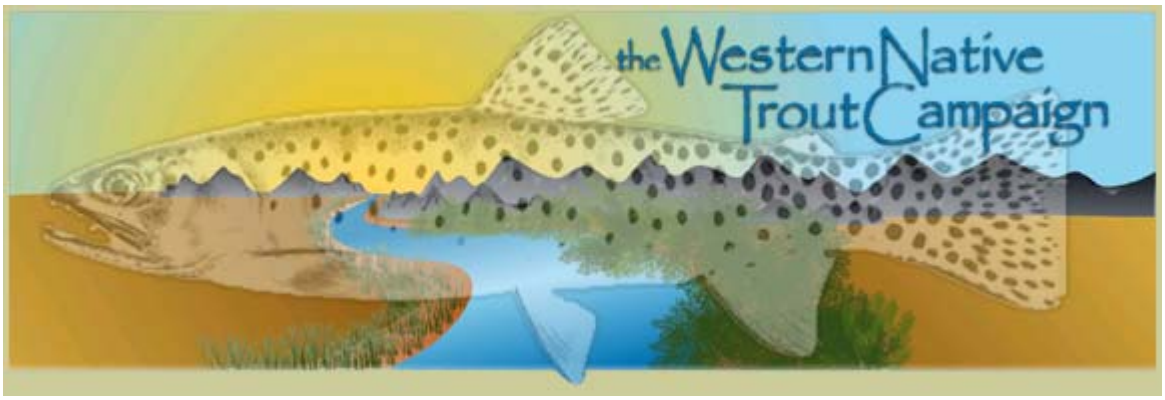

An Analysis of Trout and Salmon Status and Conservation Values of Potential Wilderness Candidates in Idaho and Eastern Washington

A Report by the Western Native Trout Campaign
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Executive Summary

This report examined areas eligible for wilderness designation in Idaho and eastern Washington for their value to native trout and salmon habitat. It analyzed all BLM and USFS roadless areas that are greater than 5000 acres or contiguous with existing wilderness areas with respect to the genetic purity and historic presence of native salmonids.

The report is based on computerized Geographic Information Systems (GIS) analysis of salmonid distributions and roadless areas using data from government and private sources. For the potential wilderness lands we identified, we examined the status of all native trout species within Idaho and eastern Washington: bull trout (*Salvelinus confluentus*), Bonneville cutthroat trout (*Oncorhynchus clarki utah*), steelhead trout (*Oncorhynchus mykiss*), westslope cutthroat trout (*Oncorhynchus clarki lewisi*), Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*), and redband trout (*Oncorhynchus mykiss gairdneri*). We also examined the status of two runs of chinook salmon (*Oncorhynchus tshawytsha*) : spring/summer, or "stream-type," chinook salmon and fall, or "ocean-type" salmon.

The results of the analysis can be seen in figures 1 – 8 where genetically strong, depressed, and historic ranges are depicted with respect to roadless areas. This analysis can aid wilderness campaign efforts in several ways. The mapping can be used to identify some of the salmonid and aquatic conservation resources associated with candidate wilderness areas. It can be used to identify and delineate priority wilderness area candidates as part of wilderness campaigns. It can also be used to explicitly examine the trade-offs and conservation risks in not including some areas as priority wilderness candidates.

Native trout can benefit wilderness protection efforts. This analysis provides a platform for ascertaining and communicating the importance of salmonid resources associated with specific wilderness candidates. This can be used to help rally up support among wilderness advocates, angling and associated business interests, other trout enthusiasts, biodiversity advocates, and those within the political realm.

An Analysis of Trout and Salmon Status and Conservation Values of Potential Wilderness Candidates in Idaho and Eastern Washington

Native trout populations across the West are imperiled. Almost all of these populations have undergone severe contractions in range and numbers. Two trout, the Alvord cutthroat and the yellowfin cutthroat, are already extinct (Behnke and Tomelleri, 2002). The condition of most native trout populations is so precarious that almost all have been listed as threatened, endangered, or candidate species, or are the subject of an active petition for listing under the Endangered Species Act (ESA). Many trout have strong populations in less than 10% of their historical range (Kessler et al., 2001). Only three native western trout subspecies appear to be in stable condition, out of 59 such populations,[1] based on the combination of status reviews by the FWS, NMFS, assessments by the American Fisheries Society, and the work of Behnke (1992)

Widespread habitat damage is a primary cause for the dire condition of native trout. This degradation has been caused by a host of activities, including logging, roads, water withdrawals, and grazing. It has fragmented and isolated remaining populations, increasing the extinction risks. The introduction of non-native fish, which compete and some times interbreed with native trout, compound the other threats to native trout.

Wilderness designation provides critically needed protection from impacts from logging, roads, and other mechanized habitat damage in parts of these species range. The best remaining trout habitat conditions are found in unroaded and unlogged landscapes (Rhodes et al., 1994; NMFS, 1995; Huntington, 1998, Hitt and Frissell, 1999; Kershner et al., 1997; Kessler et al., 2001). Across the West, roadless areas tend to contain many of the healthiest of the few remaining populations of native trout, which are crucial to protect (Kessler et al., 2001). Roadless areas are a source of high quality water essential to the protection and restoration of native trout. The high quality habitats in roadless areas help native trout compete with non-native trout, because degraded habitats can provide non-natives with a competitive advantage (Behnke, 1992). Roadless areas tend to have the lowest degree of invasion of non-native salmonids (Huntington, 2001). The maintenance of roadless character also makes it more difficult to stock non-native fish.

Unroaded areas also act as the foundation for the needed restoration of larger watersheds. Continued intrusion into roadless areas by road building and logging in watersheds with trout habitats are likely to undermine efforts to conserve and rebuild native trout and other salmonid populations (USFS et al., 1993; NMFS, 1995; USFS and BLM, 1997). Potential wilderness areas tend to be extremely vulnerable to degradation caused by land-disturbance due to landforms, climate, and other site factors (USFS et al., 1993; Rhodes et al., 1994). Habitat damage is persistent once these areas are developed.

