aspen is encroaching on wet meadows. Quaking aspen stands disturbed by livestock grazing may have shifted from the quaking aspen/red-osier dogwood habitat type to the quaking aspen/Kentucky bluegrass (*Populus tremuloides*/*Poa pratensis*) community type.

Palustrine Scrub-Shrub Wetland Riparian and Wetland Plant Communities
Riparian and wetland habitat types within the PSS wetland type (from Hansen and others 1995) include:

Bebb willow (Salix bebbiana) community type

The Bebb willow community type occurs on alluvial terraces, moist to wet areas near springs and seeps, and occasionally along major rivers and tributaries (Hansen et al. 1995). Bebb willow is tolerant of browse impacts and, as a result, has become dominant on many livestock grazing sites formerly occupied by more diverse willow communities. Bebb willow is often the only shrub present on a site. Understories are occupied by a variety of herbaceous species.

Sandbar willow (Salix exigua) community type

The sandbar willow community type occupies a wide variety of sites characterized by alluvial deposits, most often where sand is the dominant substrate (Hansen et al. 1995). Sandbar willow is the most common willow on newly deposited alluvial bars in the lower reaches of the mainstem Bitterroot River (approximately from Darby downstream). Upstream from Darby, sandbar willow occurs as a component of mixed willow stands along the streambanks.

Sandbar willow typically grows in nearly monotypic stands that, once established, spread vegetatively. The sandbar willow community type may include small amounts of other shrub species, including red-osier dogwood, common chokecherry, rose (*Rosa* spp.), and other willow species. A sedge (*Carex* spp.) understory may be present on sites with appropriate hydrology and where dense sandbar willow stems have trapped fine-textured sediments. Reed canarygrass often invades the understory of these stands, limiting the ability of other native species to become established, and possibly truncating riparian succession at these locations.

Woods' rose (Rosa woodsii) community type

The Woods' rose community type occurs on flat, alluvial areas and in narrow strips at the edge of agricultural meadows at the transition to wetter riparian ecological types (Hansen et al. 1995). It is found in areas that have been heavily grazed and may represent a transition from more complex shrub communities.

Woods' rose typically dominates and forms thick, nearly impenetrable stands. Associated shrubs include snowberry (*Symphoricarpos* spp.). Various introduced grass species occur in the understory.

Palustrine Emergent Wetland Riparian and Wetland Plant Communities
Riparian and wetland habitat types within the PEM wetland type (from Hansen and others 1995) include:

Beaked sedge (Carex rostrata) habitat type (synonym for Carex utriculata)

The beaked sedge habitat type occurs in flat areas where the soil surface is saturated for much of the growing season (Hansen et al. 1995). In the Bitterroot subbasin, this habitat type is found within open agricultural fields, along the edges of low-gradient side channels and tributary streams, within abandoned meanders and oxbows, and along irrigation ditches. The Montana Natural Heritage Program (2003) describes the plant community as follows:

> This wetland association is found throughout much of the western U.S. Stands occur in montane and subalpine areas around the edges of lakes and beaver ponds, along the margins of slow-moving reaches of streams and rivers, and in marshy swales and overflow channels on broad floodplains. Sites are flat to undulating, often with a hummocky microtopography. The water table is usually near the surface for most of the growing season. There are a wide variety of soil types for this association ranging from saturated organics or fine silty clays to clays over cobbles and alluvium to fine-loamy and sandy-skeletal. Mottling often occurs near the surface because of the high water table. The vegetation is characterized by a moderately dense to dense perennial graminoid layer dominated or codominated by *Carex utriculata* (20 to 99 percent cover). Stands often appear to be nearly pure *Carex utriculata*, but a variety of other graminoid species may be present as well. Other *Carex* species present include *Carex lenticularis* and *Carex microptera*, but usually with low cover. Other graminoid species that may be present include *Calamagrostis canadensis, Glyceria striata*, and *Juncus balticus*. Sparse forb cover can include *Geum macrophyllum, Mentha arvensis*, and *Mimulus guttatus*. Scattered *Salix* spp. shrubs may be present because these riparian shrublands are often adjacent. *Salix* species vary depending on elevation and geography (Montana Natural Heritage Program 2003).

Common cattail (Typha latifolia) habitat type

The common cattail habitat type occurs in areas where the soil is saturated or submerged during a significant portion of the growing season. In the Bitterroot subbasin, it is found along pond margins, ditches, oxbows, and backwater areas. It also occupies areas managed for agriculture where groundwater is at the soil surface, such as areas associated with irrigation ditches and stock watering ponds.

Cattail habitat types are usually single-species stands of common cattail. Adjacent communities vary widely, depending upon which landform the common cattail habitat type is occupying. In agricultural fields, adjacent drier plant communities may be dominated by beaked sedge or reed canarygrass. Where the common cattail habitat type occurs in oxbows, shrubs may dominate adjacent plant communities.

Reed canarygrass (Phalaris arundinacea) habitat type

The reed canarygrass habitat type occurs in open floodplain areas with fine-textured soils. Reed canarygrass can behave as an aggressive, invasive species and is able to grow in habitats formerly occupied by native wet meadow or shrub communities. It is tolerant of a wider range of soil moisture conditions than most native grasses and grasslike plants (Hansen et al. 1995).

Reed canarygrass is the dominant species and usually forms monotypic, stable stands. Stands that include small components of black cottonwood, rose, nightshade (*Solanum dulcamara*), other grasses, and sedges still function as stable reed canarygrass habitat types. The reed canarygrass habitat type requires active restoration (shade, mulching, herbicide and/or active revegetation) to shift it to a more complex ecological type.

Grassland and Shrub Habitat Type Descriptions

The following shrub and grassland communities are found in the Bitterroot subbasin. All descriptions are based on Grassland and Shrubland Habitat Types of Western Montana (Mueggler and Stewart 1980).

***Festuca idahoensis/Agropyron spicatum* Habitat Type**

This is the most common native grassland habitat type found in Southwestern Montana. It occurs from 4,500 to 7,500 feet in elevation in predominantly mesic soils. Native ungulates, primarily elk, use these grasslands throughout the year including during winter months when they subsist on the dried or dormant grasses. While tolerant of natural grazing, this habitat type is sensitive to intensive livestock grazing. Once disturbed, it is slow to replenish, allowing invasive species to further deteriorate the native composition.

***Purshia tridentata/Agropyron spicatum* Habitat Type**

Occurring in limited patches in other areas, this grassland is common on the drier soils of the Bitterroot subbasin on steep slopes ranging from 3,500 to 5,500 feet in elevation. This habitat type is a common food source for large game. It is also highly susceptible to over-grazing by livestock. This habitat type is often found as groundcover in Ponderosa pine (*Pinus ponderosa)* or Douglas fir (*Pseudotsuga menziesii*) forests, making it an important winter forage source.

***Artemesia tridentata/Festuca scabrella* and *Artemesia tridentata/Festuca idahoensis* Habitat Types**

F.scabrella (rough fescue) is typically co-dominant with *A. tridentata* (sagebrush) in the northern portion of the Bitterroot subbasin, while *F. idahoensis* (Idaho fescue) becomes dominant further south. These habitat types generally occur at higher elevations between 6,000 and 8,000 feet and across a wide range of precipitation levels. The fescues are sensitive to overgrazing, while the sagebrush is generally non-palatable and thrives in the absence of grassy competition.

***Artemesia tridentata/Agropyron spicatum* Habitat Type**
Found in drier soils from 4,000 to 6,000 feet in elevation, this habitat type is common in Southwestern Montana, and less frequent in other areas of the state. The sagebrush can become highly competitive if wheatgrass is subjected to overgrazing

***Festuca scabrella/Festuca idahoensis* Habitat Type**
The absence of sagebrush in this cover type makes it one of the most productive and desirable grasslands in Western Montana. Primarily occurring in wetter soils from 3,000 to 7,000 feet in elevation, these fescues are fairly resistant to grazing, and can provide both native game and livestock forage for up to nine months a year with little negative impact on native composition.

Coniferous Habitat Type Descriptions
The following coniferous communities are found in the Bitterroot subbasin. All descriptions are based on Forest Habitat Types of Montana (Pfister et al. 1977).

Ponderosa Pine (*Pinus ponderosa*) Series
This is one of the lowest elevation forested communities. It is bordered by grasslands near the valley floor and Douglas-fir communities at higher elevations. On or near the valley floor, ponderosa pine forests tend to occur on alluvial fans near the mouths of west-side mountain canyons between valley grassland communities. Ponderosa pine generally tolerates drier conditions than other coniferous species found in the Bitterroot subbasin (Pfister and others 1977). Several ponderosa pine habitat types occurring in the Bitterroot subbasin are described below.

- Ponderosa pine/bluebunch wheatgrass (*P. ponderosa/Agropyron spicatum*) habitat type – This habitat type generally occurs below 4,800 feet on south-facing slopes in the driest forested sites.
- Ponderosa pine/Idaho fescue (*P. ponderosa/Festuca idahoensis*) habitat type – This habitat type generally occurs below 5,000 feet on south and west-facing slopes at slightly wetter sites than ponderosa pine/bluebunch wheatgrass where soils are more developed. Two phases of this habitat type, Idaho fescue phase and rough fescue (*F. scabrella*) phase, occur in the Bitterroot subbasin.
- Ponderosa pine/bitterbrush (*P. ponderosa/Purshia tridentata*) habitat type – Small areas of this habitat type were documented near Darby on low elevation, dry benches and rocky slopes.
- Ponderosa pine/snowberry (*P. ponderosa/Symphoricarpos occidentalis*) habitat type – This habitat type is occasionally found on benches in lower elevation valleys on south-facing slopes. More commonly ponderosa pine habitat types with grasses (bluebunch wheatgrass or Idaho fescue) are found in these locations.

Douglas-Fir (*Pseudotsuga menziesii*) Series
Douglas-fir-dominated forested occur at moderate elevations throughout the Rocky Mountains including the Bitterroot Mountains in the Bitterroot subbasin. Douglas-fir forested areas tend to occur on well drained slopes from the valley floor to between approximately 5,500 and 7,500 feet in elevation. Douglas-fir forests are generally bordered by ponderosa pine forests at lower elevations and where site conditions

transition to drier environments. At higher elevations, Douglas-fir forests transition to subalpine fir (*Abies lasiocarpa*). Douglas-fir is more shade tolerant than other coniferous species that it grows with including ponderosa pine, lodgepole pine (*Pinus contorta*), and western larch (*Larix occidentalis*). Bunch grasses tend to dominate the forest understory at drier sites. Shrub species become more common in the forest understory at cooler sites. Several Douglas fir habitat types that commonly occur in the Bitterroot subbasin are described below (Pfister and others 1977).

- Douglas fir/bluebunch wheatgrass (*P. menziesii/Agropyron spicatum*) habitat type – This habitat type occurs in the driest Douglas fir environments, generally on south- and west-facing slopes.
- Douglas fir/dwarf huckleberry (*P. menziesii/Vaccinium caespitosum*) habitat type – This is a common habitat type on warm, moist, but well-drained benches and gentle slopes between 2,900 and 4,500 feet in elevation.
- Douglas fir/ninebark (*P. menziesii/Physocarpus malvaceus*) habitat type – This habitat type generally occurs on cool, moist, east- and north-facing slopes between 2,000 and 5,700 feet in elevation.
- Douglas fir/blue huckleberry (*P. menziesii/Vaccinium globulare*) habitat type – This is a major habitat type in the Bitterroot and Lolo National Forests at cold sites on well-drained slopes between 4,300 and 6,800 feet in elevation.
- Douglas fir/twinflower (*P. menziesii/Linnaea borealis*) habitat type – This habitat type generally occurs at moister Douglas fir sites on moderate slopes that are not southeast- to west-facing slopes, between 4,000 and 6,000 feet in elevation.
- Douglas fir/snowberry (*P. menziesii/Symphoricarpos albus*) habitat type – This is a common habitat type throughout Montana on moderately warm slopes and benches.
- Douglas fir/pinegrass (*P. menziesii/Calamagrostis rubescens*) habitat type – This is a common habitat type throughout Montana on moderately dry slopes and at the highest elevation reaches of the Douglas fir communities.
- Douglas fir/elk sedge (*P. menziesii/Carex geyeri*) habitat type – This habitat tends to occur in similar positions as the Douglas fir/pinegrass habitat type, but in slightly drier environments. It is typically found on mid- and upper-south facing slopes between 6,100 and 7,600 feet in elevation.

Other Douglas fir habitat types that occur in low abundance within the Bitterroot subbasin include:

- Douglas fir/white spirea (*P. menziesii/Spiraea betulifolia*) habitat type

Spruce (*Picea*) Series

Spruce forests are generally found at moist, cool sites (Pfister and others 1977). In the Bitterroot subbasin, spruce communities may be associated with riparian areas which are described in more detail in Section 3.4 above. Martin (2001) reports scattered occurrences of spruce forests in the Bitterroot subbasin.

Grand fir (*Abies grandis*) Series

Grand fir forests occur as a minor component at low to mid elevations in the Bitterroot River valley. At drier edges of grand fir communities, the forest transitions to Douglas fir. At cooler sites, grand fir forests transitions to subalpine fir forests. Grand fir forests tend to have a lot of Douglas fir along with western larch, lodgepole pine and ponderosa pine. Forbs adapted to moist environments along with shrubs are generally present in the understory with varying composition depending on seral stage of the forest (Pfister and others 1977). Martin (2001) reports only scattered occurrences of grand fir forests in the Bitterroot subbasin. Several grand fir habitat types that occur in the Bitterroot subbasin are described below (Pfister and others 1977).

- Grand fir/twinflower (*A. grandis/Linnaea borealis*) habitat type – This is a minor habitat type in the Bitterroot Mountains south of Missoula. It occurs on north- to southeast-facing slopes between 3,700 and 5,500 feet in elevation.
- Grand fir/beargrass (*A. grandis/Xerophyllum tenax*) habitat type – This is a minor habitat type on well-drained of the Lolo and Bitterroot National Forests between 4,700 and 5,300 feet in elevation.
- Grand fir/queencup beadlily (*A. grandis/Clintonia uniflora*) habitat type – This habitat type is found on valley bottoms and benches between 2,400 to 5,000 feet in elevation.

Lodgepole Pine (*Pinus contorta*) Series
This series is generally found near and east of the Continental Divide according to Pfister and others (1977); however, some stands of both lodgepole pine/twin flower and lodgepole pine/grouse whortleberry were sampled in the Bitterroot National Forest. Martin (2001) reports scattered coverage of lodgepole pine forests throughout the Bitterroot subbasin on south and east facing slopes. A short description of each habitat type is included below from Pfister and others (1977).

- Lodgepole pine/twinberry (*P. contorta/Linnaea borealis*) habitat type – This habitat type is occasionally found in the Bitterroot Valley on benches or north-facing slopes.
- Lodgepole pine/grouse whortleberry (*P. contorta/Vaccinium scoparium*) habitat type – This habitat type is occasionally found in the Bitterroot Valley on cold, dry, upper or middle slopes or wide ridges between 6,000 to 7,700 feet in elevation.

Subalpine Fir (*Abies lasiocarpa*) Series
This is one of the highest elevation forested communities. It is bordered by Douglas fir communities at lower elevations that are warmer and moister. The upper elevation extent of subalpine fir communities is generally timberline dominated by alpine tundra (Pfister and others 1977). Martin (2001) recorded subalpine fir dominating the headwater drainage of Lost Horse Creek and other small patches above the valley floor. Pfister and others (1977) divide subalpine fir communities into three elevation categories: lower subalpine habitat types, upper subalpine habitat types, and timberline habitat types. Habitat descriptions below are organized by these same elevation categories.

Lower subalpine fir habitat types occurring in the Bitterroot subbasin are described below (Pfister et al. 1977).

- Subalpine fir/sweetscented bedstraw (*A. lasiocarpa/Galium triflorum*) habitat type – This habitat type occurs in the warmest subalpine fir forest locations, generally on moist bottomlands, benches, north-facing slopes and at seeps on south-facing slopes between 5,000 and 6,800 feet in elevation.
- Subalpine fir/bluejoint (*A. lasiocarpa/Calamagrostis canadensis*) habitat type – This habitat type occurs at high elevation (6,00o to 7,500 feet) moist sites that have standing water in late spring and early summer. Stands tends to be small and isolated because of the water regime requirements.
- Subalpine fir/twinflower (*A. lasiocarpa/Linnaea borealis*) habitat type – This is a common habitat type at moist, north-facing slopes and benches between 5,000 and 7,000 feet in elevation.
- Subalpine fir/menziesia (*A. lasiocarpa/Menziesia ferrugina*) habitat type – This habitat type is common in the coolest, most sheltered slopes in the Bitterroot Mountains between 5,500 and 7,200 feet in elevation.
- Subalpine fir/beargrass (*A. lasiocarpa/Xerophyllum tenax*) habitat type – This habitat is common in western Montana on steep, dry slopes between 5,200 and 7,000 feet in elevation.
- Subalpine fir/Sitka alder (*A. lasiocarpa/Alnus sinuata*) habitat type – This habitat type occurs in small scattered stands at cool, moist, sites on north-facing slopes between 6,500 and 7,500 feet in elevation.
- Subalpine fir/blue huckleberry (*A. lasiocarpa/Vaccinium globulare*) habitat type – This is a minor habitat type in the Bitterroot subbasin at moderately moist, north- or east-facing slopes between 6,800 and 7,800 feet in elevation.
- Subalpine fir/grouse whortleberry (*A. lasiocarpa/Vaccinium scoparium*) habitat type – This habitat type tends to occurs on well-drained soils on ridges, slopes, and benches at higher elevations.
- Subalpine fir/queencup beadlily (*A. lasiocarpa/Clintonia uniflora*) habitat type – This is a minor, uncommon habitat type in the Bitterroot subbasin, restricted to swales or along streams in warm, moist sites.

Upper subalpine fir habitat types occurring in the Bitterroot subbasin are described below from Pfister and others (1977).

- Subalpine fir – whitebark pine/grouse whortleberry (*A. lasiocarpa – Pinus albicaulis/Vaccinium scoparium*) habitat type – This habitat type is generally found east of the Continental Divide, but some locations were sampled in the Bitterroot National Forest. It tends to occur at some of the highest elevations.
- Subalpine fir/wood-rush (*A. lasiocarpa/Lusula hitchcockii*) habitat type – This is a common habitat on most slopes between 6,800 and 8,400 feet in elevation.

Timberline habitat types occurring in the Bitterroot subbasin are described below from Pfister and Others (1977). Martin (2001) also reported alpine larch along ridgelines and steep mountain faces primarily in the northern portion of the Bitterroot subbasin.

- Alpine larch/subalpine fir (*Larix lyallii/A. lasiocarpa*) habitat type – This habitat type is common on cool slopes at timberline where there is little soil development.

- Whitebark pine/subalpine fir (*Pinus albicaulis/A. lasiocarpa*) habitat type – This is a common habitat type at most timberline sites throughout Montana.

Other Forested Communities
Martin (2001) reports western larch forests on north and north-east facing slopes in the northern portion of the Bitterroot subbasin, above Hamilton.

Forested Scree Communities
These communities occur on steep slopes (generally greater than 30 degrees) on south and west facing slopes ranging in elevation from 5,000 to 6,700 feet. Forested vegetation is occurs in scattered patches and may consist of ponderosa pine, Douglas fir, subalpine fir or limber pine (*Pinus flexis*).

Rock or Barren Sites
The GAP analysis (USGS GAP Analysis Program 2005) shows may areas of rock or barren cover interspersed with conifer vegetation, primarily on the west side of the Bitterroot Valley, but also some areas on the east side of the Bitterroot Valley. These are generally south and west facing rock outcroppings.

Bitterroot Subbasin Noxious Weed List

Scientific Name	Common Name
Anchusa officinalis [2]	Common bugloss
Berteroa incana [1]	Hoary alyssum
Bromus tectorum [2]	Cheat grass
Butomus umbellatus [1]	Flowering rush
Cardaria draba [1]	White top
Centaurea diffusa [1]	Diffuse knapweed
Centaurea maculosa [1]	Spotted knapweed
Centaurea repens [1]	Russian knapweed
Centaurea solstitialis [1]	Yellow starthistle
Chondrilla juncea [1]	Rush skeletonweed
Chrysanthemum leucanthemum [1]	Oxeye daisy
Cirsium ravense [1]	Canada thistle
Convolvulus arvensis [1]	Field bindweed
Crupina vulgaris [1]	Common crupina
Cynoglossum officinale [1]	Hounds tongue
Cytisus scoparius [1]	Scotch broom
Echium vulgare [1]	Blueweed
Euphorbia esula [1]	Leafy spurge
Hieracium aurantiacum [1]	Orange hawkweed
Hieracium floribundum, H. piloselloides, H. pratense [1]	Meadow hawkweed
Hypericum perforatum [1]	Saint johnswort
Iris pseudocorus [1]	Yellowflag iris
Isatis tinctoria [1]	Dyers woad
Lepidium latifolium [1]	Perennial pepperweed
Linaria dalmatica [1]	Dalmatian toadflax
Linaria vulgaris [1]	Yellow toadflax
Lythrum salicaria [1]	Purple loosestrife
Myriophyllum spicatum [1]	Eurasian watermilfoil
Polygonum cuspidatum, P. sachalinense, P. polystachyum [1]	Japanese knotweed complex
Potentilla recta [1]	Sulfur cinquefoil
Ranunculus acris [1]	Tall buttercup
Senecio jacobea [1]	Tansy ragwort
Tamarix species [1]	Tamarisk
Tanacetum vulgare [1]	Common tansy

[1]Included on the Montana state noxious weed list as of March 27, 2008
[2]Not listed as a statewide noxious weed but included on the Ravalli County weed list.

Appendix 1 References

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Appendix 2

Description of Montana Species Ranking Systems

State of Montana

The following is from Montana Natural Heritage Program's website (www.nhp.nris.mt.gov).

Montana employs a standardized ranking system to denote global (G - range-wide) and state status (S) (NatureServe 2003). Species are assigned numeric ranks ranging from 1 (critically imperiled) to 5 (demonstrably secure), reflecting the relative degree to which they are "at-risk". Rank definitions are given below. A number of factors are considered in assigning ranks - the number, size and distribution of known "occurrences" or populations, population trends (if known), habitat sensitivity, and threat.

G1 S1
At high risk because of extremely limited and potentially declining numbers, extent and/or habitat, making it highly vulnerable to global extinction or extirpation in the state.

G2 S2
At risk because of very limited and potentially declining numbers, extent and/or habitat, making it vulnerable to global extinction or extirpation in the state.

G3 S3
Potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though it may be abundant in some areas.

G4 S4
Uncommon but not rare (although it may be rare in parts of its range), and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern.

G5 S5
Common, widespread, and abundant (although it may be rare in parts of its range). Not vulnerable in most of its range.

Other Codes and Modifiers

X
Presumed Extinct - Species believed to be extinct throughout its range. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.

H
Possibly Extinct - Species known from only historical occurrences, but may nevertheless still be extant; further searching needed.

U
Unrankable - Species currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

HYB
Hybrid-Entity not ranked because it represents an interspecific hybrid and not a species.

T
Infraspecific Taxon (trinomial) - The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank.

?
Inexact Numeric Rank - Denotes inexact numeric rank

Q
Questionable taxonomy that may reduce conservation priority-Distinctiveness of this entity as a taxon at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon in another taxon, with the resulting taxon having a lower-priority (numerically higher) conservation status rank.

C
Captive or Cultivated Only - Species at present is extant only in captivity or cultivation, or as a reintroduced population not yet established.

A
Accidental - Species is accidental or casual in Montana, in other words, infrequent and outside usual range. Includes species (usually birds or butterflies) recorded once or only a few times at a location. A few of these species may have bred on the one or two occasions they were recorded.

Z
Zero Occurrence - Species is present but lacking practical conservation concern in Montana because there are no definable occurrences, although the taxon is native and appears regularly in Montana.

P
Potential that species occurs in Montana but no extant or historical occurrences are accepted.

R
Reported - Species reported in Montana but without a basis for either accepting or rejecting the report, or the report not yet reviewed locally. Some of these are very recent discoveries for which the program has not yet received first-hand information; others are old, obscure reports.

SYN
Synonym - Species reported as occurring in Montana, but the Montana Natural Heritage Program does not recognize the taxon; therefore the species is not assigned a rank.

*****
A rank has been assigned and is under review. Contact the Montana Natural Heritage Program for assigned rank.

B
Breeding - Rank refers to the breeding population of the species in Montana.

N
Nonbreeding - Rank refers to the non-breeding population of the species in Montana.

U.S. Fish and Wildlife Service

LE
Listed endangered - Any species in danger of extinction throughout all or a significant portion of its range (16 U.S.C. 1532(6))

PE
Proposed endangered - Any species for which a proposed rule has been published in the Federal Register to list the species as endangered

LT
Listed threatened - Any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (16 U.S.C. 1532(20)).

PT
Proposed threatened - Any species for which a proposed rule has been published in the Federal Register to list the species as threatened.

E(S/A) or T(S/A)
Any species listed endangered or threatened because of similarity of appearance.

C
Candidate - Those taxa for which sufficient information on biological status and threats exists to propose to list them as threatened or endangered. We encourage their consideration in environmental planning and partnerships; however, none of the substantive or procedural provisions of the Act apply to candidate species.

PDL
Proposed for delisting - Any species for which a final rule has been published in the Federal Register to delist the species.

NL
Not listed - No designation.

XE
Essential experimental population - An experimental population whose loss would be likely to appreciably reduce the likelihood of the survival of the species in the wild

XN
Nonessential experimental population - An experimental population of a listed species reintroduced into a specific area that receives more flexible management under the Act.

CH
Critical Habitat - The specific areas (i) within the geographic area occupied by a species, at the time it is listed, on which are found those physical or biological features (I) essential to conserve the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by the species at the time it is listed upon determination that such areas are essential to conserve the species.

PS
Partial status - status in only a portion of the species' range. Typically indicated in a "full" species record where an infraspecific taxon or population, that has a record in the database has USESA status, but the entire species does not.

PS:value
Partial status - status in only a portion of the species' range. The value of that status appears in parentheses because the entity with status is not recognized as a valid taxon by Central Sciences (usually a population defined by geopolitical boundaries or defined administratively, such as experimental populations.

none
Usually indicates the taxon does not have any federal status. However, because of potential lag time between publication in the Federal Register and entry in the central databases and refresh of this website, some taxa may have a status that does not yet appear.

Forest Service

The status of species on Forest Service lands as defined by the U.S. Forest Service manual (2670.22). These taxa are listed as such by the Regional Forester (Northern Region). The Forest Service lists animal species as:

Endangered
Listed as Endangered (LE) by the USFWS.

Threatened
Listed as Threatened (LT) by the USFWS.

Sensitive
Any species for which the Regional Forester has determined there is a concern for population viability within the state, as evidenced by a significant current or predicted downward trend in populations or habitat.

Watch
Any species recognized by Forest Supervisors that are either not known to occur on national forest land but predicted to occur there on the basis of suitable habitat, or known to occur on national forest land but with no immediate or predicted threats to population viability.

Bureau of Land Management

The status of species on Bureau of Land Management Lands as defined by the BLM 6840 Manual; designated by the Montana State Office of the BLM in 1996.

Special Status / Sensitive
Any species proven to be imperiled in at least part of its range and documented to occur on BLM lands.

Watch
Any species either known to be imperiled and suspected to occur on BLM lands; suspected to be imperiled and documented on BLM lands; or needing further study for other reasons.

Appendix 3
List of Wildlife Species Found or Potentially Found in the Bitterroot Subbasin

Species ID	Common Name	Salmon Related	Estuary	Wetland	Riparian
Amphibians					
20135	Coeur d'Alene Salamander	F	F	T	T
20030	Long-toed Salamander	F	F	T	T
20220	Tailed Frog	F	F	F	T
20240	Western Toad	F	F	T	T
20260	Pacific Chorus (Tree) Frog	F	F	T	T
20300	Columbia Spotted Frog	F	F	T	T
20320	Northern Leopard Frog	F	F	T	T
20330	Bullfrog	F	F	T	T
Reptiles					
30020	Painted Turtle	F	F	F	F
30090	Northern Alligator Lizard	F	F	F	F
30180	Western Skink	F	F	F	F
30210	Rubber Boa	F	F	F	F
30220	Racer	F	F	F	F
30290	Gopher Snake	F	F	F	F
30320	Western Terrestrial Garter Snake	T	F	F	F
30340	Common Garter Snake	T	F	T	T
30350	Western Rattlesnake	F	F	F	F
Birds					
40030	Common Loon	T	T	T	F
40050	Pied-billed Grebe	T	F	T	F
40060	Horned Grebe	T	T	T	F
40070	Red-necked Grebe	T	T	T	F
40080	Eared Grebe	F	F	T	F
40090	Western Grebe	T	T	T	F
40100	Clark's Grebe	T	T	T	F
40320	American White Pelican	T	F	F	F
40350	Double-crested Cormorant	T	T	F	T
40380	American Bittern	F	T	T	F
40400	Great Blue Heron	T	T	F	T
40410	Great Egret	T	T	F	T
40420	Snowy Egret	T	F	F	T
40450	Cattle Egret	F	F	F	F
40470	Black-crowned Night-heron	T	F	F	T
40490	White-faced Ibis	F	F	T	F
40500	Turkey Vulture	T	F	F	F
40530	Greater White-fronted Goose	F	F	F	F
40550	Snow Goose	F	F	F	F
40560	Ross's Goose	F	F	F	F
40570	Canada Goose	F	F	T	F
40600	Trumpeter Swan	T	F	T	F
40610	Tundra Swan	F	F	F	F
40630	Wood Duck	F	F	F	T
40640	Gadwall	F	F	T	F
40670	American Wigeon	F	T	T	F

40690	Mallard	T	F	T	T
40700	Blue-winged Teal	F	F	T	F
40710	Cinnamon Teal	F	F	T	F
40720	Northern Shoveler	F	F	T	F
40730	Northern Pintail	F	T	T	F
40760	Green-winged Teal	T	F	T	F
40770	Canvasback	T	T	T	F
40780	Redhead	F	F	T	F
40790	Ring-necked Duck	F	F	F	T
40810	Greater Scaup	T	T	F	F
40820	Lesser Scaup	F	F	T	F
40850	Harlequin Duck	T	F	F	T
40860	Surf Scoter	T	T	F	F
40900	Bufflehead	F	T	F	F
40910	Common Goldeneye	T	F	F	F
40920	Barrow's Goldeneye	T	F	F	F
40940	Hooded Merganser	T	F	F	T
40950	Common Merganser	T	F	F	T
40960	Red-breasted Merganser	T	T	F	F
40970	Ruddy Duck	F	F	T	F
40980	Osprey	T	F	F	F
41000	Bald Eagle	T	F	F	F
41010	Northern Harrier	F	F	F	F
41020	Sharp-shinned Hawk	F	F	F	F
41030	Cooper's Hawk	F	F	F	F
41040	Northern Goshawk	F	F	F	F
41070	Swainson's Hawk	F	F	F	F
41080	Red-tailed Hawk	T	F	F	F
41090	Ferruginous Hawk	F	F	F	F
41100	Rough-legged Hawk	F	F	F	F
41110	Golden Eagle	T	F	F	F
41120	American Kestrel	F	F	F	F
41130	Merlin	F	F	F	F
41140	Gyrfalcon	T	F	F	F
41150	Peregrine Falcon	T	F	F	F
41160	Prairie Falcon	F	F	F	F
41170	Chukar	F	F	F	F
41180	Gray Partridge	F	F	F	F
41190	Ring-necked Pheasant	F	F	F	T
41200	Ruffed Grouse	F	F	F	T
41220	Spruce Grouse	F	F	F	F
41240	Blue Grouse	F	F	F	T
41250	Sharp-tailed Grouse	F	F	F	F
41260	Wild Turkey	F	F	F	F
41290	California Quail	F	F	F	F
41300	Northern Bobwhite	F	F	F	F
41320	Virginia Rail	F	F	T	F
41330	Sora	F	F	T	F
41350	American Coot	F	T	T	F

41360	Sandhill Crane	F	F	T	F
41370	Black-bellied Plover	F	T	F	F
41380	American Golden-Plover	F	T	F	F
41420	Semipalmated Plover	F	T	F	F
41440	Killdeer	T	F	F	F
41480	Black-necked Stilt	F	F	T	F
41490	American Avocet	F	F	T	F
41500	Greater Yellowlegs	T	T	F	F
41510	Lesser Yellowlegs	F	F	F	F
41530	Solitary Sandpiper	F	F	F	F
41540	Willet	F	T	T	F
41570	Spotted Sandpiper	T	F	F	F
41580	Upland Sandpiper	F	F	F	F
41590	Whimbrel	F	T	F	F
41610	Long-billed Curlew	F	T	F	F
41640	Marbled Godwit	F	T	F	F
41700	Sanderling	F	T	F	F
41710	Semipalmated Sandpiper	F	T	F	F
41720	Western Sandpiper	F	T	F	F
41760	Least Sandpiper	F	T	F	F
41780	Baird's Sandpiper	F	T	F	F
41790	Pectoral Sandpiper	F	T	F	F
41820	Dunlin	F	T	F	F
41840	Stilt Sandpiper	F	F	F	F
41870	Short-billed Dowitcher	F	T	F	F
41880	Long-billed Dowitcher	F	F	F	F
41890	Common Snipe	F	F	T	F
41900	Wilson's Phalarope	F	F	T	F
41910	Red-necked Phalarope	F	F	F	F
41980	Franklin's Gull	T	F	T	F
42010	Bonaparte's Gull	T	T	F	F
42040	Ring-billed Gull	T	T	F	F
42050	California Gull	T	T	F	F
42060	Herring Gull	T	T	F	F
42180	Caspian Tern	T	T	F	F
42200	Common Tern	T	T	F	F
42220	Forster's Tern	T	F	T	F
42240	Black Tern	F	F	T	F
42380	Rock Dove	F	F	F	F
42410	Mourning Dove	F	F	F	T
42430	Yellow-billed Cuckoo	F	F	F	T
42440	Barn Owl	F	F	F	F
42450	Flammulated Owl	F	F	F	F
42460	Western Screech-owl	F	F	F	T
42470	Great Horned Owl	F	F	F	F
42480	Snowy Owl	T	F	F	F
42500	Northern Pygmy-owl	F	F	F	F
42510	Burrowing Owl	F	F	F	F
42530	Barred Owl	F	F	F	F

42540	Great Gray Owl	F	F	F	F
42550	Long-eared Owl	F	F	F	T
42560	Short-eared Owl	F	F	T	F
42570	Boreal Owl	F	F	F	F
42580	Northern Saw-whet Owl	F	F	F	F
42590	Common Nighthawk	F	F	F	F
42600	Common Poorwill	F	F	F	F
42610	Black Swift	F	F	F	F
42620	Vaux's Swift	F	F	F	F
42630	White-throated Swift	F	F	F	F
42640	Black-chinned Hummingbird	F	F	F	F
42650	Anna's Hummingbird	F	F	F	F
42670	Calliope Hummingbird	F	F	F	F
42680	Broad-tailed Hummingbird	F	F	F	F
42690	Rufous Hummingbird	F	F	F	F
42710	Belted Kingfisher	T	F	F	T
42720	Lewis's Woodpecker	F	F	F	F
42740	Williamson's Sapsucker	F	F	F	F
42760	Red-naped Sapsucker	F	F	F	T
42790	Downy Woodpecker	F	F	F	F
42800	Hairy Woodpecker	F	F	F	F
42820	Three-toed Woodpecker	F	F	F	F
42830	Black-backed Woodpecker	F	F	F	F
42840	Northern Flicker	F	F	F	F
42850	Pileated Woodpecker	F	F	F	F
42860	Olive-sided Flycatcher	F	F	F	F
42870	Western Wood-pewee	F	F	F	F
42890	Willow Flycatcher	T	F	F	T
42900	Least Flycatcher	F	F	F	F
42910	Hammond's Flycatcher	F	F	F	F
42930	Dusky Flycatcher	F	F	F	F
42940	Pacific-slope Flycatcher	F	F	F	F
42950	Cordilleran Flycatcher	F	F	F	T
42980	Say's Phoebe	F	F	F	F
43020	Western Kingbird	F	F	F	F
43030	Eastern Kingbird	F	F	F	F
43060	Loggerhead Shrike	F	F	F	F
43070	Northern Shrike	F	F	F	F
43140	Warbling Vireo	F	F	F	T
43160	Red-eyed Vireo	F	F	F	T
43170	Gray Jay	T	F	F	F
43180	Steller's Jay	T	F	F	F
43210	Pinyon Jay	F	F	F	F
43220	Clark's Nutcracker	F	F	F	F
43230	Black-billed Magpie	T	F	F	T
43240	American Crow	T	F	F	F
43260	Common Raven	T	F	F	F
43280	Horned Lark	F	F	F	F
43290	Purple Martin	F	T	F	F

43300	Tree Swallow	T	F	F	T
43310	Violet-green Swallow	T	F	F	F
43320	Northern Rough-winged Swallow	T	F	F	T
43330	Bank Swallow	T	F	F	T
43340	Cliff Swallow	T	F	F	T
43350	Barn Swallow	T	F	F	T
43360	Black-capped Chickadee	F	F	F	F
43370	Mountain Chickadee	F	F	F	F
43380	Chestnut-backed Chickadee	F	F	F	F
43430	Red-breasted Nuthatch	F	F	F	F
43440	White-breasted Nuthatch	F	F	F	F
43450	Pygmy Nuthatch	F	F	F	T
43460	Brown Creeper	F	F	F	F
43470	Rock Wren	F	F	F	F
43480	Canyon Wren	F	F	F	F
43500	House Wren	F	F	F	F
43510	Winter Wren	T	F	F	F
43520	Marsh Wren	F	F	T	F
43530	American Dipper	T	F	F	T
43540	Golden-crowned Kinglet	F	F	F	T
43550	Ruby-crowned Kinglet	F	F	F	F
43580	Western Bluebird	F	F	F	F
43590	Mountain Bluebird	F	F	F	F
43600	Townsend's Solitaire	F	F	F	F
43610	Veery	F	F	F	T
43630	Swainson's Thrush	F	F	F	F
43640	Hermit Thrush	F	F	F	F
43660	American Robin	T	F	F	F
43670	Varied Thrush	T	F	F	F
43690	Gray Catbird	F	F	F	T
43700	Northern Mockingbird	F	F	F	F
43710	Sage Thrasher	F	F	F	F
43740	European Starling	F	F	F	T
43800	American Pipit	F	F	F	F
43810	Bohemian Waxwing	F	F	F	F
43820	Cedar Waxwing	F	F	F	T
43870	Orange-crowned Warbler	F	F	F	F
43880	Nashville Warbler	F	F	F	F
43920	Yellow Warbler	F	F	F	T
43970	Yellow-rumped Warbler	F	F	F	F
44000	Townsend's Warbler	F	F	F	F
44060	Palm Warbler	F	F	F	F
44100	American Redstart	F	F	F	T
44140	Northern Waterthrush	F	F	F	T
44170	Macgillivray's Warbler	F	F	F	F
44180	Common Yellowthroat	F	F	T	T
44200	Wilson's Warbler	F	F	F	T
44220	Yellow-breasted Chat	F	F	F	T
44250	Western Tanager	F	F	F	F

44270	Spotted Towhee	T	F	F	F
44290	American Tree Sparrow	F	F	F	F
44300	Chipping Sparrow	F	F	F	F
44310	Clay-colored Sparrow	F	F	F	F
44320	Brewer's Sparrow	F	F	F	F
44340	Vesper Sparrow	F	F	F	F
44350	Lark Sparrow	F	F	F	F
44360	Black-throated Sparrow	F	F	F	F
44390	Savannah Sparrow	F	F	F	F
44400	Grasshopper Sparrow	F	F	F	F
44430	Fox Sparrow	F	F	F	T
44440	Song Sparrow	T	F	F	F
44450	Lincoln's Sparrow	F	F	T	T
44460	Swamp Sparrow	F	T	F	F
44470	White-throated Sparrow	F	F	F	F
44480	Harris's Sparrow	F	F	F	F
44490	White-crowned Sparrow	F	F	F	F
44510	Dark-eyed Junco	F	F	F	F
44530	Lapland Longspur	F	F	F	F
44560	Snow Bunting	F	F	F	F
44590	Black-headed Grosbeak	F	F	F	F
44610	Lazuli Bunting	F	F	F	T
44650	Bobolink	F	F	F	F
44660	Red-winged Blackbird	F	F	T	F
44680	Western Meadowlark	F	F	F	F
44690	Yellow-headed Blackbird	F	F	T	F
44710	Brewer's Blackbird	F	F	F	F
44740	Brown-headed Cowbird	F	F	F	F
44790	Bullock's Oriole	F	F	F	T
44830	Black Rosy-finch	F	F	F	F
44840	Pine Grosbeak	F	F	F	F
44850	Purple Finch	F	F	F	T
44860	Cassin's Finch	F	F	F	F
44870	House Finch	F	F	F	F
44880	Red Crossbill	F	F	F	F
44890	White-winged Crossbill	F	F	F	F
44900	Common Redpoll	F	F	F	F
44920	Pine Siskin	F	F	F	F
44930	Lesser Goldfinch	F	F	F	T
44950	American Goldfinch	F	F	F	F
44960	Evening Grosbeak	F	F	F	F
44970	House Sparrow	F	F	F	F
Mammals					
50020	Masked Shrew	T	F	F	F
50030	Preble's Shrew	F	F	F	F
50040	Vagrant Shrew	T	F	F	F
50050	Montane Shrew	T	F	F	F
50090	Water Shrew	T	F	F	T
50120	Merriam's Shrew	F	F	F	F

50130	Pygmy Shrew	F	F	F	F
50180	California Myotis	F	F	F	F
50190	Western Small-footed Myotis	F	F	F	T
50210	Little Brown Myotis	F	F	F	F
50220	Long-legged Myotis	F	F	F	T
50230	Fringed Myotis	F	F	F	F
50250	Long-eared Myotis	F	F	F	F
50260	Silver-haired Bat	F	F	F	F
50280	Big Brown Bat	F	F	F	T
50290	Hoary Bat	F	F	F	F
50310	Townsend's Big-eared Bat	F	F	F	F
50340	American Pika	F	F	F	F
50380	Nuttall's (Mountain) Cottontail	F	F	F	F
50400	Snowshoe Hare	F	F	F	T
50410	White-tailed Jackrabbit	F	F	F	F
50440	Least Chipmunk	F	F	F	F
50450	Yellow-pine Chipmunk	F	F	F	F
50490	Red-tailed Chipmunk	F	F	F	F
50500	Yellow-bellied Marmot	F	F	F	F
50510	Hoary Marmot	F	F	F	F
50540	Townsend's Ground Squirrel	F	F	F	F
50600	Columbian Ground Squirrel	F	F	F	F
50620	Golden-mantled Ground Squirrel	F	F	F	F
50650	Eastern Fox Squirrel	F	F	F	F
50670	Red Squirrel	F	F	F	F
50690	Northern Flying Squirrel	T	F	F	F
50700	Northern Pocket Gopher	F	F	F	F
50750	Great Basin Pocket Mouse	F	F	F	F
50810	American Beaver	F	F	T	T
50820	Western Harvest Mouse	F	F	T	T
50830	Deer Mouse	T	F	T	T
50900	Bushy-tailed Woodrat	F	F	F	T
50910	Southern Red-backed Vole	F	F	F	T
50930	Heather Vole	F	F	F	F
50960	Meadow Vole	F	F	T	T
50970	Montane Vole	F	F	T	F
51010	Long-tailed Vole	F	F	T	T
51030	Water Vole	F	F	F	T
51040	Sagebrush Vole	F	F	F	F
51050	Muskrat	F	F	T	T
51060	Northern Bog Lemming	F	F	T	F
51080	Norway Rat	F	F	F	F
51090	House Mouse	F	F	F	F
51100	Western Jumping Mouse	F	F	F	T
51120	Common Porcupine	F	F	F	F
51140	Coyote	T	F	F	F
51150	Gray Wolf	T	F	F	F
51160	Red Fox	T	F	F	F
51190	Black Bear	T	F	F	F

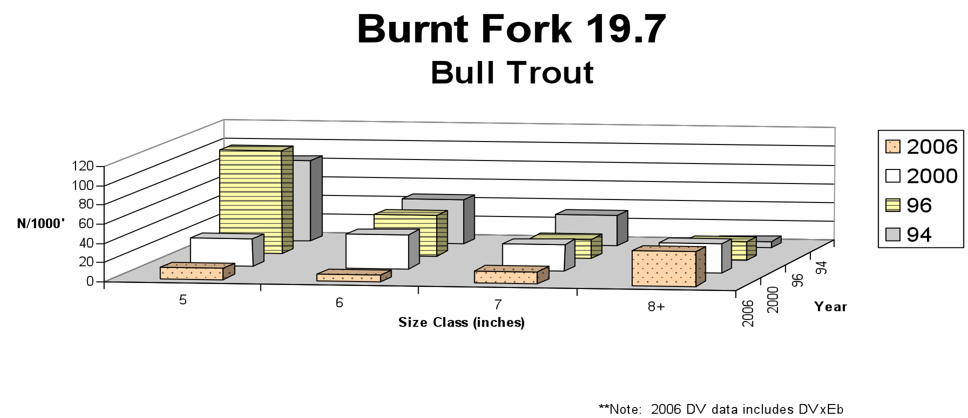
51200	Grizzly Bear	T	F	F	F
51220	Raccoon	T	T	F	T
51230	American Marten	T	F	F	F
51240	Fisher	T	F	F	T
51250	Ermine	F	F	F	F
51260	Long-tailed Weasel	T	F	F	F
51270	Mink	T	T	F	T
51280	Wolverine	T	F	F	F
51290	American Badger	F	F	F	F
51300	Western Spotted Skunk	F	F	F	F
51310	Striped Skunk	T	F	F	F
51320	Northern River Otter	T	T	T	T
51330	Mountain Lion	T	F	F	F
51340	Lynx	F	F	F	F
51350	Bobcat	T	F	F	F
51390	Elk	F	F	F	F
51400	Mule Deer	F	F	F	F
51410	White-tailed Deer	F	F	F	F
51420	Moose	F	F	F	F
51440	Pronghorn Antelope	F	F	F	F
51460	Mountain Goat	F	F	F	F
51470	Bighorn Sheep	F	F	F	F

F = False (not associated with habitat)
T = True (associated with habitat)
Source: Modified from IBIS species list for the Bitterroot subbasin.

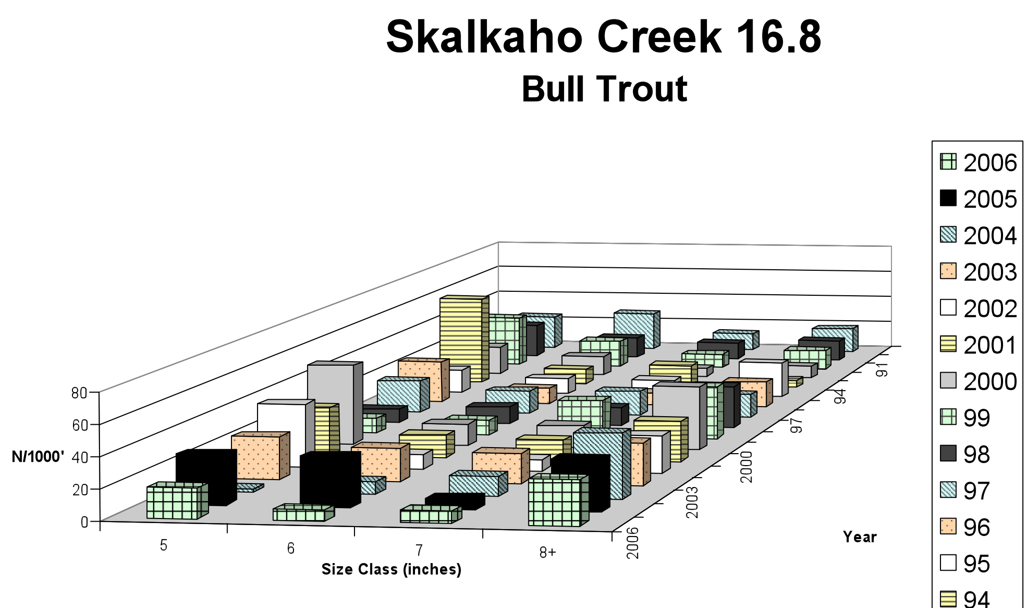
Appendix 4

Bull Trout Population Estimates for Monitoring Reaches in the Bitterroot Subbasin

The following tables were extracted from Clancy (2007) and represent the most current population estimates for bull trout in the Bitterroot subbasin.

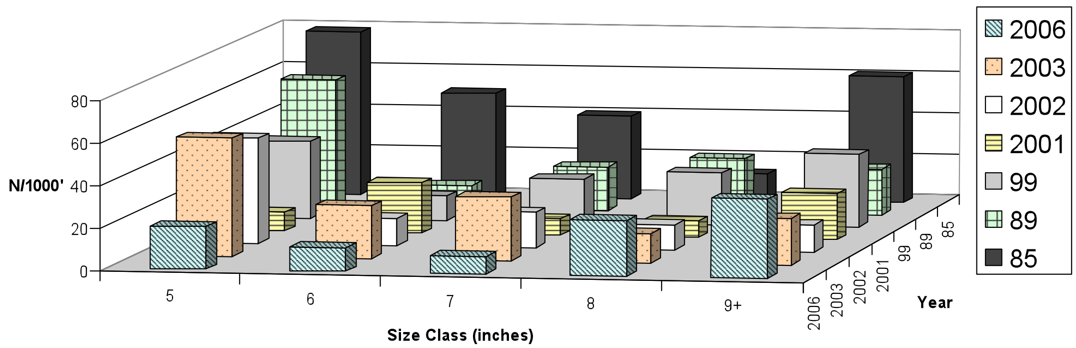


Population estimates of bull trout in the Burnt Fork 19.7 monitoring reach during the years indicated.



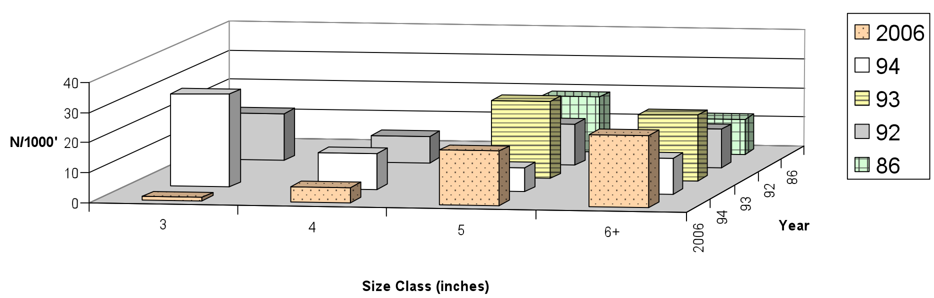
Population estimates of bull trout in the Skalkaho Creek 16.8 monitoring reach during the years indicated.

Daly Creek 0.7
Bull Trout



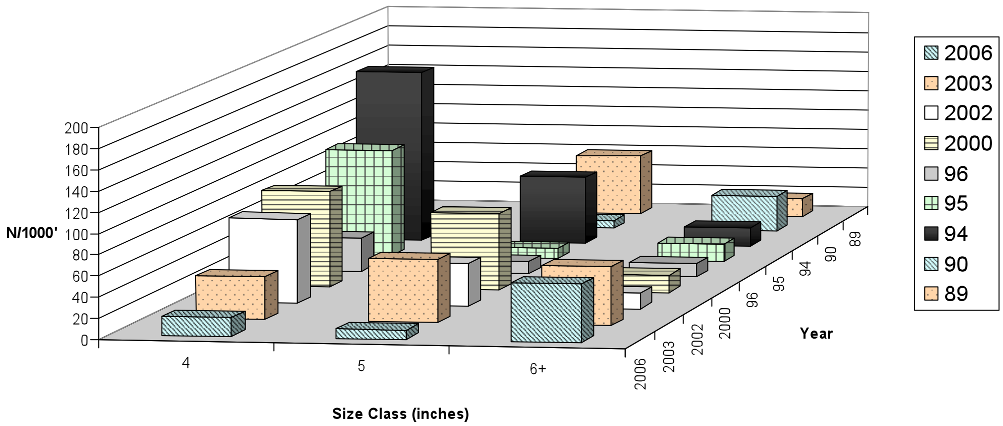
Population estimates of bull trout in the Daly Creek 0.7 monitoring reach during the years indicated.

Moose Creek 3.6
Bull Trout



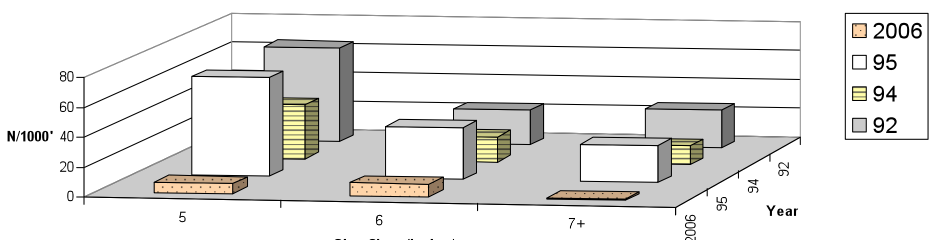
Population estimates of bull trout in the Moose Creek 3.6 monitoring reach during the years indicated.

Meadow Creek 5.6
Bull Trout



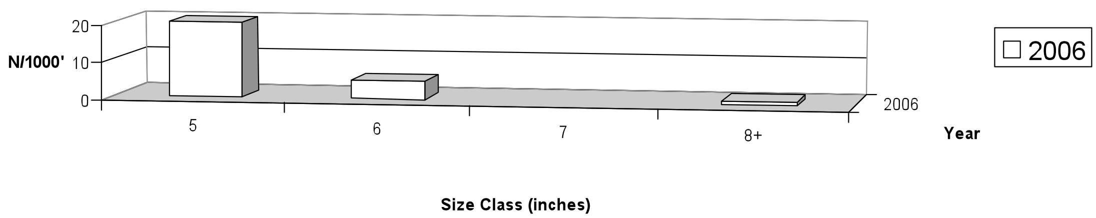
Population estimates of bull trout in the Meadow Creek 5.6 monitoring reach during the years indicated.

Warm Springs Creek 7.4
Bull Trout



Population estimates of bull trout in the Warm Springs Creek 7.4 monitoring reach during the years indicated.

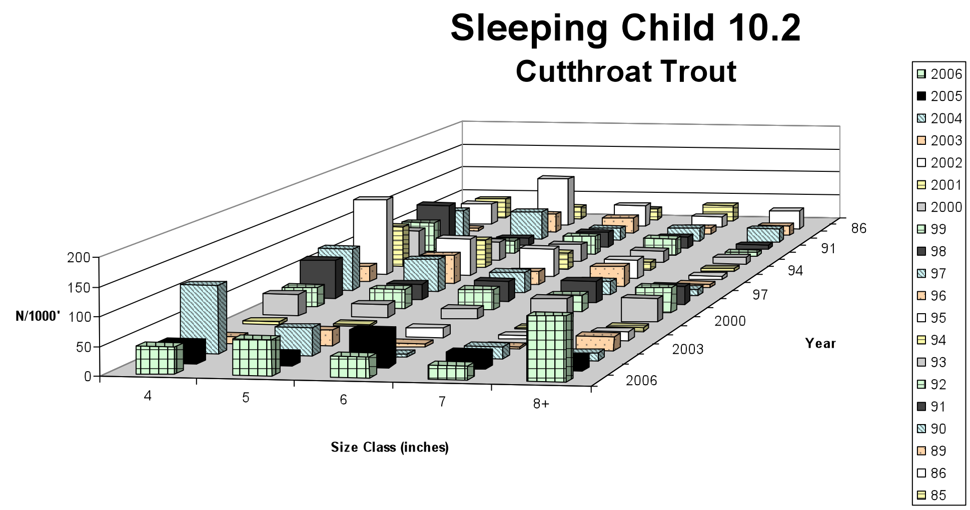
Boulder Creek 2.0
Bull Trout



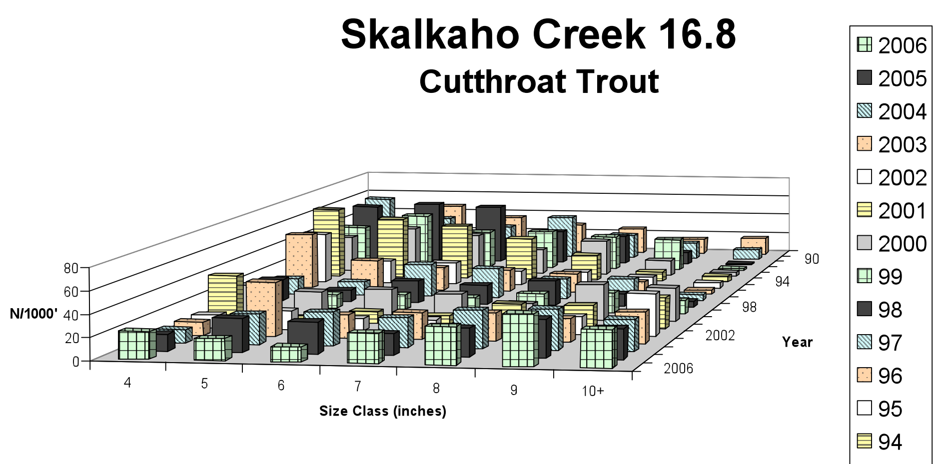
Appendix 5

Westslope Cutthroat Trout Population Estimates for Monitoring Reaches in the Bitterroot Subbasin

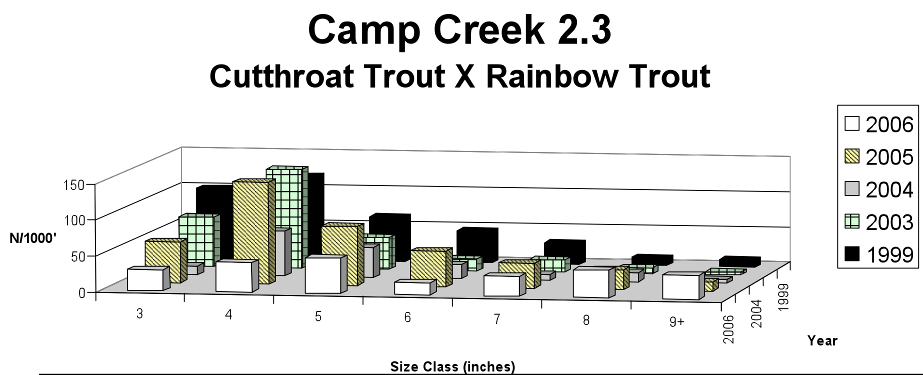
The following tables were extracted from Clancy (2007) and represent the most current population estimates for westslope cutthroat trout in the Bitterroot subbasin.



