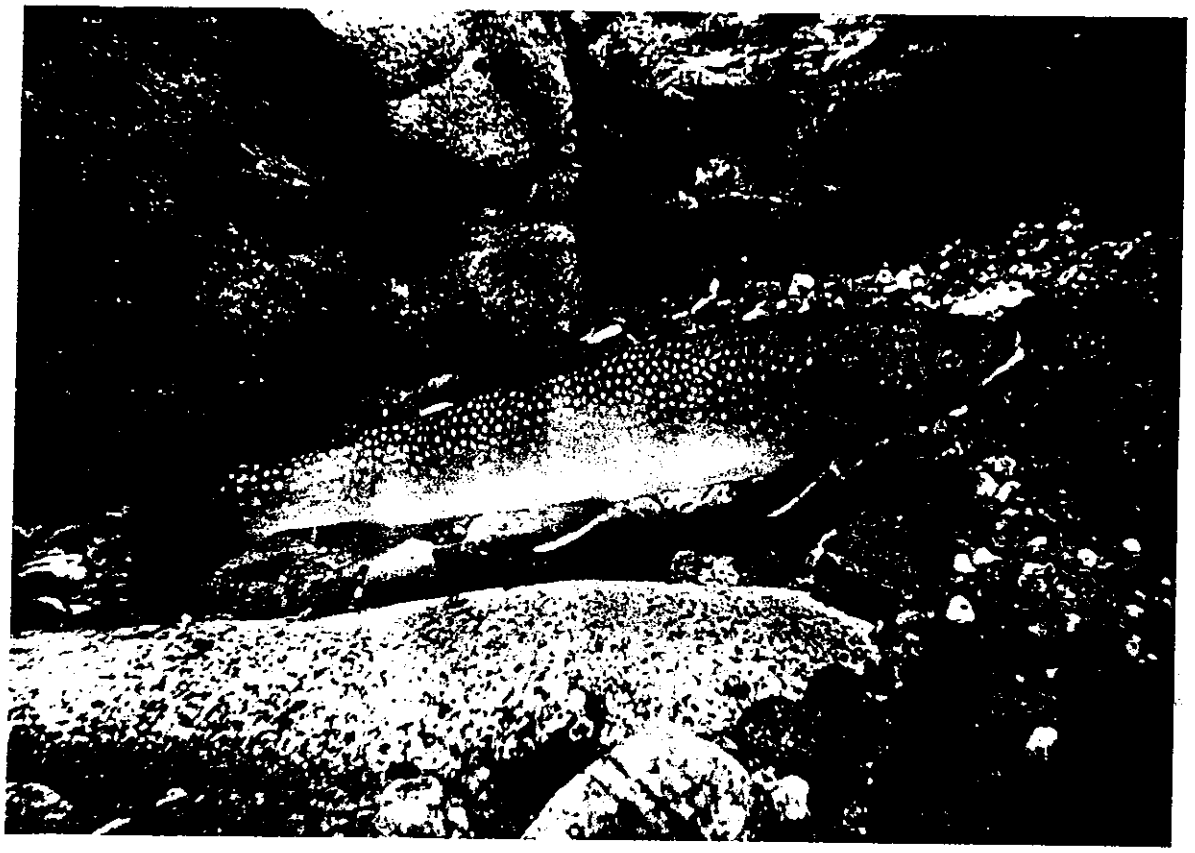
Batt 1996

GOVERNOR PHILIP E. BATT'S

STATE OF IDAHO

BULL TROUT CONSERVATION PLAN



July 1, 1996

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EXECUTIVE SUMMARY

On June 12, 1995, the U. S. Fish and Wildlife Service found that while there was sufficient information available to warrant listing of bull trout as either "endangered" or "threatened" under the Endangered Species Act (ESA), that listing was precluded because of higher priority listing actions. This decision provided states the opportunity to take conservation actions necessary to recover the species. It is possible that action by the states to conserve or restore populations of bull trout may have a direct bearing on whether the fish is listed under the ESA. The agency now is obligated to review that decision in 1996, along with the progress of the individual state efforts to see if a change in the status of the fish is warranted.

In 1995, Idaho Governor Phil Batt designated two committees, a policy and steering committee and a biology committee, to prepare a Bull Trout Conservation Plan. In opening the first meeting of the team, Governor Batt outlined his goals for the plan, noting he wanted the plan to: (1) be workable, (2) focus on areas with the greatest potential for results at the lowest cost, (3) be based on sound science, (4) include public involvement, and, (5) maintain and strengthen existing populations, as well as restore the species in appropriate areas.

Bull trout are widely distributed in Idaho. They have populations which migrate long distances and others which remain in headwater streams their entire lives. Information about bull trout life history and habitat requirements is summarized in Part 1 of this plan.

The plan then discusses historical and current threats to the bull trout. Dam building and water diversions have isolated many populations. Past road building, agriculture, forestry, grazing, mining, stocking of exotic species and over-fishing have all contributed to habitat degradation and population declines. The impacts of land-use activities vary widely across the state and the plan outlines a framework for developing watershed-specific solutions to restoring areas degraded by past activities and to preventing degradation by ongoing or future activities.

There are 59 key watersheds identified in the plan. These watersheds contain the streams with the greatest potential for protecting and restoring bull trout populations through implementation of the plan. These watersheds provide the link between managing for the needs of bull trout, useful public involvement, and the state's obligations under the Clean Water Act. Problems such as sediment sources, reduced bank cover or stability, migration barriers, poaching or predation are most effectively identified and solved at the watershed level. The plan's strategy emphasizes protecting the healthy populations we have and focusing restoration efforts on areas which are not damaged beyond repair. The goal of the plan is to initiate locally developed common sense protection and restoration measures for watershed specific conditions.

Part II of this plan describes a process through which threats to bull trout restoration or protection can be identified and reduced. While there will be changes in land uses and management resulting from the plan, the protection and restoration measures will be developed locally.

Idaho Code §39-3601(95) provides the mechanism to make this happen. This legislation focuses on watersheds as the level where water quality problems are best identified and corrected through "watershed advisory groups" (WAGs). The development of these groups provides a way to identify and solve factors limiting bull trout populations. In addition, the Basin and Watershed Advisory Groups established through this law provide for public involvement, ensuring that bull trout watershed management plans are locally developed.

Implementing the Governor's plan will require changes not only in agency roles and management practices, but also in how private landowners conduct their business. While the plan's provisions should not be overly burdensome, there are public and private costs involved. For that reason, the plan identifies possible incentives to help assure that needed investments on behalf of bull trout are made.

Another goal of the Governor's plan is to facilitate development of "habitat conservation agreements". This provision of the Endangered Species Act allows landowners or agencies to develop and enter into agreements with the Fish and Wildlife Service that are designed to meet the needs of listed or candidate species. By adhering to those agreements, the landowner or agency is granted a "safe harbor" from land use restrictions or "taking" allegations should the species ultimately be listed.

Finally, the plan calls for a state Bull Trout Coordinator. If the plan is to be successful, there must be a number of changes in agency roles and the management of private and public lands. The need for these changes must be clearly communicated, along with the technical, financial and legal incentives that will make them acceptable. Coordinating these efforts and encouraging all that is necessary to make the plan a successful reality will be the responsibility of the bull trout coordinator.

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PART I

BACKGROUND/PLAN OVERVIEW

July 1, 1996

PART I - BACKGROUND/PLAN OVERVIEW

INTRODUCTION

The bull trout (*Salvelinus confluentus*) is a federal candidate species currently under consideration for listing by the U.S. Fish and Wildlife Service (Service) as a threatened or endangered species. After initiation of a range-wide status review of the species, the Service published a 12-month finding on June 10, 1994 (59 FR 30254) that determined the listing of bull trout throughout its range was not warranted due to unavailable or insufficient data regarding threats to and status of the species within Alaska and Canada. The Service determined that sufficient information on the biological vulnerability and threats to the species was available to warrant listing of bull trout as a population segment within the conterminous United States. However, on June 12, 1995, the Service concluded that listing was precluded because of higher priority listing actions. This decision provided an opportunity for individual states to take conservation actions necessary to recover the species.

In 1995, Idaho Governor Phil Batt initiated development of a conservation plan to restore bull trout populations in Idaho. The mission of the Governor's Bull Trout Conservation Plan is to:

> Maintain and/or restore complex interacting groups of bull trout populations throughout their native range in Idaho.

To accomplish this mission, the goals of this plan include:

> Maintain the condition of those areas presently supporting critical bull trout habitat.
>
> Institute recovery strategies that produce measurable improvement in the status, abundance, and habitats of bull trout. Concentrate resources and recovery efforts in areas which will produce maximum cost-effective, short-term returns and which will also contribute to long-term recovery.
>
> Establish a secure, well-distributed set of sub-watersheds within key watersheds to achieve a stable or increasing population and to maintain options for future recovery; and
>
> Achieve the above goals while continuing to provide for the economic viability of Idaho's industries.

Idaho has long recognized the need and demonstrated the commitment to protect aquatic species. Land, water, and fisheries management practices throughout the state have been modified in a continuous, evolutionary process specifically to protect water quality and riparian habitat.

In 1995 the legislature passed a comprehensive amendment to Idaho Code (39-3601) designed to strengthen water quality protection in the state and improve compliance with the Federal Clean

Water Act (See Appendix E). This law mandates the formation of Basin Advisory Groups (BAGs) and Watershed Advisory Groups (WAGs) to address problems in water quality limited stream segments. The BAGs and WAGs, with their technical advisory groups, provide a source of technical guidance to help local communities develop standards for protection and/or maintenance of water quality.

The Governor's Bull Trout Conservation Plan utilizes the BAG and WAG framework to provide for local development of watershed specific plans to maintain and/or increase bull trout populations. State and federal agencies will provide technical assistance to BAGs and WAGs, and will make recommendations for protection of the bull trout. This will allow locally developed plans to meet the needs of both the bull trout and the community. While the state will not mandate how local communities protect the species, it will insist on meeting the goal of protecting and maintaining the species.

Although BAGs and WAGs will be the mechanism for establishing management practices for bull trout conservation in the majority of watersheds in Idaho, other efforts already underway, such as the Lemhi Model Watershed may serve the same purpose as the WAGs in some situations. In all instances the bull trout conservation goals and objectives will be met through locally developed site-specific programs and policies.

Since water quality and bull trout are closely linked, this approach is consistent with the governor's philosophy of agency coordination. It effectively provides for protection of both water quality and aquatic life forms.

The strategy for the protection and/or recovery of bull trout outlined in this plan is an ecosystem approach to riparian and aquatic management (Figure 2). While bull trout is the target species, many other aquatic and terrestrial species will also likely benefit from the proposed conservation actions.

BULL TROUT BIOLOGY

Taxonomy

Cavender (1978) identified bull trout *(Salvelinus confluentus)* as a distinct species of char, unique to western North America. Prior to the American Fisheries Society's acceptance of the description of *S. confluentus* in 1980, biologists considered bull trout and Dolly Varden, *S. malma*, to be of the same species. Local bull trout populations contain little genetic diversity relative to regional populations (Leary et al. 1993).

Historical Distribution

Bull trout occurred in all but the eastern section of Idaho, including the Snake River basin and tributaries of the upper Columbia River basin (Conley 1993). In the Snake River basin, their historical range approximates that of spring, summer, and fall chinook salmon (Thurow 1987; Rieman and McIntyre 1993) and possibly included the Owyhee River basin and other Snake River tributaries upstream as far as Salmon Falls Creek. They are not known to have occurred in the Snake River upstream of Shoshone Falls, the Wood River system, Birch Creek, or any stream in Idaho that drains the Centennial Mountains between Henry's Lake and the Bitterroot Range. An isolated population exists in the Little Lost River near Howe, Idaho between the Lost River and Lemhi mountain ranges.

In north Idaho bull trout were historically present in the Kootenai, Priest, Pend Oreille, and Spokane river drainages. Populations in the Kootenai River drainage had access to Kootenay Lake in British Columbia. Populations persist in Montana above Kootenai Falls. Adfluvial bull trout were abundant in Priest and Pend Oreille Lakes. Historical harvest exceeded 5,000 fish annually and fish heavier than 30 pounds were caught. Bull trout were caught in the Pend Oreille River and in the Priest River below Priest Lake. These areas may have supported fluvial populations as well as seasonal migrants from the lakes. Tributaries to the Clark Fork River upstream from Pend Oreille Lake supported the bulk of the spawning and rearing areas for Pend Oreille bull trout before Cabinet Gorge Dam blocked access in 1952.

Present Distribution

In 1992, Schill indicated that bull trout were the least studied salmonid in Idaho (Schill, 1992b). Presence/absence data is lacking in portions of the species' known or suspected range in north, central, and southern Idaho, although this situation is rapidly being rectified as biologists from State, Federal and private organizations pursue bull trout survey information at an accelerated pace (see Appendix F).

Biologists have encountered few new occurrences of bull trout, but have noted areas devoid of these fish where they once were known to occur. Additional survey work has documented bull trout in widely scattered segments of their known range in Idaho, mostly in headwater areas where only remnant resident populations may be surviving. Spawning activity of bull trout is

difficult to confirm in much of the species' range because remaining habitat is in isolated and inaccessible areas, numbers of fish are few, and redds are difficult to locate.

Life History

Bull trout exhibit two distinct life history forms, resident and migratory. Resident populations generally spend their entire lives in small headwater streams. Migratory bull trout rear in tributary streams for several years before either migrating into larger river systems (fluvial) or lakes (adfluvial). Research on bull trout has focused on bull trout stocks which migrate to lakes and reservoirs (especially Flathead Lake in Montana); less is known about stocks which migrate to mainstem river systems or remain resident in streams.

Outmigrating fluvial bull trout in Rapid River were primarily age 2 and 3, although younger fish may have outmigrated in the spring (Elle et al. 1994). Adfluvial juvenile bull trout migrated from upper Flathead River tributaries primarily at age 2 (49%), with smaller percentages emigrating at age 1 or 3 (18 and 32% respectively) (Pratt 1985).

Bull trout migrate to Pend Oreille lake from tributary streams at age 2 (Mason 1985). Adfluvial bull trout fry migrated from McKenzie Creek to Upper Arrow Lake during the spring freshet while older juveniles migrated in the spring and summer (McPhail and Murray 1979).

Shepard et al. (1984) speculate most juvenile migrants move quickly downstream along the stream margin to the mainstem Flathead or Flathead Lake beginning early as May and extending through the middle of July. Rapid River bull trout were sampled outmigrating in the fall. It is unknown if a spring outmigration occurs (Elle et al. 1994).

Migratory bull trout live several years in larger rivers or lakes, where they grow to much larger sizes than resident forms, before returning to tributaries to spawn. Resident and migratory forms may live together, but it is unknown if they represent a single population or separate populations (Rieman and McIntyre 1993). Generally, adfluvial fish are larger, fluvial fish tend to be slightly smaller and resident bull trout are much smaller (K.Pratt pers. comm.)

After hatching, bull trout fry rear in low velocity water (McPhail and Murray 1979). They find cover in substrate interstices, or within 0.03 meter (m) of the substrate and are associated with cobble and boulders or submerged fine debris where water velocity averages 0.09 meters per second (m/s) (Shepard et al. 1984). Juvenile bull trout prefer to be close to the substrate or some other cover which creates visual isolation (Pratt pers. comm.).

The presence of embryos, alevins and juvenile fish in the substrate during winter and spring indicates that highly variable stream flows, bedload movements, and channel instability negatively influence the survival of young bull trout (Goetz 1989; Weaver 1985). The redds of bull trout and other fall spawning fish are particularly vulnerable to flooding and scouring during winter and early spring (Elwood and Water 1969; Seegrist and Gard 1972; Wickett 1958), and to low

winter flows or freezing within the substrate. This association with substrate appears more important for bull trout than for other trout and char species (Nakano et al. 1992; Pratt 1984).

Juveniles live close to in-channel wood, substrate, or undercut banks (Goetz 1991; Pratt 1984, 1992). Adult resident bull trout also closely associate with the substrate but appear to select large cobble and boulder substrates (Jakober 1995, Goetz 1989), as well as lateral scour and pocket pools (Hoelscher and Bjornn 1989; Pratt 1984) and areas with complex woody debris and undercut banks (Graham et al. 1981; Oliver 1979; Pratt 1985; Shepard et al. 1984). Woody debris correlated significantly with densities of bull trout sampled in streams in the Bitterroot National Forest of Montana (Clancy 1992). Jakober (1995) found that stream resident bull trout of all sizes conceal themselves in the interstices of large cobble and boulder substrate and large woody debris accumulations during the day.

Although in-stream wood and substrate with clear interstitial spaces correlate with the distribution and abundance of bull trout, habitat complexity in any form can be important (Mullan et al. 1992). Strong bull trout populations will require high stream channel complexity. The amount of cover needed to maintain a strong bull trout population cannot, however, be quantified.

Migratory corridors provide access from over-wintering areas to spawning or foraging areas. Movement undoubtedly is important to the persistence and interaction of local populations within the metapopulation. Disruption of migratory corridors may reduce growth and survival, and possibly lead to the loss of the migratory life-history types. Resident stocks live upstream from natural barriers and an increasing number of barriers caused by human activities. Because these stocks are sometimes isolated in marginal or extreme habitats, they will be at increased risk of extinction (Horowitz 1978).

Reproduction

Bull trout generally mature between 5-7 years of age (Fraley and Shepard 1989, Goetz 1989, Leathe and Enk 1985). Bull trout spawn in the fall, primarily September and October (Heimer 1965, Leggett 1969, Oliver 1979, McPhail and Murray 1979, Shepard et al. 1984). Bull trout may spawn every year or in alternate years (Block 1955, Fraley and Shepard 1989, Pratt 1985, Ratliff 1992).

The migratory fish generally grow larger and have higher fecundity than resident forms. In the Rapid River drainage, fluvial bull trout are consecutive year spawners which grow an average of 54 millimeters (mm) during the 7 to 9 month over-wintering period and range from 290 to 540 mm in length (Elle et al. 1994, Elle 1995). Individuals in the Upper Salmon River spawning migrations ranged in size from 340 to 700 mm (Elle, pers. comm).

Adfluvial bull trout spawners ranged from 300 to 875 mm in length and 4 to 9 years old in the Flathead and Pend Oreille Systems (Shepard et al. 1984, Pratt 1985). Precocious males have been found in the Flathead and Pend Oreille drainages (Shepard et al. 1984, Pratt 1984).

Decreasing water temperatures may influence the onset of spawning (Shepard et al. 1984, Weaver and White 1985). Some bull trout spawn in streams with ground infiltration, particularly springs (Heimer 1965, Allan 1980, Shepard et al. 1984, Pratt 1984) or groundwater upwelling (McDonnel and Fidler 1985). However, spawning sites in Rapid River and other central Idaho systems show no evidence of groundwater influence (Elle 1995).

Upstream migration by bull trout in Rapid River appeared to coincide with temperatures >10° Centigrade (C) and a falling hydrograph following peak runoff, usually May through early July (Elle et al. 1994). In Alberta, Canada adult bull trout enter spawning streams in late July or August (Carl 1985). Bull trout leave Flathead Lake to begin their upstream migration in early spring, generally in April and May. Migrating bull trout remain in the Flathead River mainstem until mid-late August and then move into tributary streams to commence spawning (McDonnel and Fidler 1985).

McPhail and Murray (1979) found egg survival was highest at temperatures of 2 to 4°C. Egg mortality increased with increasing temperatures with only 0 to 20% survival in water 8 to 10°C. Under stable conditions, forty to fifty percent of eggs survive in the wild (Allan 1980). No specific work has been done on the oxygen requirements of bull trout eggs.

Spawning substrate is typically loosely compacted gravel and cobble (McPhail and Murray 1979, Shepard et al. 1984). Spawning sites include runs or tails or pools with water 0.2 to 0.8 m deep. Eggs were buried 10 to 20 centimeters (cm) in the gravel, and water velocities associated with redds were 0.2 to 0.6 m/s (Shepard et al. 1984). Substrate size has been shown to influence survival in laboratory tests, with survival at 0% with more than 50% fines (<6.35 mm) to about 40% with no fines (Shepard et al. 1984). Groundwater or stream bed recharge present may result in higher survival to emergence (Shepard et al. 1984).

Hatching is completed in 100 to 145 days, usually the end of January (Heimer 1965, McPhail and Murray 1979, Allan 1980, Weaver and White 1984). Yolk sac absorption requires 65 to 90 days (Shepard et al 1984). Parr marks develop and feeding begins while fry are still in the gravel. Bull trout reach lengths of 25 to 28 mm before filling their air bladders and emerging from the stream bed, approximately in April (Shepard et al 1984).

Habitat

Bull trout appear to have more specific habitat requirements than other salmonids. Channel stability, winter high flows, summer low flows, substrate, cover, temperature, and the presence of migration corridors consistently appear to influence bull trout distribution or abundance (Allan 1980; Fraley and Graham 1981; Leathe and Enk 1985; Oliver 1979; Thurow 1987; Ziller 1992).

Shifts in habitat use occur depending on the time of day. Bull trout often conceal themselves in cover (substrate and woody debris) during the day and move on or above the substrate at night (Goetz 1991, Jakober 1995). This pattern of daytime concealment is more pronounced as water temperatures decline below 7°C (45°F)(Jakober 1995, Schill 1991). Seasonal habitat shifts also

occur. During winter, activity and aggression are greatly reduced and survival depends on finding suitable shelter and minimizing energy costs (Cunjack and Power 1987).

Bull trout appear to seek large, deep pools with abundant cover in the autumn and winter (Jakober 1995). Adult bull trout over-wintering in the Salmon River used pool and run habitats (Schill et al. 1994, Elle et al. 1994). Most over-wintering bull trout showed high site fidelity after entering the main Salmon River. Individuals typically remained in the same habitat unit they selected after cessation of downstream movement (Elle et al. 1994). No published information exists regarding juvenile overwinter habitat use in large rivers.

Temperature represents a critical habitat characteristic for this species. Temperatures above about 15°C (59°F) are thought to limit bull trout distribution (Allan 1980; Brown 1992; Fraley and Shepard 1989; Goetz 1991; Oliver 1979; Pratt 1984; Ratliff 1992; Shepard et al. 1984). Goetz (1989) believed that optimum temperatures for rearing were about 7 to 8°C (45 to 46°F).

Increased temperature can limit the distribution of other char (Meissner a, 1990b) and likely will exacerbate fragmentation of bull trout populations. North Idaho bull trout appear to prefer streams with significant ground water recharge which relative to other streams in a basin are often the coldest in the summer and the warmest in the winter. This relationship is not as evident in Central Idaho (Elle, personal conversation). Bull trout in the Flathead Basin are not found in streams where maximum monthly water temperatures exceed 18°C (65°F) and are most abundant where water temperatures are 12°C(53°F) or less (Shepard et al. 1984).

Adult bull trout in Libby Reservoir live in open water in the summer and near shore during the fall (Chisholm et al. 1989). In Flathead Lake, bull trout tend to use the littoral zone (Block 1955). Bull trout occupy the lower portion of the thermocline at depths of 12.2 to 18.3 m in Priest Lake, where water temperatures are 7.2 to 12.8°C (45 to 54°F) and move to the surface when surface water temperatures drop to 12.8°C or lower (Bjornn 1961).

Food Habits

In the Flathead basin, juvenile bull trout (< 100 mm) were found feeding on macroinvertebrates (aquatic insects), with preference for mayflies (ephemeroptera) and flies (diptera) (Shepard et al. 1984). Mayflies, stoneflies (plecopterans), caddisflies (trichopterans) and beetles (coleopterans) are the preferred food of juvenile bull trout in the Muskeg River system of Western Alberta (Boag 1987). Adult bull trout are opportunistic fish eaters (piscivores). In Libby Reservoir, fish account for over 99% of the biomass consumed by bull trout (Chisholm et al. 1989).

Growth

Growth varies between the three bull trout forms. McPhail and Murray (1979) found bull trout grew to larger sizes at lower temperature and grew largest at 4°C. Bull trout rearing in streams are 100 to 150 mm by age 2 to 3 and growth increases once they enter lakes (McPhail and Murray 1979). Generally resident adults range from 150 to 300 mm in length (Goetz 1989,

Mullan et al. 1992) while migratory fish commonly exceed 600 mm in length (Goetz 1989, Pratt 1985, Shepard et al. 1984).

PROBLEMS/THREATS

The current distribution and abundance of bull trout suggest historical habitat modification has directly influenced many populations. The legacy of these historical activities may continue to degrade habitat conditions or depress bull trout populations. However, increased environmental awareness and technical knowledge have stimulated the development of management practices designed to protect water quality and riparian habitats.

Threats to bull trout persistence are linked to habitat modifications caused by timber harvest and associated road development, livestock grazing, mining, dams, hydro-electric development, and irrigation diversions (USDA Forest Service, 1994). Introduction of exotic species has impacted bull trout populations through competitive interaction, predation, and hybridization (Rieman and McIntyre 1993). Hatchery supplementation may introduce genetic threats to wild stocks (Leary et al. 1993). Bull trout have suffered from historical over-harvest. Poaching of spawning adults and mis-identification by fishermen may result in harvest. Any activity that results in significant modifications in the habitat characteristics of: 1) channel stability, 2) substrate composition, 3) cover, 4) temperature, and, 5) migratory corridors should be considered a threat to the persistence of a bull trout population (Rieman and McIntyre 1993). See Appendix C for a more complete discussion of potential threats.

Protection and/or restoration of bull trout in Idaho will require protecting the best remaining habitats, identifying threats from past land use activities, recognizing potential threats from future land use and recommending management practices that will meet the mission and goals of this plan.

BULL TROUT RECOVERY APPROACH

Fundamental to the protection and/or recovery of bull trout throughout their range in Idaho is the designation of bull trout key watersheds. These key watersheds have been identified as critical to the long-term persistence of bull trout populations. They define the land area where management actions will emphasize the maintenance and/or recovery of regionally important bull trout populations throughout Idaho. Bull trout key watersheds are designated on the basis of bull trout biology and life history needs, and not on land ownership. This plan identifies 59 key watersheds (table 6, Appendix F) that contain bull trout populations where protection and/or restoration activities are likely to produce measurable results. These watersheds range in size from 100 to 1000 square miles. The populations they support represent regional metapopulations. A metapopulation (Gilpin 1987) is a group of semi-isolated sub-populations which are interconnected and likely to share genetic material. Other watersheds in Idaho, such as the Coeur d'Alene basin, may contain bull trout, but habitat conditions are so badly degraded that restoration will be long term and potentially expensive (Dave Cross, Ned Horner, pers. comm).

The bull trout key watersheds in Idaho were selected based on five criteria (Rieman and McIntyre 1993):

1. Key watersheds must provide all critical bull trout habitat elements;

2. Key watersheds should be selected from the best available habitat with the best opportunity to be restored to high quality;

3. A key watershed must provide for replication of strong subpopulations within its boundaries. Conservatively, 5-10 subpopulations should be included within a key watershed. If multiple subpopulations cannot be incorporated, a system should not be eliminated from consideration. If strong subpopulations are not available, key watersheds should emphasize population restoration;

4. Key watersheds should be large enough to incorporate genetic and phenotypic diversity, but small enough to ensure that the component populations effectively connect;

5. Key watersheds must be distributed throughout the historical range of the species.

Strong subpopulations (source) within key watersheds, will contribute to weak (sink) subpopulations and should prevent local extinctions. The role of source and sink populations may vary over time.

Bull trout utilize different areas of the key watersheds at during different stages of their life history. Headwater areas are important for spawning and rearing, while mainstem rivers provide migratory corridors and overwintering habitat for fluvial and adfluvial fish. In addition, habitat

conditions within key watersheds will vary depending on natural conditions and land-use history. To most efficiently allocate resources and determine appropriate protection and restoration efforts, habitat conditions within key watershed sub-basins should be evaluated and classified as follows:

1) Focal habitats are critical areas with high-quality habitat, "the best of what is left". Securing focal areas supporting healthy sub-populations of several thousand individuals (source populations) can increase the persistence of adjacent populations in lower quality habitats (sink populations) (Frissell 1993, Rieman and McIntyre 1993, Pulliam 1988, Stacey and Taper 1992).

2) Adjunct habitats are areas adjacent to focal habitats which have been degraded by human or natural disturbances and do not presently support high diversity or abundance of native taxa. Restoration may be necessary to reestablish bull trout. Because of their close proximity to existing bull trout populations, chances are good bull trout populations can be established.

3) Nodal habitats are generally mainstem overwintering areas, and serve as a corridor for migratory life forms.

4) Critical contributing areas are portions of a watershed which are sources of water, wood and sediments to focal, nodal and adjunct habitats.

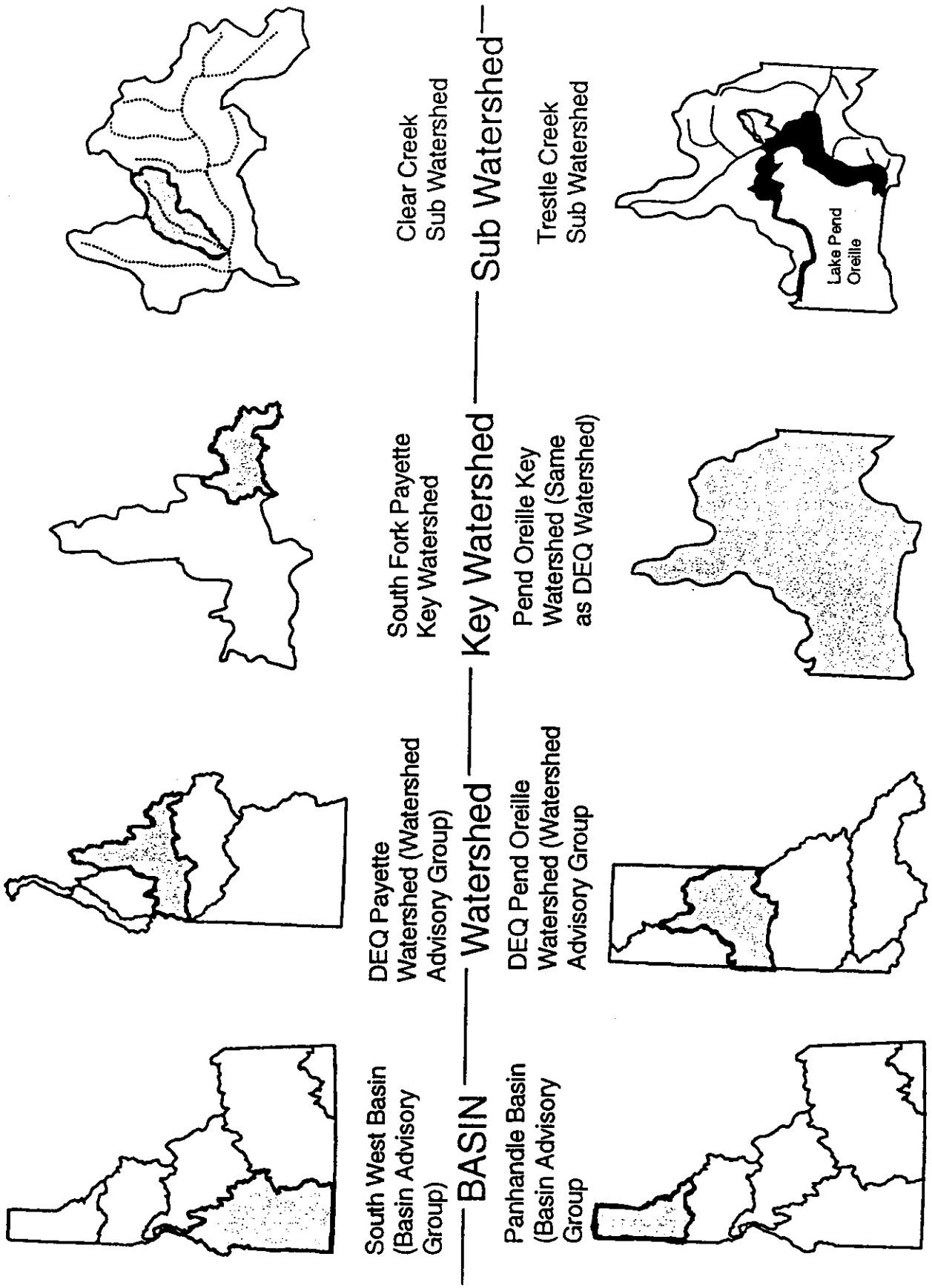
5) Lost cause habitats are areas so severely degraded that recovery is unlikely, at least within the time span of several human generations.

All the bull trout key watersheds fall within basins defined by Idaho Code 39-3601 as listed in Table 1 and illustrated in Figure 1.

TABLE 1: Listing of how Idaho Code 39-3601 Basins, Proposed DEQ Watersheds and Bull Trout Key Watersheds Nest Together. (Appendix F)

BASIN	PROPOSED DEQ WATERSHED ADVISORY GROUP	BULL TROUT KEY WATERSHED
Southeast		*No bull trout key watersheds*
Southwest/ Snake River	Lower Snake River	Jarbidge River
	Lost River	Little Lost River
	Weiser River	Weiser River
	Boise River	Arrowrock/ NF, MF, SF Boise
		Anderson Ranch/ SF Boise
	Payette River	Middle Fork Payette
		Squaw Creek
		Deadwood River
		Gold Fork
	Brownlee	Indian Creek
		Wildhorse Creek
	Hells Canyon	Hells Canyon - Sheep
Salmon Basin	Little Salmon River	Little Salmon
	Lower Salmon River	Whitebird/ Slate Creeks
		French Creek
		Wind River/ Crooked Creek
		Secesh
		Five Mile/ Sabe
		Lower SF Salmon
		Upper SF Salmon
		Johnson Creek
		Chamberlin Creek
		Horse Creek
		Owl Creek
	Middle Fork Salmon River	Lower Middle Fork
		Big Creek
		Marble Creek
		Upper Middle Fork
		Bear Valley Creek
		Big Creek to Wilson/Camas Creek
		Wilson/ Camas Creek
		Loon Creek
		Panther Creek
	North Fork Salmon River	NF Salmon
		Carmen Creek
		Hat/ Iron
		Indian Creek
	Upper Salmon River	Thompson/ Bayhorse
		Warm Springs Creek
		East Fork Salmon
		Yankee Fork
		Upper Salmon
	Pahsimeroi	Pahsimeroi
	Lemhi	Lemhi
Clearwater Basin	South Fork Clearwater	SF Clearwater
		Clear Creek
		Lolo Creek
	Lochsa River	Lochsa River
	Selway River	Meadow Creek
		Middle Selway
		Upper Selway
		Moose Creek
	North Fork Clearwater	Little North Fork
		Upper North Fork
		Kelly Forks
		Weitas Creek
	Mainstem Clearwater	*No BT key watersheds*
	Palouse River	*No BT key watersheds*
	Potlatch River	*No BT key watersheds*
	Hangman Creek	*No BT key watersheds*
Panhandle	St Joe/ St Marie	Upper St Joe
	Coeur d'Alene, Spokane, Rathdrum	*No BT key watersheds*
	Pend Oreille	Pend Oreille Lake
	Priest	Priest River
		Upper Priest Lake
	Kootenai River	Kootenai River

Figure 1 - Example of Bull Trout Basin/Watershed Hierarchy



Under the federal Clean Water Act (CWA), the State has the responsibility to set standards against which success in meeting the goals of the CWA can be measured. Inherent in the standard is the concept of "beneficial uses", and the biological or consumptive use depends upon the quality of the water or aquatic habitat values for each stream or water body. Idaho's general water quality standard requires water quality protection measures sufficient to support all beneficial uses fully.

Beneficial uses can be expressed in terms of naturally occurring biological values inherent in a stream, e.g., salmonid spawning for streams with quality sufficient to support that biological use. Beneficial uses can also be designated through a rule. However, streams cannot be downgraded artificially by designating "beneficial uses" beneath its actual capability. For example, a stream's beneficial use cannot be designated as "warm water biota" (a use that may imply lower biological values, and, consequently, relatively minor protection measures) if that stream is capable of supporting "salmonid spawning", a use which requires more stringent water quality protection measures.

Coordination of bull trout and water quality protection efforts best occur at the watershed level. The entire watershed must be considered in order to develop effective site-specific, best management practices and other measures to protect high quality streams and to restore the quality of the streams not meeting standards. For water bodies key to the protection or restoration of bull trout, it is possible to designate "bull trout spawning and rearing" as a beneficial use. Not all water bodies within a bull trout key watershed may require such a designation. Water quality protection measures must be employed which are adequate to assure that the standard is met. The development and implementation of these measures are required by state and federal laws. The entire process is summarized in Figure 2.

The state of Idaho crafted legislation to prioritize water quality problems and implement solutions to those problems (SB1284, amendments to Idaho Code 39-3601, see Appendix E). The legislation is based upon citizen participation in the form of six basin advisory groups (BAGs) in each of Idaho's major hydrologic basins, and numerous watershed specific problem-solving groups within each basin, called watershed advisory groups (WAGS). With the technical support of state and federal agencies, and private industry, these citizen groups will establish priorities and recommend protection measures and appropriate best management practices (BMPs) or modifications of BMPs to resolve water quality problems within their designated watersheds and basins.

The vehicle provided by Idaho Code 39-3601 can also be used to protect and recover bull trout throughout its range in Idaho. It can be used either parallel to or in conjunction with efforts already under way to resolve water quality issues throughout the state.

PART II

CONSERVATION MEASURES

July 1, 1996

Figure 2: Flow Diagram of Strategy to Implement Key Watershed Plans

PHASE I: Problem Assessment / Protection Measure Implementation

Completion by January 1, 1999 for all 59 Bull Trout Key Watersheds

Step 1: Establish WAGs & Technical Advisory Teams
WAGs coordinated with BAGs and Technical Advisory Teams

↓

Step 2: Assemble Existing Data
Determine Bull Trout Distributions, habitat conditions, (ie water quality standards), watershed characteristics, priority areas and limiting factors
Identify Data Gaps & Unknowns
Institute Protection Measures where threats are identified

↓

PHASE II: Development, Implementation & Monitoring of Conservation Plans
Initiated following completion of Phase I

Step 3: Establish and Evaluate Key Watershed Goals and Initiate Collection of New Data

↓

Step 4: Develop Prioritized Recovery Activities

↓

Step 5: Develop & Implement Conservation Plan
WAG submits conservation plans to BAGs, Bull Trout Coordinator and germane agencies for adequacy review

↓

Step 6: Develop & Implement Monitoring Plan and Feedback Mechanisms

PART II - CONSERVATION MEASURES

FRAMEWORK FOR IMPLEMENTATION OF KEY WATERSHED PLANS

PHASE I - Conservation Strategy Development/Problem Assessment

By January 1, 1999, the following steps will be completed:

STEP 1. The appropriate BAGs recommend the required WAGs, including the technical advisory teams (TAT).

STEP 2. Using technical advisory teams, compile existing technical bull trout information for the key watersheds and recommend appropriate bull trout and water quality protection measures.

The purpose of the TATs will be to provide biological and vegetation management information to the BAGs and WAGs to establish a scientific framework for implementing the bull trout plan. The TATs will provide current and scientific data on bull trout, water quality, and land management to the BAGs and WAGs. Finally, TATs will be involved in the planning and implementation with the WAGs.

Each agency will assign individuals with technical expertise for each BAG and WAG. The bull trout coordinator will provide leadership and consistency and assist with statewide agency coordination of technical assistance.

Examples of areas on which the technical support staff would provide assistance may include:

Prioritize streams within each watershed (developed with WAG and BAG involvement)
Identify options for habitat restoration
Identify and rank information needs (e.g. current population states, existing habitat conditions)
Identify all potential impacts to bull trout in priority and key watersheds
Accumulate and interpret data
Assist in monitoring coordination
Establish fieldwork coordination and protocols
Do adequacy review of initial recovery plan or protection measure recommendations of the WAGs
Review schedule and coordinate agency actions and implementation
Establish protocols for review of actions to assure objectives are being met

Examples of information sources may include: existing surveys and inventories, research studies, maps, aerial photographs, agency reports, records and databases, photographs, anecdotal information, and historical accounts.

Species-specific and site (habitat)-specific data would include the following:

1. Determine bull trout distribution and abundance across key watershed

This information is needed to estimate current population and to make the determinations for habitat conditions and trends which are evaluated in the next step. Presence/absence surveys,

basin-wide surveys, electro-fishing and snorkel studies, creel census data, and angler surveys are examples of data that can be used. Technical assistants will determine the status of the local and regional bull trout populations in the key watershed. Population data would be integrated with habitat data evaluated in the next step to provide a holistic view of the ecological status of bull trout and provide a means for setting priorities for the at-risk populations.

2. Identify habitat conditions and trends

Habitat condition and trend information is needed to assess factors limiting bull trout productivity in key watersheds. Information needed includes: a) channel and hydrologic stability, b) substrate size (especially fines) and relative composition, c) cover complexity such as large woody debris, frequency of pools, composition of undercut streambanks and overhanging vegetation, d) temperature and related variables such as water surface shade and stream maximum width-to-depth ratio, and e) barriers to migration such as impassable culverts, diversions and other blockages. These are critical habitat variables, but other types of habitat information, such as streamside vegetation condition, stream bank stability, stream bed stability, and riffle-pool composition which influence critical habitat variables would also be useful.

3. Identify key watershed characteristics influencing bull trout

This information is used to evaluate natural and man-caused threats to bull trout persistence. The kinds of information needed are: a) geologic processes (e.g. erosion and mass wasting) and where they occur, b) streamflow regimes and if (and how much) they have been altered from historical characteristics, c) vegetation conditions and how they influence bull trout habitats now as compared with historic conditions, d) stream channel characteristics and how they transport and deposit sediments and their stability now compared with historic conditions, and e) land uses, including what, where, and how they influence bull trout habitats.

4. Identify priority sub-watersheds

The purpose of this step is to design measures that have the greatest chance of producing measurable improvement in the abundance and condition of bull trout in the near term. Priority is given to the best remaining bull trout habitats. This is accomplished by identifying the existing mosaic of strong bull trout production areas across the key watershed in terms of the need for protection and/or restoration (focal sub-watersheds), and identifying those degraded areas that presently do not support strong bull trout numbers, but that are connected to nearby bull trout refugia (adjunct sub-watersheds), or that contribute to important bull trout habitats (critical contributing sub-watersheds). Overall priorities for protection and restoration should be as follows:

Priority 1: Focal and Nodal sub-watersheds

These are contiguous stream reaches known or believed to be suitable for spawning or initial rearing, where numbers of juvenile aged bull trout are relatively abundant (as compared with elsewhere in the key watershed). These areas provide the colonists for nearby unoccupied or lightly populated stream reaches which can be restored as long as they are connected and can be improved to a productive condition. Highest priority is given to the sub-watersheds that will respond to restoration measures in the shortest period of time, and with the least investment. Lowest priority is given to those already protected (by wilderness designation, for example).