For these combined reasons, credible studies and assessments have repeatedly concluded that the complete protection of remaining roadless areas is an essential component of strategies to protect and restore native salmonids (Henjum et al., 1994; Wissmar et al., 1994; Rhodes et al, 1994; NMFS, 1995; Espinosa et al. 1997, Kessler et al., 2001). Since wilderness designation provides the most robust protection of roadless character, it can play a much needed role in efforts to stem the decline

[1] The 59 include species, subspecies, and "Evolutionary Significant Units," a jurisdictional/biological unit used in listings under the ESA.

of native trout. But it can only do so if wilderness designation efforts include those areas needed for the protection and re-establishment of native trout.

The protection of native trout via wilderness designation can also help wilderness efforts. Trout are a totemic species with a built-in public constituency. Angling generates millions of dollars in business annually. Trout are immensely popular with the public. Citizen advocacy networks for trout already exist. Trout protection can galvanize the public support needed to help realize wilderness designation of important areas.

In a few cases, wilderness areas have been established with the express intent of protecting trout and/or their ocean-going relatives, Pacific salmon. Examples include the Golden Trout Wilderness in California, the North Fork John Day Wilderness in Oregon, the Frank Church - River of No Return Wilderness in Idaho, and the Tucannon-Wenaha Wilderness in Washington and Oregon. The 2002 Oregon Wilderness Campaign explicitly included salmonid resources associated with its wilderness candidates in its descriptions of the ecological values of its wilderness candidates. Despite these examples, many recent wilderness campaigns in the West have not rigorously examined prospective wilderness candidates for their potential benefit to native trout on a regional scale, even though such efforts can not only protect trout, but also arouse and consolidate public and political support for wilderness designation.

For these reasons, the Western Native Trout Campaign (an action-oriented coalition conservation and sportsman's groups dedicated to protecting and restoring native trout populations and habitats) developed this prototype analysis of salmonid resources associated with potential wilderness areas throughout Idaho and eastern Washington. We used state-of-the-art Geographic Information System (GIS) analyses of the best currently available data on salmonid attributes. Our analysis can be used both to help select wilderness candidates with high conservation values for salmonids and convey those values to the public.

Potential Wilderness Areas

Our analysis looked at all areas eligible for wilderness designation within eastern Washington and Idaho. It included all BLM and USFS roadless areas in the analysis that are greater than 5000 acres. It also included areas that were less than 5000 acres but contiguous with existing wilderness areas.

Roadless GIS data for the analysis area were obtained from Pacific Biodiversity Institute (PBI) (http://www.pacificbio.org). This data is considered by to be in draft from until PBI completes an accuracy assessment on it. This data only included roads and other permanent developments and did not include clear cuts and other logging in its analysis. Regardless, it is the best available data.

The data was clipped to coincide with the project area: of Washington east of the cascade crest and the entire state of Idaho. From this, roadless blocks that were less than 5000 acres in size and not contiguous to existing wilderness areas were omitted. Roadless areas outside of BLM and USFS lands were also omitted, and the remaining roadless lands should be candidates for wilderness. Of course, intensive, on the ground inventories are needed to establish final specific area boundaries.

Salmonid Resources

For the potential wilderness lands we identified, we examined the status of all native trout species within Idaho and eastern Washington: bull trout (*Salvelinus confluentus*), Bonneville cutthroat trout (*Oncorhynchus clarki utah*), steelhead trout (*Oncorhynchus mykiss*), westslope cutthroat trout (*Oncorhynchus clarki lewisi*), Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*), and redband trout (*Oncorhynchus mykiss gairdneri*). We also examined the status of two runs of chinook salmon (*Oncorhynchus tshawytsha*) : spring/summer, or "stream-type," chinook salmon and fall, or "ocean-type" salmon. These salmonids were included because salmon are a major conservation concern within the analysis area that will factor into any analysis of the conservation value of potential wilderness areas for salmonids.

We analyzed the association of potential wilderness areas within the analysis area with three indicators of the status of native salmonids. These status attributes are: a) areas within the historic ranges of native salmonids; b) areas with "depressed" populations; and c) areas with "strong" populations of native salmonids. These status attributes were mapped using the definitions and analysis of "depressed" and "strong" populations from the Interior Columbia Basin Ecosystem Management Plan (ICBEMP) analysis described in USFS and USBLM (1997) because it is the most extensive assessment for salmonids within the analysis area. However, the ICBEMP data has not been verified and may have significant errors. For instance, at least 12.5% of the "stream-type" chinook populations designated as "strong" in USFS and USBLM (1997) should have been designated as "depressed" based on the ICBEMP status criteria (CRITFC, 1998). For Bonneville cutthroat trout, we only examined the relationship of its historic range to potential wilderness areas, because ICBEMP lacked data on the spatial distribution of depressed and strong populations.

Historic ranges

The full protection of roadless areas within historic trout ranges via wilderness designation provides several important functions for trout recovery efforts, even if the trout habitats are not currently occupied. These functions include: 1) reducing fragmentation and isolation by restoring connectivity and reducing geographic gaps in the current distribution of populations and habitats; 2) re-establishing important migratory life-histories; 3) serving as areas for re-establishment of populations; 4) providing hedge against fragmentation caused by extirpation from watershed-scale or regional disturbances affecting the highly fragmented and isolated native trout populations.

Native trout populations historically exhibited a high degree of connectivity. This connectivity was important to maintaining the strength and distribution of populations and unique life history forms. However, due to cumulative degradation, native trout populations within the analysis area are now largely isolated and fragmented (USFS and USBLM, 1997; USFWS, 1998; Kessler et al., 2001). All of the trout and salmon populations analyzed in this report are absent from significant portions of the range (Table 1). Steelhead and bull trout and ocean-type and stream type chinook salmon are no longer found in the majority of watersheds they historically occupied within the ICBEMP analysis area (Table 1). Worse, the vast majority of the few remaining populations of native trout and salmon species are depressed, with the exception of Yellowstone cutthroat trout. All of the native trout and salmon analyzed in USFS and USBLM (1997) have strong populations in less than 27% of historically occupied subwatersheds (Table 1). With the exception of westslope and Yellowstone cutthroat trout, on a species/subspecies basis, known strong populations of native trout and salmon are now found in less than 5% of subwatersheds historically occupied by these species (Table 1). The situation is equally dire for Bonneville trout: Kessler et al. (2001) found that subwatershed areas with important conservation populations occupied only about 4.3% of the historically occupied area in Utah.