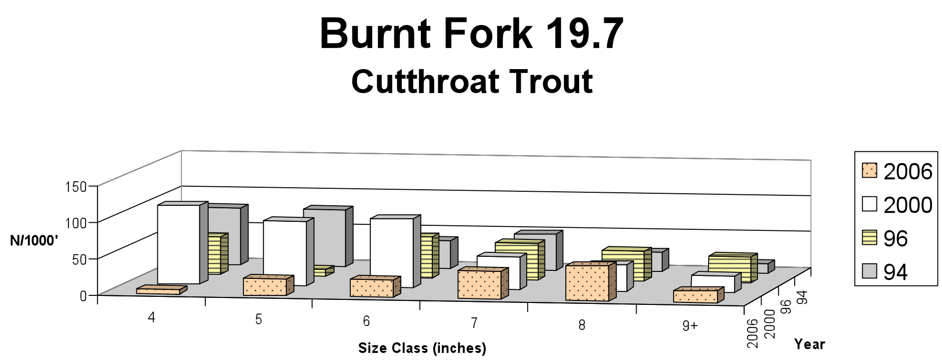
Population estimates of westslope cutthroat trout in the Sleeping Child 10.2 monitoring reach during the years indicated.



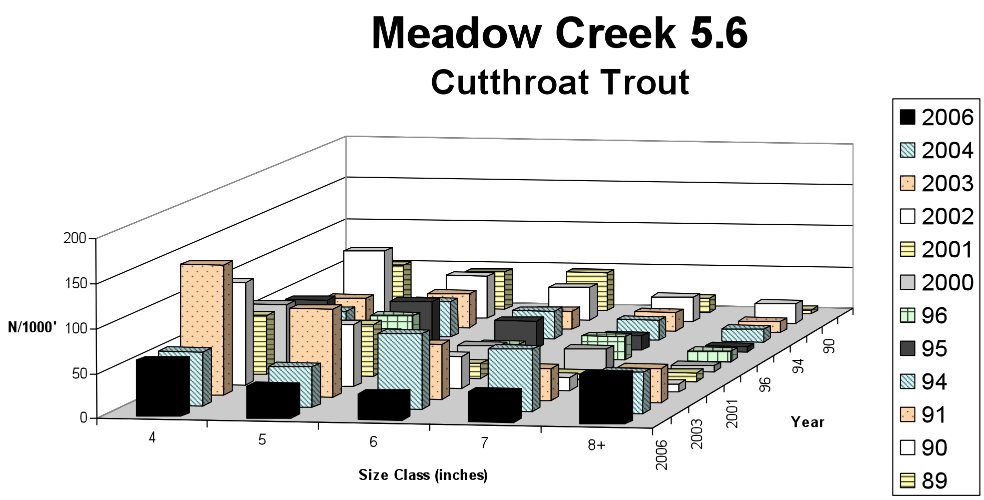
Population estimates of westslope cutthroat trout in the Skalkaho Creek 16.8 monitoring reach during the years indicated.



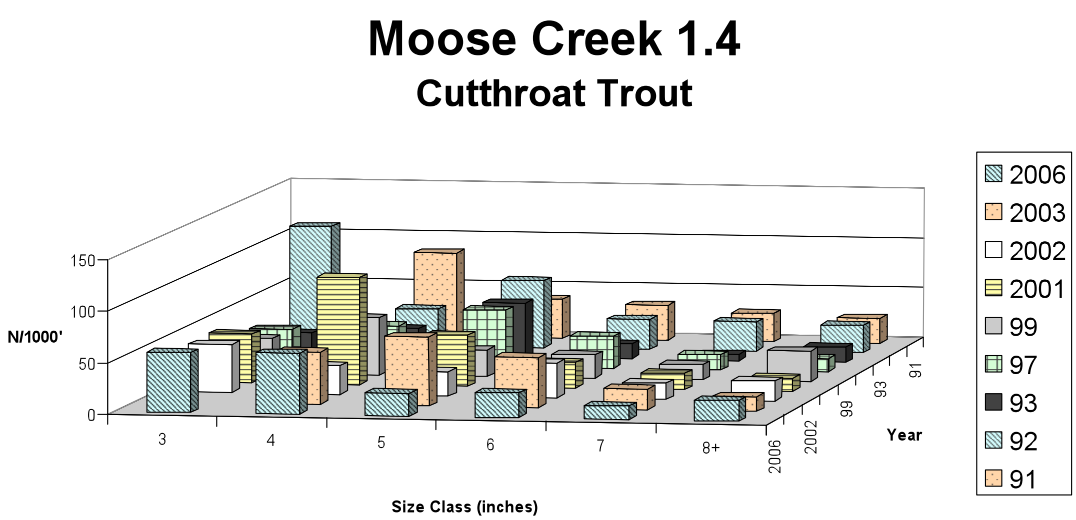
Population estimates of westslope cutthroat x rainbow trout in the Camp Creek 2.3 monitoring reach during the years indicated.



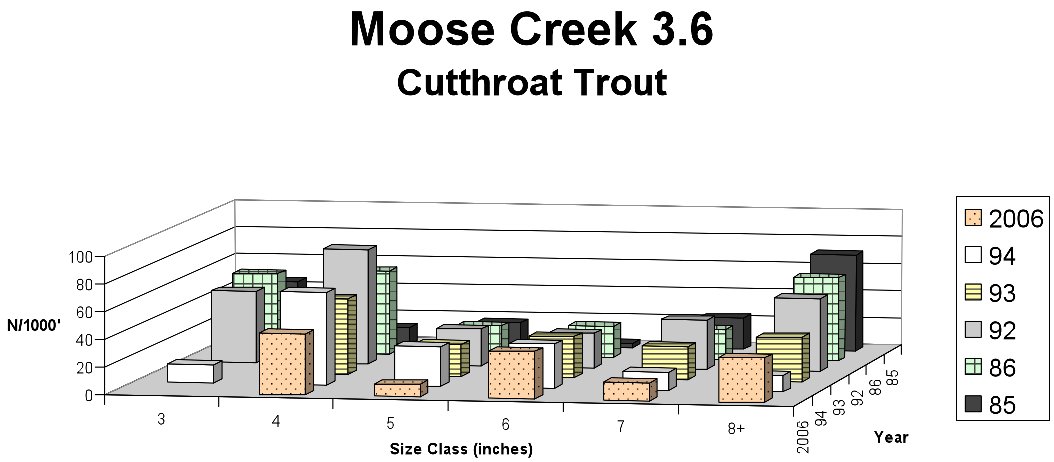
Population estimates of westslope cutthroat trout in the Burnt Fork 19.7 monitoring reach during the years indicated.



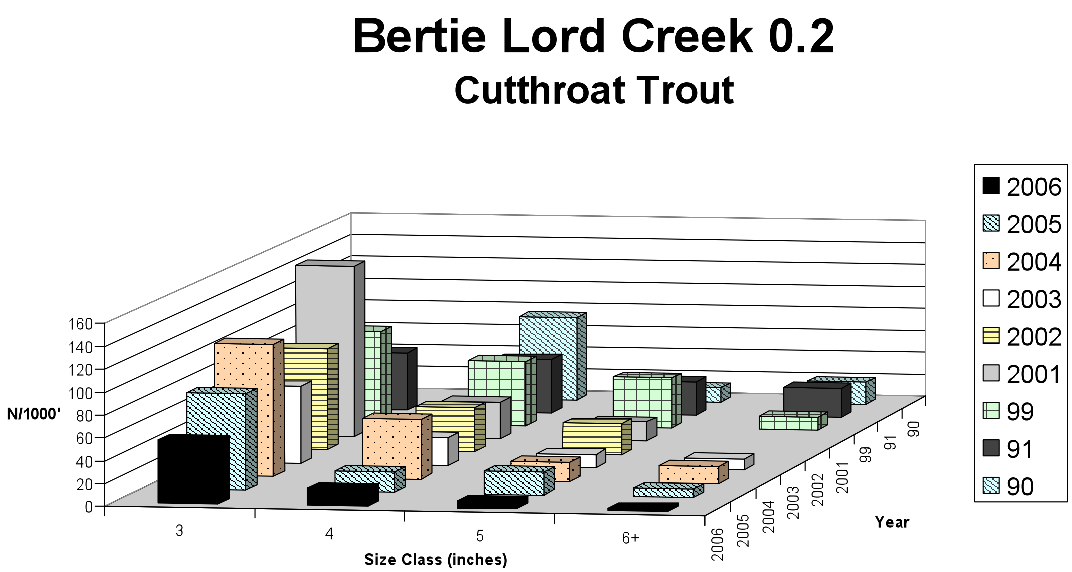
Population estimates of westslope cutthroat trout in the Meadow Creek 5.6 monitoring reach during the years indicated.



Population estimates of westslope cutthroat trout in the Moose Creek 1.4 monitoring reach during the years indicated.

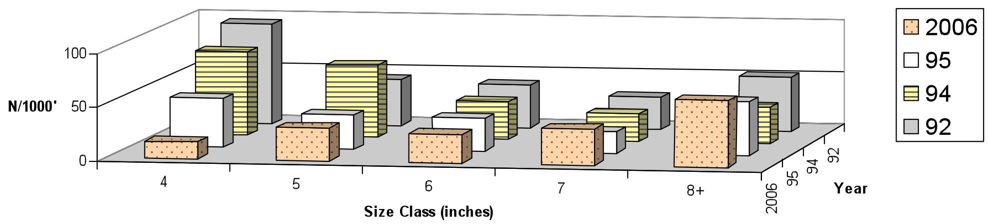


Population estimates of westslope cutthroat trout in the Moose Creek 3.6 monitoring reach during the years indicated.



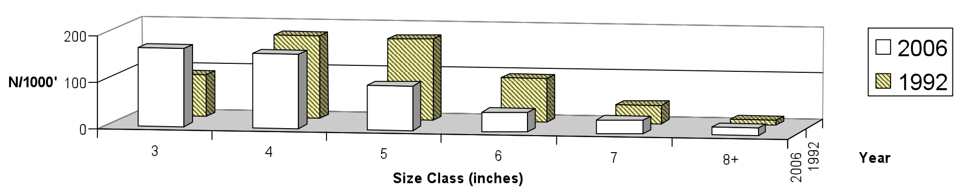
Population estimates of westslope cutthroat trout in the Bertie Lord Creek 0.2 monitoring reach during the years indicated.

Warm Springs Creek 7.4
Cutthroat Trout

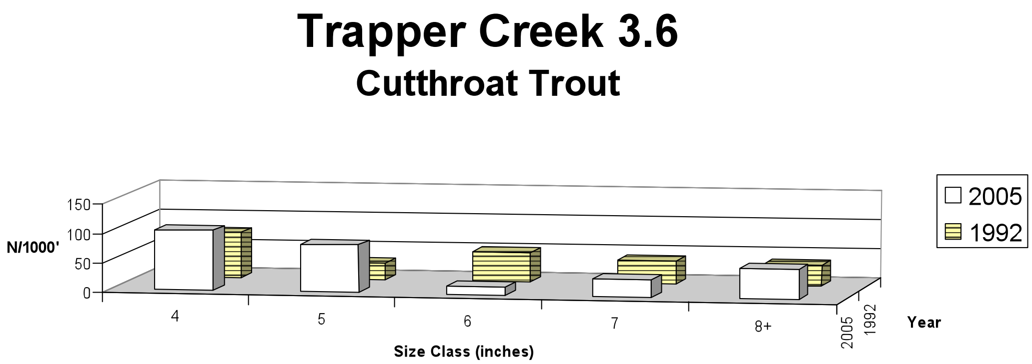


Population estimates of westslope cutthroat trout in the Warm Springs Creek 7.4 monitoring reach during the years indicated.

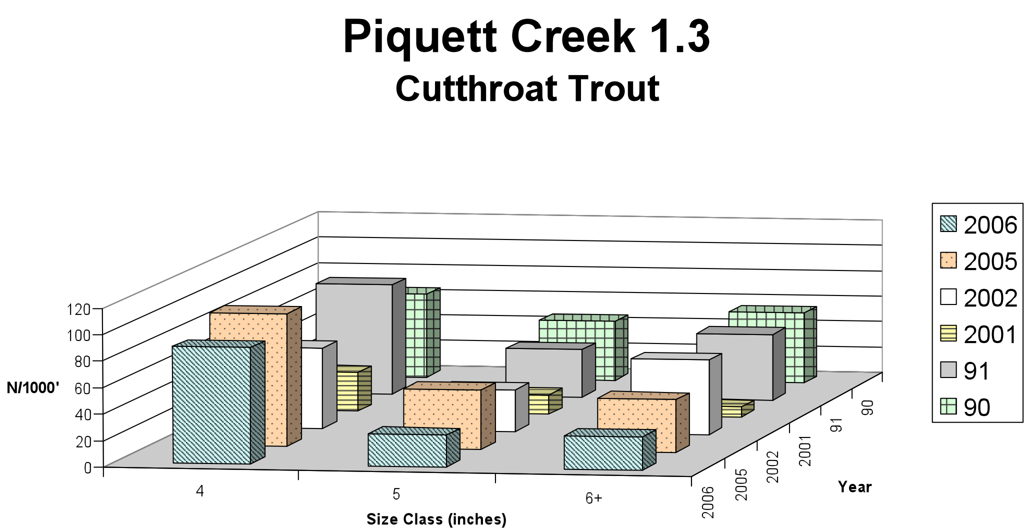
Boulder Creek 2.0
Cutthroat Trout



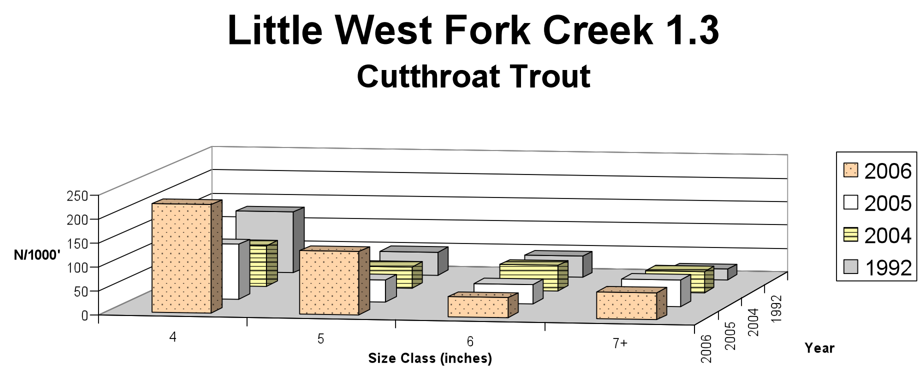
Population estimates of westslope cutthroat trout in the Boulder Creek 2.0 monitoring reach during the years indicated.



Population estimates of westslope cutthroat trout in the Trapper Creek 3.6 monitoring reach during the years indicated.



Population estimates of westslope cutthroat trout in the Piquette Creek 1.3 monitoring reach during the years indicated.



Population estimates of westslope cutthroat trout in the Little West Fork 1.3 monitoring reach during the years indicated.

Appendix 6
Bitterroot National Forest Aquatic Multi-Scale Assessment and Planning Framework

Bitterroot National Forest
October 2006

Introduction and Purpose

This multi-scale assessment and planning framework is a planning tool is a 6 step process that was developed by the Rocky Mountain Research Station, and has been used in plan revision efforts throughout Regions 1 and 4. This planning tool helps describe current resource conditions and strategies for future management of aquatic resources. The planning framework consists of the following elements.

1. Existing Conditions
2. Desired Conditions
3. Risks and Threats
4. Analysis of Risks and Threats
5. Restoration Strategy
6. Monitoring

Salmonid species status, water quality conditions, desired conditions, risks and threats all form the basis for a restoration strategy. This strategy helps identify management opportunities and priorities designed to conserve and restore native fish populations, aquatic habitats, and watershed conditions.

All aquatic data is summarized by 6th code hydrologic unit (sub-watersheds), which are nested within sub-basins. Sub-watersheds work well as the primary analysis units because they are often synonymous with local populations and/ or their life stages, risks and threats, and project level management action assessments. Some of this information is summarized and interpreted at the sub-basin (4th code hydrologic units) to determine how conditions are distributed across a larger geographic area. The sub-basin is the primary broad scale summary unit for salmonids. The sub-basin acts as a terminal aquatic environment, aligning with the salmonid meta-population - a collection of local populations interacting to hedge against extinction through the migratory life stage. Self sustaining populations – Strongholds, act as source populations for supporting weaker populations or re-colonizing extirpated populations or new habitats. This multi-scale approach allows for broader interpretations of current conditions in terms of salmonid metapopulations and movement throughout several sub-watersheds.

This multi-scale analysis incorporated professional interpretations from numerous data sources such as sub-basin assessments, species recovery plans, watershed analysis, TMDL implementation plans, or other broad or mid-scale information. Subsequent project decisions would incorporate annually updated progress toward meeting desired conditions at the watershed and subbasin scale using data summarized at the sub-watershed scale.

All data is summarized by 6th code hydrologic units (sub-watersheds). Some of this information is summarized and interpreted at the sub-basin scale (4th code hydrologic units) to determine how conditions are distributed across a larger geographic area. This multi-scale approach allows for broader interpretations of current conditions in terms of salmonid metapopulations and movement throughout several sub-watersheds.

Much of the information in this assessment was generated by expert panels of Forest Service fisheries biologists, hydrologists, and soil scientists. Their judgment calls are based on a variety of information such as the bull trout baselines, stream inventory data, watershed analyses, and numerous NEPA documents. Other information was generated using GIS models.

Existing Conditions

Existing conditions are described for native salmonid species status, watershed disturbance (integrity), and impaired waters.

Native Salmonid Species Status

Current conditions are described for bull trout and Westslope cutthroat trout, which are the primary fine-filter aquatic species.

The reasons to focus on these salmonid species are listed below.

1. Bull trout is a Threatened species under the Endangered Species Act.
2. Westslope cutthroat trout is identified as a Species of Concern in the proposed land management plan, and is listed as a Species of Concern by Montana Fish, Wildlife, and Parks.
3. More is known about salmonid species in terms of distribution, habitat needs, and population numbers. Therefore, it is more likely that environmental relationships can be established.
4. Salmonids are widely distributed, and allow for broad- scale comparisons.
5. Salmonids are predators, competitors, and prey which make them more likely to influence structure and function of aquatic ecosystems.
6. Salmonids may be more sensitive to disturbance than other aquatic taxa.

Steelhead trout, chinook salmon, bull trout, and Westslope cutthroat trout are present on the Idaho portion of the forest within the Selway-Bitterroot Wilderness. However, this assessment does not focus on those species in this area because: 1) management activities are believed to have little or no effect on their habitats, 2) aquatic restoration and species recovery efforts are focused in the Montana side of the forest where active management has occurred for the past century. Population status of these species is included in the dBase files that accompany this assessment. In general, bull trout and Westslope cutthroat trout populations are strong, while the anadromous steelhead trout and chinook salmon are depressed due to a variety of downstream impacts.

Bull Trout (Salvelinus confluentus)

Estimated population status of bull trout on the Bitterroot National Forest is shown in Table 1 and Figure 1. Population status calls were made during the summer of 2004 using a variety of information including field data and recent assessments.

Bull trout populations have been declining during the past several decades due to a wide variety of causes such as habitat fragmentation and degradation, flow modification, and competition from non-native species. These elements are ranked and described in more detail in the *Risks and Threats* section of this document.

Table 1. Estimated bull trout population status in the Bitterroot sub-basin.

Population Status	Number of Sub-Watersheds
Present Strong	4
Present Depressed	52
Present Small and Stable Population	0
Present No Information	
Present Migratory Corridor	8
Absent - Rigorous sampling has confirmed species absence	7
Absent - historically absent or currently inaccessible or unsuitable	
Unknown Suitable Habitat Present and Connected	1
Unknown Suitable Habitat Present but Unconnected	1
Unknown Suitable Habitat not Present	
Unknown	1
Total	**74**

Westslope Cutthroat Trout (Oncorhynchus clarki lewisi)

Estimated population status of Westslope cutthroat trout is shown in Table 2 and Figure 2 by sub-watershed. Population status calls were made during the summer of 2004 using a variety of information including field data and recent assessments. Westslope cutthroat trout are fairly well distributed across the forest, but many populations are depressed (Table 2 and Figure 2).

Table 2. Estimated Westslope cutthroat trout population status in the Bitterroot sub-basin.

Population Status	Number of Sub-Watersheds
Present Strong	10
Present Depressed	64
Present Small and Stable Population	
Present No Information	
Present Migratory Corridor	
Absent - Rigorous sampling has confirmed species absence	
Absent - historically absent or currently inaccessible or unsuitable	
Unknown Suitable Habitat Present and Connected	
Unknown Suitable Habitat Present but Unconnected	
Unknown Suitable Habitat not Present	

Unknown	
Total	**74**

Watershed Integrity

Sub-watersheds are ranked according to the relative degree of anthropogenic disturbances that can affect or potentially affect soil productivity, hydrologic and geomorphic processes, water quality, and aquatic habitats (Table 3). The intent is to use anthropogenic disturbance as a surrogate for overall watershed conditions or integrity. Relative disturbance is measured using GIS-based models and professional judgement. Human disturbances used in the assessment include roads, dewatering, urban development, and agricultural development. Appendix B includes the metadata used to develop the watershed integrity rankings. Watershed integrity rankings are shown in Figure 3.

All lands within each sub-watershed are assessed, including lands not managed by the Forest Service (i.e. private, State, and other Federal lands). This approach is necessary to make meaningful comparisons of all sub-watersheds containing national forest lands. This method also allows some insight into the cumulative effects associated with management of non-Forest Service lands. Therefore, it is important to consider the proportion of each sub-watershed that contains lands managed by the Forest Service.

The disturbance indicators in Table 3 are combined into a standardized composite integrity ranking for each sub-watershed using the Multi-scale Resource Integration Tool (MRIT). A relative standardized ranking is calculated for each indicator in each sub-watershed using the formula: (X – min) / (Max – Min), where Max and Min equal the maximum and minimum absolute value, respectively, among all the sub-watersheds in the population. A composite disturbance index is the sum of the standardized rankings for each disturbance indicator. This composite value is then normalized into a ranking between 0 and 1 (using the formula above). Appendix B contains the metadata for each disturbance parameter. The Forest Roads Analysis provides a Users Guide that describes the MRIT software.

Table 3. Spatial indicators of anthropogenic disturbance.

Number	Disturbance	Measurement Parameter	Data Source
1	Road/Stream Crossing Density	Percent Composition of 30 meter pixels that contain a road/stream crossing	1:24000 stream layer, TIGER road data
2	Road/Stream Proximity	Percent Composition of 30 meter pixels that contain a road within 30 meters of a stream	1:24000 stream layer, TIGER road data
3	Sediment Delivery Potential	Area-weighted Average of sediment delivery values assigned to 30 meter sections of	1:24000 stream layer, TIGER road data

		road	
4	Dewatering[1]	Expert panel ranking (low, moderate, or high)	Forest Hydrologists and Fisheries Biologists
5	Urban Development	Percent composition of 30 meter pixels containing Urban Development	LANDFIRE existing vegetation type
6	Agricultural Development	Percent composition of 30 meter pixels containing agriculture land within 30 meters of a streams	LANDFIRE existing vegetation type
7	Mining[2]	Expert panel ranking (low, moderate, or high)	Forest Hydrologists and Fisheries Biologists

The disturbance indices in Table 3 play a dominant role in affecting surface and sub-surface hydrologic patterns, surface erosion, channel stability, water quality and aquatic habitat. It is assumed that sub-watersheds with the least amount of human disturbance function within the natural range of variability under the present climate. An important limitation of this model is that it does not address the condition of forested vegetation in terms of departure from historical conditions. Fire suppression and timber harvest activities have changed forest composition, structure, and function during the past century, and this model does not address that aspect of human disturbance.

Physical, chemical, and biological processes and interrelationships in wildland watersheds are highly complex, and in many cases not well understood. This model is relatively simple, when compared to the diversity among sub-watersheds across the forest. There are other disturbances in watersheds that are not accounted for, such as concentrated recreation use and livestock grazing. However, these activities are considered to be relatively limited in terms of spatial extent. The intent of this model is only to develop a very broad characterization of watershed integrity, and to provide some context for identifying restoration priorities.

Impaired Water Bodies

In 2002, the Montana Department of Environmental Quality (MDEQ) identified waters that do not meet State standards for applicable beneficial uses. These waters are identified on the State 303(d) list. This list is updated every two years by MDEQ and documented in a 305(b) report. The 2004 report is still in draft form and being reviewed. Approximately 113 miles of stream are listed as impaired on the Bitterroot National Forest (Figure 4). Common water quality impairments include habitat alteration, flow modification, bank erosion, siltation, and habitat alteration.

[1] An expert panel approach (professional judgment) was used because current data is not sufficient to adequately describe the relative degree of dewatering effects.
[2] An expert panel approach (professional judgement) was used because current data is not sufficient to adequately describe the relative degree historic and current mining activities.

Desired Conditions

Desired conditions are described in the Forest Plan at the forest scale and at the Geographic Area scales. The Geographic Areas closely resemble sub-basin boundaries. This assessment contains desired population status of bull trout and westslope cutthroat trout in the short term, mid term, and long term in the Bitterroot sub-basin. These desired conditions illustrate the concept of expanding native fish populations through time, and describe the spatial distribution of local populations that is needed to support metapopulations and long term persistence of each species by sub-basin. The short term desired population status refers to the next 0-15 years (the current planning period). The mid term and long term desired population status refers to 15-30 years and 30-60 years, respectively. Desired population status for bull trout and Westslope cutthroat trout are shown in Figures 5-10.

1. Desired bull trout population status – short term (Figure 5)
2. Desired bull trout population status – mid term (Figure 6)
3. Desired bull trout population status – long term (Figure 7)
4. Desired westslope cutthroat trout population status – short term (Figure 8)
5. Desired westslope cutthroat trout population status – mid term (Figure 9)
6. Desired westslope cutthroat trout population status – long term (Figure 10)

Risks and Threats

Risks are intrinsic population characteristics such as genetic characteristics, recruitment, isolation, and size. Threats are land uses or conditions that can directly, indirectly, or cumulatively affect watershed conditions or aquatic habitats. The risks and threats identified in this assessment are described below and summarized in Table 4. The risks and threats are ranked as high, moderate, or low by expert panels or by GIS models. Some of the key sources of information used in expert panel rankings include the draft bull trout recovery plan, bull trout baselines, stream inventory data, roads analyses, watershed analyses, NEPA documents, water quality data, post fire assessments, and fish population data from Montana Fish, Wildlife, and Parks.

Table 4. Risks and Threats.

	Code	Variable	Data Type
Risks	R1	Temporal Variability in Recruitment or Survival	Expert Panel Ranking
	R2	Population Size	Expert Panel Ranking
	R3	Growth and Survival	Expert Panel Ranking
	R4	Isolation	Expert Panel Ranking
	R5	Overall Extinction Risk	Expert Panel Ranking
Threats	T1	Road –related Threats	GIS Models
	T2	Non-native Species	Expert Panel Ranking
	T3	Migration Barriers	Expert Panel Ranking
	T4	Mining	Expert Panel Ranking
	T5	Grazing	Expert Panel Ranking

	T6	Mixed Ownership	Expert Panel Ranking
	T7	Dewatering	Expert Panel Ranking

Extinction Risks

Extinction risks were estimated for each key salmonid species using the method described in: *Fish Habitat Relationships Technical Bulletin 14. 1993. Intermountain Research Station, Boise, ID*. Extinction risks for salmonids are extremely difficult to measure, due to all the complexities associated with population dynamics, habitat availability, and disturbance processes. The mechanisms leading to extinction can be deterministic, stochastic, or genetic, all of which may operate together. Deterministic factors may include habitat degradation (i.e. loss of pools, increased water temperature, etc.), fishing pressure, or invasion of non-native species. The level of population response to deterministic factors can be influenced by a variety of population characteristics such as size, fecundity, and maturity age.

Stochastic processes (chance events) also contribute to extinction risk. These chance events can be internal to the population or external. An internal stochastic event may involve a sudden change in reproduction or mortality rates. An external stochastic event could be a forest fire and resulting flood event.

Genetic risks are associated with a general loss of genetic diversity through a variety of mechanisms. Soule (1987) suggests that 500 individuals are needed in a population to maintain the genetic variability necessary for adaptation.

Consideration of the mechanisms and processes of extinction for salmonids (USDA 1993) is critical in conservation and restoration planning. Preservation of phenotypic and genetic diversity requires maintenance of populations over a wide geographic area in a variety of habitats. More importantly, these populations and habitats need to be connected. This allows for genetic exchange, and the ability of local populations to disperse and accommodate deterministic and stochastic events.

In this analysis the term *population* generally refers to the sub-watershed scale. A collection of such populations that interact (genetically) is termed a *metapopulation*. Metapopulations of salmonids are generally associated with watersheds and sub-basins, but depend on the level of connection with local populations. The components of extinction risk used in this assessment are summarized below (USDA 1993).

R1 – Temporal Variability in Recruitment or Survival. This ranking addresses the likelihood of environmental disturbances and associated effects on variability and survival of the species. A low ranking would indicate short-lived disturbances and low variability in habitat conditions. A high ranking would indicate high variability in habitat conditions associated with unpredictable, relatively extreme events.

R2 – Population Size. A ranking of low would indicate a population size of several thousand individuals, in which all life stages are represented. A ranking of moderate or high would indicate less than 500 or 50, respectively.

R3 – Growth and Survival. This ranking assesses relative abundance and reproduction capability. A low ranking would indicate the population is very resilient and can recover from exploitation and disturbances relatively fast (5-10 years), and habitat quality is very high. A high ranking would indicate poor habitat conditions and little potential for recovery following disturbance events.

R4 – Isolation. This ranking assesses the relative connectivity of the population with other local populations.

R5 – Overall Extinction Risk. This is a summary ranking, and is expressed as the maximum value found in R1-R4.

The overall extinction risks (R5) for bull trout and Westslope cutthroat trout are mapped by sub-watershed (Figures 11 and 12).

Threats

Threats are environmental pressures that can ultimately affect native salmonids. The threats outlined below were identified by forest hydrologists, fisheries biologists, and soil scientists. They are considered to be the primary impacts on soils, watersheds, aquatic habitat, and water quality.

T1 – Road-related Threats. Roads are considered the most significant and wide-spread threat to watershed conditions and aquatic habitats that the Forest Service has direct control over. Descriptions of road-related threats were derived from data used generated for the Watershed Integrity Assessment (Appendix B). The following coverages describe road-related threats.

1. Surface erosion and sediment delivery potential (Figure 13)
2. Road-stream crossing density (Figure 14)
3. Road proximity to streams (within 100 feet) (Figure 15)

T2 – Non-native Species. This ranking is an overall judgement call, based on fish surveys conducted during the past several years. The primary non-native species include lake trout and brook trout. These species are known to compete against or displace bull trout and Westslope cutthroat trout. Hybridization is another threat associated with non-native species. Estimated non-native species threats are shown in Figures 16 and 17 for bull trout and Westslope cutthroat trout, respectively.

T3 – Migration Barriers. Other than natural migration barriers, migration and movement of fish are primarily restricted at road-stream crossings with culverts.

Generally, the restriction is on upstream movement, although downstream migration can also be affected. This results from hanging culverts, high flow velocities in culverts, and inadequate depths for fish movement. In some locations, fish barriers are desirable to protect small native populations from invasion by non-native species, particularly brook trout. While culverts can affect the migration of amphibian species, the greatest concern (at this time) is the effect on native salmonids. Figures 18 and 19 display the migration barrier threats for bull trout and Westslope cutthroat, respectively. As of late 2005, 117 culverts have been surveyed for fish passage. Of those, 85 are considered barriers or partial barriers to adult and/or juvenile fish.

T4 – Mining. This threat was ranked through the expert panel approach because the impacts associated with mining are very difficult to analyze spatially with existing data. Most of the mining impacts on the Lolo are within the Middle Clarkfork sub-basin. The relative degree the mining is impacting aquatic habitats, water quality, and native fish is shown in Figure 20.

T5 – Livestock Grazing. The effects of livestock grazing on water quality and aquatic habitats are quite variable and difficult to measure using a spatial model. Therefore grazing impacts were assessed using an expert panel approach (Figure 21). Many of the impacts associated with livestock grazing occur on private lands.

T6 – Mixed Ownership. The degree of mixed ownership by sub-watershed has substantial effects on watershed conditions, water quality, and aquatic habitat, depending on the type of ownership. This threat was rated high if the other ownerships have substantial impacts, or make conservation efforts a challenge (Figure 22).

T7 – Dewatering. The effects of dewatering were assessed using an expert panel approach because of the difficulty in measuring these effects using a spatial model. The relative threats of dewatering are shown in Figure 23. Overall, dewatering is not a concern on National Forest lands.

Analysis of Risks and Threats

The purpose of analyzing risks and threats is to display their influence on and interactions with watershed conditions, aquatic habitats, and native salmonids. But more importantly, this analysis forms a basis for identifying restoration priorities. Figure 24 describes some very general relationships and influences on future populations of native salmonids.

Many risks and threats are due to conditions that are beyond Forest Service control or jurisdiction. However, there are some risks and threats that are well within the control of the Forest Service (i.e. roads and fish passage barriers), and should be the focus of restoration work. For example, dewatering can occur through legitimate withdrawal of water according to a specific water right. Another example is management of non-native sport fish by Montana Fish, Wildlife, and Parks that often have detrimental effects on native fish. Table 5 describes the relative degree of influence that the Forest Service has on the Risks and Threats identified in this assessment.

Table 5. Degree of Forest Service influence on risks and threats.

	Risks and Threats	Relative Degree of Forest Service Influence
Extinction Risks	Temporal Variability in Recruitment or Survival	Variable[3]
	Population Size	Variable
	Growth and Survival	Variable
	Isolation	Variable
Threats	Roads-related Threats	High
	Non-native Species	Low
	Migration Barriers	High
	Mining	Moderate
	Grazing	High
	Mixed Ownership	Low
	Dewatering	Low

Restoration Strategy

The purpose of the Restoration Strategy is to identify the most important places to improve watershed and aquatic habitat conditions that will most effectively contribute to recovery of bull trout and Westslope cutthroat trout populations, and to meeting water quality standards. This restoration strategy is based on existing conditions, risks, threats, and restoration potential. It is intended to be used as a prioritization tool for restoration work during the next 10-15 years. The goals of the strategy are to:

1. Improve watershed conditions, aquatic habitats, and water quality.
2. Expand populations of bull trout and Westslope cutthroat trout, using strongholds as a source.
3. Restore impaired waters that have been identified by the State of Montana.

The Restoration Strategy is essentially a designation of all sub-watersheds on the forest (Table 6). A map of these sub-watersheds is shown in Figure 25.

Conservation Watersheds typically have strong populations of bull trout and Westslope cutthroat trout, and they are close to desired conditions described in the forest plan. These watersheds may serve as population strongholds that have the potential to expand into other watersheds. *Active Restoration Watersheds* are typically in close proximity to *Conservation Watersheds*, and they are the highest priority for restoration during the next 10-15 years. *Deferred Restoration Watersheds* are those watersheds that are a low priority for restoration.

Table 6. Description of the Aquatic Restoration Strategy.

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[3] The relative degree of Forest Service control over population risks is highly variable because they are affected by a wide variety of threats, habitat conditions, and disturbances.

Watershed Designation	Definition	Management Approach
Conservation	Watersheds that are at or very close to Desired Conditions (as defined in the forest plan) to the extent possible, or restoration measures have been implemented to allow a trend toward desired conditions over time. All reasonable restoration measures have been implemented on National Forest lands to the degree possible. Conservation watersheds are 6th code hydrologic units.	Protect and maintain quality aquatic habitat and strong native fish populations through forest plan direction, and applicable policy and guidance.
Deferred Restoration	Watersheds that are a low priority for restoration during the current planning cycle. These watersheds are 6th code hydrologic units.	Protect and maintain quality aquatic habitat and strong native fish populations through forest plan direction, and applicable policy and guidance.
Active Restoration	Watersheds that are a high priority for aquatic restoration during the next 10-15 years. These watersheds generally do not meet desired conditions, and have a high potential to move toward Desired Conditions with appropriate restoration measures. Active Restoration Watersheds are 6th code hydrologic units.	Protect and maintain quality aquatic habitat and strong native fish populations through forest plan direction, and applicable policy and guidance. Improve aquatic habitat and water quality through restoration. Restoration activities should focus on the specific risks and threats identified in the sub-watershed.

The following population viability principles played a major role in the selection of Active Restoration Watersheds.

1. The larger the population the greater the chance of their persistence through time and disturbance (bigger is better than smaller)
2. Population recovery potential is greater in closer proximity to strong source populations (closer is better than farther).
3. Well connected populations allow for maintenance of biological diversity (genetic exchange), dispersal into unpopulated areas, and resilience to habitat disturbance (connected is better than disjointed).
4. Preserving genetic and phenotypic diversity requires maintaining populations through a wide geographic range in a variety of habitats.
5. Maintenance of strong populations in the best possible habitats throughout the planning area and preserving metapopulation structure and function are the best ways to minimize the risk of extinction (USDA 1993).

Due to budget constraints, a limited number of watersheds could be selected as priority areas for restoration. Active Restoration Watersheds were selected based on the following criteria:

1. Proximity to bull trout and Westslope cutthroat trout strongholds.
2. Population descriptions in the draft Bull Trout Recovery Plan and the Bull Trout Status Review.
3. Presence of 303(d) listed waters and active TMDL planning/implementation.
4. Risks and threats that the Forest Service has the most ability to reduce (Table 5).

5. Existing or potential cooperative efforts to restore watershed conditions and aquatic habitats on lands not administered by the Forest Service.
6. Restoration activities that are currently approved under NEPA.
7. Relative degree of degradation and potential for improvement.

Figure 26 provides a graphical description of how Active Restoration Watersheds were identified.

Rationale for Active Restoration Watersheds

The number and location of Active Restoration Watersheds can be adjusted at any time, based on new information, changes in budget levels, or following large disturbances that may change resource conditions. The Active Restoration Watersheds (sub-watersheds) on the Bitterroot are listed below with rationale for their selection. The majority of these sub-watersheds are nested within the larger East Fork Bitterroot River, West Fork Bitterroot River, Skalkaho, and Sleeping Child watersheds. These areas are highest priority because they contain the most bull trout habitat on the forest.

Each Active Restoration Watershed is assigned relative values (low, moderate, or high) for complexity and cost (Table 7). The level of complexity refers to how much planning may be required to implement needed restoration work. For example, watersheds with numerous roads that may need to be decommissioned would be considered highly complex because this work requires substantial interdisciplinary planning and public involvement. Mixed ownership may also contribute to complexity. If a watershed only needs 1-2 fish barrier removals, the complexity would be considered low.

Cost refers the relative amounts of funding needed to implement restoration work. A ranking of low indicates work is likely to be completed with existing funds, while a ranking of moderate means additional funds or partnerships may be necessary. A ranking of high would indicate significant funding above current levels.

Table 7. Active Restoration Watersheds in the Bitterroot Sub-Basin.

Active Restoration Watershed (s)	Complexity	Cost	Road Density[4]	Fish Barriers
West Fork Headwaters	Moderate	Moderate	1.8	11
Nez Perce Fork	Moderate	Moderate	2.1	9
Piquett Creek	High	High	2.6	5
Meadow Creek	Moderate	High	1.9	2
Camp Creek	High	High	2.4	1
Middle East Fork	Moderate	Moderate	1.9	3
Cameron Creek	High	High	4.8	0
Lower East Fork	High	High	2.6	0
Upper Sleeping Child	Moderate	Moderate	1.9	0
Middle Sleeping Childe	Moderate	Moderate	1.5	1
Little Sleeping Child	Moderate	Moderate	2.0	0

[4] National Forest lands only.

Lower Sleeping Child	Moderate	Moderate	2.2	0
Rye Creek	High	High	3.6	2
Upper Skalkaho	Moderate	Moderate	1.3	1
Daly Creek	High	Moderate	1.1	1
Middle Skalkaho	Moderate	Moderate	2.2	0
Ambrose Creek	High	High	5.7	2
Threemile Creek	High	High	3.4	1

West Fork Headwaters (170102050101)

1. HUC 0101 comprises the heart of the Upper West Fork drainage, which still contains good populations of bull trout and westslope cutthroat trout.
2. Fluvial life history forms of both species are present, with good spawning and rearing habitat present in the Upper West Fork and its larger tributaries.
3. Nearly all of the land ownership is National Forest.
4. There are opportunities to improve fish populations and watershed health by reducing road densities and eliminating fish barrier culverts.
5. There are 11 known or suspected fish barrier culverts. Most of these culvert barriers block access to spawning and rearing habitat in 2nd and 3rd order tributaries.
6. The portion of the West Fork that flows down the middle is a 303(d) listed stream with TMDL's established for siltation (sediment) and thermal modification.

Nez Perce Fork (170102050204)

1. Radio-telemetry studies conducted by Montana Fish, Wildlife, and Parks biologists have shown that the Nez Perce Fork and its larger tributaries in are a very important spawning and rearing area for fluvial westslope cutthroat trout from the Bitterroot River and Lower West Fork.
2. A remnant run of fluvial bull trout also spawns and rears in watershed.
3. The Nez Perce Fork and its larger tributaries maintain good year-round connectivity; however, access to the smaller 2nd and 3rd order spawning and rearing tributaries is mostly impaired by culvert barriers. There are nine known or suspected fish culvert barriers.
4. Nearly all of the land ownership is National Forest.
5. There are opportunities to improve fish populations and watershed health by reducing sediment and shade losses from FSR 468 and its spurs, and by eliminating fish barrier culverts.
6. The Nez Perce Fork is a 303(d) listed stream with a TMDL established for thermal modification.

Piquett Creek (170102050303)

1. The lower half of the Piquett Creek watershed is heavily roaded and contains several hundred stream crossings, which presents a large opportunity to reduce road densities and the number of road stream crossings. In addition, there are five known or suspected fish culvert barriers.
2. Nearly all of the land ownership is National Forest.
3. Piquett Creek is one of only four larger spawning and rearing tributaries to the Lower West Fork. It currently contains a relatively weak bull trout population, but if bull trout are ever to recover in the Lower West Fork in the future, a healthy Piquett Creek watershed is a essential.
4. Piquett Creek is a sediment source to the West Fork, which has a TMDL established for siltation (sediment) and thermal modification.

Meadow Creek (170102050404)

1. The Meadow Creek watershed borders the largely wilderness/roadless Upper East Fork watershed (HUC 0402), which is probably the strongest native fish stronghold on the Montana portion of the Bitteroot National Forest.
2. Because of its proximity to a native fish stronghold, this watershed presents a good opportunity to expand native fish populations, using the adjacent strongholds as a source.
3. Meadow Creek supports all life history forms of bull trout and westslope cutthroat trout, but it also has some elements that put it more at risk. These include a high road density, numerous road stream crossings, two key fish barrier culverts (FSR 5758 and 725) on Meadow Creek, and some localized livestock grazing impacts.
4. Meadow Creek is a sediment source to the East Fork, which has TMDLs established for siltation (sediment) and thermal modification.
5. All of the land ownership is national forest.

Camp Creek (170102050502)

1. High road density with numerous road stream crossings.
2. Long history of timber management, and was severely burned in 2000.
3. Aquatic impacts include road sediment, livestock grazing (mostly on state and private lands, a little bit on National Forest) and encroachment and channelization by U.S. Highway 93.
4. Camp Creek is not a 303(d) listed stream, but it should be because it is an important contributor of sediment and warm water to the East Fork, which has TMDLs established for siltation (sediment) and thermal modification.
5. The bull trout population in the Camp Creek watershed is remnant and imperiled, but there are healthier neighboring populations to the east (Tolan/Meadow Creeks) and west (Warm Springs Creek), so there is potential to improve/recover bull trout in the Camp Creek watershed.
6. About two-thirds of the Camp Creek watershed is National Forest land.

Middle East Fork (170102050503)

1. The East Fork runs through the middle of this watershed, and it has TMDLs established for siltation (sediment) and thermal modification.
2. The Forest Service portions of this watershed are heavily roaded with many road stream crossings. There is a good opportunity to reduce road densities and the number of road stream crossings, and thus contribute to achieving the TMDL targets in the East Fork.
3. The East Fork is an important migratory corridor for fluvial bull trout and westslope cutthroat trout. They use this corridor to move between over-wintering habitat in the lower reaches of the East Fork and good spawning and rearing habitat in the headwaters.

Cameron Creek (170102050504)

1. The Cameron Creek watershed contains a very high road density with numerous road stream crossings. It has had a long history of timber management, and was severely burned in 2000.
2. The key impacts are road sediment and livestock grazing (all ownerships). Cameron Creek is not a 303(d) listed stream, but it should be because it is a major contributor of sediment and warm water to the East Fork, which has TMDLs established for siltation (sediment) and thermal modification.
3. When storms or major runoff events occur in the Cameron Creek watershed, it makes the entire stretch of the East Fork below Sula turbid for several days. Bull trout are not present in the Cameron Creek watershed, but westslope cutthroat trout are widespread.
4. The upper third of the Cameron Creek watershed is National Forest ownership, the rest is state and private.
5. Opportunities for restoration are somewhat limited, so this watershed is considered a lower priority.

Lower East Fork (170102050506)

1. The East Fork runs through the middle of this watershed, and it has TMDLs established for siltation (sediment) and thermal modification.
2. Two of the tributaries to the East Fork (Laird and Gilbert Creeks) also have TMDLs established for siltation. The Laird Creek tributary is a known sediment source to the East Fork. Forest Service portions of the watershed are heavily roaded with many road stream crossings.
3. There is a good opportunity to reduce road densities and the number of road stream crossings, and thus contribute to achieving the TMDL targets in the East Fork.
4. The East Fork is an important migratory corridor for fluvial bull trout and westslope cutthroat trout. They use this corridor to move between over-

wintering habitat in the lower reaches of the East Fork and good spawning and rearing habitat in the headwaters.

Upper Sleeping Child Creek (170102050701)

1. The Upper Sleeping Child Creek watershed (HUC 0701) is heavily roaded with numerous road stream crossings.
2. It still contains decent bull trout and westslope cutthroat trout populations, and there is an abundance of good historic spawning and rearing habitat present.
3. There is good potential to improve watershed conditions by reducing road densities, reducing the number of road stream crossings, and eliminating fish barriers.
4. There is also good potential to re-establish the Sleeping Child Creek watershed as a native fish stronghold, which would add it to the neighboring Skalkaho Creek native fish stronghold.

Middle Sleeping Child Creek (170102050703)

1. In order to re-establish the Sleeping Child Creek watershed as a native fish stronghold, watershed improvements need to be made on a holistic, watershed-wide scale. In HUC 0703, there are good opportunities to improve watershed conditions by reducing road densities, reducing the number of road stream crossings, and eliminating fish barriers.

Little Sleeping Child Creek (170102050704)

1. There are good opportunities to improve watershed conditions by reducing road densities, reducing the number of road stream crossings, and eliminating fish barriers on state and private lands.
2. A key barrier to try and eliminate is the old DNRC dam on the reservoir below Hamburger Flat.
3. Good historic spawning and rearing habitat is available for westslope cutthroat trout, and possibly bull trout, in the national forest reaches above the dam.
4. In order to re-establish the Sleeping Child Creek watershed as a native fish stronghold, watershed improvements need to be made on a holistic, watershed-wide scale.
5. Opportunities to partner with DNRC.

Lower Sleeping Child Creek (170102050705)

1. In order to re-establish the Sleeping Child Creek watershed as a native fish stronghold, watershed improvements need to be made on a holistic, watershed-wide scale.

2. Much of this watershed consists of private lands, but there are still opportunities to improve watershed conditions on national forest lands by reducing road densities and the number of road stream crossings.
3. There are also opportunities to improve the passage of migratory trout in Sleeping Child Creek by screening irrigation ditches and eliminating diversion barriers.

Rye Creek (170102050801)

1. One of the most heavily roaded, sediment-impacted watersheds on the forest.
2. Numerous opportunities to reduce road densities, reduce the number of road stream crossings, and potentially reroute/relocate sediment-contributing segments of arterial roads (FSRs 75 and 321).
3. The recent purchase of several clearcut sections of former Darby Lumber Company lands also presents opportunities for large-scale watershed restoration.
4. Bull trout are imperiled in this watershed, but westslope cutthroat trout are still widely distributed at good numbers.
5. Restoration would add it to the neighboring Skalkaho and Sleeping Child watersheds and create a large block of good native fish habitat on the eastside of the Bitterroot Valley.

Upper Skalkaho Creek (170102050901)

1. The Upper Skalkaho Creek watershed (HUC 0901) is a native fish stronghold and supports the best bull trout and westslope cutthroat trout populations on the eastside of the Bitterroot Valley.
2. High opportunity to improve watershed conditions by reducing road densities, reducing the number of road stream crossings, and improving fish passage at the FSR 75 crossing of Skalkaho Creek.

Daly Creek (170102050902)

1. The Daly Creek watershed is a native fish stronghold and supports the best bull trout and westslope cutthroat trout populations on the eastside of the Bitterroot Valley.
2. However, there are still ample opportunities to improve watershed conditions by reducing road densities, reducing the number of road stream crossings, and reducing sediment contributions from the Skalkaho Highway.

Middle Skalkaho Creek (170102050903)

1. In recent years, large fish screens have been installed on the irrigation ditches exiting lower Skalkaho Creek to reduce losses of native fish to the ditch network.
2. Efforts are being made by MFWP to lease water for instream flows to ensure a fish-passable connection to the Bitterroot River.
3. Opportunities to complement MFWP's work, by reducing road densities and reducing the number of road stream crossings.

Ambrose Creek (170102051302)

1. HUC 1302 is involved in ongoing TMDL development. The main concern on Forest Service land is sediment input.
2. There are good opportunities to reduce sediment inputs from national forest lands by reducing road densities and the number of road stream crossings.

Threemile Creek (170102051303)

1. Active TMDL development. Sediment is the primary concern on national forest lands.
2. Ample opportunities to reduce sediment inputs from by reducing road densities and the number of road stream crossings.

Multi-Scale Analysis (the step-down process)

This multi-scale assessment and planning framework, combined with the forest plan provide large scale, strategic direction for aquatic resources. Priorities for aquatic restoration have been identified through the designation of Active Restoration Watersheds. More detailed descriptions of existing conditions, risks, threats, and restoration should be identified through Watershed Analysis (Federal Guide for Watershed Analysis 1995), Roads Analysis, TMDL planning, NEPA analysis, or other appropriate process. The Restoration Strategy provides the broad scale mechanism for prioritization.

Monitoring

The Multi-Scale Assessment and Planning Framework should be updated every 2-3 years, or following disturbance events that significantly change aquatic resource conditions. Population status of bull trout and Westslope cutthroat trout can be important monitoring items to display, as well as risks and threats. These attributes can be tracked and displayed over time by sub-watershed. In addition, the following monitoring elements are included in the Forest Plan Monitoring Strategy.

1. Objectives
2. Implementation and effectiveness of Best Management Practices (BMPs)

3. R1 Aquatic Ecological Unit Inventory (Biological Opinion Effectiveness Monitoring.

The R1 Ecological Unit Inventory program is currently monitoring 37 sites (19 managed and 18 reference) on the Bitterroot National Forest. These sites are shown in Figure 27.

Updating the Aquatic Restoration Strategy

As restoration work is implemented in Active Restoration Watersheds, conditions should improve. At some point, priorities will shift, and Active Restoration Watersheds will become Conservation Watersheds. Watershed management and restoration activities are never complete; they are on-going. However, there will come a time when the Forest Service has completed enough work in a given Active Restoration Watershed, and other watersheds may become higher priority. A watershed analysis is the most appropriate tool to make this determination. However, given budget limitations, a rapid assessment may be more appropriate. Appendix C contains a rapid assessment procedure to determine whether or not an Active Restoration Watershed can be designated as a Conservation Watershed.

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Appendix A: R1 Salmonid Status Code Definitions

(Version 9 – 7/24/03)[5]

Supplemental information to Region 1 Imperiled/Introduced Salmonids code descriptions (Version 4, IWWI Update - 5/30/02).

Each of the three digits in salmonids status assessment numerical code represents presence or absence, habitat, and species status in order of appearance (e.g. 113).

First digit – Presence, absence, or unknown
Second digit – Habitat
Third digit - Status

1 present
- 1 spawning and rearing habitat
  - 1 strong
  - 2 depressed
  - 3 small and stable
  - 9 no information
- 2 migratory corridors
  - 0 place mark

2 absent
- 1 rigorous sampling has confirmed species absence[6]
- 2 historically absent or currently inaccessible or unsuitable
  - 0 place mark

3 unknown – some data available, high uncertainty
- 1 Suitable habitat present
  - 1 connected
  - 2 un-connected
- 2 Suitable habitats not present
  - 0 place mark

9 unknown (999)
- 9 unknown
  - 9 unknown

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[5] Originally developed by Region 1 Fisheries Program Managers on May 30, 2002
[6] Must have used Western Division AFS protocols for bull trout.

Appendix B: Metadata for Watershed Integrity

1. Integrated Road Hazard

The Integrated Road Hazard is a spatial integration of: a) Surface Erosion and Sediment Delivery Potential of Roads, b) Road-Stream Crossing Density, and c.) Road-Stream Proximity. The rule sets for these parameters are described below.

a. Surface Erosion and Sediment Delivery Potential of Roads

The road layer was rasterized into 30 meter cells. Each cell is weighted according to the rule sets below. An area-weighted average is calculated for each 6th code hydrologic unit. Each HUC is then ranked in relation to the others using natural breaks. The rankings describe the relative degree that roads effect surface erosion and sediment delivery for each 6th code hydrologic unit.

Slope and Precipitation				
	Precipitation			
Slope (%)		Low	Mod	High
	<30	1	2	3
	30-60	2	3	4
	>60	4	5	6

Soil Erosion Potential						
Soil Erodibility (K Factor)						
Slope and Precipitation		Very Low	Low	Mod	High	Very High
	1	1	2	3	4	5
	2	2	3	4	5	6
	3	3	4	5	6	7
	4	4	5	6	7	8
	5	5	6	7	8	9
	6	6	7	8	9	10

Sediment Delivery Potential			
	Road Proximity (ft)		
Soil Erosion Potential	>300	100-300	<100
0.0-1.9	1	2	4
2.0-3.9	2	3	6
4.0-5.9	3	4	8
6.0-7.9	4	5	10
8.0-10.0	5	6	12

b. Road Stream Crossing Density

The number of road-stream intersections divided by the area of each 6th code hydrologic unit. The crossing density value is ranked in relation to the other 6th code hydrologic units.

c. Road-Stream Proximity

The road layer was rasterized into 30 meter cells. Each cell (and its associated area) that is within 100 feet of the stream network is counted. The total area of 30 meter cells is calculated for each 6th code hydrologic unit. Each HUC is then ranked in relation to the others using natural breaks. The rankings describe the relative degree that roads effect surface runoff, erosion, sediment delivery, microclimate, water quality, large woody debris, litterfall, and channel stability for each 6th code hydrologic unit.