Although they may be very costly for rehabilitation, nodal habitats are extremely important because they provide connectivity between habitats and are critical for over-wintering.

Priority 2: Adjunct sub-watersheds

These include stream reaches or sub-watersheds in close proximity to the refuge habitats that have the potential to foster spawning and early rearing, but may not presently support an abundance of bull trout. Highest priority is given to the sub-watersheds that will respond to restoration measures in the shortest period of time, and with the least investment. These have the greatest chance for refounding bull trout because they are often immediately adjacent to or downstream of high quality refuge habitats and are connected to sources of colonists. Restoration and protection measures in these areas stand a good chance of success.

Priority 3: Critical contributing sub-watersheds

These areas may not directly support habitat for bull trout, but are important upstream contributors. Highest priority would go to high-quality waters that contribute to existing favorable habitat conditions in downstream focal and nodal habitats. Examples are sub-watersheds that contribute cool, clear water from stable and often undisturbed areas.

5. Identify limiting factors to bull trout in the priority sub-watershed(s)

The purpose of identifying specific bull trout threats and limiting factors is to provide a basis for restoring bull trout in the most economically efficient and effective manner possible. The approach is similar to the one used by doctors to identify causes of illness and thereby prescribe remedies. Potential threats fall into four general areas:

1. Habitat degradation : Identify threats to bull trout stream spawning, early rearing, migration, and over-wintering habitats. These can be evaluated using the watershed habitat information and the identified limiting factors due to historical activities. Treatment of these threats can derive the greatest benefits if spawning and/or early rearing life stages are currently limiting production of the population.

2. Identify threats to lake habitats, if present. Threats are often associated with poor water quality, severe water level drawdowns, and habitat fragmentation due to blockages by dams.

3. Harvest or over-utilization threats: Bull trout are currently not subject to legal harvest by fishermen in the state of Idaho, therefore, this is generally not considered a threat. However, areas of high angling pressure may result in mis-identification and poaching of bull trout. Possible fishing and incidental harvest threats that may occur should be identified.

4. Exotic Species threats: Identify whether bull trout overlap with non-native species in a watershed (e.g. brook trout and lake trout). Adverse interactions between the species include competition, predation, and hybridization.

PHASE II - Conservation Measures/Implementation/Monitoring/Progress Evaluation

With the completion of Phase I, the state of Idaho will complete conservation plans for a minimum of 6 bull trout key watersheds per year. At least one conservation plan will be developed each year in each of the Panhandle, Clearwater, Salmon and Southwest Area Basins.

STEP 3. Establish and Evaluate Key Watershed Goals; Initiate Collection of New Data

Existing technical information should provide enough background to understand general watershed capabilities, beneficial uses, and current bull trout population conditions. The principles of conservation biology provide the theoretical framework for the recovery of bull trout. Inherent in this approach is determining the minimum viable population (how many fish do you need for bull trout populations to exist for at least the next 100 years). Research indicates a minimum of 5 to 10 healthy sub-populations are necessary to maintain overall bull trout population viability within a key watershed (Rieman and McIntyre 1993). Healthy bull trout populations are defined as populations near equilibrium-carrying capacity (as many fish as the habitat can support) in good quality habitat, with reproduction, survival and growth operating within normal bounds with an effective population size of several thousand individuals.

Not all key watersheds have bull trout populations which meet these criteria and some may not be able to meet these goals (i.e. Squaw Creek and Gold Fork key watersheds in the Payette Basin). Goals for the key watershed should be developed based on local conditions and should reflect watershed capabilities. Typical goal statements should include:

- Establish a network of secure sub-watersheds within the key watershed to establish a stable or upward trend in the population status and to maintain options for future recovery;

- Maintain the present condition of those areas presently supporting critical bull trout spawning, rearing, migration, and over-wintering;

- Institute recovery strategies in the Key Watershed that stand the greatest chance of producing measurable improvement in the status and abundance of bull trout. Prioritize treatment to emphasize the most time/cost efficient responses which also contribute to long-term recovery (treat the causes of decline, not the symptoms).

STEP 4. Develop prioritized recovery activities

Bull trout restoration and protection activities will be prioritized by the ones that will provide the most time/cost efficient response. These activities will focus on removing identified threats. Immediate protection measures, for habitats identified by the WAGs prior to January 1, 1999, will be designed to prevent further damage. Pro-active actions such as road obliteration and changes in existing streamside grazing practices are two examples of actions that can be taken. In general, restoration efforts should be directed at controlling the cause rather than the symptoms of habitat degradation. However, in some cases, mechanical restoration may prove beneficial in the short-term to allow long-term natural processes to succeed.

Focal habitats are the highest priority for security and restoration because: 1) many other aquatic species benefit from protection and maintenance of the area; 2) the cost of protection or

restoration can be low relative to the biological benefits gained or secured; and 3) the likelihood of near-term success is high, since focal habitats already provide suitable habitat for many of the populations or species assemblages of interest.

Considerable restoration may be necessary to reestablish a natural biotic community in adjunct habitats. These areas are important because: 1) if watershed processes are controlled, or at least buffered, by the adjacent refuge habitat, the riparian and in-channel restoration measures stand a good chance of succeeding; 2) nearby refuge habitats ensure a source of appropriately adapted colonists , so that habitat recovery is likely to be followed by biotic recovery; 3) restoration of adjunct habitats can directly improve the productivity and viability of existing refuge populations.

Restoration and maintenance of nodal habitats are also important because they: 1) sustain existing populations in the watershed; 2) are highly connected and accessible to bull trout moving up or down stream; and 3) are potentially productive, since they have a mix of life history types of numerous populations.

Finally, protection and restoration of critical contributing areas is necessary to secure the functional value of associated focal, nodal, and adjunct habitats.

STEP 5. Develop and implement conservation plan

Conservation plans will be developed by the WAGs based on prioritized recovery activities identified in Step 4. The conservation plans will be reviewed for technical and procedural adequacy by the BAGs, bull trout coordinator, and germane agencies. The state of Idaho will complete and begin implementation of at least 6 bull trout key watershed conservation plans per year, starting January 1, 1999, with at least one conservation plan developed and implemented each year in the Panhandle, Clearwater, Salmon and Southwest Area Basins. If WAGs complete the problem assessment phase prior to January 1, 1999, these groups should proceed with the development and implementation of conservation plans.

STEP 6. Develop and implement monitoring plans and feedback mechanisms

Monitoring will provide information to demonstrate bull trout persistence in Key Watersheds (Rieman and McIntyre 1993), and will also be needed to identify trends in habitat productivity and population abundance. Rieman and McIntyre (1993) suggest that knowledge of bull trout distribution is the first priority, followed by monitoring the relative abundance and habitat condition trends. IDFG and IDEQ will be the primary monitoring agencies and must coordinate and establish monitoring protocols.

IDEQ will be the lead agency responsible for initiating and coordinating water quality monitoring programs. IDFG will be responsible for implementing fish population monitoring and developing guidelines for sampling to be utilized by interested private landowners. State agencies, through the Bull Trout Coordinator, will coordinate with federal land managers to ensure data transfer and compatibility.

Effectiveness monitoring will measure the effectiveness of locally developed conservation plans and to determine where modifications are necessary. Three types of monitoring will be necessary for evaluating the effectiveness of the bull trout conservation plan:

1. Describe population distribution, status and relative habitat condition

Data obtained from this IDFG monitoring objective will be used to describe and verify key watershed conditions, including, focal, adjunct, nodal, critical contributing, and "lost cause" habitats; define baseline (or reference) areas and their conditions; and to prioritize treatment and restoration efforts.

Monitoring at this broad scale will be of reconnaissance or inventory intensity and conducted through a stratified (on eco-region, landscape, habitat types, etc.) systematic design. Monitoring on a drainage or key watershed scale will be more intense and quantitative. Monitoring parameters will include descriptions of bull trout presence/absence, relative abundance, and relative habitat condition data. The purpose of monitoring is to acquire tools for pro-active bull trout management.

2. Evaluate management guidelines (implementation, compliance and habitat response)

The bull trout coordinator will evaluate the effectiveness of management standards in maintaining and/or improving bull trout habitat. The information obtained will also be used to evaluate the effectiveness of key watershed conservation plans. This monitoring will provide information to implement a feedback loop concept as outlined in Clark (1990).

Two types of monitoring will be used: implementation (compliance) monitoring and habitat response monitoring. Implementation monitoring will determine if treatments complied with planned prescriptions. Habitat response monitoring will be used to gather information on changes in critical bull trout habitat variables.

Implementation (compliance) monitoring will focus on such things as: erosion and runoff from roads, culvert adequacy, barrier removal (culverts and other crossings identified as passage problems), livestock utilization, canopy removal effects on water yield/flooding, mine reclamation, recreation developments, hydroelectric diversion, etc.

3. Evaluate bull trout (population) response to recovery treatments

In order to evaluate whether actions resulting from this conservation strategy have, in fact, contributed to protection or restoration of bull trout populations, direct measures of bull trout abundance and habitat trends are required. Measurements of surrogates, such as habitat conditions are not adequate.

Data will quantitatively describe bull trout abundance, limiting factors of physical habitat, limiting factors of riparian habitat, population dynamics (genetics, demographics, age structure, etc.), life history, and total fish community analysis.

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July 1, 1996

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APPENDIX A

DEFINITIONS

July 1, 1996

APPENDIX A - DEFINITIONS

ADFLUVIAL	Bull trout that migrate into lakes.
ADJUNCT HABITAT	Areas directly adjacent to focal or refuge habitats that have been degraded by human or natural disturbances and do not presently support high diversity or abundance of native species.
AG PLAN	Idaho Agricultural Water Quality Plan.
BAG	A Basin Advisory Group as defined by Idaho Code § 39-3601.
BENEFICIAL USE	The biological or consumptive uses that indicate the quality of water or aquatic habitat value for a stream or water body.
BEST MANAGEMENT PRACTICE	A practice or combination of practices determined to be the most effective and practicable means of preventing or reducing the amount of non-point pollution generated by management activities.
BLM	United States Department of Interior, Bureau of Land Management.
BMP	Best Management Practice.
BOR	United States Department of Interior, Bureau of Reclamation.
CA	Conservation Agreement - A voluntary agreement between the U.S. Fish and Wildlife Service or other federal or state agency and a participating private entity to undertake management activities that create, restore or maintain habitat benefitting potentially threatened or endangered species.
CES	United States Department of Agriculture, Cooperative Extension Service.
CLEAN WATER ACT	33 USC 466 et seq.
CRITICAL CONTRIBUTING AREA	Portions of a watershed which are a source of water, wood and sediments to focal, nodal and adjunct habitats.
DEQ	Idaho Department of Health and Welfare, Division of Environmental Quality.
ENDANGERED SPECIES ACT	16 U.S.C. 1531 et. seq.
EPA	United States Environmental Protection Agency.
EQUILIBRIUM CARRYING CAPACITY	The maximum number of fish a habitat can support.
ESA	Endangered Species Act.
FLUVIAL	Bull trout that migrate into larger river systems.
FOCAL HABITAT	Critical areas supporting a mosaic of high quality habitats that sustain a diverse or unusually productive complement of native species.
FPA	Idaho Forest Practices Act. Idaho Code Title 38 Chapter 1.
FSA	United States Department of Agriculture, Farm Service Agency.
FTP	Full time position.

IDA	Idaho Department of Agriculture.
IDFG	Idaho Department of Fish and Game.
IDL	Idaho Department of Lands.
IDWR	Idaho Department of Water Resources.
INFISH	Inland Native Fish Strategy. A strategy designed by federal agencies to protect native fish habitats within the geographic scope of the Forest Ecosystem Management Assessment area.
ISCC	Idaho Soil Conservation Commission.
KEY WATERSHEDS	Those watersheds that have been designated as critical to the long- term persistence of regionally important trout populations.
LOST CAUSE HABITAT	Areas so severely degraded that recovery of bull trout is unlikely at least within the time span of several human generations.
METAPOPULATION	A group of semi-isolated subpopulations of bull trout which are interconnected and likely to share genetic material.
MOU	Memorandum of Understanding.
NODAL HABITAT	Areas that are separated from focal and adjunct habitats but serve critical life history functions for individual bull trout from other populations.
NRCS	United States Department of Agriculture, Natural Resource Conservation Service.
PACFISH	Anadromous Habitat and Watershed Conservation Strategy designed by federal agencies to save pacific salmon, steelhead, and C-run cutthroat trout throughout their range in Oregon, Washington, Idaho and portions of California.
SAFE HARBOR	A process by which landowners willing to engage in habitat improvement for endangered species are protected against additional legal responsibilities.
SCD	Soil Conservation District.
SINK POPULATIONS	Weak subpopulations within a metapopulation which without contributions from strong or source subpopulations will likely go extinct.
SOURCE POPULATIONS	Strong subpopulations of bull trout within a metapopulation which contribute to weak (sink) subpopulations and will prevent local extinctions.
TMDL	Total Maximum Daily Load.
TOTAL MAXIMUM DAILY LOAD	The sum of the individual wasteload allocations from point sources, load allocations from nonpoint sources and natural background levels of all pollutants.
USDA	United States Department of Agriculture.
USFS	United States Department of Agriculture, Forest Service.
USFWS	United States Department of Interior, Fish and Wildlife Service.
WAG	Watershed Advisory Group as defined by Idaho Code § 39-3601.

APPENDIX B

AGENCY ROLES AND RESPONSIBILITIES

July 1, 1996

APPENDIX B - AGENCY ROLES AND RESPONSIBILITIES

With the exception of some areas protected within the boundaries of Wilderness Areas including the Frank Church River of No Return, the Selway-Bitterroot, the Gospel-Hump, the Sawtooth, and the Jarbidge, most streams and rivers within the present bull trout range in Idaho have been modified by human activities. Federal, State and local regulatory processes cover many of the land use activities potentially impacting bull trout. Table 2 summarizes legislative authority and mandates of the agencies.

The current roles and responsibilities of state, federal and local governments will require only minor modifications to implement the provisions of this plan. The agencies will be required to coordinate with one another in providing the planning and implementation factors of this plan.

FEDERAL AGENCIES:

Forest Service

Primary authorities: Organic Act of 1897 (16 U.S.C. 551),Multiple Use Sustained Yield Act of 1960 (16 U.S.C. 528), National Forest Management Act of 1976 (16 U.S.C. 1600).

The Forest Service regulates and permits land-use activities on National Forest System lands in Idaho. USFS implements non-point source pollution control and the Idaho State Water Quality Standards on these lands to improve, protect, and restore water quality so that beneficial uses are supported. USFS designs and implements monitoring programs for activities that may impact beneficial uses. These water quality programs are coordinated with local, state and federal agencies, affected public lands users, adjoining land owners, and other affected interests.

Standards for managing bull trout are included in the Forest Plans of all National Forests in Idaho. Those standards are based on implementation of the interim INFISH and PACFISH conservation strategies for native inland and anadromous fishes.

Bureau of Land Management

Primary authorities: Taylor Grazing Act of 1934 Federal Land Policy and Management Act of 1976 Public Range Lands Improvement Act of 1978 Water Pollution Control Act of 1972

BLM regulates and licenses land use activities on 12 million acres of public land in Idaho to maintain or improve water quality consistent with state and federal water quality standards, and to minimize non-point source pollution. It designs and implements monitoring programs for activities that may affect beneficial uses. BLM coordinates all its water quality programs with local, state and federal agencies, affected public land users, adjoining land owners, and other affected interests.

Bull trout habitats within the critical habitat of anadromous fish on land administered by BLM are protected under the interim PACFISH standards. Bull trout outside the anadromous fish areas are protected under an interim bull trout habitat conservation strategy.

Natural Resource Conservation Service

Primary authorities: Soil Conservation and Domestic Allotment Act, Section 7 (Public Law 46▲74; USC 590a(3)), Agriculture and Burner Protection Act, Title 10, Agricultural Credit Act, Title 4.

The Natural Resource Conservation Service provides technical assistance to land users for planning and implementing water quality measures and initiatives. NRCS publishes the Field Office Technical Guide as a technical resource for agricultural best management practices. NRCS administers a number of programs which include water quality components (PL-566 Small Watershed Program, Conservation Operations, Resource Conservation and development, River Basin Planning, Soil Survey, Snow Survey, Emergency Watershed Protection, the Plant Materials Program, Conservation Reserve Program, Wetland Reserve Program, and Agricultural conservation Program). Private landowners participating in these programs are required to develop conservation plans to reduce soil erosion. NRCS provides technical assistance to participants in the development of these conservation plans.

NRCS shares leadership with Farm Service Agency and the Cooperative Extension Service in implementing USDA water quality initiatives such as hydrologic unit planning and demonstration project activities.

Farm Service Agency

The Farm Service Agency shares the cost of soil, water, woodland, and wildlife conservation practices with individual farmers under the Conservation Reserve Program, and the Rock Creek Rural Clean Water Program. FSA shares leadership with the Natural Resource Conservation Service and the Cooperative Extension Service in implementing USDA water quality initiatives including hydrologic unit planning and demonstration projects, and Agricultural Conservation Program special water quality projects.

Cooperative Extension Service

Primary authorities: Smith-Lever Act of 1914

The Cooperative Extension Service is the education arm of the United States Department of Agriculture (USDA). Along with the Natural Resource Conservation Service (NRCS) and the Farm Service Agency (FSA), CES is a lead agency in implementing USDA water quality initiatives such as hydrologic unit planning and demonstration projects. CES helps plan, deliver and analyze water quality procedures, publishes technical guides and other references, and organizes professional training.

Environmental Protection Agency

Primary authorities: Clean Water Act (33 U.S.C. 466 et seq.)

The Environmental Protection Agency ensures that non-point source water quality impacts are adequately addressed by the state through review and approval of state water quality standards.

U.S. Fish and Wildlife Service

Primary Authority: Endangered Species Act of 1973 as amended in 1988.

Congress gave authorities to the Fish and Wildlife Service, an agency of the Department of the Interior, to list species as threatened or endangered under Section 4. The following are threats that merit listing a species as threatened or endangered: 1) destruction or modification of its habitat or range; 2) overutilization for commercial, recreational, scientific, or educational purposes; 3) disease or predation; 4) the inadequacy of existing regulatory mechanisms to effect protection; 5) other natural or manmade factors. There are a number of steps that FWS needs to fulfill before a species is listed. A status review needs to be completed which serves as the scientific document with which the FWS makes a determination to list. Status reviews need to be updated periodically. The Pre-Listing Program was developed under Section 4 to pursue conservation of species that are candidates for listing under the Endangered Species Act. Section 6 provides for cooperation with states to conserve candidate, threatened and endangered species. It allows for funds to be provided to the states to assist in the recovery of listed and candidate species.

TRIBAL GOVERNMENTS

STATE AGENCIES

The lands owned by the State of Idaho are managed by the Idaho Department of Lands, Idaho Department of Fish and Game, Idaho Department of Parks and Recreation or other state agencies and are required to be operated in compliance with Idaho laws and Idaho water quality standards, including bull trout standards.

Division of Environmental Quality

Primary authorities: Clean Water Act (33 U.S.C. 466 et.seq.),Idaho Environmental Protection and Health Act of 1972 (Title 39, Chapter 1, Idaho Code), Title 39, Chapter 36, Idaho Code, Title 1, Chapter 2, Water Quality Standards and Waste Water Treatment Requirements, Rules and Regulations of the Idaho Department of Health and Welfare.
Title 1, Chapter 17, Idaho Code
Title 39, Chapters 1 and 16, Idaho Code
Title 37, Chapter 21
Title 39, Chapters 1 and 18, Idaho Code
Title 39, Chapter 13, Idaho Code

State Non-Point Source Program

The Division of Environmental Quality is the agency charged with coordinating and administering water quality protection programs in Idaho. In this capacity DEQ is responsible for:

- Establishing numerical water quality standards evaluate the effectiveness of best management practices (BMPs);

- Coordinating water quality planning and implementation efforts;

- Identifying high priority watersheds and implementing non-point source controls to achieve water quality standards in those watersheds;

- Developing and evaluating BMPs for non-point sources not currently listed as approved in the Water Quality Standards;

- Monitoring water quality to ensure that standards are met and beneficial uses are supported;

DEQ appoints Watershed Advisory Groups (WAGs), the mechanism for local involvement in prioritizing streams. WAGs are charged with developing Total Maximum Daily Loads (TMDLs) or equivalent processes for control of all point and non-point source pollutants in high priority watersheds. DEQ monitors each watershed to identify and determine the status of beneficial uses. In cooperation with appropriate land management agencies, DEQ ensures that BMPs are monitored to determine their effect on water quality and beneficial uses, and to evaluate progress toward achieving TMDL goals.

DEQ regulates the land application of waste water, on-site sewage disposal systems, the Public Drinking Water Program, the Underground Storage Tank Program, and the Wellhead Protection Program.

DEQ co-administers the State Agricultural Water Quality Program with the Idaho Soil Conservation Commission.

DEQ regulates cyanide leaching facilities and reviews reclamation plan specifications for other mining operations.

DEQ is the lead agency for implementation of the Forest Practices Water Quality Management Plan (1988). In this capacity it assesses BMP effectiveness, and recommends revisions to Forest Practices Act BMPs.

The Idaho Department of Lands

Primary authorities: Idaho Forest Practices Act (Title 38, Chapter 1, Idaho Code) Dredge and Placer Mining Protection Act, Idaho Surface Mining Act, and Idaho Abandoned Mine Reclamation Act (Title 47, Chapters 13, 15 and 17, Idaho Code), Idaho Lake Protection Act (Title 58, Chapter 13, Idaho Code).

The Idaho Department of Lands is the agency responsible for management of Idaho endowment and public trust lands and is responsible for "on the ground" vegetative and soil management on these lands. These lands include a mixture of forest, grazing, recreation and other uses. IDL implements the management plans to meet water quality standards and protect beneficial uses.

IDL ensures compliance with Forest Practices Act (FPA), Best Management Practices (BMPs), on all forest lands in the state through on-site inspections and MOUs with federal agencies. FPA enforcement authority includes issuing Stop Work Orders and filing liens on property to ensure completion of directed remediation action when needed.

IDL provides technical assistance to federal agencies to ensure proper FPA BMP interpretation and implementation, and responds to reports of BMP violations on federal lands.

IDL has developed, and is implementing on state-managed lands, the Forest Practices Cumulative Effects Watershed Effects Process for Idaho. This process was developed in conjunction with state and federal agencies and private landowner and environmental representatives and was designed to ensure that "...watersheds are managed to protect water quality so that beneficial uses are supported."

IDL reviews applications for surface and dredge and placer mining operations on state and private lands and designs site-specific BMPs and reclamation plans to protect water quality so that beneficial uses are supported. BMP and reclamation plan provisions are enforced throughout the life of the operation.

IDL has entered into MOUs with federal agencies to coordinate the administration of laws and regulations pertaining to mining operations on federal lands in Idaho.

IDL is signatory to the Idaho Agricultural Pollution Abatement Plan. IDL applies component practices of this plan on state grazing and agricultural land.

IDL regulates encroachments such as docks and shoreline erosion control below the high water mark of navigable lakes. Applications are subject to federal and state agency review, and permits are subject to water quality protection provisions.

Soil Conservation Commission

Primary authorities: Soil Conservation District Law (Title 22, Chapter 27, Idaho Code). Title 39, Section 36, Idaho Code.

The Soil Conservation Commission is the lead agency for state and private agricultural practices in Idaho. SCC co-administers the State Agricultural Water Quality Program (Ag Plan) with the Division of Environmental Quality. It also administers Resource Conservation and Rangeland Development Program loans and grants, and the grazing land conservation initiative.

The delivery mechanism for agricultural best management practices is the 51 local Soil Conservation Districts (SCDs). The Ag Plan contains a catalog of Best Management Practices BMPs) and component practices which are selectively adopted by SCDs for treating agricultural water quality and riparian habitat concerns within their respective districts. Agricultural BMPs are applied through a non-regulatory program of technical assistance, information, education and financial incentives. The program is supported by regulation in situations of known violations of state water quality standards. The SCDs receive technical assistance and financial assistance if appropriate from SCC, the Idaho Department of Agriculture, the Natural Resource Conservation Service and the Farm Service Agency.

Idaho Department of Fish and Game

Primary authorities: Title 36, Chapter 1, Idaho Code
Idaho Code Title 36, Chapter

The Idaho Department of Fish and Game is the designated wildlife management agency for Idaho. Its authority includes determining wildlife population status, setting seasons, and declaring emergencies for wildlife protection. IDFG has executed MOUs with state and federal resource management agencies to protect or enhance habitat, protect populations, and protect water quality. It consults with those agencies on the potential impacts of resource management activities on fish and wildlife, and appropriate measures to mitigate those impacts.

IDFG consults with federal agencies concerning terms and conditions for hydroelectric licensing and administers the protected areas program of the Northwest Power Planning Council. This program protects river reaches that contain important habitat for valued fish and wildlife species.

IDFG manages lands owned by the agency to comply with water quality standards.

In January, 1995, the Fish and Game Commission adopted a Bull Trout Conservation Strategy to offer land managers a methodology that should restore and maintain bull trout populations and habitats.

Idaho Department of Parks and Recreation

The Idaho Department of Parks and Recreation manages designated state parks in Idaho. It manages these park lands to comply with state water quality standards.

Idaho Department of Agriculture

Primary authorities: Idaho Pesticide Law (Title 22, Chapter 34, Idaho Code), Idaho Fertilizer Law (Title 22, Chapter 6, Idaho Code), Idaho Chemigation Law (Title 22, Chapter 14, Idaho Code).
Title 37, Chapters 3, 4, 5 and 7, Idaho Code.

The Idaho Department of Agriculture regulates the use of pesticides and fertilizers, licenses applicators, and provides assistance in monitoring the effectiveness of best management practices relating to application of agricultural chemicals. IDA also regulates dairy waste.

Idaho Department of Water Resources

Primary authorities: Stream Channel Protection Act (Title 42, Chapter 38, Idaho Code), Dam Safety Act (Title 42, Chapter 17, Idaho Code) Title 42, Chapter 39, Idaho Code. Title 42, Chapter 2, Idaho Code). Section 404 of the Clean Water Act (33 U.S.C. 466 et. seq.

The Idaho Department of Water Resources regulates stream channel alterations, the safety of most impoundment structures, and waste water disposal by injection wells. It also appropriates and allocates surface and ground water resources, including geothermal resources, and protects those resources against waste and contamination.

IDWR has entered into MOUs with the USDA Forest Service, USDI Bureau of Land Management, Idaho Department of Lands, Idaho Transportation Department and local road districts to protect streams and their associated environments through close coordination and cooperation on all projects with the potential to alter stream channels. Projects on lands not included under these MOUs are subject to individual permits from IDWR and the US Army Corps of Engineers.

As a condition of the local public interest, IDWR must consider water quality in acting on a request for a water right. No permit is issued if it would cause a violation of water quality standards.

The Idaho State Water Plan and the Comprehensive State Water Plan together comprise The Idaho State Water Planning Program. The State Water Plan is designed to guide development, conservation and protection of the state's water supplies. The Comprehensive State Water Plan examines existing and planned resource uses, identifies goals, and makes recommendations to the Idaho Water Resource Board relative to improving, developing and conserving the water resources of the basin in the public interest.

The Idaho Water Resource Board is authorized to apply for minimum stream flow water rights and minimum lake level water rights for the protection of fish and fish habitat, or other considerations. These applications must be approved by the Idaho Legislature.

Idaho Transportation Department

The Idaho Transportation Department developed and signed a Bull Trout Conservation Agreement with the U.S. Fish and Wildlife Service in 1994. The agreement addresses 1) fish passage through culverts, 2) sediment and erosion control BMPs and protection, and, 3) protection and restoration of riparian habitat. This agreement could serve as a model for the types of agreements which may be developed by landowners in bull trout key watersheds.

LOCAL GOVERNMENTS

County Governments

The 44 counties in Idaho may each have individual zoning and planning regulations for activities in riparian areas. Owyhee, Lemhi and other counties are taking a proactive approach to dealing with endangered species issues and are in the process of or have developed plans addressing these issues.

PRIVATE LANDS

Private lands in Idaho are managed under a variety of guidelines. The geographic location and use of the land determines which management objectives must be followed. Timber lands must follow the Idaho Forest Management Practices Act; mining lands must adhere to the Idaho Mining Act. Agricultural operations on private and state lands will be conducted under the guidelines of the Idaho Agricultural Pollution Abatement Plan (Ag Plan). The Ag Plan includes a back up regulatory program to address violations of state water quality standards.

Federal and state programs pertaining to agricultural operations must be modified to include bull trout considerations when relevant lands are within key watersheds for bull trout. For agricultural operations not covered by other regulatory programs, the WAGs should address bull trout concerns in the agricultural portion of the watershed assessment.

For agricultural operations not in a WAG watershed, but within a bull trout key watershed, the Soil Conservation District, in conjunction with the SCC, is required to develop an evaluation process to ensure the activity provides adequate protection for bull trout, even if the watershed does not have water quality limited streams [Section 303(d) listed]. The Soil Conservation Districts also have the authority to address cumulative impacts of numerous combined agricultural operations. In carrying out this authority, the Districts utilize various tools such as the State Agricultural Water Quality Program, PL-566 Small Watershed Program, RCRDP loans and grants, and others.

Coordination

Implementing the Governor's Bull Trout Plan will require the coordinated efforts of a number of state agencies, several federal agencies and private landowners. While the legal authorities for virtually all the provisions of the plan already exist, focusing the myriad of policies and programs and making them "work" to meet the needs of bull trout at both the state and local levels will require close attention.

For this reason, the Governor's Bull Trout Plan envisions a state "Bull Trout Coordinator" who will:

1. Publicize the plan and build understanding and support for it.

2. Help shape the actions of federal and state agencies toward implementation of the plan.

3. Keep track of progress in implementing the plan and in achieving measurable results, reporting and publicizing those results.

4. Build support for changes in legislation or policies needed at either the state or federal level to further the objectives of the plan.

While the Coordinator will report to the Governor, that person will also be responsive to those with actual responsibility for implementing parts of the plan. As such, the coordinator will serve as the Governor's point of contact between agencies and landowners in resolving problems and otherwise assuring progress in implementing the plan. Ideally, such a person will be found within the existing ranks of state agencies and will be a person who can be assigned to the coordinator's job as part of their agency job, recognizing, of course, that there will be some shift in responsibilities to accommodate the new "bull trout" duties.

Apart from defining the position and responsibilities of the Bull Trout Coordinator, the plan envisions each agency reassessing its traditional responsibilities to accommodate provisions of the Bull Trout Plan. Table 2 summarizes those roles as they exist and suggests how they might change in order to implement the plan.

Table 2: Summary of State and Federal Agency Roles, Regulatory Responsibilities and Resources

	LAND MANAGEMENT RESPONSIBILITY			REGULATORY RULES							
	Federal Owned Lands	State Owned Lands	Private Lands	Establish Water Quality Standards	Develop BMPs	Monitor BMP Implementation	Monitor BMP effectiveness?	Monitor Water Quality	Monitor Stream Flow	Monitor Habitat Condition	Other
FEDERAL AGENCIES											
University of Idaho, Cooperative Extension Service	-	-	-								provide technical information & assistance
USDA: Natural Resource Conservation Service	-	-	-				X				technical assistance for water quality planning & implementation
USDA: Farm Service Agency	-	-	-								Cost sharing of conservation practices
USDA: Forest Service	X				X	X				X	must meet or exceed state standards
USDI: Bureau of Land Management	X				X	X				X	must meet or exceed state standards
Environmental Protection Agency	-	-	-								review and approve state water quality standards, provide technical assistance
U.S. Fish and Wildlife Service							X			X	assist in species recovery efforts
STATE AGENCIES											
Idaho Department of Agriculture	-	-	-		X	X					regulates use of agricultural chemicals (pesticides & fertilizers)
Idaho Department of Health and Welfare, Division of Environmental Quality	X	X	X	X				X		X	
Idaho Department of Fish and Game										X	
Idaho Department of Lands	X	X	X		X	X					
Idaho Soil Conservation Commission	-	-	-		X	X					Non-regulatory technical assistance, education & financial incentives
Idaho Department of Water Resources									X		
Idaho Department of Transportation	-	-	-								Developed bull trout conservation agreement for ITD projects
COUNTY GOVERNMENTS			X								Planning and Zoning Regulations

APPENDIX C

THREATS TO BULL TROUT

July 1, 1996

APPENDIX C - THREATS TO BULL TROUT

Timber Harvest

Timber harvest and associated activities such as road construction and skidding can affect the amount, form and function of woody debris, the composition of substrate, and the stability and form of channels (Bisson et al. 1987; Hicks et al. 1991; Sullivan et al. 1987). Many systems exhibit impacts from historical activities such as splash damming, skidding and debris removal which often operated within the stream channel.

Clearcutting and watershed modification are linked to increased water yields, bed load movement, more frequent flooding or scour events (Chamberlain et al. 1991; King 1989; Sullivan and other 1987), and to channel instability (Kapesser 1992). Stream temperatures have been altered with changes in the forest canopy and riparian shading, in water yield and in hydrologic patterns (Beschta et. al. 1987; McGurk 1989; Rishel et. al. 1982).

Forest managers recognize the potential impacts of forest management and design practices to reduce impacts because of new operations (Bission et al. 1992). However, unique or previously impacted areas may be intolerant to any additional increases in sediment or reductions in forest canopy. Impacts from previous activities (legacy effects) may limit current management options.

Road Development

Edwards and Burns (1986) linked levels of fine sediments in streams to road densities. Weaver and Fraley (1991) and Shepard et al. (1984) linked levels of fine sediment to some ground disturbing activities. Many larger streams within key watersheds have roads of varying quality parallel to the channel. These roads often constrain channel meanders and are frequently a source of fine sediments. Also, on steep or unstable slopes, poorly planned, constructed or maintained roads have washed out or triggered large debris flows filling stream channels with sediments and resulting in instability even decades after the road has been abandoned, and they will continue to do so until they are identified and either upgraded or properly abandoned. Many roads were originally built for mining or timber harvest purposes and were subsequently taken over by counties or road districts for public use and residential access. Maintenance is often infrequent and not adequate to limit sediment delivery to streams. Construction of new roads may result in sedimentation if adequate sediment delivery mechanisms are not considered.

Livestock Grazing

The effects of improper livestock grazing include altering and reducing the vegetation adjacent to the stream, thereby reducing cover and shade, and weakening streambanks. This results in increasing bank instability, bank retreat, and bank erosion and sediment delivery to the stream. This alters channel morphology by increasing accumulated fine sediments, degrading stream substrates, reducing bed stability, reducing habitat diversity, reducing over-wintering habitat, widening channels, and decreasing water depths. Other results include increasing water temperature extremes, suspended sediments, nutrients, bacteria and other adverse water chemistry parameters (Armour et al. 1991, Chaney, et al. 1993, and Platts 1991). Proper grazing management can provide opportunities to protect and/or restore riparian areas without large expenditures of money (Elmore and Beschta 1987).

The site specific nature of management is demonstrated by the wide range in predictions of allowable use in riparian zones. These predictions vary from 25% to as much as 70% use (Platts 1991, Clary & Webster 1989, Bryant 1985). Careful consideration must be given to the amount of use and, in particular, to the

amount of foliage remaining after grazing in relation to the site specific system. The degree of allowable use clearly depends upon the characteristics and needs of the individual site.

Mining

There are areas in Idaho which have been impacted by historic open-pit, underground, and placer mining operations and effluent from these closed or abandoned mines. Tailings dams, waste dumps, and diversions provide barriers to bull trout migratory corridors and spawning sites. Toxic constituents (heavy metals) in drainages arising from historic sites may block migratory corridors or kill life stages of bull trout. Some current operations are permitted to alter stream channels. Increased sedimentation or release of toxins into surface or ground water may occur if specified site- specific BMPs are not designed, enforced and maintained.

Dams : Hydroelectric Development & Irrigation Diversion

Fragmentation and disruption of bull trout habitats isolate populations and isolate or eliminate life history forms, particularly fluvial and adfluvial forms. Those effects probably have influenced both local and regional extinctions. Where isolation has occurred, natural events such as floods and drought increase the risk of local extinctions (Horowitz 1978). Dams and irrigation diversion that dewater or block streams are common in many interior basins. Dewatered stream sections and diversion structures can fragment and isolate bull trout populations from the rest of the drainage. Reduced flows below diversions reduce cover and can result in temperature increases to lethal levels.

Direct effects of water withdrawals for irrigation on bull trout habitats include effects on water quality (increased temperature, suspended sediment, nutrients, and pesticides), water quantity, blockage of migration corridors and direct losses of fish into water conveyance systems.

Bull trout are sympatric with resident salmonids, and anadromous species such as spring and summer chinook salmon and steelhead (Schutz and Northcote 1972; Thurow 1987; Ratliff 1992). Migratory conditions in the Snake and Columbia Rivers and habitat losses that have negatively impacted chinook and sockeye (*Oncorhynchus nerka*) salmon stocks in Idaho have also reduced distribution and numbers of bull trout. In watersheds which formerly supported anadromous fish, loss of the anadromous fish due to blockage by dams or population declines has resulted in a subsequent loss of prey for bull trout. This preybase cannot be restored in drainages which have permanently blocked anadromous migration. Drainages which have depressed anadromous populations have the potential to restore the food base if the anadromous fish populations are restored.

Urbanization

Some key watersheds have expanding housing subdivisions and urban development. Houses built along the stream can change runoff patterns and increase sedimentation. Vegetation is frequently cleared from stream banks to improve the view. Septic tanks and drain fields may seep into ground water, altering nutrient chemistry in the stream.

Catastrophic Fire

Past management activities and successful wildfire control have caused a shift in forest species composition and stocking levels, predisposing them to large scale mortality. Recent recurrent drought conditions have

further disposed these forests to increased wildfire incidence and intensity, resulting in significant negative impacts on water quality and fish habitat.

Sport Fishing

The Idaho Department of Fish and Game has declared all waters in the state closed to bull trout harvest beginning January 1, 1996. Most harvest opportunities were closed in 1994. Although seasons for harvest have been closed throughout the state, mis-identification of bull trout as brook trout or lake trout does lead to incidental harvest. Poaching remains a problem in some areas.

Historically, bull trout were considered significant predators on other salmonid game fish species and harvest was encouraged. Bull trout spawners are particularly vulnerable to poaching because they often enter small tributary streams several months prior to spawning and congregate in pools. In developed watersheds, extensive road systems provide easy access to prime spawning areas.

Disease, Predation or Competition

Disease has not been identified as a significant factor in the decline of native bull trout. Introduction of hatchery fish may pose a disease risk to wild stocks of bull trout.

Interactions with introduced non-native fishes through competition, predation, and hybridization have decreased the likelihood that some bull trout populations will persist. Introduced brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) have been associated with the decline of bull trout populations (Bond 1992; Mullan et al. 1992). Bull trout often appear restricted to waters upstream from those used by introduced rainbow trout and brown trout (Mullan et al. 1992; Pratt 1985). The expansion of lake trout (*Salvelinus namaycush*) may have severely depressed adfluvial bull trout in Priest Lake, Idaho (Rieman and Lukens 1979) and in Flathead Lake, Montana (Weaver and Fraley 1991). Lake trout may prey on juvenile bull trout. Competitive displacement also seems likely where lake trout have been introduced.

Hybridization appears to be a common problem where isolated or remnant bull trout populations overlap with brook trout (Cavender 1978; Leary et al. 1983, 1991). Both species are likely to spawn at about the same time and in some of the same places (Balon 1984), and have similar temperature requirements for incubation (McPhail and Murray 1979). Hybrids are likely to be sterile and experience developmental problems (Leary et al. 1985, 1991). Brook trout likely have a reproductive advantage over resident bull trout because they mature earlier. Hybridization could eliminate a bull trout population (Leary et al. 1993; Mullan et al. 1992).

Hatchery Supplementation

Supplementation of wild bull trout stocks with hatchery bull trout may be harmful by altering or reducing genetic diversity. Ryman and Laikre (1991) have shown the release of artificially reared progeny may reduce the effective population size of local populations because of the greater reproductive success of those adults used to provide hatchery progeny. Hatchery reared Dolly Varden were stocked on the Pend Oreille drainage, but genetic and morphometric measures of present bull trout populations in Pend Oreille show no signs of introgression. There currently is no stocking of hatchery reared bull trout in the state of Idaho.

Table 3: Summary of threats to bull trout habitat and populations.

HABITAT MODIFICATION		
Activity	Potential Disturbances	Potential Habitat Responses
Timber Harvest	- Removal of riparian zone canopy cover - Soil disturbance, increased erosion of fine sediments - Alteration of total basin vegetation cover	- Potentially increased summer water temperatures & formation of anchor ice. - Potential decrease in interstitial spaces and pools (spawning and rearing habitat) - Potential alteration of timing and magnitude of peak flows (hydrology)
Road Development	- Surface erosion, increased fine sediment inputs - Destabilization of upslope areas, increased coarse and fine sediment inputs - Blockage of migratory corridors (culverts)	- Potential decrease in interstitial spaces and pools (spawning and rearing habitat) - Potential for major channel disruption and loss of all habitat with large erosion events - Loss of migratory population component
Livestock Grazing	- Bank damage - In-channel stream bed disruption - Removal of bank vegetation	- Decreased bank stability and direct inputs of fine sediments - Loss or disruption of summer rearing habitat - Loss of cover, potential for increased summer water temperatures and formation of anchor ice
Mining	- Streambed disturbance - Fine sediment inputs - Chemical runoff	- Loss or disruption of spawning and summer rearing habitat - Creation of chemical barriers and/or direct fish mortality
Dams: Hydroelectric Development and Irrigation Diversion	- Blockage of migratory corridors - Increased temperatures, fine sediments and nutrients with waste water returns - Channel dewatering - Loss of anadromous fish	- Loss of migratory population component - Overall decrease in habitat condition - Direct mortality of redds, loss of available habitat - Loss of anadromous prey base
Urbanization, Recreation & Other	- Reduction/removal of riparian vegetation - Streambed damage - Dewatering - Channel stability	- Potentially increased summer water temperatures and formation of anchor ice
Catastrophic Fires	- Fine sediment inputs - Chemical runoff - Channel stability	- Loss or disruption of spawning and summer rearing habitat - Decreased bank stability and direct inputs of fine sediments - Potential alteration of timing and magnitude of peak flows
UTILIZATION / HARVEST		
Fishing Harvest	- Direct mortality	- Direct mortality
DISEASE, PREDATION, COMPETITION		
Exotic species introductions	- Competition - Hybridization - Predation	- Displacement from most favorable habitats - Sterile hybrids - Direct mortality

APPENDIX D

INCENTIVES AND RECOMMENDATIONS

July 1, 1996

APPENDIX D - INCENTIVES AND RECOMMENDATIONS

Possible Incentives for Private Land Owners

Implementing the Governor's bull trout plan will require some changes in forest management, farming, grazing, recreational developments, and fisheries management practices. Most of the changes should be relatively minor or can be incorporated within changed practices or processes for public agencies with no direct cost to individuals. However, meeting the needs of bull trout will require some changes in land uses or management that will require financial investments by private landowners, or lost opportunity costs. There are a variety of possible incentives.