Population isolation has been intensified by the loss of migratory life histories, which are essential to the persistence and recovery of many varieties of native trout. This loss is partially due to the intense degradation of most larger streams that provide habitat and migratory corridors. Together with the contraction in range and numbers, habitat degradation, and loss of genetic integrity, this fragmentation and loss of migratory life histories increases the likelihood that native trout will continue to be extirpated from watersheds (USFS and USBLM, 1997; USFWS, 1998).

Merely maintaining fragmented populations will not be adequate to recover trout to stable conditions. The recovery and long-term survival of isolated and fragmented trout populations requires increasing population and habitat connectivity and re-establishing trout in larger, more hydrologically complex drainages (Propst et al., 1992; Henjum et al., 1994; Propst and Stefferud, 1997). For highly fragmented species, such as bull trout and Bonneville trout, re-establishing populations in historic habitats may be necessary to recover self-sustaining conditions. Such efforts have the highest probability for success in areas with ample, high-quality habitat within historic ranges. Since roadless areas typically contain the highest quality habitat, these areas have the greatest promise for re-establishment efforts and need to be protected in order to re-establish populations and population connectivity, even if they are presently unoccupied by native trout and salmon.

Increasing the connectivity of populations and habitats also requires large-scale efforts to restore the larger rivers that once served as migration corridors and habitats for migratory life histories (Henjum et al., 1994; Propst et al., 1992; Propst and Stefferud, 1997). Roadless areas within historic ranges have an integral role in such efforts, by serving as anchors for restoration of larger rivers and watersheds (Anderson et al., 1993; USFS et al., 1994).

Figure 1 depicts the number of historic ranges intersecting potential wilderness areas within our analysis area for the native trout and salmon species analyzed. Areas that include historic habitat for more than one trout or salmon species provide multi-species benefits to recovery efforts. Additional maps showing potential wilderness candidates within the historic range for specific species can also be rapidly developed and displayed from our GIS analysis.

Habitats for depressed trout and salmon populations

Protecting and restoring depressed populations of native trout and salmon and their habitats is absolutely essential to their survival. Strong populations are now a relative rarity, due to the combined ravages of habitat loss and damage, dams and water withdrawals, and other insults. Within the ICBEMP analysis area, the depressed populations comprise the overwhelming majority of the few remaining subwatershed populations of all native trout and salmon species, except Yellowstone cutthroat trout (Table 1). However, even for Yellowstone cutthroat trout, the area of watersheds with depressed populations exceeds the area of watersheds with strong populations (Table 2). Unfortunately, depressed populations are the most vulnerable to extirpation from habitat degradation. The loss of depressed populations severely increases the already considerable isolation and fragmentation of remaining populations. Therefore, wilderness designation of areas with depressed populations would provide critically needed cornerstones for efforts to arrest the decline of native trout and salmon.

Figures 2-8 show the potential wilderness candidates that contain depressed populations of native trout and salmon for each of the species/subspecies analyzed in this report. These data can be used

to identify the species-specific benefits of wilderness designation for areas with depressed populations of salmonids.

Habitats for strong trout and salmon populations

The protection of habitats occupied by the healthiest salmonid populations is an indispensable measure for the conservation of salmonids, as a legion of studies and assessments have concluded (e.g., USFS et al., 1993; Henjum et al., 1994; NMFS, 1995; USFS and USBLM, 1997; USFWS, 1998). These populations and habitats are the foundation upon which to restore population strength and connectivity and migratory life-histories. These populations also act as the source for re-colonization and re-establishment of native trout within their historic range. Logging, road construction, and other entry into such areas increases the already significant extinction risk and undermines restoration efforts (USFS et al., 1993; Rhodes et al., 1994; Henjum et al., 1994; NMFS, 1995; Kessler et al., 2001).

Many of the few remaining strong populations are found in roadless areas. Kessler et al (2001) documented that on an area basis, 88% of the remaining strong populations of bull trout and 71% of those for westslope cutthroat trout were found in roadless areas within the ICBEMP analysis area.

Although strong trout populations are robustly associated with and dependent on roadless areas, a significant amount of these critically important populations and habitats are not protected because they are not yet within designated wilderness (USFS and USBLM, p. 1343, 1997). Even for bull trout and westslope cutthroat trout, which are among the most fragmented and depressed populations in the ICBEMP analysis area, 45% and 50%, respectively, of strong populations in roadless areas are not in protected wilderness (USFS and USBLM, p. 1343, 1997). In an analysis lumping together all of the salmonid species, USFS and USBLM (1997) indicate that 48% of the area of roadless areas with strong salmonid populations on USFS and BLM lands are not in protected wilderness. Table 2 provides a summary of the area occupied by strong populations for each salmonid in potential wilderness candidates in Idaho and eastern Washington. In aggregate, this strongly indicates that a significant amount of the strong native salmonid populations in roadless areas are not fully protected from future degradation from roads, logging, and mining, until protection through wilderness protection is achieved.

Figures 2-8 show the potential wilderness candidates that contain strong and depressed populations of native trout and salmon for each of the species/subspecies analyzed in this report. These data can be used to identify the species-specific benefits of wilderness designation for areas with strong populations of salmonids.

Figure 9 provides a composite view of potential wilderness within historic ranges, and those with depressed and strong populations for all of the salmonids with distribution data within our analysis area. These types of composite data can be used to delineate wilderness candidates or assess the salmonid resources associated with wilderness candidates.

Other Salmonid Conservation Considerations

While our analysis of the distribution of salmonid habitats and populations within potential wilderness candidates provides an important initial assessment of some of important salmonid conservation attributes, it is not an exhaustive assessment. There are several other characteristics of salmonid habitats and populations critical to their conservation that we did not map or analyze,

although our analysis can act as a foundation for the analysis of some of these attributes at a later date.

Some habitats have additional importance because of the surrounding gaps in roadless areas, high quality habitats, and stronger populations (Henjum et al., 1994; USFS and USBLM, 1997). For instance, there are very few roadless areas and strong populations in the western Idaho Panhandle, so the few remaining such areas have extraordinary value for salmonid conservation.