> The following assumptions apply to GIS rule sets related to roads.
>
> - Surface runoff potential is higher on steeper slopes.
> - More surface and sub-surface water is available on lower slope positions.
> - Soil erosion potential is influenced by physical soil properties, particularly the K factor, which is the relative soils erodibility.
> - Soil erosion potential is higher on steeper slopes and lower on gentle slopes.
> - Sediment delivery potential is greater on roads that are closer to streams.
> - There is a higher potential for road-related hillslope failure on landtypes that have been identified as susceptible to this type of erosion. Higher road densities of roads increase this potential.
> - Stream crossings (mainly culverts) interrupt the movement of large woody debris and bedload material, and change hydraulic and geomorphic characteristics of streams. Culverts also have the potential to plug or fail during flood events, which can result in road failures and excessive erosion.
> - Roads directly adjacent to stream channels have a high potential to adversely affect recruitment of woody material and organic litter, water quality, channel morphology, and aquatic habitat.

The distance breaks and weighting values in the rule sets below are somewhat arbitrary, with exception to the 300 foot distance value. A review by Belt et al. (1992) concluded that non-channelized sediment rarely travels more than 300 feet and 200-300 riparian filter strips are generally effective in protecting streams from sediment and non-channelized runoff. Therefore, this value is used in evaluating sediment delivery potential.

2. Dewatering

Sub-watersheds are ranked by professional judgement as low, moderate, or high based on the relative degree that dewatering affects hydrologic processes, channel morphology, water quality, aquatic habitats, and fish passage. The low, moderate, and high rankings are assigned numbers 1, 2, and 3, respectively. These values were entered into the MRIT software and integrated with other data parameters.

3. Urban Development

Urban development is described using the “developed land” coverage from the LANDFIRE vegetation layers. Each sub-watershed is ranked low, moderate, or high, based on the percent composition of land classified as “urban”.

4. Agricultural Development

Agricultural development is described using the “agriculture” coverage from the LANDFIRE vegetation layers. Each sub-watershed is ranked low, moderate, or high, based on the percent composition of land classified as “agriculture”.

Appendix C: Rapid Assessment for Active Restoration Watersheds

Sub-Watershed Name / HUC:

On National Forest Lands……	Yes	No	Trend
Do all water bodies meet or exceed State standards for applicable beneficial uses?			
Is the stream network stable and functioning?			
Are native salmonid populations fully connected to the degree possible?			
Are threats of non-native salmonids under control?			
Are RCAs in a condition that adequately maintains and protects water quality and aquatic habitats?			
Are road densities low enough to allow for long term improvement of water quality and aquatic habitats?			
Are instream flows sufficient to provide for channel maintenance, water quality, and aquatic habitat?			
Are Instream Habitat Features at or trending toward reference ranges?			
Are water diversion impacts at the lowest level possible?			

Are factors contributing to resource conditions that are outside the control the Forest Service?

Have all reasonable restoration measures been implemented to allow for long term maintenance and improvement of watershed conditions, water quality, aquatic habitats, and native salmonids?

Recommended Restoration Theme

______Conservation
______Active Restoration
______Deferred Restoration

Appendix 7
Lolo National Forest Aquatic Multi-Scale Assessment and Planning Framework

Lolo National Forest
October 2006

Introduction and Purpose

This multi-scale assessment and planning framework is a planning tool is a 6 step process that was developed by the Rocky Mountain Research Station, and has been used in plan revision efforts throughout Regions 1 and 4. This planning tool helps describe current resource conditions and strategies for future management of aquatic resources. The planning framework consists of the following elements.

1. Existing Conditions
2. Desired Conditions
3. Risks and Threats
4. Analysis of Risks and Threats
5. Restoration Strategy
6. Monitoring

Salmonid species status, water quality conditions, desired conditions, risks and threats all form the basis for a restoration strategy. This strategy helps identify management opportunities and priorities designed to conserve and restore native fish populations, aquatic habitats, and watershed conditions.

All aquatic data is summarized by 6th code hydrologic unit (sub-watersheds), which are nested within sub-basins. Sub-watersheds work well as the primary analysis units because they are often synonymous with local populations and/ or their life stages, risks and threats, and project level management action assessments. Some of this information is summarized and interpreted at the sub-basin (4th code hydrologic units) to determine how conditions are distributed across a larger geographic area. The sub-basin is the primary broad scale summary unit for salmonids. The sub-basin acts as a terminal aquatic environment, aligning with the salmonid meta-population - a collection of local populations interacting to hedge against extinction through the migratory life stage. Self sustaining populations – Strongholds, act as source populations for supporting weaker populations or re-colonizing extirpated populations or new habitats. This multi-scale approach allows for broader interpretations of current conditions in terms of salmonid metapopulations and movement throughout several sub-watersheds.

This multi-scale analysis incorporated professional interpretations from numerous data sources such as sub-basin assessments, species recovery plans, watershed analysis, TMDL implementation plans, or other broad or mid-scale information. Subsequent project decisions would incorporate annually updated progress toward meeting desired conditions at the watershed and subbasin scale using data summarized at the sub-watershed scale.

All data is summarized by 6th code hydrologic units (sub-watersheds). Some of this information is summarized and interpreted at the sub-basin scale (4th code hydrologic units) to determine how conditions are distributed across a larger geographic area. This multi-scale approach allows for broader interpretations of current conditions in terms of salmonid metapopulations and movement throughout several sub-watersheds.

Much of the information in this assessment was generated by expert panels of Forest Service fisheries biologists, hydrologists, and soil scientists. Their judgment calls are based on a variety of information such as the bull trout baselines, stream inventory data, watershed analyses, and numerous NEPA documents. Other information was generated using GIS models.

Existing Conditions

Existing conditions are described for native salmonid species status, watershed disturbance (integrity), and impaired waters.

Native Salmonid Species Status

Current conditions are described for bull trout and Westslope cutthroat trout, which are the primary fine-filter aquatic species. The reasons to focus on these salmonid species are listed below.

1. Bull trout is a Threatened species under the Endangered Species Act.
2. Westslope cutthroat trout is identified as a Species of Concern in the proposed land management plan, and is listed as a Species of Concern by Montana Fish, Wildlife, and Parks.
3. More is known about salmonid species in terms of distribution, habitat needs, and population numbers. Therefore, it is more likely that environmental relationships can be established.
4. Salmonids are widely distributed, and allow for broad- scale comparisons.
5. Salmonids are predators, competitors, and prey which make them more likely to influence structure and function of aquatic ecosystems.
6. Salmonids may be more sensitive to disturbance than other aquatic taxa.

Bull Trout (Salvelinus confluentus)

Estimated population status of bull trout on the Lolo National Forest is shown in Table 1 and Figure 1. Population status calls were made during the summer of 2004 using a variety of information including field data and recent assessments. The Bitterroot and Flint Rock sub-basins include lands administered by the Bitterroot and Beaverhead-Deerlodge National Forests.

Strong populations of bull trout are limited to just a few sub-watersheds in each sub-basin (Table 1 and Figure 1). In many sub-watersheds, the presence of bull trout is generally unknown, indicating that their numbers may be very small, or that they may be extirpated. Their populations have been declining due to a wide variety of causes such as habitat fragmentation and degradation, flow modification, and competition from non-native species. These elements are ranked and described in more detail in the *Risks and Threats* section of this document.

Table 1. Estimated bull trout population status by sub-basin.

	Sub-Basin				
Population Status	**Lower Clarkfork**	**Middle Clarkfork**	**Blackfoot**	**Flint Rock**	**Bitterroot**
Present Strong	2	4	5	8	5
Present Depressed	11	18	9	5	53
Present Small and Stable Population					
Present No Information	4	2	5		
Present Migratory Corridor					6
Absent - Rigorous sampling has confirmed species absence					8
Absent - historically absent or currently inaccessible or unsuitable	2				
Unknown Suitable Habitat Present and Connected	26	38	14	6	12
Unknown Suitable Habitat Present but Unconnected	1	1	4		2
Unknown Suitable Habitat not Present	1		1		
Unknown			2		
Totals	**47**	**63**	**40**	**19**	**86**

Westslope Cutthroat Trout (Oncorhynchus clarki lewisi)

Estimated population status of Westslope cutthroat trout is shown in Table 2 and Figure 2 by sub-watershed. Population status calls were made during the summer of 2004 using a variety of information including field data and recent assessments. The Bitterroot and Flint Rock sub-basins include lands administered by the Bitterroot and Beaverhead-Deerlodge National Forests. Westslope cutthroat trout are fairly well distributed across the forest, but many populations are depressed (Table 2 and Figure 2).

Table 2. Estimated Westslope cutthroat trout population status by sub-basin.

	Number of Sub-Watersheds by Sub-Basin					
Population Status	**Lower Clarkfork**	**Middle Clarkfork**	**Blackfoot**	**Flint Rock**	**Bitterroot**	**Totals**
Present Strong (111)	9	9	13	9	11	
Present Depressed (112)	30	49	21	9	72	
Present Small and Stable Population (113)	1					
Present No Information (119)	4	3	3			
Present Migratory Corridor (120)					3	
Absent - Rigorous sampling has confirmed species absence (210)						
Absent - historically absent or						

Absent - historically absent or currently inaccessible or unsuitable (220)						
Unknown Suitable Habitat Present and Connected (311)	2	2		1		
Unknown Suitable Habitat Present but Unconnected (312)	1				1	
Unknown Suitable Habitat not Present (320)			1			
Unknown (999)	1		2			

Watershed Integrity

Sub-watersheds are ranked according to the relative degree of anthropogenic disturbances that can affect or potentially affect soil productivity, hydrologic and geomorphic processes, water quality, and aquatic habitats (Table 3). The intent is to use anthropogenic disturbance as a surrogate for overall watershed conditions or integrity. Relative disturbance is measured using GIS-based models and professional judgement. Human disturbances used in the assessment include roads, dewatering, urban development, agricultural development, and mining. Appendix B includes the metadata used to develop the watershed integrity rankings. Watershed integrity rankings are shown in Figure 3.

All lands within each sub-watershed are assessed, including lands not managed by the Forest Service (i.e. private, State, and other Federal lands). This approach is necessary to make meaningful comparisons of all sub-watersheds containing national forest lands. This method also allows some insight into the cumulative effects associated with management of non-Forest Service lands. Therefore, it is important to consider the proportion of each sub-watershed that contains lands managed by the Forest Service.

The disturbance indicators in Table 3 are combined into a standardized composite integrity ranking for each sub-watershed using the Multi-scale Resource Integration Tool (MRIT). A relative standardized ranking is calculated for each indicator in each sub-watershed using the formula: (X – min) / (Max – Min), where Max and Min equal the maximum and minimum absolute value, respectively, among all the sub-watersheds in the population. A composite disturbance index is the sum of the standardized rankings for each disturbance indicator. This composite value is then normalized into a ranking between 0 and 1 (using the formula above). Appendix B contains the metadata for each disturbance parameter. The Forest Roads Analysis provides a Users Guide that describes the MRIT software.

Table 3. Spatial indicators of anthropogenic disturbance.

Number	Disturbance	Measurement Parameter	Data Source
1	Road/Stream Crossing Density	Percent Composition of 30 meter pixels that contain a road/stream crossing	1:24000 stream layer, TIGER road data
2	Road/Stream Proximity	Percent Composition of 30 meter	1:24000 stream

		pixels that contain a road within 30 meters of a stream	layer, TIGER road data
3	Sediment Delivery Potential	Area-weighted Average of sediment delivery values assigned to 30 meter sections of road	1:24000 stream layer, TIGER road data
4	Dewatering[1]	Expert panel ranking (low, moderate, or high)	Forest Hydrologists and Fisheries Biologists
5	Urban Development	Percent composition of 30 meter pixels containing Urban Development	LANDFIRE, existing vegetation type
6	Agricultural Development	Percent composition of 30 meter pixels containing agriculture land within 30 meters of a streams	LANDFIRE existing vegetation type
7	Mining[2]	Expert panel ranking (low, moderate, or high)	Forest Hydrologists and Fisheries Biologists

The disturbance indices play a dominant role in affecting surface and sub-surface hydrologic patterns, surface erosion, channel stability, water quality and aquatic habitat. It is assumed that sub-watersheds with the least amount of human disturbance function within the natural range of variability under the present climate. An important limitation of this model is that it does not address the condition of forested vegetation in terms of departure from historical conditions. Fire suppression and timber harvest activities have changed forest composition, structure, and function during the past century, and this model does not address that aspect of human disturbance.

Physical, chemical, and biological processes and interrelationships in wildland watersheds are highly complex, and in many cases not well understood. This model is relatively simple, when compared to the diversity among sub-watersheds across the forest. There are other disturbances in watersheds that are not accounted for, such as concentrated recreation use and livestock grazing. However, these activities are considered to be relatively limited in terms of spatial extent. The intent of this model is only to develop a very broad characterization of watershed integrity, and to provide some context for identifying restoration priorities.

Impaired Water Bodies

In 2002, the Montana Department of Environmental Quality (MDEQ) identified waters that do not meet State standards for applicable beneficial uses. These waters are identified on the State 303(d) list. This list is updated every two years by MDEQ and documented in a 305(b) report. The 2004 report is still in draft form and being reviewed.

[1] An expert panel approach (professional judgment) was used because current data is not sufficient to adequately describe the relative degree of dewatering effects.
[2] An expert panel approach (professional judgement) was used because current data is not sufficient to adequately describe the relative degree historic and current mining activities.

Approximately 190 miles of stream are listed (Figure 4). Common water quality impairments include habitat alteration, temperature, heavy metals, nutrients, flow alteration, and algal growth.

Desired Conditions

Desired conditions are described in the Forest Plan at the forest scale and at the Geographic Area scales. The Geographic Areas closely resemble sub-basin boundaries. This assessment contains desired population status of bull trout and westslope cutthroat trout in the short term, mid term, and long term. These desired conditions illustrate the concept of expanding native fish populations through time, and describe the spatial distribution of local populations that is needed to support metapopulations and long term persistence of each species by sub-basin. The short term desired population status refers to the next 0-15 years (the current planning period). The mid term and long term desired population status refers to 15-30 years and 30-60 years, respectively. Desired population status for bull trout and Westslope cutthroat trout are shown in Figures 5-10.

1. Desired bull trout population status – short term (Figure 5)
2. Desired bull trout population status – mid term (Figure 6)
3. Desired bull trout population status – long term (Figure 7)
4. Desired westslope cutthroat trout population status – short term (Figure 8)
5. Desired westslope cutthroat trout population status – mid term (Figure 9)
6. Desired westslope cutthroat trout population status – long term (Figure 10)

Risks and Threats

Risks are intrinsic population characteristics such as genetic characteristics, recruitment, isolation, and size. Threats are land uses or conditions that can directly, indirectly, or cumulatively affect watershed conditions or aquatic habitats. The risks and threats identified in this assessment are described below and summarized in Table 4. The risks and threats are ranked as high, moderate, or low by expert panels or by GIS models. Some of the key sources of information used in expert panel rankings include the draft bull trout recovery plan, bull trout baselines, stream inventory data, roads analyses, watershed analyses, NEPA documents, water quality data, post fire assessments, and fish population data from Montana Fish, Wildlife, and Parks.

Table 4. Risks and Threats.

	Code	Variable	Data Type
Risks	R1	Temporal Variability in Recruitment or Survival	Expert Panel Ranking
	R2	Population Size	Expert Panel Ranking
	R3	Growth and Survival	Expert Panel Ranking
	R4	Isolation	Expert Panel Ranking
	R5	Overall Extinction Risk	Expert Panel Ranking
Threats	T1	Road –related Threats	GIS Models
	T2	Non-native Species	Expert Panel Ranking

	T3	Migration Barriers	Expert Panel Ranking
	T4	Mining	Expert Panel Ranking
	T5	Grazing	Expert Panel Ranking
	T6	Mixed Ownership	Expert Panel Ranking
	T7	Dewatering	Expert Panel Ranking

Extinction Risks

Extinction risks were estimated for each key salmonid species using the method described in: *Fish Habitat Relationships Technical Bulletin 14. 1993. Intermountain Research Station, Boise, ID*. Extinction risks for salmonids are extremely difficult to measure, due to all the complexities associated with population dynamics, habitat availability, and disturbance processes. The mechanisms leading to extinction can be deterministic, stochastic, or genetic, all of which may operate together. Deterministic factors may include habitat degradation (i.e. loss of pools, increased water temperature, etc.), fishing pressure, or invasion of non-native species. The level of population response to deterministic factors can be influenced by a variety of population characteristics such as size, fecundity, and maturity age.

Stochastic processes (chance events) also contribute to extinction risk. These chance events can be internal to the population or external. An internal stochastic event may involve a sudden change in reproduction or mortality rates. An external stochastic event could be a forest fire and resulting flood event.

Genetic risks are associated with a general loss of genetic diversity through a variety of mechanisms. Soule (1987) suggests that 500 individuals are needed in a population to maintain the genetic variability necessary for adaptation.

Consideration of the mechanisms and processes of extinction for salmonids (USDA 1993) is critical in conservation and restoration planning. Preservation of phenotypic and genetic diversity requires maintenance of populations over a wide geographic area in a variety of habitats. More importantly, these populations and habitats need to be connected. This allows for genetic exchange, and the ability of local populations to disperse and accommodate deterministic and stochastic events.

In this analysis the term *population* generally refers to the sub-watershed scale. A collection of such populations that interact (genetically) is termed a *metapopulation*. Metapopulations of salmonids are generally associated with watersheds and sub-basins, but depend on the level of connection with local populations. The components of extinction risk used in this assessment are summarized below (USDA 1993).

R1 – Temporal Variability in Recruitment or Survival. This ranking addresses the likelihood of environmental disturbances and associated effects on variability and survival of the species. A low ranking would indicate short-lived disturbances and low variability in habitat conditions. A high ranking would indicate high variability in habitat conditions associated with unpredictable, relatively extreme events.

R2 – Population Size. A ranking of low would indicate a population size of several thousand individuals, in which all life stages are represented. A ranking of moderate or high would indicate less than 500 or 50, respectively.

R3 – Growth and Survival. This ranking assesses relative abundance and reproduction capability. A low ranking would indicate the population is very resilient and can recover from exploitation and disturbances relatively fast (5-10 years), and habitat quality is very high. A high ranking would indicate poor habitat conditions and little potential for recovery following disturbance events.

R4 – Isolation. This ranking assesses the relative connectivity of the population with other local populations.

R5 – Overall Extinction Risk. This is a summary ranking, and is expressed as the maximum value found in R1-R4.

The overall extinction risks (R5) for bull trout and Westslope cutthroat trout are mapped by sub-watershed (Figures 11 and 12). Across the forest, extinction risk for bull trout and Westslope cutthroat trout range from moderate to extreme. Bull trout populations are very small, and in many sub-watersheds, their presence is unknown (Figure 1).

Threats

Threats are environmental pressures that can ultimately affect native salmonids. The threats outlined below were identified by forest hydrologists, fisheries biologists, and soil scientists. They are considered to be the primary impacts on soils, watersheds, aquatic habitat, and water quality.

T1 – Road-related Threats. Roads are considered the most significant and wide-spread threat to watershed conditions and aquatic habitats that the Forest Service has direct control over. Descriptions of road-related threats were derived from data used generated for the Watershed Integrity Assessment (Appendix B). The following coverages describe road-related threats.

1. Surface erosion and sediment delivery potential (Figure 13)
2. Road-stream crossing density (Figure 14)
3. Road proximity to streams (within 100 feet) (Figure 15)

T2 – Non-native Species. This ranking is an overall judgement call, based on fish surveys conducted during the past several years. Common non-native species include rainbow trout, brown trout, and brook trout. All of these species are known to compete against or displace bull trout and Westslope cutthroat trout. Hybridization is another threat associated with non-native species. Estimated non-native species threats are shown in Figures 16 and 17 for bull trout and Westslope cutthroat trout, respectively.

T3 – Migration Barriers. Other than natural barriers, migration and movement of fish are primarily restricted at road-stream crossings with culverts. Generally, the restriction is on upstream movement, although downstream migration can also be affected. This results from hanging culverts, high flow velocities in culverts, and inadequate depths for fish movement. In some locations, fish barriers are desirable to protect small native populations from invasion by non-native species, particularly brook trout. While culverts can affect the migration of amphibian species, the greatest concern (at this time) is the effect on native salmonids. Figures 18 and 19 display the migration barrier threats for bull trout and Westslope cutthroat, respectively. On the Lolo, approximately 681 culverts have been surveyed for fish passage. Of those, 575 are considered to be barriers to adult and/or juvenile fish.

T4 – Mining. This threat was ranked through the expert panel approach because the impacts associated with mining are very difficult to analyze spatially with existing data. Most of the mining impacts on the Lolo are within the Middle Clarkfork sub-basin. The relative degree the mining is impacting aquatic habitats, water quality, and native fish is shown in Figure 20.

T5 – Livestock Grazing. The effects of livestock grazing on water quality and aquatic habitats are quite variable and difficult to measure using a spatial model. Therefore grazing impacts were assessed using an expert panel approach (Figure 21). Many of the impacts associated with livestock grazing occur on private lands.

T6 – Mixed Ownership. The degree of mixed ownership by sub-watershed has substantial effects on watershed conditions, water quality, and aquatic habitat, depending on the type of ownership. This threat was rated high if the other ownerships have substantial impacts, or make conservation efforts a challenge (Figure 22).

T7 – Dewatering. The effects of dewatering were assessed using an expert panel approach because of the difficulty in measuring these effects using a spatial model. The relative threats of dewatering are shown in Figure 23.

Analysis of Risks and Threats

The purpose of analyzing risks and threats is to display their influence on and interactions with watershed conditions, aquatic habitats, and native salmonids. But more importantly, this analysis forms a basis for identifying restoration priorities. Figure 24 describes some very general relationships and influences on future populations of native salmonids.

Many risks and threats are due to conditions that are beyond Forest Service control or jurisdiction. However, there are some risks and threats that are well within the control of the Forest Service (i.e. roads and fish passage barriers), and should be the focus of restoration work. For example, dewatering can occur through legitimate withdrawal of water according to a specific water right. Another example is management of non-native sport fish by Montana Fish, Wildlife, and Parks that often have detrimental effects on native fish. Table 5 describes the relative degree of influence that the Forest Service has on the Risks and Threats identified in this assessment.

Table 5. Degree of Forest Service influence on risks and threats.

	Risks and Threats	Relative Degree of Forest Service Influence
Extinction Risks	Temporal Variability in Recruitment or Survival	Variable[3]
	Population Size	Variable
	Growth and Survival	Variable
	Isolation	Variable
Threats	Roads-related Threats	High
	Non-native Species	Low
	Migration Barriers	High
	Mining	Moderate
	Grazing	High
	Mixed Ownership	Low
	Dewatering	Low

Restoration Strategy

The purpose of the Restoration Strategy is to identify the most important places to improve watershed and aquatic habitat conditions that will most effectively contribute to recovery of bull trout and Westslope cutthroat trout populations, and to meeting water quality standards. This restoration strategy is based on existing conditions, risks, threats, and restoration potential. It is intended to be used as a prioritization tool for restoration work during the next 10-15 years. The goals of the strategy are to:

1. Improve watershed conditions, aquatic habitats, and water quality.
2. Expand populations of bull trout and Westslope cutthroat trout, using strongholds as a source.
3. Restore impaired waters that have been identified by the State of Montana.

The Restoration Strategy is essentially a designation of all sub-watersheds on the forest (Table 7). A map of these sub-watersheds is shown in Figure 25.

Conservation Watersheds typically have strong populations of bull trout and Westslope cutthroat trout, and they are close to desired conditions described in the forest plan. These watersheds may serve as population strongholds that have the potential to expand into other watersheds. *Active Restoration Watersheds* are typically in close proximity to *Conservation Watersheds*, and they are the highest priority for restoration during the next

[3] The relative degree of Forest Service control over population risks is highly variable because they are affected by a wide variety of threats, habitat conditions, and disturbances.

10-15 years. *Deferred Restoration Watersheds* are those watersheds that are a low priority for restoration.

Table 7. Description of the Aquatic Restoration Strategy.

Watershed Designation	Definition	Management Approach
Conservation	Watersheds that are at or very close to Desired Conditions (as defined in the forest plan) to the extent possible, or restoration measures have been implemented to allow a trend toward desired conditions over time. All reasonable restoration measures have been implemented on National Forest lands to the degree possible. Conservation watersheds are 6th code hydrologic units.	Protect and maintain quality aquatic habitat and strong native fish populations through forest plan direction, and applicable policy and guidance.
Deferred Restoration	Watersheds that are a low priority for restoration during the current planning cycle. These watersheds are 6th code hydrologic units.	Protect and maintain quality aquatic habitat and strong native fish populations through forest plan direction, and applicable policy and guidance.
Active Restoration	Watersheds that are a high priority for aquatic restoration during the next 10-15 years. These watersheds generally do not meet desired conditions, and have a high potential to move toward Desired Conditions with appropriate restoration measures. Active Restoration Watersheds are 6th code hydrologic units.	Protect and maintain quality aquatic habitat and strong native fish populations through forest plan direction, and applicable policy and guidance. Improve aquatic habitat and water quality through restoration. Restoration activities should focus on the specific risks and threats identified in the sub-watershed.

The following population viability principles played a major role in the selection of Active Restoration Watersheds.

1. The larger the population the greater the chance of their persistence through time and disturbance (bigger is better than smaller)
2. Population recovery potential is greater in closer proximity to strong source populations (closer is better than farther).
3. Well connected populations allow for maintenance of biological diversity (genetic exchange), dispersal into unpopulated areas, and resilience to habitat disturbance (connected is better than disjointed).
4. Preserving genetic and phenotypic diversity requires maintaining populations through a wide geographic range in a variety of habitats.
5. Maintenance of strong populations in the best possible habitats throughout the planning area and preserving metapopulation structure and function are the best ways to minimize the risk of extinction (USDA 1993).

Due to budget constraints, a limited number of watersheds could be selected as priority areas for restoration. Active Restoration Watersheds were selected based on the following criteria:

1. Proximity to bull trout and Westslope cutthroat trout strongholds.

2. Population descriptions in the draft Bull Trout Recovery Plan and the Bull Trout Status Review.
3. Presence of 303(d) listed waters and active TMDL planning/implementation.
4. Risks and threats that the Forest Service has the most ability to reduce (Table 5).
5. Existing or potential cooperative efforts to restore watershed conditions and aquatic habitats on lands not administered by the Forest Service.
6. Restoration activities that are currently approved under NEPA.
7. Relative degree of degradation and potential for improvement.

Figure 26 provides a graphical description of how Active Restoration Watersheds were identified.

Rationale for Active Restoration Watersheds

The number and location of Active Restoration Watersheds can be adjusted at any time, based on new information, changes in budget levels, or following large disturbances that may change resource conditions. The Active Restoration Watersheds on the Lolo are listed below with rationale for their selection.

Each Active Restoration Watershed is assigned relative values (low, moderate, or high) for complexity and cost (Table 7). The level of complexity refers to how much planning may be required to implement needed restoration work. For example, watersheds with numerous roads that may need to be decommissioned would be considered highly complex because this work requires substantial interdisciplinary planning and public involvement. Mixed ownership may also contribute to complexity. If a watershed only needs 1-2 fish barrier removals, the complexity would be considered low.

Cost refers the relative amounts of funding needed to implement restoration work. A ranking of low indicates work is likely to be completed with existing funds, while a ranking of moderate means additional funds or partnerships may be necessary. A ranking of high would indicate significant funding above current levels.

Table 7. Active Restoration Watersheds.

Sub-Basin	Active Restoration Watershed (s)	Complexity	Cost	Road Density[4]	Fish Barriers
Blackfoot	Morrell Drew	Low	Low	1.3	1
Middle Clarkfork	Upper Ninemile Creek	Moderate	High	3.4	26
	Cache Creek	Low	Low	0.3	3
	Upper Trout Creek	Low	Low	1.2	3
	Lost Oregon	Moderate	Moderate	1.8	7
	Silver Timber	Low	Moderate	1.3	12
	Big Creek	Moderate	Moderate	2.4	9
	Little Joe Creek	Moderate	Moderate	1.9	11
Bitterroot	Upper Lolo Creek	High	High	2.6	65

[4] National Forest lands only.

Lower Clarkfork	West Fork Fish Trap	Moderate	Moderate	2.6	2

Bitterroot Sub-Basin

East Fork Lolo Creek, West Fork Lolo Creek, and Granite Creek

1. The Lolo Creek TMDL plan is being implemented to improve water quality.
2. NEPA is complete for a variety of restoration projects.
3. Partnerships are already in place (e.g. Lolo Watershed Group and Plum Creek). Plum Creek is an active partner in fish passage projects.
4. Abundance of low gradient spawning habitat for fluvial cutthroat and bull trout.
5. Opportunities to expand and secure Westslope cutthroat trout and bull trout throughout the larger, Lolo Creek drainage.
6. Lolo Creek was designated a bull trout Priority Watershed, and the East and West Forks provide high quality habitat that supports these populations.
7. In the West Fork Lolo Creek, there is a unique, isolated Westslope cutthroat trout population above Snowshoe Falls that may serve as natural genetic reserve.
8. Adds to restoration of the Lolo Creek ecosystem. Headwaters contain high quality habitats within un-roaded lands.
9. Strong Westslope cutthroat trout populations to expand upon.

Middle Clarkfork Sub-Basin

Upper Ninemile

1. Upper Ninemile is in the headwaters, and active restoration work is being implemented downstream.
2. Good potential to strengthen and expand the Upper Ninemile bull trout subpopulation.
3. Partnerships are in place.
4. Ninemile TMDL plan is being implemented.
5. The Post Burn EIS approved several road decommissioning projects.
6. Contains only known population of bull trout in the Ninemile watershed.
7. Opportunity to expand Westslope cutthroat trout populations.
8. Opportunities to implement mine reclamation projects.

Cache Creek

1. Low difficulty.
2. Large watershed with little development.
3. Strong population of fluvial cutthroat and recent bull trout.
4. Low road densities.
5. Strong support from Montana Fish, Wildlife, and Parks.

6. Only 3 barriers to remove

Little Joe Creek

1. Unique fluvial bull trout population.
2. St. Regis TMDL plan in progress.
3. High quality habitat and temperature refugia
4. Federal Highway Proposal
5. Unique native fish genetics
6. 11 barriers

Silver Timber Creek

1. Low difficulty
2. high cost/benefit;
3. Large undeveloped watershed with high quality habitat
4. High potential for fluvial spawning areas.
5. St. Regis TMDL planning in progress; private land; DeBaugan Fuels project NEPA
6. 12 barriers

Big Creek

1. Current and past restoration activities.
2. Important tributary to the St. Regis River.
3. Provides quality temperature refugia.
4. Idaho giant salamanders have been documented.
5. St. Regis TMDL plan in progress.
6. DeBaugan Fuels EA and associated restoration projects.
7. Stimson access needs
8. 9 barriers to remove.

Lost Oregon Creek

1. Highest concentration of bull trout spawning in the Middle Clark Fork sub-basin.
2. High quality habitat and temperature refugia;
3. Strong partnerships in place, including MFWP.
4. Opportunity for land acquisition in lower reaches.
5. Primarily Forest Service ownership with patented mining claims along creek.
6. High potential to expand bull trout and Westslope cutthroat trout populations.
7. Cedar Creek Land Acquisition

Upper Trout Creek

1. Contains important source for the Middle Clark Fork sub-basin.
2. Prospect Fire and associated restoration work.

3. potential bull trout stronghold;
4. TMDL planning in progress
5. Quality habitat and temperature refugia
6. Post Burn EIS and associated restoration projects.
7. Recent BAER work.
8. Only 3 barriers to remove.

Lower Clarkfork Sub-Basin

West Fork Fish Trap Creek

1. High potential to strengthen the Thompson River subpopulation.
2. Primary bull trout spawning tributary for the Middle Clarkfork sub-basin.
3. Fishtrap EIS and associated restoration projects.
4. High concentration of bull trout spawning.
5. All lands are managed by the Forest Service
6. Quality habitat and temperature refugia.

Blackfoot Sub-Basin

Morrell Drew

1. Low difficulty.
2. Main spawning tributary for Clearwater sub-populations.
3. Partners are in place.
4. Cold water and largely undeveloped headwaters.
5. Only adfluvial fish populations on the forest.
6. Only one barrier to remove.

Multi-Scale Analysis (the step-down process)

This multi-scale assessment and planning framework, combined with the forest plan provide large scale, strategic direction for aquatic resources. Priorities for aquatic restoration have been identified through the designation of Active Restoration Watersheds. More detailed descriptions of existing conditions, risks, threats, and restoration should be identified through Watershed Analysis (Federal Guide for Watershed Analysis 1995), Roads Analysis, TMDL planning, NEPA analysis, or other appropriate process. The Restoration Strategy provides the broad scale mechanism for prioritization.

Monitoring

The Multi-Scale Assessment and Planning Framework should be updated every 2-3 years, or following disturbance events that significantly change aquatic resource conditions. Population status of bull trout and Westslope cutthroat trout can be important monitoring items to display, as well as risks and threats. These attributes can be tracked and displayed over time by sub-watershed. In addition, the following monitoring elements are included in the Forest Plan Monitoring Strategy.

1. Objectives
2. Implementation and effectiveness of Best Management Practices (BMPs)
3. R1 Aquatic Ecological Unit Inventory (Biological Opinion Effectiveness Monitoring.

The R1 Ecological Unit Inventory program is currently monitoring 57 sites on the Lolo National Forest. These sites are shown in Figure 27 with the aquatic restoration strategy layer.

Updating the Aquatic Restoration Strategy

As restoration work is implemented in Active Restoration Watersheds, conditions should improve. At some point, priorities will shift, and Active Restoration Watersheds will become Conservation Watersheds. Watershed management and restoration activities are never complete; they are on-going. However, there will come a time when the Forest Service has completed enough work in a given Active Restoration Watershed, and other watersheds may become higher priority. A watershed analysis is the most appropriate tool to make this determination. However, given budget limitations, a rapid assessment may be more appropriate. Appendix C contains a rapid assessment procedure to determine whether or not an Active Restoration Watershed can be designated as a Conservation Watershed.

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Appendix A: R1 Salmonid Status Code Definitions

(Version 9 – 7/24/03)[5]

Supplemental information to Region 1 Imperiled/Introduced Salmonids code descriptions (Version 4, IWWI Update - 5/30/02).

Each of the three digits in salmonids status assessment numerical code represents presence or absence, habitat, and species status in order of appearance (e.g. 113).

First digit – Presence, absence, or unknown
Second digit – Habitat
Third digit - Status

- 1 present
  - 1 spawning and rearing habitat
    - 1 strong
    - 2 depressed
    - 3 small and stable
    - 9 no information
  - 2 migratory corridors
    - 0 place mark
- 2 absent
  - 1 rigorous sampling has confirmed species absence[6]
  - 2 historically absent or currently inaccessible or unsuitable
    - 0 place mark
- 3 unknown – some data available, high uncertainty
  - 1 Suitable habitat present
    - 1 connected
    - 2 un-connected
  - 2 Suitable habitats not present
    - 0 place mark
- 9 unknown (999)
  - 9 unknown
    - 9 unknown

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[5] Originally developed by Region 1 Fisheries Program Managers on May 30, 2002
[6] Must have used Western Division AFS protocols for bull trout.

Appendix B: Metadata for Watershed Integrity

1. Integrated Road Hazard

The Integrated Road Hazard is a spatial integration of: a) Surface Erosion and Sediment Delivery Potential of Roads, b) Road-Stream Crossing Density, and c.) Road-Stream Proximity. The rule sets for these parameters are described below.

a. Surface Erosion and Sediment Delivery Potential of Roads

The road layer was rasterized into 30 meter cells. Each cell is weighted according to the rule sets below. An area-weighted average is calculated for each 6th code hydrologic unit. Each HUC is then ranked in relation to the others using natural breaks. The rankings describe the relative degree that roads effect surface erosion and sediment delivery for each 6th code hydrologic unit.

Slope and Precipitation				
	Precipitation			
Slope (%)		Low	Mod	High
	<30	1	2	3
	30-60	2	3	4
	>60	4	5	6

Soil Erosion Potential						
Soil Erodibility (K Factor)						
Slope and Precipitation		Very Low	Low	Mod	High	Very High
	1	1	2	3	4	5
	2	2	3	4	5	6
	3	3	4	5	6	7
	4	4	5	6	7	8
	5	5	6	7	8	9
	6	6	7	8	9	10

Sediment Delivery Potential			
	Road Proximity (ft)		
Soil Erosion Potential	>300	100-300	<100
0.0-1.9	1	2	4
2.0-3.9	2	3	6
4.0-5.9	3	4	8
6.0-7.9	4	5	10
8.0-10.0	5	6	12

b. Road Stream Crossing Density

The number of road-stream intersections divided by the area of each 6th code hydrologic unit. The crossing density value is ranked in relation to the other 6th code hydrologic units.

c. Road-Stream Proximity

The road layer was rasterized into 30 meter cells. Each cell (and its associated area) that is within 100 feet of the stream network is counted. The total area of 30 meter cells is calculated for each 6th code hydrologic unit. Each HUC is then ranked in relation to the others using natural breaks. The rankings describe the relative degree that roads effect surface runoff, erosion, sediment delivery, microclimate, water quality, large woody debris, litterfall, and channel stability for each 6th code hydrologic unit.

> The following assumptions apply to GIS rule sets related to roads.
>
> - Surface runoff potential is higher on steeper slopes.
> - More surface and sub-surface water is available on lower slope positions.
> - Soil erosion potential is influenced by physical soil properties, particularly the K factor, which is the relative soils erodibility.
> - Soil erosion potential is higher on steeper slopes and lower on gentle slopes.
> - Sediment delivery potential is greater on roads that are closer to streams.
> - There is a higher potential for road-related hillslope failure on landtypes that have been identified as susceptible to this type of erosion. Higher road densities of roads increase this potential.
> - Stream crossings (mainly culverts) interrupt the movement of large woody debris and bedload material, and change hydraulic and geomorphic characteristics of streams. Culverts also have the potential to plug or fail during flood events, which can result in road failures and excessive erosion.
> - Roads directly adjacent to stream channels have a high potential to adversely affect recruitment of woody material and organic litter, water quality, channel morphology, and aquatic habitat.

The distance breaks and weighting values in the rule sets below are somewhat arbitrary, with exception to the 300 foot distance value. A review by Belt et al. (1992) concluded that non-channelized sediment rarely travels more than 300 feet and 200-300 riparian filter strips are generally effective in protecting streams from sediment and non-channelized runoff. Therefore, this value is used in evaluating sediment delivery potential.

2. Dewatering

Sub-watersheds are ranked by professional judgement as low, moderate, or high based on the relative degree that dewatering affects hydrologic processes, channel morphology, water quality, aquatic habitats, and fish passage. The low, moderate, and high rankings are assigned numbers 1, 2, and 3, respectively. These values were entered into the MRIT software and integrated with other data parameters.

3. Urban Development

Urban development is described using the “developed land” coverage from the LANDFIRE vegetation layers. Each sub-watershed is ranked low, moderate, or high, based on the percent composition of land classified as “urban”.

4. Agricultural Development

Agricultural development is described using the “agriculture” coverage from the LANDFIRE vegetation layers. Each sub-watershed is ranked low, moderate, or high, based on the percent composition of land classified as “agriculture”.

5. Mining

Sub-watersheds are ranked by professional judgement as low, moderate, or high based on the relative degree that historic and current mining activities affect soil productivity, hydrologic processes, channel morphology, water quality, and or aquatic habitats. The low, moderate, and high rankings are assigned numbers 1, 2, and 3, respectively. These values were entered into the MRIT software and integrated with other data parameters.

Appendix C: Rapid Assessment for Active Restoration Watersheds

Sub-Watershed Name / HUC:

On National Forest Lands……	Yes	No	Trend
Do all water bodies meet or exceed State standards for applicable beneficial uses?			
Is the stream network stable and functioning?			
Are native salmonid populations fully connected to the degree possible?			
Are threats of non-native salmonids under control?			
Are RCAs in a condition that adequately maintains and protects water quality and aquatic habitats?			
Are road densities low enough to allow for long term improvement of water quality and aquatic habitats?			
Are instream flows sufficient to provide for channel maintenance, water quality, and aquatic habitat?			
Are Instream Habitat Features at or trending toward reference ranges?			
Are water diversion impacts at the lowest level possible?			

Are factors contributing to resource conditions that are outside the control the Forest Service?

Have all reasonable restoration measures been implemented to allow for long term maintenance and improvement of watershed conditions, water quality, aquatic habitats, and native salmonids?

Recommended Restoration Theme

______Conservation
______Active Restoration
______Deferred Restoration

Appendix 8
Spatial Displays of Results of Forest Service Aquatic Multi-scale Assessment Applied to Bitterroot Subbasin

6th Code HUC	Last 4 digits of 6th Code HUC	6th Code HUC (Sub-watershed) Name
170102050101	0101	Deer Creek
170102050102	0102	West Fork Bitterroot River-Beaver Creek
170102050103	0103	Hughes Creek
170102050104	0104	Overwhich Creek
170102050105	0105	Upper Blue Joint Creek
170102050106	0106	Lower Blue Joint Creek
170102050107	0107	Slate Creek
170102050108	0108	West Fork Bitterroot River-Painted Rock Lake
170102050201	0201	Sheephead Creek
170102050202	0202	Watchtower Creek
170102050203	0203	Little West Fork
170102050204	0204	Nez Perce Fork-Nelson Lake
170102050301	0301	West Fork Bitterroot River-Mud Creek
170102050302	0302	Boulder Creek
170102050303	0303	Piquette Creek
170102050304	0304	Trapper Creek
170102050305	0305	West Fork Bitterroot River-Lloyd Creek
170102050401	0401	Moose Creek
170102050402	0402	Martin Creek
170102050403	0403	East Fork Bitterroot River-Clifford Creek
170102050404	0404	Meadow Creek
170102050405	0405	East Fork Bitterroot River-Bertie Lord Creek
170102050501	0501	Tolan Creek
170102050502	0502	Camp Creek
170102050503	0503	East Fork Bitterroot River-Jennings Camp Creek
170102050504	0504	Cameron Creek
170102050505	0505	Warm Springs Creek
170102050506	0506	East Fork Bitterroot River-Laird Creek
170102050601	0601	Lost Horse Creek
170102050602	0602	South Lost Horse Creek
170102050701	0701	Divide Creek
170102050702	0702	Upper Sleeping Child Creek
170102050703	0703	Middle Sleeping Child Creek
170102050704	0704	Little Sleeping Child Creek
170102050705	0705	Lower Sleeping Child Creek
170102050801	0801	Upper Rye Creek
170102050802	0802	Lower Rye Creek
170102050803	0803	Bitterroot River-Chaffin Creek

6th Code HUC	Last 4 digits of 6th Code HUC	6th Code HUC (Sub-watershed) Name
170102050804	0804	Tin Cup Creek
170102050805	0805	Rock Creek
170102050806	0806	Bitterroot River-Darby
170102050807	0807	Bitterroot River-Lick Creek
170102050901	0901	Daly Creek
170102050902	0902	Upper Skalkaho Creek
170102050903	0903	Middle Skalkaho Creek
170102050904	0904	Lower Skalkaho Creek
170102051001	1001	Roaring Lion Creek
170102051002	1002	Sawtooth Creek
170102051003	1003	Bitterroot River-Canyon Creek
170102051004	1004	Gird Creek
170102051005	1005	Blodgett Creek
170102051006	1006	Willow Creek
170102051007	1007	Bitterroot River-Woodside
170102051101	1101	Mill Creek
170102051102	1102	Fred Burr Creek
170102051103	1103	Sweathouse Creek
170102051104	1104	Bear Creek
170102051105	1105	Bitterroot River-Birch Creek
170102051201	1201	Big Creek
170102051202	1202	Willoughby Creek
170102051203	1203	Bitterroot River-Spooner Creek
170102051301	1301	McCalla Creek
170102051302	1302	Kootenai Creek
170102051303	1303	Upper Burnt Fork Bitterroot River
170102051304	1304	Lower Burnt Fork Bitterroot River
170102051305	1305	Burnt Fork Bitterroot River-Stevensville
170102051401	1401	West Fork Lolo Creek
170102051402	1402	East Fork Lolo Creek
170102051403	1403	Granite Creek
170102051404	1404	Howard Creek
170102051405	1405	Upper Lolo Creek
170102051406	1406	West Fork Butte Creek
170102051407	1407	South Fork Lolo Creek
170102051408	1408	Lolo Creek-Grave Creek
170102051409	1409	Lower Lolo Creek
170102051501	1501	Bass Creek
170102051502	1502	Ambrose Creek
170102051503	1503	Threemile Creek

6th Code HUC	Last 4 digits of 6th Code HUC	6th Code HUC (Sub-watershed) Name
170102051504	1504	Sweeney Creek
170102051505	1505	Eightmile Creek
170102051506	1506	Bitterroot River-Larry Creek
170102051507	1507	Swan Creek
170102051508	1508	Bitterroot River-North Woodchuck Creek
170102051601	1601	Miller Creek
170102051602	1602	O'Brien Creek
170102051603	1603	Bitterroot River-Hayes Creek

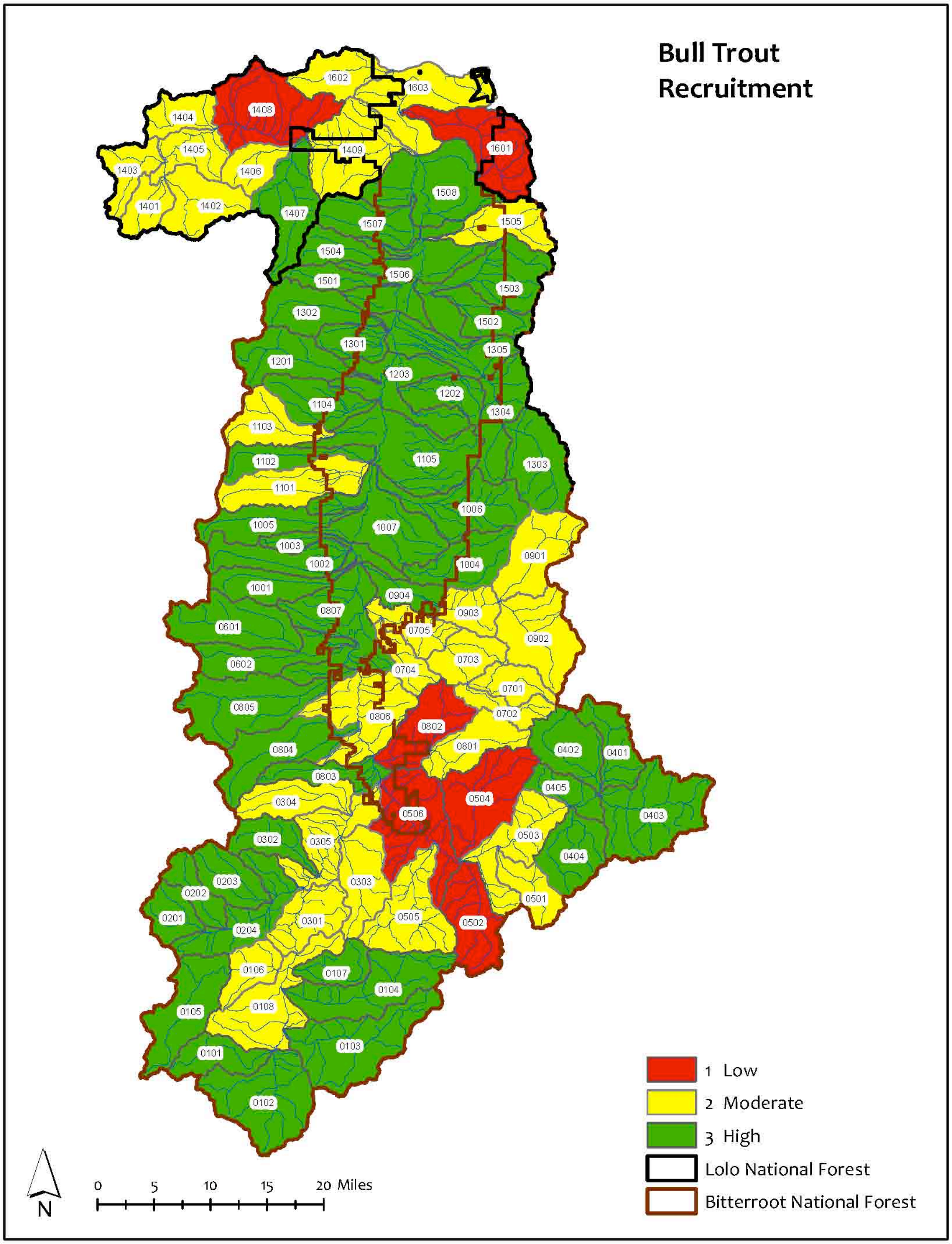

Figure 1. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Risk 1: Recruitment

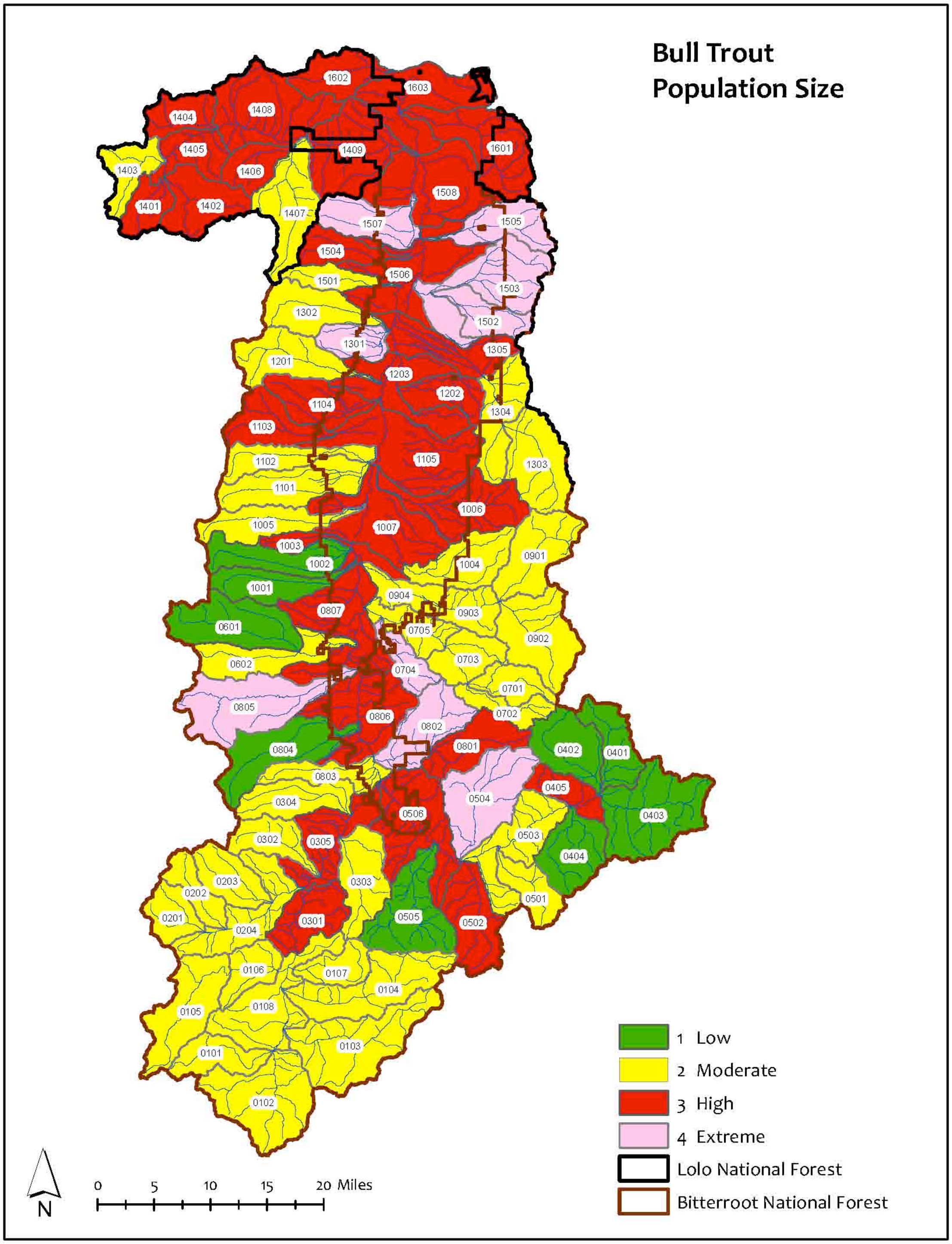

Figure 2. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Risk 2: Population Size

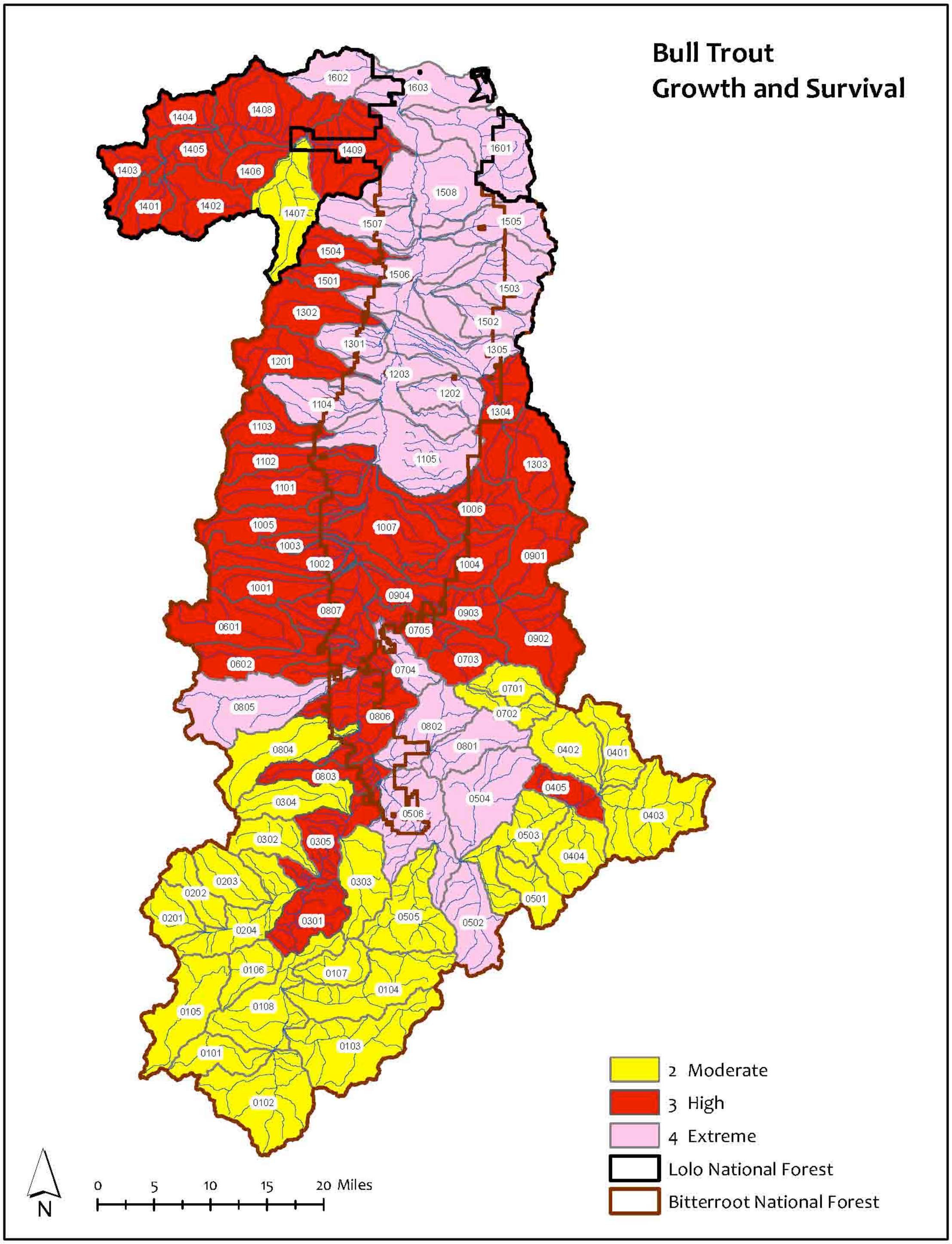

Figure 3. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Risk 3: Growth and Survival