Safe Harbors and Conservation Agreements

The Governor's Bull Trout Plan is intended to provide the framework for developing site-specific conservation assessments and strategies from which individual landowners or land managing agencies can then form conservation agreements. These agreements will spell out on-the-ground actions landowners will take to help meet the goals of the plan. If approved by the USFWS, those agreements become contracts between that agency and the individual landowner or land managing agency.

In 1995, the North Carolina Sandhills Habitat Conservation Plan was the first to use the authority of Section 10 of the ESA to give assurances of "safe harbor" against any added legal responsibility to landowners willing to engage in habitat improvement for endangered species. The "safe harbor" for species of concern or candidate species (in this case, bull trout) could be designed using a similar approach.

Many private landowners desire to manage their lands in ways that directly or indirectly promote habitat for or benefit candidate species. In many cases, they may be reluctant to do so because of real or perceived concerns about land use restrictions or a loss of value that may result if the species is listed at some point in the future. In fact, concern about future land use restrictions has caused some landowners to employ practices that discourage or prevent the occurrence of listed or candidate species on their land.

The USFWS "Safe Harbor Policy" was designed to remove this disincentive to manage lands for listed or candidate species. It provides landowners who initiate, conduct, or otherwise participate in land management programs that benefit federally listed or candidate species with assurances that their conservation efforts will protect them from future regulatory obligations more stringent than those existing at the time such actions are commenced. The policy applies only to those situations in which it is possible to measure a conservation benefit to a species from habitat improvements and that allows for the species in question to emigrate into habitats after improvements, etc..

The purpose of the conservation agreement (CA) policy is to establish procedures for the development of conservation agreements. These agreements are usually between the USFWS or other federal or state agencies and participating private groups and individuals, or private landowners who voluntarily undertake management activities on their lands that create, restore, or maintain habitat benefiting candidate species.

The primary objectives of a conservation agreement process for candidate species are to (1) identify and implement early conservation measures to reduce or eliminate threats to the species'

well-being, and (2) stabilize and recover the species and their habitats before listing becomes necessary. A third objective is to encourage private landowners to manage their land holdings voluntarily for candidate species and species of concern or to maintain or enhance habitat for those species. This objective can most readily be achieved by providing landowners assurance, or safe harbor, from restrictions on land use that result from the immigration of new species or an increase in the number of individuals of a resident species into the managed habitat in the event the species is later listed under the ESA. Safe harbors should be considered on a case-by-case basis.

Conservation agreements among parties potentially affected by endangered or threatened species listings can be an extremely effective tool to achieve needed conservation for species before listing the species as endangered or threatened becomes necessary. The objective of any CA is to reduce or eliminate threats to a candidate species and/or its habitat. If successful, it has the potential to reduce the listing priority of candidate species and, in some cases, eliminate the need to list altogether. The potential for a successful CA to prevent listing is an extremely effective incentive for both voluntary private landowner participation and broad-based agency support.

The USFWS has no direct statutory or regulatory authority to impose restrictions on any party or require any actions on behalf of candidate species. Participation by any party in a candidate conservation process is strictly voluntary. However, emphasis on early conservation efforts for candidate species will allow all stakeholders, public and private, to work together to stabilize and recover these species and their habitats before listing becomes a high priority. By addressing the needs of candidate species early on, stakeholders have the opportunity to retain management flexibility, minimize the cost of recovery if listing is later necessitated, and alleviate the potential for restrictive land use policies in the future.

The conservation agreement process should be flexible, and is not intended to become so cumbersome as to discourage implementation. Typical large-scale approaches should have three components: (1) a conservation assessment, (2) a conservation strategy, and (3) one or more actual conservation agreements. Each agreement will contain formal commitments of signatory parties to implement specific conservation actions. Development of all three components of the candidate conservation agreement process should be a joint effort by all stakeholders.

An initial step in the CA process is to identify parties interested in developing an agreement relative to a candidate species or species group. The most basic agreement will engage only the USFWS and one landowner and a single candidate species; the more complex may include numerous federal, state, and private land managers working on a group of species across an ecosystem. The scope and geographic scale of assessments, strategies, and agreements will vary according to the needs and interests of the participating parties and the species involved.

In order to achieve maximum support from the private sector, the CA must also address certainty through a "no surprises" policy and the "safe harbor" provisions and mechanisms should the species warrant future listing. The terms of any safe harbor agreement should satisfy the standards of Section 10 (a) (2)(B) of the ESA, i.e., management practices outlined in the agreement should not contribute to further decline of the species. If a participant follows a conservation agreement faithfully and the species still becomes listed at some point in the future, then provisions agreed to in the CA should carry through to the habitat conservation's plan or "no-take" agreement. This will give greater incentive to work to keep species off the list and give a greater level of regulatory certainty to the private stakeholder.

Stewardship Contracts

Public agencies and even private landowners can effectively stimulate investments in habitat improvements by offering "stewardship contracts". These contracts take the form of requirements for the purchasers of timber or those who seek grazing or mining permits to complete habitat conservation measures as part of the contract or permit. Through such contractual provisions, old, sediment-producing roads can be eliminated, fish barrier culverts replaced or riparian vegetation planted with the timber purchaser or permittee taking into account the cost of meeting these provisions in the bid. Such contracts have built-in advantages. Often, the timber purchaser particularly, has the necessary equipment and resources on hand to complete the work as the timber is harvested. The work can often be completed by logging crews during "slow" times or when weather precludes actual logging. As such, habitat improvement work can serve to keep crews working when they might otherwise be laid off.

Financing this work is "off budget", in that actual hard dollars need not be appropriated for its completion. Agencies or landowners accept less money for the sale or lease, but the needed work is completed when it might be difficult to finance otherwise. Since the habitat improvement work is a provision of the contract, it is enforceable.

Seed Money

The State could establish a conservation "seed money" bank by setting aside money coming from the federal government such as Land & Water Conservation Funds and other relevant sources.

These funds could be available to local communities, other governmental jurisdictions, or other multi-landowner entities for the purpose of developing and maintaining conservation projects to benefit bull trout. These funds could be provided through special appropriations, specific grants or matching grant funds, or other mechanisms. The state may also choose to establish a special funding mechanism by appropriation of the legislature.

Technical Assistance

Technical assistance should be provided by public agencies to private landowners, permittees, communities and local governments in planning for and maintaining conservation plans. This can take the form of information, material and financial assistance, project facilitation, on-site expertise and technical assistance regarding the needs of the species coupled with the participants objectives, and assistance with coordinating the requirements of multiple governmental agencies.

The state "bull trout coordinator" should coordinate technical assistance. Such coordination would encourage "one stop shopping" for information, expertise providers, and interagency requirements. The coordinator could also maintain the required/desired data to support and promote conservation projects. Information could be made available statewide through a toll-free telephone number for those wishing information on conservation projects, the types and locations of projects that may be needed or are underway, and where information/support are available.

Recognition and Award Program

People have shown a willingness to assist in conservation efforts if they are aware of the need, understand the importance of the effort, and have enough information to help them get involved.

Many potential supporters of bull trout conservation efforts would be encouraged to get involved with little or no financial remuneration. However, almost everyone would appreciate receiving recognition for involvement in conservation and awards for accomplishments. The establishment of a state conservation award program would be an effective way to recognize and reward those who support bull trout conservation.

The Governor could establish and publicize a Bull Trout Conservation Award Program and present a series of awards to outstanding participants each year.

Recommendations

Success in implementing the Governor's Bull Trout Plan is dependent, in part, upon actions which must be taken by federal agencies, the U. S. Congress, and the state Legislature. While actions undertaken by state agencies can be directed by the Governor through an executive order or through rule making, some can only be recommended to federal agencies or legislative bodies. The plan can serve as a commitment on the part of the Governor and those who support the plan to work actively for adoption of its recommendations at all levels of government.

Development and implementation of the Idaho Bull Trout Conservation Plan will require some modification to management strategies and processes. Those will require agency (state and federal) coordination and cooperation. Federal and state law may require modifications to clarify Idaho's ability to protect its natural resources, specifically, bull trout. The expenditure of time and public moneys needs to be considered, but a majority of the expenses, both financial and in time devoted to implementation, will be borne by local citizens who live and work in a key watershed. Those individuals or businesses deserve consideration for efforts expended to protect or restore bull trout populations. Plan implementation recommendations are:

1) In keeping with the Governor's philosophy of agency cooperation and consolidation, the state of Idaho should promote coordination among federal, state, and local governments to incorporate the provisions of this plan into processes already established and funded. This effort should not require a large number of new FTPs. In most cases the plan implementation may be a part of other considerations already established. A coordinator for bull trout conservation plan implementation should be designated by the governor. That funding for the position will be provided and potentially shared between the state agencies (IDA, SCC, IDEQ, IDWR, IDPR, IDFG, and IDL).

2) The state of Idaho encourages modifications to the federal Endangered Species Act (ESA) to clarify Idaho's or any state's ability to develop, adopt, and implement a conservation plan for candidate species and for threatened species listed under ESA. That federal funding provided under ESA will be allocated to the state for use in development, adoption, and implementation of state conservation plans.

3) The state, in cooperation with affected interests in Idaho, develop a "Safe Harbor" law. If individuals and/or businesses have developed and implemented approved conservation or operation plans to protect sensitive species, then they are in compliance with environmental law and should be provided a "safe harbor" from penalties and additional mandates. If most individuals comply with the development and implementation of conservation plans or operational management plans, but a few have failed to do so, those few may be required to comply. This "Safe Harbor" provision should provide protection to those farmers/ranchers,

miners, timber interests and others committing to comply with conservation plans and other ESA and CWA provisions. This legislative change should be instituted in federal and state law.

4) The state will explore, with local governments and the Associations of Idaho Cities and Counties, a program that would assess property taxes based on the actual land use. This plan may provide for the "set aside" or non-use of some amount of property that is currently taxed at a land-use rate. If the current use of the property is changed to a non-use to protect bull trout, then the property tax rate should reflect such a change.

Table 4: Actions and Recommendations for Implementation of the Governor's Bull Trout Plan

		Legislation		Agency	
	Provision	**Federal**	**State**	**Rules/ MOUs**	**Executive Order**
1.	Bull Trout Coordinator				X
2.	Habitat Conservation Assessment & Strategy Individual Plans			X X	
3.	Watershed Assessments			X	
4.	"Bad Actor" Law		X		
5.	Establish Bull Trout Standards			X	
6.	Develop Stewardship Contracts			X	
7.	Develop Interim Measure where water quality standards are met		X	X	X
8.	Assure adequate technical assistance			X	
9.	Develop data for key watersheds			X	
10.	Clarify ESA provisions on HCAs	X		X	

APPENDIX E

HISTORY AND OVERVIEW OF SB1284

July 1, 1996

APPENDIX E - HISTORY AND OVERVIEW OF SB1284

INTRODUCTION

In 1995, the Idaho legislature passed Senate Bill 1284 (SB1284) which restructures the administration of water quality laws in the state of Idaho through Idaho Code 39-3601. SB1284 was passed as a result of a lawsuit filed in federal court in Seattle by two Idaho environmental groups against the United States Environmental Protection Agency (EPA). (*Idaho Sportsmen's Coalition v. EPA,* Case No. C93-943, W.D. Wash). The basis for the lawsuit was Idaho's alleged failure to fulfill minimum requirements under the Clean Water Act. SB1284 attempts to address the issues raised in the lawsuit while codifying the water quality protection efforts that have succeeded in the state.

THE STATE OF IDAHO'S MINIMUM REQUIREMENTS UNDER THE CLEAN WATER ACT

The goals of the Clean Water Act are to restore the nation's waters so that all waters are fishable and swimmable. The Clean Water Act anticipates that each state will play a key role in restoring the nation's waters. Each state is required to pass minimally acceptable water quality standards which identify designated or beneficial uses for state waters, establish chemical criteria necessary to protect the uses and which prohibit degradation of water quality below a level necessary to maintain existing uses (antidegradation).

Section 303(d) of the Clean Water Act requires each state to submit a biannual list to EPA, which identifies those waters throughout the state which are not achieving state water quality standards in spite of the application of technology-based controls in NPDES permits. Such water bodies are known as "water quality limited segments" (WQLSs). After identification of a WQLS, the state must then develop total maximum daily loads (TMDLs) for each water body identified as WQLS. TMDLs are first developed on WQLSs that are identified by the state as high priority waters. TMDLs are pollution budgets in which the state attempts to predict the amount or "daily load" of a particular pollutant which can be discharged to state waters from all sources without causing violation or impairment of water quality standards. Once the state identifies the actual pollutant loading discharged to state waters from both point and nonpoint source activities, the state then implements point source and nonpoint source controls to cut back on the daily loading of pollutants until the water body is brought back into compliance with water quality standards. Once developed, TMDLs are submitted to EPA for approval. Under the Clean Water Act, Congress mandated that EPA identify WQLS and develop TMDLs if the state did not fulfill its responsibilities under § 303(d) of the Clean Water Act.

Since 1988, Idaho has submitted biannual WQLSs for EPA approval. In 1992 and 1994, Idaho submitted WQLSs list to EPA for approval. Idaho's 1994 list included over sixty (60) water bodies throughout the state. Idaho has developed TMDLs on four WQLSs which have been approved by EPA. Idaho is also in the process of developing over thirty TMDLs or other state plans equivalent to TMDLs on high priority waters. Development of TMDLs in the state has been a difficult and expensive task. Examples of Idaho's TMDL activities include the nutrient management planning activities occurring on the middle Snake River and TMDL activities in the Coeur d'Alene basin and Cascade Reservoir.

TMDL Lawsuit

In 1993, two Idaho environmental organizations filed a lawsuit in federal court in Seattle against EPA alleging that EPA improperly approved Idaho's 1992 WQLS list because it did not identify all state waters which were impaired. Secondly, the plaintiffs alleged that since Idaho has only developed four TMDLs, EPA should have stepped in and developed TMDLs for all Idaho WQLSs. Various Idaho industry groups, including the timber industry and Idaho water users, intervened in the lawsuit. In April 1994, the judge partially ruled in favor of the plaintiffs and found that Idaho's proposed WQLS list was "underinclusive" and ordered EPA to publish a new list. After extensive public comment, EPA published a final WQLS list for Idaho which includes 962 water bodies. Most of the water bodies on EPA's list have not been monitored to determine whether they are or are not in violation of Idaho water quality standards. Rather, EPA's list was based upon other lists compiled by other state and federal agencies which merely identified certain water bodies which were potentially at risk or were suspected to be at risk. Thus, the effect of EPA's expansive list is that water bodies on the list are assumed to be in violation of Idaho water quality standards until proven otherwise.

In May 1995, the court ruled on whether Idaho's development of TMDLs was consistent with the requirements of the Clean Water Act. The court found that by reason of Idaho's recent TMDL activities, Idaho had complied with the Clean Water Act requirements. The court was concerned about the pace of the TMDL development in Idaho and therefore ordered EPA to establish a schedule with Idaho to develop TMDLs on all WQLSs at a reasonable rate.

Senate Bill 1284

As a result of the court's rulings in the lawsuit, it was clear that there were a number of deficiencies in the administration of Idaho's water quality program. First, it was clear that it was necessary to monitor hundreds of water bodies throughout the state in order to determine the appropriate designated uses for those water bodies, and whether those water bodies were or were not in compliance with state water quality standards. Secondly, it was clear that there was no established and definitive process to determine whether a water body is in fact impaired, as set forth under state water quality standards and the Clean Water Act. Finally, in those instances where a water body is impaired and a TMDL or other pollution control activities are necessary, it was clear that the most successful and accepted manner to deal with such water bodies was through local watershed groups comprised of interests and industries affecting water quality in the watershed. Local watershed groups have been successful in adopting effective consensus-based pollution control strategies in the middle Snake River, Cascade Reservoir, and Henry's Fork of the Snake River.

Consistent with the concerns raised in the lawsuit, the Idaho legislature passed SB1284. The statute amends Idaho Code 39-3601 and requires the Idaho DEQ to monitor all streams for two purposes: (1) to properly identify designated uses on those water bodies, and (2) to make a determination of whether those water bodies are or are not in compliance with state water quality standards. In making the determination whether a water body is in compliance with water quality standards, the statute establishes a process to identify "reference streams." Reference streams are relatively pristine or unimpaired streams within the particular watershed which reflect "minimum conditions that fully support all designated uses." In making a determination whether a monitored stream is "impaired", the monitored stream is then compared with biological, physical and chemical conditions in the referenced stream. If a stream is comparable to or relatively consistent with the conditions in the referenced stream, then a determination can be made that the stream is not

impaired under state water quality standards and need not be listed as impaired. If a water body is determined to be impaired, DEQ notifies EPA and other agencies and establishes priority classifications for each impaired water body depending upon the severity of the pollution (e.g. high, medium and low). For impaired waters, general limitations are placed upon point sources and changes to best management practices for nonpoint source activities through development of TMDLs or other processes. Limitations or pollution control strategies are adopted as a result of local input from watershed advisory groups.

The final objective of the legislation is to establish community-based citizen advisory committees to recommend to DEQ and other resource agencies how to properly manage impaired watersheds, while recommending pollution controls in the watershed necessary to bring the impaired waters into compliance with state water quality standards. The statute establishes basin advisory groups (BAGs) and watershed advisory groups (WAGs) which are comprised of interests affecting, and affected by, water quality in the area. The BAGs are concerned with water quality throughout each major river basin and make recommendations to DEQ concerning monitoring, water quality standard revisions, prioritization of impaired waters, and development of TMDLs throughout the basin. The WAGs focus their efforts on a particular watershed. The WAGs make specific recommendations to DEQ concerning adoption of pollution control strategies for impaired water bodies.

Table 5: Idaho water quality standards compared to Bull Trout habitat requirements.

Cold Water Biota Criteria	Idaho Water Quality Standards	Bull Trout Requirements
Temperature	22 °C, daily average < 19°C	9 to 15 °C
Dissolved Oxygen	na	na
Turbidity	< 50 NTU above background & <25 NTU above background for 10 consecutive days	not available
Salmonid Spawning Criteria		
Intergravel Dissolved Oxygen	one-day minimum > 5.0 mg/l & 7-day mean not < 6.0mg/l	not available
Water Column Dissolved Oxygen	na	na
Temperature	< 13°C, daily average < 9°C	success increases with temperatures <10°C, optimum 2 to 4°C

APPENDIX F

BULL TROUT METAPOPULATIONS, KEY WATERSHED DESCRIPTIONS

July 1, 1996

APPENDIX F - BULL TROUT METAPOPULATIONS, KEY WATERSHED DESCRIPTIONS

Gilpin (1987) defined a metapopulation as a group of semi isolated sub-populations which are interconnected so that individuals can migrate to other portions of the watershed and reproduce with other sub-populations. Sedell and Everett (1993) describe a meta-population as a population comprising local populations that are linked by migrants, allowing for recolonization of unoccupied habitat patches after local extinction events.

Metapopulation principals form the base for selection of the bull trout key watersheds in Idaho. For many key watersheds, connectivity between populations has been lost due to habitat fragmentation. In other key watersheds where connectivity remains on a large scale basis, ie. Salmon River, the physical size of the key watershed and the likely distance a bull trout may travel and the ability to actually measure recovery impacts restricted the size the key watershed. In these cases the key watershed boundaries are somewhat arbitrary and may need adjustments as more information becomes available.

Using criteria suggested by Rieman and McIntyre (1993), bull trout key watersheds should meet at least five criteria.

> A key watershed should provide all critical habitat elements. Ideally, a key watershed should meet the needs of migratory and resident life forms.
>
> Key watersheds should represent the best remaining habitat or habitat with the best opportunity for restoration. As an example, a key watershed might consist of a collection of managed and unmanaged or carefully managed watersheds that remain connected by normal migratory corridors.
>
> A key watershed should provide for replication of strong populations within its boundaries. To minimize the risk of extinction a system should consist of multiple, healthy sub-populations.
>
> Key watersheds should be large enough to incorporate genetic and phenotypic diversity, but small enough to ensure theat the component populations effectively connect. If sub-populations are too close to one another, their response to environmental changes may be correlated, or they may become vulnerable to the same random threat. If sub-populations are too far apart, they will not support each other and suffer the long term consequences of genetic drift ro inbreeding. For bull trout, key watersheds should be from 250 to 2500 square kilometers.
>
> Key watersheds must be distributed throughout the historic range of the species. The genetic variation for bull trout is contained among different populations rather than within any single population. Conservation of genetic diversity implies conservation of populations throughout the historic range.

Refugia or refuge habitats:

Locations and habitats that support populations of organisms that are limited to small fragments of their previous geographic range.

Figure 3: Bull Trout Key Watershed Boundaries

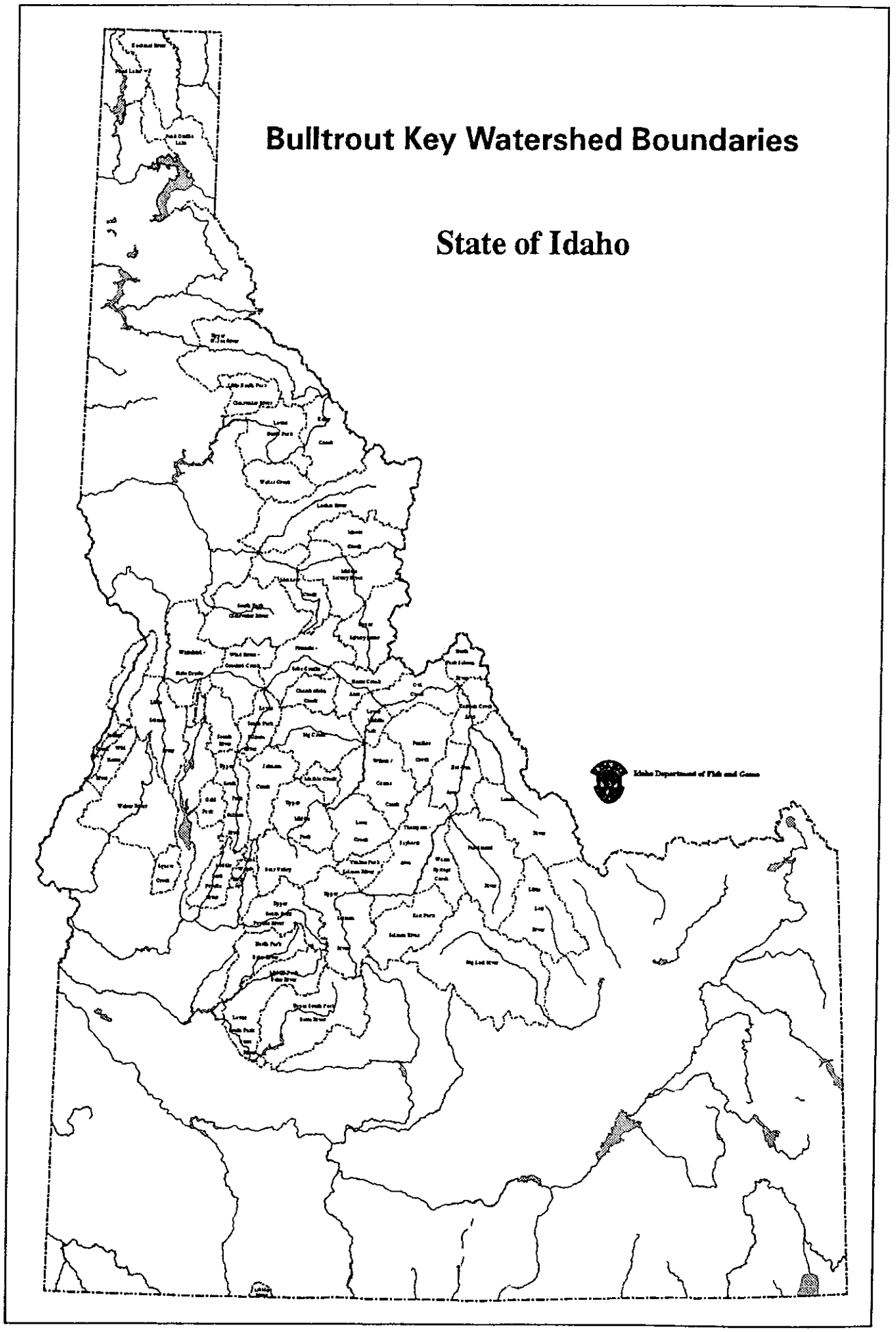


Table 6: Bull Trout Key Watersheds. All key watersheds include tributaries unless otherwise stated.

Basin: Snake River

Key Watershed	Description
Jarbidge River	Upstream of confluence of East Fork and West Fork Remaining known population in Nevada.
Little Lost River	Mouth to Headwaters. This is a remnant population and only known population upstream of Shoshone Falls.
Weiser River	Upstream of, and including, the Little Weiser River.
Boise River, Middle Fork	Upstream of Arrowrock Reservoir. Includes South Fork of the Boise Downstream of Anderson Ranch Reservoir.
Boise River, North Fork	From confluence with Middle Fork to Headwaters.
Boise River, South Fork	Upstream of Anderson Ranch Reservoir.
Payette River, South Fork	Upstream from the Mouth of the Deadwood River. Includes the Deadwood River downstream from Deadwood Reservoir.
Payette River, Middle Fork	Upstream from the mouth of Lightening Creek.
Squaw Creek	Upstream from confluence with 2nd. Fork Squaw Creek.
Deadwood River	Upstream from Deadwood Reservoir.
Gold Fork River (Payette Basin)	Upstream of the diversion dam.
Indian Creek	Upstream from its confluence with the Snake River near Oxbow Dam.
Wildhorse River	Upstream from its confluence with the Snake River near Brownlee Dam.
Hells Canyon	Main Snake River Downstream from Hells Canyon Dam
Basin: Salmon	
Whitebird/Slate	Whitebird Creek drainage, Slate Creek Drainage, and Partridge Creek Drainage.
Little Salmon River	Entire Little Salmon River drainage including Rapid River.
French Creek	Entire French Creek Drainage.
Wind River/Crooked River	Entire Wind River and Crooked River Drainage.

South Fork Salmon River, Lower	The South Fork of the Salmon River Drainage from its mouth upstream to the confluence with the East Fork of the South Fork, not including The Secesh River Drainage or The East Fork of the South Fork Drainage.
Secesh River	The entire Secesh River Drainage.
South Fork Salmon River, Upper	The South Fork of the Salmon River Drainage from the confluence with the East Fork of the South Fork upstream to its headwaters, not including the East Fork of the South Fork.
Johnson Creek	Entire East Fork of the South Fork of the Salmon River up stream to headwaters including entire Johnson Creek Drainage.
Five Mile/Sabe Creeks	The Main Salmon River encompassing the Mallard, Five Mile, Sabe, Bargamin Creek Drainage.
Chamberlain Creek	The entire Chamberlain Creek Drainage.
Horse Creek	The Main Salmon River encompassing the Horse Creek, Disappointment Creek and Cottonwood Creek Drainage.
Middle Fork of the Salmon River, Lower	The Main Salmon River and the Middle Fork of the Salmon River encompassing the Kitchen Creek, Roaring Creek, Papoose Creek and Ship Island Creek Drainage.
Wilson/Camas	The Middle Fork of the Salmon River encompassing the Wilson Creek, Camas Creek, Soldier Creek, Brush Creek, Sheep Creek, and Norton Creek Drainage.
Big Creek	The entire Big Creek Drainage, tributary to the Middle Fork of the Salmon River.
Marble Creek	The entire Marble Creek Drainage, tributary to the Middle Fork of the Salmon River.
Loon Creek	The entire Loon Creek Drainage, tributary to the Middle Fork of the Salmon River.
Middle Fork of the Salmon River, Upper	The Middle Fork of the Salmon River encompassing the Indian Creek, Pistol Creek, Rapid River, Elkhorn Creek and Sulphur Creek Drainage.
Bear Valley/Marsh Creek	The entire Bear Valley Creek and Marsh Creek Drainage.
Owl Creek	The Main Salmon River encompassing the Owl Creek, Boulder Creek, Indian Creek, Pine Creek and Moose Creek Drainage.
North Fork of the Salmon River	The entire North Fork of the Salmon River Drainage

Carmen Creek	The Main Salmon River encompassing the Fourth of July Creek and Carmen Creek Drainage.
Lemhi River	The entire Lemhi River Drainage.
Panther Creek	The entire Panther Creek Drainage.
Hat/Iron	The Main Salmon River encompassing the Hat Creek, Iron Creek, Twelvemile Creek, Warmsprings Creek, and Williams Creek Drainage.
Thompson/Bayhorse	The Main Salmon River encompassing the Thompson Creek, Bayhorse Creek, Morgan Creek, Challis Creek, Garden Creek, and Squaw Creek Drainage.
Pahsimeroi River	The entire Pahsimeroi River Drainage.
Warm Springs Creek	Entire Warm Springs Creek Drainage, tributary to the Main Salmon River.
East Fork, Salmon River	The entire East Fork of the Salmon River Drainage.
Yankee Fork, Salmon River	The entire Yankee Fork of the Salmon River Drainage.
Salmon River, Upper	Main Salmon River encompassing Basin Creek, Valley Creek, Warmsprings Creek, Redfish Creek, Fourth of July Creek, Alturas Creek and the Main Salmon River to its headwaters.
Basin: Clearwater	
North Fork Clearwater	The North Fork of the Clearwater River From Dworshack Reservoir upstream to Kelly Creek.
Little North Fork Clearwater	The Little North Fork of the Clearwater River upstream of Dworshack Reservoir.
Weitas Creek	Entire Weitas Creek Drainage, tributary to the North Fork of the Clearwater River.
Kelly Forks	The entire North Fork of the Clearwater River Drainage from the mouth of Kelly Creek upstream.
South Fork of the Clearwater	The entire South Fork of the Clearwater Drainage upstream from the Meadow Creek Drainage.
Lochsa River	The entire Lochsa River Drainage.
Meadow Creek	Selway River upstream from mouth of Lochsa River encompassing entire Meadow and Gadney Creek Drainages.

Selway River, Middle	The Selway River encompassing the Mink Creek, Marlen Creek, Three Links Creek, Petibone Creek, Bear Creek and Bad Luck Creek Drainage.
Moose Creek	The entire Moose Creek Drainage, tributary to the Selway River.
Selway River, Upper	The Selway River encompassing the White Cap Creek, Indian Creek, Clearwater Creek, Swet Creek, Deep Creek, and Selway River headwaters.

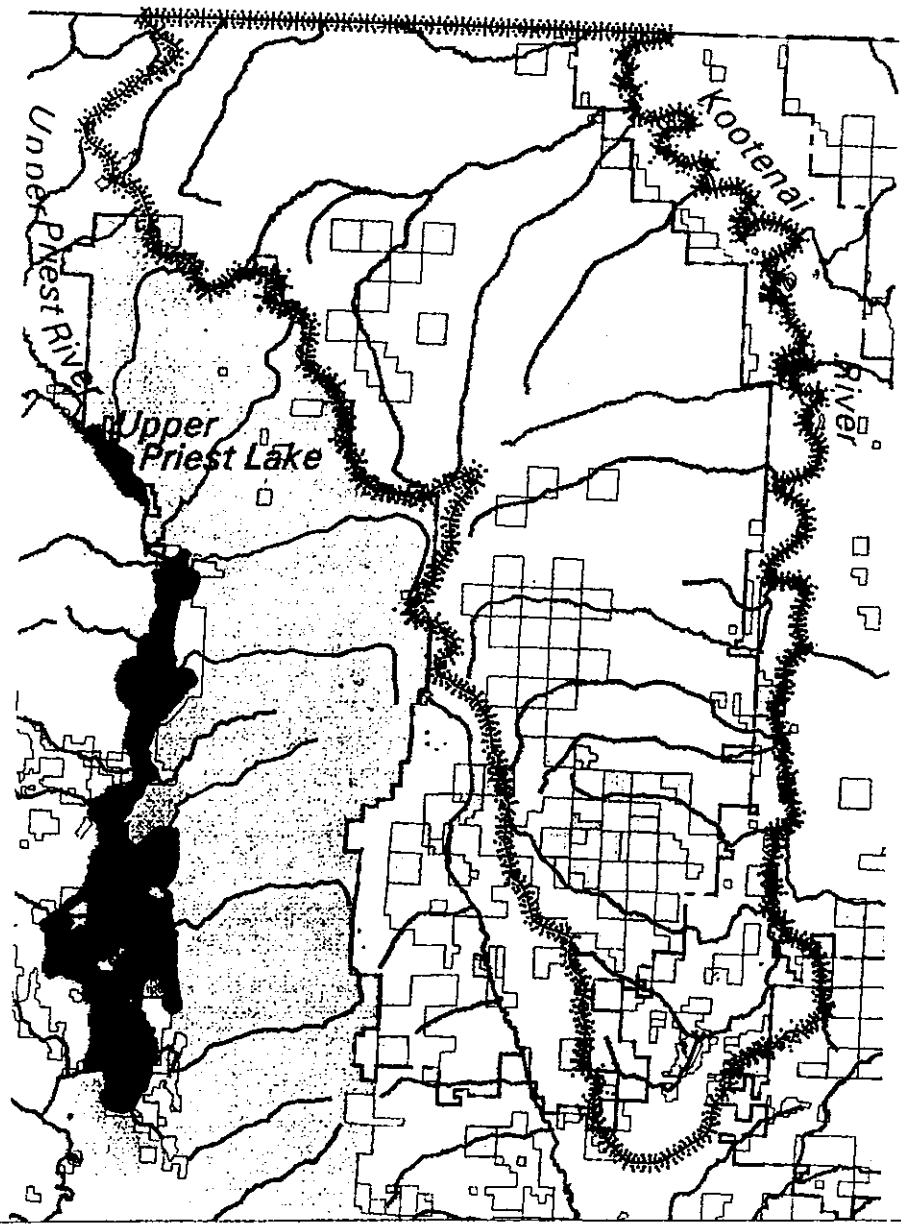
Basin: Panhandle

St. Joe River	The entire St. Joe River Drainage upstream from Mica Creek.
Coeur d'Alene River	The entire Coeur d'Alene River Drainage.
Pend Oreille Lake	The entire drainage to Pend Oreille Lake.
Priest Lake	The entire drainage to Priest Lake excluding Soldier Creek.
Kootenai River	The entire Kootenai River drainage within Idaho.

BULL TROUT KEY WATERSHED MAPS

July 1, 1996

Status of Bull Trout in Idaho
Kootenai River Key Watershed



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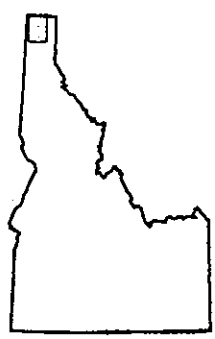
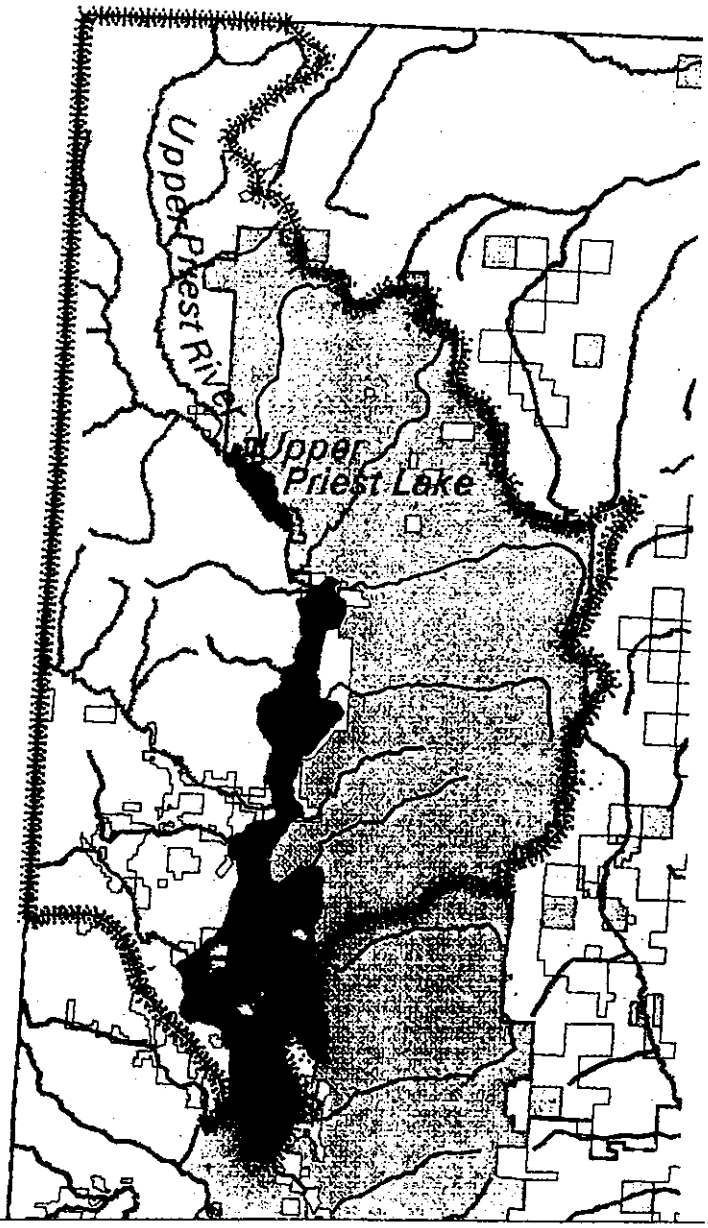
Extirpated
Outside Historic Range

U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private

0 10 Miles



Status of Bull Trout in Idaho
Priest Lake Key Watershed



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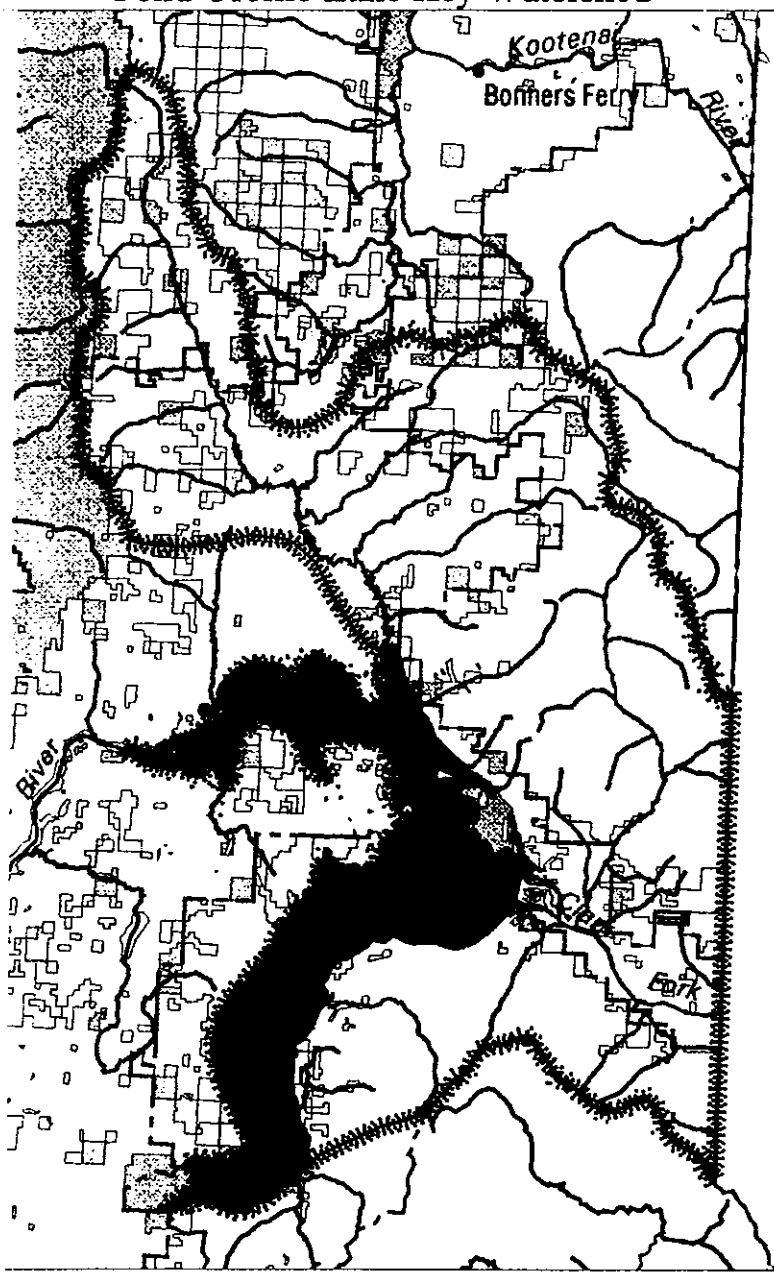
Extirpated
Outside Historic Range

U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private

0 10 Miles

Status of Bull Trout in Idaho
Pend Oreille Lake Key Watershed



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Outside Historic Range

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State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
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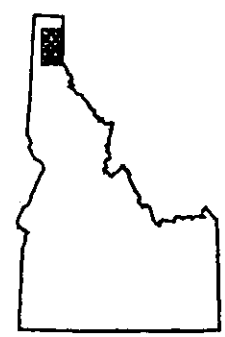
U.S. Fish and Wildlife Service
Private