In a similar vein, larger, lower elevation, low gradient, unconstrained streams in roadless watersheds within historic range of native salmonids are exceedingly rare in Idaho and eastern Washington (Henjum et al., 1994; Rhodes et al., 1994; Huntington, 1998). Streams with these characteristics provide some of most productive and important habitats for salmonids.[2] The rarity and productivity of these types of habitats makes their protection crucial. Information on topographical stream settings could be combined with our analysis to identify such habitats.

The genetics of salmonid populations are a critical conservation consideration that is not covered in our analysis. Salmonid populations that have little or no introgression by non-native or non-wild salmonids are both extremely rare and important. Introgression and competition with non-native salmonids are one of the primary threats to native salmonids. Data on genetic purity of populations, and threats to existing pure populations, can be coupled with our analysis to identify important conservation population within potential wilderness candidates, as done for some native trout populations in Kessler et al. (2001). USFS and USBLM (p. 1219, 1997) include some qualitative information on the spatial distribution of genetic integrity for steelhead and salmon, but not native trout, due to the lack of information within the ICBEMP analysis area. For this reason, we did not include this fragmentary information in our analysis. Nonetheless, genetic integrity of watershed populations is a critical aspect of the importance of potential wilderness areas for salmonid conservation.

Some additional considerations not explicitly addressed in our analysis are the relative connectivity of habitats and populations, fringe populations of salmonids, overlap with other important aquatic species, habitat quality, and the role of areas to larger scale watershed and stream restoration. All of these aspects factor into the ecological roles of potential wilderness areas to salmonid conservation.

Conclusions

Wilderness campaign efforts can use our mapping and analysis of salmonid resources in several ways. The mapping can be used to identify some of the salmonid and aquatic conservation resources associated with candidate wilderness areas. It can be used to identify and delineate priority wilderness area candidates as part of wilderness campaigns. It can also be used to explicitly examine the trade-offs and conservation risks in not including some areas as priority wilderness candidates.

Although the analysis can be used to set priorities, there is danger in failing to conserve all remaining roadless areas within historic salmonid ranges as wilderness. Development of unprotected areas forecloses restoration options, when too many options have already been foreclosed. High quality aquatic systems in unroaded and fully protected watersheds are scant

[2] . In fact, the pervasive damage of these types of streams on a landscape scale is a major factor in the current plight of native trout and salmon (Rhodes et al., 1994; USFS and USBLM, 1997).

islands in a sea of degradation. Restoring viable and well-distributed populations of native salmonids will be a daunting, task even with the designation of all potential wilderness candidates in historic trout ranges. Piecemeal protection of only some of these areas is not ecologically prudent. Within historic salmonid ranges, all remaining roadless areas should be protected and potential wilderness candidates formally designated as wilderness.

While wilderness designation can provide essential help to native salmonids if areas important to the species are included, it is not a panacea for the recovery of these fish and their habitats (Henjum et al., 1994). Roadless areas are too small (<5,000 acres) to meet wilderness candidate criteria are essential to protect (Henjum et al., 1994; Rhodes et al., 1994; Kessler et al., 2001). Even though a significant number of strong populations reside in roadless areas, a significant number of populations are also found outside of roadless areas, especially for a few species, such as redband trout (Kessler et al., 2001). Remaining salmonid populations are so few and fragmented, that all remaining populations have high conservation value. Protecting these populations and re-establishing habitat and connectivity will require restoring roaded watersheds. Other widespread and significant threats to trout must also be abated, including domestic livestock grazing, water withdrawals, and non-native species, which wilderness designation does not directly address. Thus, while wilderness designations are not, alone, sufficient to recover native salmonids, they are some of the essential steps.

Native trout can benefit wilderness protection efforts. Our analysis provides a platform for ascertaining and communicating the importance of salmonid resources associated with specific wilderness candidates. This can be used to help rally up support among wilderness advocates, angling and associated business interests, other trout enthusiasts, biodiversity advocates, and those within the political realm.

Additional wilderness designation has tremendous potential for helping to restore native salmonids. It is time to realize that potential. These fish need that help.

Literature Cited

Anderson, J.W., Beschta, R.L., Boehne, P.L., Bryson, D., Gill, R., McIntosh, B.A., Purser, M.D., Rhodes, J.J., Sedell, J.W., and Zakel, J. 1993. A comprehensive approach to restoring habitat conditions needed to protect threatened salmon species in a severely degraded river -- The Upper Grande Ronde River Anadromous Fish Habitat Protection, Restoration, and Monitoring Plan. Riparian Management: Common Threads and Shared Interests, USFS Gen. Tech. Rept. RM-226, pp. 175-179.

Behnke, R.J. and J.R. Tomelleri. 2002. Trout and Salmon of North America. The Free Press.

Behnke, R.J. 1992. Native Trout of Western North America. American Fisheries Society Monograph 6.

Columbia River Inter-Tribal Fish Commission (CRITFC), 1998. Technical comments on ICBEMP DEISs and supporting science materials. CRITFC, Portland, Or.

Henjum, M.G., Karr, J.R., Bottom, D.L., Perry, D.A., Bednarz, J.C., Wright, S.G., Beckwitt, S.A., and Beckwitt, E., 1994. Interim Protection for Late Successional Forests, Fisheries, and Watersheds: National Forests East of The Cascade Crest, Oregon and Washington. The Wildlife Soc., Bethesda, Md.

Hitt, N.P. and Frissell, C.A. 1999. Wilderness in a landscape context: an evaluation of wilderness and aquatic biological integrity in western Montana. Presented at the Wilderness Science Conf., May 1999, Missoula, Montana.

Kershner, J.L., Bischoff, C.M., and Horan, D.L. 1997. Population, habitat, and genetic characteristics of Colorado River cutthroat trout in wilderness and non-wilderness stream sections in the Uinta Mountains of Utah and Wyoming. N. Am. J. Fish. Manage. 17: 1134-1147.

Kessler, J., Bradley, C., Rhodes, J., and Wood, J., 2001. Imperiled Western Trout and the Importance of Roadless Areas. Center for Biological Diversity, Tucson, Az.
http://www.westerntrout.org/trout/roadless.htm

National Marine Fisheries Service (NMFS). 1995. Biological Opinion on Implementation of the Interim Strategies for Managing Anadromous Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California. NMFS, Portland, OR.