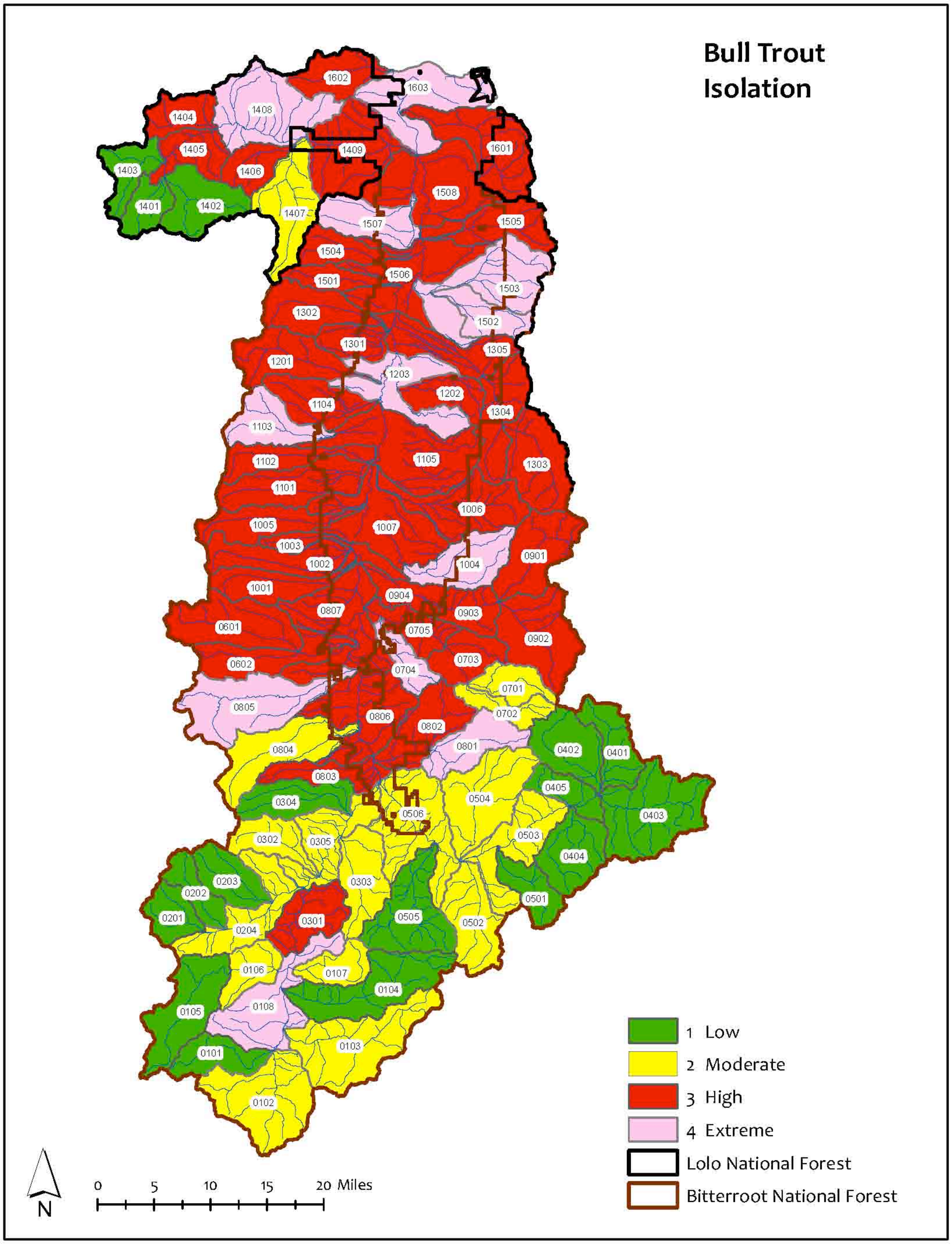

Figure 4. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Risk 4: Isolation

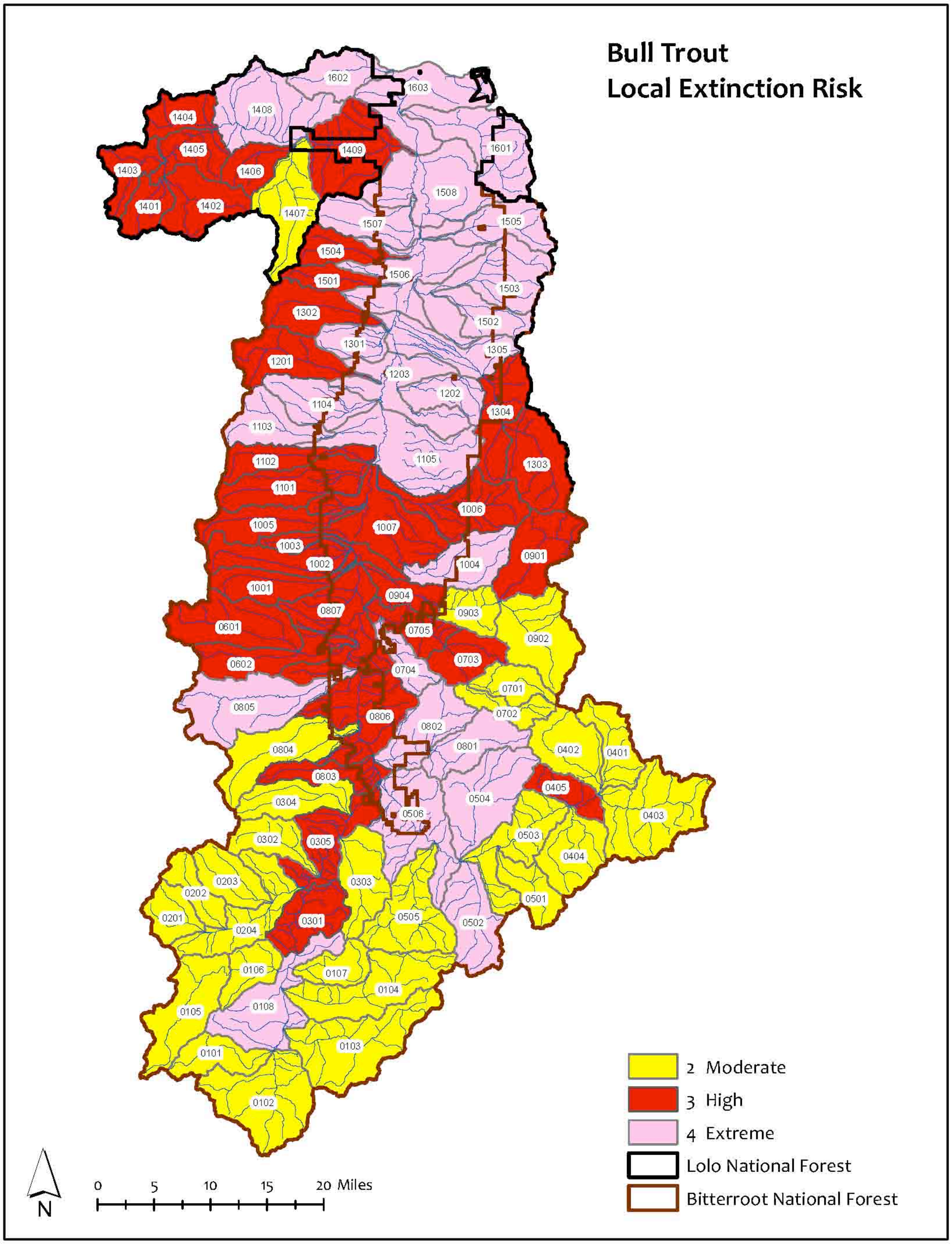

Figure 5. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Risk 5: Overall Extinction

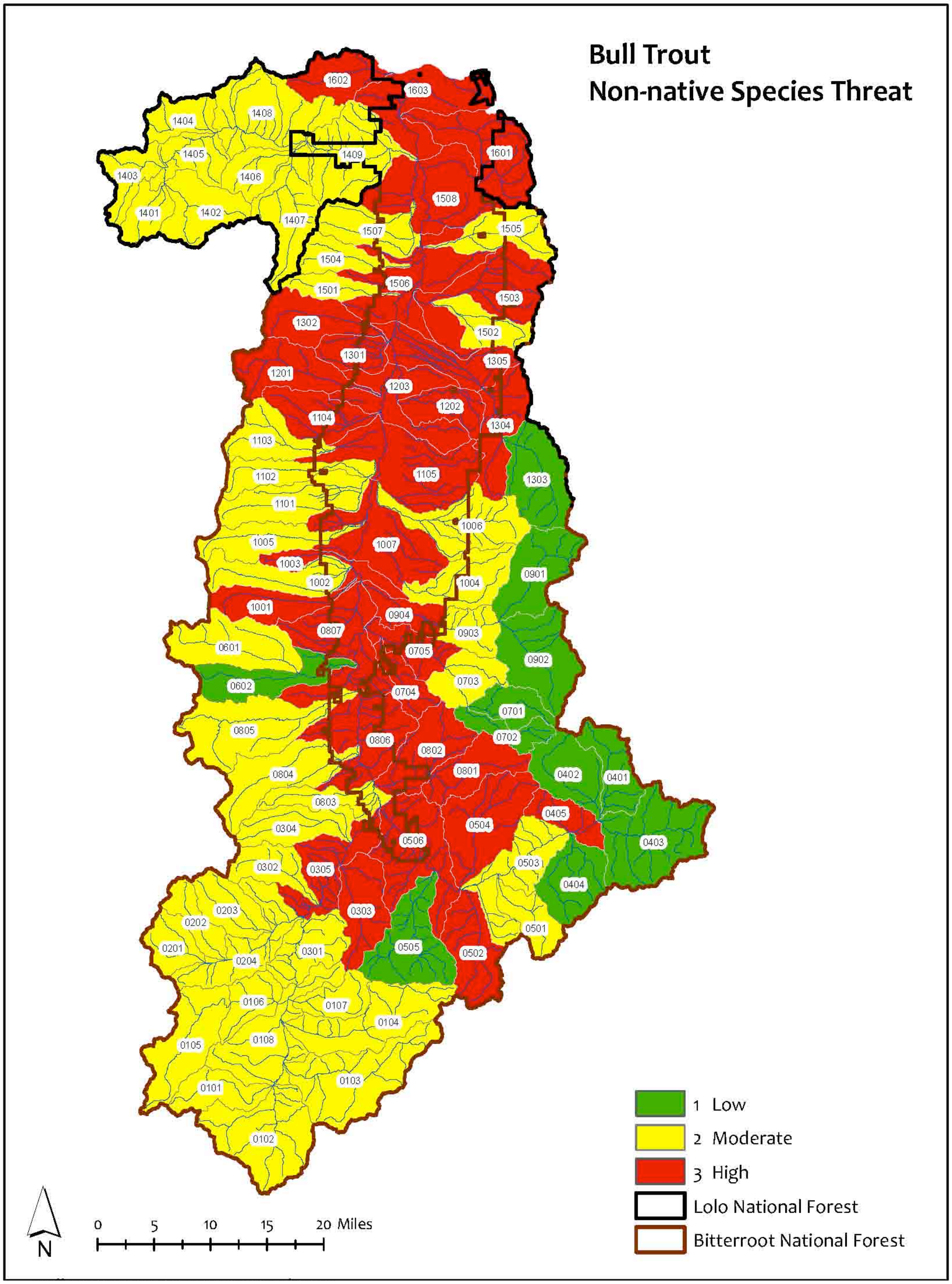

Figure 6. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Threat 2: Non-native Species

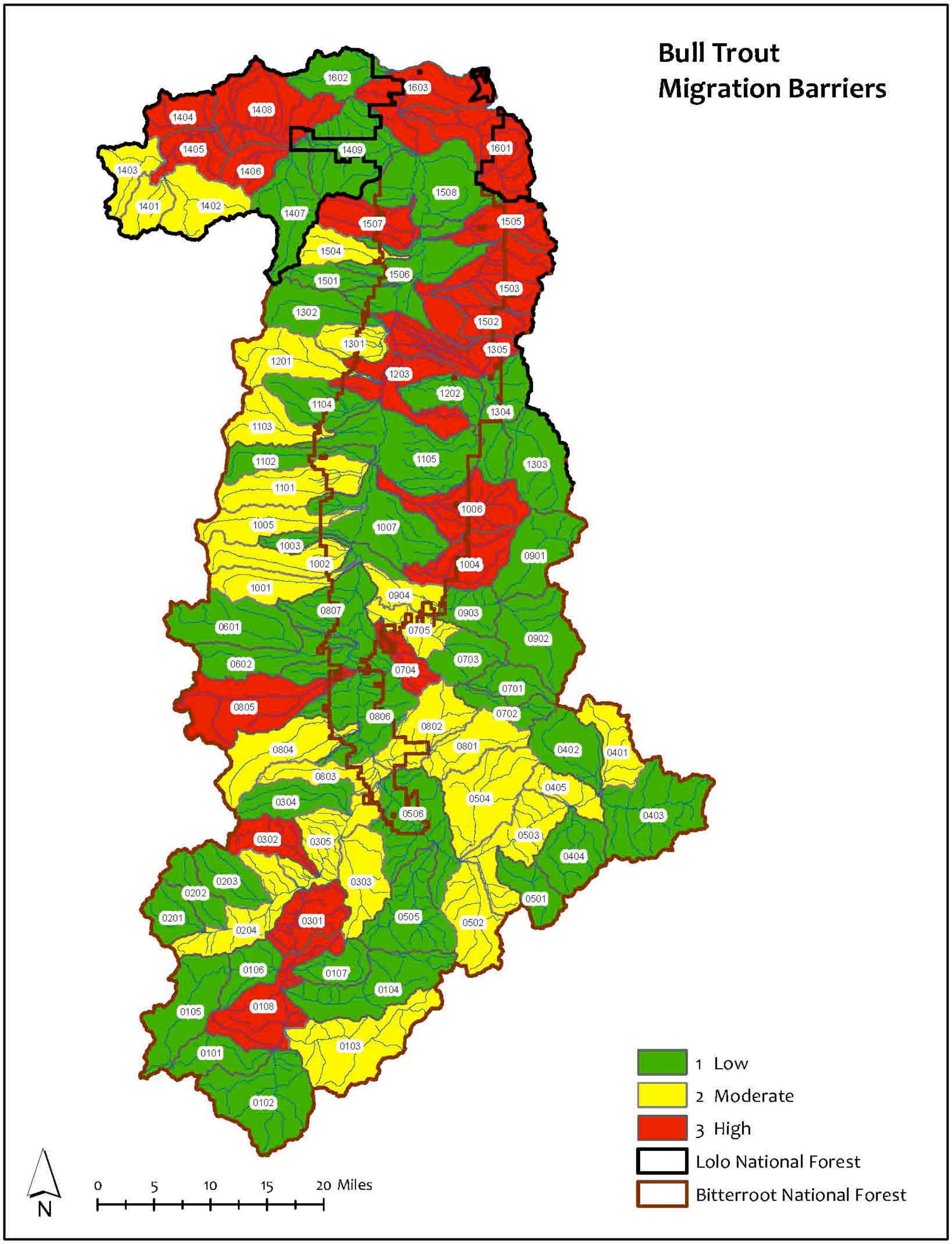

Figure 7. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Threat 3: Migration barriers

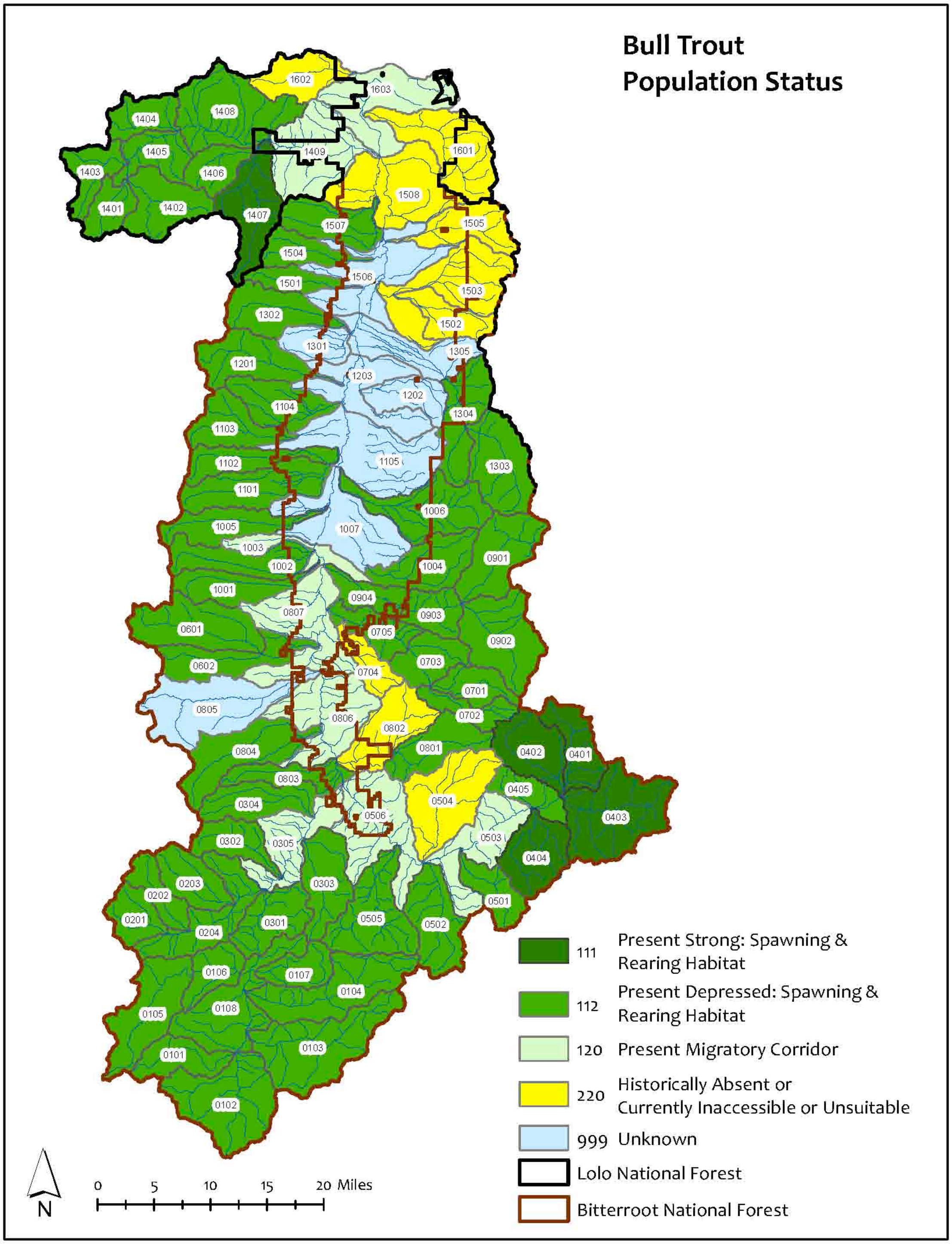

Figure 8. Bull trout overall population status in the Bitterroot Subbasin.

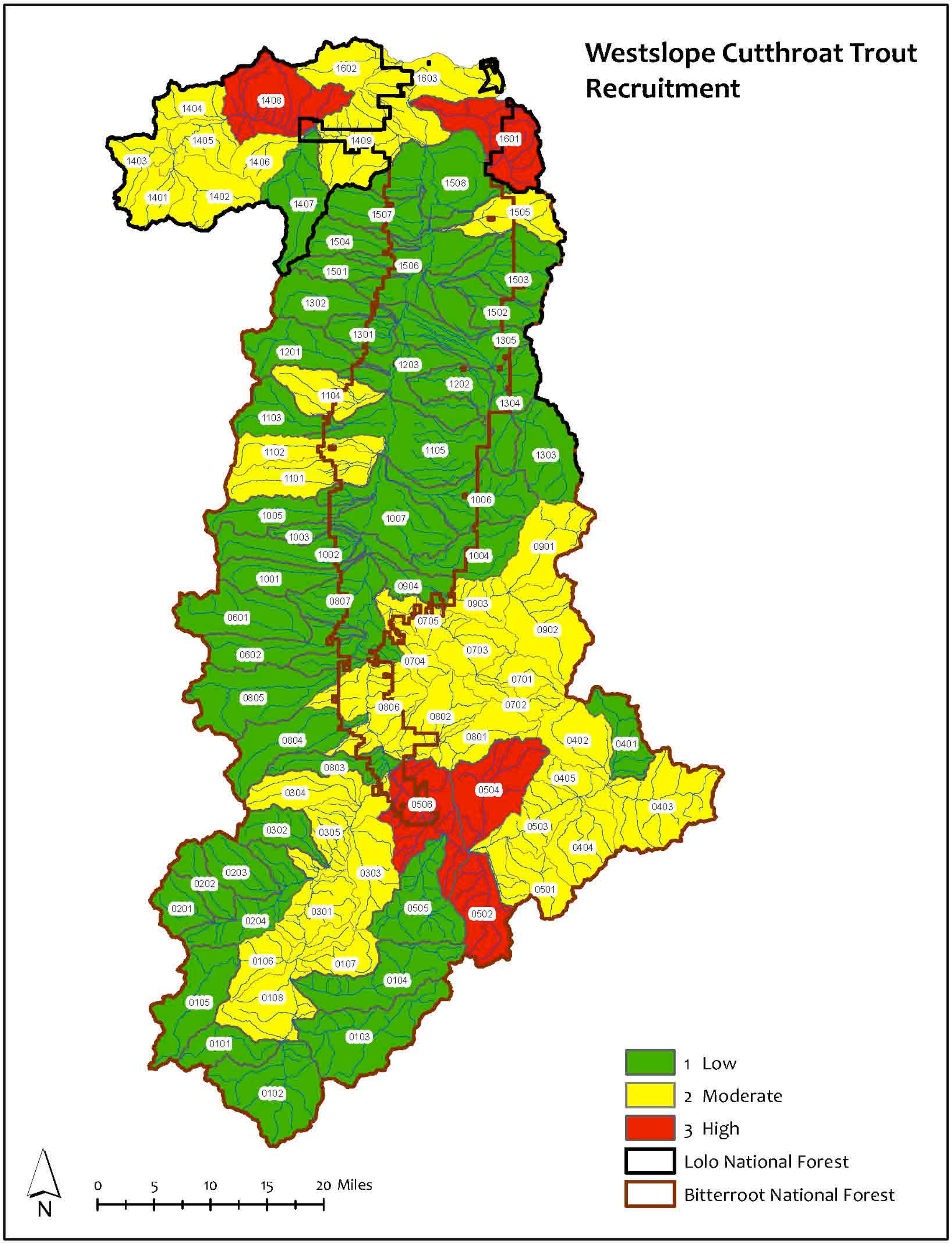

Figure 9. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Risk 1: Recruitment

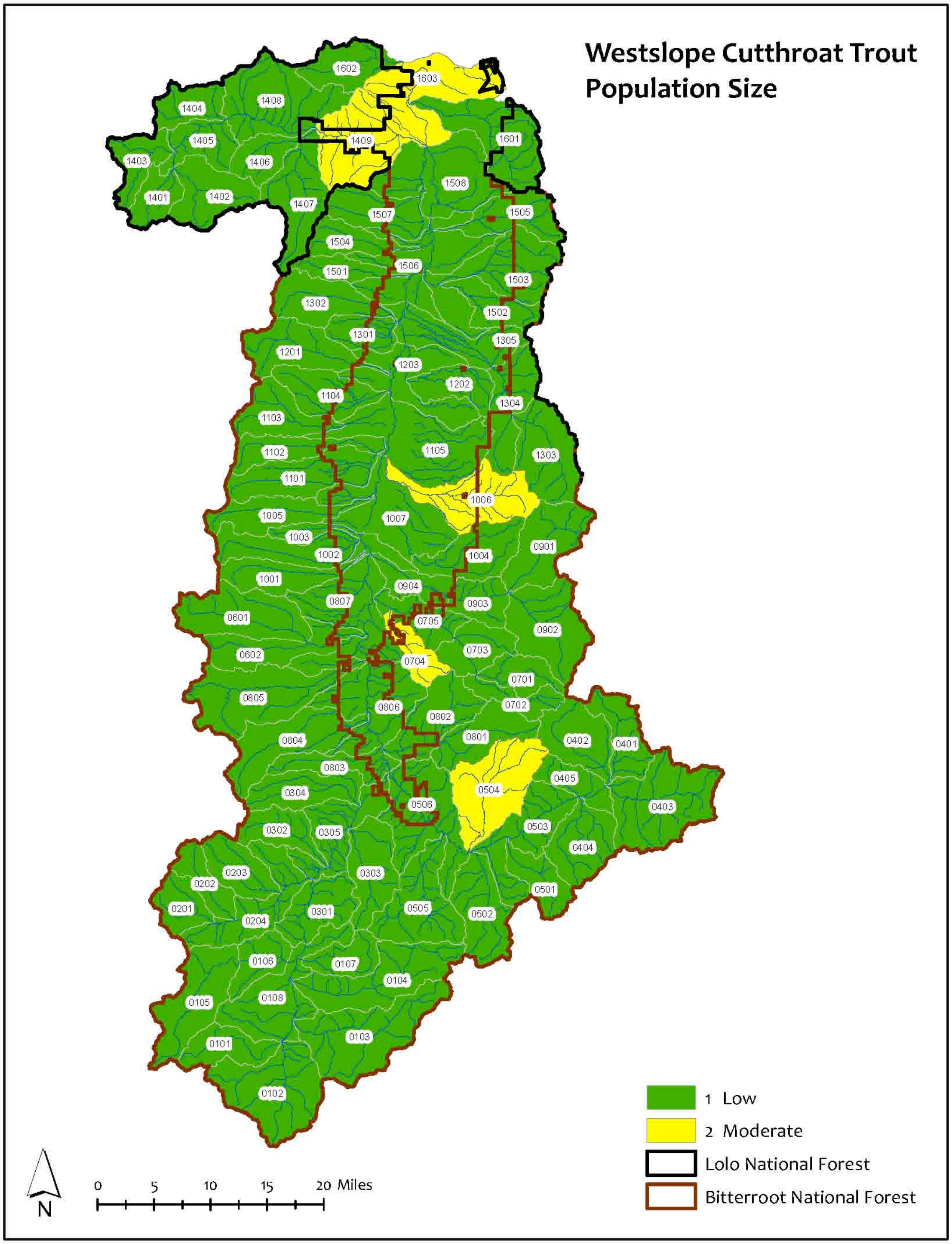

Figure 10. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Risk 2: Population Size

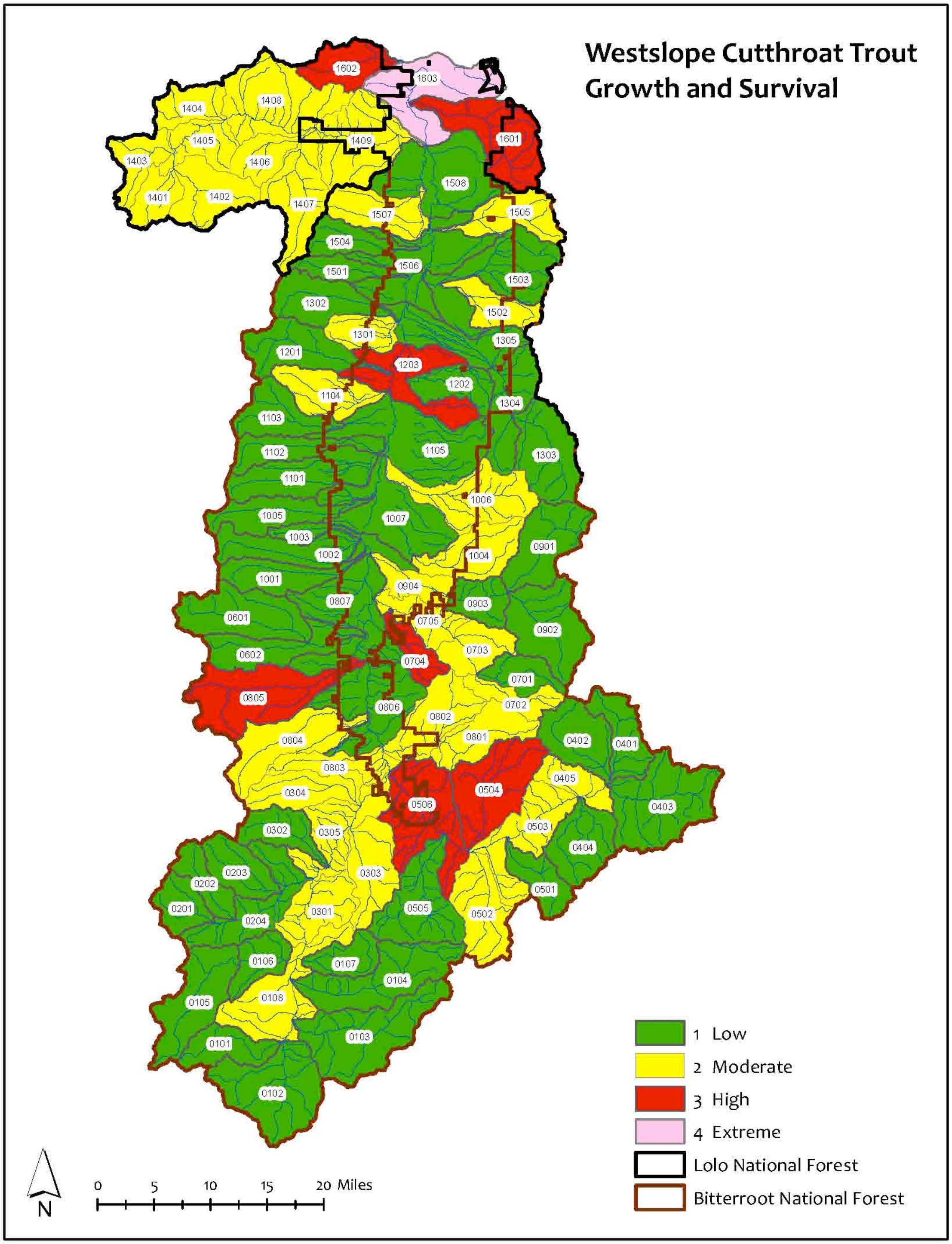

Figure 11. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Risk 3: Growth and Survival

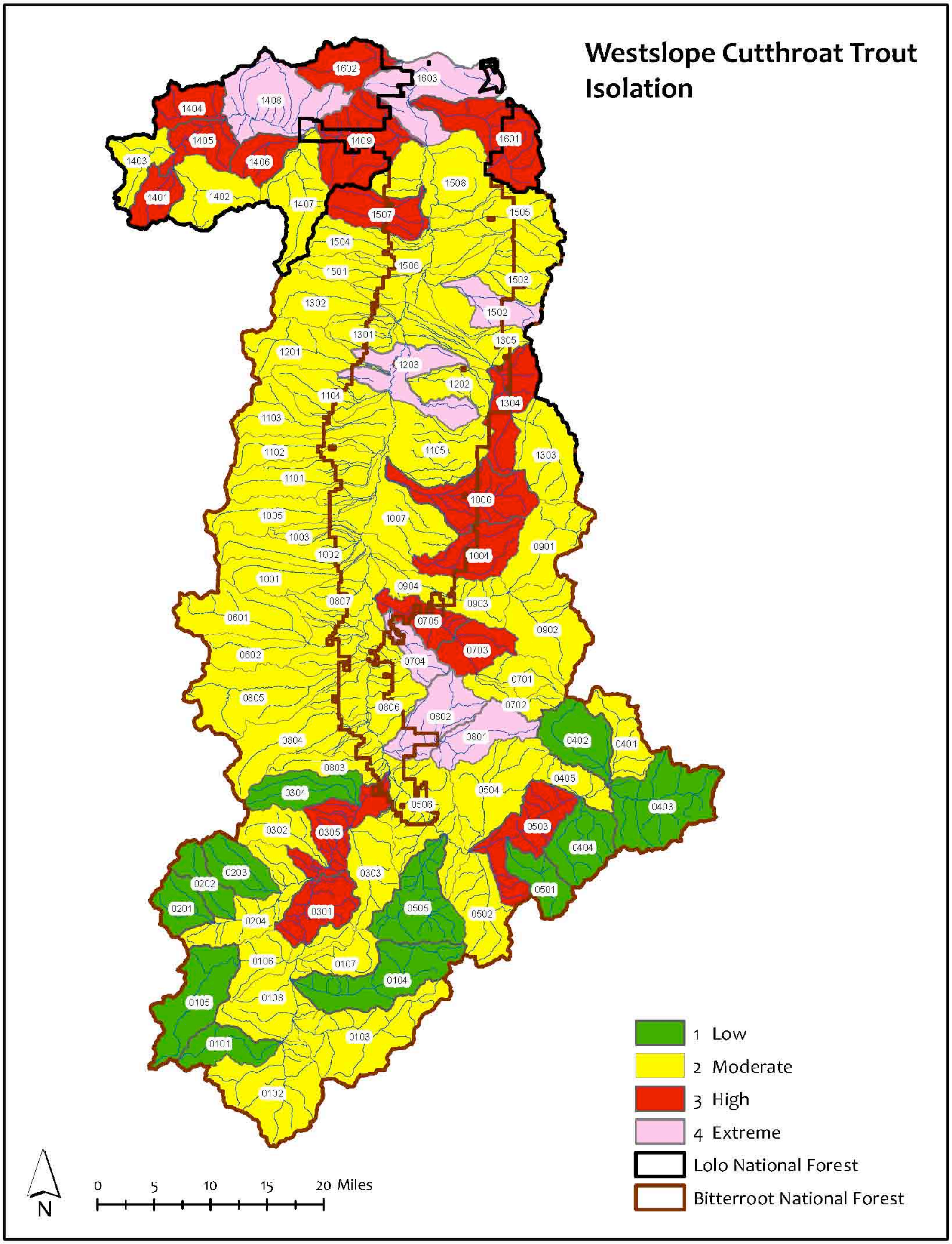

Figure 12. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Risk 4: Isolation

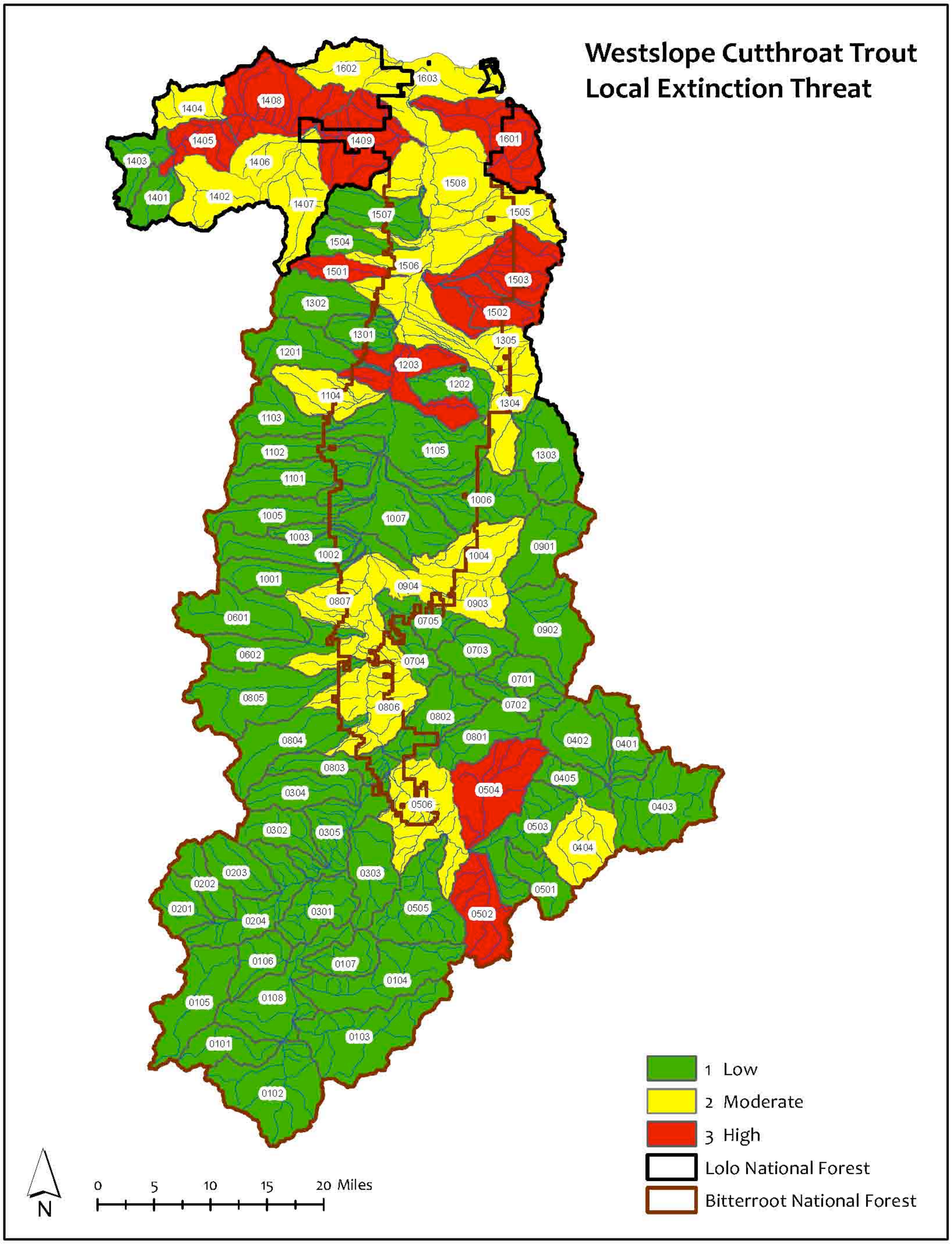

Figure 13. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Risk 5: Overall Extinction

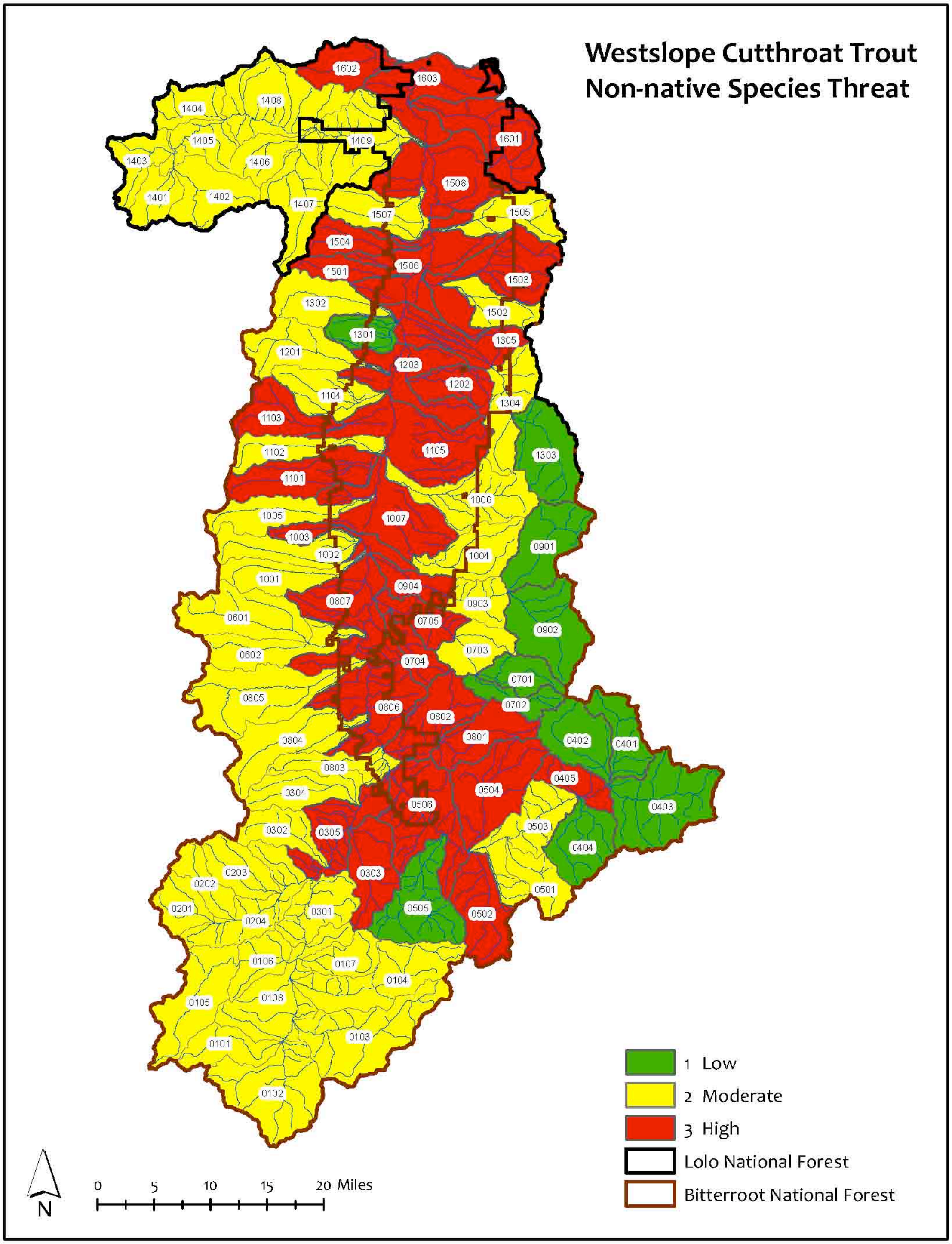

Figure 14. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Threat 2: Non-native Species

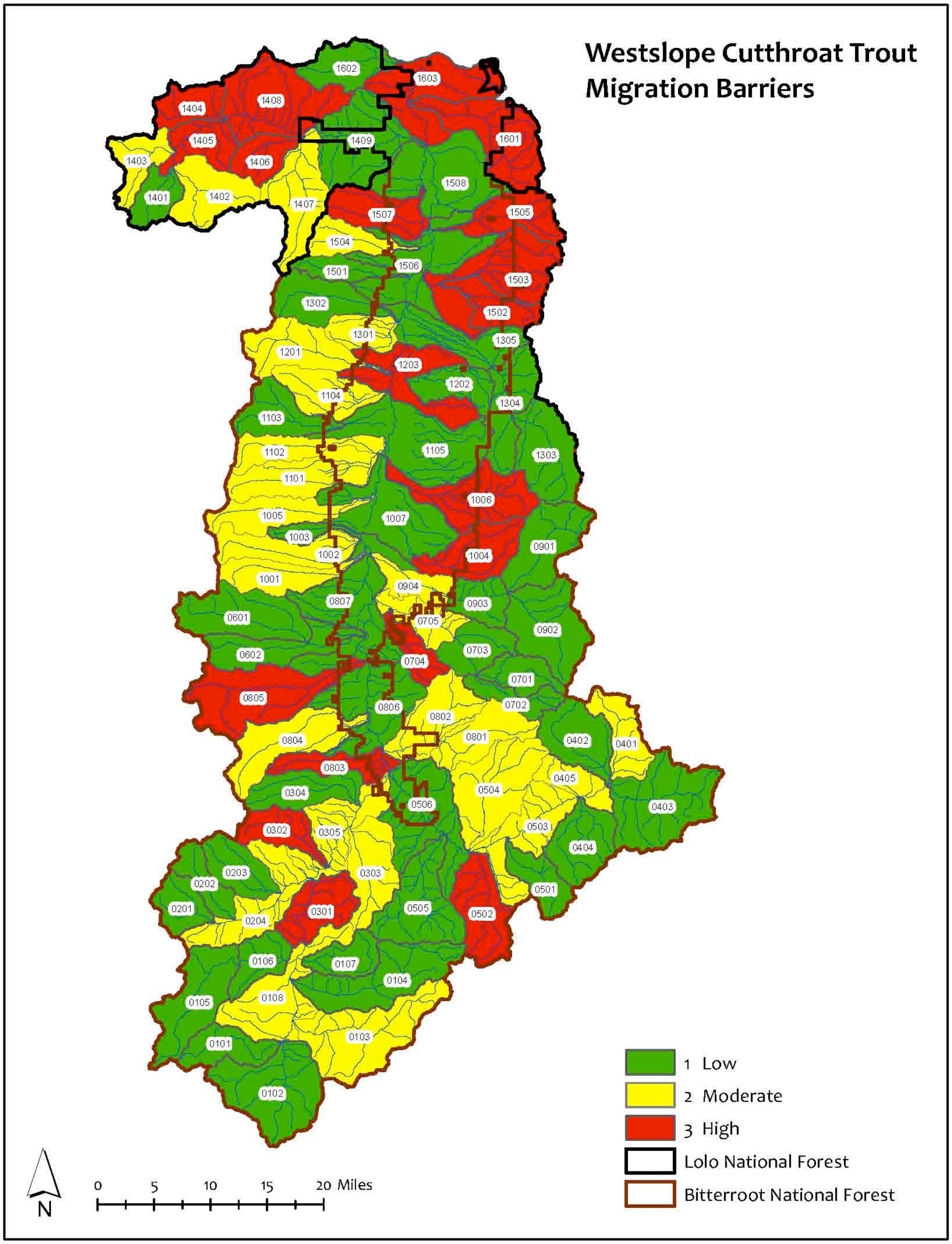

Figure 15. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Threat 3: Migration Barriers

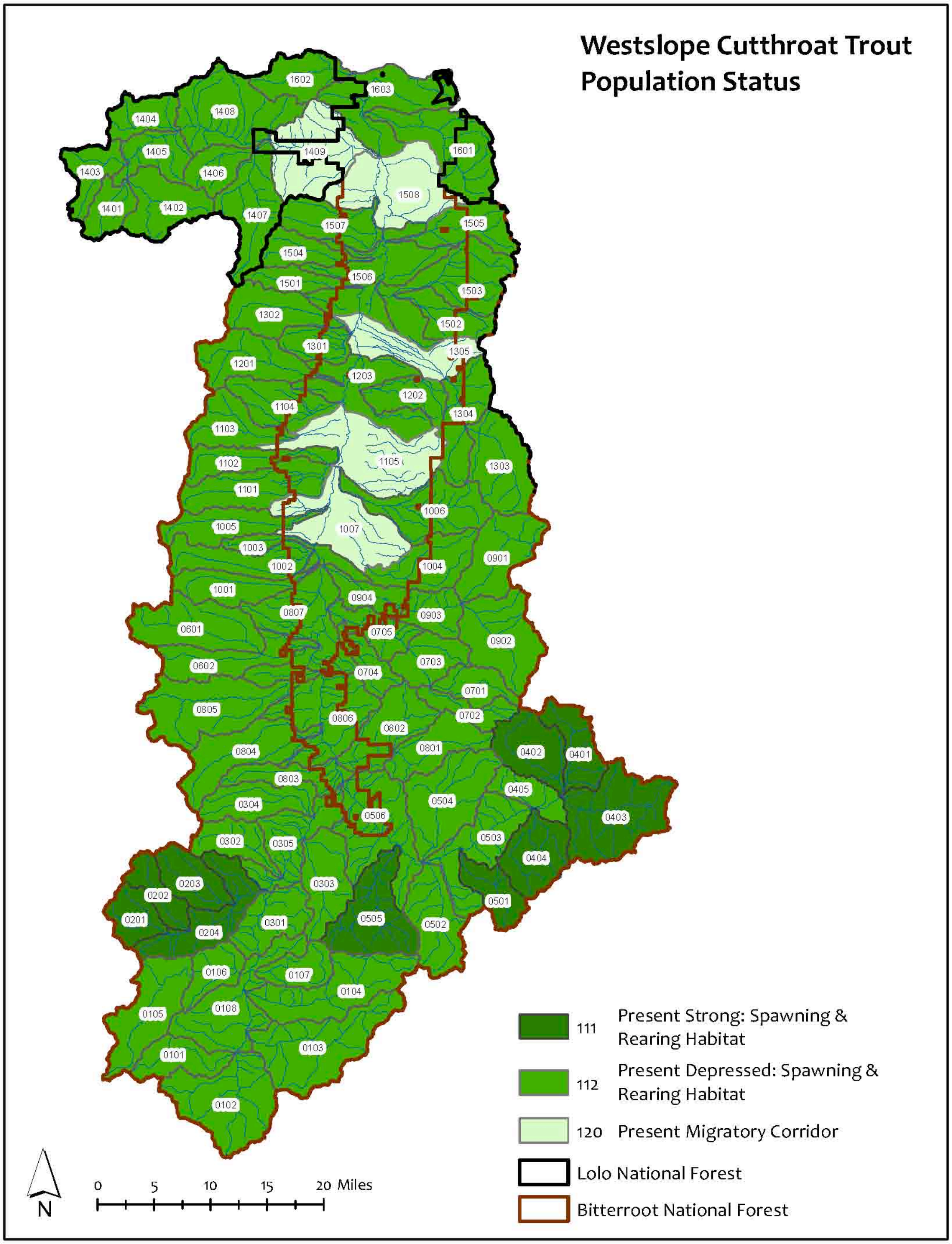

Figure 16. Westslope Cutthroat trout overall population status in the Bitterroot Subbasin.

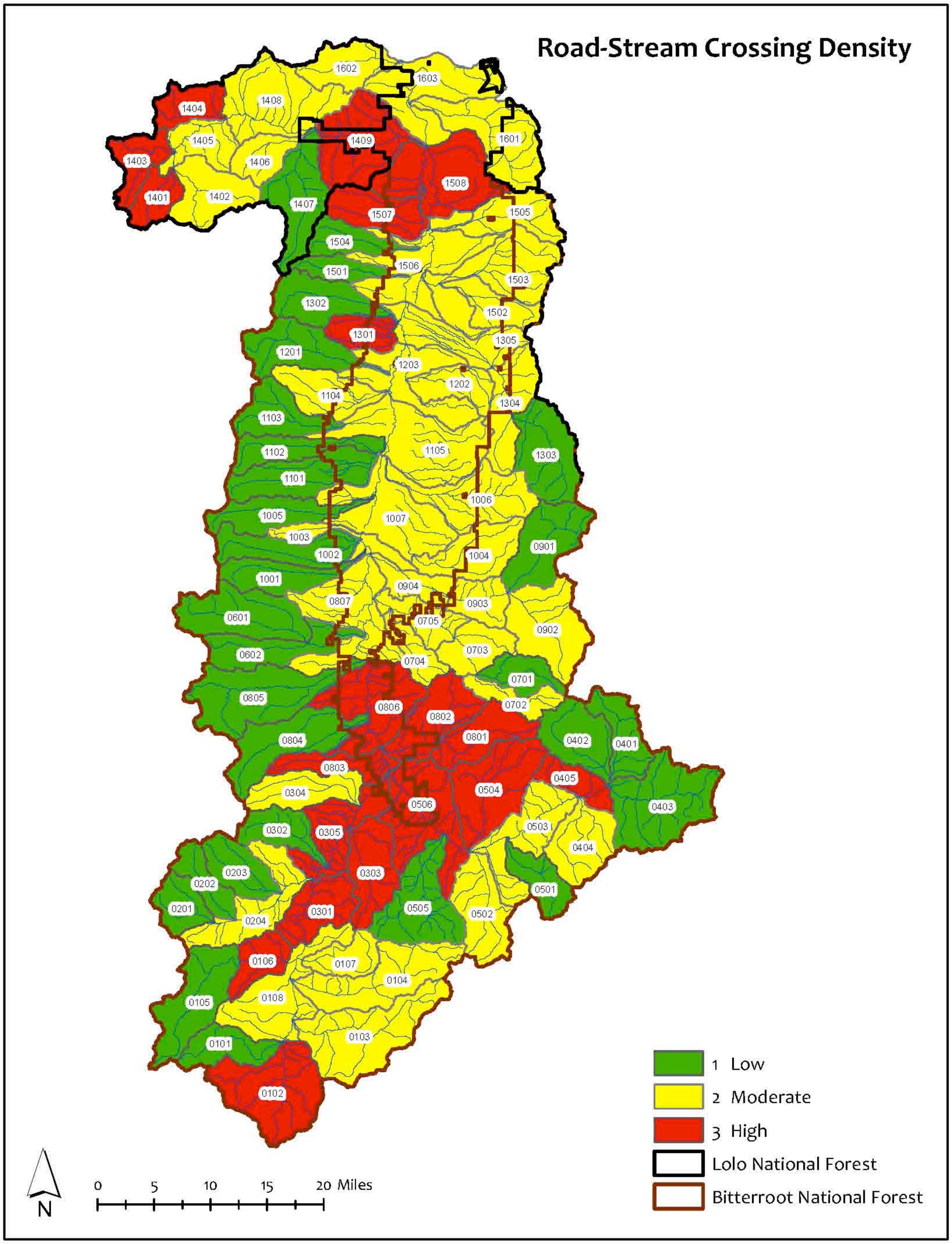

Figure 17. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Threat 1: Road related (combined with figure 18)

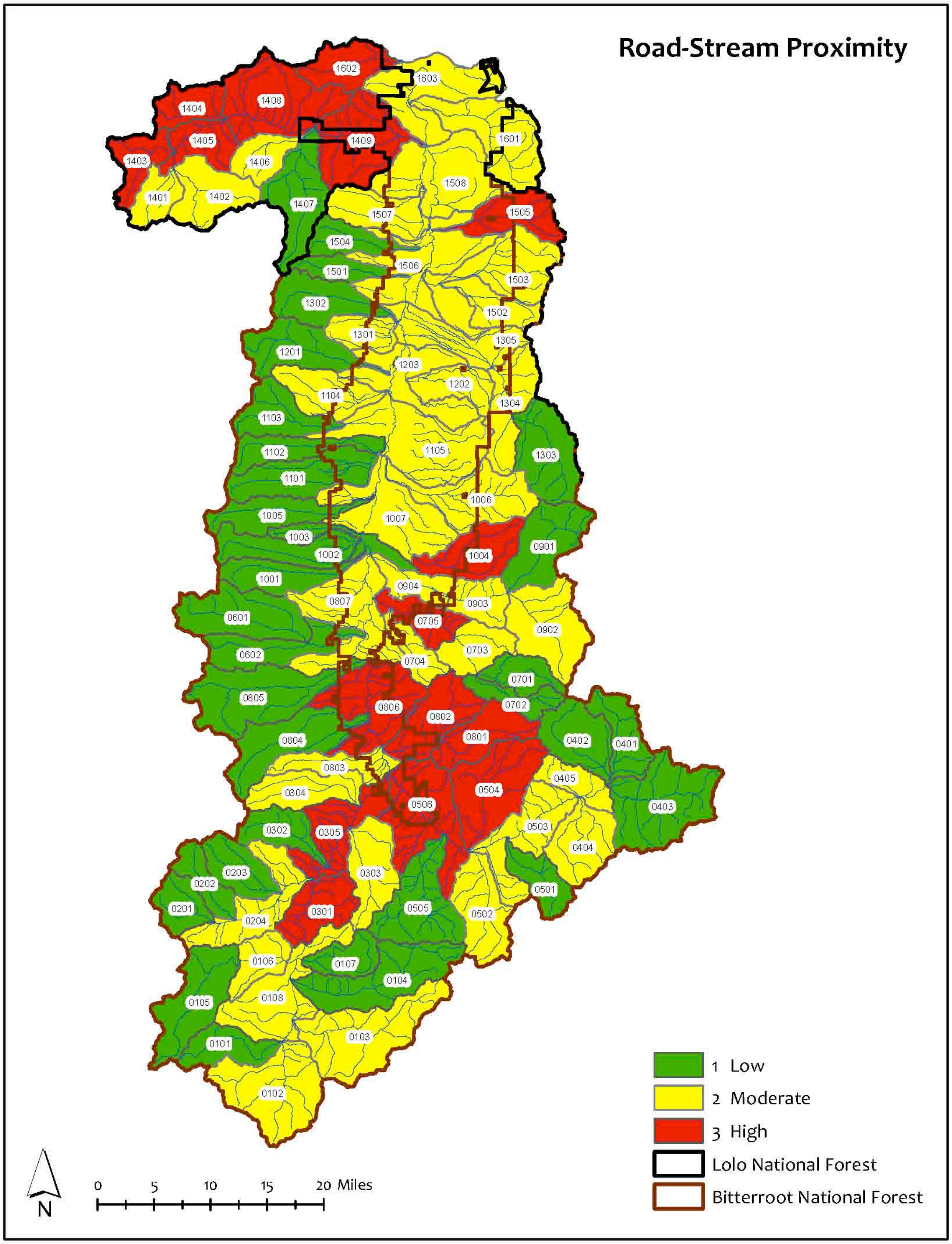

Figure 18. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Threat 1: Road related (combined with figure 17)