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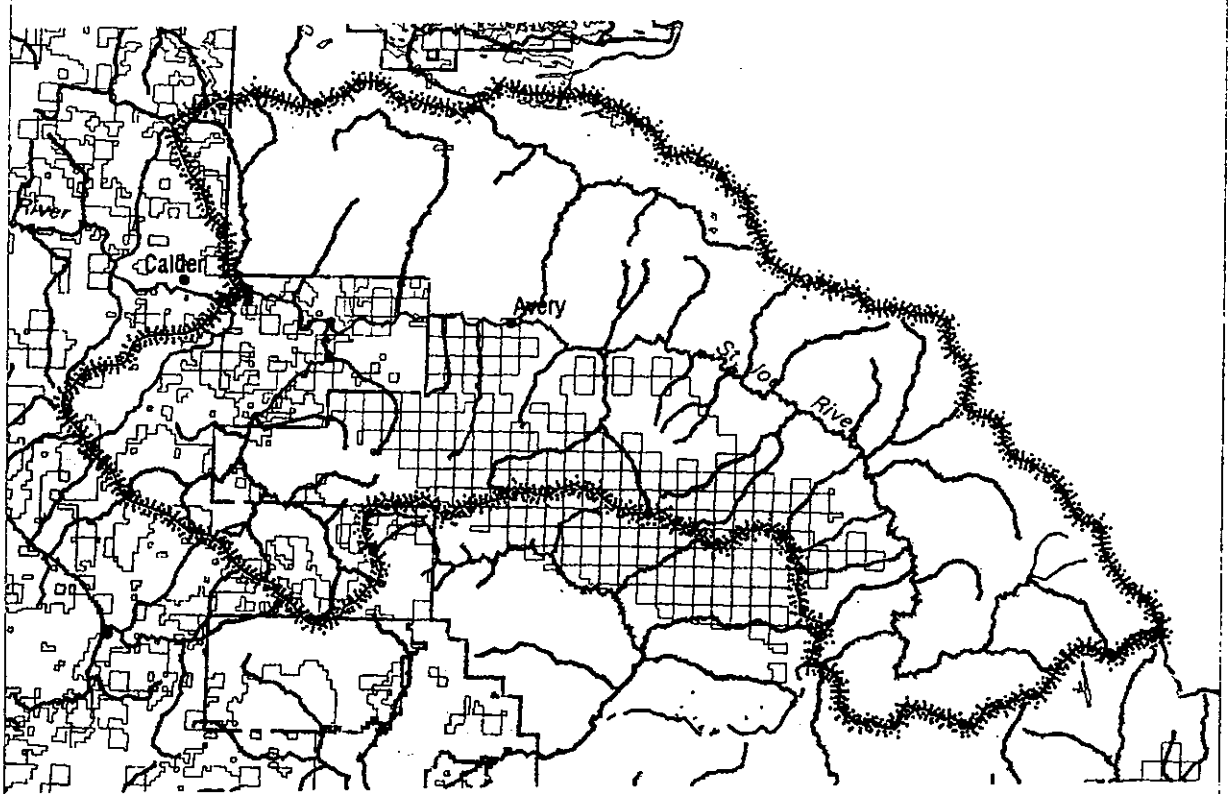
Status of Bull Trout in Idaho
Upper St. Joe River Key Watershed



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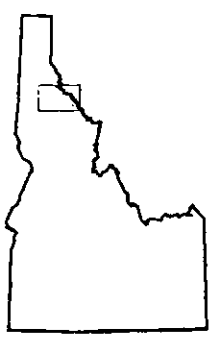
Extirpated
Outside Historic Range

U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private



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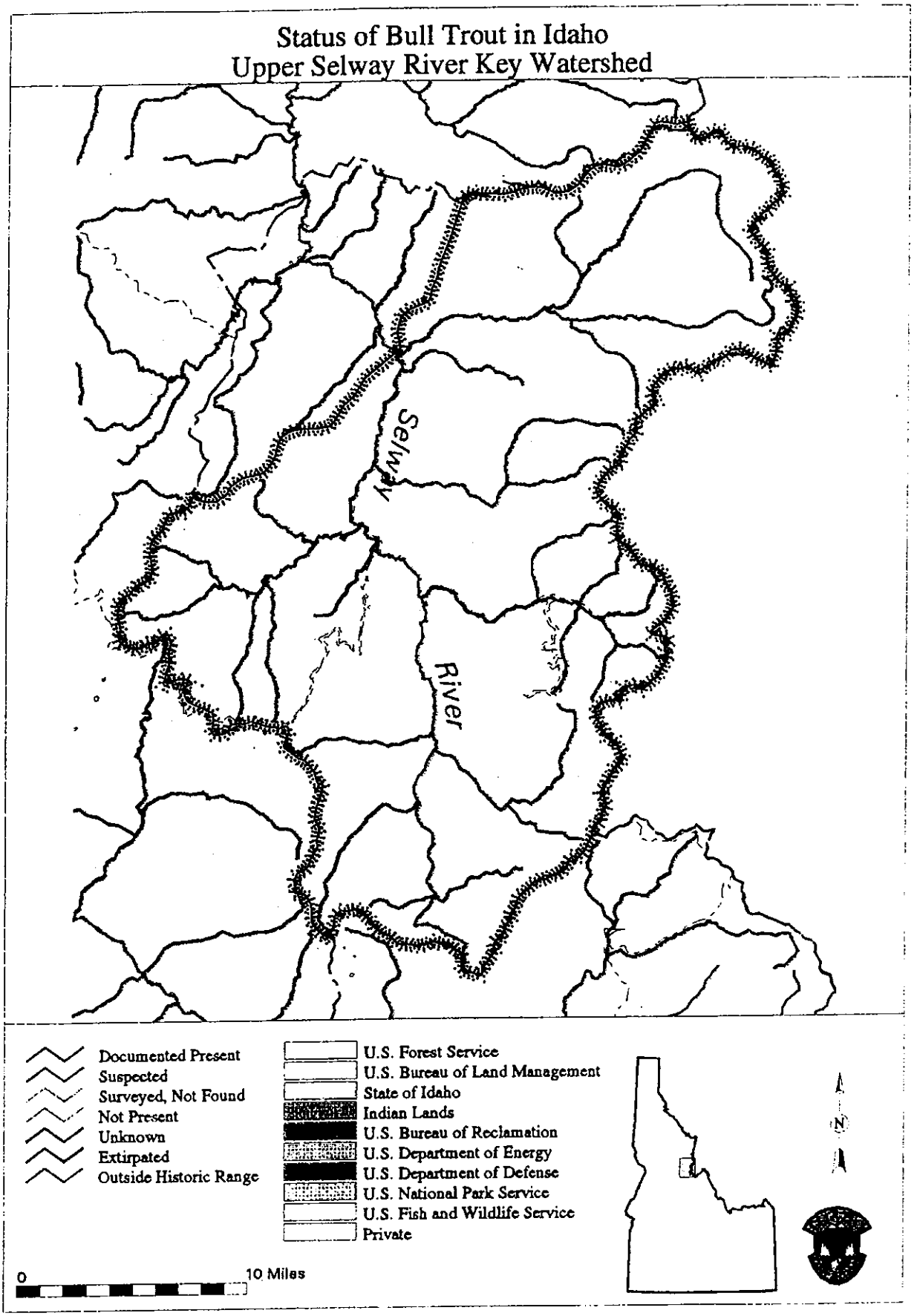
Status of Bull Trout in Idaho
Upper Selway River Key Watershed
Selway
River
Documented Present
Suspected
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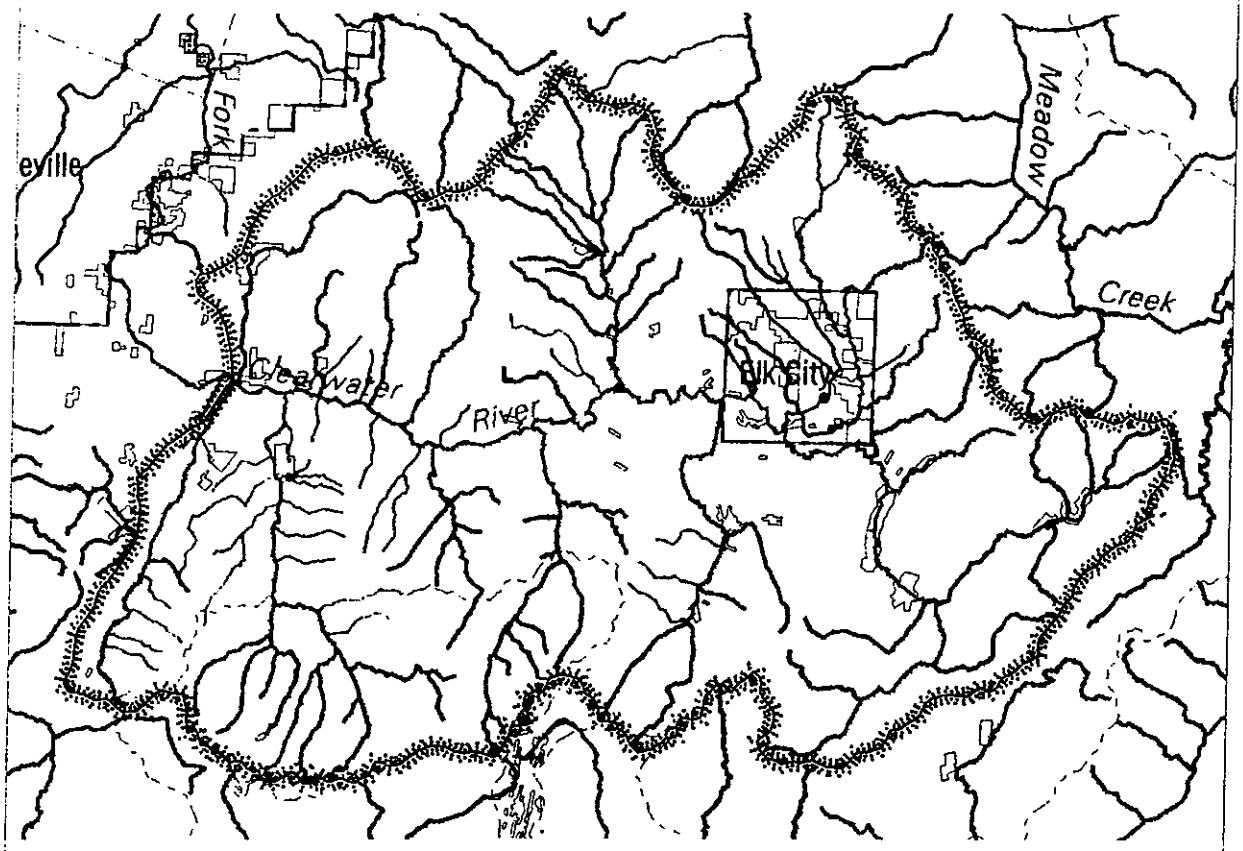
Extirpated
Outside Historic Range
U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private
0
10 Miles
N

Status of Bull Trout in Idaho
South Fork Clearwater River Key Watershed



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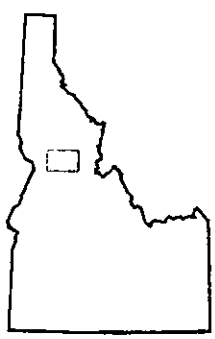
Extirpated
Outside Historic Range

U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private



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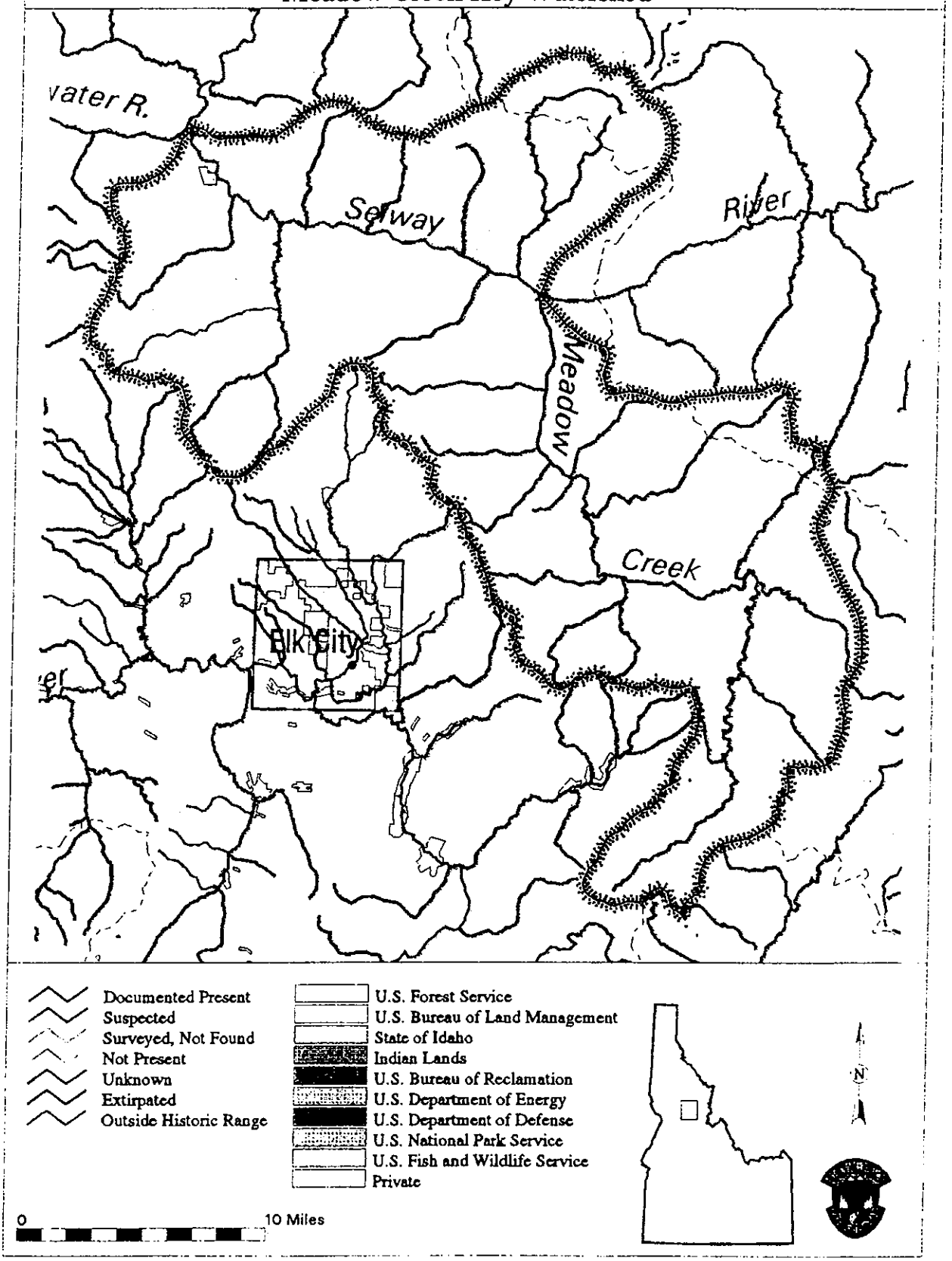
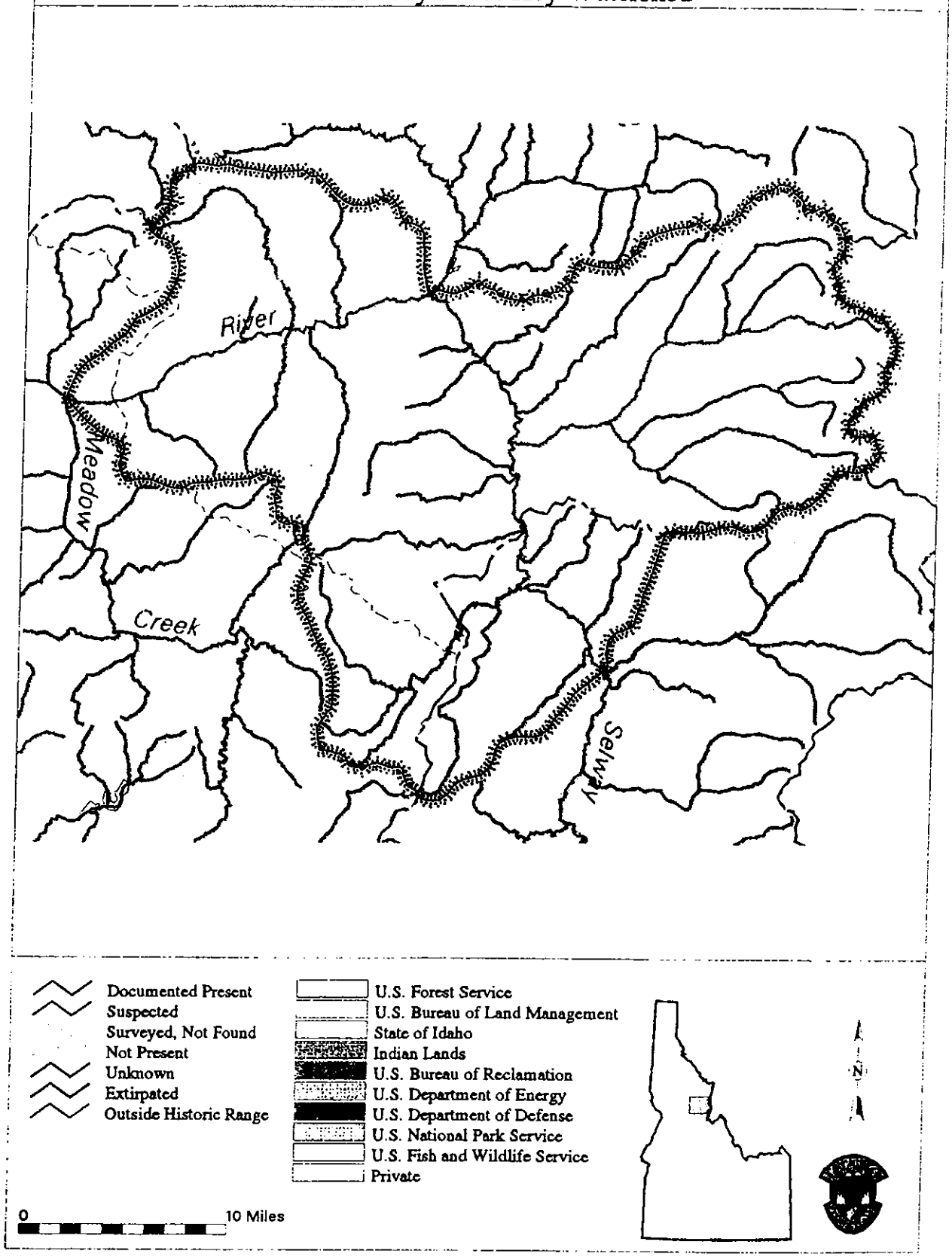
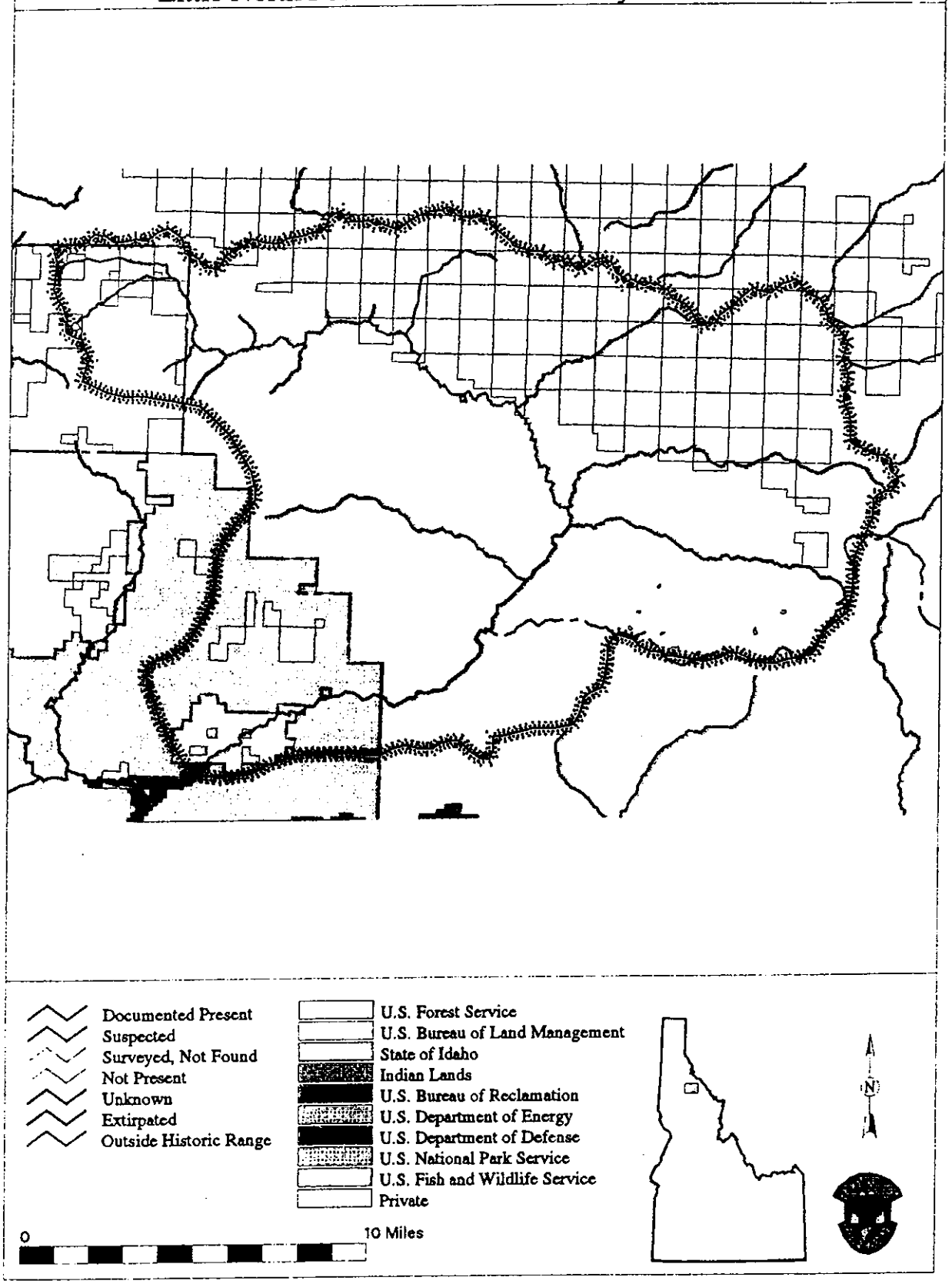
Status of Bull Trout in Idaho
Meadow Creek Key Watershed

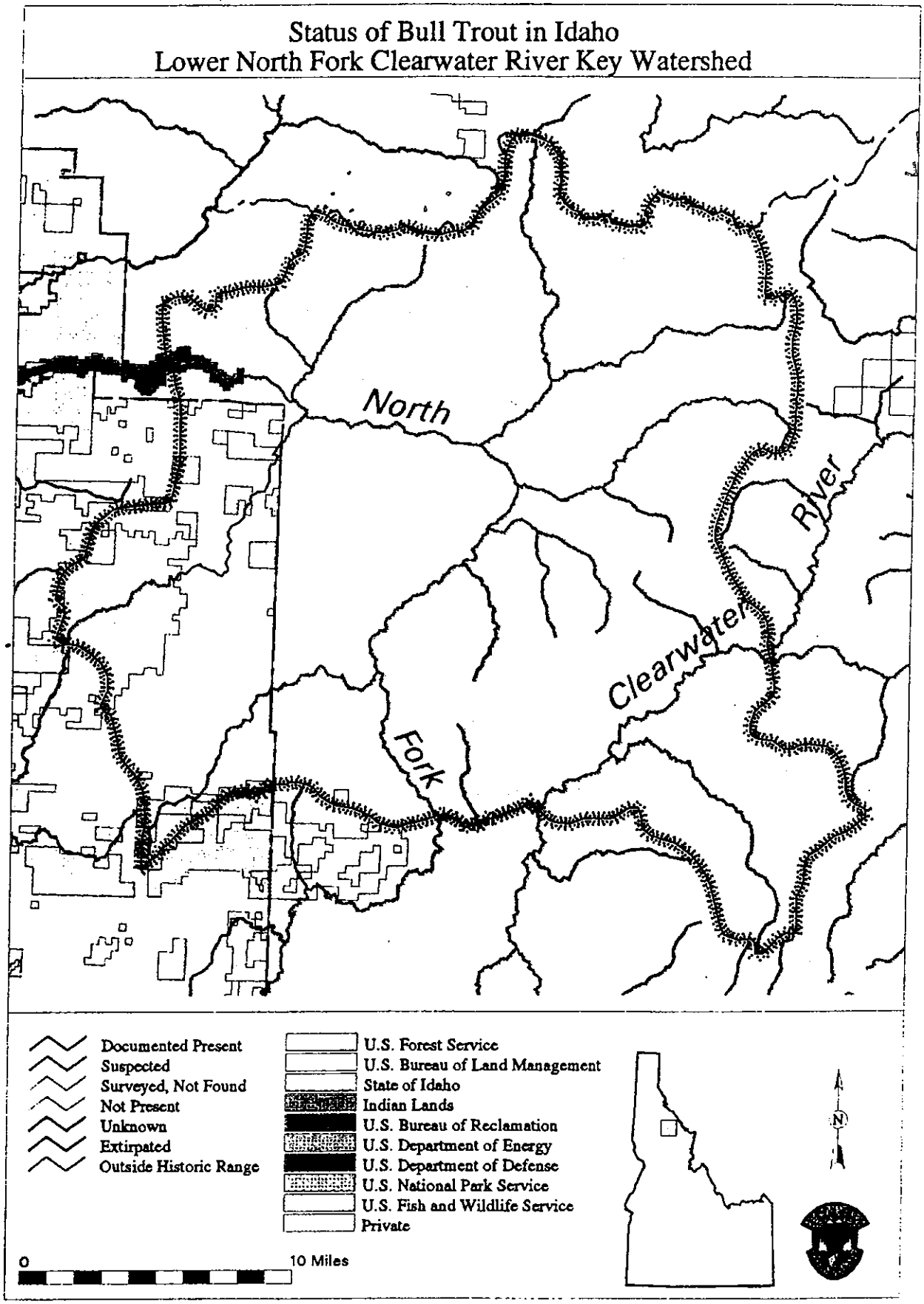


Status of Bull Trout in Idaho
Middle Selway River Key Watershed



Status of Bull Trout in Idaho
Little North Fork Clearwater River Key Watershed




Status of Bull Trout in Idaho
Lower North Fork Clearwater River Key Watershed
North
Fork
Clearwater
River
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Extirpated
Outside Historic Range
U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private
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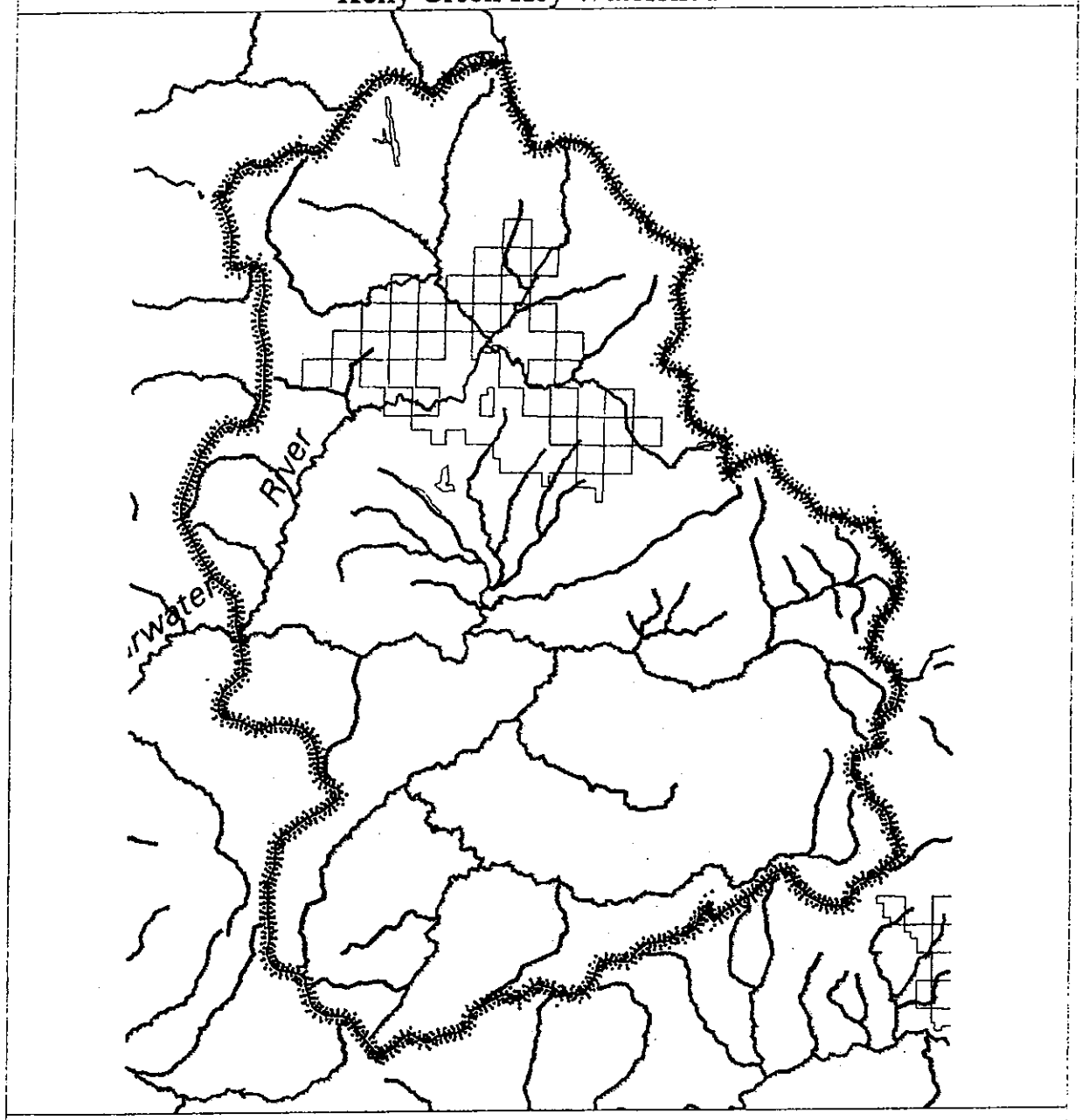
Status of Bull Trout in Idaho
Kelly Creek Key Watershed



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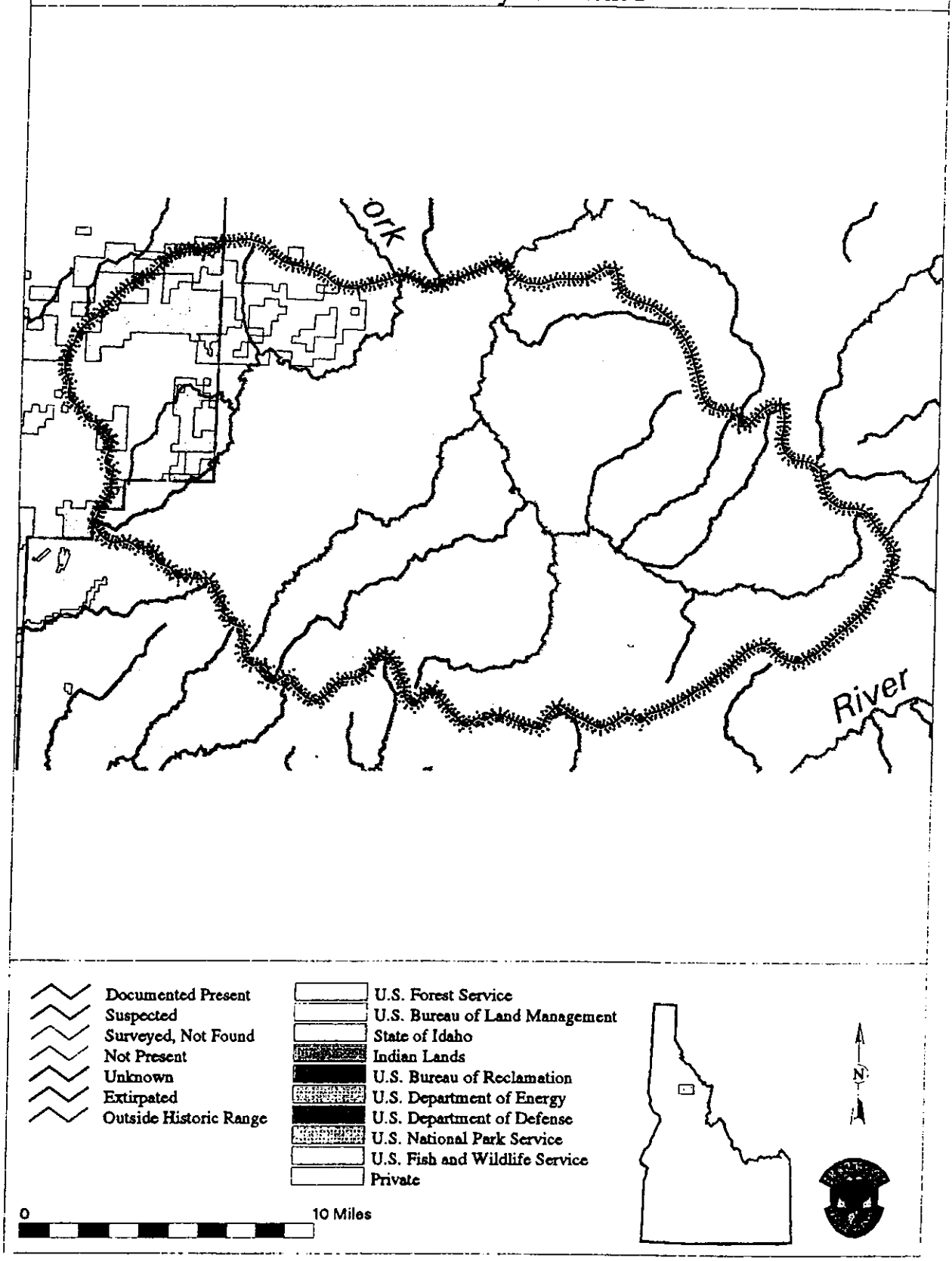
Outside Historic Range

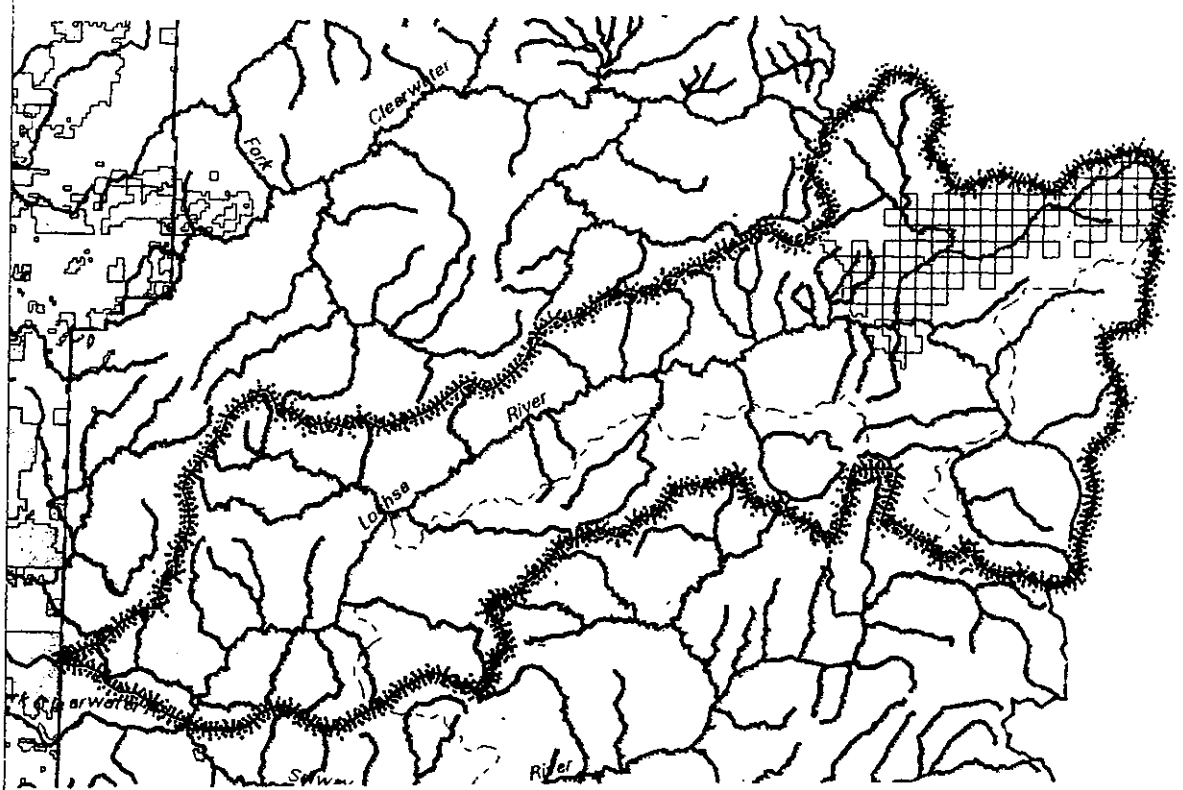
U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private

0 10 Miles

Status of Bull Trout in Idaho
Weitas Creek Key Watershed



Status of Bull Trout in Idaho
Lochsa River Key Watershed



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U.S. Bureau of Land Management
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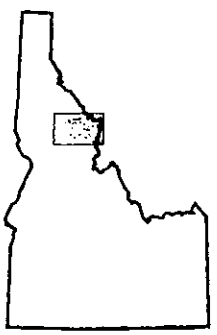

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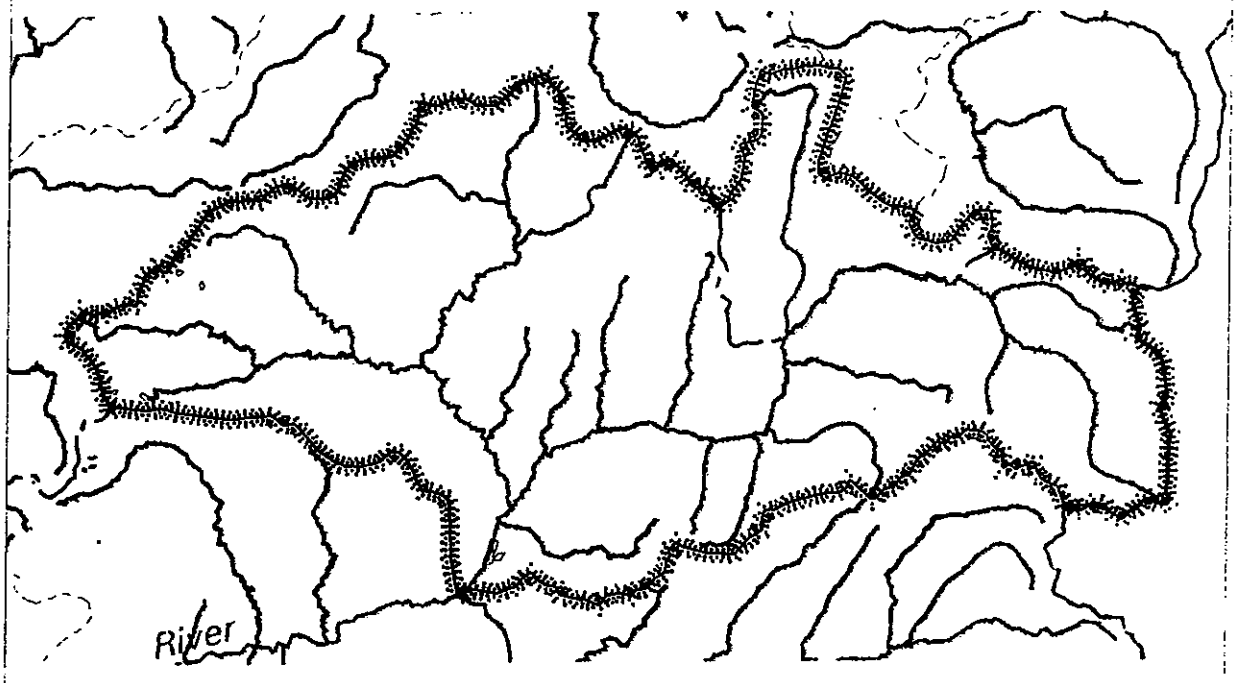
0 10 Miles

Status of Bull Trout in Idaho
Moose Creek Key Watershed



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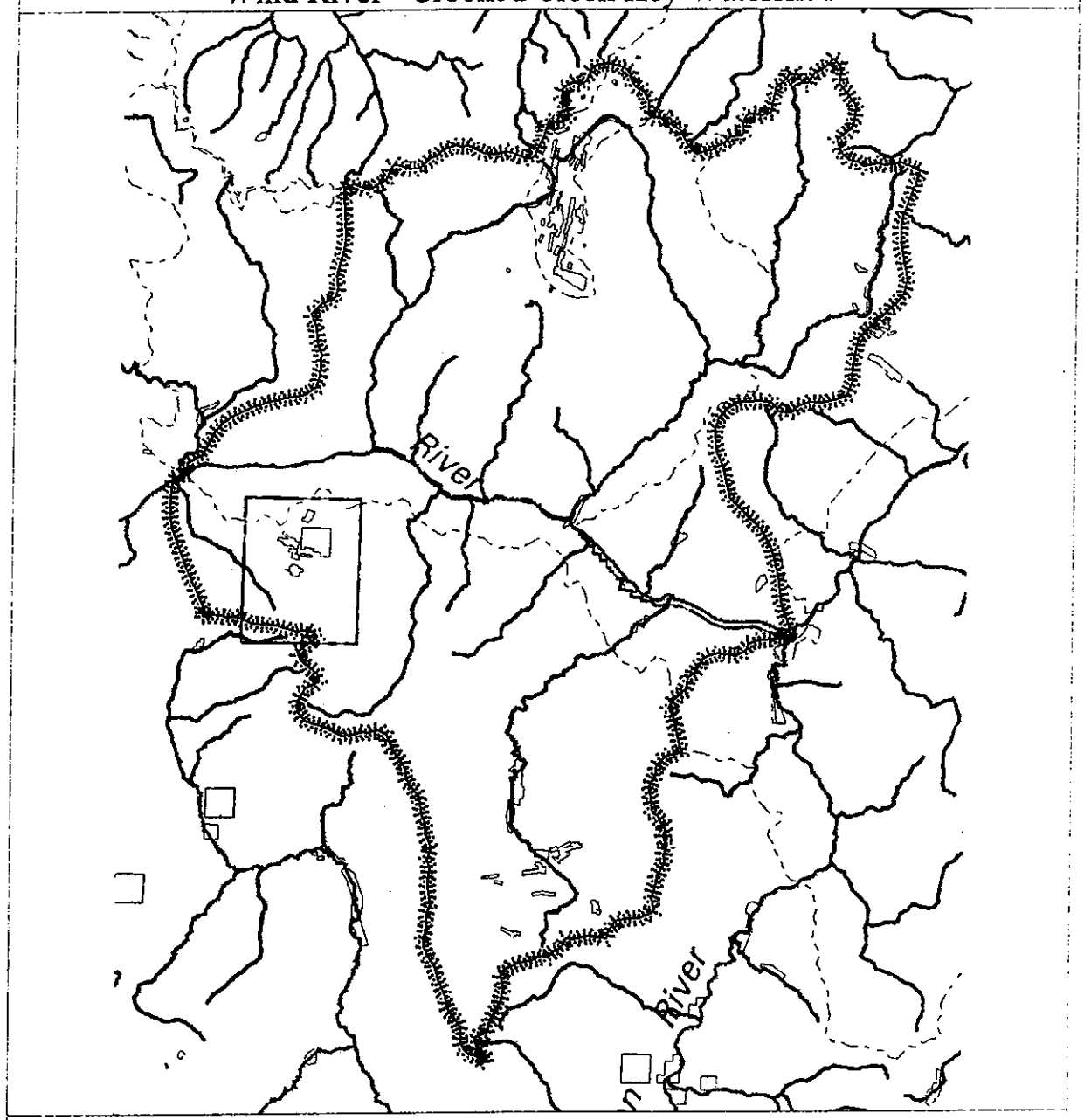
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private