Propst, D.L, Stefferud, J.A., and Turner, P.R. 1992. Conservation and status of Gila trout, *Ocorhynchus gilea*. The Southwestern Naturalist, 37: 117-125.

Propst, D.L. and Stefferud, J.A. 1997. Population dynamics of Gila trout in the Gila River drainage of the southwestern United States. J. Fish Biol. 51: 1137-1154.

Rhodes, J.J., McCullough, D.A., and Espinosa Jr., F.A., 1994. A Coarse Screening Process for Evaluation of the Effects of Land Management Activities on Salmon Spawning and Rearing Habitat in ESA Consultations. CRITFC Tech. Rept. 94-4, Portland, Or. http://www.critfc.org/text/tech_rep.htm

USFS, National Marine Fisheries Service (NMFS), U.S. Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), U.S. National Park Service (NPS), U.S. Environmental Protection Agency (EPA). 1993. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. USFS PNW Region, Portland, OR

USFS and USBLM, 1997. The Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins, Volumes I-IV. PNW-GTR-405, USFS, Walla Walla, Washington.

USFWS, 1998. Biological Opinion for the Effects to Bull Trout from the Continued Implementation of Land and Resource Management Plans as Amended by the Interim Strategy for Managing Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana, and Portions of Nevada (INFISH), and the Interim Strategy for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH).

Other Data

Interior Columbia Basin Ecosystem Management Project (ICBEMP): Project Data. 1998. FEIS Key Salmonid Status Update. U.S.D.A. Forest Service, Regional Office R6. Portland, OR. Downloaded from ICBEMP website http://www.icbemp.gov/spatial/. Filename bdbfishup.exe.

Pacific Biodiversity Institute (PBI). 2001. Roadless Areas of Six Western States. Filename Westrdlsgeo.shp.

Table 1. Status attributes for native trout and salmon species analyzed in this report within the ICBEMP analysis area (Eastern Oregon and Washington, Oregon, Western Montana and Wyoming, and Northern Nevada). All attributes calculated on the basis of the numbers of subwatersheds and known status.[3] Spatial population strength distribution data for Bonneville trout within the analysis area were unavailable.

Salmonid	Percent of historic range known occupied	Percent of subwatersheds within historic range occupied by known strong populations	Percent of subwatersheds populations with known status that are known strong	Percent of subwatershed populations with known status that are known depressed
Yellowstone cutthroat trout	79.6%	26.4%	59.7%	40.3%
Steelhead trout	41.3%	0.6%	2.3%	97.7%
Bull trout	36.4%	3.8%	21.3%	78.7%
Westslope cutthroat trout	75.2%	12.5%	25.1%	74.9%
Redband trout	54.7%	4.6%	26.5%	73.5%
Stream-type (spr/sum) chinook salmon	25.3%	0.2%	1.7%	98.3%
Ocean-type (fall) chinook salmon	28.6%	3.8%	26.9%	73.1%

[3]In the ICBEMP analysis (USFS and USBLM, 1997), the status of significant numbers of populations at the subwatershed scale were unknown for each of salmonid populations. USFS and USBLM (1997) provided predictions of the status of these subwatershed populations. Because these predictions remain unverified, they were not used in Table 1. Kessler et al (2001) calculated the percentage of historic areas occupied by several native trout species on the basis of the areas of occupied subwatersheds and historic ranges. Because the values in Table 1 are on the basis of numbers of subwatersheds rather area, the results are not directly comparable to those of Kessler et al. (1997). However, despite the difference in methods the results are similar.

Table 2. Total area of strong and depressed populations and historic ranges of salmonids within potential wilderness candidates in Idaho and eastern Washington, based on subwatershed area of populations with known status in USFS and USBLM (1997). Since these data are in terms of subwatershed area, they are not directly comparable to the data in Table 1, which are on the basis of the number of subwatersheds.

Salmonid	Total area of subwatersheds with known strong populations in potential wilderness candidates (acres)	Total area of subwatersheds with known depressed populations in potential wilderness candidates (acres)	Total area of historic range within potential wilderness candidates (acres)
Yellowstone cutthroat trout	447,965	518,258	1,792,426
Steelhead trout	113,810	3,425,313	12,361,889
Bull trout	794,584	3,288,602	13,040,073
Westslope cutthroat trout	1,757,139	1,927,195	8,918,083
Redband trout	591,750	1,843,080	14,764,877
Stream-type (spr/sum) chinook salmon	80,946	2,475,101	12,196,665
Ocean-type (fall) chinook salmon	5,309	207,586	667,122

Figure 1. The number of historical ranges of six species of native trout and two species of salmon in potential wilderness candidates in Idaho and Eastern Washington.