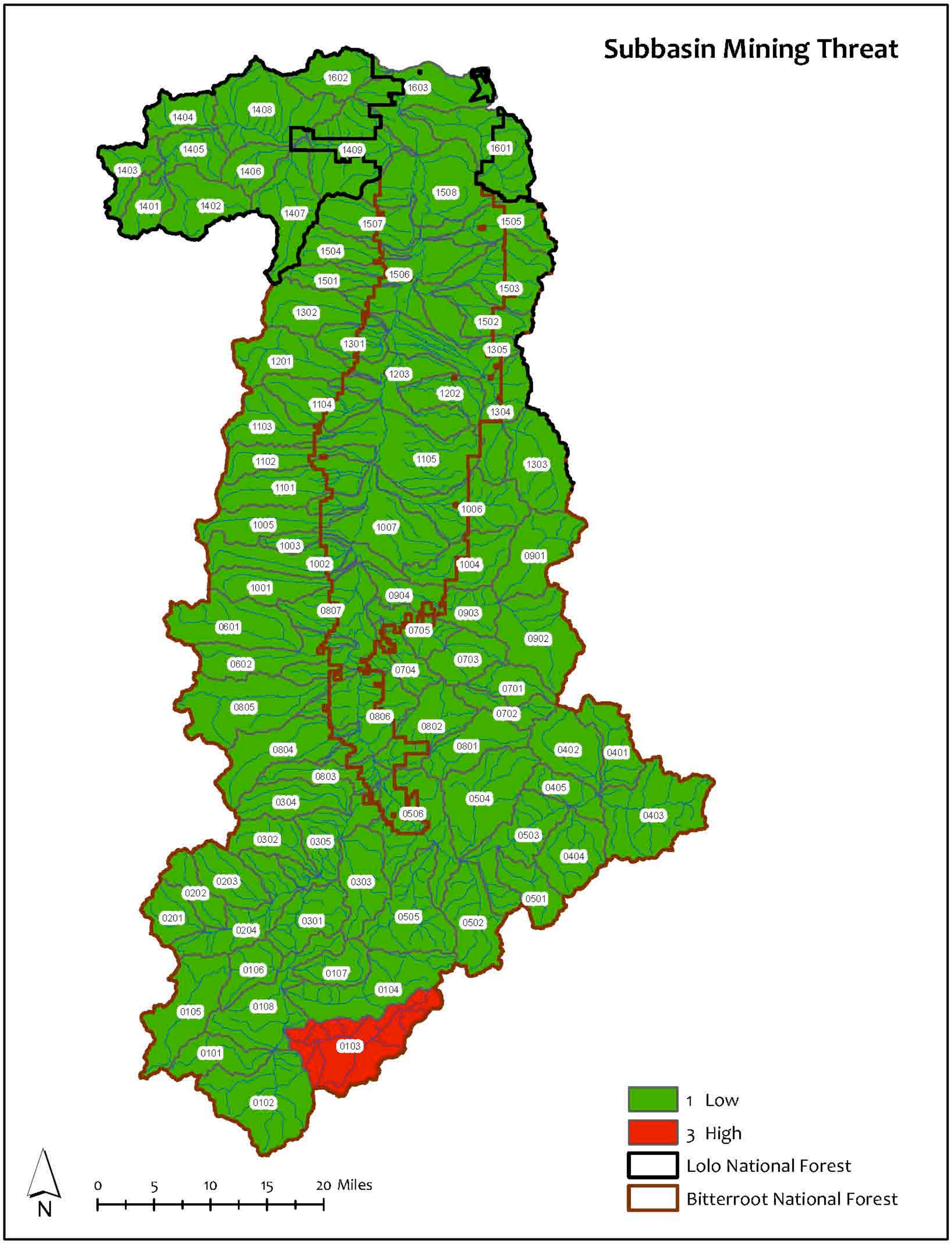

Figure 19. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Threat 4: Mining

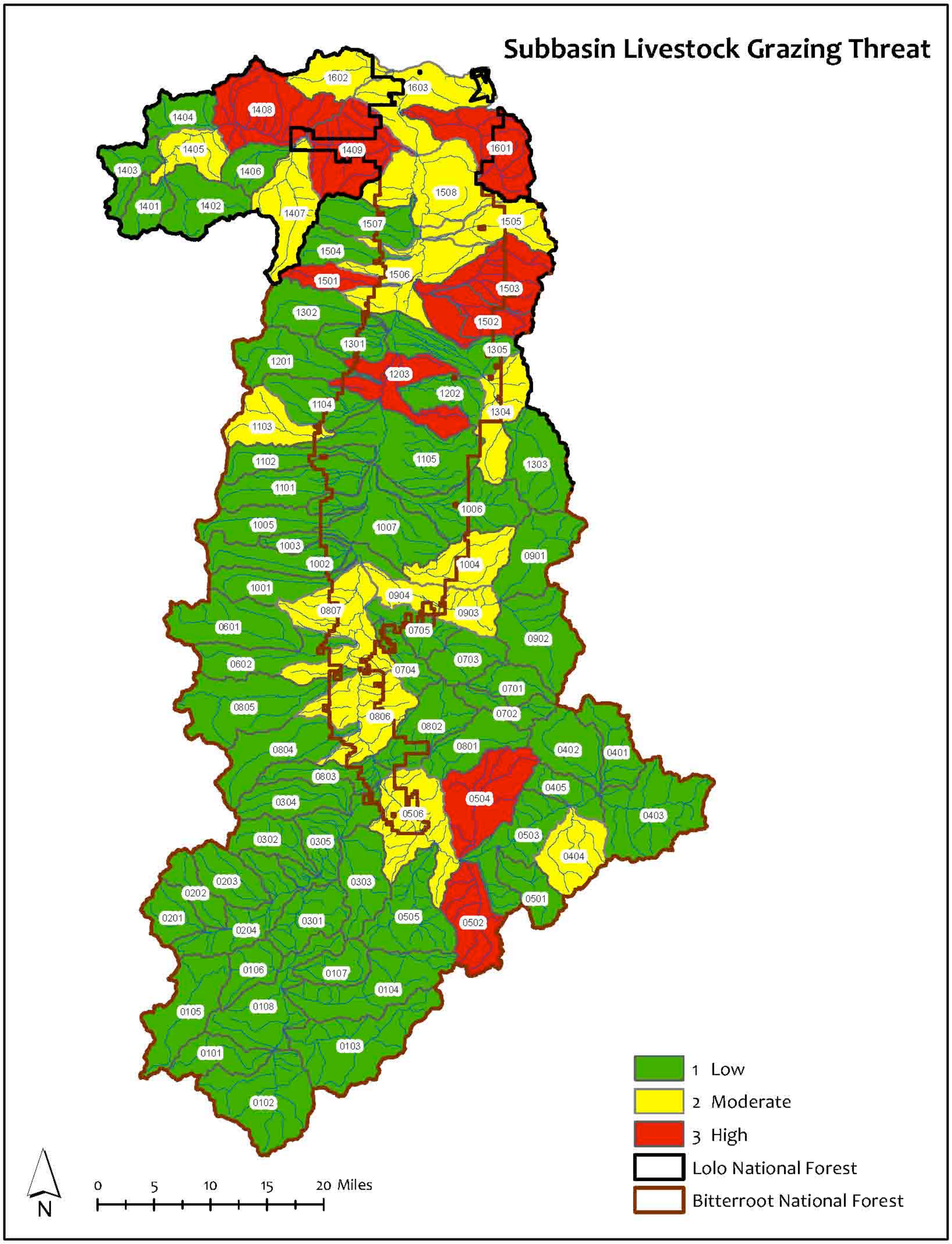

Figure 20. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Threat 5: Livestock Grazing

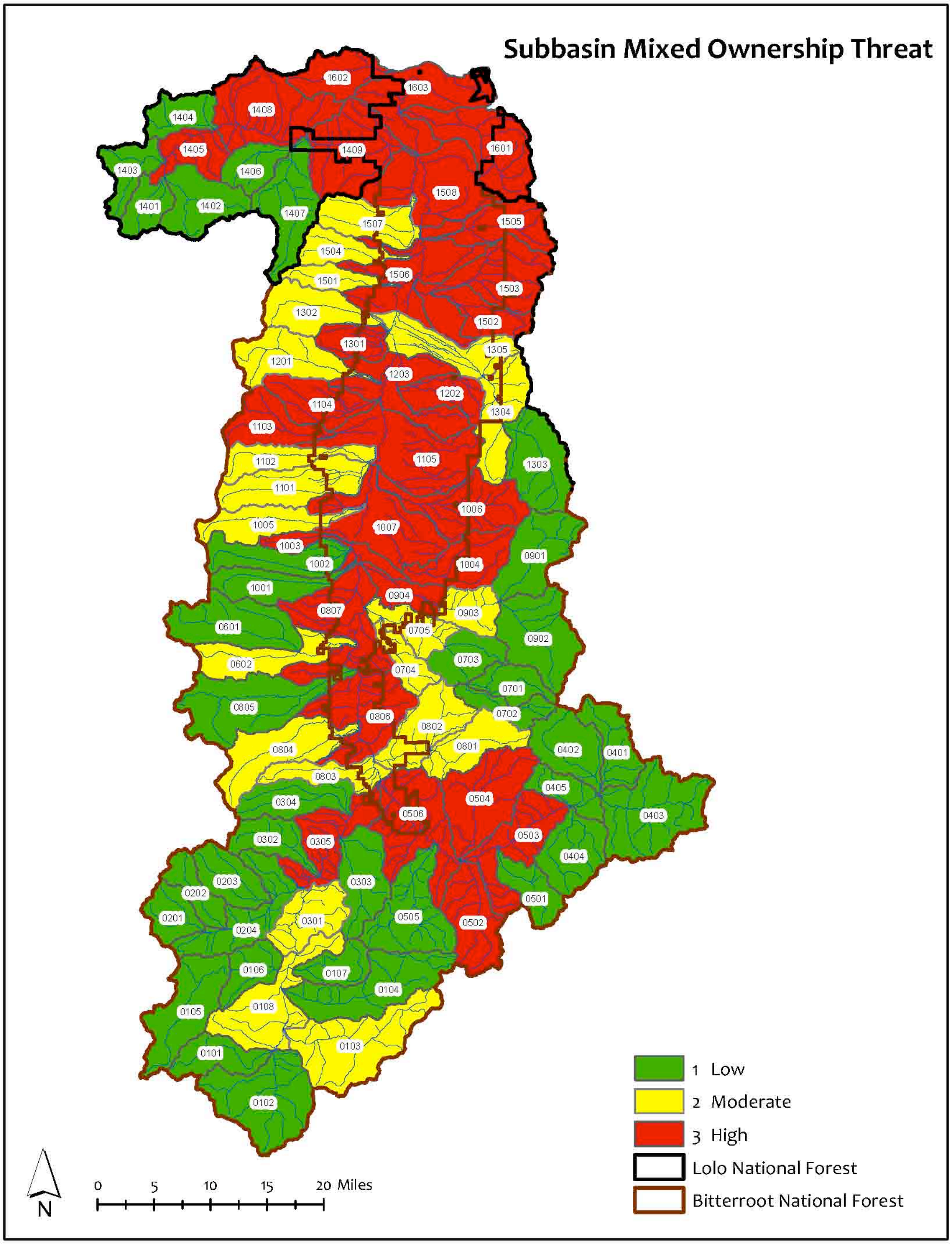

Figure 21. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Threat 6: Mixed Ownership

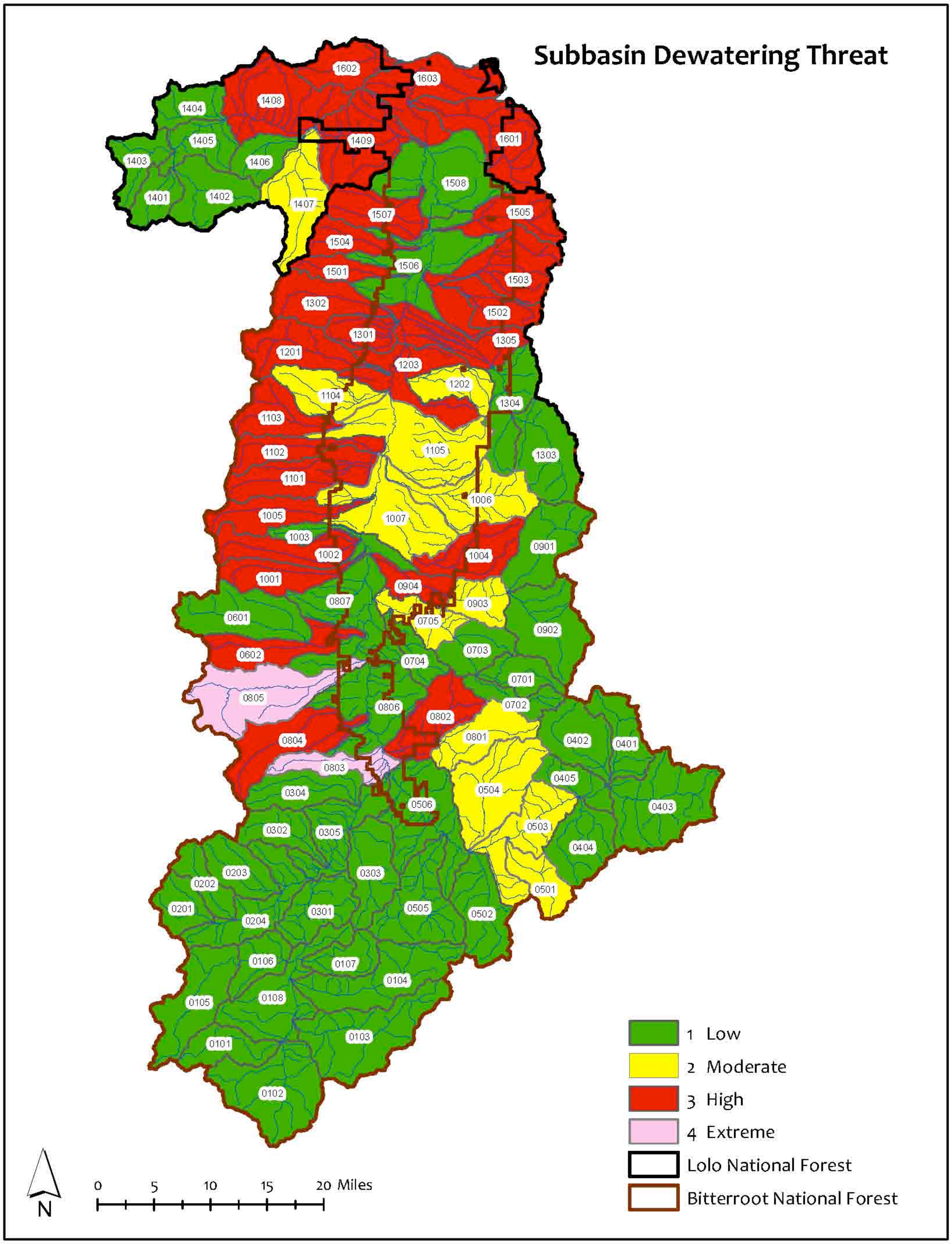

Figure 22. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Threat 7: Dewatering

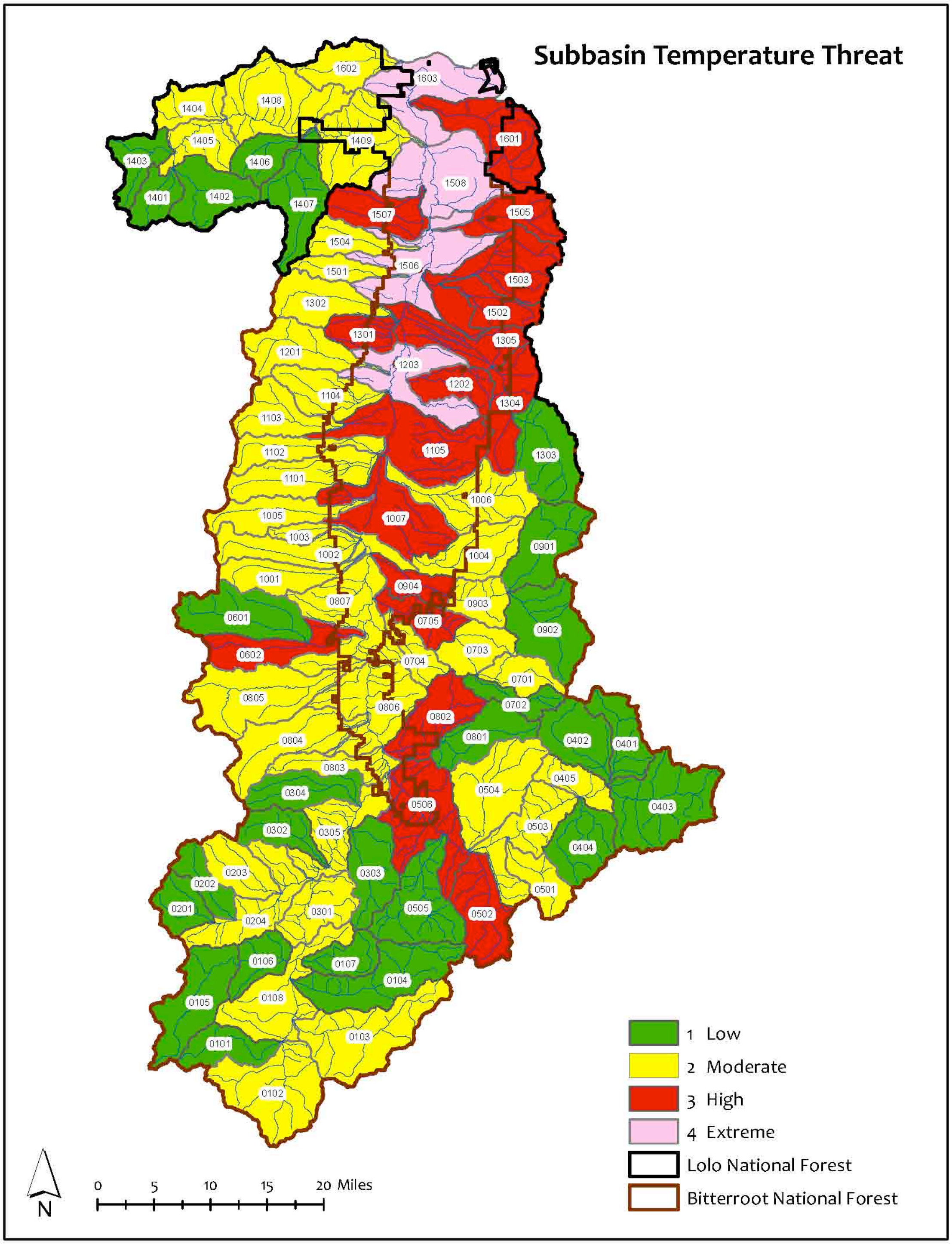

Figure 23. Aquatic species limiting factors analysis in the Bitterroot Subbasin. Threat 8: Temperature

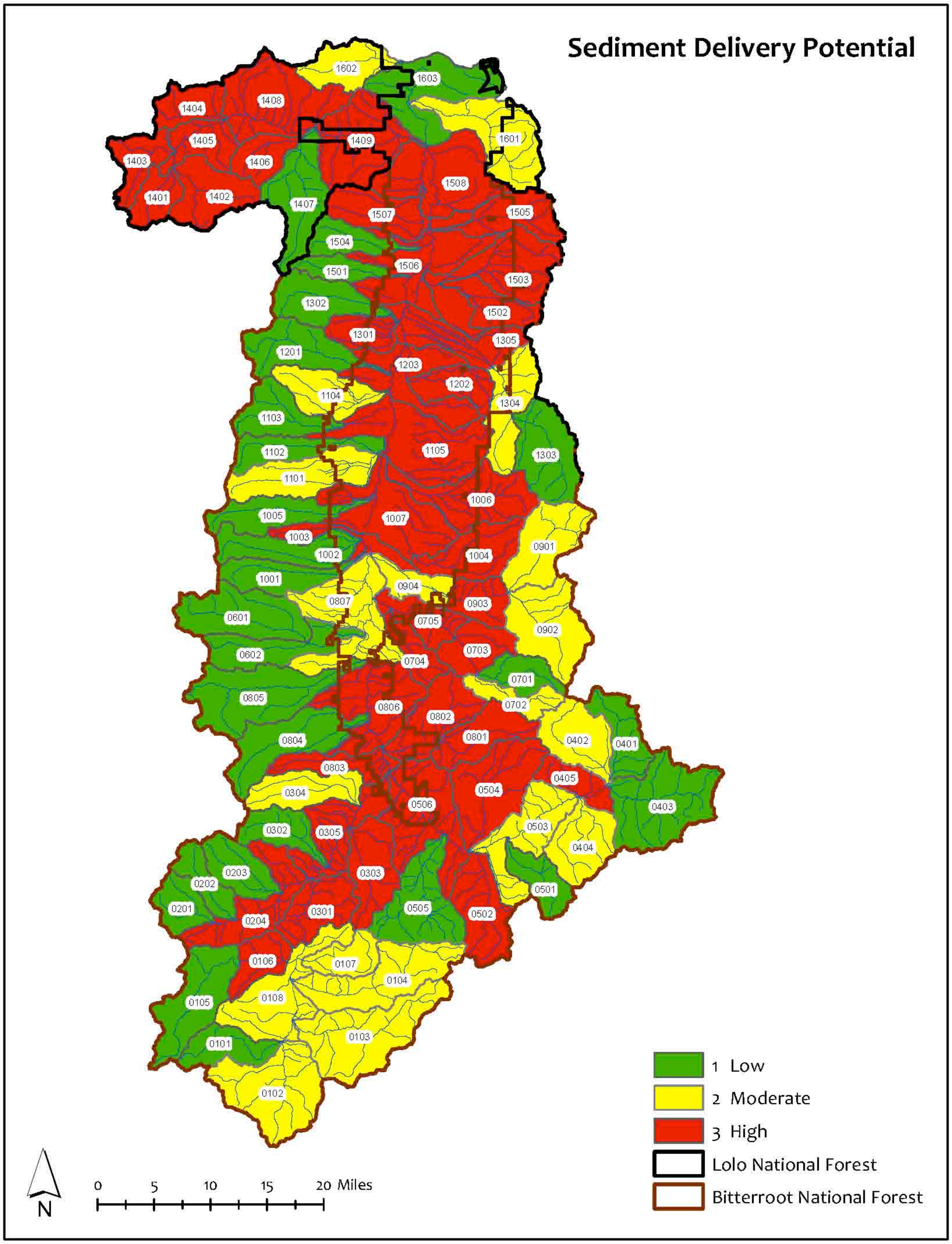

Figure 24. Aquatic species limiting factors analysis: Subbasin sediment delivery potential in the Bitterroot Subbasin.

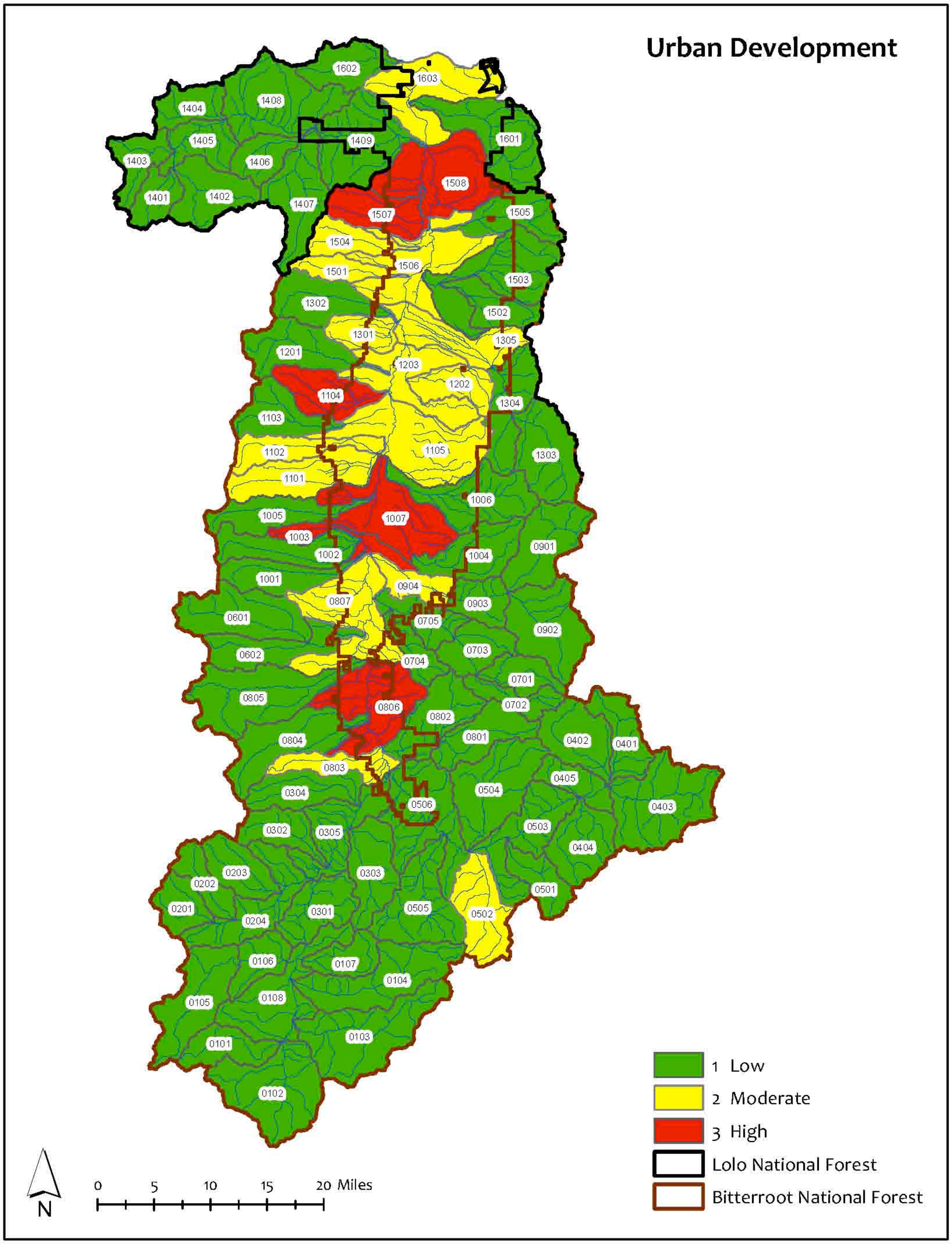

Figure 25. Aquatic species limiting factors analysis: Subbasin urban development in the Bitterroot Subbasin.

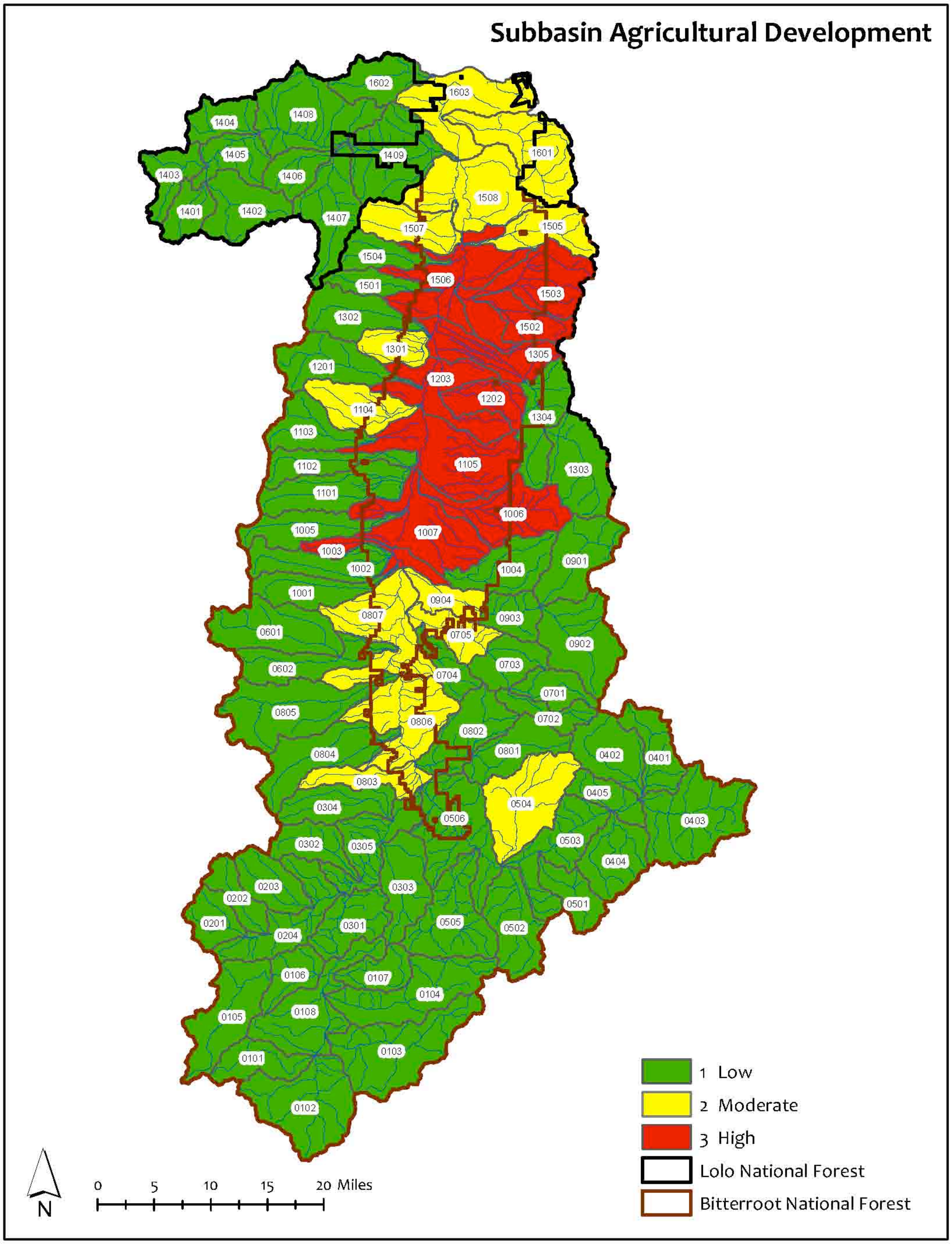

Figure 26. Aquatic species limiting factors analysis: Subbasin agricultural development in the Bitterroot Subbasin.

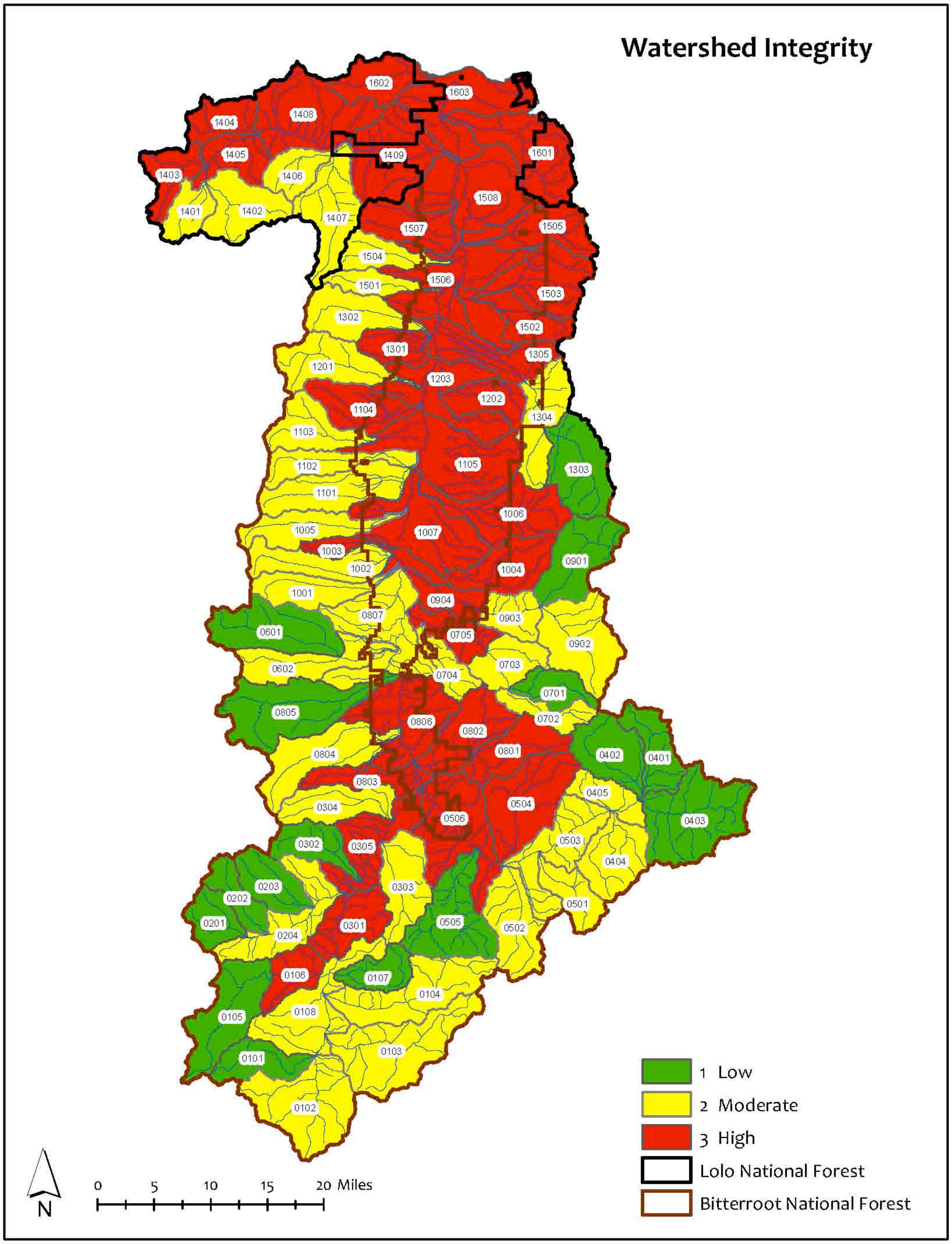

Figure 27. Aquatic species limiting factors analysis: Watershed integrity assessment in the Bitterroot Subbasin.

Appendix 9
Montana Bull Trout Restoration Goals and Criteria

Montana Bull Trout Restoration Goal, Objectives and Proposed Actions

The following goals and objectives are taken from the *Restoration Plan for Bull Trout in the Clark Fork River Basin and Kootenai River Basin Montana* (MBTRT 2000).

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 (see Table 1 of MBTRT 2000). 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 longterm 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 [*Note: Bitterroot River is a discrete RCA*]. 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 fragmentation 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) (see Fig. 4 of MBTRT 2000).

<u>Restoration Goal/Objectives</u>

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 (Restoration/Conservation Areas) 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 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.

<u>Restoration Criteria</u>
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.

<u>Proposed Actions to Restore Bull Trout</u>
The Restoration Plan recommends nearly 100 possible actions to conserve and restore bull trout populations in Montana (see Appendix E of MBTRT 2000 for complete list of

actions). 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.

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

Appendix 10
Bitterroot Subbasin Total Maximum Daily Load (TMDL) Water Quality Goals & Restoration Targets

This appendix includes excerpts of two MTDEQ TMDL reports for the Bitterroot Subbasin. The strategies and restoration goals outlined in these reports will be incorporated into any future restoration projects initiated through the Subbasin Plan. The sections included are single chapters taken from larger documents, and only cover specific restoration goals and water quality targets. For the complete documents, or to follow section or table references within the chapters, refer to the following citations:

MT DEQ. 2005. Water Quality Restoration Plan and Total Maximum Daily Loads for the Bitterroot Headwaters Planning Area. Montana Department of Environmental Quality.

MT DEQ. 2003. Water Quality Restoration Plan and Total Maximum Daily Loads for the Upper Lolo Creek TMDL Planning Area. Montana Department of Environmental Quality.

Water Quality Restoration Plan and Total Maximum Daily Loads for the Upper Lolo Creek TMDL Planning Area

Section 5.0 Water Quality Goals & Restoration Targets

This section is divided into three components, each designed to achieve full beneficial use support within the Upper Lolo TPA. 1). Water quality goals are the big picture objectives that would be met following implementation of each strategy outlined in this water quality restoration plan. 2). Targets are numeric criteria by which measurements can be made to show whether desired levels and ultimately water quality goals are being achieved. 3). Indicators are water quality controls that indirectly suggest that numeric targets are being met. Indicators allow for the many uncertainties and variability that exists in nature and account for parameters outside the control of land managers.

5.1 Water Quality Goals

The following water quality goals are the primary objective of this restoration project. These goals would be achieved through implementation efforts outlined in this restoration plan.

1. Ensure protection of all streams within the Upper Lolo TPA, with the intent of maintaining full support of water quality standards.
2. Ensure full recovery of aquatic life beneficial uses to all streams within the Upper Lolo TPA;
3. Work with landowners and other stakeholders in a cooperative manner to ensure implementation of water quality protection activities; and
4. Continue to monitor conditions in the watershed to identify any additional impairment conditions, track progress toward protecting water bodies in the watershed, and provide early warning if water quality starts to deteriorate.

These goals are further developed as part of the Implementation Strategy and Monitoring Plan Sections of this document (Sections 7 and 8). To help define measurable objectives toward meeting Goals 1 and 2, numeric targets are developed within this section of the document. These targets are meant to reflect those conditions that need to be satisfied to ensure protection and/or recovery of beneficial uses. Goals 3 and 4 were designed to ensure cooperation among all parties involved.

A secondary objective of the restoration plan is to improve the connectivity of aquatic habitats throughout the watershed. This would be accomplished by correcting fish passage barriers at stream crossing culverts as outlined in Section 7.3.4.

5.2 Targets

Targets were developed as part of the requirements of this water quality restoration plan.

5.2.1 In-Stream Targets

The numeric in-stream targets developed for the Upper Lolo TMDL are intended to interpret narrative water quality standards. The numeric targets represent the conditions expected for salmonid reproductive success and full beneficial use support. These numeric targets are based on available monitoring data, scientific literature, and best professional judgment. It is uncertain whether these targets will actually meet narrative standards and ultimately provide support for all beneficial uses. However, data collection as outlined in Sections 7 and 8, is intended to provide the basis for greater certainty.

Scientific literature suggests that percent fines, pool frequency, V*[1] and channel structure/stability are indicators that are most closely linked to fish habitat conditions which support salmonids and can be used to evaluate long-term impacts of upslope activities and erosion reduction efforts (Knopp, 1993, Chapman, 1988). Tables 12 and 13 below summarize the in-stream targets.

Due to the lack of existing data in 3 of the 5 in-stream targets, numeric targets will only be set for the percent fines parameters at this time. The other parameters (as summarized in Table 13) would be monitored as outlined in Sections 7 and 8 whereby numeric targets could be set upon future reevaluation processes.

Table 12. In-stream Targets for the Upper Lolo TPA.

Life Stage & Channel Stability	Parameter	Stream Type	Target
Embryo Development	Percent fines < 2 mm	A	22%
		B	16%
		C	21%
Emergence	Percent fines < 6 mm	A	31%
		B	21%
		C	30%

** Based on Rosgen stream type classification (Rosgen, 1996).*

[1] V* is a measure of the fraction of a pool.s volume that is filled by fine sediment and is representative of the in-channel supply of mobile bedload sediment. Lisle (1993), demonstrated the usefulness of the parameter by comparing annual sediment yields of select streams with their average V* values. The comparison indicated that V* was well correlated to annual sediment yield. He also demonstrated that V* values can quickly respond to changes in sediment supply.

Table 13. Performance-Based In-Stream Targets for the Upper Lolo TPA.

Life Stage & Channel Stability	Parameter	Targets
Rearing	Pool Frequency	Established following both reference and response reach data collection*
Channel Structure/Stability	V*	Established following both reference and response reach data collection*
Channel Structure/Stability	Entrenchment Ratio	
	Width/Depth Ratio	
	Sinuosity	

** Explanation of data collection is outlined in Section 8-, later in this document*

Sufficient reference reach data does not exist for Rosgen E channel types. Therefore, an adaptive management approach would be used to determine numeric targets for E channels and the parameters in Table 12. This is further explained in the monitoring plan (Section 8.7) later in this document. Additionally, the targets would apply to specific stream type reaches throughout each impaired segment. These specific streams types have not been fully mapped to date, but would be in the future as described in sections 7 and 8.

5.2.2 In-Stream Target Justification

The full support of a cold-water fishery and aquatic life are the primary goals behind the development of this watershed restoration plan. To assess the amount of interstitial fine sediments occurring in the fish spawning habitat, the Wolman pebble count methodology is proposed as the measurement tool. As outlined in section 8 later in this document, McNeil Core sampling will occur in the future to help better understand subsurface fines in the Upper Lolo TPA.

Based on upstream conditions, reference conditions, valley type, existing data and general knowledge of stream morphological evolution, several segments of stream channels within the Upper Lolo TPA are not currently meeting their full geomorphic potential and have lost significant stream length over the past 60 years (Sylte and Riggers, 1999).

Given the current status of data collected, we do not know what the percent fines numbers should be in the Upper Lolo TPA, however estimates based on reference data obtained from adjacent drainages can be made. Additionally, it is important to note that the available substrate data is surface fines data and may not fully represent subsurface fines. However, inferences can still be made towards percent fines values in the channel. As part of the five-year evaluation, the targets would be adjusted accordingly.
Percent fines targets (Table 12) were developed using reference reach data as outlined in Section 3.5. These targets were taken from a sub-sample of the aforementioned dataset containing 229 streams. As outlined in Section 3.5 the sub-sample is stratified by reference and non-reference streams. Additionally, the sub-sample was further stratified by Rosgen stream types. Population means, mins, maxs, 25th, and 75th percentiles were calculated for both reference and non-reference streams.

The data presented in Figure 5 and Tables 6 & 7 represents .reference conditions for the purpose of determining targets for the streams in the Upper Lolo TPA. The percent fines targets (shown in Tables 12 and 14) are the attainment of reference conditions in the Upper Lolo TPA streams. In defining a reference condition and determining compliance with water quality standards (fully supporting beneficial uses), consideration must be given to variation in natural systems and sampling and analysis methodology used to compare conditions. The 75^{th} percentile represents 75% of the reference reach data. Therefore the target selected for percent fines is the reference condition, with the allowance of the 25^{th} percentile to account for natural variation and sampling and analysis methods. Additionally, a 10% margin of safety was used to set the final targets to account for uncertainty and variability. As more percent fines data is collected, it may be appropriate to reduce the percent fines target, based on an increased understanding of the uncertainty associated with the natural variation of the percent fines target and the sampling methodology.

As discussed above, the targets outlined in Tables 12 and 13 are designed to incorporate all life stages of fish and support other aquatic life beneficial uses. The targets in Table 13 were developed to account for the additional life stages of salmonids in the Upper Lolo TPA. At this time, data for these parameters is limited. Therefore, a phased approach (as outlined in section 8) would be used to further collect data and establish targets for these parameters.

5.2.3 Margin of Safety

Given the uncertainty that exists and the natural variability in percent fines data, a 10 percent margin of safety was applied to the percent fines reference values outlined in Table 6, which in turn, resulted in the in-stream targets outlined in Tables 12 & 14.

5.3 Comparison of Numeric Targets to Existing Conditions

Table 14 compares the proposed targets to the existing conditions of each stream within the Upper Lolo TPA. The values below are averages of each stream type. As indicated in previous sections, it would appear that some of the streams are not impaired based on the existing numbers. These numbers however, are based from only two years worth of data. Secondly, the numbers in Table 14 were summed and averaged for ease of display. Further detail and analysis is outlined in Section 3.5. Finally, we have acknowledged the level of uncertainty (Section 3.6) of the existing data and through efforts outlined in Sections 7 and 8, plan to focus efforts towards eliminating that uncertainty and ultimately meeting the goals and objectives of this plan.

Table 14. Comparison of Numeric Targets to Existing Conditions in the Upper Lolo TPA.

Stream Type	Target		Existing Data[1]	
	% Fines < 2MM	% Fines < 6MM	% Fines < 2MM	% Fines < 6MM
A	22	31	14	23
B	16	21	28	40
C	21	30	21	26

[1] The existing data is based on 1997 and 2001 data from the USFS Lolo National Forest. Values reported are the75th percentiles for each particular stream type with a 10% margin of safety.

5.4 Restoration Indicators

Additional goals have been set to serve as indicators of in-stream health and overall condition of the beneficial uses. Some of these indicators would be set following sufficient data collection as outlined in Section 8. Indicators will be used to help determine whether or not specific targets are being met. In general, the indicators to be used in evaluating the success of this restoration plan include the following:

1. Percent of forest road length and/or stream crossings meeting Montana Forestry BMPs.
2. Length of forest road that is surplus to the needs of forest land managers.
3. BMP application rates in timber harvest areas.
4. Traction sand application rates and percent of mitigations measures along U.S. being met.
5. Geomorphic indicators of proper pattern, profile and dimension.*
6. Sufficient number of age classes of native salmonids exist in the Upper Lolo TPA.*
7. Macroinvertebrate indicators associated with sediment and full support based on standard DEQ protocols.*
8. Number of human-caused fish passage barriers corrected.

* Note: These indicators are further discussed in Section 8.6.

5.4.1 In-Stream Indicator Discussion

Indicators 1 through 4 are designed to help track mitigation and changes in management designed to meet the objectives and goals of the WQRP. Indicator 5 was developed to show whether targets listed in Table 13 are being met. The methodologies are further discussed in Section 8.4. Indicator 6 was crafted to be a direct measure of the beneficial use. If multiple age classes of fish are present in the stream, it can be inferred that fish are successfully reproducing (propagating). Exact densities and population levels are not proposed as targets because of scientific uncertainty and insufficient data that would pertain to the Upper Lolo TPA. Through efforts outlined in the Implementation Strategy and Monitoring Plan (Sections 7 & 8), fish population indicators could be set following sufficient data collection. This determination would be made following the scheduled 5-

year evaluation that is outlined in Sections 7 and 8. Indicator number 7 is based on biological data since ideally this would best represent aquatic life beneficial use support. Finally, the last indicator is designed to answer the secondary objective of this plan as discussed in Section 5.1.

5.5 Uncertainty and Adaptive Management

The targets have been developed based on the best available information and the current understanding of the impairments in the Upper Lolo TPA. The monitoring strategy described in Section 8 would be implemented on an annual basis. Additionally, the relationships between management activities, appropriate mitigation and sedimentation to stream channels will continue to be evaluated.

The above targets all apply under normal conditions of natural background loading and natural disturbance. It is recognized that under some natural conditions such as a large fire or flood event, it may be impossible to satisfy some of the targets such as percent fines for a period of time. The goal under these conditions will be to ensure that management activities within the watershed or individual tributaries are undertaken in such a way that the recovery time to conditions where the targets can be met is not delayed. Another goal will be to ensure that potentially negative impacts to beneficial uses from natural events are not significantly increased due to human activities.

While numeric targets have been developed for percent fines, applying them by stream type cannot be carried out at this time. This is due to the lack of available stream classification mapping in the Upper Lolo TPA. Therefore a phased approach would be used as mentioned in Section 5.2.2. This approach would properly map Rosgen stream types within the Upper Lolo TPA, so that the proposed targets could then be applied accordingly. This effort is further described in section 8.6.

Targets will be evaluated at least every five years for suitability and may be modified based on identification of more suitable reference and/or identification of a better indicator of habitat condition required to support fisheries and aquatic life.

WATER QUALITY RESTORATION PLAN and TOTAL MAXIMUM DAILY LOADS FOR THE BITTERROOT HEADWATERS PLANNING AREA

Section 8.0 Restoration Strategy

8.1 Restoration Priorities

The strategies outlined in Section 8.0 are specific to the sources of impairment described in Volume II. However, it is important to note that not all of the strategies outlined in Section 8.0 can be met in short order. Specific commitments from each stakeholder have not been clearly outlined in this section. However, steps identified in Section 8.0, would have to be pursued as feasible in order to achieve the goals of this WQRP. The suggestive steps outlined in Section 8.2 are essential to restoring water quality in the BHTPA and would be the voluntary responsibility of all stakeholders as additional resources become available. Moreover, the strategies that are currently scheduled have been structured as the highest priorities that will result in the greatest benefit to the resource in the shortest time frame.

The following priority restoration actions in the Bitterroot Headwaters TPA have been identified:

- Upgrade forest and private roads to meet Montana Forestry BMPs.
- Reclaim forest and private roads that are surplus to the needs of forest managers.
- Continue to Implement Montana's Forestry BMPs on all timber harvest operations on BNF lands and encourage widespread implementation on private lands.
- Conduct follow-up assessments of potential bank instability to determine causes of bank failure and priority restoration areas.
- Continue post fire restoration and sediment mitigation efforts.
- Upgrade undersized culverts over time to better accommodate large floods.
- Correct priority fish passage barriers that are significantly affecting the connectivity of native fish habitats.
- Continue riparian management and monitoring in areas impacted by livestock use.
- Pursue funding for the local watershed group (Bitterroot Water Forum) to implement TMDL recommendations on private land and to bring local residents and land owners into the TMDL and watershed restoration process.

8.2 Water Quality Protection and Improvement Strategy

8.2.1 Stream-specific Restoration Priorities

Sections 8.2.1.1 through 8.2.1.12 provide specific stream-by-stream restoration recommendations.

8.2.1.1 Buck Creek

8.2.1.1.1 Roads

Of the 49 potential road sediment sources evaluated in the Buck Creek sediment source assessment, 25 had contributing road treads, cut slope, and/or fill slopes that exceeded 200 ft and were thus identified as restoration priorities. Two hundred feet was selected simply as an example to illustrate the potential for sediment reduction and is not a formal goal of the WQRP. Road restoration will need to be site specific. These contributing areas are located on Forest Service roads 5715, 6186, 13432 and 5716.

Stream crossings and near stream road segments accounted for an estimated 192 tons of sediment/year in the Buck Creek watershed when they were assessed in 2002. Sediment delivery mitigation will reduce the sediment load from them to an estimated 61 tons/year, for a reduction of 131 tons/year. Although the FroSAM analysis (see Section 4.0) was used to estimate the potential for road sediment reduction in the watershed, achieving this reduction in sediment loading from roads may be occur through a variety of methods. Crossings in need of sediment delivery mitigation are presented below (Table 8-1). Maps showing the location of these crossings are included in Appendix G.

Table 8-1. Buck Creek Road Crossing and Segment Restoration Priorities.

2748 (USFS 5715)	2754 (USFS 5715)	2775 (USFS 13432)	2776 (USFS 5715)	2777 (USFS 13432)
2783 (USFS 5715)	2784 (USFS 13432)	2788 (USFS 5715)	2816 (USFS 5715)	2819 (USFS 8168)
2831 (USFS 5715)	2857 (USFS 8168)	2858 (USFS 8168)	2862 (USFS 5715)	2864 (USFS 5715)
2869 (USFS 5715)	2871 (USFS 8168)	2883 (USFS 5716)	2884 (USFS 5715)	2885 (USFS 8168)
2888 (USFS 8168)	2826 (USFS 5715)	2866 (USFS 5715)	2886 (USFS 5716)	2781 (USFS 5715)

Note: The first road segment number represents the number associated with the source assessment as shown in Appendix G, the second number equates to the appropriate USFS road number.

8.2.1.1.2 Culverts

There are no culverts in the Buck Creek watershed that are known to impede or block fish passage. The only known culvert on the fish-bearing portion of Buck Creek is the culvert under the West Fork Highway. That highway culvert is suitable for fish passage. However, Buck Creek flows across residential properties on both sides of the highway, and there could be other culverts on private lands that have not been evaluated. Buck Creek is a small stream that goes intermittent near the West Fork Highway during the summer and autumn, and dewatering occurs on the private lands near the West Fork Highway. It appears that having an adequate supply of water in the creek is the limiting factor for fish passage in Buck Creek, not culverts.

8.2.1.2 Ditch Creek

8.2.1.2.1 Roads

Of the 18 potential road sediment sources evaluated in the Ditch Creek sediment source assessment, 8 had contributing road treads, cut slope, and/or fill slopes that exceeded 200 ft and were thus identified as restoration priorities. Two hundred feet was selected simply as an example to illustrate the potential for sediment reduction and is not a formal goal of the WQRP. Road restoration will need to be site specific. These contributing areas are located on Forest Service roads 5715, 6186, 13432 and 5716.

Stream crossings and near stream road segments accounted for an estimated 70 tons of sediment/year in the Ditch Creek watershed when they were assessed in 2002. Sediment delivery mitigation will reduce the sediment load from them to an estimated 26 tons/year, for a reduction of 44 tons/year. Although the FroSAM analysis (see Section 4.0) was used to estimate the potential for road sediment reduction in the watershed, achieving this reduction in sediment loading from roads may be occur through a variety of methods.

Crossings in need of sediment delivery mitigation are presented below (Table 8-2). Maps showing the location of these crossings are included in Appendix G.

Table 8-2. Ditch Creek Road Crossing and Segment Restoration Priorities.

3005 (USFS 5715)	3011 (USFS 5715)	3021 (USFS 5715)	3022 (USFS 5715)
3024 (USFS 5715)	3025 (USFS 13435)	3033 (USFS 13435)	3034 (USFS 5715)

Note: The first road segment number represents the number associated with the source assessment as shown in Appendix G, the second number equates to the appropriate USFS road number.

8.2.1.2.2 Culverts

There are two culverts in the Ditch Creek watershed that are known to impede or block fish passage. One is the culvert on Ditch Creek under the West Fork Highway, the other is the culvert on Ditch Creek on Road 91-E about 0.7 miles upstream of the highway. In both locations, Ditch Creek is intermittent and often dry during late summer. Some overland flow intermittently occurs in the section of stream between the two culverts. The rest of the culverts in the Ditch Creek watershed do not affect fish. BNF recommended that the West Fork Highway and Road 91-E culverts be replaced when the opportunity and funding allows. As with the Buck Creek culvert, replacement of the culvert on the highway will be more difficult due to the expense. It is most likely to occur whenever the highway is reconstructed in the future.

8.2.1.3 Meadow Creek

8.2.1.3.1 Roads

Of the 177 potential forest road sediment sources evaluated in the Meadow Creek sediment source assessment, 40 had contributing road treads, cut slope, and/or fill slopes that exceeded 200 ft and were thus identified as restoration priorities. Two hundred feet was selected simply as an example to illustrate the potential for sediment reduction and is not a formal goal of the WQRP. Road restoration will need to be site specific. These contributing areas are located on Forest Service roads 725 and 725B, 5761, 5762, 73609, 5759, 73614, and 5764. Forest Service roads 725, 725B, 5761, 5759, and 5764 were identified during the post 2000 Fire EIS process as needing BMP upgrades. BMP upgrades will occur as funding allows.

Stream crossings and near stream road segments accounted for an estimated 173 tons of sediment/year in the Meadow Creek watershed when they were assessed in 2002. Sediment delivery mitigation will reduce the sediment load from them to an estimated 115 tons/year, for a reduction of 58 tons/year. Although the FroSAM analysis (see Section 4.0) was used to estimate the potential for road sediment reduction in the watershed, achieving this reduction in sediment loading from roads may be occur through a variety of methods. Crossings in need of sediment delivery mitigation are presented below (Table 8-3). Maps showing the location of these crossings are included in Appendix G.

Some sediment delivery reduction work had occurred since the road sediment delivery analysis was completed. The Bitterroot National Forest has performed a full BMP upgrade to a portion of Road 725 where it parallels the stream (7.19 miles) and hardened the crossings at Meadow Creek and Spruce Creek. These two undersized stream crossings where upgraded to 100-year, fish friendly culverts. On Road 725, over 20 contributing road treads, cut slopes, and/or crossings have been improved. Swift Creek Road 5764 is graveled in Swift Creek riparian area. Thus the estimated sediment load from road presented above is probably an overestimate of current conditions.

Table 8-3. Meadow Creek Road Crossing and Segment Restoration Priorities.

1798 (USFS 725)	1804 (USFS 725)	1805 (USFS 725)	1812 (USFS 5762)	1815 (USFS 5762)	1879 (USFS 73609)
1817 (USFS 73609)	1855 (USFS 5762)	1856 (USFS 5762)	1871 (USFS 73609)	1874 (USFS 5762)	1964 (USFS 725)
1881 (USFS 5762)	1882 (USFS 5762)	1887	1919 (USFS 725)	1960	2038 (USFS 73614)
2262	1987 (USFS 5769)	1992 (USFS 73609)	19995 (USFS 73609)	2009 (USFS 73614)	2419 (USFS 725)
2130 (USFS 5762)	2249 (USFS 725B)	2318 (USFS 725)	2366 (USFS 725)	2417 (USFS 725)	RS4 (USFS 725)
RS1 (USFS 725)	RS10 (USFS 725)	RS11 (USFS 725)	RS2 (USFS 725)	RS3 (USFS 725)	
RS5 (USFS 725)	RS6 (USFS 725)	RS7 (USFS 725)	RS8 (USFS 725)	RS9 (USFS 725)	

Note: The first road segment number represents the number associated with the source assessment as shown in Appendix G, the second number equates to the appropriate USFS road number.

8.2.1.3.2 Culverts

There are two culverts on Meadow Creek that are believed to impede fish passage: FDR 5758 and FDR 725. BNF knows from a decade of fish population monitoring surveys that some adult migratory bull trout and westslope cutthroat trout can get upstream through these two culverts. However, at higher flows, water velocities through these culverts are probably barriers or impediments to smaller juveniles of both species. Both culverts pinch the bankfull and baseflow wetted channel of Meadow Creek by more than half, and there is no substrate in the bottom of the culvert barrels. The FishXing model predicts that both culverts are barriers for juvenile and adult bull trout. Two other culverts in the Meadow Creek watershed were identified in the Burned Area Recovery FEIS as fish barriers: the Road 725 and 73609 culverts on Bugle Creek. Bugle Creek is a tributary to Meadow Creek. The Road 725 culvert on Bugle Creek was replaced with a new stream simulation culvert in November 2003. The plan to replace the Road 73609 culvert was dropped because electrofishing surveys conducted in summer, 2003 indicated that fish are not present above or below the culvert, and habitat is unsuitable due to steep gradients. BNF recommended that the forest replace the FDR 5758 and 725 culverts on Meadow Creek, pending funding.