N

0 10 Miles

Status of Bull Trout in Idaho
Wind River - Crooked Creek Key Watershed



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State of Idaho
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U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private

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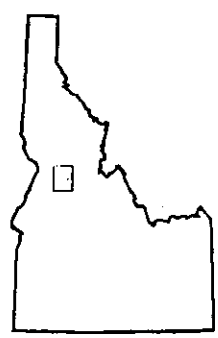

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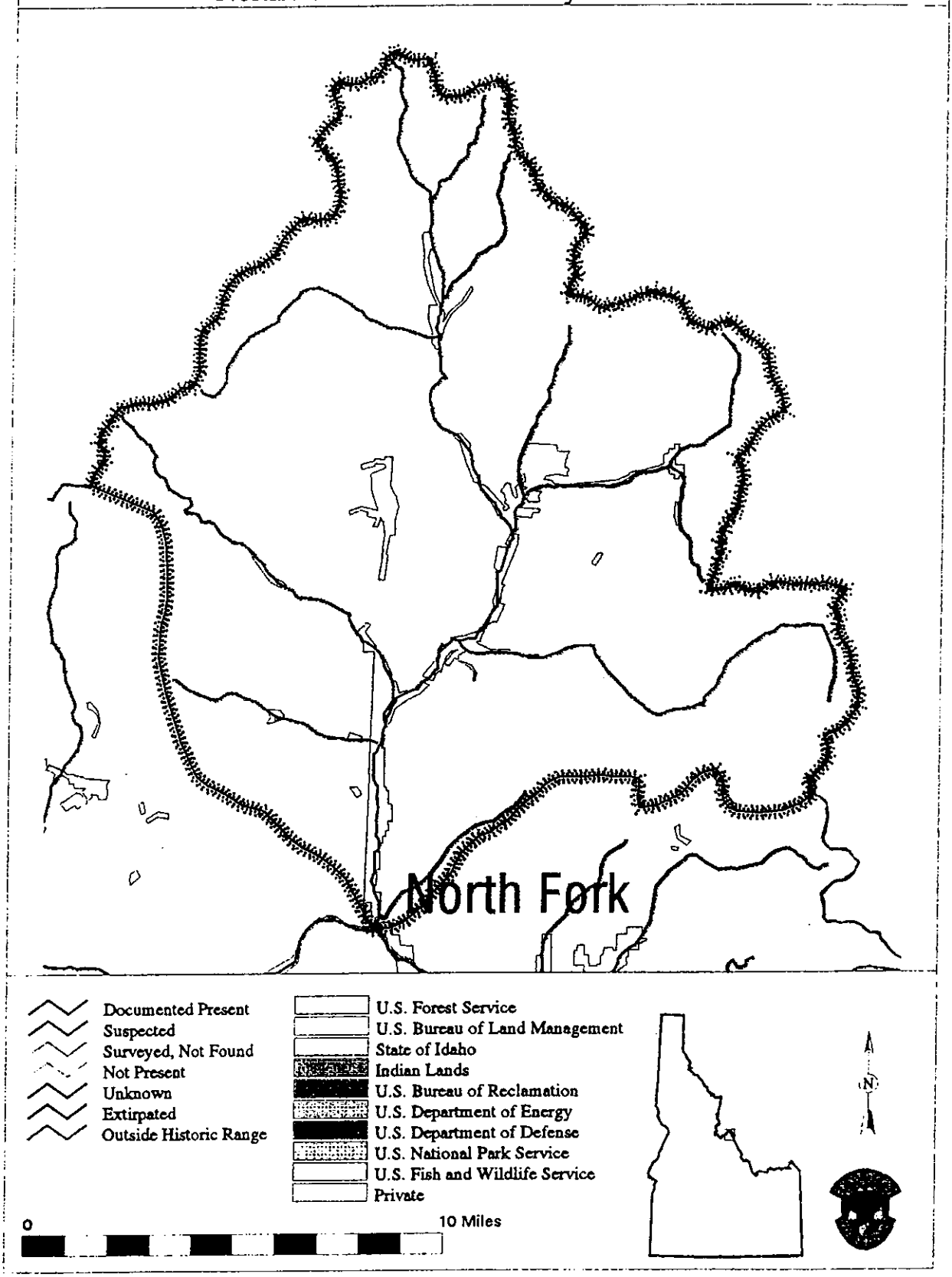
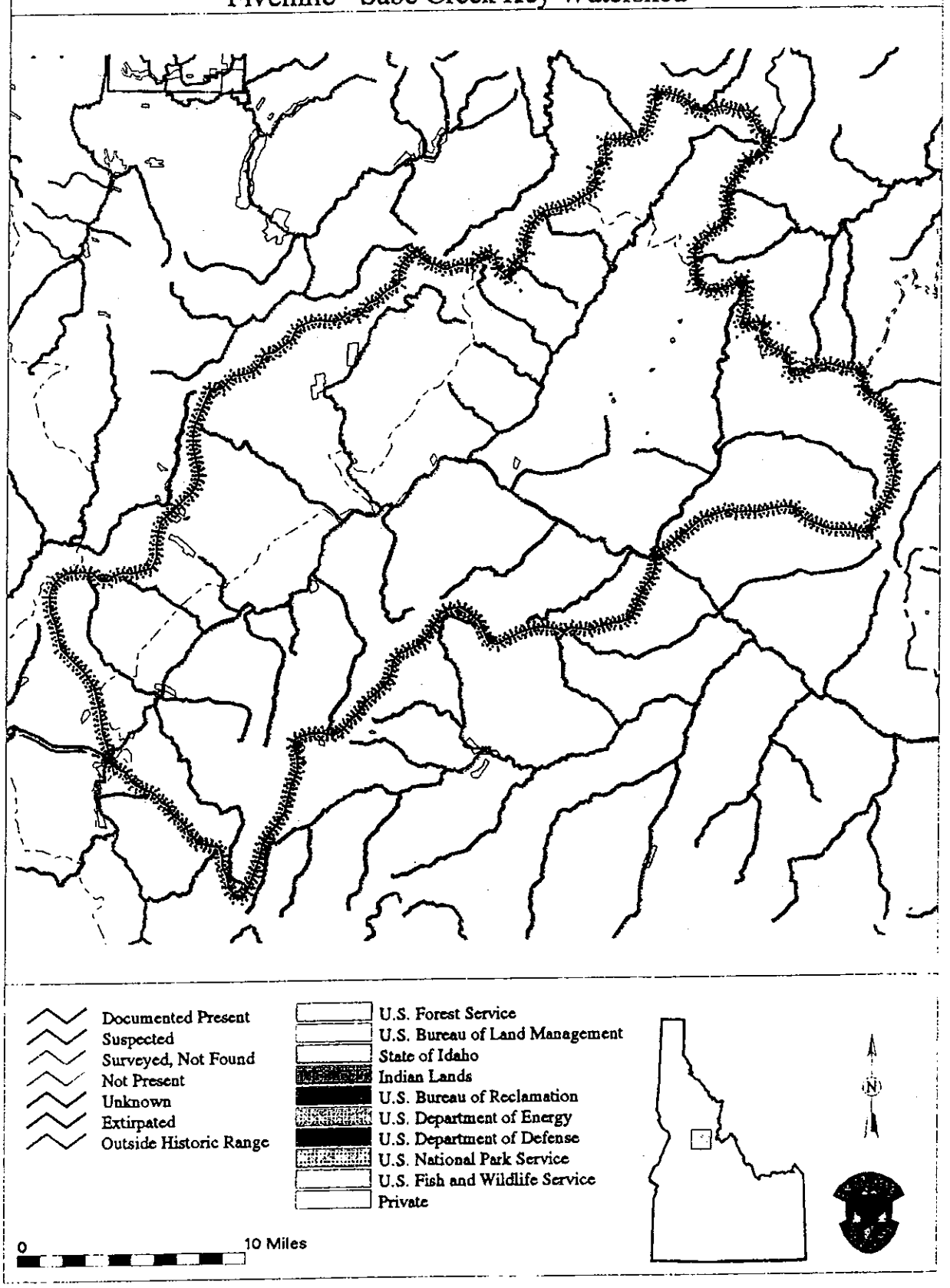
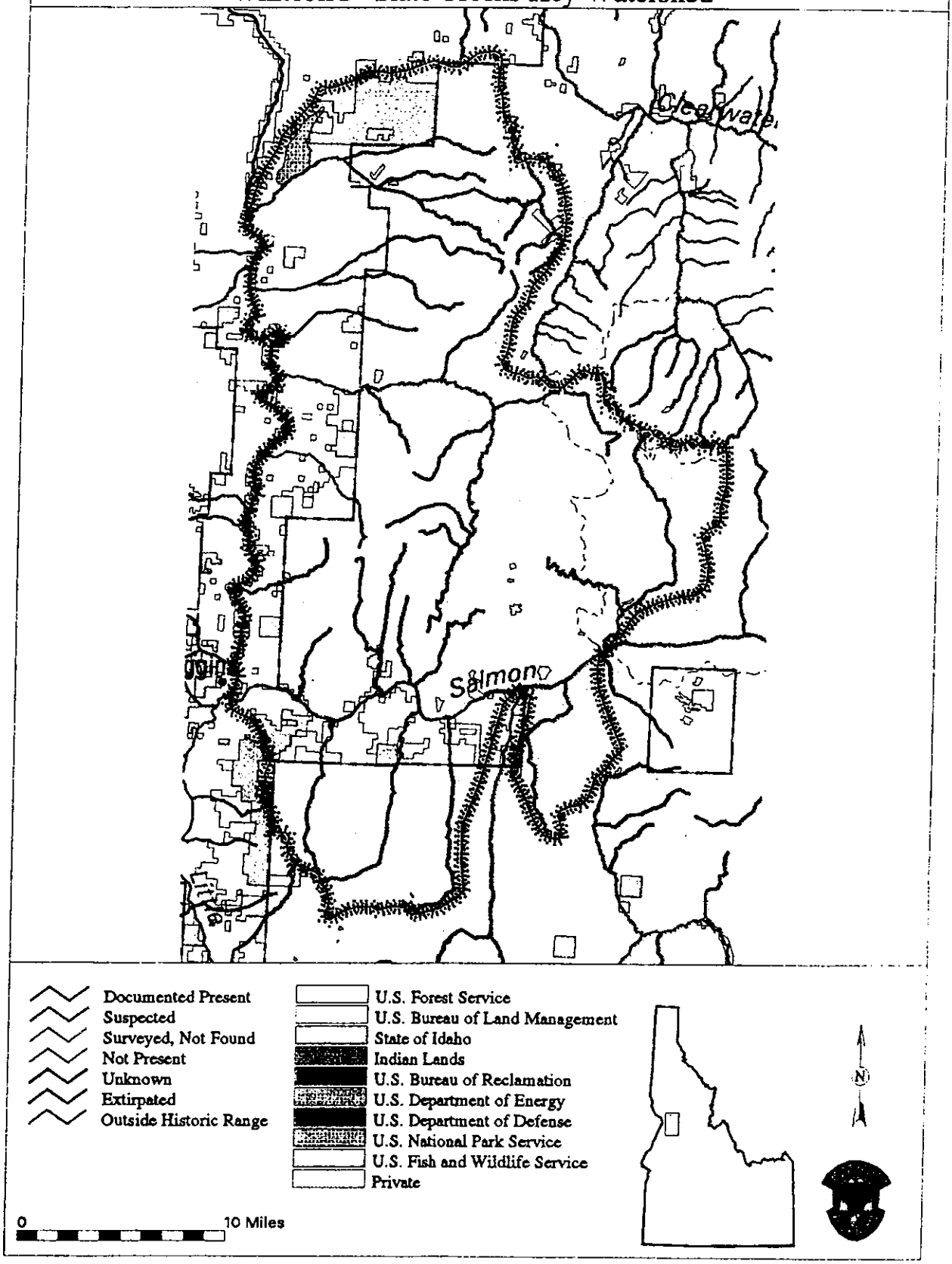
Status of Bull Trout in Idaho
North Fork Salmon River Key Watershed



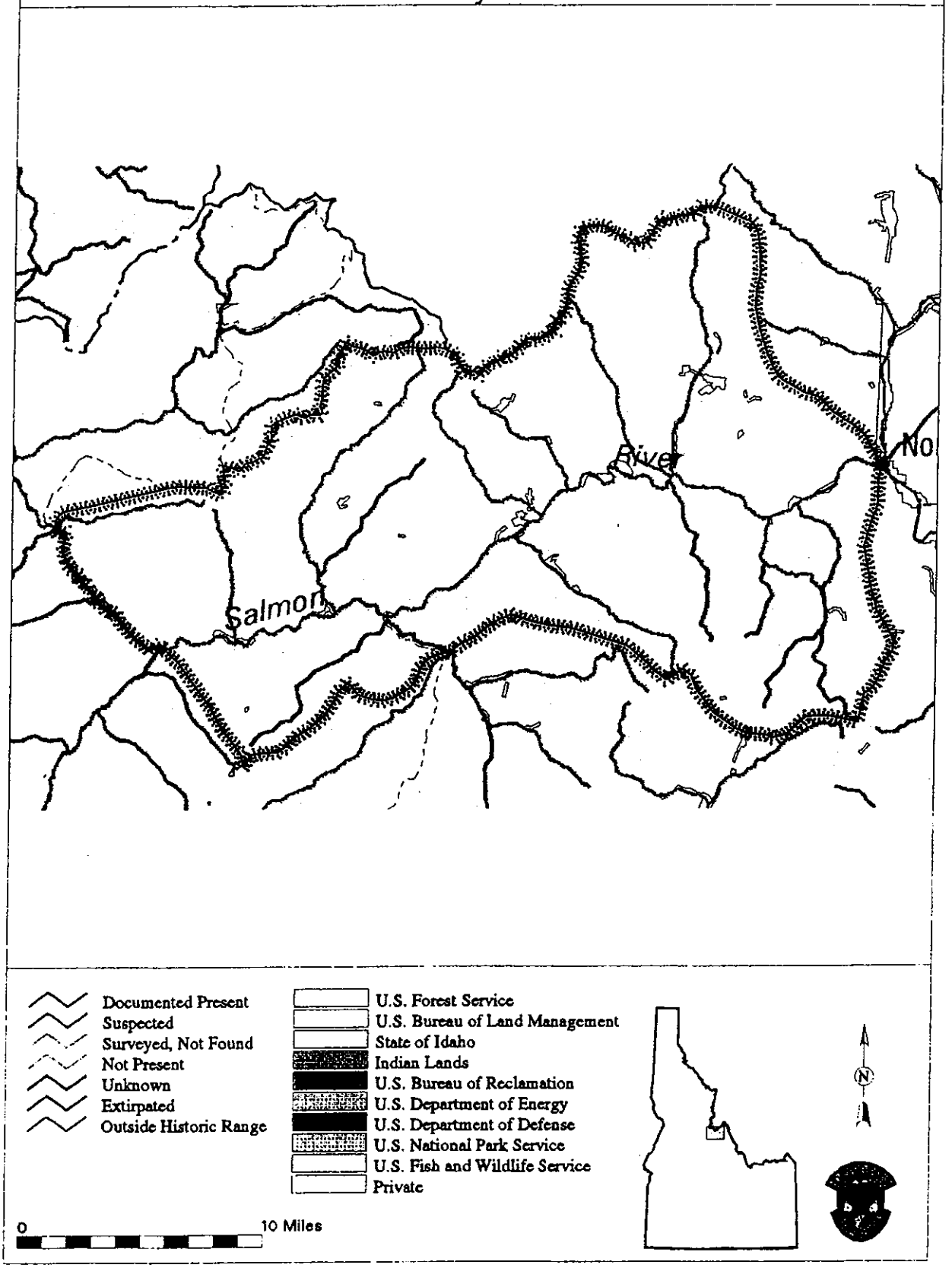
Status of Bull Trout in Idaho
Fivemile - Sabe Creek Key Watershed



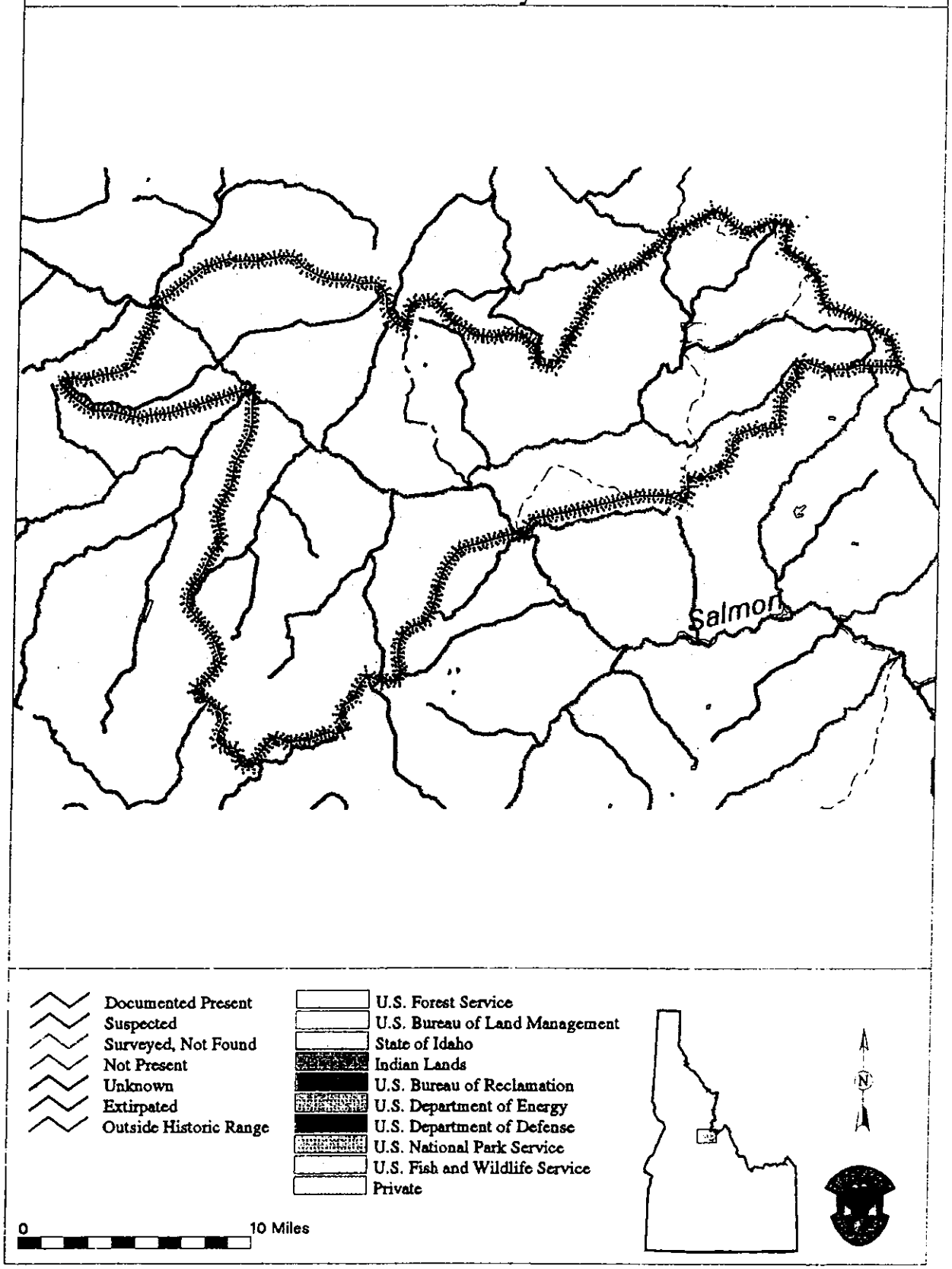
Status of Bull Trout in Idaho
Whitebird - Slate Creeks Key Watershed



Status of Bull Trout in Idaho
Owl Creek Key Watershed



Status of Bull Trout in Idaho
Horse Creek Area Key Watershed



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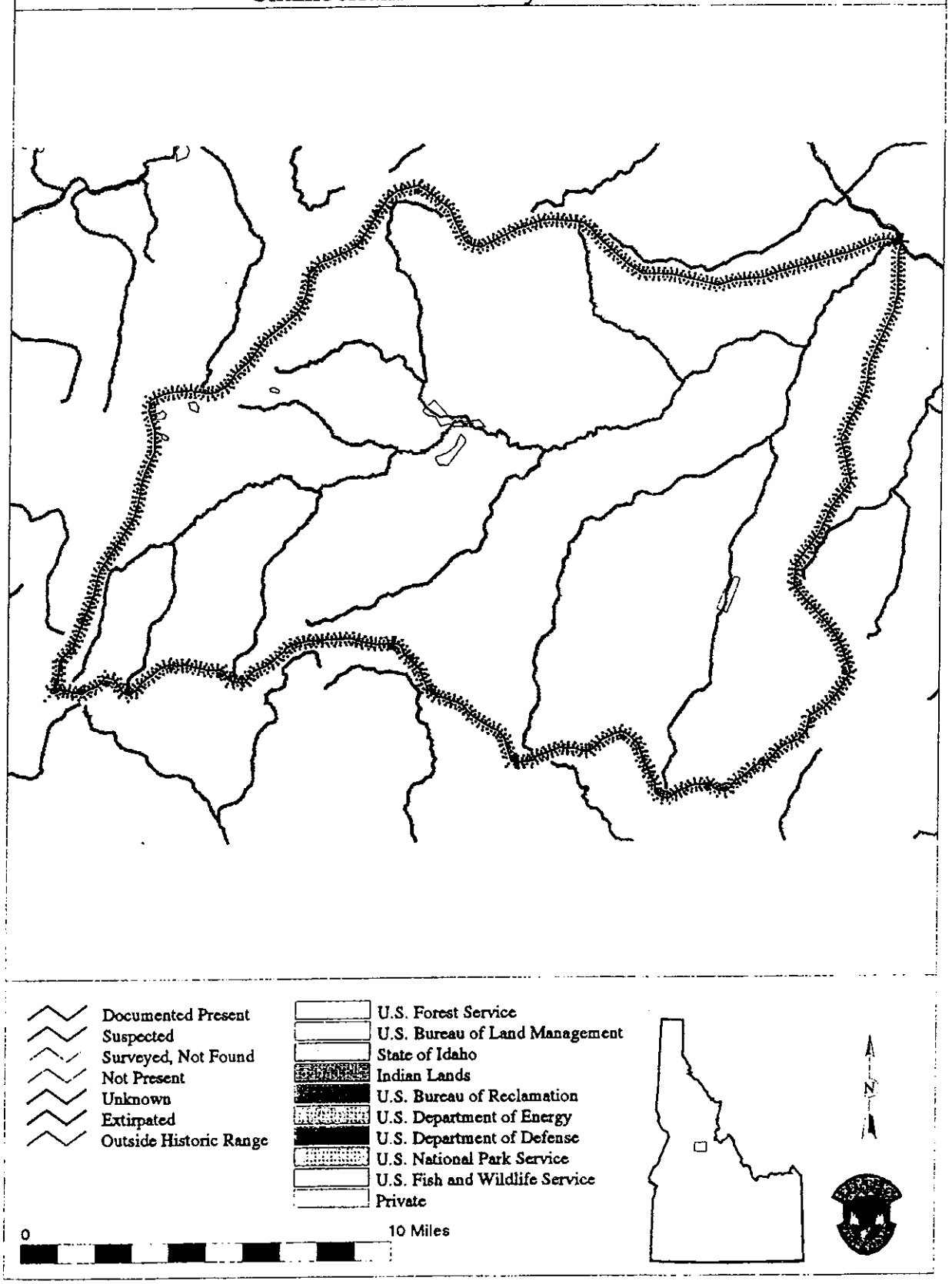
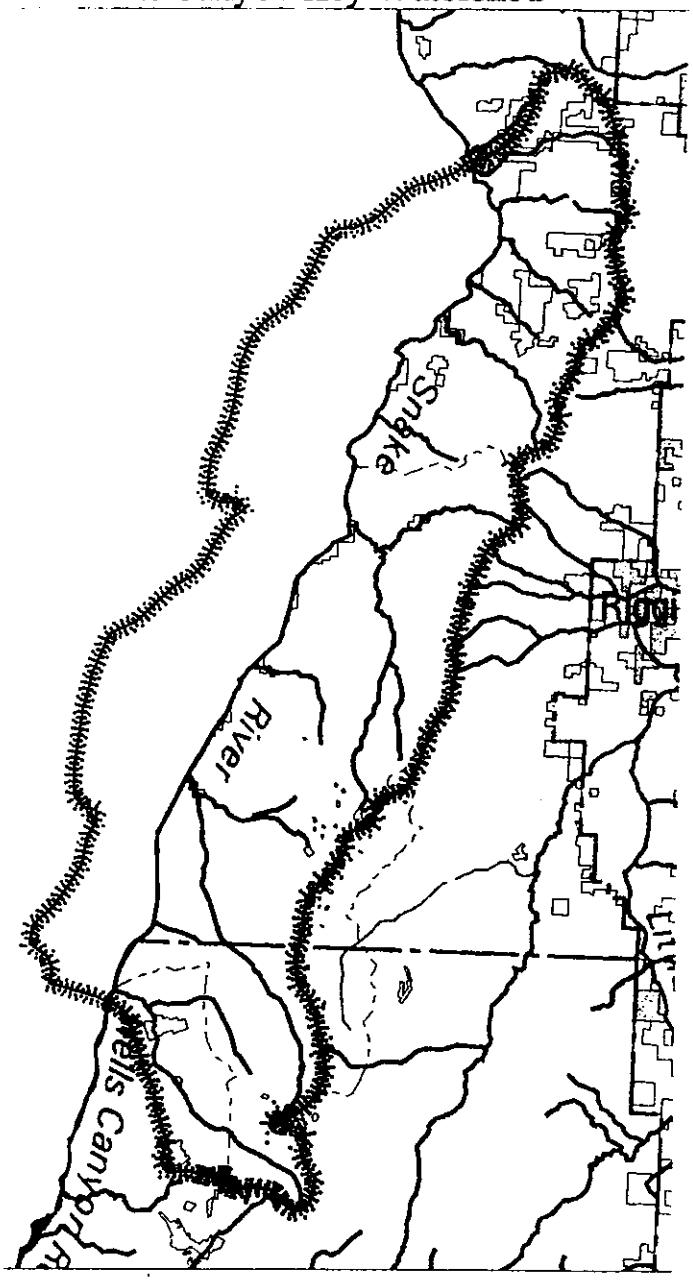
Chamberlain Creek Key Watershed



Status of Bull Trout in Idaho
Hells Canyon Key Watershed



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Outside Historic Range

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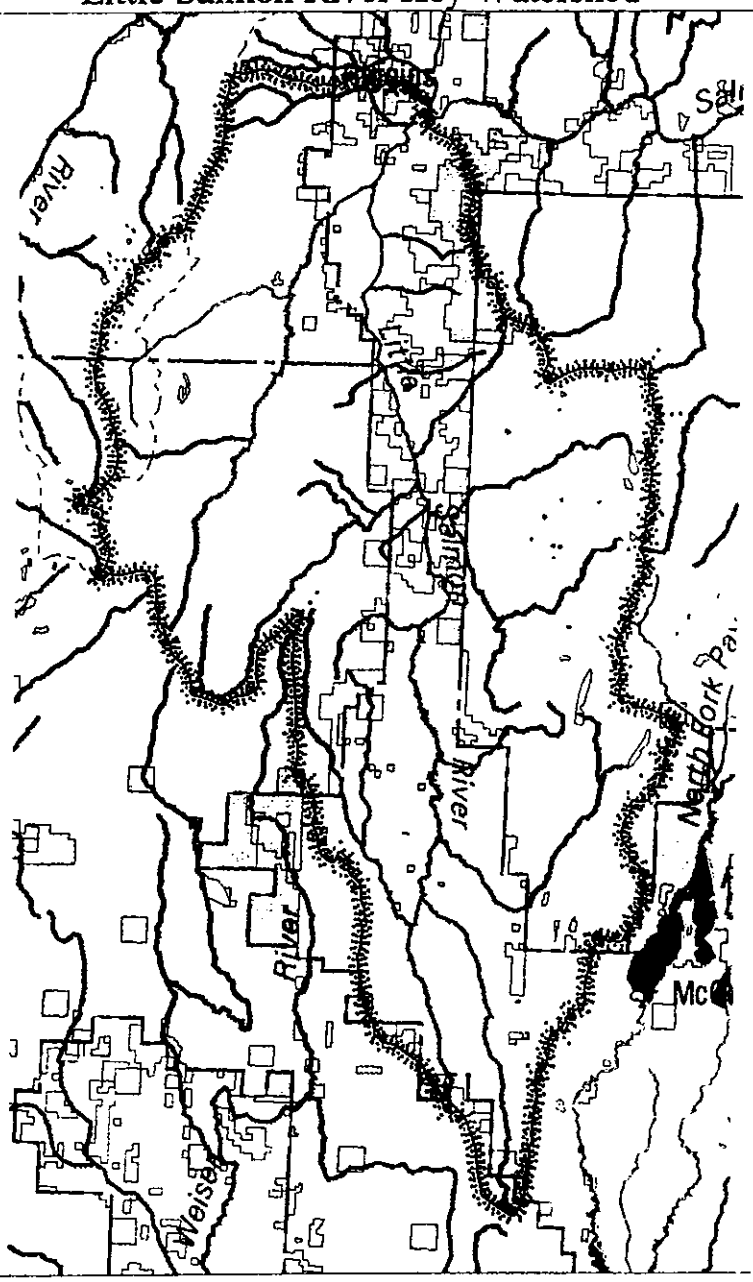
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private

0 10 Miles

Status of Bull Trout in Idaho
Little Salmon River Key Watershed



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U.S. Fish and Wildlife Service
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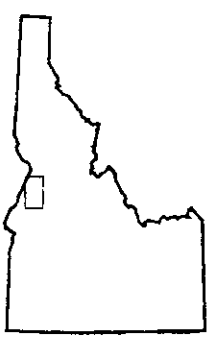

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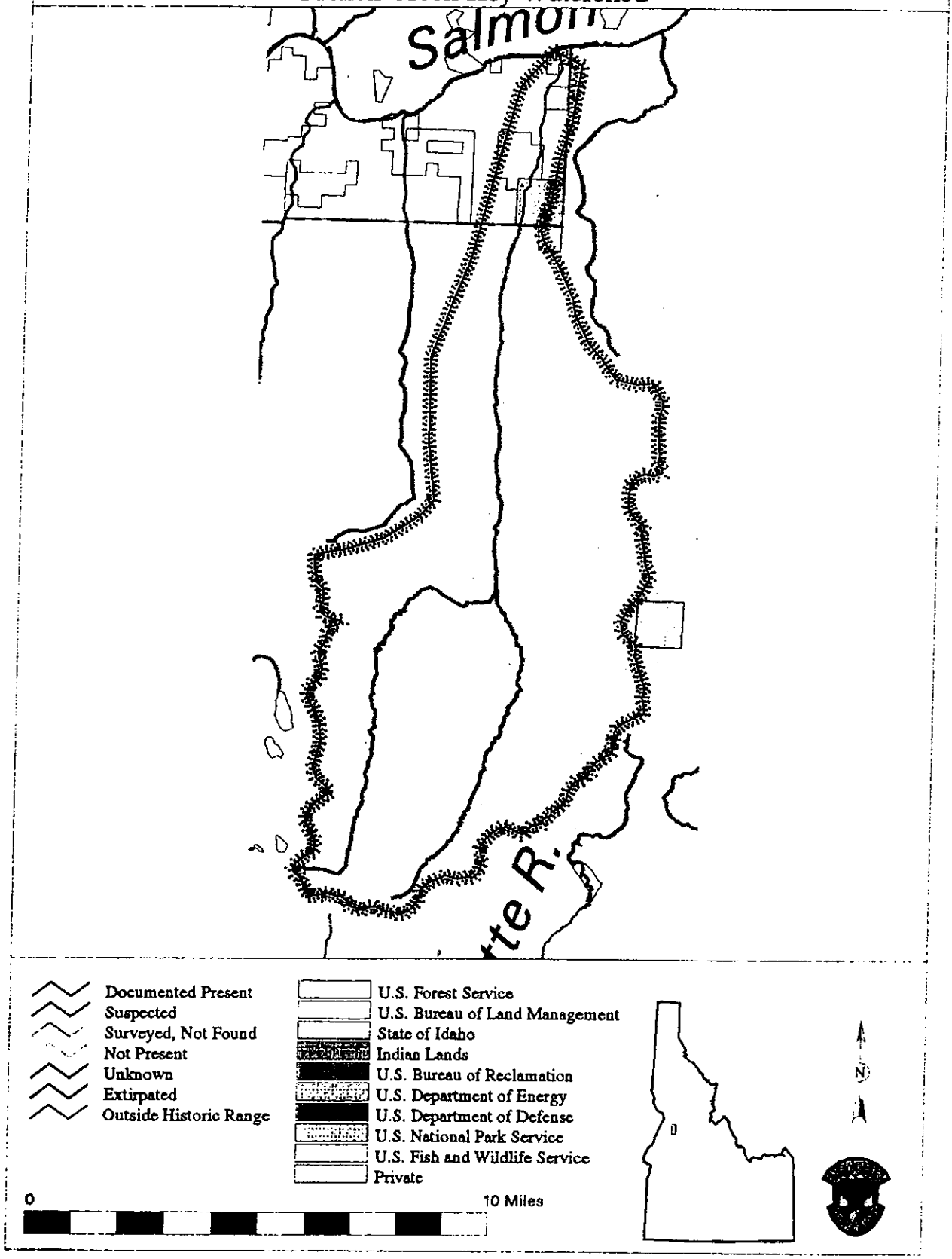
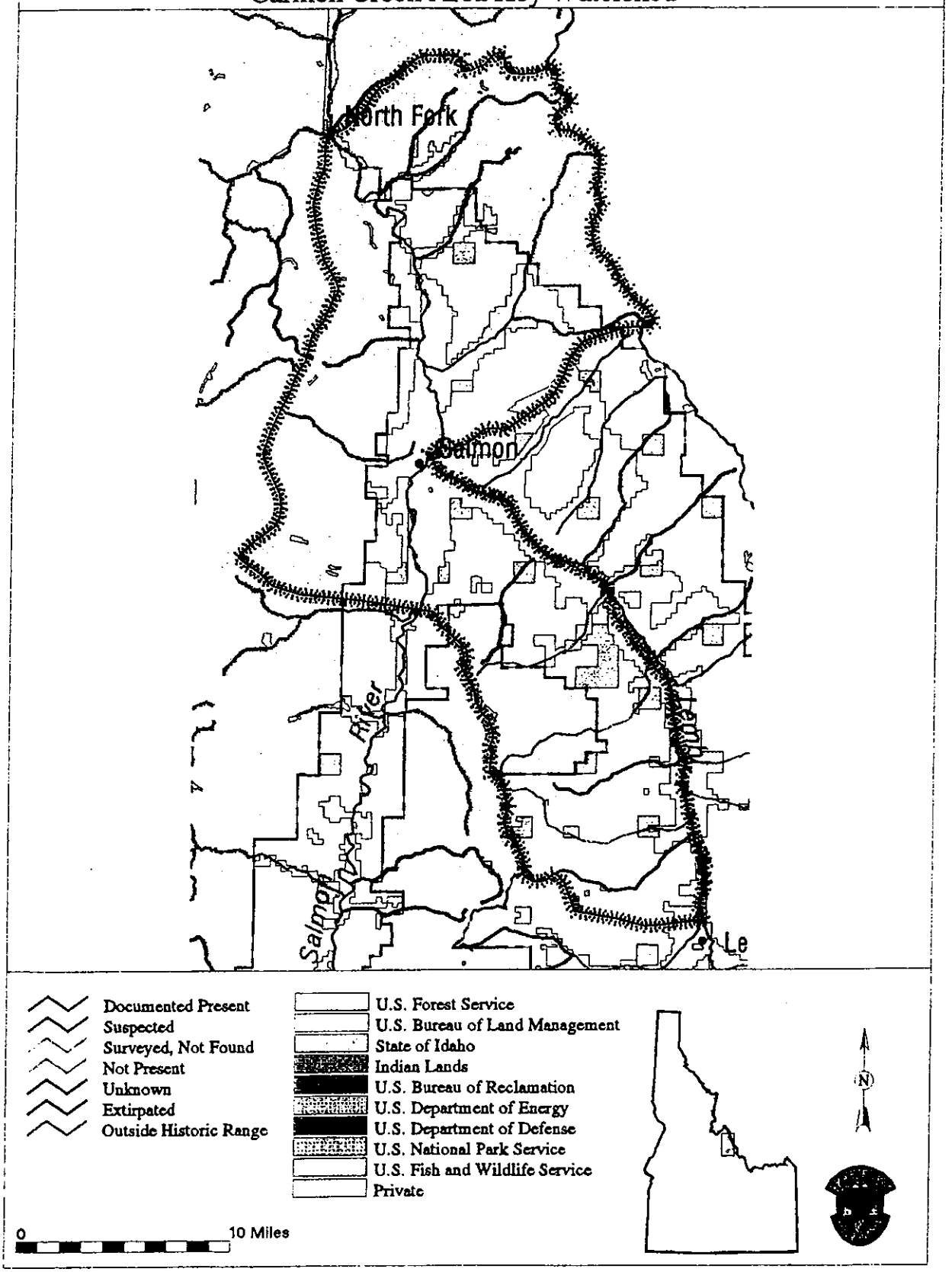
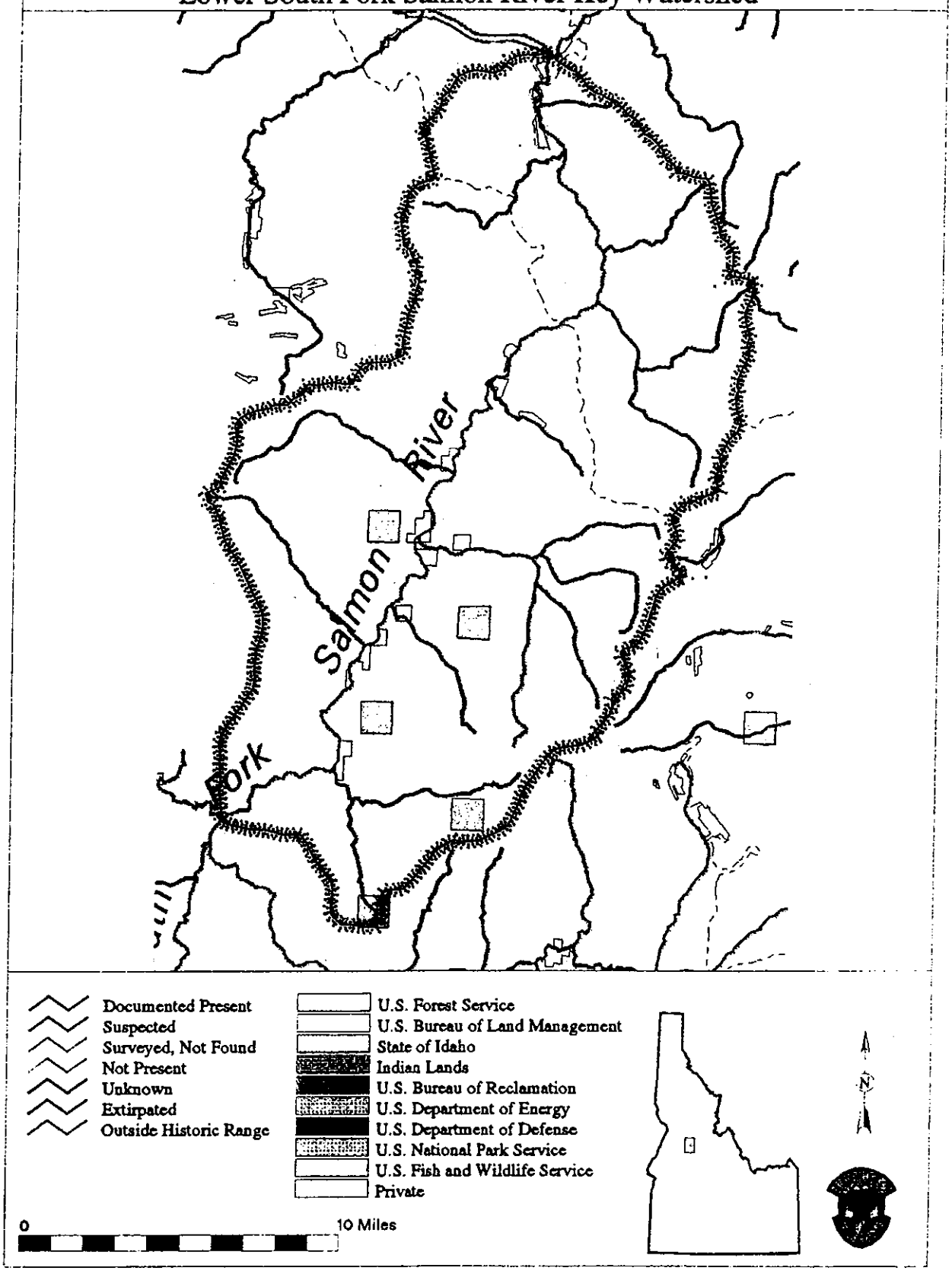
Status of Bull Trout in Idaho
French Creek Key Watershed