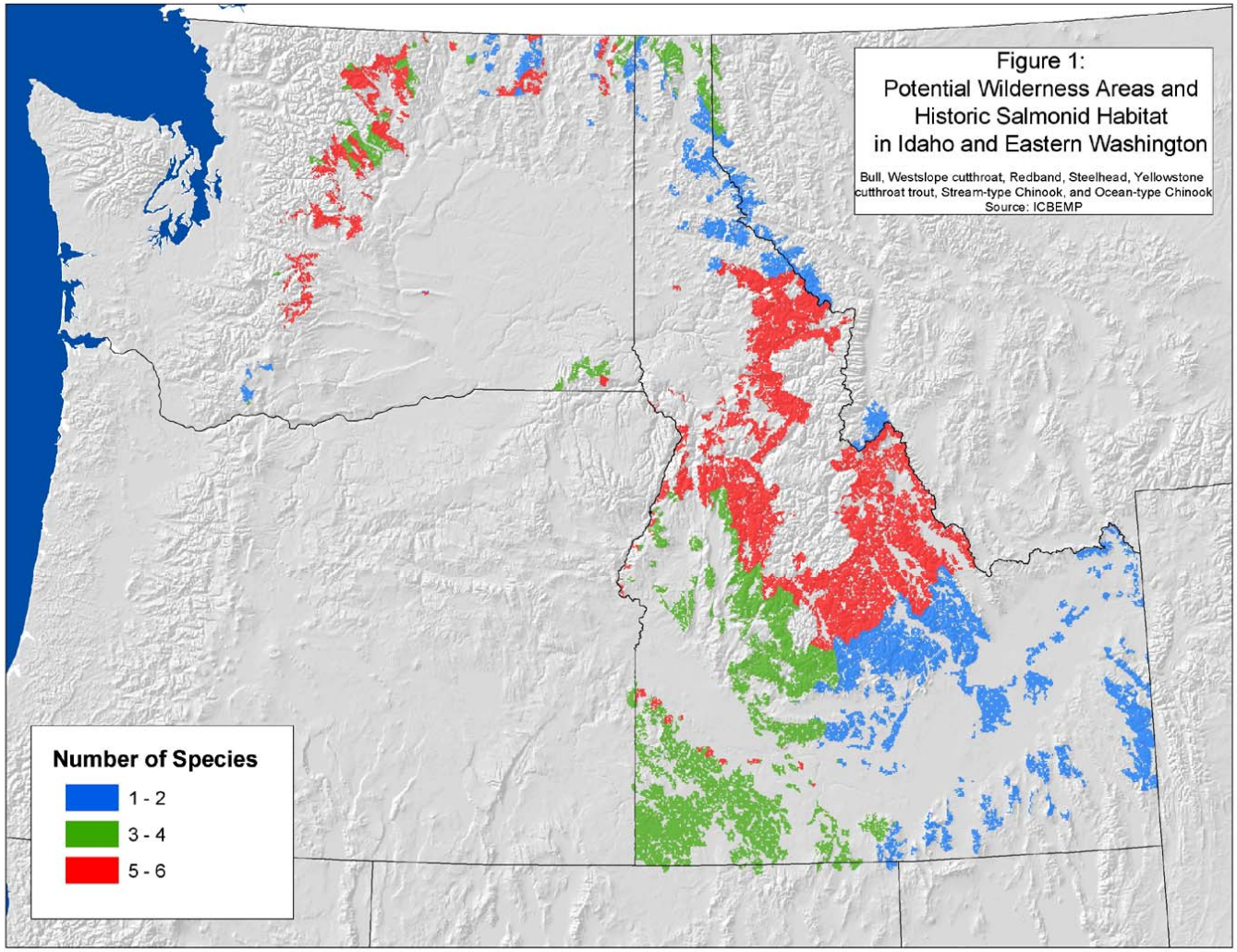

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Figure 2. The distribution of remaining depressed and strong populations overlaid on top of the historic habitat of Yellowstone cutthroat trout in potential wilderness candidates in Idaho.

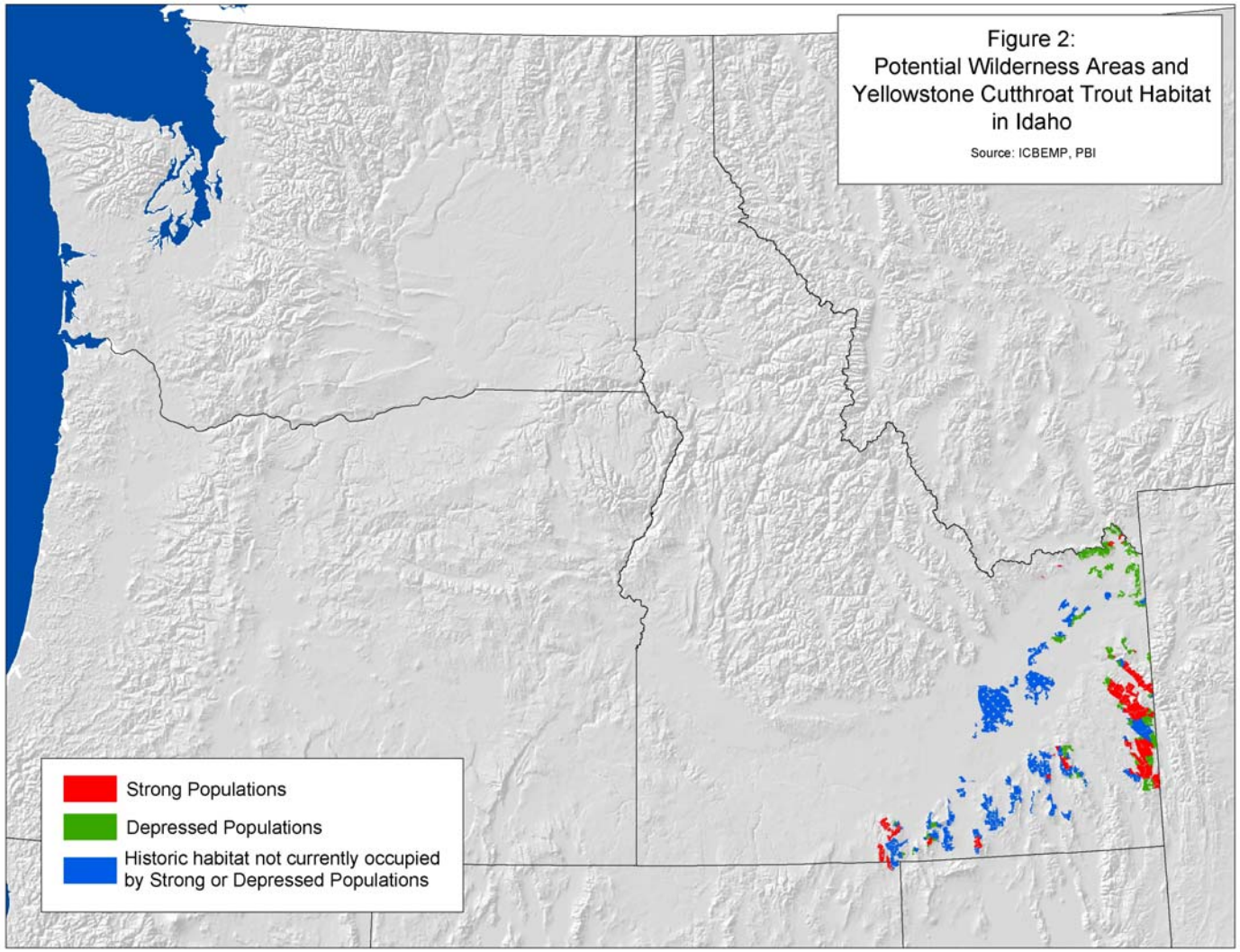

Figure 3. The distribution of remaining depressed and strong populations overlaid on top of the historic habitat of Steelhead trout in Idaho and Eastern Washington.