8.2.1.3.3 Stream Bank Instability

Potential bank instability problems appeared to be concentrated in reach 4, in which 18% of the banks appeared to be unstable. It is uncertain, however, the extent to which the bank instability results from natural vs. anthropogenic impacts. As part of the restoration strategy for Meadow Creek, a more detailed assessment of reach 4 will be preformed, and, if necessary, restoration of the banks in this section will be implemented. The location of reach 4 is presented in the Meadow Creek stream bank condition map in Appendix H.

Some stream bank instability reduction work has already occurred in the Meadow Creek watershed. During the summer of 2004, approximately 1700 feet of Meadow Creek was fenced with a riparian cattle exclosure and one cattle watering ford hardened. This work occurred in sections 2 and 10, which include part of reach 4.

8.2.1.4 Reimel Creek

8.2.1.4.1 Forest Roads

Of the 13 potential forest road sediment sources evaluated in the Reimel Creek sediment source assessment, one Forest Service road (Road 727), had contributing road treads, cut slope, and/or fill slopes that exceeded 200 ft and was thus identified as restoration priorities. Two hundred feet was selected simply as an example to illustrate the potential for sediment reduction and is not a formal goal of the WQRP. Road restoration will need to be site specific. This road was identified during the post 2000 Fire EIS process as needing Best Management Practices (BMPs) upgrades. BMP upgrades were recently completed on this road. The crossing at Diggins Creek (2560) is a new fish-friendly, stream simulation culvert with rock embankments slopes and gravel road surface over the crossing.

This crossing (#2560) accounted for an estimated 3.4 tons of sediment/year. Bringing this crossing up to BMP standards is expected to reduce the sediment load from them to 1.2 tons/year, for a reduction of 2.2 tons/year. Maps showing the location of this crossing are included in Appendix G.

8.2.1.4.2 Culverts

There is one known culvert in the Reimel Creek watershed that blocks or impedes fish passage, and that culvert occurs on private land near the mouth of Reimel Creek. On the forest, the two culverts that affected fish (the Road 727 crossings of Reimel Creek and Diggins Creek) were replaced with new stream simulation culverts in 2000 and 2003, respectively. Both are adequately maintaining fish passage. There are no other culverts on the forest in the Reimel Creek watershed that affect fish. The BNF recommends pursuing replacement of the culvert on private land, and monitoring the two culverts on the forest to ensure that fish passage is being adequately maintained.

8.2.1.4.3 Dewatering
Reimel Creek was not listed for flow alterations, but according to the BNF's post-fire EIS, an irrigation pond on private land at the mouth of the Reimel Creek canyon results in year-round isolation from the East Fork of the Bitterroot River. The Bitterroot Headwaters Implementation Team (IT) and the Bitterroot Water Forum will contact the landowner to explore the possibility of restoring connectivity between Reimel Creek and the East Fork of the Bitterroot. USFS and MFWP fisheries biologist will be consulted as well to confirm that the currently isolation is not protecting native salmonid genetics.

8.2.1.4.4 Grazing
The Bitterroot National Forest has installed riparian fencing and conducted stream restoration on the grazing-impacted portions of Reimel Creek. The BNF will continue to monitor the success of these actions in minimizing sediment loading to Reimel Creek as a result of grazing, and will take corrective action where necessary.

8.2.1.5 East Fork
8.2.1.5.1 Forest Roads
Because of the large size of the East Fork Watershed and the extensive road network, it was not possible to evaluate the sediment load from every road in the basin. Instead, all of the roads in the sediment-listed tributaries to the East Fork of the Bitterroot River were evaluated, and results were extrapolated to the non-listed tributaries to derive a total basin-wide sediment load from forest roads. GIS data layers obtained from the Forest Service show 1,962 potential stream crossings in the East Fork Watershed. Of these, 362 were visited on the ground, and those that were identified as sediment delivery mitigation priorities are discussed the Laird, Gilbert, Moose, and Meadow Creeks restoration sections. An on-the-ground assessment of road sediment loading in non-listed tributaries is included in the monitoring plan in Section 9.0.

Roads in the East Fork Watershed accounted for an estimated 1570 tons of sediment/year. Sediment delivery mitigation will reduce the sediment load from them to an estimated 911 tons/year, for a reduction of 659 tons/year. Although the FroSAM analysis (see Section 4.0) was used to estimate the potential for road sediment reduction in the watershed, achieving this reduction in sediment loading from roads may be occur through a variety of methods.

Since the completion of the road sediment loading assessment, some restoration work has already been completed in the East Fork watershed. The Bitterroot National Forest has surfaced and brought four (4) roads to BMP standards: Road 369 (approximately 5.3 miles), Road 5745 (approximately 0.8 miles), and Rd 13256 (approximately 4.8 miles). Jennings Camp Road 723 will be surfaced and BMP worked completed in 2005. This will add an addition 9.0 miles of road improved in the East Fork Watershed. In addition, the Forest has obliterated approximately 3.0 miles of road (Roads 62717, including spurs, 62701, and 62702. Thus the estimate of sediment loading from roads in the East Fork watershed presented in this document is probably an overestimate of current conditions.

8.2.1.5.2 Culverts
There are no known culverts on the East Fork of the Bitterroot River that block or impede fish passage. There are several culverts on small tributaries to the East Fork that block or impede fish passage (e.g. Guide, Jennings Camp, Bertie Lord Creek and its tributaries, Tepee Creek, Springer Creek, Mink Creek, the West Fork of Camp Creek and its tributaries, Crazy Creek, Medicine Tree Creek, Laird Creek). A few of these culverts either have, or will be, proposed for replacement in current forest NEPA projects such as the Burned Area Recovery FEIS. Five of the culverts proposed in the Burned Area Recovery FEIS were replaced with new stream simulation culverts in November 2003 (Bugle Creek, Road 725; Crazy Creek, Road 370-A; West Fork of Camp Creek, Road 729; two unnamed tributaries to the West Fork of Camp Creek, Road 8112). The BNF has recommended that replacing as many of the remaining barrier culverts as possible, pending funding. The forest should also monitor the new replacements to ensure that fish passage is being adequately maintained.

8.2.1.5.3 Bank Instability
Potential bank instability problems appeared to be concentrated in reaches 1, 2, 6, and 7 where the % of banks unstable was 15.4, 24.6, 10.8, and 11.7 respectively. It is uncertain, however, the extent to which the bank instability results from natural vs. anthropogenic impacts. As part of the restoration strategy for the East Fork, a more detailed assessment of these reaches will be preformed, and, if necessary, restoration of the banks in this section will be implemented. The location of reaches 1, 2, 6, and 7 is presented in the East Fork stream bank condition map in Appendix H.

Additionally, the BNF's post-fire EIS indicated that encroachment by home construction, U. S. Highway 93 and the East Fork Highway has resulted in reductions in channel length, woody debris recruitment, and habitat complexity and potentially elevated water temperatures. The Bitterroot Headwaters TMDL IT and the Bitterroot Water Forum will work with local landowners and highway administrators to reduce road and construction impacts to the East Fork.

8.2.1.5.4 Grazing
Grazing was determined to be a man-caused factor in the sediment induced from bank erosion in the BHTPA. Restoration efforts that utilize the adaptive management strategy outlined in Section 9.11 are recommended as part of this WQRP. The adaptive management strategy will help prioritize these efforts. It is envisioned that several management strategies could be used to address grazing issues in the BHTPA. This plans recommends fencing off riparian corridors, providing off-site watering and utilizing rest rotation grazing strategies to achieve reductions in sediment load to the BHTPA streams.

8.2.1.5.5 Temperature
This plan recommends prioritization of the thermal sources identified in Section 5.0 and the restoration of those sources were feasible as outlined in Section 5.8.

8.2.1.6 Gilbert/Laird Creek

8.2.1.6.1 Roads

Of the 119 potential road sediment sources evaluated in the Gilbert/Laird Creek sediment source assessment, 17 had contributing road treads, cut slope, and/or fill slopes that exceeded 200 ft and were thus identified as restoration priorities. Two hundred feet was selected simply as an example to illustrate the potential for sediment reduction and is not a formal goal of the WQRP. Road restoration will need to be site specific. These contributing areas are located on Forest Service roads 370, 5731, 13311, 13325, 13323, and 13324.

Stream crossings and near stream road segments accounted for an estimated 90 tons of sediment/year in the Gilbert/Laird watershed when they were assessed in 2002. Sediment delivery mitigation will reduce the sediment load from them to an estimated 33 tons/year, for a reduction of 57 tons/year. Although the FroSAM analysis (see Section 4.0) was used to estimate the potential for road sediment reduction in the watershed, achieving this reduction in sediment loading from roads may be occur through a variety of methods. Crossings that needed sediment delivery mitigation are presented below (Table 8-4). Maps showing the location of these crossings are included in Appendix G.
All of the Forest Service roads in Table 8-4 were identified during the post 2000 Fire EIS process as needing BMP upgrades, to be decommissioned or to be put into storage. BMP upgrades were completed on Forest Service Road 370, the main Laird Road during the summer of 2003. BMP upgrades are partially completed on roads 13323 and 13324. Forest Service Road 13325 has been placed in storage. The crossing at Forest Service Road 13323 was repaired in the fall of 2002. Road crossings # 2203 and 2143 have hardened fords. Road BMP upgrades and decommissioning is continuing in the Gilbert area with work completed in 2003 and planned for 2004 and 2005 as funding allows. Crossing 2203 has been removed and the road recontoured. Crossing 2143 is an open bottom arch pipe with a hardened overflow dip. BMP work has been completed on the full length of road 370 (over 12 miles and including any pipe needs). Crossing 2241 is an open bottom arch on concrete footings with armored dip and all crossings on Rd 13323 are new installations in 2001 with rock-lined catch basins.

Table 8-4. Gilbert/Laird Creek Road Crossing and Segment Restoration Priorities.

243 (USFS 5731)	1949	1953	1955	2060 (USFS 13323)	2241 (USFS 13323)
2122 (USFS 13323)	2143 (USFS 13325)	2190 (USFS 370)	2205	2211 (USFS 13323)	2489
2268 (USFS 370)	2309 (USFS 370)	2348 (USFS 5615 New culvert upsized in 2000)	2410	2413 (USFS 5615 New culvert upsized in 2000)	

8.2.1.6.2 Culverts

There is one culvert in the Laird/Gilbert Creek watershed that is thought to potentially impede fish passage, and that culvert is located on private land under Highway 93. It is scheduled for replacement with a fish passable structure when the Conner North/South reconstruction phase of Highway 93 is implemented. Another culvert on private land near the first house just below the forest boundary was replaced by a private contractor in November 2002. Since then, some of the substrate has been flushed from the barrel, but the culvert is believed to still provide adequate fish passage. On the forest, there are four culverts on Laird Creek that could potentially affect fish movement (in order from the bottom of the stream to the top, they are Road 13325, Road 13323, Road 370, and Road 5715), and one culvert on Gilbert Creek (Road 370). All but the Road 13325 and 13323 culverts were replaced with new stream simulation culverts following the 2000 fires. The Road 13325 and 13323 culverts were not replaced following the fires of 2000 because they were fish passable. Monitoring of the five fish culverts on Forest Service land in the Laird/Gilbert Creek watershed indicates that fish passage is being adequately maintained at all sites. BNF recommended that the fish culverts on the forest continue to be monitored in the future to ensure that adequate fish passage is maintained.

8.2.1.6.3 Stream Bank Instability

Potential bank instability problems appeared to be concentrated in reaches 1 and 3 where the % of banks unstable was 38.5 and 16.4 respectively. It is uncertain, however, the extent to which the bank instability results from natural vs. anthropogenic impacts. As part of the restoration strategy for the Gilbert/Laird Creek Watershed, a more detailed assessment of these reaches will be preformed, and, if necessary, restoration of the banks in this section will be implemented. The location of reaches 1 and 3 is presented in the Gilbert/Laird stream bank condition map in Appendix H.

8.2.1.7 Hughes Creek

8.2.1.7.1 Roads

Of the 151 potential forest road sediment sources evaluated in the Hughes Creek sediment source assessment, 25 had contributing road treads, cut slope, and/or fill slopes that exceeded 200 ft and were thus identified as restoration priorities. Two hundred feet was selected simply as an example to illustrate the potential for sediment reduction and is not a formal goal of the WQRP. Road restoration will need to be site specific. These contributing areas are identified on Forest Service roads 5693, 5793, 5688, 5694, 74249, 13404, 74288, and 74287. BMP upgrades will occur as funding allows.

Stream crossings and near stream road segments currently account for an estimated 112 tons of sediment/year in the Hughes Creek watershed when they were assessed in 2002. Sediment delivery mitigation will reduce the sediment load from them to an estimated 72 tons/year, for a reduction of 40 tons/year. Although the FroSAM analysis (see Section 4.0) was used to estimate the potential for road sediment reduction in the watershed, achieving this reduction in sediment loading from roads may be occur through a variety of methods. Crossings in need of BMP upgrades are presented below (Table 8-5). Maps showing the location of these crossings are included in Appendix G.

In addition, road County Road 104-D encroaches on the lower ten miles of Hughes Creek's floodplain, increasing the potential for sediment delivery and potentially limiting floodplain function. The IT will work in cooperation with local land managers to determine the feasibility of reducing road encroachment in the area.

Table 8-5. Hughes Creek Road Crossing and Segment Restoration Priorities.

530 (USFS 5693)	531 (USFS 5694)	536 (USFS 5694)	540 (USFS 13404)	541 (USFS 9630) (Rd 104-D county
3300 (USFS 9630) Rd 104-D county	3290 (USFS 5693)	3296 (USFS 5694)	3297 (USFS 74288)	3298 (USFS 9630) Rd 104-D county
3402 (USFS 5793)	3330 (USFS 74249)	3338 (USFS 74249)	3368 (USFS 5793)	3382 (USFS 5793)
3474 (USFS 5688)	3417 (USFS 5793)	3423 (USFS 5688)	3431 (USFS 5793)	3453
3524 (USFS 5688)	3476	3481 (USFS 5688)	3496 (USFS 5688)	3519 (USFS 9630) Rd 104-D county

8.2.1.7.2 Culverts

There are five culverts in the Hughes Creek watershed that are known to block or impede fish passage. Four are located on the Bitterroot National Forest; one is located on private land in lower Taylor Creek. From lowest to highest in the watershed, they are: (1) Malloy Gulch, Road 104-D; (2) Mill Gulch, Road 104-D; (3) Taylor Creek, private road near mouth; (4) Taylor Creek, Road 104-D, and (5) Mine Creek, Road 5688 (only USFS culvert). The one barrier culvert on the Bitterroot National Forest will be replaced as funding allows. Replacement of the Road 104-D culverts will require cooperation with the county, as 104-D is a county road. BNF also recommended that efforts be made to work with the private landowner to replace the barrier culvert on private land in lower Taylor Creek. The rest of the culverts in the Hughes Creek watershed do not affect fish.

8.2.1.7.3 Stream Bank Instability

Potential bank instability problems in Hughes Creek appeared to be concentrated in reach 13. It is uncertain, however, the extent to which the bank instability results from natural vs. anthropogenic impacts. As part of the restoration strategy for the Hughes Creek Watershed, a more detailed assessment of this reaches will be preformed, and, if necessary, restoration of the banks in this section will be implemented. The location of reach 13 is presented in the Hughes Creek stream bank condition map in Appendix H.

8.2.1.7.4 Mining

On federal land, the reaches of Hughes Creek that were impacted by placer mining have been restored. However, no such restoration has occurred on private land. The IT and BWF will evaluate landowner willingness to consider restoration and will search for potential funding to conduct this restoration if/where landowners interested.

8.2.1.7.5 Temperature

This plan recommends prioritization of the thermal sources identified in Section 5.0 and the restoration of those sources were feasible as outlined in Section 5.8.

8.2.1.7.6 Future Impacts

This plan recommends proper planning with all future activities in the BHTPA to help ensure that the goals of this WQRP are met.

8.2.1.8 Moose Creek

8.2.1.8.1 Roads

Of the 67 potential forest road sediment sources evaluated in the Moose Creek sediment source assessment, 12 have contributing road treads, cut slope, and/or fill slopes that exceed 200 ft and were thus identified as restoration priorities. Two hundred feet was selected simply as an example to illustrate the potential for sediment reduction and is not a formal goal of the WQRP. Road restoration will need to be site specific. These contributing areas are identified on Forest Service roads 432, 5770, and 5771. BMP upgrades will occur as funding allows.

Stream crossings and near stream road segments accounted for an estimated 35 tons of sediment/year in the Moose Creek watershed when they were assessed in 2002. Sediment delivery mitigation will reduce the sediment load from them to and estimated 25 tons/year, for a reduction of 10 tons/year. Although the FroSAM analysis (see Section 4.0) was used to estimate the potential for road sediment reduction in the watershed, achieving this reduction in sediment loading from roads may be occur through a variety of methods.

8.2.1.8.2 Culverts

There are five culverts in the Moose Creek watershed that are known to block or impede fish passage. From lowest to highest in the watershed, they are: (1) Moose Creek, Road 726; (2) Lick Creek, Road 432; (3) Lick Creek, Road 5771; (4) Reynolds Creek, Road 432 is a bridge project scheduled for 2005; and (5) Sign Creek, Road 432. The Road 726 culvert on Moose Creek was proposed for replacement as a bridge in the Burned Area Recovery FEIS, and survey and design has been completed. When funding becomes available, the Forest plans on removing the FDR 726 culvert on Moose Creek and replacing it with a new bridge. This is likely to occur in the next couple of years. BNF recommended that the forest replace the other four barrier culverts on Lick, Reynolds, and Sign Creeks (tributaries to Moose Creek), pending funding.

8.2.1.8.3 Stream Bank Instability

Stream banks in Moose Creek were generally stable, but 8.2% of the banks evaluated on the ground were in the extreme BEHI erosion risk category. It is uncertain, however, the extent to which the bank instability results from natural vs. anthropogenic impacts. As part of the restoration strategy for the Moose Creek Watershed, a more detailed assessment will be preformed, and, if necessary, restoration section will be implemented.

8.2.1.9 West Fork Bitterroot River

8.2.1.9.1 Roads

Because of the large size of the West Fork Watershed and the extensive road network, it was not possible to evaluate the sediment load from every road in the basin. Instead, all of the roads in the sediment-listed tributaries to the West Fork of the Bitterroot River were evaluated, and results were extrapolated to the non-listed tributaries to derive a total basin-wide sediment load from forest roads. GIS data layers obtained from the Forest Service show 1,787 potential stream crossings in the West Fork Watershed. Of these, 219 were visited on the ground, and those that were identified as restoration priorities are discussed the Buck, Ditch, and Hughes Creek restoration sections. An on-the-ground assessment of road sediment loading in non-listed tributaries is included in the monitoring plan in Section 9.0.

Roads in the West Fork Watershed accounted for an estimated 3,041 tons of sediment/year. Sediment delivery mitigation will reduce the sediment load from them to an estimated 1,308 tons/year, for a reduction of 1,733 tons/year. Although the FroSAM analysis (see Section 4.0) was used to estimate the potential for road sediment reduction in the watershed, achieving this reduction in sediment loading from roads may be occur through a variety of methods.

In addition, encroachment of the West Fork Road and private land development have resulted in a loss of riparian over story, stream shade, and woody debris recruitment along much of the West Fork below Deer Creek. The IT will work in cooperation with local land managers to determine the feasibility of reducing road encroachment in the area.

8.2.1.9.2 Culverts

There are no culverts on the West Fork of the Bitterroot River that block or impede fish passage. There are numerous culverts on tributaries to the West Fork that block or impede fish passage (e.g. Pierce, Baker, Lavene, Boulder, Ward, East Piquett, Castle, Britts, Beavertail, Ditch, Little Boulder, Elk, Coal, Johnson, and Sheep Creeks). About a third of these culverts have been proposed for replacement in current forest NEPA projects such as the Burned Area Recovery FEIS and Frazier Interface EA. Four of the culverts proposed in the Burned Area Recovery FEIS were replaced with new stream simulation culverts in July 2003 (Took Creek, Road 1303; Took Creek, Road 362; Magpie Creek, Road 362; Sand Creek, Road 362). BNF recommended that the forest replace as many of the remaining barrier culverts as possible, pending funding. The forest should also monitor the new replacements to ensure that fish passage is being adequately maintained.

8.2.1.9.3 Stream Bank Instability

Potential bank instability problems appeared to be concentrated in twelve reaches of the West Fork (Table 8-6). It is uncertain, however, the extent to which the bank instability results from natural vs. anthropogenic impacts. As part of the restoration strategy for the West Fork Watershed, a more detailed assessment of this reaches will be preformed, and, if necessary, restoration of the banks in this section will be implemented. The location of the unstable reaches is presented in the West Fork stream bank condition map in Appendix H.

Table 8-6. Reaches of the West Fork with Potentially Significant Bank Instability.

Reach #	Reach Length (miles)	% Unstable
1	4.29	60.3
4	1.23	20.7
5	1.76	17.4
13	0.54	11.7
14	1.14	16.7
18	14.14	25.3
23	1.03	12.6
36	1.86	13.6
39	1.33	10.3
42	1.10	40.4
47	5.95	29.5
48	0.84	43.0

8.2.1.9.4 Temperature

This plan recommends prioritization of the thermal sources identified in Section 5.0 and the restoration of those sources where feasible as outlined in Section 5.8.

8.2.1.10 Overwhich Creek

8.2.1.10.1 Culverts

There is only one culvert in the Overwhich Creek watershed that is known to impede or blocks fish passage, and that is the Road 5703 culvert on Kyke Creek, which is a small tributary to Overwhich Creek. The rest of the culverts in the Overwhich Creek watershed do not affect fish. BNF recommended that the forest replace the culvert on Kyke Creek when funding is available. It would be a low priority because suitable fish habitat above the culvert is very limited (< 0.2 miles) because of steep gradients. Low numbers of small westslope cutthroat trout are present in Kyke Creek near the Road 5703 culvert.

8.2.1.10.2 Temperature

This plan recommends prioritization of the thermal sources identified in Section 5.0 and the restoration of those sources were feasible as outlined in Section 5.8.

8.2.1.11 Nez Perce Fork

8.2.1.11.1 Culverts

There are six culverts in the Nez Perce Fork watershed that are know to block or impede fish passage. From lowest to highest in the watershed, they are: (1) Gemmell Creek, Road 5633; (2) Two Creek, Road 5650; (3) Tough Creek, Road 5644; (4) Flat Creek, Road 468; (5) Nez Perce Fork, lower crossing of Road 468; and (6) Nez Perce Fork, upper crossing of Road 468. The rest of the culverts in the Nez Perce Fork watershed are either new stream simulation culverts that allow adequate fish passage (Nelson Creek, Road 468; Gemmell Creek, Road 468; and Sentimental Creek, Road 13482), or culverts that do not affect fish. BNF recommended that the forest replace as many of the seven barrier culverts as possible, and continue to monitor the three recent replacements to ensure adequate fish passage is maintained at those sites. The two upper culverts on the Nez Perce Fork are located on the paved portion of Road 468, and both contain very deep fills. Due to the expense and limited amount of suitable fish habitat upstream of those culverts, any replacements would probably have to occur in conjunction with major road reconstruction.

8.2.1.11.2 Temperature

This plan recommends prioritization of the thermal sources identified in Section 5.0 and the restoration of those sources were feasible as outlined in Section 5.8.

8.2.1.12 Martin Creek

8.2.1.12.1 Culverts

There are three culverts in the Martin Creek watershed that could potentially block or impede fish passage: the Road 726 culvert on Bush Creek and the Road 13318 and 13317 culverts on Paint Creek. Bush Creek and Paint Creek are tributaries to lower Martin Creek. BNF recommended that the forest replace these three barrier culverts, pending funding.

8.2.1.12.2 Shade/temperature

Martin Creek was found as not impaired for thermal modifications (See table 3-67). However, this plan proposes further study as outlined in Sections 5.5.3.2 and 9.11.

8.2.2 Agency and Stakeholder Coordination

8.2.2.1 Future Impacts

This plan recommends proper planning with all future activities in the BHTPA to help ensure that the goals of this WQRP are met as outlined in Sections 4.0 and 5.0.

Achieving the targets set forth in this TMDL will require a coordinated effort between land management agencies, the state and county governments and private landowners. A Water Quality Implementation Team (IT) will be formed with representatives invited from the entities listed below. It is expected that this IT would evolve from the already established Bitter Root Water Forum and existing BHTPA TAC.

- Bitterroot Conservation District
- Ravalli County Planning Office
- MFWP
- Bitter Root Water Forum
- Bitterroot National Forest
- MDEQ
- USEPA
- Tri-State Water Quality Council

Additionally, up to three community members unaffiliated with any group and up to three environmental group representatives will be invited. The group will be facilitated by MDEQ or their designated representative. The purpose of the group will be to track the implementation of this Water Quality Improvement Strategy and to address new threats to water quality as they arise. Specific tasks that will be undertaken by the IT are:

- Conduct annual watershed-wide road inventories in drainages that have experienced recent timber management activities.
- Compile, reports, and serve as a repository for data being collected throughout the Bitterroot Headwaters.
- Oversee the implementation of the specific source reduction tasks prescribed in this TMDL.
- Coordinate the restoration and monitoring efforts of agencies and stakeholders.
- Address new threats to water quality as they arise.
- Work with private landowners and land management agencies to address bank instability through grazing management, restoration, and other available methods.

8.2.3 Bitterroot National Forest

For a description of restoration activities planned by the Bitterroot National Forest other than those described elsewhere in this document, refer to the Burned Area Recovery Final EIS, September 2001 and to recent BNF Forest Management Plans.

8.2.4 Bitterroot Conservation District

Future involvement of the Bitterroot CD in the Bitterroot headwaters will primarily consist of technical assistance and review of any planned culvert replacements on perennial streams, as required under Montana’s Natural Streambed and Land Preservation Act (310 Law).
BCD will actively be involved in restoration planning for the Bitterroot Headwaters TMDL planning are, since coordination with numerous small private landowners will be required.

Appendix 11
Terrestrial Prioritization Habitat Scoring

Wetland Habitats

	Wetland Acres				Limiting Factor							Habitat Attribute								Social Attributes						
					Only FS Land			Non-FS Land				Only FS Land				Non-FS Land				FS Land	Non-FS Land					
GMU	Total Acreage	Only FS Land	Non-FS Land	Total Miles of Stream	Number of Dwellings w/in 250 ft of stream	Acres of 250ft Buffered Stream	Dwelling Density on 250 Ft stream buffer (acres per dwelling)	Number of Dwelling s w/in 250 ft of stream	Acres of 250ft Buffered Stream	Dwelling Density on 250 Ft stream buffer (acres per dwelling)	Limiting Factor Score	Total FS acreage wetland score	Total miles of FS stream	FS Acreage Wetland / Miles of Stream	Non USFS acreage wetland score	Total miles of non-FS stream	Non-FS Acreage Wetlands / Miles of Stream	Wetlands/ Mile Score	Biological & Habitat Score	Percent Wetlands on FS Land	Percent Wetlands on non-FS Land	Socal Attribute Score	Total Score		Ranking	
203	467	133	334	380	0	12613	12613	134	10317	77	2	1	208	0.6	1	172	2	0	2	28%	72%	1	5	203	High	>5 very high
204N	48	0	48	134	0	1251	1251	705	6870	10	0	0	21	0.0	0	113	0.4	0	0	0%	100%	2	2	204N	High	<6 high
204S	215	2	213	197	0	886	886	368	10701	29	1	0	14	0.1	1	183	1	0	1	1%	99%	2	4	204S	High	all wetlands are importa
240C	1639	965	674	200	0	6780	6780	289	5317	18	0	1	111	8.7	1	89	8	1	3	59%	41%	1	4	240C	High	
240N	1247	567	680	218	0	8807	8807	168	4384	26	1	1	145	3.9	1	73	9	1	3	45%	55%	1	5	240N	High	
240S	2607	1770	837	335	0	14340	14340	210	5603	27	1	2	239	7.4	1	96	9	1	4	68%	32%	1	6	240S	Very High	
250	3441	1936	1505	675	13	37042	2849.4	157	3431	22	0	2	613	3.2	2	62	24	2	6	56%	44%	1	7	250	Very High	
260 A	1770	33	1737	71	0	68	68	439	3984	9	0	0	1.0	33.0	2	70	25	2	4	2%	98%	2	6	260 A	Very High	
260 B	3391	651	2740	76	0	370	370	141	3992	28	1	1	7.0	93.0	2	69	40	2	5	19%	81%	2	8	260 B	Very High	
260 C	2035	0	2035	72	0	0	0	169	4076	24	0	0	0	0.0	2	72	28	2	4	0%	100%	2	6	260 C	Very High	
260 D	882	0	882	42	0	0	0	66	2236	34	1	0	0	0.0	1	42	21	2	3	0%	100%	2	6	260 D	Very High	
261	763	104	659	440	0	6884	6884	808	19082	24	0	1	113	0.9	1	327	2	0	2	14%	86%	2	4	261	High	
270N	4955	4564	391	280	0	13655	13655	174	3084	18	0	2	227	20.1	1	53	7	1	4	92%	8%	0	4	270N	High	
270S	12457	7044	5413	603	12	26428	2202.3	219	9790	45	1	2	436	16.2	2	167	32	2	6	57%	43%	1	8	270S	Very High	
totals	35917	17769	18148	3723	25	129124		4047	92867				2135	187		1588	209									

Sagebrush Habitats

Parcel ID	acres	GMU	Limiting Factor Scores: Conversion to Ag Land	Road Density	Grazing Regime (expert)	Weeds (expert)	Limiting Factor TOTAL	Biological & Habitat Attribute Scores: Presence of Species of Concern	Size of Habitat	Vegetative Diversity (expert)	Heart of the Rockies	Biological & Habitat TOTAL	Social Attributes: Conservation Status	Adjacency to Conservation	Dwellings	Socal Attribute TOTAL	Total Score			
1	526	204N	1	1	1	0	3	3	1	1	0	5	0	0	2	2	10	Class 1	Very High	>7 very higl
2	694	204N	1	0	0	0	1	2	2	0	0	4	0	1	2	3	8	Class 1	Very High	<8 high
3	279	204S	0	1	0	0	1	3	1	0	0	4	0	1	1	2	7	2	high	<4 deferred
4	311	204S	2	0	0	0	2	1	1	1	0	3	0	2	1	3	8	Class 1	Very High	
5	192	204S	0	0	0	0	0	1	1	-1	0	1	0	1	0	1	2	3	deferred	
6	340	204S	0	1	0	0	1	2	1	0	1	4	0	1	2	3	8	Class 1	Very High	
7	1474	204S	2	0	0	0	2	3	2	-1	1	5	1	2	0	3	10	Class 1	Very High	
8	1666	204S	1	0	0	0	1	2	2	1	1	6	1	2	2	5	12	Class 1	Very High	
9	1820	204S	1	0	0	-1	0	2	2	0	2	6	2	2	2	6	12	Class 1	Very High	
10	215	261	0	1	0	-1	0	1	1	0	0	2	0	0	0	0	2	3	deferred	
11	676	261	2	0	0	0	2	2	2	0	1	5	0	1	0	1	8	Class 1	Very High	
12	202	261	2	0	0	0	2	2	1	0	2	5	0	2	2	4	11	Class 1	Very High	
13	191	261	2	0	0	0	2	1	1	0	2	4	0	2	1	3	9	Class 1	Very High	
14	169	261	0	0	0	0	0	1	1	0	2	4	0	2	0	2	6	2	high	
15	412	261	1	1	0	0	2	1	1	0	2	4	0	2	1	3	9	Class 1	Very High	
16	797	261	1	0	0	0	1	1	2	0	2	5	2	2	1	5	11	Class 1	Very High	
17	1942	261	1	1	0	-1	1	2	2	0	1	5	1	2	2	5	11	Class 1	Very High	
18	413	261	0	0	0	0	0	1	1	-1	1	2	0	0	0	0	2	3	deferred	
19	1312	261	1	0	1	1	3	2	2	1	0	5	0	2	1	3	11	Class 1	Very High	
20	2109	270N	1	1	1	0	3	2	2	1	1	6	0	2	2	4	13	Class 1	Very High	
21	715		2	0			2	0	2		0	2	2	2	2	6	10	Not sage	NONE	
22	174	270S	2	1	1	0	4	2	1	1	0	4	2	2	2	6	14	Class 1	Very High	
23	183	250	2	0	1	0	3	2	1	1	2	6	2	2	2	6	15	Class 1	Very High	
24	160	250	2	0	1	0	3	2	1	1	0	4	2	2	2	6	13	Class 1	Very High	
25	186	250	2	2	1	0	5	1	1	1	0	3	2	2	2	6	14	Class 1	Very High	
26	511	250	2	0	1	0	3	1	1	1	0	3	2	2	2	6	12	Class 1	Very High	

Mesic Forest Habitats

			Limiting Factor Scores						Biological & Habitat Attribute Scores					Social Attributes							
Parcel ID	Total Acres	GMU	Fragmentation by Roads	Timber Mgmt	Fire Regime	Insects & Disease	Wildlife & Human Conflicts (expert)	Limiting Factor TOTAL	Presence of Species of Concern (expert)	Size of Habitat	Vegetative Diversity (expert)	Heart of the Rockies	Biological & Habitat TOTAL	Conservation Status	Adjacency to Conservation	Dwellings	Restoration Projects (expert)	Socal Attribute TOTAL	Total Score	Ranking	
1	4634	203	0	0	2	0	0	2		2	0	0	2	2	2	2		6	10	High	>11 very high
2	2099	203	0	0	2	1	0	3		2	0	0	2	2	2	2		6	11	High	>7 high
3	1033	204N	0	0	1	0	0	1		2	0	0	2	2	2	2		6	9	High	<8 deferred
4	1346	203	0	0	2	0	0	2		2	0	0	2	2	2	2		6	10	High	
5	3907	203	0	0	1	0	0	1		2	0	0	2	2	2	2		6	9	High	
6	690	204N	0	0	2	1	0	3		2	0	0	2	2	2	2		6	11	High	
7	859	203	0	0	1	0	0	1		2	0	0	2	2	2	2		6	9	High	
8	1162	203	0	0	1	0	0	1		2	0	0	2	2	2	2		6	9	High	
9	80087	204N	0	0	2	0	0	2		2	0	0	2	2	2	2		6	10	High	
10	1325	203	0	0	1	2	0	3		0	0	0	0	0	2	1		3	6	Deferred	
11	4358	203	0	0	1	1	0	2		2	0	0	2	2	2	2		6	10	High	
12	1700	203	0	0	1	1	0	2		2	0	0	2	2	2	1		5	9	High	
13	12944	204N	0	0	1	1	0	2		2	0	1	3	2	2	2		6	11	High	
14	1161	203	0	0	1	1	0	2		2	0	0	2	2	2	2		6	10	High	
15	932	240N	2	0	1	1	0	4		2	0	0	2	2	2	2		6	12	Very High	
16	1030	240N	1	1	2	1	0	5		2	0	0	2	2	2	2		6	13	Very High	
17	4140	240N	1	1	2	1	0	5		2	0	0	2	2	2	2		6	13	Very High	
18	745	240N	1	2	1	1	0	5		2	0	0	2	2	2	2		6	13	Very High	
19	9322	204S	0	1	2	0	0	3		2	0	1	3	2	2	2		6	12	Very High	
20	7759	240N	1	1	1	1	0	4		2	0	1	3	2	2	2		6	13	Very High	
21	2149	240N	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
22	1363	240N	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
23	1822	204S	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
24	5700	240N	1	1	1	1	1	5		2	1	0	3	2	2	2		6	14	Very High	
25	1372	240N	0	0	1	0	0	1		1	0	2	3	1	2	2		5	9	High	
26	1084	240C	1	1	1	1	0	4		2	0	1	3	2	2	2		6	13	Very High	
27	4929	240C	2	1	1	2	0	6		2	0	0	2	2	2	2		6	14	Very High	
28	1527	240C	0	1	1	2	0	4		2	0	0	2	2	2	1		5	11	High	
29	1265	240C	1	2	1	1	0	5		2	0	0	2	2	2	2		6	13	Very High	
30	1454	240C	1	1	1	1	0	4		2	0	1	3	2	2	2		6	13	Very High	
31	1120	261	0	1	1	1	0	3		2	0	1	3	2	2	2		6	12	Very High	
32	2069	240C	1	1	1	1	0	4		2	0	1	3	2	2	2		6	13	Very High	
33	952	240C	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
34	1303	240C	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
35	3519	240C	1	1	1	2	0	5		2	1	1	4	2	2	2		6	15	Very High	
36	1454	240C	2	0	2	1	0	5		2	0	0	2	2	2	2		6	13	Very High	
37	55094	261	1	1	1	0	0	3		2	0	1	3	2	2	2		6	12	Very High	
38	1033	240C	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
39	699	240C	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
40	1155	240C	1	1	1	1	1	5		2	1	1	4	2	2	2		6	15	Very High	
41	729	261	0	1	1	0	0	2		2	1	1	4	2	2	2		6	12	Very High	
42	2082	240C	1	2	1	0	0	4		2	0	0	2	2	2	2		6	12	Very High	
43	2925	240S	2	0	2	2	0	6		2	0	0	2	2	2	2		6	14	Very High	
44	694	240S	2	1	1	1	0	5		2	0	1	3	2	2	2		6	14	Very High	
45	2221	240S	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
46	1663	240S	1	1	1	1	0	4		2	0	0	2	2	2	2		6	12	Very High	
47	1998	270N	1	2	2	0	0	5		2	0	0	2	2	2	2		6	13	Very High	
48	1480	240S	1	2	1	1	0	5		2	0	0	2	2	2	2		6	13	Very High	
49	3946	240S	1	2	1	0	0	4		2	0	0	2	2	2	2		6	12	Very High	
50	2640	270N	0	2	1	0	0	3		2	0	0	2	2	2	2		6	11	High	
51	2502	270N	0	1	1	0	0	2		2	0	0	2	2	2	2		6	10	High	
52	9333	270N	1	1	1	0	0	3		2	0	1	3	2	2	2		6	12	Very High	
53	1426	270N	2	1	2	2	0	7		2	1	0	3	2	2	2		6	16	Very High	
54	803	240S	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
55	3010	240S	1	1	1	1	0	4		2	0	0	2	2	2	2		6	12	Very High	
56	793	270S	0	0	1	1	0	2		2	0	1	3	2	2	2		6	11	High	
57	2167	270N	0	0	2	0	0	2		2	0	0	2	2	2	2		6	10	High	
58	7023	270N	1	1	2	0	0	4		2	0	0	2	2	2	2		6	12	Very High	
59	3277	240S	2	0	1	1	0	4		2	0	0	2	2	2	2		6	12	Very High	
60	1899	270S	0	1	1	1	0	3		2	0	1	3	2	2	2		6	12	Very High	
61	1554	270N	1	2	2	0	0	5		2	0	0	2	2	2	2		6	13	Very High	
62	1294	270N	0	1	2	0	0	3		2	0	0	2	2	2	2		6	11	High	
63	2507	240S	1	1	1	1	0	4		2	0	0	2	2	2	2		6	12	Very High	
64	3725	240S	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
65	907	270S	0	0	1	2	0	3		2	0	0	2	2	2	2		6	11	High	
66	1578	270S	0	1	1	2	0	4		2	0	0	2	2	2	2		6	12	Very High	
67	718	270S	0	0	1	1	0	2		2	0	0	2	2	2	2		6	10	High	
68	6682	270S	1	1	2	0	0	4		2	0	0	2	2	2	2		6	12	Very High	
69	7000	240S	1	1	1	0	0	3		2	0	0	2	2	2	2		6	11	High	
70	1526	270S	0	1	1	0	0	2		2	0	0	2	2	2	2		6	10	High	
71	1380	270S	0	0	1	2	0	3		2	0	0	2	2	2	2		6	11	High	
72	4818	270S	1	1	1	0	0	3		2	0	0	2	2	2	2		6	11	High	
73	747	270S	1	1	1	0	0	3		2	0	0	2	2	2	2		6	11	High	
74	2103	240S	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
75	816	270S	0	0	1	1	0	2		2	0	0	2	2	2	2		6	10	High	
76	2375	240S	0	1	1	0	0	2		2	0	0	2	2	2	2		6	10	High	
77	1132	270S	0	0	1	1	0	2		2	0	1	3	2	2	2		6	11	High	
78	5108	270S	0	1	1	0	0	2		2	0	0	2	2	2	2		6	10	High	
79	721	270S	0	1	1	1	0	3		2	0	0	2	2	2	2		6	11	High	
80	928	250	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
81	1276	270S	2	1	2	2	1	8		2	1	0	3	2	2	2		6	17	Very High	
82	843	270S	0	1	1	0	0	2		2	0	0	2	2	2	2		6	10	High	
83	874	270S	2	0	1	1	0	4		2	0	0	2	2	2	2		6	12	Very High	
84	7244	270S	0	1	1	0	0	2		2	0	1	3	2	2	1		5	10	High	
85	3939	270S	0	0	1	1	0	2		2	0	1	3	2	2	2		6	11	High	
86	1624	270S	0	0	1	2	0	3		0	0	0	0	0	2	1		3	6	Deferred	
87	2619	250	0	2	1	0	0	3		2	0	0	2	2	2	2		6	11	High	
88	1466	250	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
89	671	250	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
90	655	270S	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
91	707	270S	0	1	2	1	0	4		2	0	0	2	2	2	2		6	12	Very High	
92	5229	270S	0	2	2	0	0	4		2	0	1	3	2	2	2		6	13	Very High	
93	850	250	2	1	2	0	0	5		2	0	0	2	2	2	2		6	13	Very High	
94	13451	250	0	1	1	0	0	2		2	0	0	2	2	2	2		6	10	High	
95	1157	250	2	0	2	2	1	7		2	1	0	3	2	2	2		6	16	Very High	
96	3736	250	0	1	1	0	0	2		2	0	1	3	2	2	2		6	11	High	
97	1023	250	2	0	1	2	0	5		2	0	0	2	2	2	2		6	13	Very High	
98	5332	250	1	1	1	0	0	3		2	0	0	2	2	2	2		6	11	High	
99	2111	270S	0	0	1	1	0	2		2	0	1	3	2	2	2		6	11	High	
100	754	250	0	1	2	0	0	3		2	0	1	3	2	2	2		6	12	Very High	
101	18335	270S	1	1	2	0	0	4		2	0	1	3	2	2	2		6	13	Very High	
102	734	250	0	1	1	0	0	2		2	0	0	2	2	2	2		6	10	High	
103	1469	250	1	1	1	0	0	3		2	0	0	2	2	2	2		6	11	High	
104	5230	250	1	1	2	0	0	4		2	0	0	2	2	2	2		6	12	Very High	
105	878	250	0	2	2	0	0	4		2	0	0	2	2	2	2		6	12	Very High	
106	810	250	0	1	2	1	0	4		2	0	0	2	2	2	2		6	12	Very High	
107	3126	250	2	1	2	0	0	5		2	0	0	2	2	2	2		6	13	Very High	
108	9098	250	0	2	2	0	0	4		2	0	1	3	2	2	2		6	13	Very High	
109	42045	250	1	1	2	0	0	4		2	0	1	3	2	2	2		6	13	Very High	
110	936	250	2	0	2	0	0	4		2	0	0	2	2	2	2		6	12	Very High	
111	829	250	1	2	1	0	0	4		2	0	1	3	2	2	2		6	13	Very High	
112	13521	250	1	1	2	0	0	4		2	0	1	3	2	2	2		6	13	Very High	
113	876	250	2	1	1	0	0	4		2	0	0	2	2	2	2		6	12	Very High	
114	3215	250	0	2	2	0	0	4		2	0	1	3	2	2	2		6	13	Very High	
115	731	250	1	2	2	0	0	5		2	0	0	2	2	2	2		6	13	Very High	
116	1840	250	2	2	2	0	0	6		2	1	0	3	2	2	2		6	15	Very High	
117	1206	250	1	2	1	0	0	4		2	0	0	2	2	2	2		6	12	Very High	
118	4123	250	1	2	2	0	0	5		2	0	0	2	2	2	2		6	13	Very High	
119	644	250	2	1	1	0	0	4		2	0	0	2	2	2	2		6	12	Very High	
	497733																				

Grassland Habitats

Parcel ID	acres	GMU	Limiting Factor Scores					Biological & Habitat Attribute Scores					Social Attributes							
			Conversion to Ag Land	Road Density	Grazing Regime (expert)	Weeds (expert)	Limiting Factor TOTAL	Presence of Species of Concern	Size of Habitat	Vegetative Diversity (expert)	Heart of the Rockies	Biological & Habitat TOTAL	Conservation Status	Adjacency to Conservation	Dwellings	Socal Attribute TOTAL	Total Score			
1	782	203	1	0	0	-1	0	1	1	0	0	2	0	2	0	2	4	Class 3	Deferred	>8 very high
2	1290	203	1	0	0	0	1	1	1	-1	0	1	1	2	0	3	5	Class 3	Deferred	<9high
3	17401	204N	1	0	0	0	1	3	3	1	0	7	0	2	0	2	10	Class 1	Very High	<6 deferred
4	5884	240N	0	0	0	0	0	1	2	0	0	3	0	2	0	2	5	Class 3	Deferred	
5	2485	203	1	0	0	-1	0	1	2	0	0	3	0	2	0	2	5	Class 3	Deferred	
6	2698	240N	0	0	0	-1	-1	1	2	-1	0	2	0	2	0	2	3	Class 3	Deferred	
7	11177	204S	0	0	0	-1	-1	1	3	-1	1	4	0	2	0	2	5	Class 3	Deferred	
8	3862	204S	1	0	0	0	1	2	2	0	2	6	2	2	2	6	13	Class 1	Very High	
9	4342	261	0	0	0	0	0	1	2	-1	1	3	0	2	0	2	5	Class 3	Deferred	
10	5748	261	1	0	0	0	1	1	2	0	2	5	1	2	1	4	10	Class 1	Very High	
11	1883	240C	0	0	0	0	0	1	1	0	1	3	0	2	0	2	5	Class 3	Deferred	
12	17031	261	1	0	1	1	3	1	3	0	1	5	0	2	1	3	11	Class 1	Very High	
13	1445	260C	0	0	0	0	0	0	1	-1	0	0	0	2	0	2	2	Class 3	Deferred	
14	806	240C	2	0	0	0	2	1	1	-1	1	2	0	2	1	3	7	Class 2	High	
15	974	240C	0	0	0	0	0	1	1	-1	0	1	0	0	0	0	1	Class 3	Deferred	
16	2466	240C	0	0	0	0	0	1	1	-1	1	2	0	2	0	2	4	Class 3	Deferred	
17	3355	240C	1	0	0	0	1	1	2	-1	1	3	0	2	0	2	6	Class 2	High	
18	19248	270N	1	0	0	0	1	2	3	1	1	7	0	2	1	3	11	Class 1	Very High	
19	843	260D	0	0	0	0	0	1	1	-1	1	2	0	0	0	0	2	Class 3	Deferred	
20	1055	240S	0	0	0	0	0	1	1	-1	0	1	0	2	0	2	3	Class 3	Deferred	
21	1034	240S	0	0	0	0	0	1	1	-1	1	2	0	2	0	2	4	Class 3	Deferred	
22	933	270S	0	0	0	-1	-1	1	1	0	1	3	0	2	1	3	5	Class 3	Deferred	
23	14488	270S	1	0	0	-1	0	1	3	1	1	6	0	2	0	2	8	Class 2	High	
24	871	250	0	0	0	0	0	1	1	-1	2	3	0	2	0	2	5	Class 3	Deferred	
25	3036	270S	2	1	0	0	3	2	2	1	1	6	1	2	2	5	14	Class 1	Very High	
26	658		2	0			2	1	1		0	2	2	2	2	6	10	MisID by GAP		
#26		is	Not grassland																	

Dry Forest Habitats

			Limiting Factor Scores						Biological & Habitat Attribute Scores						Social Attributes							
Parcel ID	Acres	GMU	Fragmentation by Roads	Timber Mgmt	Fire Regime	Insects & Disease	Wildlife & Human Conflicts	Limiting Factor TOTAL	Presence of Species of Concern	Size of Habitat	Vegetative Diversity (expert)	Heart of the Rockies	Biological & Habitat TOTAL	Conservation Status	Adjacency to Conservation	Dwellings	Restoration Projects	Socal Attribute TOTAL	Total Score		
1	804	203	0	0	1	0	0	1	0	2	0	0	2	2	2	2	0	6	9	High	>11 very high
2	1165	203	0	0	1	1	0	2	0	0	1	0	1	0	2	2	1	5	8	High	<12 high
3	1632	203	0	0	1	1	0	2	0	2	0	0	2	2	2	2	0	6	10	High	<7 deferred
4	843	204N	0	0	1	2	0	3	0	2	0	0	2	2	2	2	0	6	11	High	
5	1223	240N	1	1	1	1	0	4	0	2	0	1	3	2	2	1	0	5	12	Very High	
6	643	204S	0	0	1	1	0	2	0	2	0	2	4	2	2	2	0	6	12	Very High	
7	1404	240S	0	0	1	2	0	3	0	0	0	1	1	0	2	0	0	2	6	deferred	
8	1693	240S	1	1	1	2	0	5	0	2	1	0	3	2	2	1	1	6	14	Very High	
9	771	240S	0	1	1	2	0	4	0	1	0	1	2	1	2	0	0	3	9	High	
10	734	270N	0	0	1	1	0	2	0	0	0	1	1	0	2	1	0	3	6	deferred	
11	2152	240S	0	1	1	1	0	3	0	2	1	1	4	2	2	2	1	7	14	Very High	
12	1195	240S	0	1	1	1	1	4	0	2	0	1	3	2	2	2	0	6	13	Very High	
13	670	240S	0	1	1	0	0	2	1	2	0	0	3	2	2	0	0	4	9	High	
14	735	270S	0	0	1	2	0	3	0	0	0	2	2	0	2	2	0	4	9	High	
15	1169	240S	0	1	1	1	1	4	0	2	1	1	4	2	2	2	1	7	15	Very High	
16	2618	250	0	1	1	1	0	3	1	2	0	1	4	2	2	2	0	6	13	Very High	
17	650	250	1	0	1	2	0	4	0	2	1	0	3	2	2	2	1	7	14	Very High	
18	657	270S	0	1	1	0	0	2	0	2	0	0	2	2	2	2	0	6	10	High	
19	1817	270S	0	0	1	0	0	1	0	2	0	0	2	2	2	2	0	6	9	High	
20	959	270S	0	0	1	2	0	3	0	1	0	0	1	1	2	1	0	4	8	High	
	23534																				

Riparian Habitats

RIPARIAN HABITATS= New version, 28 May 08

	Riparian Acres			Limiting Factor: Fragmentation												Habitat Attribute								Social Attributes						
				Only FS Land					Non-FS Land							Only FS Land			Non-FS Land					FS Land	Non-FS Land					
GMU	Total Acres	Only FS Land	Non-FS Land	Number of Dwellings w/in 250 ft of stream	Acres of 250ft Buffered Stream	Dwelling Density on 250 Ft stream buffer (acres per dwelling)	FS Riparian acres/buffer (%)	FS Score	Number of Dwellings w/in 250 ft of stream	Acres of 250ft Buffered Stream	Dwelling Density on 250 Ft stream buffer (acres per dwelling)	Buffer Dwelling Density Score	Acres/dwelling	Acres/ Dwelling Score	Limiting Factor Score: Total	Total miles of FS stream	FS Acreage Riparian / Miles of Stream	FS continuity	Non-FS Acreage Riparian / Miles of Stream	Non-FS Acreage Riparian/ Miles of Stream	Acreage/ mile Score	Biological & Habitat Score	Percent Riparian on FS Land	Percent Riparian on non-FS Land	Socal Attribute Score	Total Score			
203	3147	997	2150	0	12613	12613	0.08	0	134	10317	77	2	16	2	4	208	5	0	172	13	1	1	32%	33%	1	6	203	Very High	>5 very high
204N	980	98	882	0	1251	1251	0.08	0	705	6870	10	0	1	0	0	21	5	0	113	8	0	0	10%	64%	1	1	204N	High	<6 high
204S	1027	19	1008	0	886	886	0.02	0	368	10701	29	1	3	0	1	14	1	0	183	6	0	0	2%	87%	2	3	204S	High	all riparian is important
240C	8722	4660	4062	0	6780	6780	0.69	2	289	5317	18	0	14	1	3	111	42	2	89	46	2	4	53%	46%	1	8	240C	Very High	
240N	3266	901	2365	0	8807	8807	0.10	0	168	4384	26	1	14	1	2	145	6	0	73	32	1	1	28%	66%	1	4	240N	High	
240S	4348	2111	2237	0	14340	14340	0.15	0	210	5603	27	1	11	1	2	239	9	0	96	23	1	1	49%	51%	1	4	240S	High	
250	19817	16304	3513	13	37042	2849.4	0.44	1	157	3431	22	0	22	2	3	613	27	1	62	57	2	3	82%	2%	0	6	250	Very High	
260 A	5569	58	5511	0	68	68	0.85	2	439	3984	9	0	13	1	3	1.0	58	2	70	79	2	4	1%	99%	2	9	260 A	Very High	
260 B	4722	416	4306	0	370	370	1.12	2	141	3992	28	1	31	2	5	7.0	59	2	69	62	2	4	9%	99%	2	11	260 B	Very High	
260 C	4338	0	4338	0	0	0			169	4076	24	0	26	2	2	0	0	0	72	60	2	2	0%	100%	2	6	260 C	Very High	
260 D	2629	0	2629	0	0	0			66	2236	34	1	40	2	3	0	0	0	42	63	2	2	0%	100%	2	7	260 D	Very High	
261	2573	601	1972	0	6884	6884	0.09	0	808	19082	24	0	2	0	0	113	5	0	327	6	0	0	23%	76%	2	2	261	High	
270N	11225	10327	898	0	13655	13655	0.76	2	174	3084	18	0	5	0	2	227	45	2	53	17	1	3	92%	6%	0	5	270N	High	
270S	27442	19109	8333	12	26428	2202.3	0.72	2	219	9790	45	1	38	2	5	436	44	2	167	50	2	4	70%	8%	0	9	270S	Very High	
Totals	99805	55601	44204	25	129124				4047	92867						2135			1588										

Appendix 12
List of Contributors

Aquatic Subcommittee Members

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Chris Brick, Clark Fork Coalition
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Alina Nicklison, Five Valleys Land Trust
Shane Hendrickson, Lolo National Forest
Taylor Greenup, Lolo National Forest
Bobbie Bartlette, Lolo Watershed Group
Wendy Sturgis, Lolo Watershed Group
Banning Starr, Montana Department of Environmental Quality
Chris Clancy, Montana Department of Fish, Wildlife, and Parks
Ladd Knotek, Montana Department of Fish, Wildlife, and Parks
John Zelazny, Trout Conservancy
Michael Young, US Forest Service Rocky Mountain Research Station
Lisa Eby, University of Montana

Terrestrial Subcommittee Members

John Ormiston, Bitterroot Audubon
Dave Lockman, Bitterroot National Forest
Cheri Hartless, Bitterroot National Forest
Cole Mayn, Bitterroot National Forest
Dave Romero, Bitterroot National Forest
Abby Kirkaldie, Bitterroot National Forest
Gavin Ricklefs, Bitter Root Land Trust
Theresa Blazicevich, Bitter Root Trout Unlimited
Amy Cilimburg, Montana Audubon
Craig Jourdonnais, Montana Department of Fish, Wildlife, and Parks
Kristi DuBois, Montana Department of Fish, Wildlife, and Parks
Mike Mueller, Rocky Mountain Elk Foundation
Jeremy Roberts, Sun Ranch Institute
Sam Lawry, Teller Wildlife Refuge
Dean Pearson, US Forest Service Rocky Mountain Research Station
Pat Lauridson, Natural Resource and Conservation Service
Kurt Gelderman, Montana Department of Natural Resources and Conservation

General Meeting and Document Comment Participants

In addition to the Aquatic and Terrestrial Committee members listed above, these the following attended and participated in full stakeholder meetings or commented on the documents in progress.