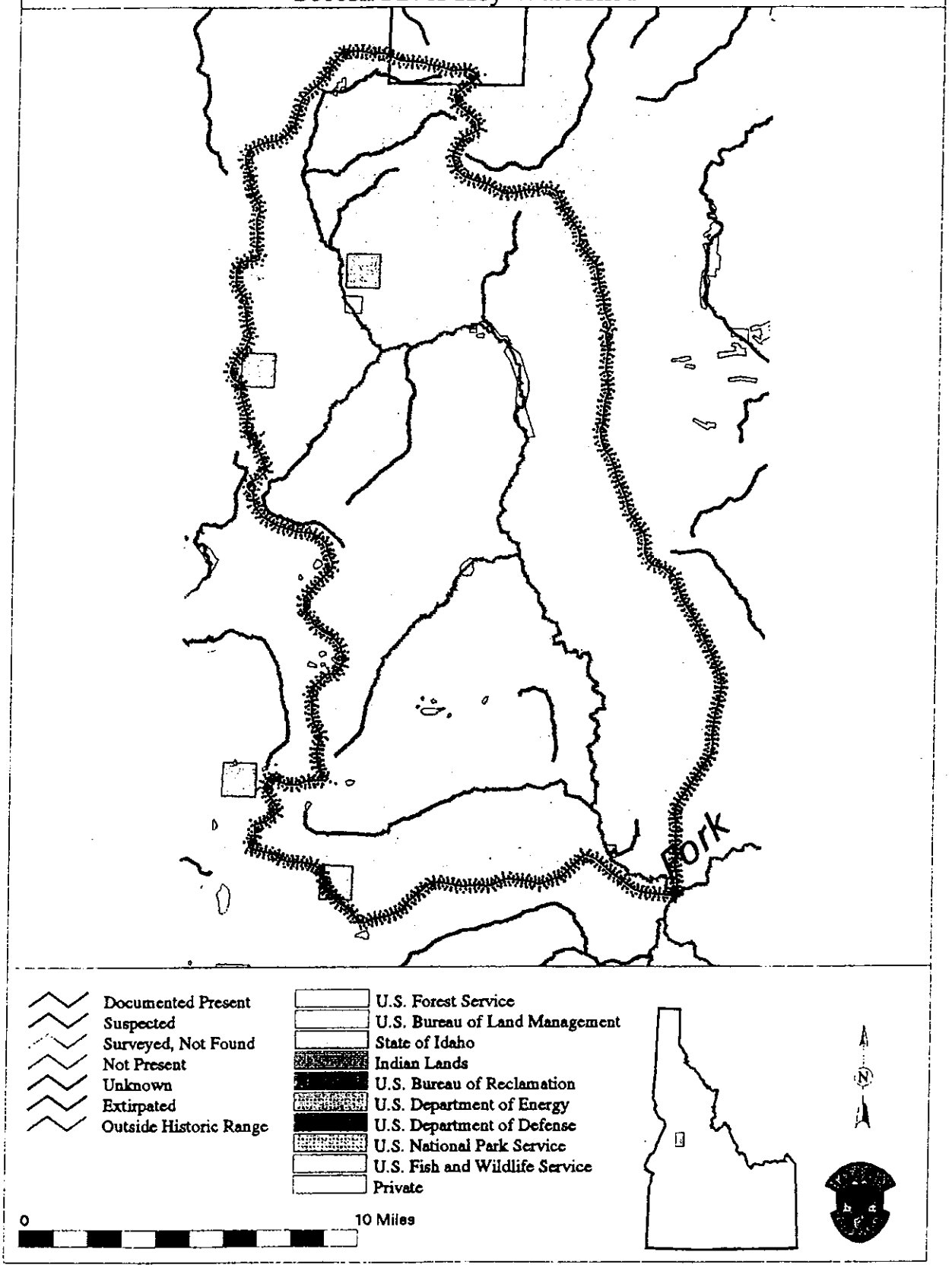
Status of Bull Trout in Idaho
Carmen Creek Area Key Watershed



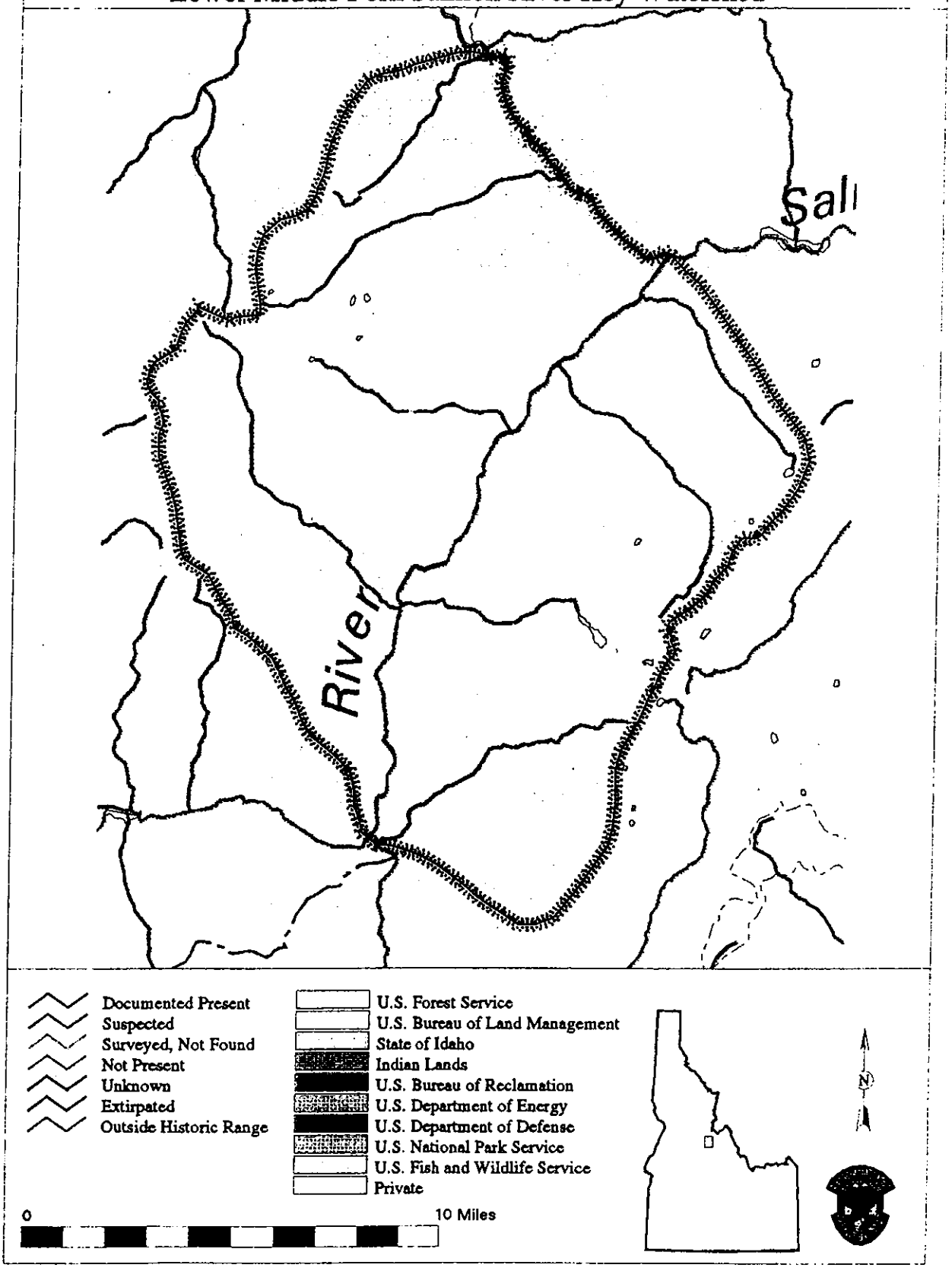
Status of Bull Trout in Idaho
Lower South Fork Salmon River Key Watershed



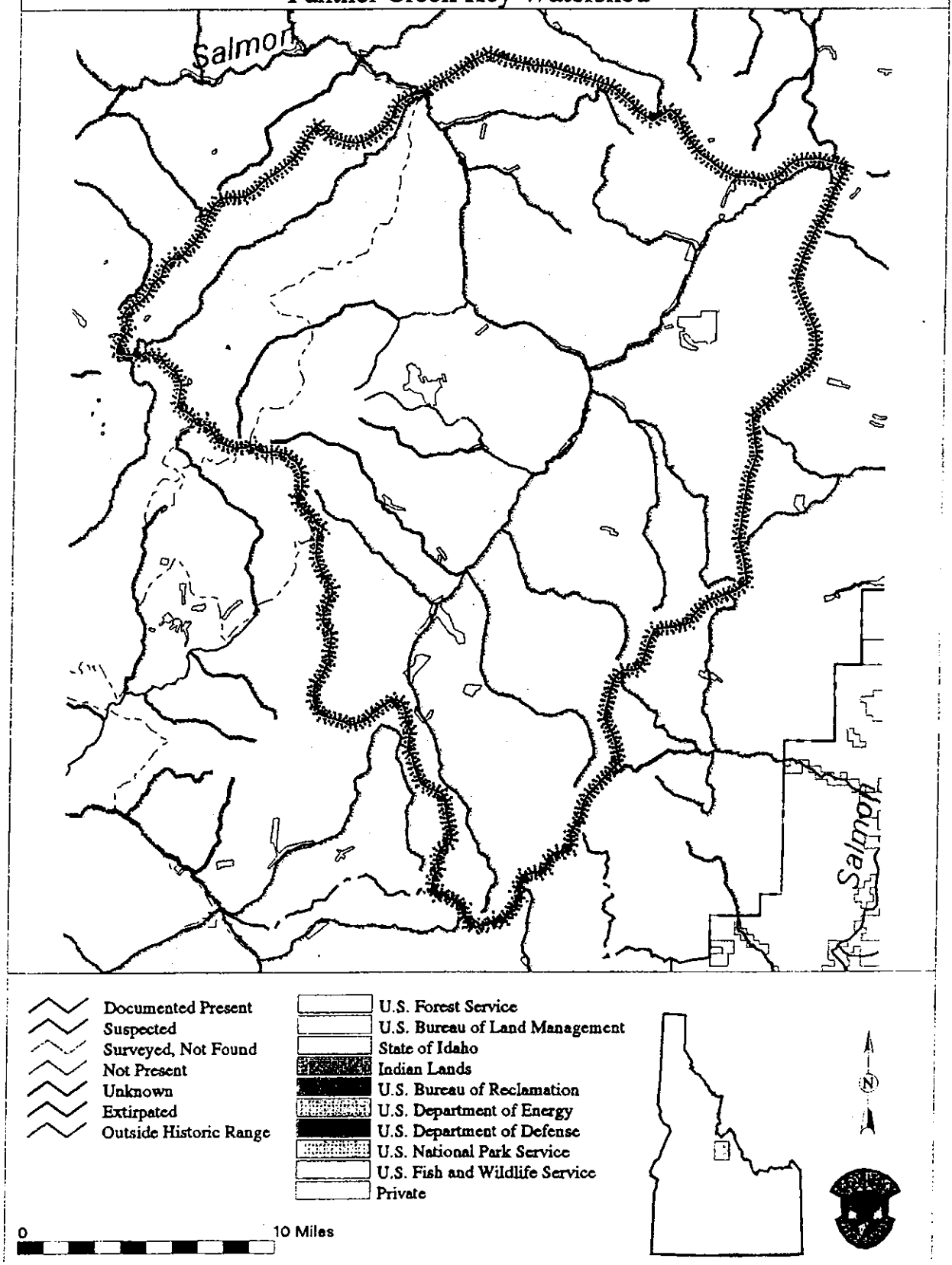
Status of Bull Trout in Idaho
Secesh River Key Watershed



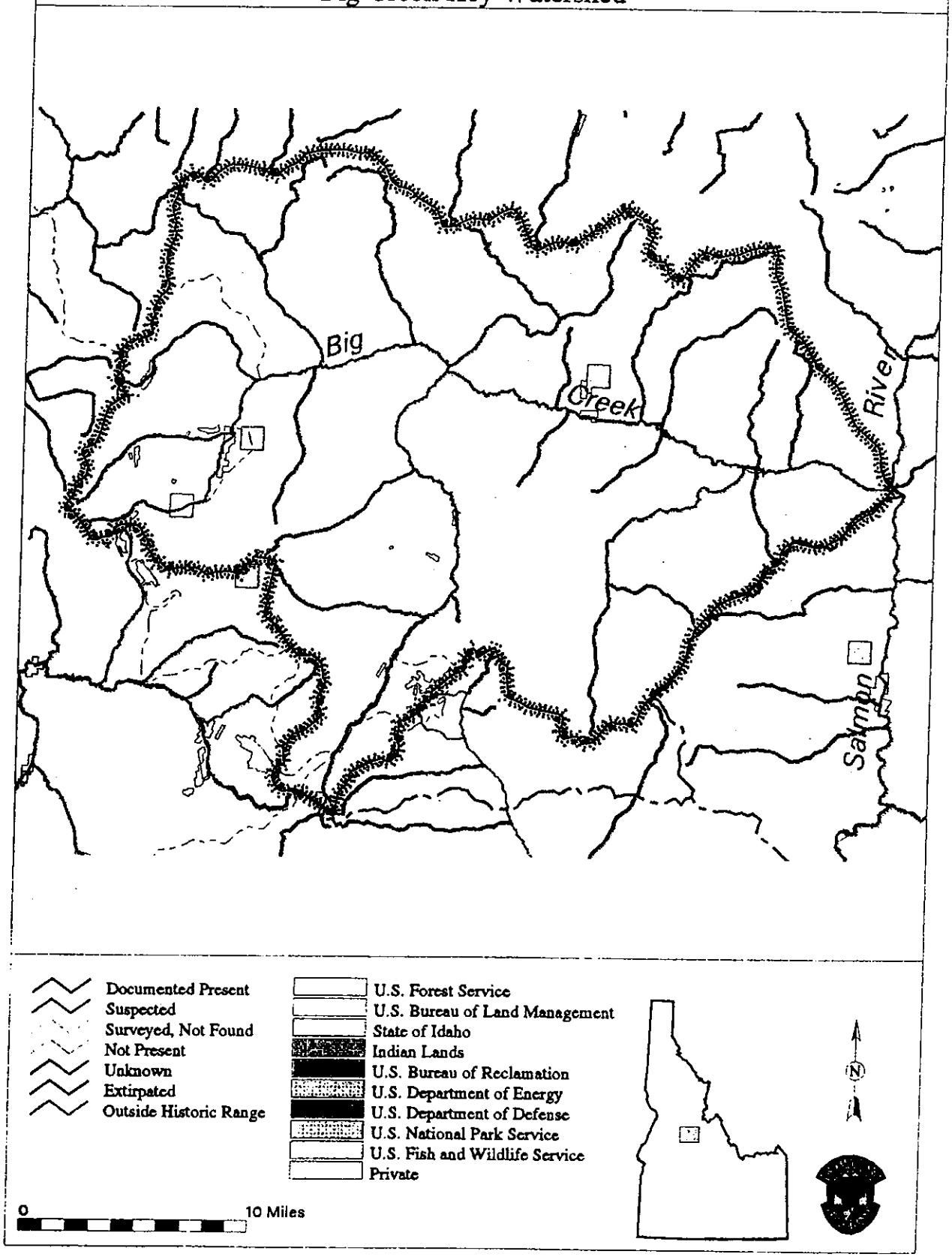
Status of Bull Trout in Idaho
Lower Middle Fork Salmon River Key Watershed



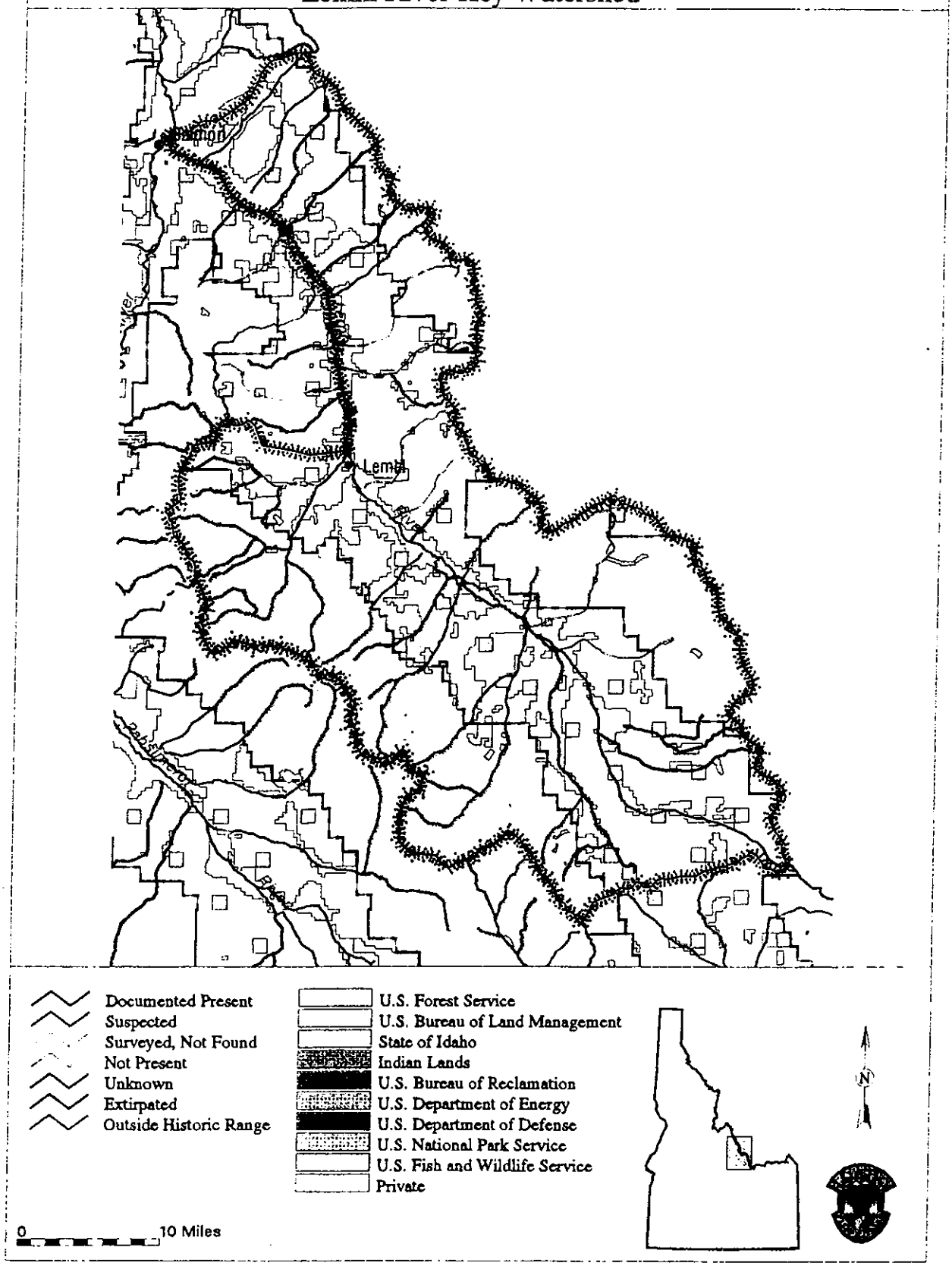
Status of Bull Trout in Idaho
Panther Creek Key Watershed



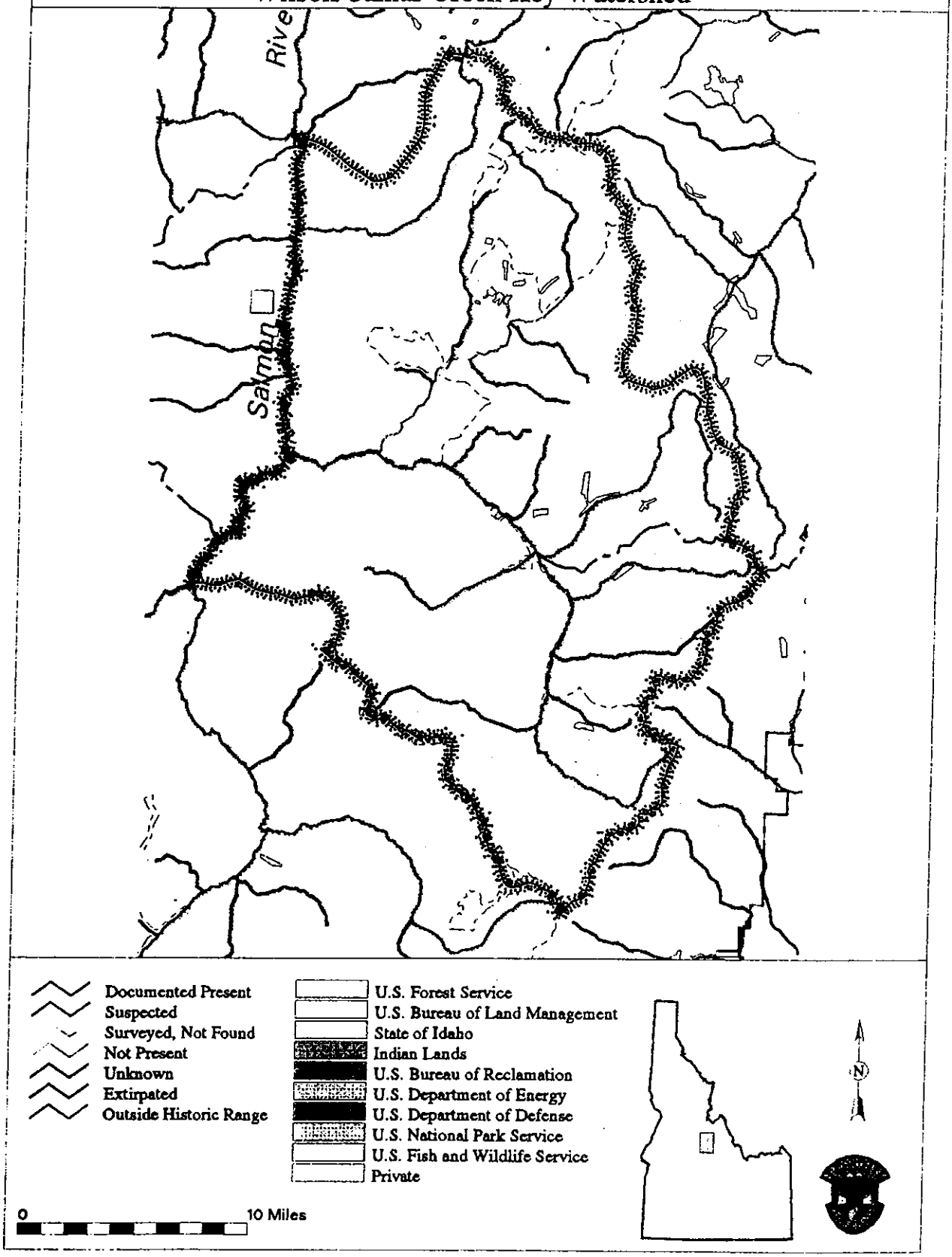
Status of Bull Trout in Idaho
Big Creek Key Watershed

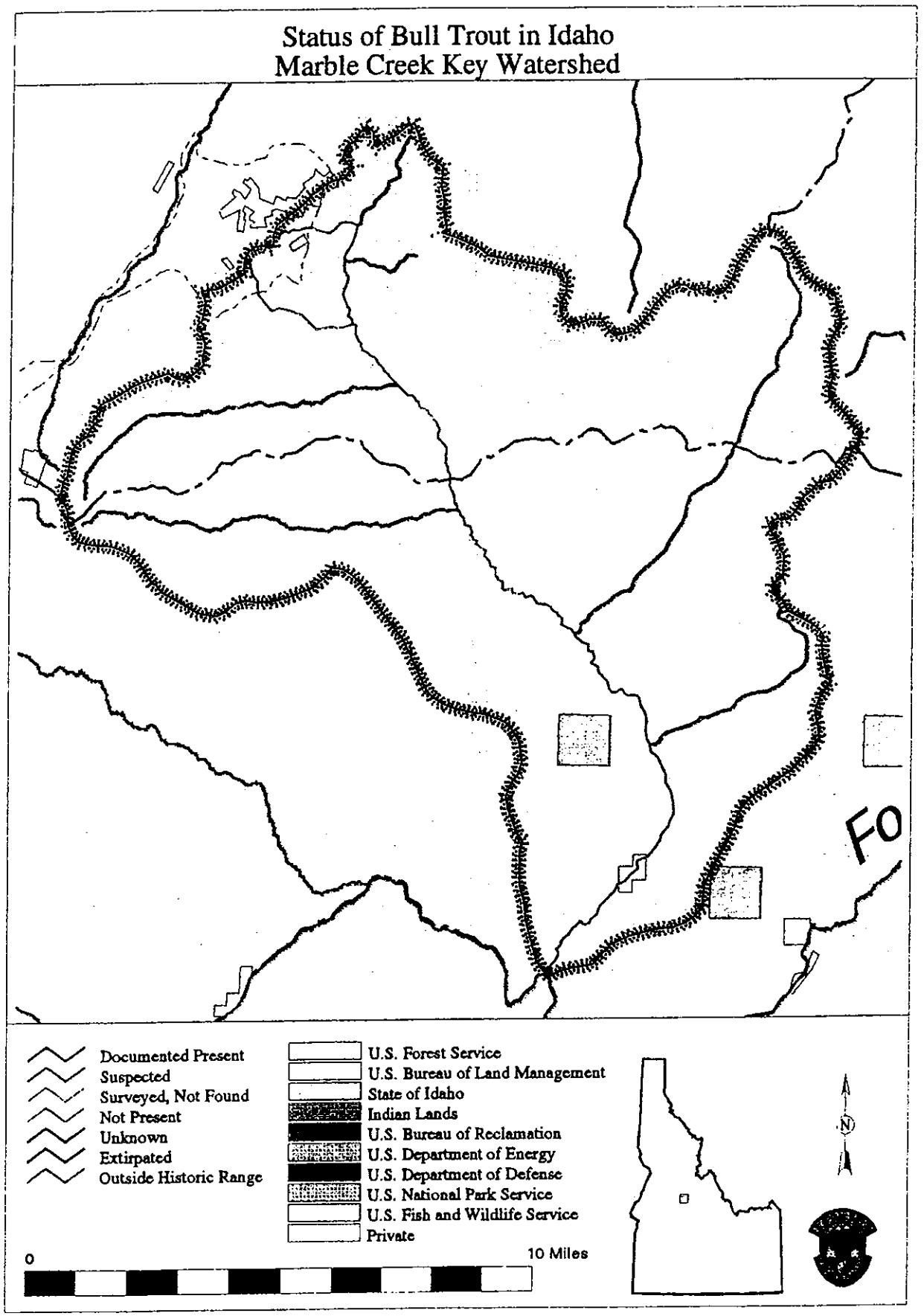


Status of Bull Trout in Idaho
Lemhi River Key Watershed

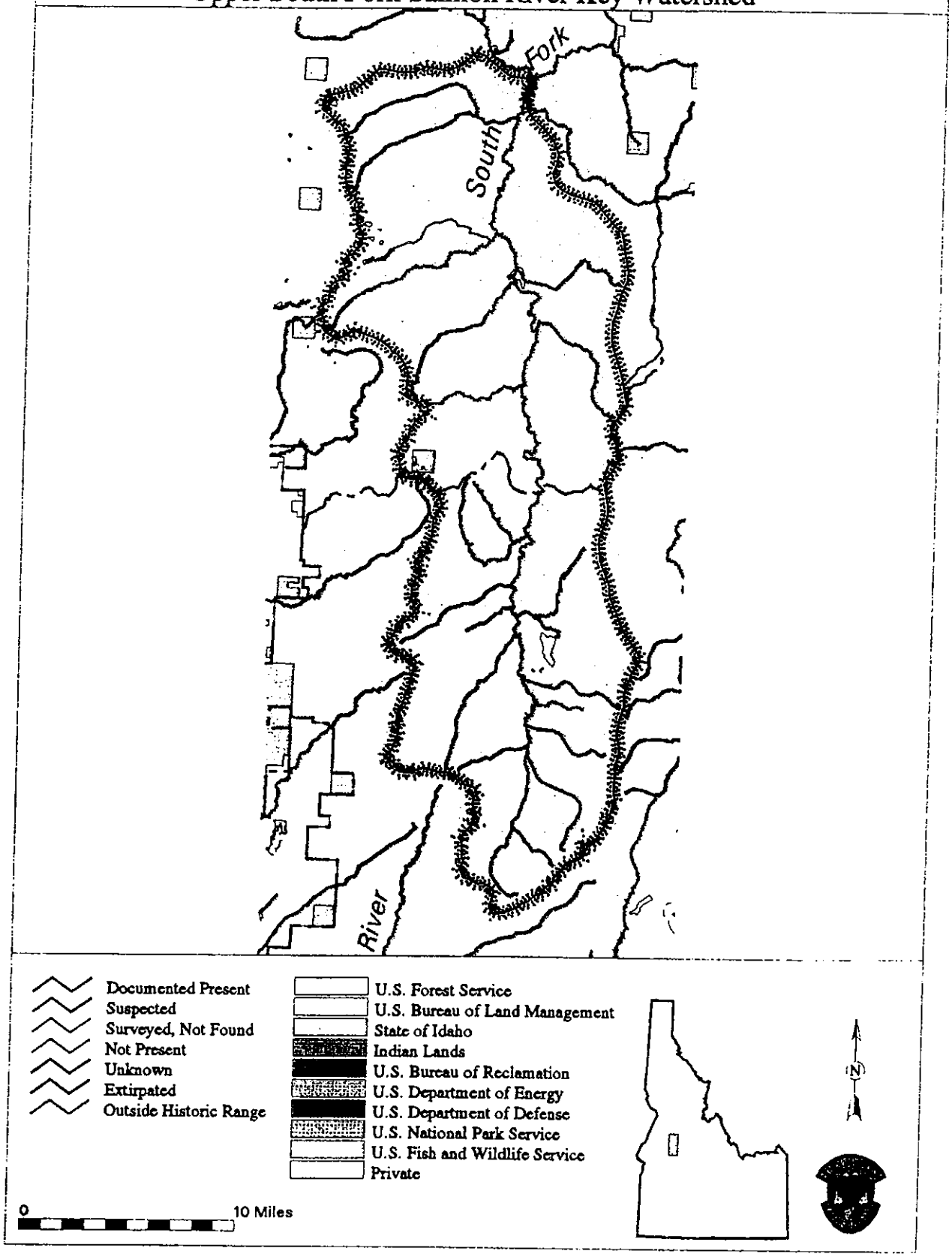


Status of Bull Trout in Idaho
Wilson/Camas Creek Key Watershed

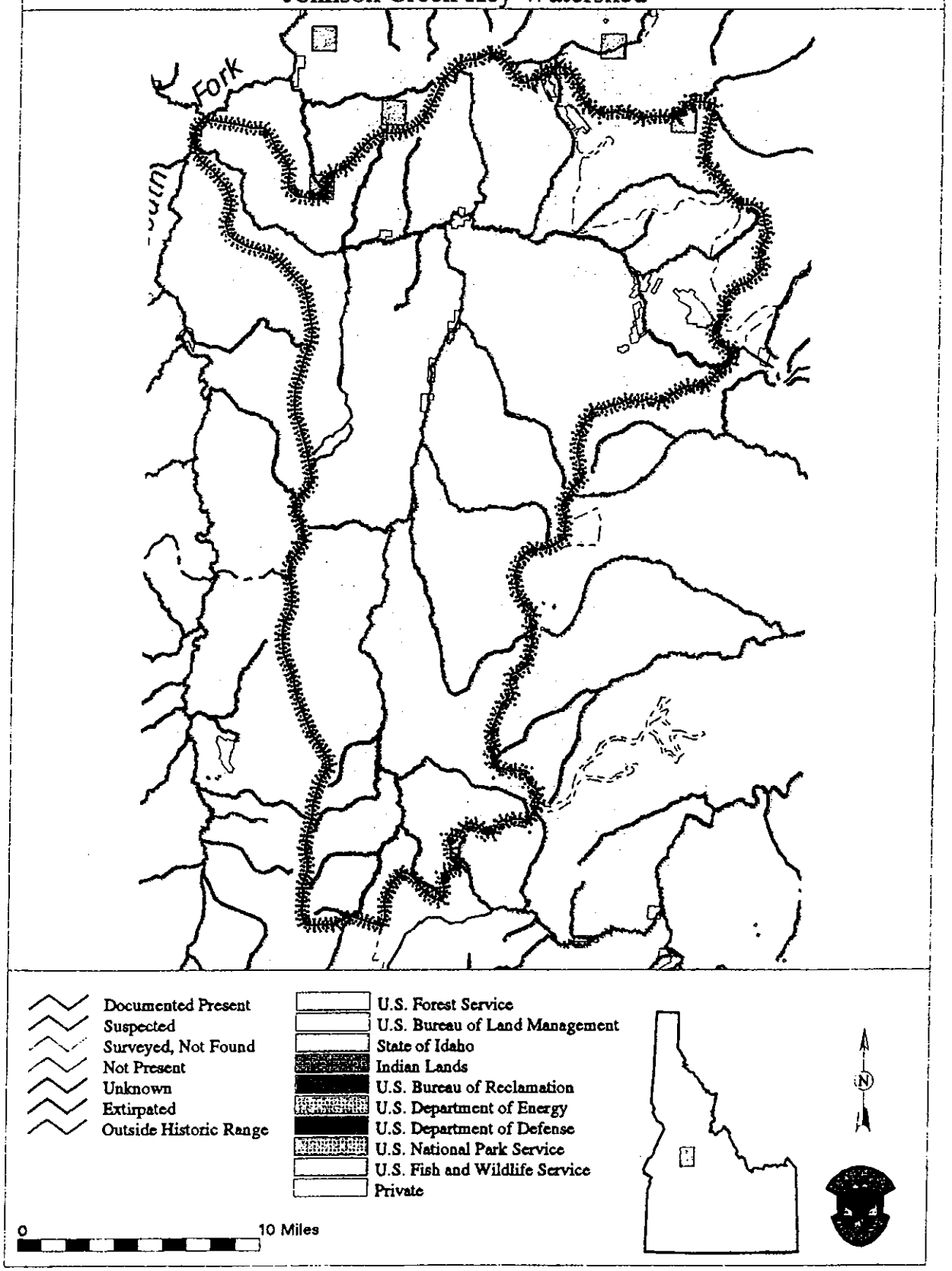


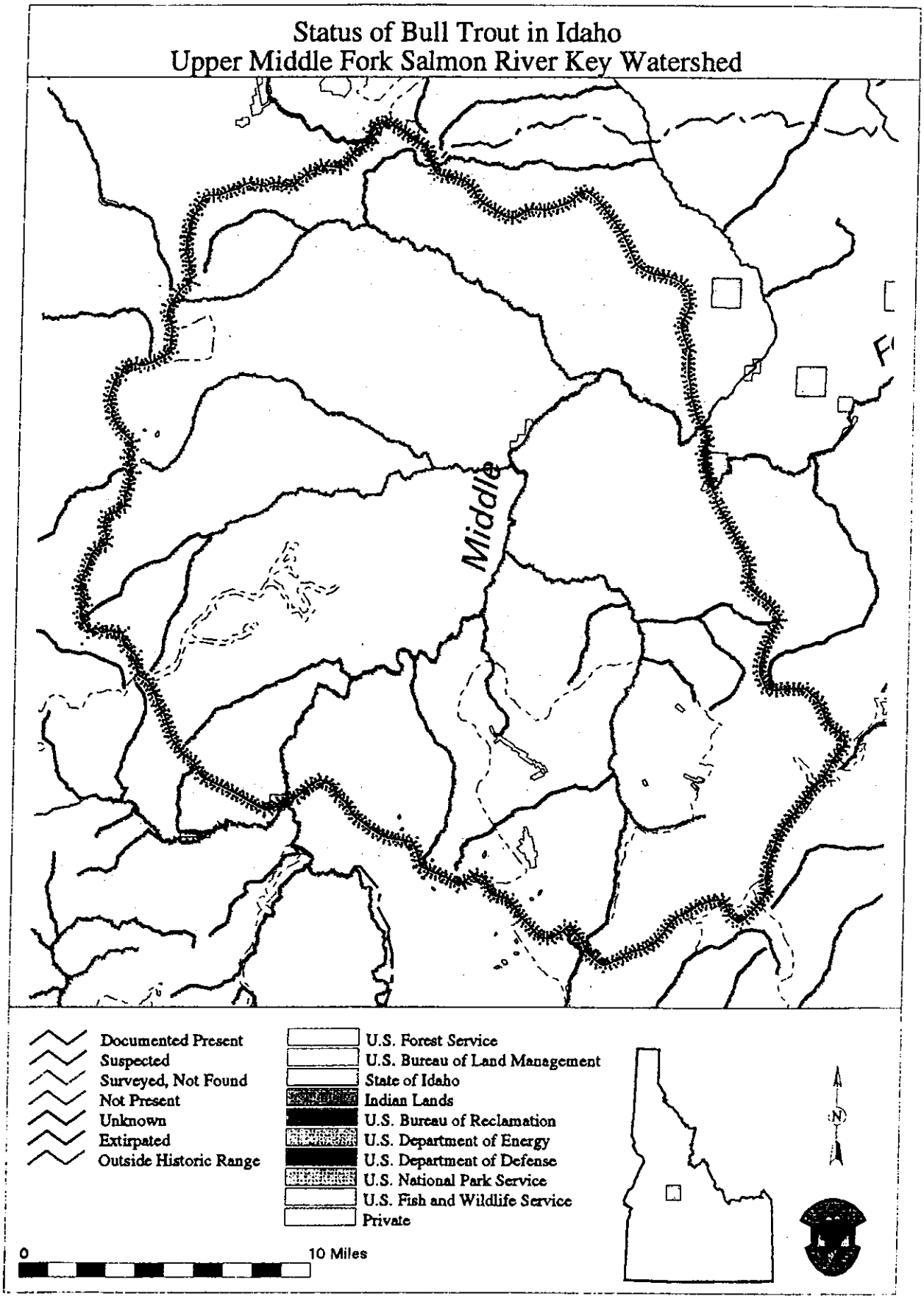

Status of Bull Trout in Idaho
Marble Creek Key Watershed
Documented Present
Suspected
Surveyed, Not Found
Not Present
Unknown
Extirpated
Outside Historic Range
U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private
0
10 Miles
N

Status of Bull Trout in Idaho
Upper South Fork Salmon River Key Watershed

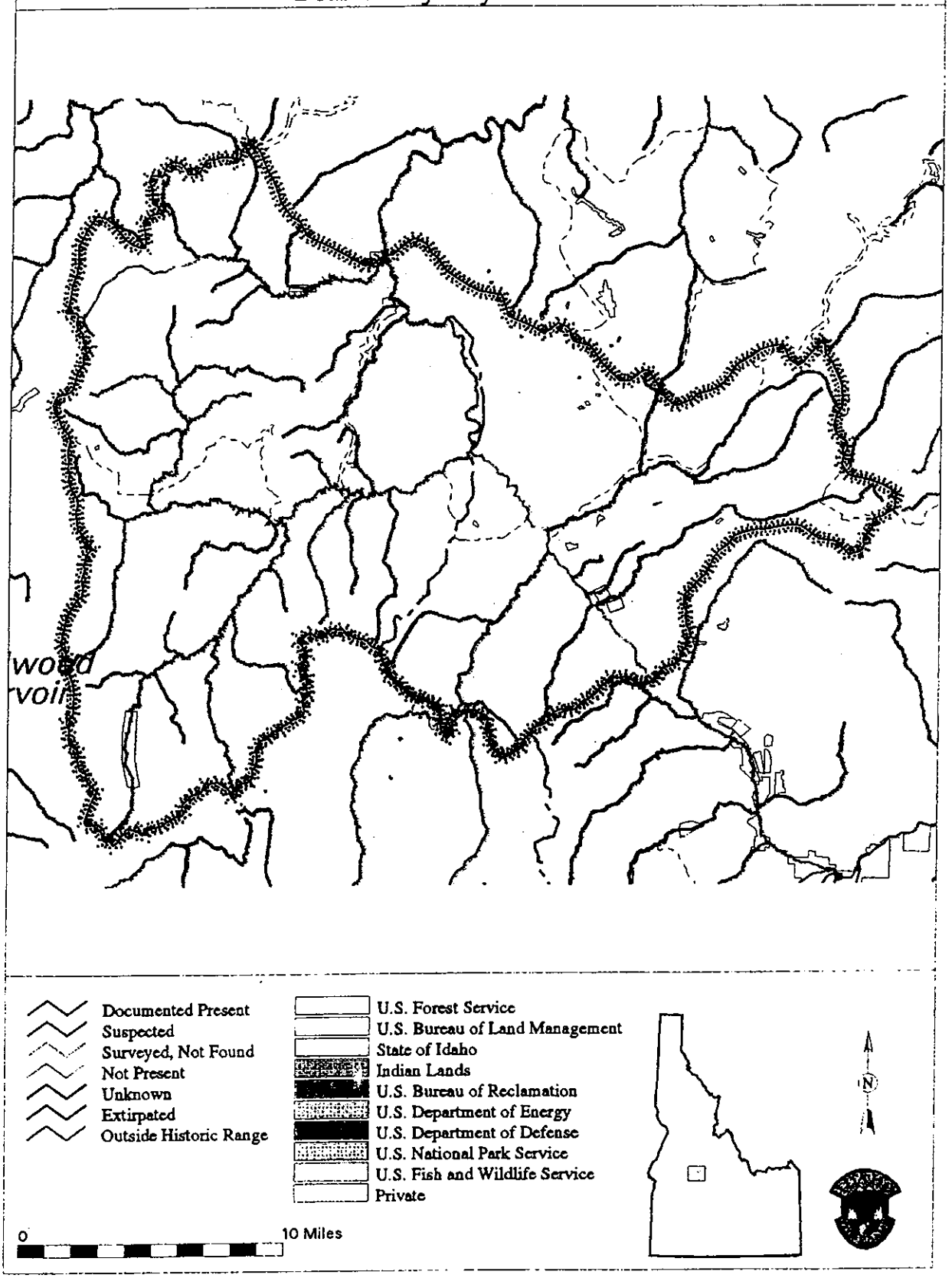


Status of Bull Trout in Idaho
Johnson Creek Key Watershed

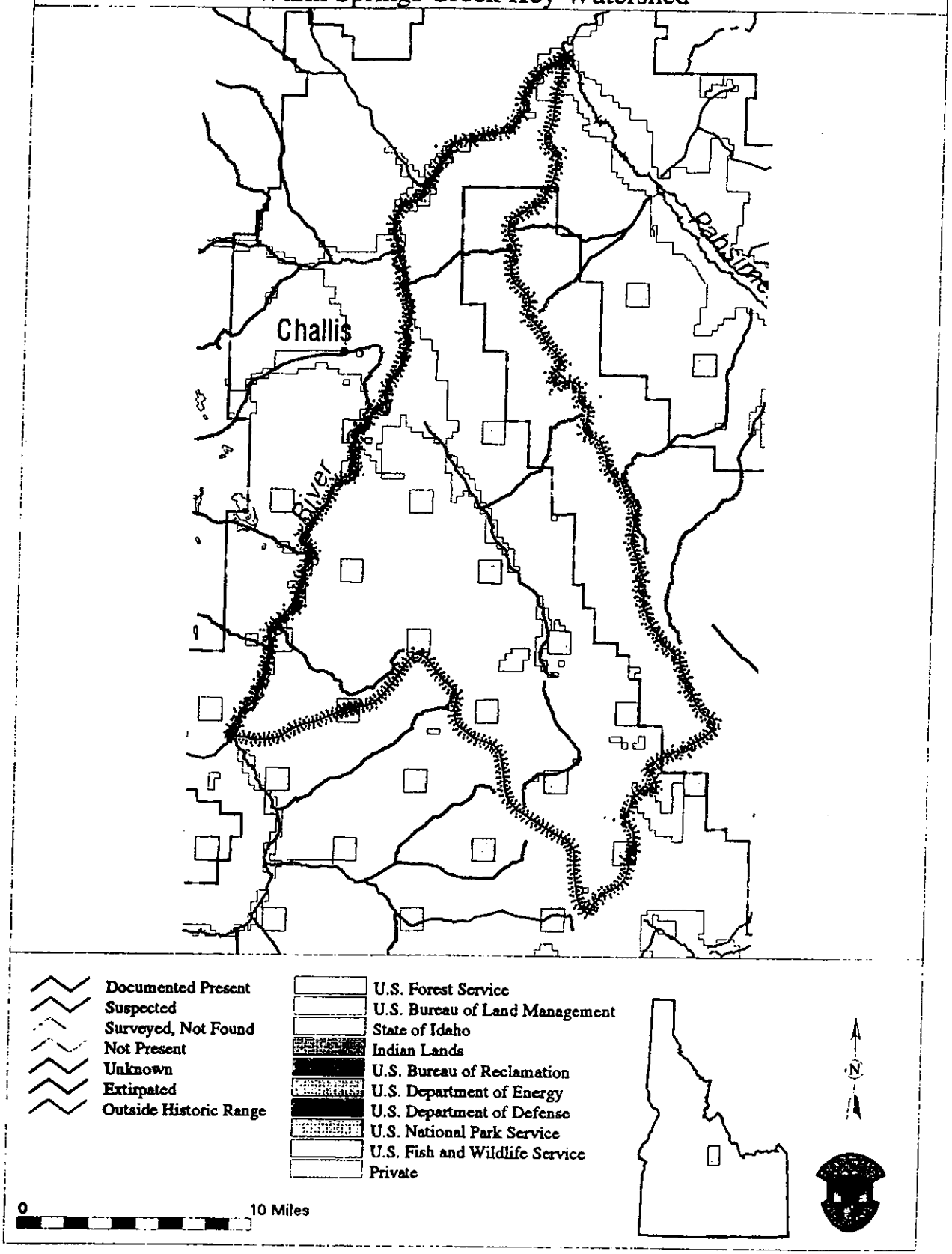



Status of Bull Trout in Idaho
Upper Middle Fork Salmon River Key Watershed
Middle
Documented Present
Suspected
Surveyed, Not Found
Not Present
Unknown
Extirpated
Outside Historic Range
U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private
0
10 Miles
N