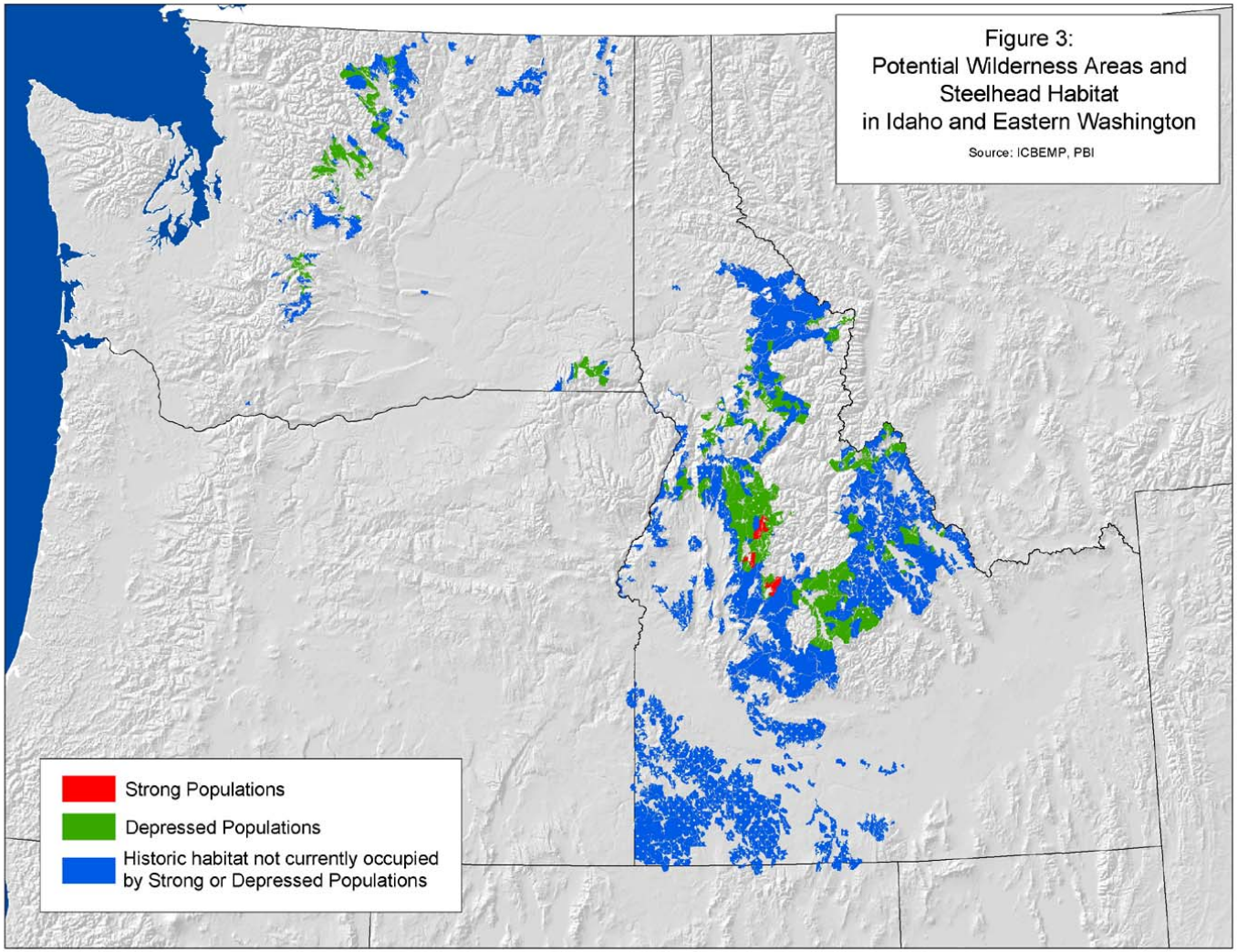

Figure 4. The distribution of remaining depressed and strong populations overlaid on top of the historic habitat of Bull trout in Idaho and Eastern Washington.