Ed Snook, Bitterroot Natl Forest Supervisor's Office

Brian Sugden, Plum Creek Timber
John Lavey, Ravalli County Planning Department

Appendix 13
Genetic Analysis of Westslope Cutthroat Trout and Bull Trout in the Bitterroot Subbasin*

** Data downloaded from Montana Fish, Wildlife and Parks Montana Fisheries Information System (MFISH). Accessed at http://fwp.mt.gov/fishing/mfish/ on July 10, 2009.*

BULL TROUT

Waterbody Name	Tributary To	Collection Date	Analysis Type	Species Composition	Number of Sampled Fish	Percent
Bass Creek	Bitterroot River	7/22/84	Allozymes	Westslope Cutthroat Trout	11	<10
Bass Creek	Bitterroot River	7/22/84	Allozymes	Yellowstone Cutthroat Trout	11	<10
Beaver Creek	West Fork Bitterroot River	7/11/95	Allozymes	Westslope Cutthroat Trout	11	100
Beaver Creek	West Fork Bitterroot River	9/6/92	Allozymes	Westslope Cutthroat Trout	4	100
Bertie Lord Creek	East Fork Bitterroot River	7/13/95	Allozymes	Westslope Cutthroat Trout	6	100
Big Creek	Bitterroot River	9/23/92	Allozymes	Westslope Cutthroat Trout	5	80
Big Creek	Bitterroot River	9/23/92	Allozymes	Rainbow Trout	5	20
Bitterroot River	Clark Fork River	4/11/03	PINES	Westslope Cutthroat Trout	12	83
Bitterroot River	Clark Fork River	4/11/03	PINES	Rainbow Trout	12	17
Bitterroot River	Clark Fork River	4/2/02	PINES	Westslope X Rainbow	10	0
Bitterroot River	Clark Fork River	4/2/02	PINES	Westslope Cutthroat Trout	10	0
Bitterroot River	Clark Fork River	4/2/02	PINES	Westslope X Rainbow	10	0
Bitterroot River	Clark Fork River	9/20/99	PINES	Westslope Cutthroat Trout	7	0
Bitterroot River	Clark Fork River	9/20/99	PINES	Westslope X Rainbow	7	0
Bitterroot River	Clark Fork River	4/6/99	PINES	Westslope Cutthroat Trout	10	0
Bitterroot River	Clark Fork River	4/6/99	PINES	Westslope X Rainbow	10	0
Bitterroot River	Clark Fork River	9/27/96	Allozymes	Westslope Cutthroat Trout	4	100
Blodgett Creek	Bitterroot River	8/13/94	Allozymes	Rainbow Trout	12	73.6
Blodgett Creek	Bitterroot River	8/13/94	Allozymes	Westslope Cutthroat Trout	12	26.4
Blodgett Creek	Bitterroot River	8/1/94	Allozymes	Westslope Cutthroat Trout	9	90.7
Blodgett Creek	Bitterroot River	8/1/94	Allozymes	Rainbow Trout	9	9.3
Blodgett Creek	Bitterroot River	4/7/94	Allozymes	Westslope Cutthroat Trout	6	100
Blue Joint Creek	West Fork Bitterroot River	8/12/94	Allozymes	Westslope Cutthroat Trout	10	100
Blue Joint Creek	West Fork Bitterroot River	7/18/94	Allozymes	Westslope Cutthroat Trout	6	100
Boulder Creek	West Fork Bitterroot River	8/22/94	Allozymes	Westslope Cutthroat Trout	12	<10
Boulder Creek	West Fork Bitterroot River	8/22/94	Allozymes	Rainbow Trout	12	<10
Burnt Fork Bitterroot River	Bitterroot River	6/3/94	Allozymes	Westslope Cutthroat Trout	14	100
Burnt Fork Bitterroot River	Bitterroot River	6/2/94	Allozymes	Westslope Cutthroat Trout	8	100
Cameron Creek	East Fork Bitterroot River	6/7/94	Allozymes	Westslope Cutthroat Trout	7	100
Camp Creek	East Fork Bitterroot River	8/11/99	Allozymes	Westslope X Rainbow	21	0
Camp Creek	East Fork Bitterroot River	8/11/99	Allozymes	Westslope Cutthroat Trout	21	74.6
Camp Creek	East Fork Bitterroot River	8/11/99	Allozymes	Rainbow Trout	21	22.6
Camp Creek	East Fork Bitterroot River	8/11/99	Allozymes	Yellowstone Cutthroat Trout	21	1.7
Camp Creek	East Fork Bitterroot River	4/27/94	Allozymes	Westslope Cutthroat Trout	5	97.2
Camp Creek	East Fork Bitterroot River	4/27/94	Allozymes	Rainbow Trout	5	2.8
Chaffin Creek	Bitterroot River	9/27/90	Allozymes	Westslope Cutthroat Trout	15	100
Chicken Creek	West Fork Bitterroot River	7/21/95	Allozymes	Westslope Cutthroat Trout	10	100
Coal Creek	West Fork Bitterroot River	5/10/94	Allozymes	Westslope Cutthroat Trout	11	100
Coal Creek	West Fork Bitterroot River	9/24/90	Allozymes	Westslope Cutthroat Trout	15	100
Deer Creek	West Fork Bitterroot River	8/23/99	Allozymes	Westslope Cutthroat Trout	18	100
East Fork Bitterroot River	Bitterroot River	5/11/00	PINES	Bull Trout	5	100
East Fork Bitterroot River	Bitterroot River	8/19/99	Allozymes	Westslope Cutthroat Trout	10	100
Gold Creek	Burnt Fork Bitterroot River	1/1/91	Allozymes	Bull Trout	5	0
Gold Creek	Burnt Fork Bitterroot River	1/1/91	Allozymes	Brook Trout	5	0
Gold Creek	Burnt Fork Bitterroot River	1/1/91	Allozymes	Brook X Bull Trout hybrid	5	0
Gold Creek	Burnt Fork Bitterroot River	8/1/90	Allozymes	Westslope Cutthroat Trout	4	100
Gold Creek	Burnt Fork Bitterroot River	8/29/85	Allozymes	Westslope Cutthroat Trout	26	100
Hughes Creek	West Fork Bitterroot River	7/18/94	Allozymes	Westslope Cutthroat Trout	12	100
Kootenai Creek	Bitterroot River	8/18/94	Allozymes	Westslope Cutthroat Trout	10	100
Little Boulder Creek	West Fork Bitterroot River	5/10/94	Allozymes	Westslope Cutthroat Trout	4	100
Meadow Creek	East Fork Bitterroot River	10/9/92	Allozymes	Bull Trout	11	100
Meadow Creek	East Fork Bitterroot River	8/15/91	Allozymes	Bull Trout	6	100
Meadow Creek	East Fork Bitterroot River	9/1/89	Allozymes	Bull Trout	3	100
Meadow Creek	East Fork Bitterroot River	9/1/89	Allozymes	Westslope Cutthroat Trout	21	100
Meadow Creek	East Fork Bitterroot River	9/1/89	Allozymes	Westslope Cutthroat Trout	21	100
Meadow Creek	East Fork Bitterroot River	8/22/85	Allozymes	Westslope Cutthroat Trout	25	100
Mill Creek	Bitterroot River	8/29/91	Allozymes	Westslope Cutthroat Trout	14	88.7
Mill Creek	Bitterroot River	8/29/91	Allozymes	Rainbow Trout	14	11.3
Moose Creek	East Fork Bitterroot River	10/9/92	Allozymes	Bull Trout	6	100
Moose Creek	East Fork Bitterroot River	9/4/85	Allozymes	Westslope Cutthroat Trout	25	100
Moose Creek	East Fork Bitterroot River	1/1/85	Allozymes	Bull Trout	25	100
Nez Perce Fork	West Fork Bitterroot River	8/12/94	Allozymes	Westslope Cutthroat Trout	6	100
Nez Perce Fork	West Fork Bitterroot River	5/10/94	Allozymes	Westslope Cutthroat Trout	6	100
Nez Perce Fork	West Fork Bitterroot River	8/18/92	Allozymes	Brook X Bull Trout hybrid	2	0
Nez Perce Fork	West Fork Bitterroot River	8/1/92	Allozymes	Bull Trout	2	100
Piquett Creek	West Fork Bitterroot River	9/27/90	Allozymes	Westslope Cutthroat Trout	15	100
Reimel Creek	East Fork Bitterroot River	9/5/92	Allozymes	Westslope Cutthroat Trout	3	100
Reimel Creek	East Fork Bitterroot River	1/1/92	Allozymes	Brook Trout	3	100
Roaring Lion Creek	Bitterroot River	4/26/94	Allozymes	Westslope Cutthroat Trout	11	100
Rye Creek	Bitterroot River	8/10/06	Allozymes	Westslope Cutthroat Trout	28	100
Rye Creek	Bitterroot River	4/27/94	Allozymes	Westslope Cutthroat Trout	10	100
Rye Creek	Bitterroot River	9/12/84	Allozymes	Westslope Cutthroat Trout	26	100
Sawtooth Creek	Bitterroot River	7/29/94	Allozymes	Westslope Cutthroat Trout	10	100
Skalkaho Creek	Bitterroot River	5/15/04	PINES	Westslope Cutthroat Trout	68	99.5
Skalkaho Creek	Bitterroot River	5/15/04	PINES	Rainbow Trout	68	0.5
Skalkaho Creek	Bitterroot River	9/10/02	PINES	Westslope Cutthroat Trout	25	98.7
Skalkaho Creek	Bitterroot River	9/10/02	PINES	Rainbow Trout	25	1.3
Skalkaho Creek	Bitterroot River	5/3/94	Allozymes	Westslope Cutthroat Trout	10	100
Skalkaho Creek	Bitterroot River	10/14/92	Allozymes	Bull Trout	15	100
Skalkaho Creek	Bitterroot River	9/4/91	Allozymes	Westslope Cutthroat Trout	5	100
Skalkaho Creek	Bitterroot River	9/3/91	Allozymes	Bull Trout	10	0
Skalkaho Creek	Bitterroot River	9/3/91	Allozymes	Brook Trout	10	0
Skalkaho Creek	Bitterroot River	9/3/91	Allozymes	Westslope Cutthroat Trout	10	100
Slate Creek	West Fork Bitterroot River	7/18/94	Allozymes	Westslope Cutthroat Trout	11	100
Slate Creek	West Fork Bitterroot River	6/1/93	Allozymes	Bull Trout	21	0
Slate Creek	West Fork Bitterroot River	6/1/93	Allozymes	Brook X Bull Trout hybrid	21	0
Slate Creek	West Fork Bitterroot River	6/1/93	Allozymes	Brook Trout	21	0
Slate Creek	West Fork Bitterroot River	7/29/92	Allozymes	Brook X Bull Trout hybrid	8	0
Slate Creek	West Fork Bitterroot River	7/29/92	Allozymes	Brook Trout	8	0
Slate Creek	West Fork Bitterroot River	7/29/92	Allozymes	Bull Trout	8	0
Slate Creek	West Fork Bitterroot River	9/5/91	Allozymes	Westslope Cutthroat Trout	2	98.1
Slate Creek	West Fork Bitterroot River	9/5/91	Allozymes	Yellowstone Cutthroat Trout	2	1.9
Slate Creek	West Fork Bitterroot River	9/5/91	Allozymes	Brook Trout	4	0
Slate Creek	West Fork Bitterroot River	9/5/91	Allozymes	Bull Trout	4	0
Slate Creek	West Fork Bitterroot River	9/5/91	Allozymes	Brook X Bull Trout hybrid	4	0
Sleeping Child Creek	Bitterroot River	10/14/92	Allozymes	Bull Trout	11	100
Sleeping Child Creek	Bitterroot River	1/1/91	Allozymes	Bull Trout	9	0
Sleeping Child Creek	Bitterroot River	1/1/91	Allozymes	Brook Trout	9	0
Sleeping Child Creek	Bitterroot River	5/31/90	Allozymes	Westslope Cutthroat Trout	45	100
Sleeping Child Creek	Bitterroot River	9/1/89	Allozymes	Westslope Cutthroat Trout	17	100
Sleeping Child Creek	Bitterroot River	9/5/85	Allozymes	Westslope Cutthroat Trout	25	100
Sweathouse Creek	Bitterroot River	9/5/91	Allozymes	Westslope Cutthroat Trout	11	98.8
Sweathouse Creek	Bitterroot River	9/5/91	Allozymes	Yellowstone Cutthroat Trout	11	1.2
Sweeney Creek	Bitterroot River	2/4/99	Allozymes	Rainbow Trout	11	77.3
Sweeney Creek	Bitterroot River	2/4/99	Allozymes	Westslope Cutthroat Trout	11	17.5
Sweeney Creek	Bitterroot River	2/4/99	Allozymes	Yellowstone Cutthroat Trout	11	0.07
Tin Cup Creek	Bitterroot River	9/24/92	Allozymes	Brook X Bull Trout hybrid	5	0
Tin Cup Creek	Bitterroot River	9/24/92	Allozymes	Brook Trout	5	0
Tin Cup Creek	Bitterroot River	8/17/82	Allozymes	Westslope Cutthroat Trout	50	95.2
Tin Cup Creek	Bitterroot River	8/17/82	Allozymes	Rainbow Trout	50	4.8
Tin Cup Creek	Bitterroot River	8/17/82	Allozymes	Brook Trout	36	0
Tin Cup Creek	Bitterroot River	8/17/82	Allozymes	Brook X Bull Trout hybrid	36	0
Tin Cup Creek	Bitterroot River	8/17/82	Allozymes	Bull Trout	36	0
Tolan Creek	East Fork Bitterroot River	8/15/91	Allozymes	Brook Trout	7	0
Tolan Creek	East Fork Bitterroot River	8/15/91	Allozymes	Bull Trout	7	0
Tolan Creek	East Fork Bitterroot River	8/28/85	Allozymes	Westslope Cutthroat Trout	26	100
Trapper Creek	West Fork Bitterroot River	9/15/92	Allozymes	Brook X Bull Trout hybrid	3	0
Trapper Creek	West Fork Bitterroot River	9/15/92	Allozymes	Brook Trout	3	0
Trapper Creek	West Fork Bitterroot River	9/5/92	Allozymes	Westslope Cutthroat Trout	13	70.5
Trapper Creek	West Fork Bitterroot River	9/5/92	Allozymes	Rainbow Trout	13	29.5
Warm Springs Creek	East Fork Bitterroot River	6/7/94	Allozymes	Westslope Cutthroat Trout	11	100
Warm Springs Creek	East Fork Bitterroot River	5/31/90	Allozymes	Westslope Cutthroat Trout	5	85
Warm Springs Creek	East Fork Bitterroot River	5/31/90	Allozymes	Rainbow Trout	5	15
Warm Springs Creek	East Fork Bitterroot River	5/31/90	Allozymes	Westslope Cutthroat Trout	5	85
Warm Springs Creek	East Fork Bitterroot River	5/31/90	Allozymes	Rainbow Trout	5	15
West Fork Bitterroot River	Bitterroot River	9/21/98	Allozymes	Westslope Cutthroat Trout	6	100
West Fork Bitterroot River	Bitterroot River	9/17/98	Allozymes	Westslope Cutthroat Trout	9	77.8
West Fork Bitterroot River	Bitterroot River	9/17/98	Allozymes	Yellowstone Cutthroat Trout	9	15.2
West Fork Bitterroot River	Bitterroot River	9/17/98	Allozymes	Rainbow Trout	9	7
West Fork Bitterroot River	Bitterroot River	9/17/98	PINES	Westslope Cutthroat Trout	14	97.3

West Fork Bitterroot River	Bitterroot River	9/17/98	PINES	Rainbow Trout	14	2.7
West Fork Bitterroot River	Bitterroot River	7/18/94	Allozymes	Westslope Cutthroat Trout	16	100
West Fork Bitterroot River	Bitterroot River	9/6/92	Allozymes	Westslope Cutthroat Trout	16	100
West Fork Bitterroot River	Bitterroot River	8/1/91	Allozymes	Brook Trout	3	100
Willow Creek	Bitterroot River	6/1/90	Allozymes	Westslope Cutthroat Trout	5	100
Woods Creek	West Fork Bitterroot River	7/31/95	Allozymes	Westslope Cutthroat Trout	10	100
Woods Creek	West Fork Bitterroot River	8/1/91	Allozymes	Bull Trout	5	40
Woods Creek	West Fork Bitterroot River	8/1/91	Allozymes	Brook Trout	5	40
Woods Creek	West Fork Bitterroot River	8/1/91	Allozymes	Brook X Bull Trout hybrid	5	20

Westslope Cutthroat Trout

Waterbody Name	Tributary To	Collection Date	Analysis Type	Species Composition	Number of Fish Sampled	Percent
Bass Creek	Bitterroot River	9/30/95	Allozymes	Westslope Cutthroat Trout	1	100
Bass Creek	Bitterroot River	3/30/95	Allozymes	Yellowstone Cutthroat Trout	1	100
Bass Creek	Bitterroot River	7/22/84	Allozymes	Yellowstone Cutthroat Trout	11	-10
Bass Creek	Bitterroot River	7/22/84	Allozymes	Westslope Cutthroat Trout	11	-10
Beaver Creek	West Fork Bitterroot River	7/11/95	Allozymes	Westslope Cutthroat Trout	11	100
Beaver Creek	West Fork Bitterroot River	9/6/92	Allozymes	Westslope Cutthroat Trout	4	100
Bertie Lord Creek	East Fork Bitterroot River	7/13/95	Allozymes	Westslope Cutthroat Trout	6	100
Big Creek	Bitterroot River	9/23/92	Allozymes	Westslope Cutthroat Trout	5	80
Big Creek	Bitterroot River	9/23/92	Allozymes	Rainbow Trout	5	20
Bitterroot River	Clark Fork River	4/11/03	PINES	Westslope Cutthroat Trout	12	83
Bitterroot River	Clark Fork River	4/11/03	PINES	Rainbow Trout	12	17
Bitterroot River	Clark Fork River	4/2/02	PINES	Westslope X Rainbow	10	0
Bitterroot River	Clark Fork River	4/2/02	PINES	Westslope Cutthroat Trout	10	0
Bitterroot River	Clark Fork River	4/2/02	PINES	Westslope X Rainbow	10	0
Bitterroot River	Clark Fork River	9/20/99	PINES	Westslope Cutthroat Trout	7	0
Bitterroot River	Clark Fork River	9/20/99	PINES	Westslope X Rainbow	7	0
Bitterroot River	Clark Fork River	4/6/99	PINES	Westslope Cutthroat Trout	10	0
Bitterroot River	Clark Fork River	4/6/99	PINES	Westslope X Rainbow	10	0
Bitterroot River	Clark Fork River	9/27/96	Allozymes	Westslope Cutthroat Trout	4	100
Blodgett Creek	Bitterroot River	8/13/94	Allozymes	Rainbow Trout	12	73.6
Blodgett Creek	Bitterroot River	8/13/94	Allozymes	Westslope Cutthroat Trout	12	26.4
Blodgett Creek	Bitterroot River	8/1/94	Allozymes	Westslope Cutthroat Trout	9	90.7
Blodgett Creek	Bitterroot River	8/1/94	Allozymes	Rainbow Trout	9	9.3
Blodgett Creek	Bitterroot River	4/7/94	Allozymes	Westslope Cutthroat Trout	6	100
Blue Joint Creek	West Fork Bitterroot River	8/12/94	Allozymes	Westslope Cutthroat Trout	10	100
Blue Joint Creek	West Fork Bitterroot River	7/18/94	Allozymes	Westslope Cutthroat Trout	6	100
Boulder Creek	West Fork Bitterroot River	8/30/96	Allozymes	Westslope Cutthroat Trout	17	100
Boulder Creek	West Fork Bitterroot River	8/22/94	Allozymes	Rainbow Trout	12	-10
Boulder Creek	West Fork Bitterroot River	8/22/94	Allozymes	Westslope Cutthroat Trout	12	-10
Burnt Fork Bitterroot River	Bitterroot River	6/3/94	Allozymes	Westslope Cutthroat Trout	14	100
Burnt Fork Bitterroot River	Bitterroot River	6/2/94	Allozymes	Westslope Cutthroat Trout	8	100
Camas Creek	Bitterroot River	9/21/98	Allozymes	Westslope Cutthroat Trout	10	91.1
Camas Creek	Bitterroot River	9/21/98	Allozymes	Yellowstone Cutthroat Trout	10	8.9
Cameron Creek	East Fork Bitterroot River	6/7/94	Allozymes	Westslope Cutthroat Trout	7	100
Camp Creek	East Fork Bitterroot River	8/11/99	Allozymes	Westslope X Rainbow	21	0
Camp Creek	East Fork Bitterroot River	8/11/99	Allozymes	Westslope Cutthroat Trout	21	74.6
Camp Creek	East Fork Bitterroot River	8/11/99	Allozymes	Rainbow Trout	21	22.6
Camp Creek	East Fork Bitterroot River	8/11/99	Allozymes	Yellowstone Cutthroat Trout	21	1.7
Camp Creek	East Fork Bitterroot River	4/27/94	Allozymes	Westslope Cutthroat Trout	5	97.2
Camp Creek	East Fork Bitterroot River	4/27/94	Allozymes	Rainbow Trout	5	2.8
Canyon Creek	Bitterroot River	9/14/98	Allozymes	Westslope Cutthroat Trout	9	100
Canyon Creek	Bitterroot River	4/7/94	Allozymes	Westslope Cutthroat Trout	10	-10
Canyon Creek	Bitterroot River	4/7/94	Allozymes	Yellowstone Cutthroat Trout	10	-10
Chaffin Creek	Bitterroot River	9/27/90	Allozymes	Westslope Cutthroat Trout	15	100
Chicken Creek	West Fork Bitterroot River	7/21/95	Allozymes	Westslope Cutthroat Trout	10	100
Coal Creek	West Fork Bitterroot River	5/10/94	Allozymes	Westslope Cutthroat Trout	11	100
Coal Creek	West Fork Bitterroot River	9/24/90	Allozymes	Westslope Cutthroat Trout	15	100
Deer Creek	West Fork Bitterroot River	8/23/99	Allozymes	Westslope Cutthroat Trout	18	100
Divide Creek	Sleeping Child Creek	1/1/91	Allozymes	Bull Trout	4	100
East Fork Bitterroot River	Bitterroot River	5/11/00	PINES	Bull Trout	5	100
East Fork Bitterroot River	Bitterroot River	8/19/99	Allozymes	Westslope Cutthroat Trout	10	100
Eightmile Creek	Bitterroot River	9/22/98	Allozymes	Westslope Cutthroat Trout	10	100
Gold Creek	Burnt Fork Bitterroot River	1/1/91	Allozymes	Bull Trout	5	0
Gold Creek	Burnt Fork Bitterroot River	1/1/91	Allozymes	Brook Trout	5	0
Gold Creek	Burnt Fork Bitterroot River	1/1/91	Allozymes	Brook X Bull Trout hybrid	5	0
Gold Creek	Burnt Fork Bitterroot River	8/1/90	Allozymes	Westslope Cutthroat Trout	4	100
Gold Creek	Burnt Fork Bitterroot River	8/29/85	Allozymes	Westslope Cutthroat Trout	26	100
Hayes Creek	Bitterroot River	6/15/02	PINES	Westslope Cutthroat Trout	27	96.9
Hayes Creek	Bitterroot River	6/15/02	PINES	Rainbow Trout	27	3.1
Hughes Creek	West Fork Bitterroot River	7/18/94	Allozymes	Westslope Cutthroat Trout	12	100
Kootenai Creek	Bitterroot River	8/18/94	Allozymes	Westslope Cutthroat Trout	10	100
Laird Creek	East Fork Bitterroot River	9/18/95	Allozymes	Westslope Cutthroat Trout	8	100
Lick Creek	Bitterroot River	7/24/92	Allozymes	Westslope Cutthroat Trout	1	100
Little Boulder Creek	West Fork Bitterroot River	5/10/94	Allozymes	Westslope Cutthroat Trout	4	100
Lost Horse Creek	Bitterroot River	8/2/94	Allozymes	Westslope Cutthroat Trout	12	88.9
Lost Horse Creek	Bitterroot River	8/2/94	Allozymes	Rainbow Trout	12	11.1
Maynard Creek	East Fork Bitterroot River	9/26/95	Allozymes	Westslope Cutthroat Trout	10	92
Maynard Creek	East Fork Bitterroot River	9/26/95	Allozymes	Rainbow Trout	10	8
Meadow Creek	East Fork Bitterroot River	10/9/92	Allozymes	Bull Trout	11	100
Meadow Creek	East Fork Bitterroot River	8/15/91	Allozymes	Bull Trout	6	100
Meadow Creek	East Fork Bitterroot River	9/1/89	Allozymes	Bull Trout	3	100
Meadow Creek	East Fork Bitterroot River	9/1/89	Allozymes	Westslope Cutthroat Trout	21	100
Meadow Creek	East Fork Bitterroot River	9/1/89	Allozymes	Westslope Cutthroat Trout	21	100
Meadow Creek	East Fork Bitterroot River	8/22/85	Allozymes	Westslope Cutthroat Trout	25	100
Mill Creek	Bitterroot River	8/29/91	Allozymes	Westslope Cutthroat Trout	14	88.7
Mill Creek	Bitterroot River	8/29/91	Allozymes	Rainbow Trout	14	11.3
Miller Creek	Bitterroot River	8/8/07	PINES	Westslope Cutthroat Trout	10	100
Moose Creek	East Fork Bitterroot River	10/9/92	Allozymes	Bull Trout	6	100
Moose Creek	East Fork Bitterroot River	9/4/85	Allozymes	Westslope Cutthroat Trout	25	100
Moose Creek	East Fork Bitterroot River	1/1/85	Allozymes	Bull Trout	25	100
Nez Perce Fork	West Fork Bitterroot River	8/12/94	Allozymes	Westslope Cutthroat Trout	6	100
Nez Perce Fork	West Fork Bitterroot River	5/10/94	Allozymes	Westslope Cutthroat Trout	6	100
Nez Perce Fork	West Fork Bitterroot River	8/18/92	Allozymes	Brook X Bull Trout hybrid	2	0
Nez Perce Fork	West Fork Bitterroot River	8/1/92	Allozymes	Bull Trout	2	100
OBrien Creek	Bitterroot River	1/1/00	PINES	Westslope Cutthroat Trout	7	0
OBrien Creek	Bitterroot River	1/1/00	PINES	Westslope X Rainbow	7	0
OBrien Creek	Bitterroot River	1/1/00	PINES	Westslope Cutthroat Trout	8	0
OBrien Creek	Bitterroot River	1/1/00	PINES	Westslope X Rainbow	8	0
Piquett Creek	West Fork Bitterroot River	9/27/90	Allozymes	Westslope Cutthroat Trout	15	100
Reimel Creek	East Fork Bitterroot River	9/5/92	Allozymes	Westslope Cutthroat Trout	3	100
Reimel Creek	East Fork Bitterroot River	9/5/92	Allozymes	Westslope Cutthroat Trout	2	100
Reimel Creek	East Fork Bitterroot River	1/1/92	Allozymes	Brook Trout	3	100
Roaring Lion Creek	Bitterroot River	4/26/94	Allozymes	Westslope Cutthroat Trout	11	100
Rye Creek	Bitterroot River	8/10/06	Allozymes	Westslope Cutthroat Trout	28	100
Rye Creek	Bitterroot River	4/27/94	Allozymes	Westslope Cutthroat Trout	10	100
Rye Creek	Bitterroot River	9/12/84	Allozymes	Westslope Cutthroat Trout	26	100
Sawtooth Creek	Bitterroot River	7/29/94	Allozymes	Westslope Cutthroat Trout	10	100
Skalkaho Creek	Bitterroot River	5/15/04	PINES	Westslope Cutthroat Trout	68	99.5
Skalkaho Creek	Bitterroot River	5/15/04	PINES	Rainbow Trout	68	0.5
Skalkaho Creek	Bitterroot River	9/10/02	PINES	Westslope Cutthroat Trout	25	98.7
Skalkaho Creek	Bitterroot River	9/10/02	PINES	Rainbow Trout	25	1.3
Skalkaho Creek	Bitterroot River	5/3/94	Allozymes	Westslope Cutthroat Trout	10	100
Skalkaho Creek	Bitterroot River	10/14/92	Allozymes	Bull Trout	15	100
Skalkaho Creek	Bitterroot River	9/4/91	Allozymes	Westslope Cutthroat Trout	5	100
Skalkaho Creek	Bitterroot River	9/3/91	Allozymes	Bull Trout	10	0
Skalkaho Creek	Bitterroot River	9/3/91	Allozymes	Brook Trout	10	0
Skalkaho Creek	Bitterroot River	9/3/91	Allozymes	Westslope Cutthroat Trout	10	100
Slate Creek	West Fork Bitterroot River	7/18/94	Allozymes	Westslope Cutthroat Trout	11	100
Slate Creek	West Fork Bitterroot River	6/1/93	Allozymes	Bull Trout	21	0
Slate Creek	West Fork Bitterroot River	6/1/93	Allozymes	Brook X Bull Trout hybrid	21	0
Slate Creek	West Fork Bitterroot River	6/1/93	Allozymes	Brook Trout	21	0
Slate Creek	West Fork Bitterroot River	7/29/92	Allozymes	Brook X Bull Trout hybrid	8	0
Slate Creek	West Fork Bitterroot River	7/29/92	Allozymes	Brook Trout	8	0
Slate Creek	West Fork Bitterroot River	7/29/92	Allozymes	Bull Trout	8	0
Slate Creek	West Fork Bitterroot River	9/5/91	Allozymes	Westslope Cutthroat Trout	2	98.1
Slate Creek	West Fork Bitterroot River	9/5/91	Allozymes	Yellowstone Cutthroat Trout	2	1.9
Slate Creek	West Fork Bitterroot River	9/5/91	Allozymes	Brook Trout	4	0
Slate Creek	West Fork Bitterroot River	9/5/91	Allozymes	Bull Trout	4	0
Slate Creek	West Fork Bitterroot River	9/5/91	Allozymes	Brook X Bull Trout hybrid	4	0
Sleeping Child Creek	Bitterroot River	10/14/92	Allozymes	Bull Trout	11	100

Sleeping Child Creek	Bitterroot River	1/1/91	Allozymes	Bull Trout	9	0
Sleeping Child Creek	Bitterroot River	1/1/91	Allozymes	Brook Trout	9	0
Sleeping Child Creek	Bitterroot River	5/31/90	Allozymes	Westslope Cutthroat Trout	45	100
Sleeping Child Creek	Bitterroot River	9/1/89	Allozymes	Westslope Cutthroat Trout	17	100
Sleeping Child Creek	Bitterroot River	9/5/85	Allozymes	Westslope Cutthroat Trout	25	100
Sweathouse Creek	Bitterroot River	9/5/91	Allozymes	Westslope Cutthroat Trout	11	98.8
Sweathouse Creek	Bitterroot River	9/5/91	Allozymes	Yellowstone Cutthroat Trout	11	1.2
Sweathouse Creek	Bitterroot River	8/13/91	Allozymes	Westslope Cutthroat Trout	12	98.1
Sweathouse Creek	Bitterroot River	8/13/91	Allozymes	Yellowstone Cutthroat Trout	12	1.9
Threemile Creek	Bitterroot River	5/6/94	Allozymes	Westslope Cutthroat Trout	10	100
Tin Cup Creek	Bitterroot River	9/24/92	Allozymes	Brook X Bull Trout hybrid	5	0
Tin Cup Creek	Bitterroot River	9/24/92	Allozymes	Brook Trout	5	0
Tin Cup Creek	Bitterroot River	9/17/92	Allozymes	Westslope Cutthroat Trout	10	93.8
Tin Cup Creek	Bitterroot River	9/17/92	Allozymes	Rainbow Trout	10	3.1
Tin Cup Creek	Bitterroot River	9/17/92	Allozymes	Yellowstone Cutthroat Trout	10	3.1
Tin Cup Creek	Bitterroot River	8/17/82	Allozymes	Westslope Cutthroat Trout	50	95.2
Tin Cup Creek	Bitterroot River	8/17/82	Allozymes	Rainbow Trout	50	4.8
Tin Cup Creek	Bitterroot River	8/17/82	Allozymes	Brook Trout	36	0
Tin Cup Creek	Bitterroot River	8/17/82	Allozymes	Brook X Bull Trout hybrid	36	0
Tin Cup Creek	Bitterroot River	8/17/82	Allozymes	Bull Trout	36	0
Tolan Creek	East Fork Bitterroot River	8/15/91	Allozymes	Brook Trout	7	0
Tolan Creek	East Fork Bitterroot River	8/15/91	Allozymes	Bull Trout	7	0
Tolan Creek	East Fork Bitterroot River	8/28/85	Allozymes	Westslope Cutthroat Trout	26	100
Trapper Creek	West Fork Bitterroot River	9/15/92	Allozymes	Brook X Bull Trout hybrid	3	0
Trapper Creek	West Fork Bitterroot River	9/15/92	Allozymes	Brook Trout	3	0
Trapper Creek	West Fork Bitterroot River	9/5/92	Allozymes	Westslope Cutthroat Trout	13	70.5
Trapper Creek	West Fork Bitterroot River	9/5/92	Allozymes	Rainbow Trout	13	29.5
Warm Springs Creek	East Fork Bitterroot River	6/7/94	Allozymes	Westslope Cutthroat Trout	11	100
Warm Springs Creek	East Fork Bitterroot River	5/31/90	Allozymes	Westslope Cutthroat Trout	5	85
Warm Springs Creek	East Fork Bitterroot River	5/31/90	Allozymes	Rainbow Trout	5	15
Warm Springs Creek	East Fork Bitterroot River	5/31/90	Allozymes	Westslope Cutthroat Trout	5	85
Warm Springs Creek	East Fork Bitterroot River	5/31/90	Allozymes	Rainbow Trout	5	15
West Creek	West Fork Bitterroot River	7/19/95	Allozymes	Westslope Cutthroat Trout	10	100
West Fork Bitterroot River	Bitterroot River	9/21/98	Allozymes	Westslope Cutthroat Trout	6	100
West Fork Bitterroot River	Bitterroot River	9/17/98	Allozymes	Westslope Cutthroat Trout	9	77.8
West Fork Bitterroot River	Bitterroot River	9/17/98	Allozymes	Yellowstone Cutthroat Trout	9	15.2
West Fork Bitterroot River	Bitterroot River	9/17/98	Allozymes	Rainbow Trout	9	7
West Fork Bitterroot River	Bitterroot River	9/17/98	PINES	Westslope Cutthroat Trout	14	97.3
West Fork Bitterroot River	Bitterroot River	9/17/98	PINES	Rainbow Trout	14	2.7
West Fork Bitterroot River	Bitterroot River	7/18/94	Allozymes	Westslope Cutthroat Trout	16	100
West Fork Bitterroot River	Bitterroot River	9/6/92	Allozymes	Westslope Cutthroat Trout	16	100
West Fork Bitterroot River	Bitterroot River	8/1/91	Allozymes	Brook Trout	3	100
Willow Creek	Bitterroot River	6/1/90	Allozymes	Westslope Cutthroat Trout	5	100
Woods Creek	West Fork Bitterroot River	7/31/95	Allozymes	Westslope Cutthroat Trout	10	100
Woods Creek	West Fork Bitterroot River	8/1/91	Allozymes	Bull Trout	5	40
Woods Creek	West Fork Bitterroot River	8/1/91	Allozymes	Brook Trout	5	40
Woods Creek	West Fork Bitterroot River	8/1/91	Allozymes	Brook X Bull Trout hybrid	5	20

Appendix 14
Fish Stocking History of the Bitterroot Subbasin*

** Data downloaded from Montana Fish, Wildlife and Parks Montan Fisheries Information System (MFISH). Accessed at http://fwp.mt.gov/fishing/mfish/ on July 10, 2009.*

Brook Trout

Waterbody Name	Tributary To	Plant Date	Number of Fish	Hatchery Name
Bitterroot River	Clark Fork River	3/21/40	35000	Hamilton
Bitterroot River	Clark Fork River	4/10/39	20000	Hamilton
Bitterroot River	Clark Fork River	4/14/38	28400	Hamilton
Bitterroot River	Clark Fork River	4/21/37	25400	Hamilton
Bitterroot River	Clark Fork River	3/21/40	35000	Hamilton
Bitterroot River	Clark Fork River	4/10/39	20000	Hamilton
Bitterroot River	Clark Fork River	4/14/38	28400	Hamilton
Bitterroot River	Clark Fork River	4/21/37	25400	Hamilton
Burnt Fork Bitterroot River	Bitterroot River	7/14/48	1200	Jocko River Trout Hatchery
Burnt Fork Bitterroot River	Bitterroot River	7/13/48	1200	Jocko River Trout Hatchery
Burnt Fork Bitterroot River	Bitterroot River	8/1/47	1400	Jocko River Trout Hatchery
Burnt Fork Bitterroot River	Bitterroot River	7/31/47	1400	Jocko River Trout Hatchery
Cameron Creek	East Fork Bitterroot River	4/29/43	16600	Hamilton
Camp Creek	East Fork Bitterroot River	4/29/42	14640	Hamilton
Miller Creek	Bitterroot River	7/24/47	1400	Jocko River Trout Hatchery
Miller Creek	Bitterroot River	7/22/47	1400	Jocko River Trout Hatchery
Threemile Creek	Bitterroot River	8/2/47	1400	Jocko River Trout Hatchery
Threemile Creek	Bitterroot River	8/2/47	1400	Jocko River Trout Hatchery
Tin Cup Creek	Bitterroot River	5/8/40	5070	Hamilton
Willow Creek	Bitterroot River	4/28/43	16600	Hamilton
Willow Creek	Bitterroot River	5/16/41	10000	Hamilton
Willow Creek	Bitterroot River	5/11/40	15000	Hamilton

Brown Trout

Waterbody Name	Tributary To	Plant Date	Number of Fish	Hatchery Name
Bitterroot River	Clark Fork River	4/24/79	6144	Hamilton
Bitterroot River	Clark Fork River	6/8/54	46150	Hamilton
Bitterroot River	Clark Fork River	6/7/54	3940	Hamilton
Bitterroot River	Clark Fork River	6/7/54	7880	Hamilton
Bitterroot River	Clark Fork River	6/7/54	7880	Hamilton
Bitterroot River	Clark Fork River	6/4/54	11520	Hamilton
Bitterroot River	Clark Fork River	6/3/54	11520	Hamilton
Bitterroot River	Clark Fork River	5/4/54	6845	Hamilton
Bitterroot River	Clark Fork River	5/4/54	16835	Hamilton
Bitterroot River	Clark Fork River	5/3/54	18300	Hamilton
Bitterroot River	Clark Fork River	4/28/54	18300	Hamilton
Bitterroot River	Clark Fork River	5/13/53	19175	Hamilton
Bitterroot River	Clark Fork River	5/8/53	32995	Hamilton
Bitterroot River	Clark Fork River	5/5/53	25344	Hamilton
Bitterroot River	Clark Fork River	4/17/53	9600	Hamilton
Bitterroot River	Clark Fork River	3/13/53	19200	Hamilton
Bitterroot River	Clark Fork River	3/12/53	9600	Hamilton
Bitterroot River	Clark Fork River	3/12/53	9600	Hamilton
Bitterroot River	Clark Fork River	5/3/51	9450	Hamilton
Bitterroot River	Clark Fork River	5/3/51	12000	Hamilton
Bitterroot River	Clark Fork River	5/3/51	14000	Hamilton
Bitterroot River	Clark Fork River	5/2/51	12000	Hamilton
Bitterroot River	Clark Fork River	5/2/51	12000	Hamilton
Bitterroot River	Clark Fork River	5/2/51	12000	Hamilton
Bitterroot River	Clark Fork River	5/2/51	13720	Hamilton
Bitterroot River	Clark Fork River	5/9/50	4440	Hamilton
Bitterroot River	Clark Fork River	5/9/50	5920	Hamilton
Bitterroot River	Clark Fork River	5/9/50	5920	Hamilton
Bitterroot River	Clark Fork River	5/9/50	10360	Hamilton
Bitterroot River	Clark Fork River	5/9/50	10480	Hamilton
Bitterroot River	Clark Fork River	5/9/50	14800	Hamilton
Bitterroot River	Clark Fork River	4/24/49	6144	Hamilton
Bitterroot River	Clark Fork River	4/24/49	10240	Hamilton
Bitterroot River	Clark Fork River	4/11/49	6144	Hamilton
Bitterroot River	Clark Fork River	4/11/49	6144	Hamilton
Bitterroot River	Clark Fork River	4/11/49	6144	Hamilton
Bitterroot River	Clark Fork River	4/11/49	6144	Hamilton
Bitterroot River	Clark Fork River	4/11/49	10240	Hamilton
Bitterroot River	Clark Fork River	4/11/49	14336	Hamilton
Bitterroot River	Clark Fork River	5/1/48	5248	Hamilton
Bitterroot River	Clark Fork River	5/1/48	5248	Hamilton
Bitterroot River	Clark Fork River	5/1/48	10496	Hamilton
Bitterroot River	Clark Fork River	5/1/48	10496	Hamilton
Bitterroot River	Clark Fork River	5/1/48	15744	Hamilton
Bitterroot River	Clark Fork River	5/1/48	20992	Hamilton
Bitterroot River	Clark Fork River	5/20/47	6800	Hamilton
Bitterroot River	Clark Fork River	5/20/47	13600	Hamilton
Bitterroot River	Clark Fork River	5/20/47	13600	Hamilton
Bitterroot River	Clark Fork River	5/2/46	10000	Hamilton
Bitterroot River	Clark Fork River	5/2/46	14000	Hamilton
Bitterroot River	Clark Fork River	5/1/46	7000	Hamilton
Bitterroot River	Clark Fork River	5/1/46	13668	Hamilton
Bitterroot River	Clark Fork River	5/1/46	21250	Hamilton
Bitterroot River	Clark Fork River	4/17/45	51440	Hamilton
Bitterroot River	Clark Fork River	4/10/45	20440	Hamilton
Bitterroot River	Clark Fork River	4/10/45	31000	Hamilton
Bitterroot River	Clark Fork River	4/12/44	52000	Hamilton
Bitterroot River	Clark Fork River	4/18/43	27500	Hamilton
Mill Creek	Bitterroot River	5/12/48	24700	Hamilton

Rainbow Trout

Waterbody Name	Tributary To	Plant Date	Number of Fish	Hatchery Name
Bass Creek	Bitterroot River	11/12/34	50000	Hamilton
Big Creek	Bitterroot River	6/10/43	2000	Hamilton
Big Creek	Bitterroot River	10/24/38	20000	Hamilton
Big Creek	Bitterroot River	10/13/37	15000	Hamilton
Big Creek	Bitterroot River	8/6/64	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/24/60	644	Hamilton
Bitterroot River	Clark Fork River	8/24/60	920	Hamilton
Bitterroot River	Clark Fork River	8/24/60	920	Hamilton
Bitterroot River	Clark Fork River	8/23/60	660	Hamilton
Bitterroot River	Clark Fork River	8/23/60	920	Hamilton
Bitterroot River	Clark Fork River	8/22/60	660	Hamilton
Bitterroot River	Clark Fork River	8/22/60	920	Hamilton
Bitterroot River	Clark Fork River	8/22/60	920	Hamilton
Bitterroot River	Clark Fork River	8/18/60	920	Hamilton
Bitterroot River	Clark Fork River	8/18/60	920	Hamilton
Bitterroot River	Clark Fork River	8/17/60	920	Hamilton
Bitterroot River	Clark Fork River	8/17/60	920	Hamilton
Bitterroot River	Clark Fork River	8/17/60	920	Hamilton
Bitterroot River	Clark Fork River	8/16/60	680	Hamilton
Bitterroot River	Clark Fork River	8/16/60	680	Hamilton
Bitterroot River	Clark Fork River	8/16/60	920	Hamilton
Bitterroot River	Clark Fork River	8/15/60	680	Hamilton
Bitterroot River	Clark Fork River	8/13/60	920	Hamilton
Bitterroot River	Clark Fork River	7/29/60	992	Hamilton
Bitterroot River	Clark Fork River	7/29/60	1066	Hamilton
Bitterroot River	Clark Fork River	7/21/60	992	Hamilton
Bitterroot River	Clark Fork River	7/20/60	1004	Hamilton
Bitterroot River	Clark Fork River	7/20/60	1004	Hamilton
Bitterroot River	Clark Fork River	7/6/60	992	Hamilton
Bitterroot River	Clark Fork River	7/6/60	992	Hamilton
Bitterroot River	Clark Fork River	7/5/60	992	Hamilton
Bitterroot River	Clark Fork River	7/5/60	992	Hamilton
Bitterroot River	Clark Fork River	7/5/60	992	Hamilton
Bitterroot River	Clark Fork River	6/29/60	992	Hamilton
Bitterroot River	Clark Fork River	6/29/60	992	Hamilton
Bitterroot River	Clark Fork River	8/4/59	800	Hamilton
Bitterroot River	Clark Fork River	8/4/59	1600	Hamilton
Bitterroot River	Clark Fork River	8/4/59	1600	Hamilton
Bitterroot River	Clark Fork River	8/3/59	1280	Hamilton
Bitterroot River	Clark Fork River	8/3/59	1280	Hamilton
Bitterroot River	Clark Fork River	7/29/59	875	Hamilton
Bitterroot River	Clark Fork River	7/29/59	875	Hamilton
Bitterroot River	Clark Fork River	7/29/59	880	Hamilton
Bitterroot River	Clark Fork River	7/29/59	935	Hamilton
Bitterroot River	Clark Fork River	7/29/59	962	Hamilton

Bitterroot River	Clark Fork River	7/29/59	1000	Hamilton
Bitterroot River	Clark Fork River	7/29/59	1000	Hamilton
Bitterroot River	Clark Fork River	7/28/59	880	Hamilton
Bitterroot River	Clark Fork River	7/28/59	880	Hamilton
Bitterroot River	Clark Fork River	7/28/59	880	Hamilton
Bitterroot River	Clark Fork River	7/28/59	935	Hamilton
Bitterroot River	Clark Fork River	7/28/59	935	Hamilton
Bitterroot River	Clark Fork River	7/28/59	1000	Hamilton
Bitterroot River	Clark Fork River	7/27/59	1100	Hamilton
Bitterroot River	Clark Fork River	7/24/59	880	Hamilton
Bitterroot River	Clark Fork River	7/21/59	800	Hamilton
Bitterroot River	Clark Fork River	7/21/59	880	Hamilton
Bitterroot River	Clark Fork River	7/13/59	960	Hamilton
Bitterroot River	Clark Fork River	7/13/59	960	Hamilton
Bitterroot River	Clark Fork River	7/13/59	960	Hamilton
Bitterroot River	Clark Fork River	7/7/59	800	Hamilton
Bitterroot River	Clark Fork River	7/7/59	960	Hamilton
Bitterroot River	Clark Fork River	8/7/58	315	Hamilton
Bitterroot River	Clark Fork River	8/7/58	945	Hamilton
Bitterroot River	Clark Fork River	8/6/58	700	Hamilton
Bitterroot River	Clark Fork River	8/6/58	700	Hamilton
Bitterroot River	Clark Fork River	8/6/58	700	Hamilton
Bitterroot River	Clark Fork River	8/5/58	700	Hamilton
Bitterroot River	Clark Fork River	8/5/58	700	Hamilton
Bitterroot River	Clark Fork River	8/5/58	700	Hamilton
Bitterroot River	Clark Fork River	7/24/58	700	Hamilton
Bitterroot River	Clark Fork River	7/24/58	700	Hamilton
Bitterroot River	Clark Fork River	7/23/58	700	Hamilton
Bitterroot River	Clark Fork River	7/23/58	700	Hamilton
Bitterroot River	Clark Fork River	7/23/58	700	Hamilton
Bitterroot River	Clark Fork River	7/22/58	700	Hamilton
Bitterroot River	Clark Fork River	7/22/58	700	Hamilton
Bitterroot River	Clark Fork River	7/22/58	700	Hamilton
Bitterroot River	Clark Fork River	7/22/58	700	Hamilton
Bitterroot River	Clark Fork River	7/16/58	750	Hamilton
Bitterroot River	Clark Fork River	7/16/58	800	Hamilton
Bitterroot River	Clark Fork River	7/15/58	750	Hamilton
Bitterroot River	Clark Fork River	7/15/58	750	Hamilton
Bitterroot River	Clark Fork River	7/15/58	750	Hamilton
Bitterroot River	Clark Fork River	7/14/58	700	Hamilton
Bitterroot River	Clark Fork River	7/14/58	750	Hamilton
Bitterroot River	Clark Fork River	6/26/58	375	Hamilton
Bitterroot River	Clark Fork River	6/26/58	630	Hamilton
Bitterroot River	Clark Fork River	6/26/58	750	Hamilton
Bitterroot River	Clark Fork River	6/25/58	600	Hamilton
Bitterroot River	Clark Fork River	6/25/58	600	Hamilton
Bitterroot River	Clark Fork River	6/25/58	600	Hamilton
Bitterroot River	Clark Fork River	6/25/58	720	Hamilton
Bitterroot River	Clark Fork River	6/24/58	600	Hamilton
Bitterroot River	Clark Fork River	6/23/58	600	Hamilton
Bitterroot River	Clark Fork River	6/23/58	600	Hamilton
Bitterroot River	Clark Fork River	6/23/58	600	Hamilton
Bitterroot River	Clark Fork River	6/23/58	600	Hamilton
Bitterroot River	Clark Fork River	6/23/58	600	Hamilton
Bitterroot River	Clark Fork River	6/18/58	480	Hamilton
Bitterroot River	Clark Fork River	8/28/57	840	Hamilton
Bitterroot River	Clark Fork River	8/28/57	1000	Hamilton
Bitterroot River	Clark Fork River	8/28/57	1000	Hamilton
Bitterroot River	Clark Fork River	8/14/57	1050	Hamilton
Bitterroot River	Clark Fork River	8/14/57	1050	Hamilton
Bitterroot River	Clark Fork River	8/13/57	1120	Hamilton
Bitterroot River	Clark Fork River	7/30/57	1050	Hamilton
Bitterroot River	Clark Fork River	7/29/57	1050	Hamilton
Bitterroot River	Clark Fork River	7/29/57	1050	Hamilton
Bitterroot River	Clark Fork River	7/22/57	1400	Hamilton
Bitterroot River	Clark Fork River	7/17/57	1050	Hamilton
Bitterroot River	Clark Fork River	7/15/57	1050	Hamilton
Bitterroot River	Clark Fork River	6/26/57	975	Hamilton
Bitterroot River	Clark Fork River	6/26/57	975	Hamilton
Bitterroot River	Clark Fork River	6/26/57	976	Hamilton
Bitterroot River	Clark Fork River	6/26/57	980	Hamilton
Bitterroot River	Clark Fork River	6/24/57	1200	Hamilton
Bitterroot River	Clark Fork River	6/19/57	1200	Hamilton
Bitterroot River	Clark Fork River	6/19/57	1200	Hamilton
Bitterroot River	Clark Fork River	6/19/57	1200	Hamilton
Bitterroot River	Clark Fork River	6/19/57	1400	Hamilton
Bitterroot River	Clark Fork River	8/16/56	500	Hamilton
Bitterroot River	Clark Fork River	8/11/56	850	Hamilton
Bitterroot River	Clark Fork River	8/11/56	950	Hamilton
Bitterroot River	Clark Fork River	8/10/56	950	Hamilton
Bitterroot River	Clark Fork River	8/10/56	950	Hamilton
Bitterroot River	Clark Fork River	8/9/56	960	Hamilton
Bitterroot River	Clark Fork River	8/9/56	960	Hamilton
Bitterroot River	Clark Fork River	7/17/56	1275	Hamilton
Bitterroot River	Clark Fork River	7/16/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/16/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/16/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/16/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/16/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/12/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/11/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/11/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/2/56	1200	Hamilton
Bitterroot River	Clark Fork River	6/28/56	1200	Hamilton
Bitterroot River	Clark Fork River	6/28/56	1950	Hamilton
Bitterroot River	Clark Fork River	6/27/56	1200	Hamilton
Bitterroot River	Clark Fork River	6/26/56	1800	Hamilton
Bitterroot River	Clark Fork River	6/26/56	1920	Hamilton
Bitterroot River	Clark Fork River	6/25/56	1200	Hamilton
Bitterroot River	Clark Fork River	6/25/56	1200	Hamilton
Bitterroot River	Clark Fork River	5/21/56	54950	Hamilton
Bitterroot River	Clark Fork River	8/8/55	1100	Hamilton
Bitterroot River	Clark Fork River	8/5/55	1650	Hamilton
Bitterroot River	Clark Fork River	8/5/55	1650	Hamilton
Bitterroot River	Clark Fork River	8/5/55	1980	Hamilton
Bitterroot River	Clark Fork River	8/4/55	1800	Hamilton
Bitterroot River	Clark Fork River	8/3/55	1100	Hamilton
Bitterroot River	Clark Fork River	7/29/55	1040	Hamilton
Bitterroot River	Clark Fork River	7/28/55	735	Hamilton
Bitterroot River	Clark Fork River	7/27/55	720	Hamilton
Bitterroot River	Clark Fork River	7/27/55	900	Hamilton
Bitterroot River	Clark Fork River	7/26/55	1050	Hamilton
Bitterroot River	Clark Fork River	7/22/55	1050	Hamilton
Bitterroot River	Clark Fork River	7/22/55	1050	Hamilton
Bitterroot River	Clark Fork River	7/21/55	1120	Hamilton
Bitterroot River	Clark Fork River	7/19/55	225	Hamilton
Bitterroot River	Clark Fork River	7/19/55	1050	Hamilton
Bitterroot River	Clark Fork River	7/19/55	1200	Hamilton
Bitterroot River	Clark Fork River	7/12/55	780	Hamilton
Bitterroot River	Clark Fork River	7/12/55	840	Hamilton
Bitterroot River	Clark Fork River	7/12/55	980	Hamilton
Bitterroot River	Clark Fork River	7/8/55	1120	Hamilton
Bitterroot River	Clark Fork River	7/8/55	1350	Hamilton
Bitterroot River	Clark Fork River	7/7/55	1350	Hamilton
Bitterroot River	Clark Fork River	7/7/55	1350	Hamilton
Bitterroot River	Clark Fork River	7/12/54	1400	Hamilton
Bitterroot River	Clark Fork River	7/12/54	1500	Hamilton
Bitterroot River	Clark Fork River	7/12/54	1700	Hamilton
Bitterroot River	Clark Fork River	7/8/54	1200	Hamilton
Bitterroot River	Clark Fork River	7/8/54	1680	Hamilton
Bitterroot River	Clark Fork River	7/7/54	1560	Hamilton
Bitterroot River	Clark Fork River	7/7/54	1960	Hamilton
Bitterroot River	Clark Fork River	7/7/54	1960	Hamilton
Bitterroot River	Clark Fork River	7/6/54	1540	Hamilton
Bitterroot River	Clark Fork River	7/6/54	1820	Hamilton