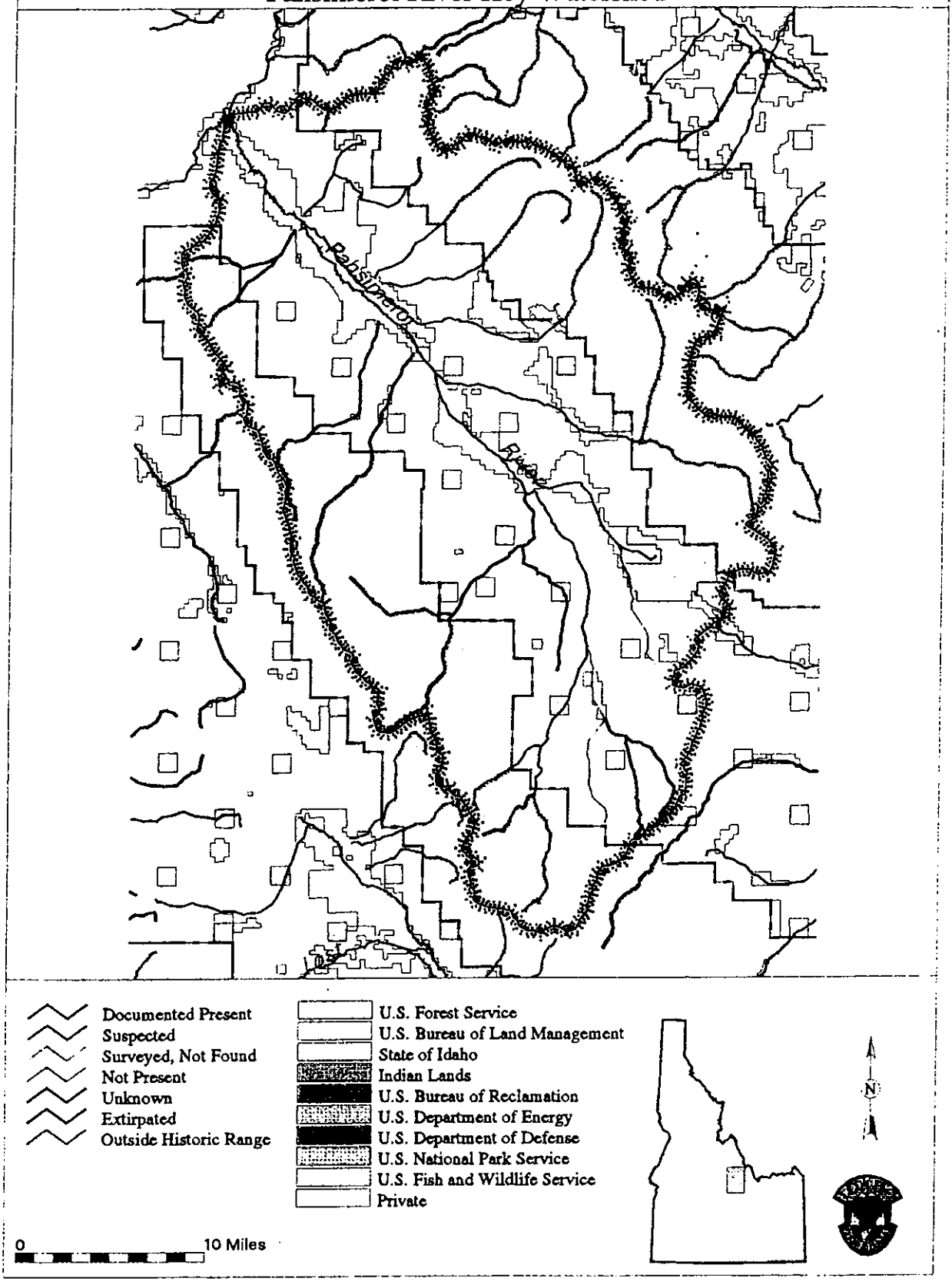
Status of Bull Trout in Idaho
Bear Valley Key Watershed



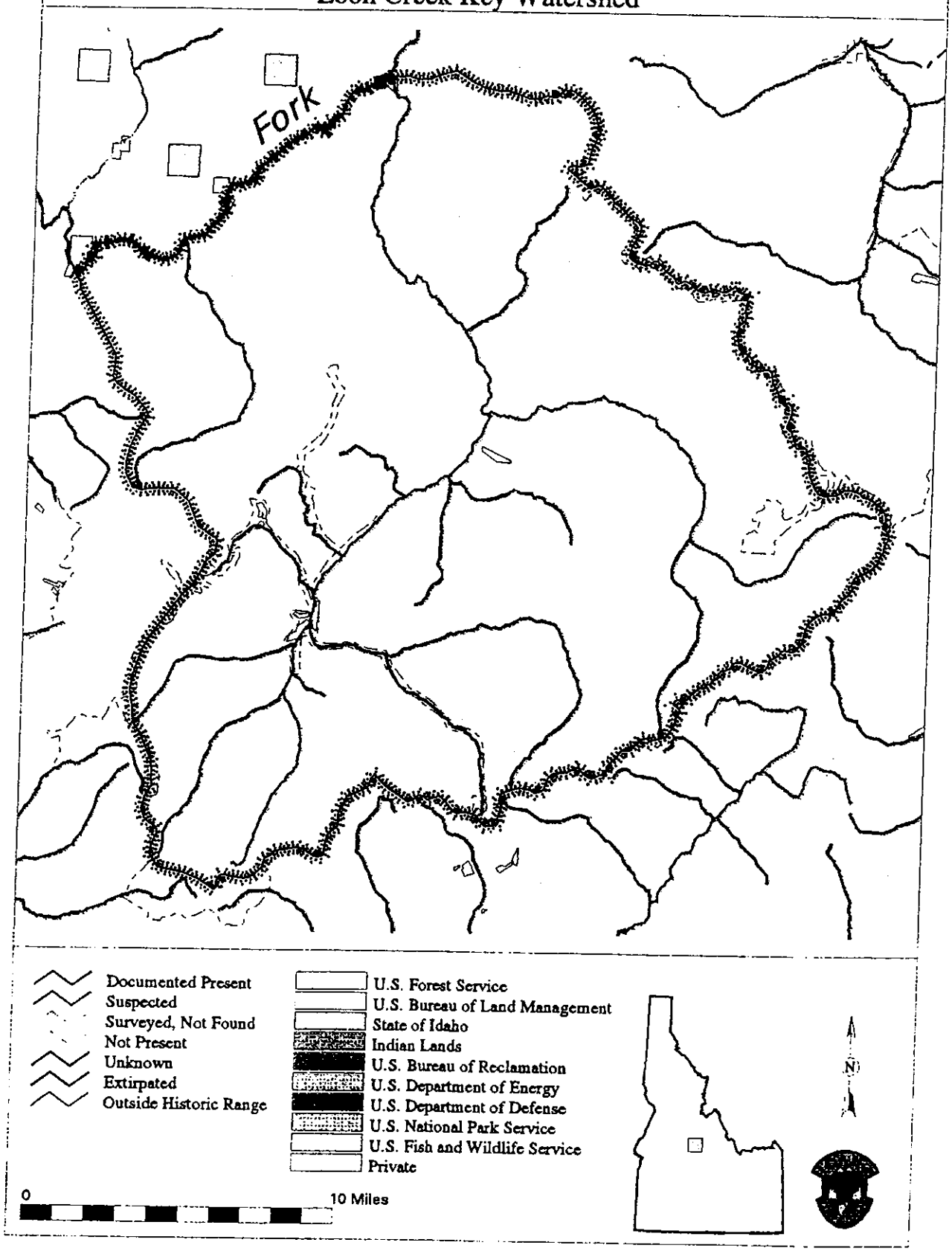
Status of Bull Trout in Idaho
Warm Springs Creek Key Watershed



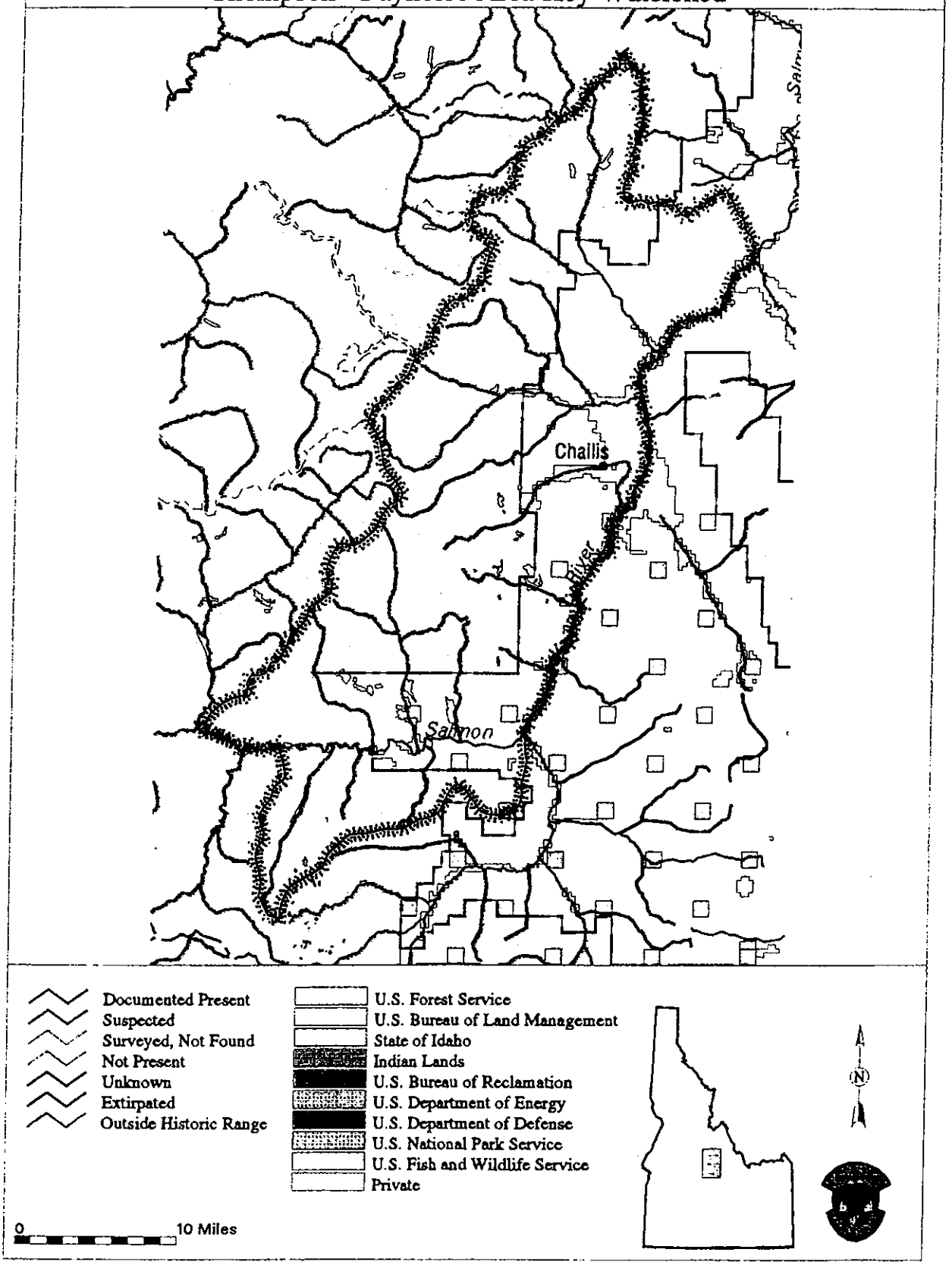
Status of Bull Trout in Idaho
Pahsimeroi River Key Watershed



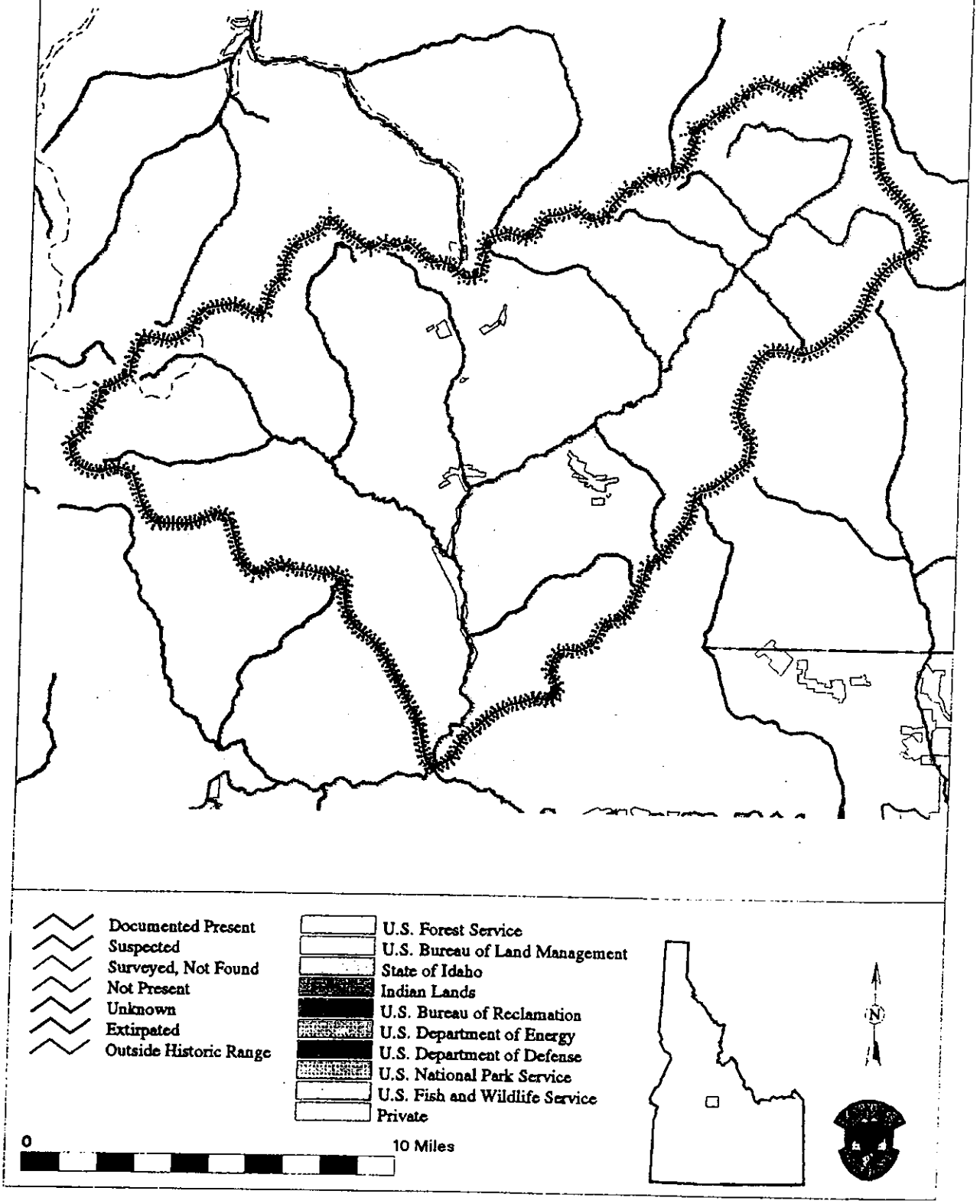
Status of Bull Trout in Idaho
Loon Creek Key Watershed



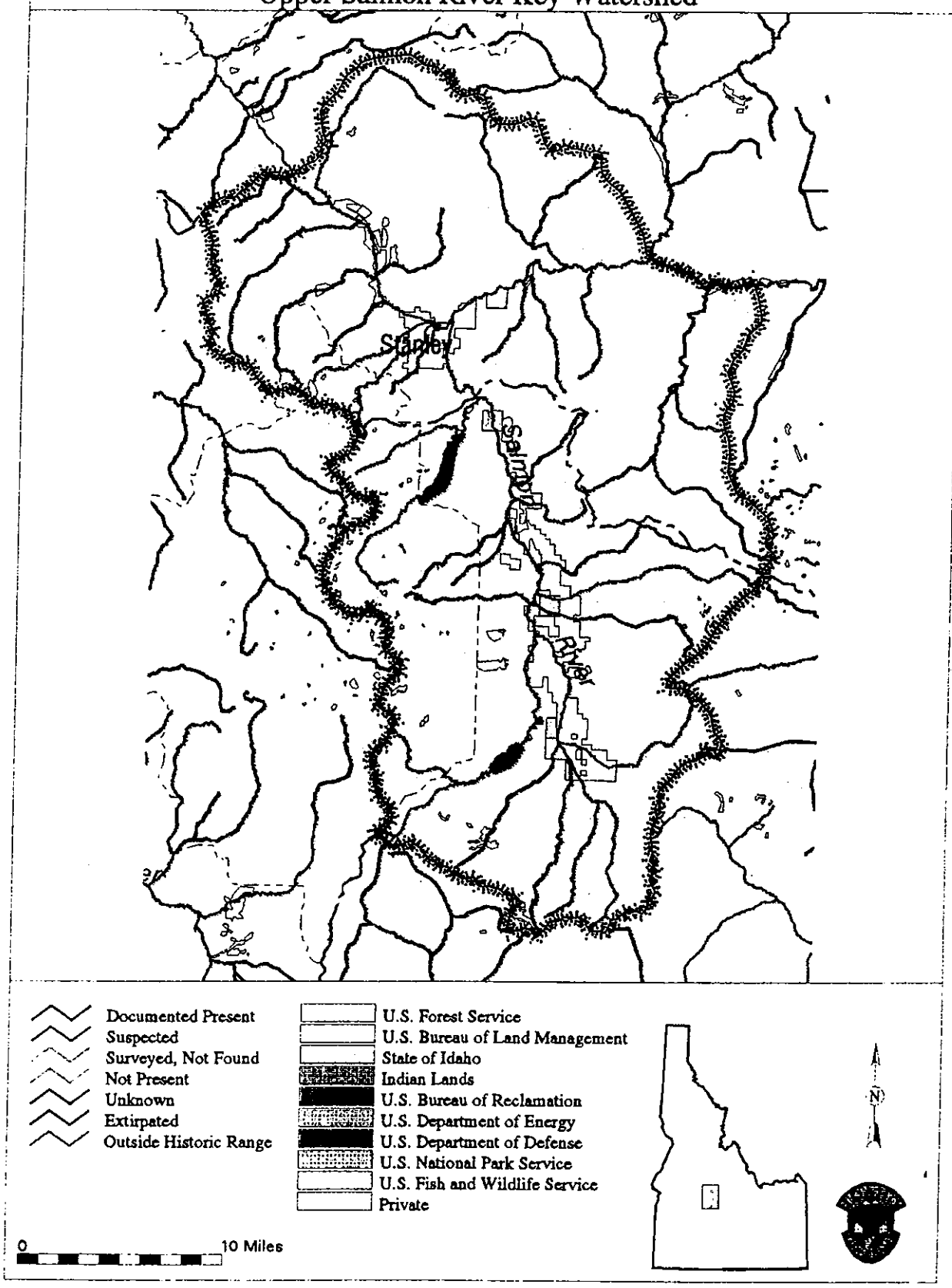
Status of Bull Trout in Idaho
Thompson - Bayhorse Area Key Watershed



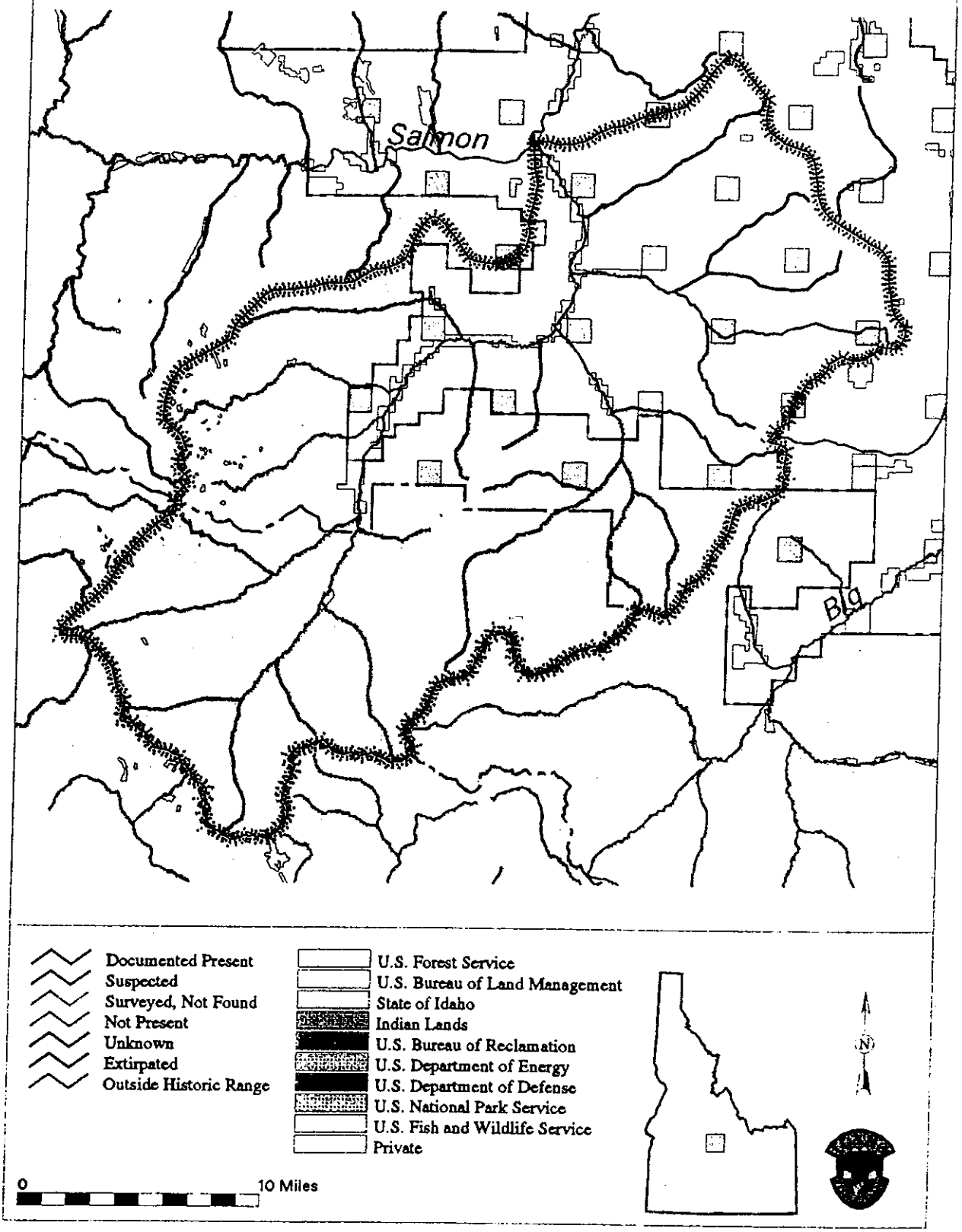
Status of Bull Trout in Idaho
Yankee Fork Salmon River Key Watershed



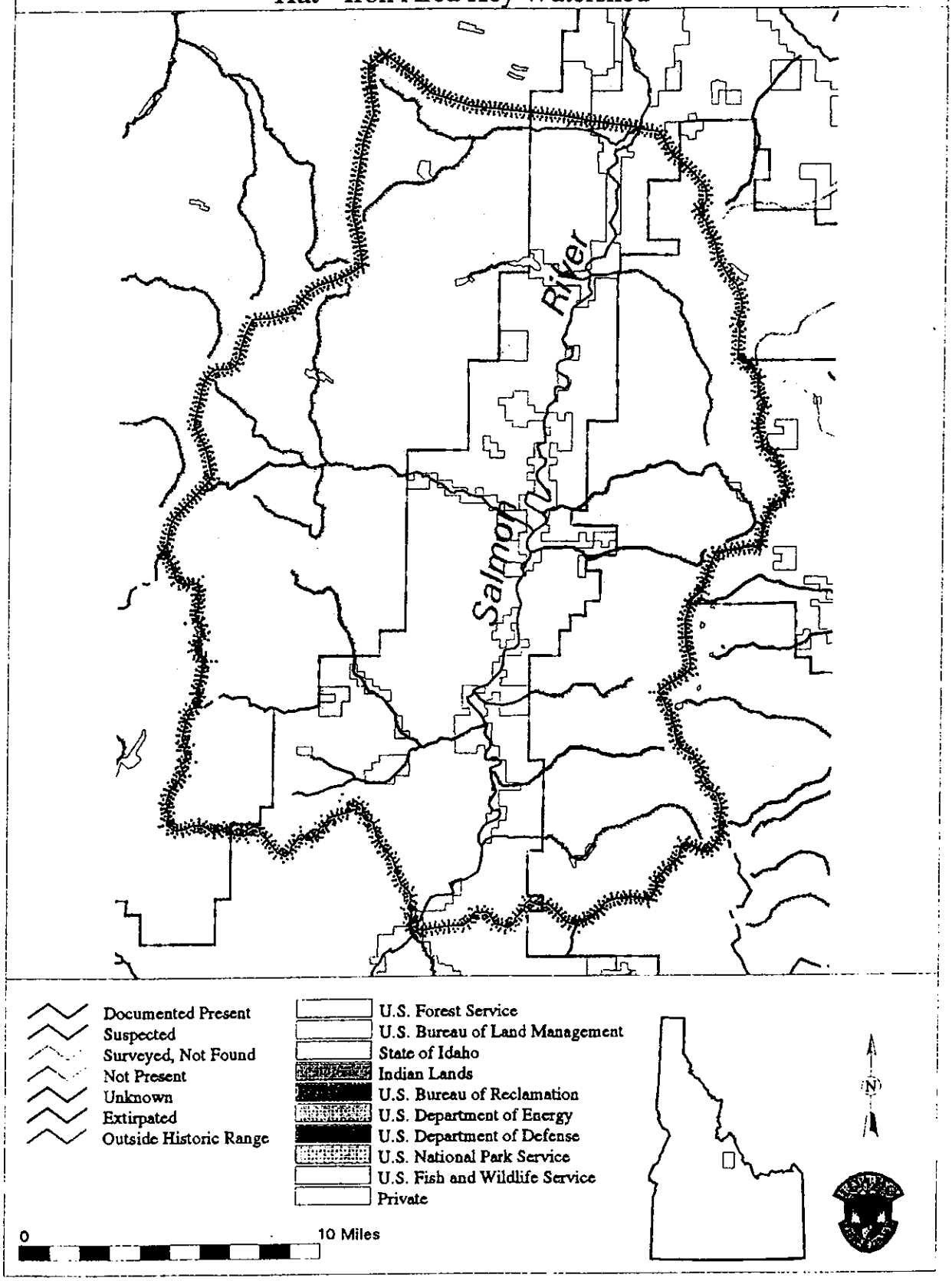
Status of Bull Trout in Idaho
Upper Salmon River Key Watershed



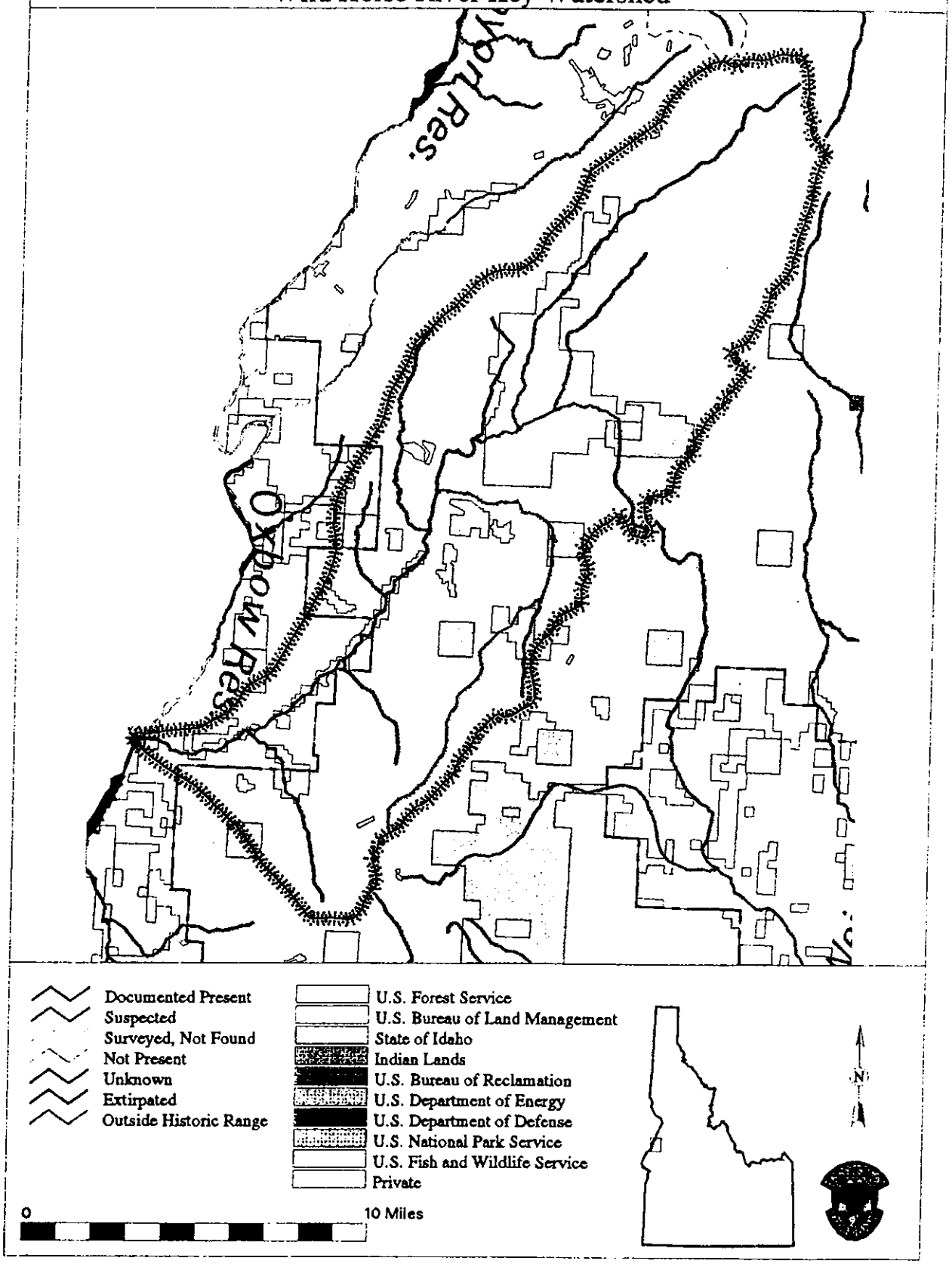
Status of Bull Trout in Idaho
East Fork Salmon River Key Watershed



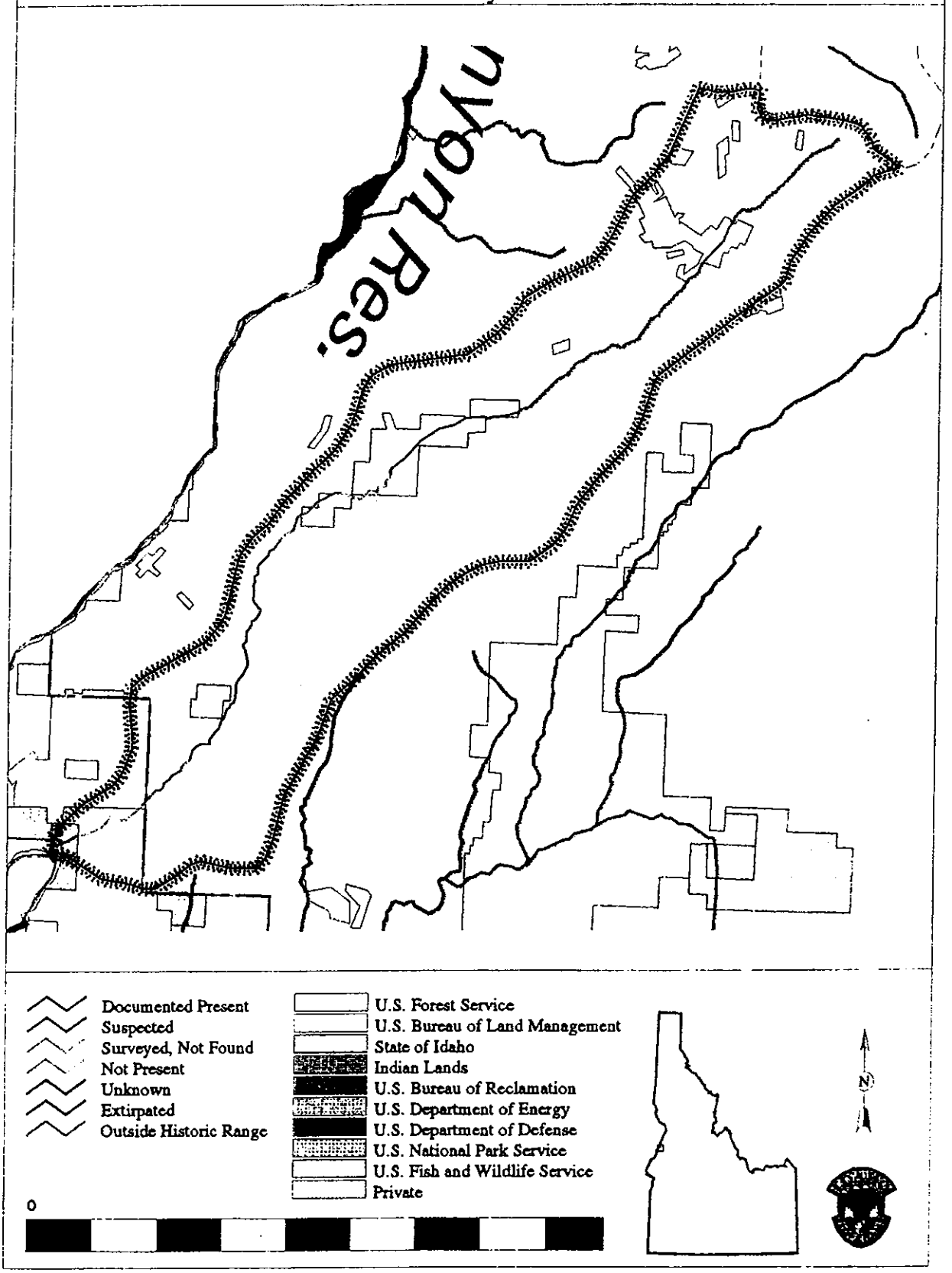
Status of Bull Trout in Idaho
Hat - Iron Area Key Watershed



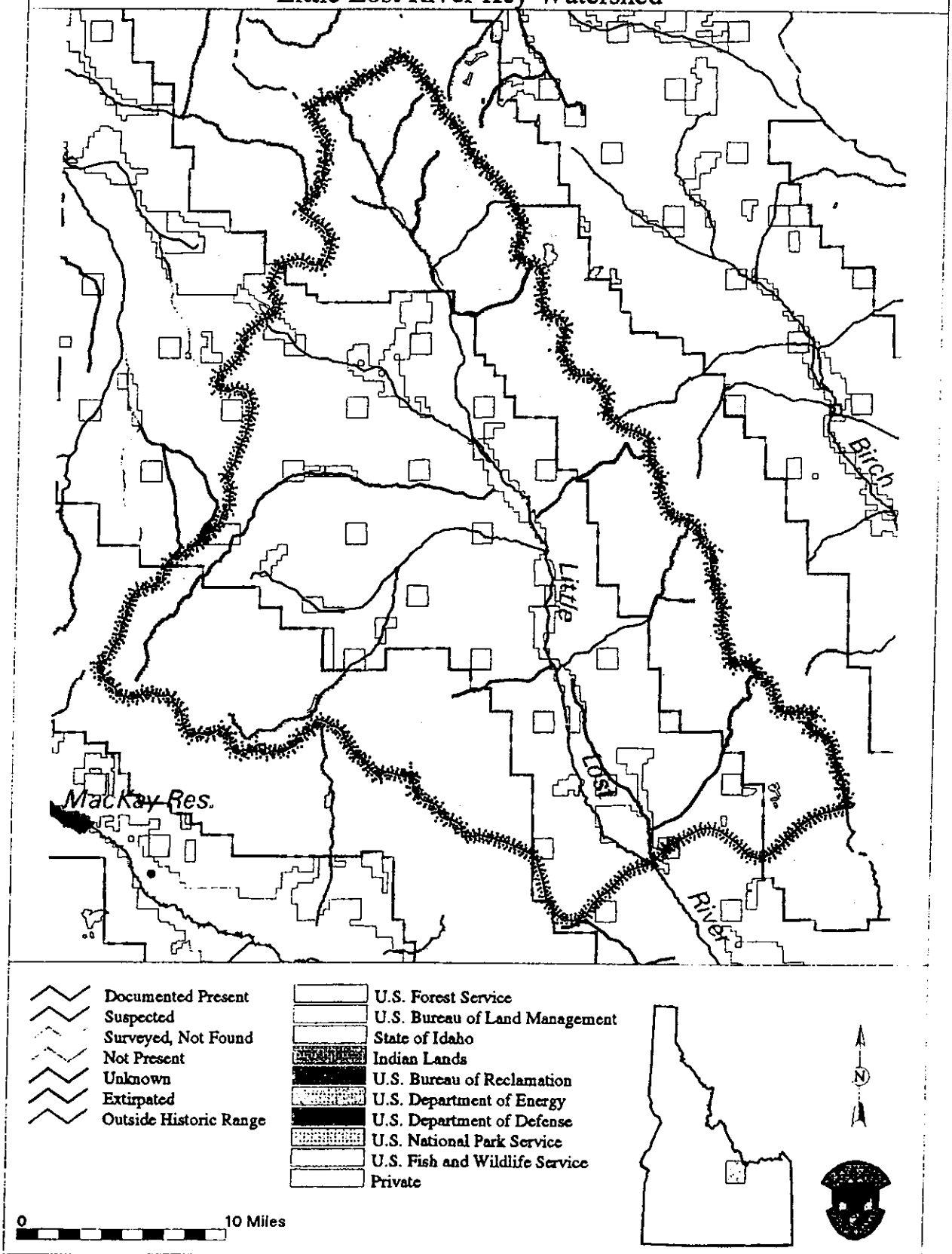
Status of Bull Trout in Idaho
Wild Horse River Key Watershed



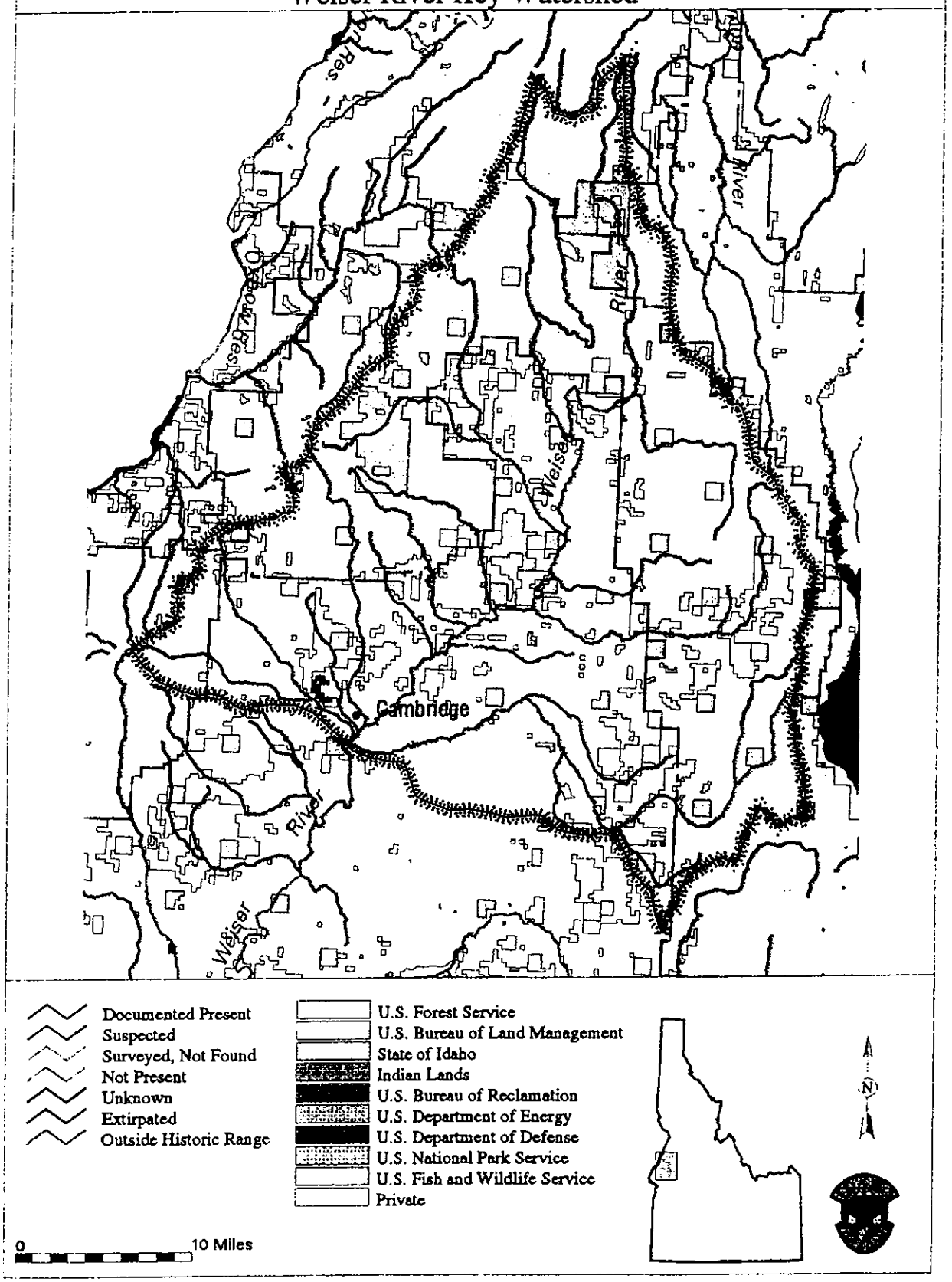
Status of Bull Trout in Idaho
Indian Creek Key Watershed

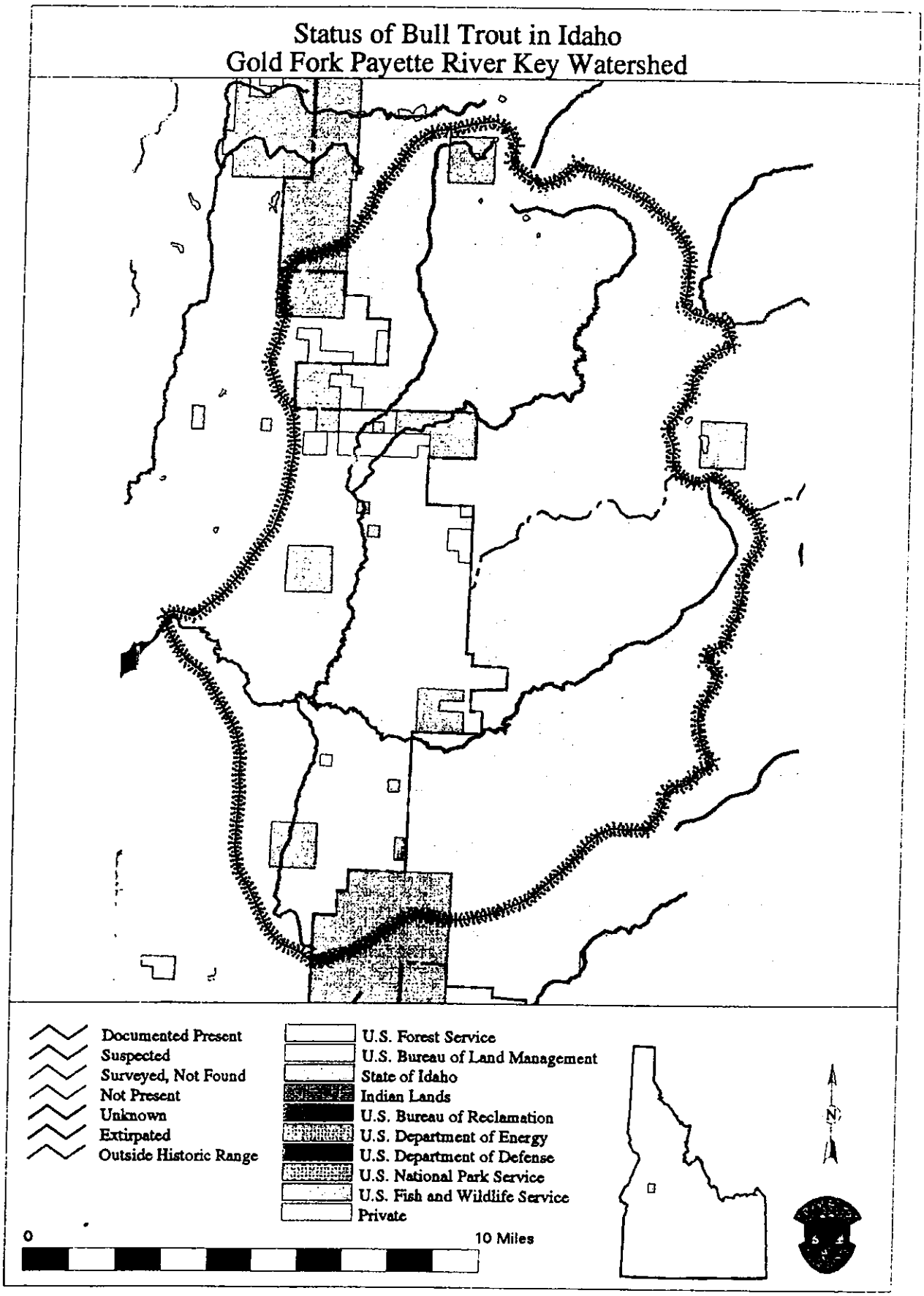


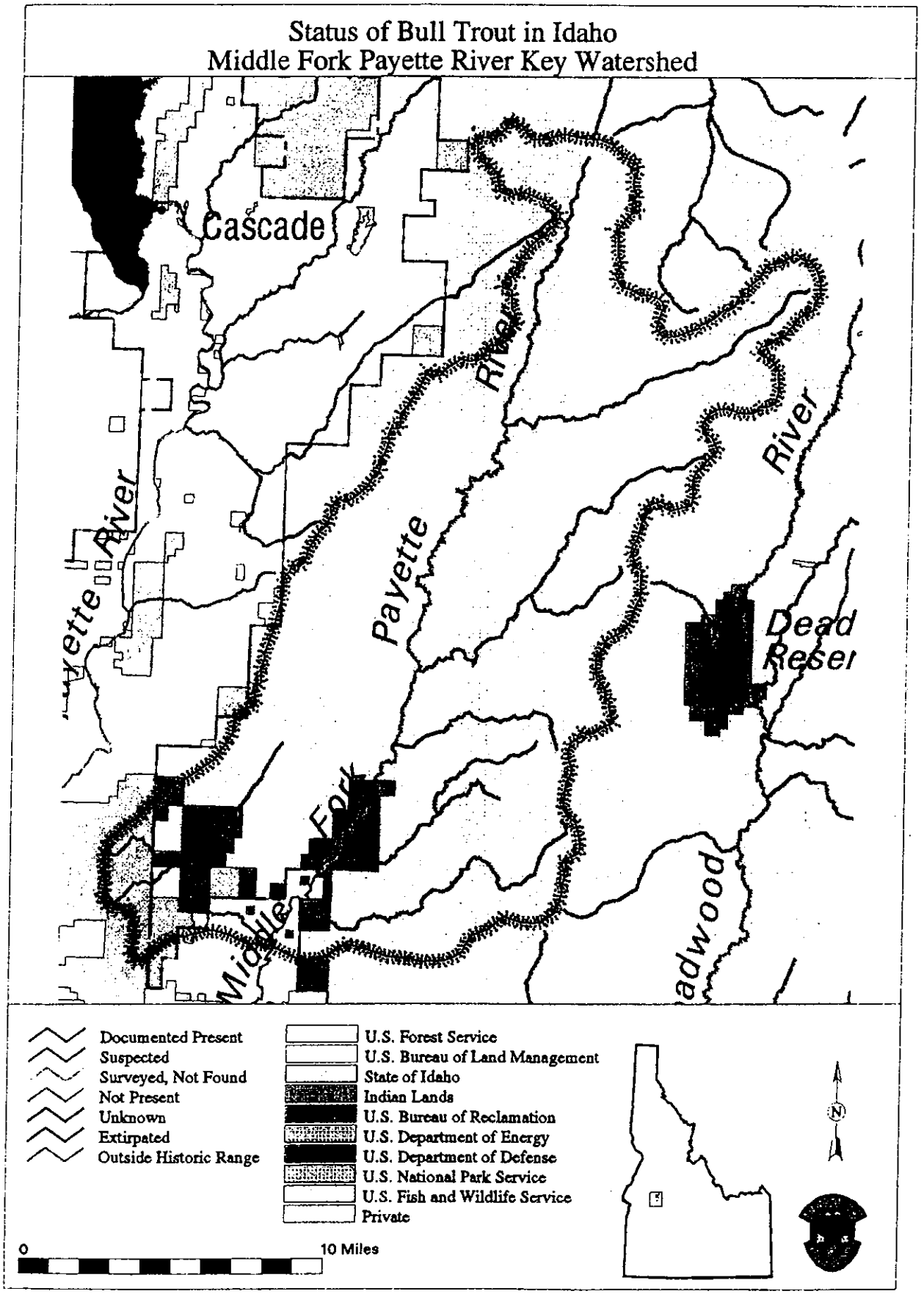
Status of Bull Trout in Idaho
Little Lost River Key Watershed



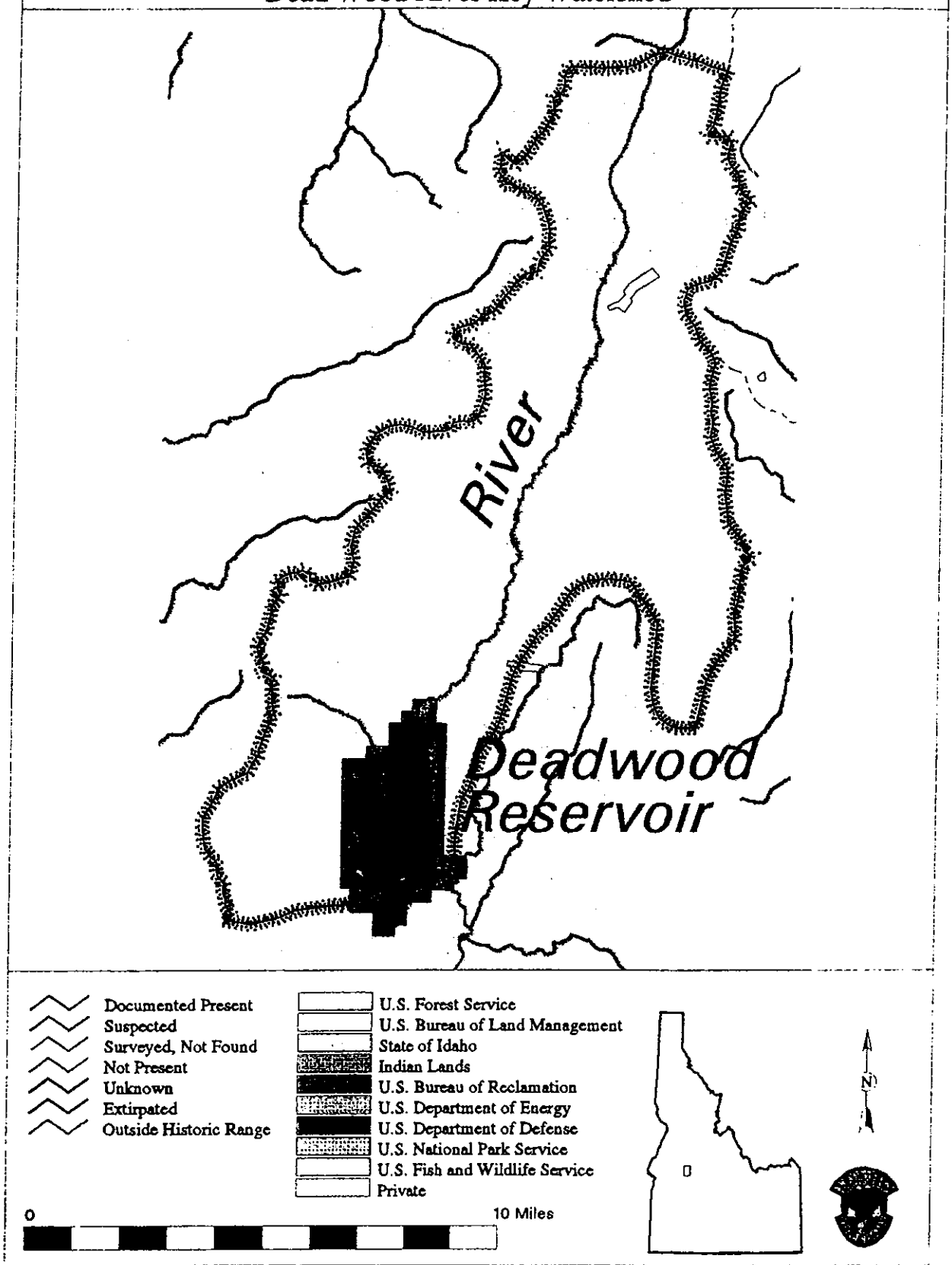
Status of Bull Trout in Idaho
Weiser River Key Watershed

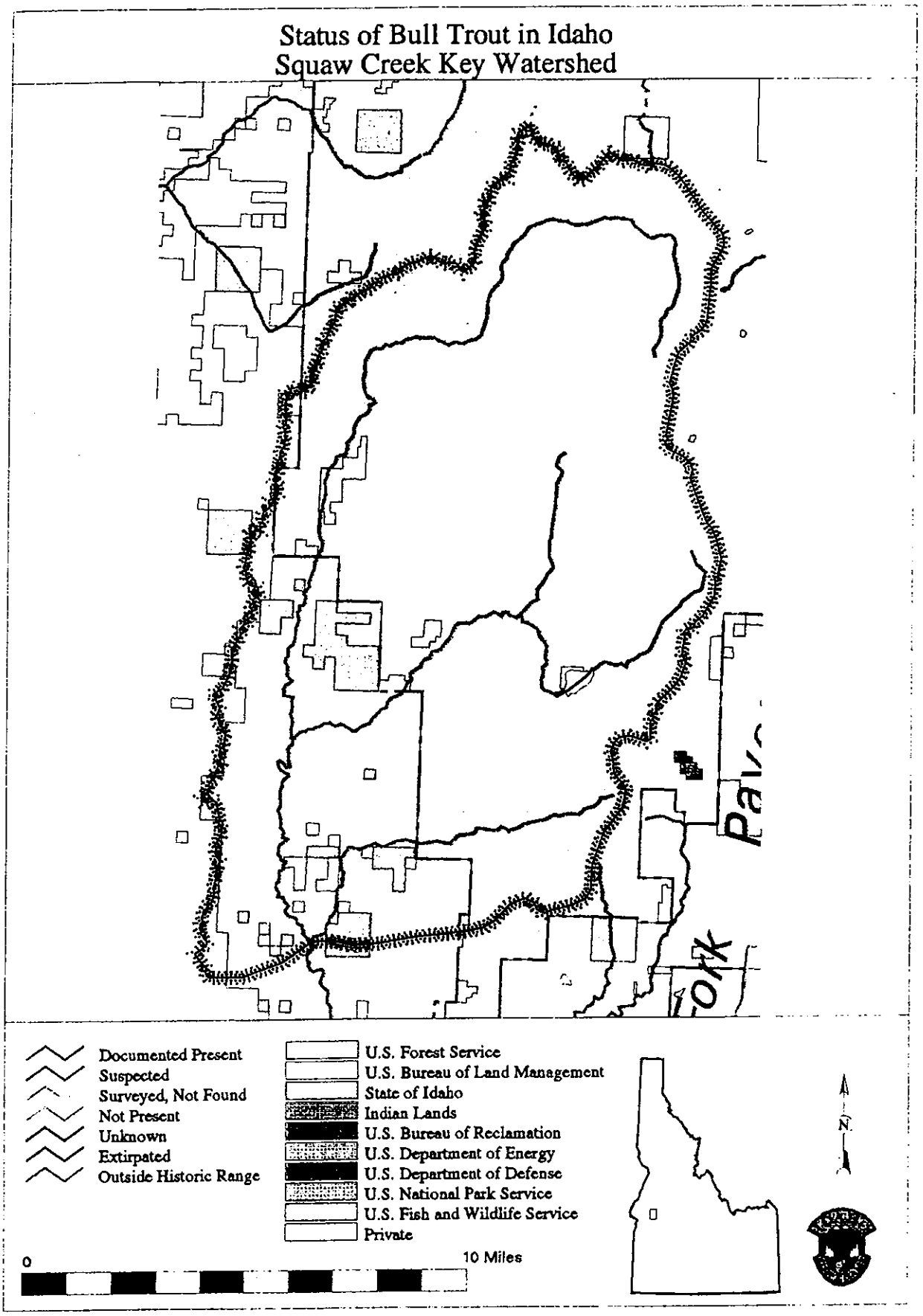



Status of Bull Trout in Idaho
Gold Fork Payette River Key Watershed
Documented Present
Suspected
Surveyed, Not Found
Not Present
Unknown
Extirpated
Outside Historic Range
U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private
0
10 Miles
N

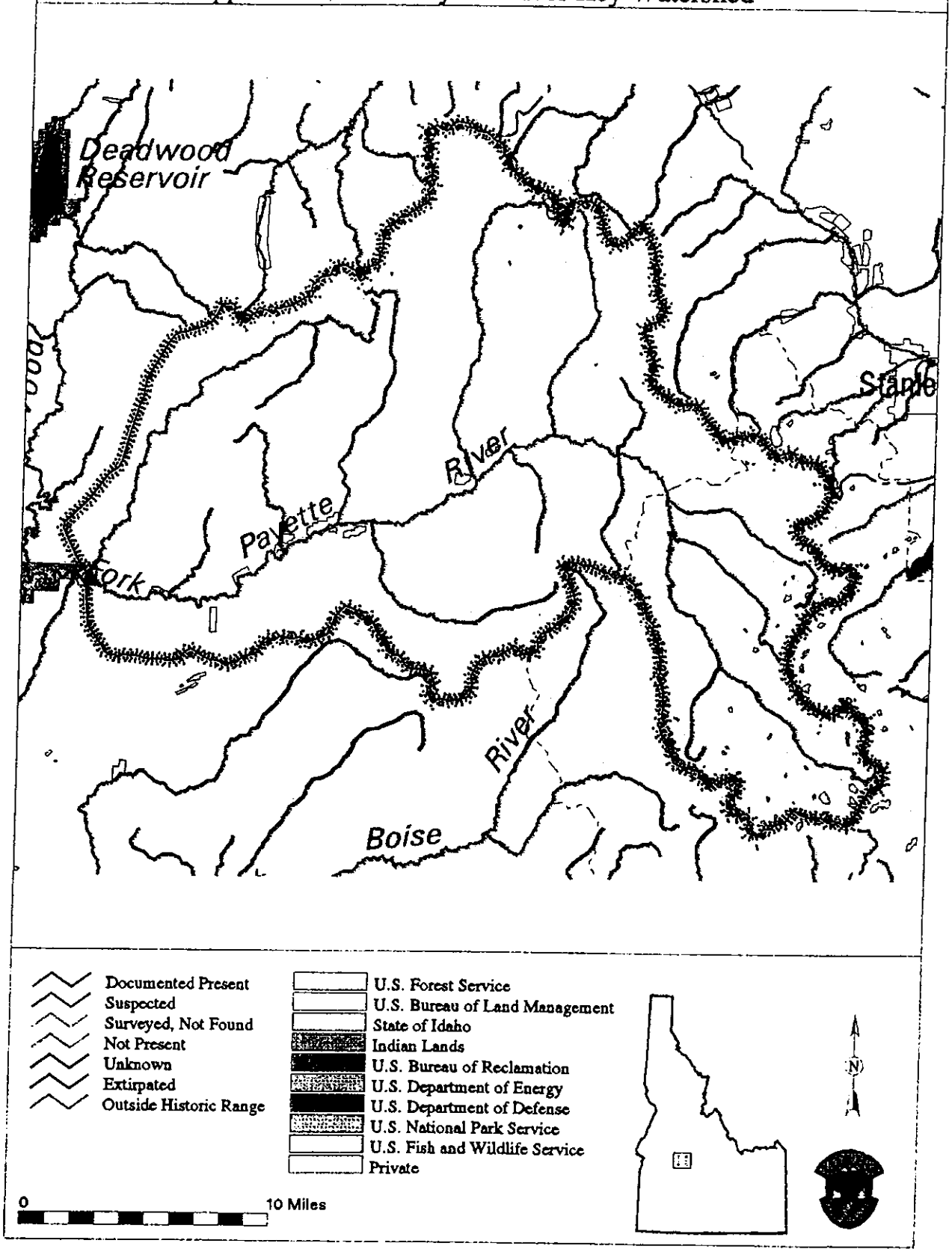

Status of Bull Trout in Idaho
Middle Fork Payette River Key Watershed
Cascade
Payette
River
Middle
Fork
Dead
Documented Present
Suspected
Surveyed, Not Found
Not Present
Unknown
Extirpated
Outside Historic Range
U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private
0
10 Miles
N

Status of Bull Trout in Idaho
Dead Wood River Key Watershed

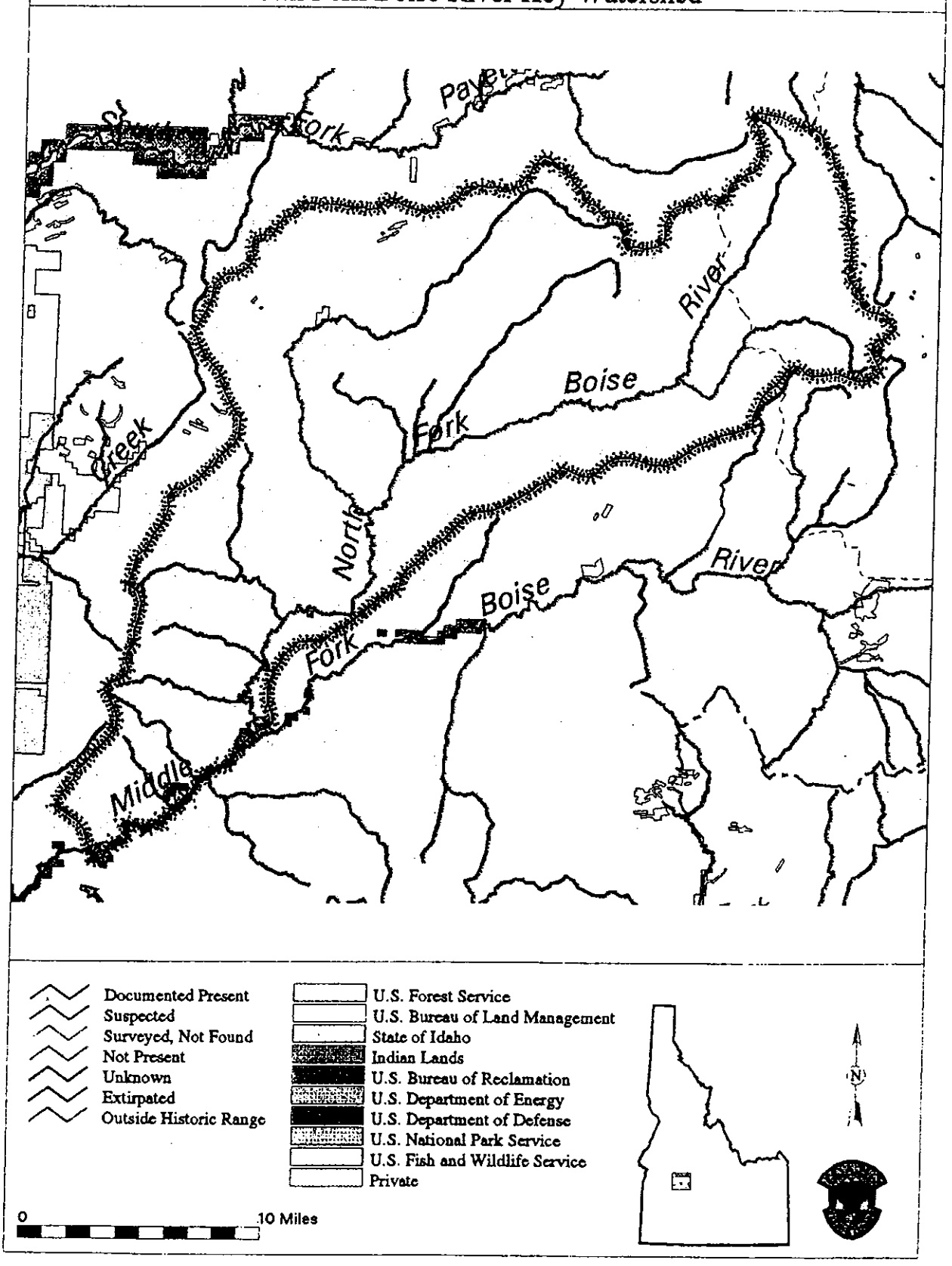



Status of Bull Trout in Idaho
Squaw Creek Key Watershed
Documented Present
Suspected
Surveyed, Not Found
Not Present
Unknown
Extirpated
Outside Historic Range
U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private
0
10 Miles
N

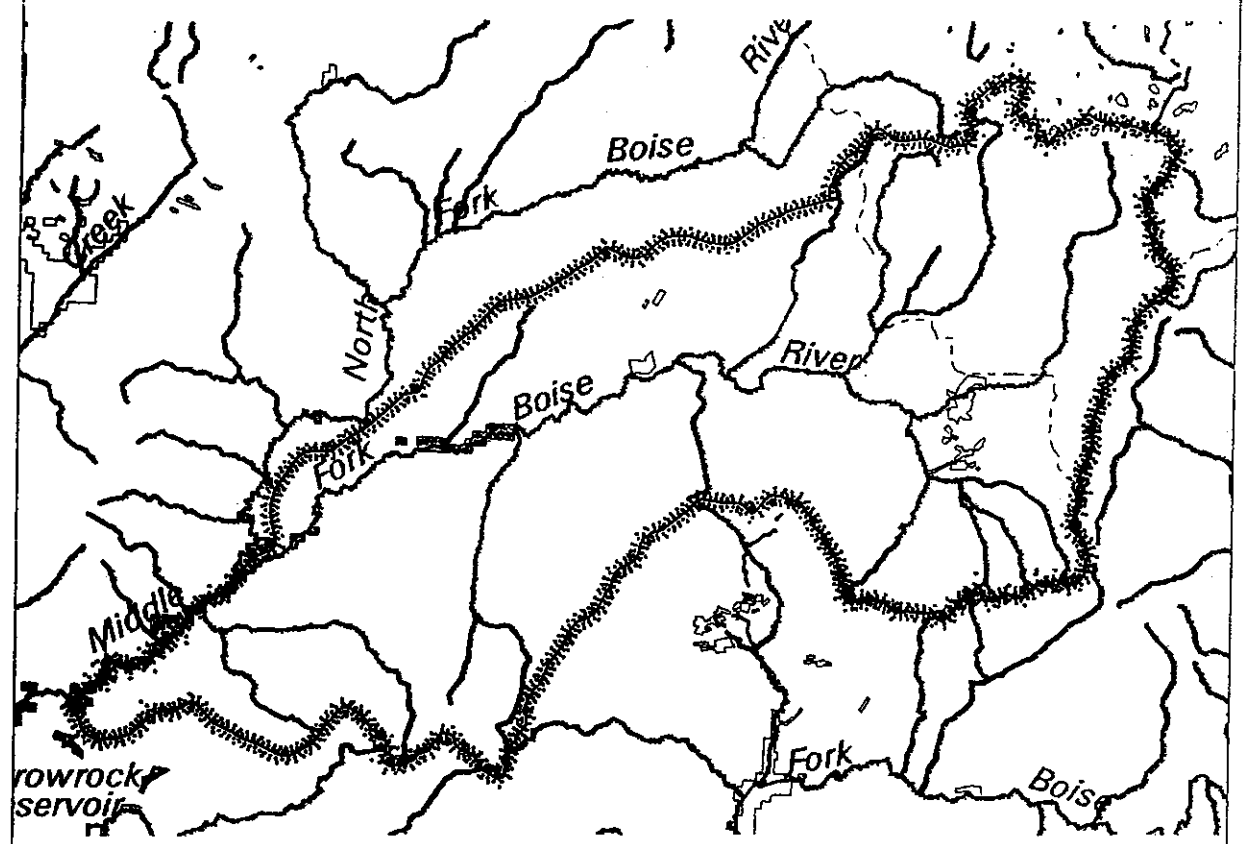
Status of Bull Trout in Idaho
Upper South Fork Payette River Key Watershed



Status of Bull Trout in Idaho
North Fork Boise River Key Watershed



Status of Bull Trout in Idaho
Middle Fork Boise River Key Watershed

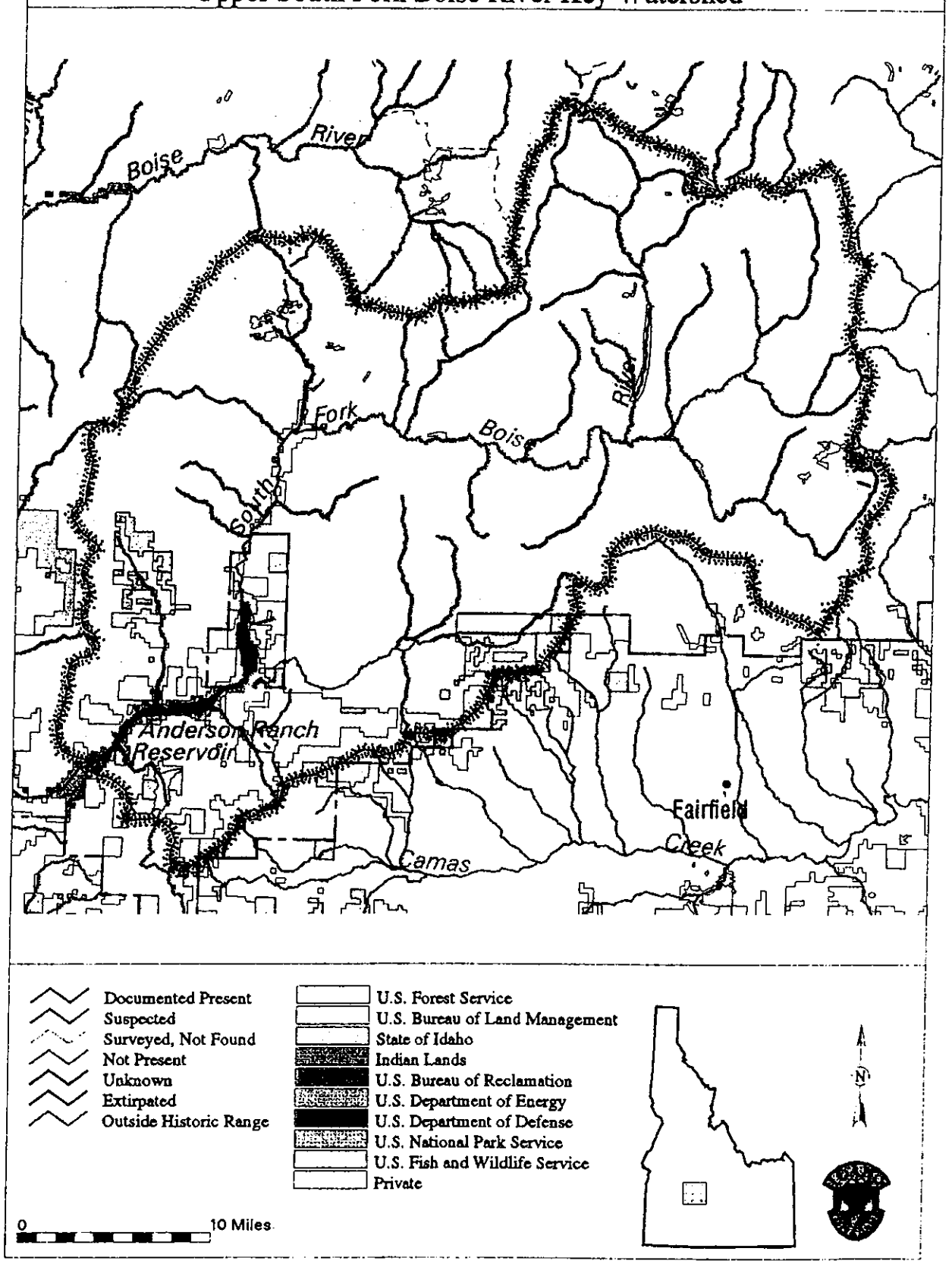


Documented Present
Suspected
Surveyed, Not Found
Not Present
Unknown
Extirpated
Outside Historic Range

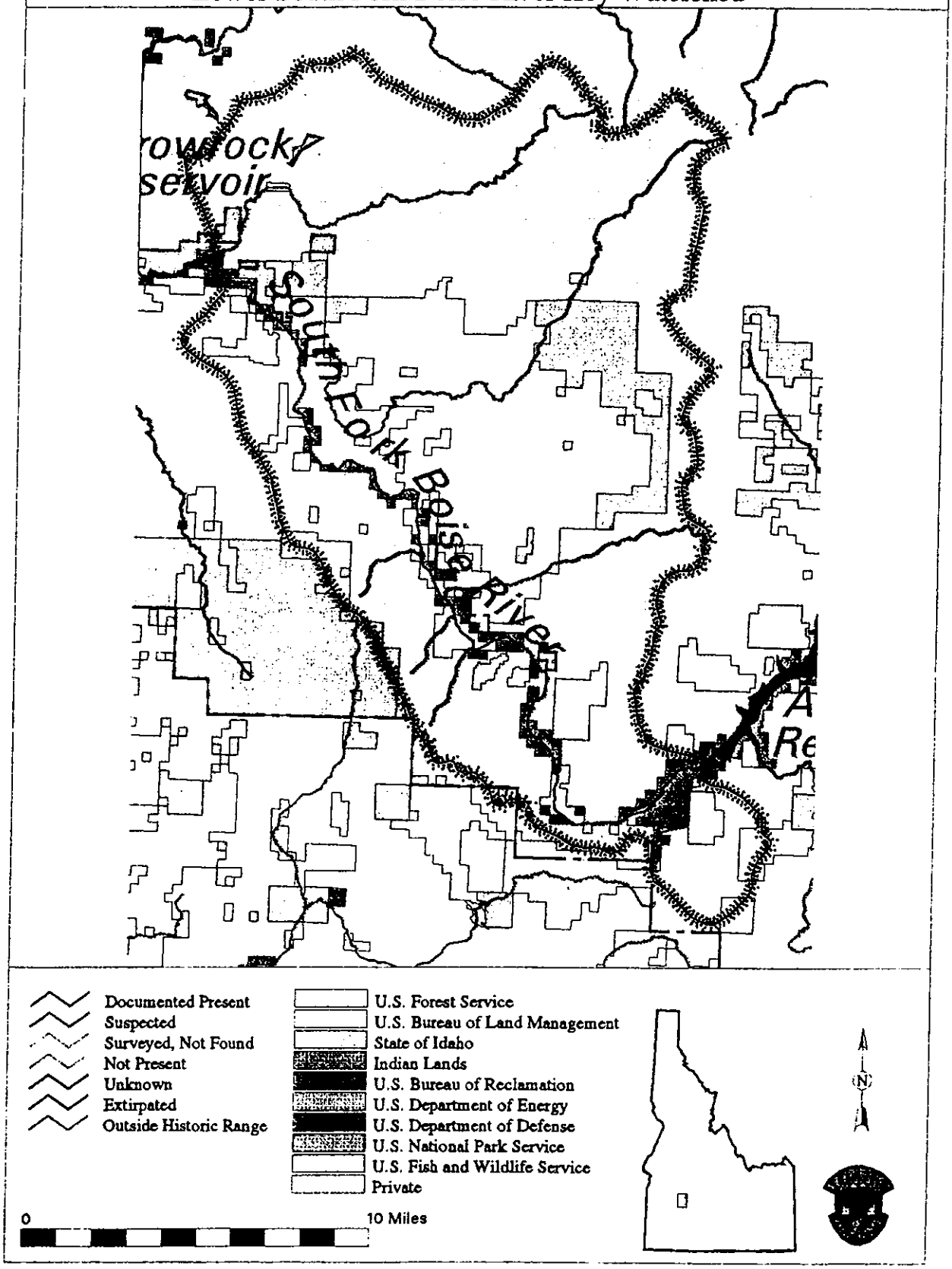
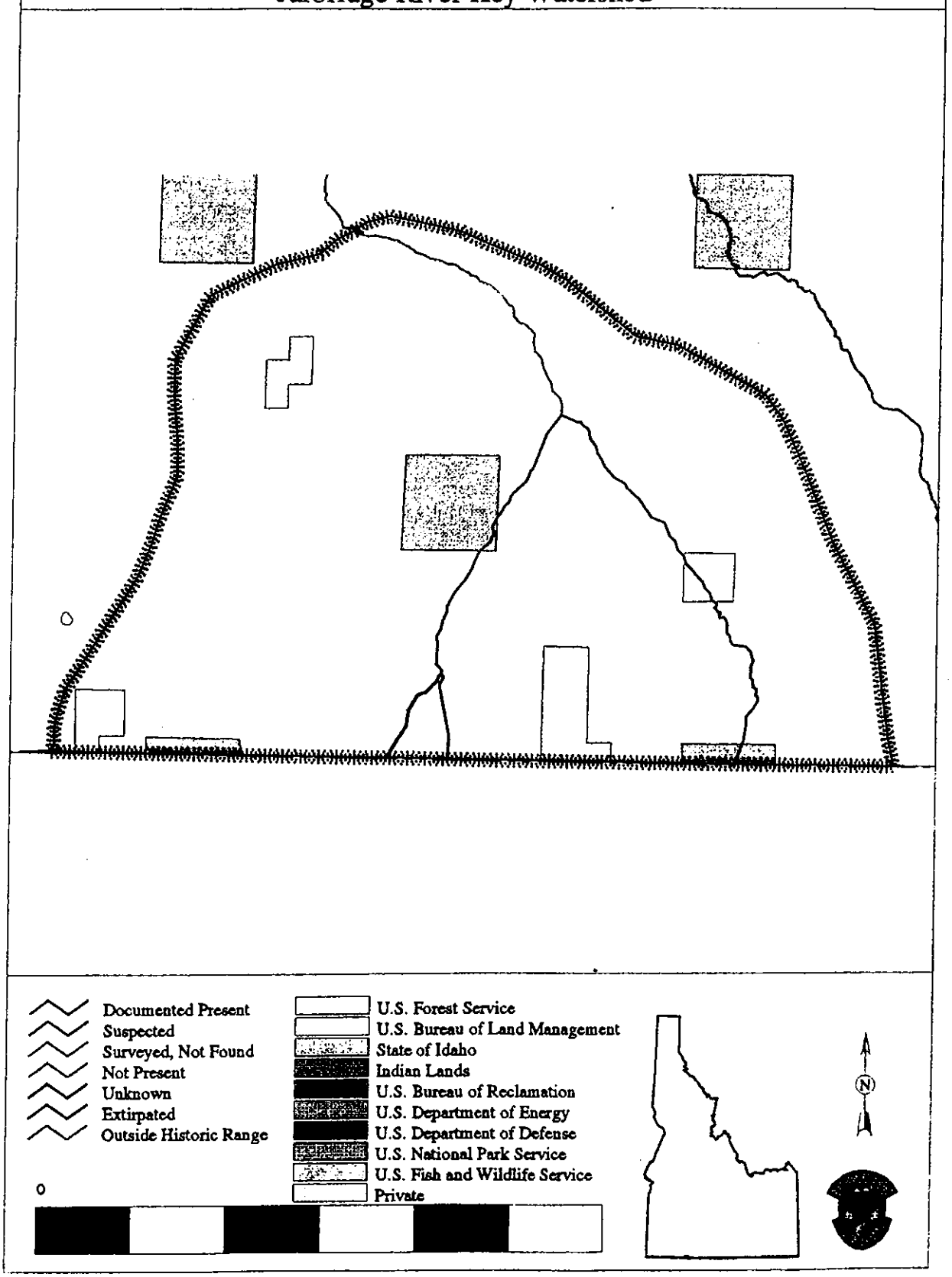
U.S. Forest Service
U.S. Bureau of Land Management
State of Idaho
Indian Lands
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Department of Defense
U.S. National Park Service
U.S. Fish and Wildlife Service
Private

0 10 Miles

Status of Bull Trout in Idaho
Upper South Fork Boise River Key Watershed



Status of Bull Trout in Idaho
Lower South Fork Boise River Key Watershed



Status of Bull Trout in Idaho
Jarbridge River Key Watershed