Bitterroot River	Clark Fork River	6/24/54	1100	Hamilton
Bitterroot River	Clark Fork River	6/24/54	1820	Hamilton
Bitterroot River	Clark Fork River	6/24/54	2240	Hamilton
Bitterroot River	Clark Fork River	6/23/54	990	Hamilton
Bitterroot River	Clark Fork River	6/23/54	1080	Hamilton
Bitterroot River	Clark Fork River	6/23/54	1260	Hamilton
Bitterroot River	Clark Fork River	6/15/54	1200	Hamilton
Bitterroot River	Clark Fork River	6/15/54	1440	Hamilton
Bitterroot River	Clark Fork River	6/11/54	1440	Hamilton
Bitterroot River	Clark Fork River	6/10/54	900	Hamilton
Bitterroot River	Clark Fork River	7/8/53	1600	Hamilton
Bitterroot River	Clark Fork River	7/8/53	2000	Hamilton
Bitterroot River	Clark Fork River	7/7/53	1700	Hamilton
Bitterroot River	Clark Fork River	7/7/53	1700	Hamilton
Bitterroot River	Clark Fork River	7/6/53	1700	Hamilton
Bitterroot River	Clark Fork River	7/6/53	1700	Hamilton
Bitterroot River	Clark Fork River	7/6/53	1700	Hamilton
Bitterroot River	Clark Fork River	6/26/53	1700	Hamilton
Bitterroot River	Clark Fork River	6/26/53	2380	Hamilton
Bitterroot River	Clark Fork River	6/6/52	3000	Hamilton
Bitterroot River	Clark Fork River	6/6/52	4200	Hamilton
Bitterroot River	Clark Fork River	6/5/52	3000	Hamilton
Bitterroot River	Clark Fork River	6/5/52	6000	Hamilton
Bitterroot River	Clark Fork River	6/19/51	5000	Hamilton
Bitterroot River	Clark Fork River	6/19/51	5000	Hamilton
Bitterroot River	Clark Fork River	6/13/51	5000	Hamilton
Bitterroot River	Clark Fork River	6/13/51	6200	Hamilton
Bitterroot River	Clark Fork River	7/28/50	6000	Hamilton
Bitterroot River	Clark Fork River	7/27/50	4000	Hamilton
Bitterroot River	Clark Fork River	7/26/50	6000	Hamilton
Bitterroot River	Clark Fork River	7/25/50	5000	Hamilton
Bitterroot River	Clark Fork River	7/20/50	2000	Hamilton
Bitterroot River	Clark Fork River	7/18/50	5300	Hamilton
Bitterroot River	Clark Fork River	7/18/50	5400	Hamilton
Bitterroot River	Clark Fork River	7/15/50	1800	Hamilton
Bitterroot River	Clark Fork River	7/14/50	5400	Hamilton
Bitterroot River	Clark Fork River	7/13/50	5300	Hamilton
Bitterroot River	Clark Fork River	7/12/50	5400	Hamilton
Bitterroot River	Clark Fork River	7/11/50	5500	Hamilton
Bitterroot River	Clark Fork River	7/10/50	6176	Hamilton
Bitterroot River	Clark Fork River	7/10/50	6548	Hamilton
Bitterroot River	Clark Fork River	6/22/49	1984	Hamilton
Bitterroot River	Clark Fork River	6/22/49	3100	Hamilton
Bitterroot River	Clark Fork River	6/21/49	4340	Hamilton
Bitterroot River	Clark Fork River	6/15/49	2700	Hamilton
Bitterroot River	Clark Fork River	6/14/49	3000	Hamilton
Bitterroot River	Clark Fork River	6/13/49	2500	Hamilton
Bitterroot River	Clark Fork River	9/23/48	13600	Hamilton
Bitterroot River	Clark Fork River	9/23/48	20000	Hamilton
Bitterroot River	Clark Fork River	8/6/48	1386	Hamilton
Bitterroot River	Clark Fork River	7/29/48	3844	Hamilton
Bitterroot River	Clark Fork River	7/23/48	3800	Hamilton
Bitterroot River	Clark Fork River	7/18/48	1000	Hamilton
Bitterroot River	Clark Fork River	7/14/48	3500	Hamilton
Bitterroot River	Clark Fork River	7/14/48	3500	Hamilton
Bitterroot River	Clark Fork River	7/10/48	4000	Hamilton
Bitterroot River	Clark Fork River	7/9/48	3600	Hamilton
Bitterroot River	Clark Fork River	7/8/48	2880	Hamilton
Bitterroot River	Clark Fork River	7/6/48	3000	Hamilton
Bitterroot River	Clark Fork River	5/11/48	75	Hamilton
Bitterroot River	Clark Fork River	6/5/47	5580	Hamilton
Bitterroot River	Clark Fork River	9/7/46	3000	Hamilton
Bitterroot River	Clark Fork River	7/30/46	5080	Hamilton
Bitterroot River	Clark Fork River	7/21/46	4200	Hamilton
Bitterroot River	Clark Fork River	6/29/43	3150	Hamilton
Bitterroot River	Clark Fork River	7/24/42	33000	Hamilton
Bitterroot River	Clark Fork River	7/21/42	24000	Hamilton
Bitterroot River	Clark Fork River	6/6/42	60000	Hamilton
Bitterroot River	Clark Fork River	6/19/41	2250	Hamilton
Bitterroot River	Clark Fork River	5/27/41	60000	Hamilton
Bitterroot River	Clark Fork River	10/29/40	11000	Hamilton
Bitterroot River	Clark Fork River	10/2/40	25000	Hamilton
Bitterroot River	Clark Fork River	8/12/40	20000	Hamilton
Bitterroot River	Clark Fork River	5/18/40	3200	Hamilton
Bitterroot River	Clark Fork River	5/17/40	2500	Hamilton
Bitterroot River	Clark Fork River	10/11/39	36000	Hamilton
Bitterroot River	Clark Fork River	9/12/39	3600	Hamilton
Bitterroot River	Clark Fork River	10/6/38	3000	Hamilton
Bitterroot River	Clark Fork River	6/26/35	50000	Hamilton
Bitterroot River	Clark Fork River	6/25/35	50000	Hamilton
Bitterroot River	Clark Fork River	6/24/35	50000	Hamilton
Bitterroot River	Clark Fork River	6/8/34	43000	Hamilton
Bitterroot River	Clark Fork River	6/7/34	43000	Hamilton
Bitterroot River	Clark Fork River	6/5/34	40000	Hamilton
Bitterroot River	Clark Fork River	6/4/34	40000	Hamilton
Bitterroot River	Clark Fork River	9/22/33	25000	Hamilton
Bitterroot River	Clark Fork River	9/22/33	25000	Hamilton
Bitterroot River	Clark Fork River	9/21/33	25000	Hamilton
Bitterroot River	Clark Fork River	12/1/31	50000	Hamilton
Bitterroot River	Clark Fork River	11/4/28	50000	Hamilton
Bitterroot River	Clark Fork River	7/14/28	24000	Hamilton
Bitterroot River	Clark Fork River	7/12/28	24000	Hamilton
Bitterroot River	Clark Fork River	7/9/28	24000	Hamilton
Bitterroot River	Clark Fork River	8/24/60	644	Hamilton
Bitterroot River	Clark Fork River	8/24/60	920	Hamilton
Bitterroot River	Clark Fork River	8/24/60	920	Hamilton
Bitterroot River	Clark Fork River	8/23/60	660	Hamilton
Bitterroot River	Clark Fork River	8/23/60	920	Hamilton
Bitterroot River	Clark Fork River	8/22/60	660	Hamilton
Bitterroot River	Clark Fork River	8/22/60	920	Hamilton
Bitterroot River	Clark Fork River	8/22/60	920	Hamilton
Bitterroot River	Clark Fork River	8/18/60	920	Hamilton
Bitterroot River	Clark Fork River	8/18/60	920	Hamilton
Bitterroot River	Clark Fork River	8/17/60	920	Hamilton
Bitterroot River	Clark Fork River	8/17/60	920	Hamilton
Bitterroot River	Clark Fork River	8/17/60	920	Hamilton
Bitterroot River	Clark Fork River	8/16/60	680	Hamilton
Bitterroot River	Clark Fork River	8/16/60	680	Hamilton
Bitterroot River	Clark Fork River	8/16/60	920	Hamilton
Bitterroot River	Clark Fork River	8/15/60	680	Hamilton
Bitterroot River	Clark Fork River	8/13/60	920	Hamilton
Bitterroot River	Clark Fork River	7/29/60	992	Hamilton
Bitterroot River	Clark Fork River	7/29/60	1066	Hamilton
Bitterroot River	Clark Fork River	7/21/60	992	Hamilton
Bitterroot River	Clark Fork River	7/20/60	1004	Hamilton
Bitterroot River	Clark Fork River	7/20/60	1004	Hamilton
Bitterroot River	Clark Fork River	7/6/60	992	Hamilton
Bitterroot River	Clark Fork River	7/6/60	992	Hamilton
Bitterroot River	Clark Fork River	7/5/60	992	Hamilton
Bitterroot River	Clark Fork River	7/5/60	992	Hamilton
Bitterroot River	Clark Fork River	7/5/60	992	Hamilton
Bitterroot River	Clark Fork River	6/29/60	992	Hamilton
Bitterroot River	Clark Fork River	6/29/60	992	Hamilton
Bitterroot River	Clark Fork River	8/4/59	800	Hamilton
Bitterroot River	Clark Fork River	8/4/59	1600	Hamilton
Bitterroot River	Clark Fork River	8/4/59	1600	Hamilton
Bitterroot River	Clark Fork River	8/3/59	1280	Hamilton
Bitterroot River	Clark Fork River	8/3/59	1280	Hamilton
Bitterroot River	Clark Fork River	7/29/59	875	Hamilton
Bitterroot River	Clark Fork River	7/29/59	875	Hamilton
Bitterroot River	Clark Fork River	7/29/59	880	Hamilton
Bitterroot River	Clark Fork River	7/29/59	935	Hamilton
Bitterroot River	Clark Fork River	7/29/59	962	Hamilton
Bitterroot River	Clark Fork River	7/29/59	1000	Hamilton
Bitterroot River	Clark Fork River	7/29/59	1000	Hamilton

Bitterroot River	Clark Fork River	7/28/59	880	Hamilton
Bitterroot River	Clark Fork River	7/28/59	880	Hamilton
Bitterroot River	Clark Fork River	7/28/59	880	Hamilton
Bitterroot River	Clark Fork River	7/28/59	935	Hamilton
Bitterroot River	Clark Fork River	7/28/59	935	Hamilton
Bitterroot River	Clark Fork River	7/28/59	1000	Hamilton
Bitterroot River	Clark Fork River	7/27/59	1100	Hamilton
Bitterroot River	Clark Fork River	7/24/59	880	Hamilton
Bitterroot River	Clark Fork River	7/21/59	800	Hamilton
Bitterroot River	Clark Fork River	7/21/59	880	Hamilton
Bitterroot River	Clark Fork River	7/13/59	960	Hamilton
Bitterroot River	Clark Fork River	7/13/59	960	Hamilton
Bitterroot River	Clark Fork River	7/13/59	960	Hamilton
Bitterroot River	Clark Fork River	7/7/59	800	Hamilton
Bitterroot River	Clark Fork River	7/7/59	960	Hamilton
Bitterroot River	Clark Fork River	8/7/58	315	Hamilton
Bitterroot River	Clark Fork River	8/7/58	945	Hamilton
Bitterroot River	Clark Fork River	8/6/58	700	Hamilton
Bitterroot River	Clark Fork River	8/6/58	700	Hamilton
Bitterroot River	Clark Fork River	8/6/58	700	Hamilton
Bitterroot River	Clark Fork River	8/5/58	700	Hamilton
Bitterroot River	Clark Fork River	8/5/58	700	Hamilton
Bitterroot River	Clark Fork River	8/5/58	700	Hamilton
Bitterroot River	Clark Fork River	7/24/58	700	Hamilton
Bitterroot River	Clark Fork River	7/24/58	700	Hamilton
Bitterroot River	Clark Fork River	7/23/58	700	Hamilton
Bitterroot River	Clark Fork River	7/23/58	700	Hamilton
Bitterroot River	Clark Fork River	7/23/58	700	Hamilton
Bitterroot River	Clark Fork River	7/22/58	700	Hamilton
Bitterroot River	Clark Fork River	7/22/58	700	Hamilton
Bitterroot River	Clark Fork River	7/22/58	700	Hamilton
Bitterroot River	Clark Fork River	7/22/58	700	Hamilton
Bitterroot River	Clark Fork River	7/16/58	750	Hamilton
Bitterroot River	Clark Fork River	7/16/58	800	Hamilton
Bitterroot River	Clark Fork River	7/15/58	750	Hamilton
Bitterroot River	Clark Fork River	7/15/58	750	Hamilton
Bitterroot River	Clark Fork River	7/15/58	750	Hamilton
Bitterroot River	Clark Fork River	7/14/58	700	Hamilton
Bitterroot River	Clark Fork River	7/14/58	750	Hamilton
Bitterroot River	Clark Fork River	6/26/58	375	Hamilton
Bitterroot River	Clark Fork River	6/26/58	630	Hamilton
Bitterroot River	Clark Fork River	6/26/58	750	Hamilton
Bitterroot River	Clark Fork River	6/25/58	600	Hamilton
Bitterroot River	Clark Fork River	6/25/58	600	Hamilton
Bitterroot River	Clark Fork River	6/25/58	600	Hamilton
Bitterroot River	Clark Fork River	6/25/58	720	Hamilton
Bitterroot River	Clark Fork River	6/24/58	600	Hamilton
Bitterroot River	Clark Fork River	6/23/58	600	Hamilton
Bitterroot River	Clark Fork River	6/23/58	600	Hamilton
Bitterroot River	Clark Fork River	6/23/58	600	Hamilton
Bitterroot River	Clark Fork River	6/23/58	600	Hamilton
Bitterroot River	Clark Fork River	6/23/58	600	Hamilton
Bitterroot River	Clark Fork River	6/18/58	480	Hamilton
Bitterroot River	Clark Fork River	8/28/57	840	Hamilton
Bitterroot River	Clark Fork River	8/28/57	1000	Hamilton
Bitterroot River	Clark Fork River	8/28/57	1000	Hamilton
Bitterroot River	Clark Fork River	8/14/57	1050	Hamilton
Bitterroot River	Clark Fork River	8/14/57	1050	Hamilton
Bitterroot River	Clark Fork River	8/13/57	1120	Hamilton
Bitterroot River	Clark Fork River	7/30/57	1050	Hamilton
Bitterroot River	Clark Fork River	7/29/57	1050	Hamilton
Bitterroot River	Clark Fork River	7/29/57	1050	Hamilton
Bitterroot River	Clark Fork River	7/22/57	1400	Hamilton
Bitterroot River	Clark Fork River	7/17/57	1050	Hamilton
Bitterroot River	Clark Fork River	7/15/57	1050	Hamilton
Bitterroot River	Clark Fork River	6/26/57	975	Hamilton
Bitterroot River	Clark Fork River	6/26/57	975	Hamilton
Bitterroot River	Clark Fork River	6/26/57	976	Hamilton
Bitterroot River	Clark Fork River	6/26/57	980	Hamilton
Bitterroot River	Clark Fork River	6/24/57	1200	Hamilton
Bitterroot River	Clark Fork River	6/19/57	1200	Hamilton
Bitterroot River	Clark Fork River	6/19/57	1200	Hamilton
Bitterroot River	Clark Fork River	6/19/57	1200	Hamilton
Bitterroot River	Clark Fork River	6/19/57	1400	Hamilton
Bitterroot River	Clark Fork River	8/16/56	500	Hamilton
Bitterroot River	Clark Fork River	8/11/56	850	Hamilton
Bitterroot River	Clark Fork River	8/11/56	950	Hamilton
Bitterroot River	Clark Fork River	8/10/56	950	Hamilton
Bitterroot River	Clark Fork River	8/10/56	950	Hamilton
Bitterroot River	Clark Fork River	8/9/56	960	Hamilton
Bitterroot River	Clark Fork River	8/9/56	960	Hamilton
Bitterroot River	Clark Fork River	7/17/56	1275	Hamilton
Bitterroot River	Clark Fork River	7/16/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/16/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/16/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/16/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/16/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/12/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/11/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/11/56	1200	Hamilton
Bitterroot River	Clark Fork River	7/2/56	1200	Hamilton
Bitterroot River	Clark Fork River	6/28/56	1200	Hamilton
Bitterroot River	Clark Fork River	6/28/56	1950	Hamilton
Bitterroot River	Clark Fork River	6/27/56	1200	Hamilton
Bitterroot River	Clark Fork River	6/26/56	1800	Hamilton
Bitterroot River	Clark Fork River	6/26/56	1920	Hamilton
Bitterroot River	Clark Fork River	6/25/56	1200	Hamilton
Bitterroot River	Clark Fork River	6/25/56	1200	Hamilton
Bitterroot River	Clark Fork River	5/21/56	54950	Hamilton
Bitterroot River	Clark Fork River	8/8/55	1100	Hamilton
Bitterroot River	Clark Fork River	8/5/55	1650	Hamilton
Bitterroot River	Clark Fork River	8/5/55	1650	Hamilton
Bitterroot River	Clark Fork River	8/5/55	1980	Hamilton
Bitterroot River	Clark Fork River	8/4/55	1800	Hamilton
Bitterroot River	Clark Fork River	8/3/55	1100	Hamilton
Bitterroot River	Clark Fork River	7/29/55	1040	Hamilton
Bitterroot River	Clark Fork River	7/28/55	735	Hamilton
Bitterroot River	Clark Fork River	7/27/55	720	Hamilton
Bitterroot River	Clark Fork River	7/27/55	900	Hamilton
Bitterroot River	Clark Fork River	7/26/55	1050	Hamilton
Bitterroot River	Clark Fork River	7/22/55	1050	Hamilton
Bitterroot River	Clark Fork River	7/22/55	1050	Hamilton
Bitterroot River	Clark Fork River	7/21/55	1120	Hamilton
Bitterroot River	Clark Fork River	7/19/55	225	Hamilton
Bitterroot River	Clark Fork River	7/19/55	1050	Hamilton
Bitterroot River	Clark Fork River	7/19/55	1200	Hamilton
Bitterroot River	Clark Fork River	7/12/55	780	Hamilton
Bitterroot River	Clark Fork River	7/12/55	840	Hamilton
Bitterroot River	Clark Fork River	7/12/55	980	Hamilton
Bitterroot River	Clark Fork River	7/8/55	1120	Hamilton
Bitterroot River	Clark Fork River	7/8/55	1350	Hamilton
Bitterroot River	Clark Fork River	7/7/55	1350	Hamilton
Bitterroot River	Clark Fork River	7/7/55	1350	Hamilton
Bitterroot River	Clark Fork River	7/12/54	1400	Hamilton
Bitterroot River	Clark Fork River	7/12/54	1500	Hamilton
Bitterroot River	Clark Fork River	7/12/54	1700	Hamilton
Bitterroot River	Clark Fork River	7/8/54	1200	Hamilton
Bitterroot River	Clark Fork River	7/8/54	1680	Hamilton
Bitterroot River	Clark Fork River	7/7/54	1560	Hamilton
Bitterroot River	Clark Fork River	7/7/54	1960	Hamilton
Bitterroot River	Clark Fork River	7/7/54	1960	Hamilton
Bitterroot River	Clark Fork River	7/6/54	1540	Hamilton
Bitterroot River	Clark Fork River	7/6/54	1820	Hamilton
Bitterroot River	Clark Fork River	6/24/54	1100	Hamilton
Bitterroot River	Clark Fork River	6/24/54	1820	Hamilton

Bitterroot River	Clark Fork River	6/24/54	2240	Hamilton
Bitterroot River	Clark Fork River	6/23/54	990	Hamilton
Bitterroot River	Clark Fork River	6/23/54	1080	Hamilton
Bitterroot River	Clark Fork River	6/23/54	1260	Hamilton
Bitterroot River	Clark Fork River	6/15/54	1200	Hamilton
Bitterroot River	Clark Fork River	6/15/54	1440	Hamilton
Bitterroot River	Clark Fork River	6/11/54	1440	Hamilton
Bitterroot River	Clark Fork River	6/10/54	900	Hamilton
Bitterroot River	Clark Fork River	7/8/53	1600	Hamilton
Bitterroot River	Clark Fork River	7/8/53	2000	Hamilton
Bitterroot River	Clark Fork River	7/7/53	1700	Hamilton
Bitterroot River	Clark Fork River	7/7/53	1700	Hamilton
Bitterroot River	Clark Fork River	7/6/53	1700	Hamilton
Bitterroot River	Clark Fork River	7/6/53	1700	Hamilton
Bitterroot River	Clark Fork River	7/6/53	1700	Hamilton
Bitterroot River	Clark Fork River	6/26/53	1700	Hamilton
Bitterroot River	Clark Fork River	6/26/53	2380	Hamilton
Bitterroot River	Clark Fork River	6/6/52	3000	Hamilton
Bitterroot River	Clark Fork River	6/6/52	4200	Hamilton
Bitterroot River	Clark Fork River	6/5/52	3000	Hamilton
Bitterroot River	Clark Fork River	6/5/52	6000	Hamilton
Bitterroot River	Clark Fork River	8/2/51	1232	Hamilton
Bitterroot River	Clark Fork River	8/1/51	4040	Hamilton
Bitterroot River	Clark Fork River	6/19/51	5000	Hamilton
Bitterroot River	Clark Fork River	6/19/51	5000	Hamilton
Bitterroot River	Clark Fork River	6/13/51	5000	Hamilton
Bitterroot River	Clark Fork River	6/13/51	6200	Hamilton
Bitterroot River	Clark Fork River	7/28/50	6000	Hamilton
Bitterroot River	Clark Fork River	7/27/50	4000	Hamilton
Bitterroot River	Clark Fork River	7/26/50	6000	Hamilton
Bitterroot River	Clark Fork River	7/25/50	5000	Hamilton
Bitterroot River	Clark Fork River	7/20/50	2000	Hamilton
Bitterroot River	Clark Fork River	7/18/50	5300	Hamilton
Bitterroot River	Clark Fork River	7/18/50	5400	Hamilton
Bitterroot River	Clark Fork River	7/15/50	1800	Hamilton
Bitterroot River	Clark Fork River	7/14/50	5400	Hamilton
Bitterroot River	Clark Fork River	7/13/50	5300	Hamilton
Bitterroot River	Clark Fork River	7/12/50	5400	Hamilton
Bitterroot River	Clark Fork River	7/11/50	5500	Hamilton
Bitterroot River	Clark Fork River	7/10/50	6176	Hamilton
Bitterroot River	Clark Fork River	7/10/50	6548	Hamilton
Bitterroot River	Clark Fork River	6/22/49	1984	Hamilton
Bitterroot River	Clark Fork River	6/22/49	3100	Hamilton
Bitterroot River	Clark Fork River	6/21/49	4340	Hamilton
Bitterroot River	Clark Fork River	6/15/49	2700	Hamilton
Bitterroot River	Clark Fork River	6/14/49	3000	Hamilton
Bitterroot River	Clark Fork River	6/13/49	2500	Hamilton
Bitterroot River	Clark Fork River	9/23/48	13600	Hamilton
Bitterroot River	Clark Fork River	9/23/48	20000	Hamilton
Bitterroot River	Clark Fork River	8/6/48	1386	Hamilton
Bitterroot River	Clark Fork River	7/29/48	3844	Hamilton
Bitterroot River	Clark Fork River	7/23/48	3800	Hamilton
Bitterroot River	Clark Fork River	7/18/48	1000	Hamilton
Bitterroot River	Clark Fork River	7/14/48	3500	Hamilton
Bitterroot River	Clark Fork River	7/14/48	3500	Hamilton
Bitterroot River	Clark Fork River	7/10/48	4000	Hamilton
Bitterroot River	Clark Fork River	7/9/48	3600	Hamilton
Bitterroot River	Clark Fork River	7/8/48	2880	Hamilton
Bitterroot River	Clark Fork River	7/6/48	3000	Hamilton
Bitterroot River	Clark Fork River	5/11/48	75	Hamilton
Bitterroot River	Clark Fork River	6/5/47	5580	Hamilton
Bitterroot River	Clark Fork River	9/7/46	3000	Hamilton
Bitterroot River	Clark Fork River	7/30/46	5080	Hamilton
Bitterroot River	Clark Fork River	7/21/46	4200	Hamilton
Bitterroot River	Clark Fork River	6/29/43	3150	Hamilton
Bitterroot River	Clark Fork River	7/24/42	33000	Hamilton
Bitterroot River	Clark Fork River	7/21/42	24000	Hamilton
Bitterroot River	Clark Fork River	6/6/42	60000	Hamilton
Bitterroot River	Clark Fork River	6/19/41	2250	Hamilton
Bitterroot River	Clark Fork River	5/27/41	60000	Hamilton
Bitterroot River	Clark Fork River	10/29/40	11000	Hamilton
Bitterroot River	Clark Fork River	10/2/40	25000	Hamilton
Bitterroot River	Clark Fork River	8/12/40	20000	Hamilton
Bitterroot River	Clark Fork River	5/18/40	3200	Hamilton
Bitterroot River	Clark Fork River	5/17/40	2500	Hamilton
Bitterroot River	Clark Fork River	10/11/39	36000	Hamilton
Bitterroot River	Clark Fork River	9/12/39	3600	Hamilton
Bitterroot River	Clark Fork River	10/6/38	3000	Hamilton
Bitterroot River	Clark Fork River	6/26/35	50000	Hamilton
Bitterroot River	Clark Fork River	6/25/35	50000	Hamilton
Bitterroot River	Clark Fork River	6/24/35	50000	Hamilton
Bitterroot River	Clark Fork River	6/8/34	43000	Hamilton
Bitterroot River	Clark Fork River	6/7/34	43000	Hamilton
Bitterroot River	Clark Fork River	6/5/34	40000	Hamilton
Bitterroot River	Clark Fork River	6/4/34	40000	Hamilton
Bitterroot River	Clark Fork River	9/22/33	25000	Hamilton
Bitterroot River	Clark Fork River	9/22/33	25000	Hamilton
Bitterroot River	Clark Fork River	9/21/33	25000	Hamilton
Bitterroot River	Clark Fork River	12/1/31	50000	Hamilton
Bitterroot River	Clark Fork River	10/22/31	2000	Hamilton
Bitterroot River	Clark Fork River	9/29/31	20000	Hamilton
Bitterroot River	Clark Fork River	9/16/31	35000	Hamilton
Bitterroot River	Clark Fork River	9/14/31	35000	Hamilton
Bitterroot River	Clark Fork River	11/4/28	50000	Hamilton
Bitterroot River	Clark Fork River	7/14/28	24000	Hamilton
Bitterroot River	Clark Fork River	7/12/28	24000	Hamilton
Bitterroot River	Clark Fork River	7/9/28	24000	Hamilton
Bitterroot River	Clark Fork River	7/13/61	4731	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	6/30/61	1935	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	6/29/61	1992	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	8/2/51	1232	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	8/1/51	4040	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	8/28/48	2220	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	5/11/48	75	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	5/7/48	75	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	5/7/48	75	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	7/15/47	2250	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	7/13/61	4731	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	6/30/61	1935	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	6/29/61	1992	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	8/28/48	2220	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	5/11/48	75	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	5/7/48	75	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	5/7/48	75	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	7/15/47	2250	Jocko River Trout Hatchery
Bitterroot River	Clark Fork River	10/22/31	2000	Other Abandoned
Bitterroot River	Clark Fork River	9/29/31	20000	Other Abandoned
Bitterroot River	Clark Fork River	9/16/31	35000	Other Abandoned
Bitterroot River	Clark Fork River	9/14/31	35000	Other Abandoned
Bitterroot River	Clark Fork River	7/31/79	1600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/17/79	1775	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/3/79	1710	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/11/78	1513	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/24/78	1775	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/12/78	1785	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/25/77	1468	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/11/77	1913	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	6/27/77	1673	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/28/76	2000	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/21/76	2132	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/7/76	3219	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/12/75	2617	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/30/75	2448	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/75	2429	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/29/74	2203	Washoe Park Trout Hatchery

Bitterroot River	Clark Fork River	7/18/74	3182	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/10/74	2203	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	6/28/73	2000	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	6/14/73	1224	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/8/72	1198	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/20/72	5712	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/6/72	2448	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/6/72	2448	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/29/71	6120	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/26/71	3264	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/21/71	3264	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/15/71	5975	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/7/71	7578	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	5/28/71	3958	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/31/70	3917	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/30/70	1958	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/20/70	5712	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/6/70	6365	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	5/22/70	4086	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/25/69	3530	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/69	4406	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/21/69	765	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/17/69	7939	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/14/69	9220	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/11/69	4406	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/24/68	7755	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/19/68	5875	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/11/68	11750	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/24/67	4600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/12/67	2400	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/12/67	7480	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/10/67	9600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/12/66	8100	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/6/66	9600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/28/65	8320	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/65	9280	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/13/65	8400	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/12/64	2805	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/7/64	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/28/64	3875	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/24/64	4200	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/64	4200	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/20/64	4080	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/14/64	4080	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/23/63	4320	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/22/63	1280	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/21/63	1920	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/15/63	3840	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/13/63	3840	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/63	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/19/63	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/18/63	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/12/63	6240	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/11/63	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/8/62	4220	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/3/62	1545	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/2/62	1860	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/25/62	5040	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/62	6000	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/18/62	5040	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/11/62	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/3/62	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	9/19/61	4830	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	9/15/61	3205	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	9/14/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	9/8/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	9/5/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/28/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/23/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/15/61	3700	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/11/61	3340	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/7/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/18/61	2500	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/7/61	4000	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	6/30/61	4000	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	6/20/57	5500	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/31/79	1600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/17/79	1775	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/3/79	1710	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/11/78	1513	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/24/78	1775	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/12/78	1785	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/25/77	1468	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/11/77	1913	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	6/27/77	1673	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/28/76	2000	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/21/76	2132	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/7/76	3219	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/12/75	2617	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/30/75	2448	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/75	2429	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/29/74	2203	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/18/74	3182	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/10/74	2203	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	6/28/73	2000	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	6/14/73	1224	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/8/72	1198	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/20/72	5712	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/6/72	2448	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/6/72	2448	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/29/71	6120	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/26/71	3264	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/21/71	3264	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/15/71	5975	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/7/71	7578	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	5/28/71	3958	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/31/70	3917	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/30/70	1958	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/20/70	5712	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/6/70	6365	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	5/22/70	4086	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/25/69	3530	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/69	4406	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/21/69	765	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/17/69	7939	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/14/69	9220	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/11/69	4406	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/24/68	7755	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/19/68	5875	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/11/68	11750	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/24/67	4600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/12/67	2400	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/12/67	7480	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/10/67	9600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/12/66	8100	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/6/66	9600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/28/65	8320	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/65	9280	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/13/65	8400	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/12/64	2805	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/7/64	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/28/64	3875	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/24/64	4200	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/64	4200	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/20/64	4080	Washoe Park Trout Hatchery

Bitterroot River	Clark Fork River	7/14/64	4080	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/23/63	4320	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/22/63	1280	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/21/63	1920	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/15/63	3840	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/13/63	3840	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/63	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/19/63	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/18/63	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/12/63	6240	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/11/63	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/8/62	4220	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/3/62	1545	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/2/62	1860	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/25/62	5040	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/23/62	6000	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/18/62	5040	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/11/62	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/3/62	3600	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	9/19/61	4830	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	9/15/61	3205	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	9/14/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	9/8/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	9/5/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/28/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/23/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/15/61	3700	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/11/61	3340	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	8/7/61	2800	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/18/61	2500	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	7/7/61	4000	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	6/30/61	4000	Washoe Park Trout Hatchery
Bitterroot River	Clark Fork River	6/20/57	5500	Washoe Park Trout Hatchery
Blodgett Creek	Bitterroot River	10/11/38	8000	Hamilton
Blodgett Creek	Bitterroot River	10/11/38	8000	Hamilton
Burnt Fork Bitterroot River	Bitterroot River	7/12/47	2250	Hamilton
Burnt Fork Bitterroot River	Bitterroot River	6/26/41	3000	Hamilton
Burnt Fork Bitterroot River	Bitterroot River	6/25/41	28800	Hamilton
Burnt Fork Bitterroot River	Bitterroot River	9/28/40	4200	Hamilton
Burnt Fork Bitterroot River	Bitterroot River	9/18/40	2240	Hamilton
Burnt Fork Bitterroot River	Bitterroot River	10/21/38	25000	Hamilton
Burnt Fork Bitterroot River	Bitterroot River	9/21/34	4000	Hamilton
Burnt Fork Lake	Burnt Fork Bitterroot River	7/15/42	16800	Hamilton
Camp Creek	East Fork Bitterroot River	10/30/37	30000	Hamilton
Camp Creek	East Fork Bitterroot River	10/16/36	48000	Hamilton
Camp Creek	East Fork Bitterroot River	9/27/33	25000	Hamilton
East Fork Bitterroot River	Bitterroot River	6/28/73	1000	Hamilton
East Fork Bitterroot River	Bitterroot River	8/8/72	500	Hamilton
East Fork Bitterroot River	Bitterroot River	7/28/72	1540	Hamilton
East Fork Bitterroot River	Bitterroot River	7/5/72	2978	Hamilton
East Fork Bitterroot River	Bitterroot River	6/17/51	5000	Hamilton
East Fork Bitterroot River	Bitterroot River	6/15/51	5000	Hamilton
East Fork Bitterroot River	Bitterroot River	7/12/50	5500	Hamilton
East Fork Bitterroot River	Bitterroot River	7/11/50	6000	Hamilton
East Fork Bitterroot River	Bitterroot River	6/17/49	3500	Hamilton
East Fork Bitterroot River	Bitterroot River	7/31/48	3968	Hamilton
East Fork Bitterroot River	Bitterroot River	7/13/48	4000	Hamilton
East Fork Bitterroot River	Bitterroot River	7/19/46	9200	Hamilton
East Fork Bitterroot River	Bitterroot River	7/18/45	3690	Hamilton
East Fork Bitterroot River	Bitterroot River	7/30/43	4000	Hamilton
East Fork Bitterroot River	Bitterroot River	7/15/43	3850	Hamilton
East Fork Bitterroot River	Bitterroot River	7/10/43	3420	Hamilton
East Fork Bitterroot River	Bitterroot River	7/9/43	5130	Hamilton
East Fork Bitterroot River	Bitterroot River	7/11/42	1920	Hamilton
East Fork Bitterroot River	Bitterroot River	7/10/42	2340	Hamilton
East Fork Bitterroot River	Bitterroot River	7/9/42	2760	Hamilton
East Fork Bitterroot River	Bitterroot River	7/8/42	2760	Hamilton
East Fork Bitterroot River	Bitterroot River	7/8/42	2760	Hamilton
East Fork Bitterroot River	Bitterroot River	7/6/42	2960	Hamilton
East Fork Bitterroot River	Bitterroot River	5/28/41	2400	Hamilton
East Fork Bitterroot River	Bitterroot River	5/21/41	58000	Hamilton
East Fork Bitterroot River	Bitterroot River	4/14/41	2000	Hamilton
East Fork Bitterroot River	Bitterroot River	9/17/40	5000	Hamilton
East Fork Bitterroot River	Bitterroot River	7/19/40	20000	Hamilton
East Fork Bitterroot River	Bitterroot River	5/22/40	32000	Hamilton
East Fork Bitterroot River	Bitterroot River	10/19/39	45000	Hamilton
East Fork Bitterroot River	Bitterroot River	10/17/39	17500	Hamilton
East Fork Bitterroot River	Bitterroot River	6/19/39	40000	Hamilton
East Fork Bitterroot River	Bitterroot River	6/19/39	40000	Hamilton
East Fork Bitterroot River	Bitterroot River	6/22/38	40000	Hamilton
East Fork Bitterroot River	Bitterroot River	11/9/37	12500	Hamilton
East Fork Bitterroot River	Bitterroot River	8/9/37	14600	Hamilton
East Fork Bitterroot River	Bitterroot River	8/27/36	40000	Hamilton
East Fork Bitterroot River	Bitterroot River	11/16/34	50000	Hamilton
East Fork Bitterroot River	Bitterroot River	4/20/49	1000	Jocko River Trout Hatchery
Elk Lake	Rock Creek	9/22/39	7000	Hamilton
Elk Lake	Rock Creek	9/18/38	4000	Hamilton
Elk Lake	Rock Creek	9/18/36	24000	Hamilton
Fred Burr Creek	Mill Creek	10/10/39	12000	Hamilton
Fred Burr Creek	Mill Creek	9/28/36	15000	Hamilton
Glen Lake	No downlink	8/18/39	6000	Hamilton
Heironymous Pond	No Downlink	5/5/08	182	Jocko River Trout Hatchery
Heironymous Pond	No Downlink	5/1/07	190	Jocko River Trout Hatchery
Heironymous Pond	No Downlink	6/27/06	181	Jocko River Trout Hatchery
Heironymous Pond	No Downlink	5/19/05	7	Jocko River Trout Hatchery
Heironymous Pond	No Downlink	5/19/05	180	Jocko River Trout Hatchery
Heironymous Pond	No Downlink	5/20/04	4	Jocko River Trout Hatchery
Heironymous Pond	No Downlink	5/20/04	182	Jocko River Trout Hatchery
Hope Lake	No downlink	8/22/79	600	Jocko River Trout Hatchery
Hope Lake	No downlink	7/27/81	637	Washoe Park Trout Hatchery
Hope Lake	No downlink	8/19/63	600	Washoe Park Trout Hatchery
Hope Lake	No downlink	8/31/62	1700	Washoe Park Trout Hatchery
Kenck Lake	No downlink	9/29/44	3000	Hamilton
Kenck Lake	No downlink	6/8/40	5000	Hamilton
Kenck Lake	No downlink	8/27/39	3600	Hamilton
Kenck Lake	No downlink	7/15/38	1500	Hamilton
Lake Como	Rock Creek	5/21/97	2250	Big Springs Trout Hatchery
Lake Como	Rock Creek	5/21/97	5780	Big Springs Trout Hatchery
Lake Como	Rock Creek	7/12/99	5000	Giant Springs Trout Hatchery
Lake Como	Rock Creek	7/7/98	7700	Giant Springs Trout Hatchery
Lake Como	Rock Creek	7/1/96	6880	Giant Springs Trout Hatchery
Lake Como	Rock Creek	7/24/95	7095	Giant Springs Trout Hatchery
Lake Como	Rock Creek	7/12/94	4840	Giant Springs Trout Hatchery
Lake Como	Rock Creek	6/25/93	4500	Giant Springs Trout Hatchery
Lake Como	Rock Creek	7/9/91	5040	Giant Springs Trout Hatchery
Lake Como	Rock Creek	7/31/90	6080	Giant Springs Trout Hatchery
Lake Como	Rock Creek	7/6/89	5000	Giant Springs Trout Hatchery
Lake Como	Rock Creek	6/14/88	5060	Giant Springs Trout Hatchery
Lake Como	Rock Creek	10/24/28	50000	Hamilton
Lake Como	Rock Creek	11/20/08	23	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/20/08	128	Jocko River Trout Hatchery
Lake Como	Rock Creek	9/26/08	663	Jocko River Trout Hatchery
Lake Como	Rock Creek	9/9/08	4006	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/5/08	616	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/22/08	259	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/22/08	648	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/22/08	870	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/17/08	864	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/16/08	840	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/15/08	888	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/14/08	763	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/14/08	817	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/11/08	840	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/10/08	790	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/9/08	766	Jocko River Trout Hatchery

Lake Como	Rock Creek	10/11/07	1988	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/1/07	576	Jocko River Trout Hatchery
Lake Como	Rock Creek	3/20/07	2329	Jocko River Trout Hatchery
Lake Como	Rock Creek	3/19/07	3233	Jocko River Trout Hatchery
Lake Como	Rock Creek	3/14/07	720	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/23/06	6	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/23/06	207	Jocko River Trout Hatchery
Lake Como	Rock Creek	9/26/06	419	Jocko River Trout Hatchery
Lake Como	Rock Creek	6/27/06	235	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/31/06	435	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/18/06	1859	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/12/06	1834	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/11/06	1741	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/5/06	2122	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/17/05	1881	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/1/05	2354	Jocko River Trout Hatchery
Lake Como	Rock Creek	3/31/05	2376	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/4/04	36	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/4/04	81	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/4/04	275	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/22/04	1750	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/6/04	2637	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/2/04	981	Jocko River Trout Hatchery
Lake Como	Rock Creek	3/25/04	1880	Jocko River Trout Hatchery
Lake Como	Rock Creek	3/24/04	752	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/23/03	56	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/23/03	95	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/5/03	18	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/5/03	191	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/14/03	2036	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/13/03	868	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/13/03	1122	Jocko River Trout Hatchery
Lake Como	Rock Creek	3/26/03	3000	Jocko River Trout Hatchery
Lake Como	Rock Creek	3/25/03	1000	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/10/02	30	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/10/02	109	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/12/02	36	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/12/02	128	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/20/02	400	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/24/02	687	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/10/02	645	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/2/02	2420	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/1/02	629	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/15/01	201	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/23/01	43	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/23/01	131	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/18/01	2204	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/17/01	2260	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/16/01	791	Jocko River Trout Hatchery
Lake Como	Rock Creek	3/2/01	973	Jocko River Trout Hatchery
Lake Como	Rock Creek	2/28/01	920	Jocko River Trout Hatchery
Lake Como	Rock Creek	2/27/01	920	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/5/00	253	Jocko River Trout Hatchery
Lake Como	Rock Creek	6/1/00	1470	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/26/00	490	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/26/00	1953	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/4/00	491	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/4/00	3806	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/18/99	81	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/18/99	133	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/10/99	46	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/10/99	70	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/21/99	2000	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/21/99	2000	Jocko River Trout Hatchery
Lake Como	Rock Creek	1/29/99	200	Jocko River Trout Hatchery
Lake Como	Rock Creek	1/21/99	175	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/10/98	22	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/10/98	93	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/10/98	300	Jocko River Trout Hatchery
Lake Como	Rock Creek	1/15/98	188	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/5/97	200	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/29/97	91	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/22/96	77	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/15/96	77	Jocko River Trout Hatchery
Lake Como	Rock Creek	1/26/96	125	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/17/95	40	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/17/95	212	Jocko River Trout Hatchery
Lake Como	Rock Creek	1/10/95	1000	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/5/94	15	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/5/94	56	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/23/94	16	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/23/94	57	Jocko River Trout Hatchery
Lake Como	Rock Creek	9/28/94	250	Jocko River Trout Hatchery
Lake Como	Rock Creek	1/12/94	86	Jocko River Trout Hatchery
Lake Como	Rock Creek	1/12/94	2000	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/13/93	260	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/29/93	93	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/8/93	10	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/8/93	65	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/30/92	42	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/30/92	88	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/15/92	30	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/15/92	70	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/14/92	96	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/29/91	16	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/29/91	82	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/29/91	277	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/25/91	37	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/25/91	123	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/9/90	40	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/9/90	62	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/9/90	130	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/17/90	6	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/17/90	10	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/17/90	41	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/17/90	50	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/17/90	249	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/1/89	447	Jocko River Trout Hatchery
Lake Como	Rock Creek	9/14/89	105	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/7/88	52	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/7/88	146	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/23/88	43	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/23/88	132	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/25/88	245	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/30/87	313	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/14/87	156	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/14/87	215	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/25/87	37	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/25/87	67	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/25/87	200	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/16/87	430	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/1/87	102	Jocko River Trout Hatchery
Lake Como	Rock Creek	1/16/87	117	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/19/86	135	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/14/86	61	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/14/86	131	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/22/86	1322	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/21/86	1417	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/24/85	157	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/24/85	309	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/7/85	321	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/23/85	1575	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/16/85	1559	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/28/84	149	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/21/84	228	Jocko River Trout Hatchery

Lake Como	Rock Creek	1/26/84	2220	Jocko River Trout Hatchery
Lake Como	Rock Creek	1/26/84	2936	Jocko River Trout Hatchery
Lake Como	Rock Creek	1/24/84	3621	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/21/83	301	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/13/83	119	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/13/83	769	Jocko River Trout Hatchery
Lake Como	Rock Creek	7/12/83	333	Jocko River Trout Hatchery
Lake Como	Rock Creek	7/12/83	1814	Jocko River Trout Hatchery
Lake Como	Rock Creek	7/12/83	2976	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/15/82	665	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/6/82	510	Jocko River Trout Hatchery
Lake Como	Rock Creek	6/8/82	11000	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/14/81	474	Jocko River Trout Hatchery
Lake Como	Rock Creek	9/14/81	360	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/12/81	10043	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/23/80	331	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/9/80	323	Jocko River Trout Hatchery
Lake Como	Rock Creek	9/11/80	335	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/30/80	10027	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/8/79	338	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/5/79	200	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/27/79	726	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/27/79	9412	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/13/78	385	Jocko River Trout Hatchery
Lake Como	Rock Creek	11/2/78	347	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/11/78	10005	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/3/77	10080	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/26/76	400	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/30/76	11070	Jocko River Trout Hatchery
Lake Como	Rock Creek	12/2/75	270	Jocko River Trout Hatchery
Lake Como	Rock Creek	10/17/75	300	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/19/75	10320	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/6/74	10200	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/20/73	10500	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/20/72	10530	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/3/71	10140	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/29/70	40040	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/12/69	40034	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/30/68	40040	Jocko River Trout Hatchery
Lake Como	Rock Creek	4/25/67	40090	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/17/65	40152	Jocko River Trout Hatchery
Lake Como	Rock Creek	5/29/64	41500	Jocko River Trout Hatchery
Lake Como	Rock Creek	6/7/63	40000	Jocko River Trout Hatchery
Lake Como	Rock Creek	6/2/62	80000	Jocko River Trout Hatchery
Lake Como	Rock Creek	6/7/67	5760	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/15/60	600	Hamilton
Lolo Creek	Bitterroot River	7/1/60	992	Hamilton
Lolo Creek	Bitterroot River	8/5/59	960	Hamilton
Lolo Creek	Bitterroot River	7/7/59	825	Hamilton
Lolo Creek	Bitterroot River	7/1/59	1000	Hamilton
Lolo Creek	Bitterroot River	7/8/58	700	Hamilton
Lolo Creek	Bitterroot River	7/2/58	700	Hamilton
Lolo Creek	Bitterroot River	6/24/58	600	Hamilton
Lolo Creek	Bitterroot River	6/24/58	600	Hamilton
Lolo Creek	Bitterroot River	7/2/57	1150	Hamilton
Lolo Creek	Bitterroot River	8/9/56	900	Hamilton
Lolo Creek	Bitterroot River	7/3/56	700	Hamilton
Lolo Creek	Bitterroot River	6/29/56	700	Hamilton
Lolo Creek	Bitterroot River	7/23/46	4200	Hamilton
Lolo Creek	Bitterroot River	7/5/41	3000	Hamilton
Lolo Creek	Bitterroot River	6/14/41	3100	Hamilton
Lolo Creek	Bitterroot River	10/27/28	50000	Hamilton
Lolo Creek	Bitterroot River	7/13/61	1540	Jocko River Trout Hatchery
Lolo Creek	Bitterroot River	7/23/79	675	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/17/79	744	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/5/79	652	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	8/3/78	648	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/17/78	678	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/3/78	745	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/14/77	750	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	6/29/77	627	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	6/6/77	686	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/13/76	892	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/1/76	940	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/29/75	1000	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/17/75	1011	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/25/74	507	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/16/74	795	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/2/74	710	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/12/73	1461	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	6/27/73	1800	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	6/13/73	1820	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	8/1/72	1585	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/17/72	1785	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/3/72	1632	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	8/3/71	1428	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/21/71	1785	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/7/71	1836	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/30/70	1592	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/15/70	1755	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/2/70	1652	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/21/69	2550	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/24/68	2508	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/20/67	2640	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/13/65	2800	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	7/13/64	2502	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	8/21/63	1920	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	8/2/62	1860	Washoe Park Trout Hatchery
Lolo Creek	Bitterroot River	6/28/61	1780	Washoe Park Trout Hatchery
Lost Horse Creek	Bitterroot River	6/15/51	2000	Hamilton
Lost Horse Creek	Bitterroot River	7/14/41	48000	Hamilton
Lower Twin Lake	Lost Horse Creek	7/19/60	1000	Hamilton
Lower Twin Lake	Lost Horse Creek	7/13/60	2002	Hamilton
Lower Twin Lake	Lost Horse Creek	8/9/54	3300	Hamilton
Lower Twin Lake	Lost Horse Creek	7/28/54	1920	Hamilton
Lower Twin Lake	Lost Horse Creek	7/27/54	1800	Hamilton
Lower Twin Lake	Lost Horse Creek	8/25/53	2508	Hamilton
Lower Twin Lake	Lost Horse Creek	8/13/53	2500	Hamilton
Lower Twin Lake	Lost Horse Creek	7/24/52	4800	Hamilton
Lower Twin Lake	Lost Horse Creek	8/12/43	4000	Hamilton
Lower Twin Lake	Lost Horse Creek	6/20/42	2070	Hamilton
Lower Twin Lake	Lost Horse Creek	6/20/42	2300	Hamilton
Lower Twin Lake	Lost Horse Creek	8/28/38	40000	Hamilton
Lower Twin Lake	Lost Horse Creek	8/23/38	2500	Hamilton
Lower Twin Lake	Lost Horse Creek	9/23/36	30000	Hamilton
Lower Twin Lake	Lost Horse Creek	9/21/36	30000	Hamilton
Lower Twin Lake	Lost Horse Creek	7/1/92	6010	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/12/91	6579	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/24/90	3200	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/23/90	3000	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/7/89	871	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/7/89	5512	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/20/88	6014	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/24/87	6617	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/15/86	6593	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	6/27/85	1092	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	6/27/85	1808	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	6/25/85	5118	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/18/83	6577	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/23/82	6547	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	8/6/81	6243	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/22/80	6000	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/10/79	6004	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/14/78	1012	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/14/78	5014	Jocko River Trout Hatchery

Lower Twin Lake	Lost Horse Creek	6/14/77	6000	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/28/70	6000	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/30/69	6174	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/9/68	6864	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/19/67	9000	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	6/22/66	8540	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/12/65	6000	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	8/13/64	6000	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/2/63	9200	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/3/62	6042	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/17/61	6480	Jocko River Trout Hatchery
Lower Twin Lake	Lost Horse Creek	7/5/60	16300	Washoe Park Trout Hatchery
Mill Creek	Bitterroot River	6/19/41	2250	Hamilton
Mill Creek	Bitterroot River	8/9/40	20000	Hamilton
Mill Creek	Bitterroot River	10/13/38	16000	Hamilton
Mill Creek	Bitterroot River	10/22/37	15000	Hamilton
Mill Creek	Bitterroot River	9/30/36	15000	Hamilton
Mill Creek	Bitterroot River	9/21/34	4000	Hamilton
Nez Perce Fork	West Fork Bitterroot River	7/27/48	3800	Hamilton
Nez Perce Fork	West Fork Bitterroot River	7/27/45	3360	Hamilton
Nez Perce Fork	West Fork Bitterroot River	7/28/43	4000	Hamilton
Nez Perce Fork	West Fork Bitterroot River	6/19/42	2760	Hamilton
Nez Perce Fork	West Fork Bitterroot River	6/18/42	2760	Hamilton
Nez Perce Fork	West Fork Bitterroot River	7/15/41	72000	Hamilton
Nez Perce Fork	West Fork Bitterroot River	4/23/41	2500	Hamilton
North Kootenai Lake	Kootenai Creek, N Fk	9/16/40	40000	Hamilton
OBrien Creek	Bitterroot River	6/7/60	100	Jocko River Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	6/11/43	3400	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	8/24/42	40000	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	6/24/42	2760	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	5/23/42	56000	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	5/22/42	52000	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	8/12/41	1500	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	8/11/41	500	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	5/22/41	2300	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	4/21/41	2500	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	9/27/40	20000	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	7/23/40	2000	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	7/23/40	3000	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	7/23/40	3000	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	7/20/40	20000	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	7/19/40	20000	Hamilton
Painted Rocks Reservior	West Fork Bitterroot River	5/20/74	4012	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	5/24/72	2020	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	5/23/72	2020	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	5/5/71	4131	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	5/11/70	4040	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	5/7/69	4028	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	5/28/68	4140	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	5/15/67	10080	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	5/19/66	10260	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	6/11/65	10240	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	5/27/64	4800	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	8/16/63	3840	Washoe Park Trout Hatchery
Painted Rocks Reservior	West Fork Bitterroot River	5/17/63	7200	Washoe Park Trout Hatchery
Rock Creek	Bitterroot River	9/22/39	7000	Hamilton
Rock Creek	Bitterroot River	7/10/47	10000	Jocko River Trout Hatchery
Rye Creek	Bitterroot River	10/12/43	22800	Hamilton
Rye Creek	Bitterroot River	7/22/42	33000	Hamilton
Rye Creek	Bitterroot River	6/26/41	3000	Hamilton
Rye Creek	Bitterroot River	11/3/28	50000	Hamilton
Sawtooth Creek	Bitterroot River	6/5/42	20000	Hamilton
Skalkaho Creek	Bitterroot River	8/17/60	920	Hamilton
Skalkaho Creek	Bitterroot River	8/13/60	594	Hamilton
Skalkaho Creek	Bitterroot River	8/4/59	1280	Hamilton
Skalkaho Creek	Bitterroot River	7/27/59	1100	Hamilton
Skalkaho Creek	Bitterroot River	8/6/58	700	Hamilton
Skalkaho Creek	Bitterroot River	8/5/58	700	Hamilton
Skalkaho Creek	Bitterroot River	7/24/58	700	Hamilton
Skalkaho Creek	Bitterroot River	7/25/50	6000	Hamilton
Skalkaho Creek	Bitterroot River	7/5/48	2600	Hamilton
Skalkaho Creek	Bitterroot River	7/5/48	3400	Hamilton
Skalkaho Creek	Bitterroot River	6/4/47	2480	Hamilton
Skalkaho Creek	Bitterroot River	6/3/47	3720	Hamilton
Skalkaho Creek	Bitterroot River	7/20/46	3780	Hamilton
Skalkaho Creek	Bitterroot River	7/20/45	2050	Hamilton
Skalkaho Creek	Bitterroot River	10/21/43	16200	Hamilton
Skalkaho Creek	Bitterroot River	10/6/43	15800	Hamilton
Skalkaho Creek	Bitterroot River	6/28/43	3150	Hamilton
Skalkaho Creek	Bitterroot River	6/30/42	2350	Hamilton
Skalkaho Creek	Bitterroot River	6/30/42	2350	Hamilton
Skalkaho Creek	Bitterroot River	6/23/42	2760	Hamilton
Skalkaho Creek	Bitterroot River	5/20/41	40000	Hamilton
Skalkaho Creek	Bitterroot River	6/8/40	50000	Hamilton
Skalkaho Creek	Bitterroot River	6/3/40	400	Hamilton
Skalkaho Creek	Bitterroot River	5/22/40	80000	Hamilton
Skalkaho Creek	Bitterroot River	8/9/39	60000	Hamilton
Skalkaho Creek	Bitterroot River	5/25/39	2000	Hamilton
Skalkaho Creek	Bitterroot River	6/27/34	44000	Hamilton
Skalkaho Creek	Bitterroot River	11/30/31	50000	Hamilton
Skalkaho Creek	Bitterroot River	7/27/71	306	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	7/13/71	194	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	7/27/70	262	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	7/13/70	258	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	7/25/69	550	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	7/15/69	1958	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	7/19/68	1562	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	7/24/67	1500	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	7/20/65	1250	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	8/4/64	1500	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	8/22/63	1520	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	8/3/62	1500	Washoe Park Trout Hatchery
Skalkaho Creek	Bitterroot River	8/10/61	1540	Washoe Park Trout Hatchery
Sleeping Child Creek	Bitterroot River	7/16/46	2520	Hamilton
Sleeping Child Creek	Bitterroot River	9/6/44	15200	Hamilton
Sleeping Child Creek	Bitterroot River	6/30/43	3710	Hamilton
Sleeping Child Creek	Bitterroot River	8/7/41	1800	Hamilton
Sleeping Child Creek	Bitterroot River	7/14/41	48000	Hamilton
Sleeping Child Creek	Bitterroot River	5/19/41	2700	Hamilton
Sleeping Child Creek	Bitterroot River	5/7/41	2500	Hamilton
Sweathouse Creek	Bitterroot River	6/10/43	2000	Hamilton
Tin Cup Creek	Bitterroot River	8/23/43	2400	Hamilton
Tin Cup Creek	Bitterroot River	7/16/41	60000	Hamilton
Tin Cup Creek	Bitterroot River	9/23/32	15000	Hamilton
West Fork Bitterroot River	Bitterroot River	6/21/51	5000	Hamilton
West Fork Bitterroot River	Bitterroot River	6/14/51	5000	Hamilton
West Fork Bitterroot River	Bitterroot River	8/5/48	3600	Hamilton
West Fork Bitterroot River	Bitterroot River	7/17/46	14000	Hamilton
West Fork Bitterroot River	Bitterroot River	7/12/45	3780	Hamilton
West Fork Bitterroot River	Bitterroot River	7/11/45	3000	Hamilton
West Fork Bitterroot River	Bitterroot River	9/8/44	37000	Hamilton
West Fork Bitterroot River	Bitterroot River	8/6/44	14000	Hamilton
West Fork Bitterroot River	Bitterroot River	7/29/43	4000	Hamilton
West Fork Bitterroot River	Bitterroot River	7/7/43	5300	Hamilton
West Fork Bitterroot River	Bitterroot River	8/24/42	40000	Hamilton
West Fork Bitterroot River	Bitterroot River	6/29/42	2350	Hamilton
West Fork Bitterroot River	Bitterroot River	6/29/42	2350	Hamilton
West Fork Bitterroot River	Bitterroot River	6/24/42	2700	Hamilton
West Fork Bitterroot River	Bitterroot River	8/2/40	1500	Hamilton
West Fork Bitterroot River	Bitterroot River	5/25/40	32000	Hamilton
West Fork Bitterroot River	Bitterroot River	7/20/39	2500	Hamilton
West Fork Bitterroot River	Bitterroot River	7/11/39	75000	Hamilton
West Fork Bitterroot River	Bitterroot River	6/16/39	40000	Hamilton
West Fork Bitterroot River	Bitterroot River	6/16/39	40000	Hamilton
West Fork Bitterroot River	Bitterroot River	8/16/38	2500	Hamilton

West Fork Bitterroot River	Bitterroot River	8/5/38	2500	Hamilton
West Fork Bitterroot River	Bitterroot River	7/20/36	1200	Hamilton
West Fork Bitterroot River	Bitterroot River	11/16/34	50000	Hamilton
West Fork Bitterroot River	Bitterroot River	9/26/34	55000	Hamilton
West Fork Bitterroot River	Bitterroot River	10/2/33	25000	Hamilton
West Fork Bitterroot River	Bitterroot River	6/16/31	12500	Hamilton
West Fork Bitterroot River	Bitterroot River	6/11/31	12500	Hamilton
West Fork Bitterroot River	Bitterroot River	7/20/28	24000	Hamilton
West Fork Bitterroot River	Bitterroot River	4/20/49	1000	Jocko River Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/31/79	800	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/17/79	877	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/3/79	855	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	8/11/78	792	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/24/78	836	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/12/78	892	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/25/77	837	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/11/77	888	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	6/27/77	820	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/21/76	689	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/7/76	1073	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	8/12/75	864	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/30/75	816	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/23/75	833	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/29/74	735	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/18/74	1060	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/10/74	734	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/17/73	3988	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/12/73	6854	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	6/28/73	2000	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	6/14/73	3672	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	8/8/72	750	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/28/72	4620	Washoe Park Trout Hatchery
West Fork Bitterroot River	Bitterroot River	7/5/72	2978	Washoe Park Trout Hatchery