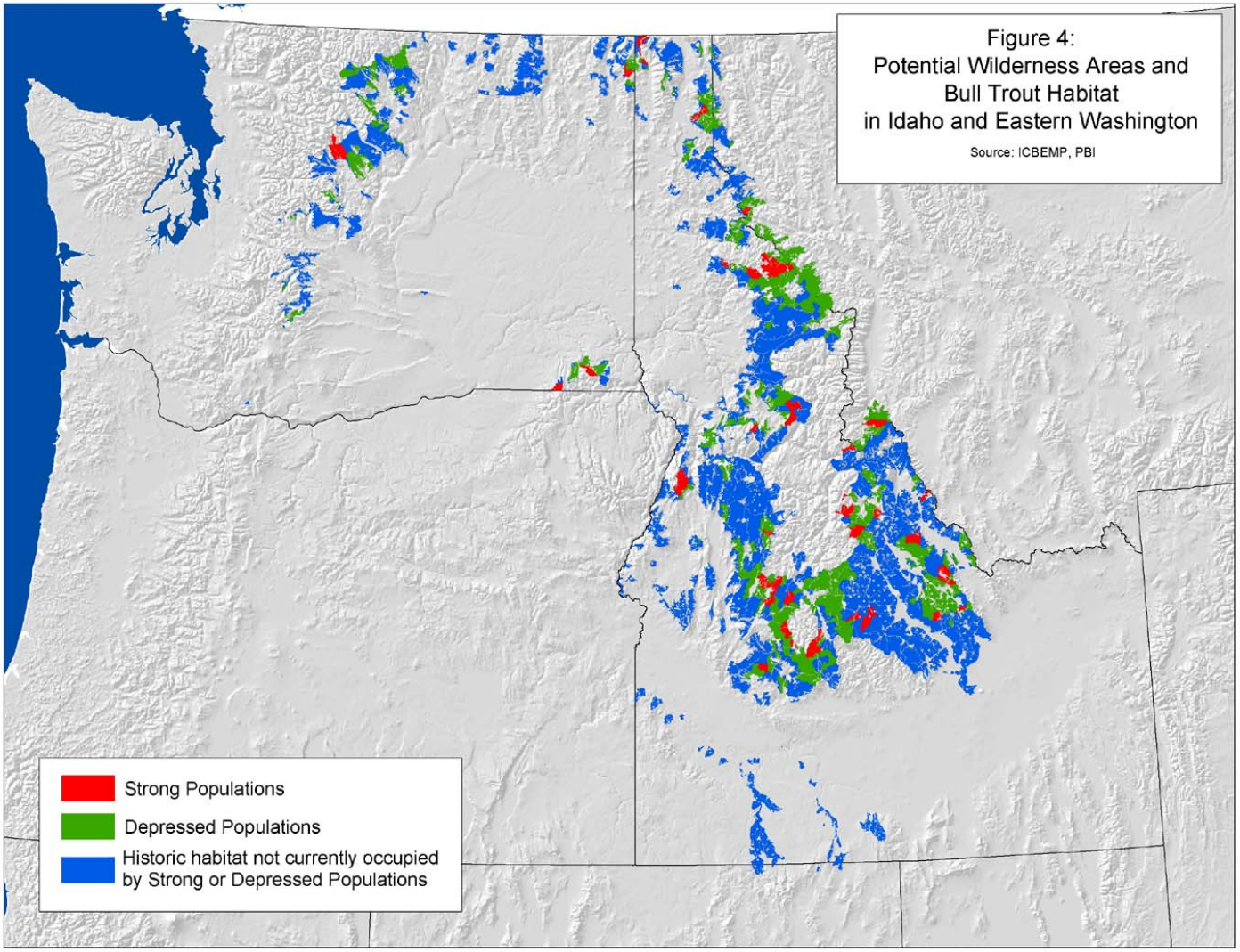

Figure 5. The distribution of remaining depressed and strong populations overlaid on top of the historic habitat of Westslope cutthroat trout in Idaho and Eastern Washington.

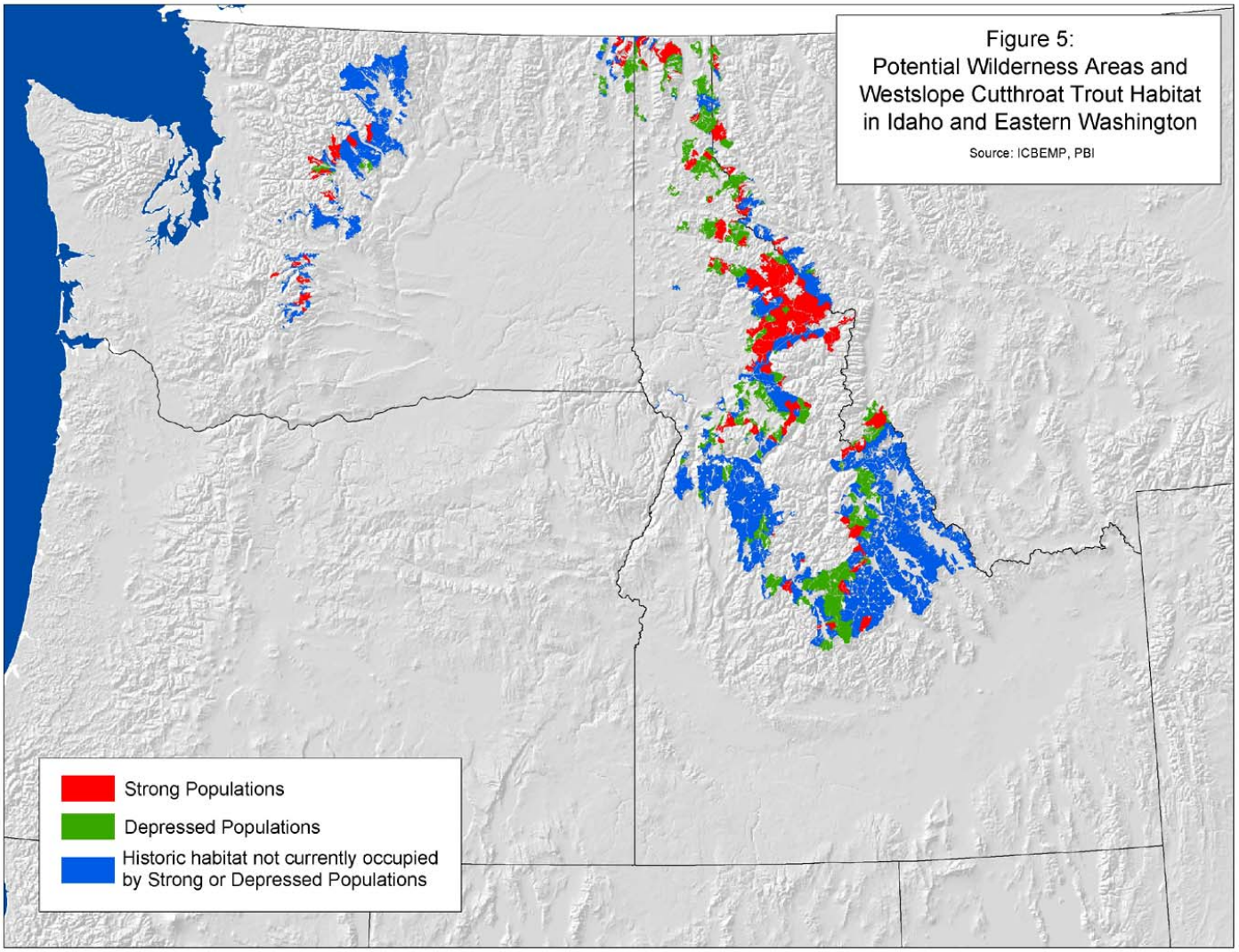

Figure 6. The distribution of remaining depressed and strong populations overlaid on top of the historic habitat of Redband trout in Idaho and Eastern Washington.

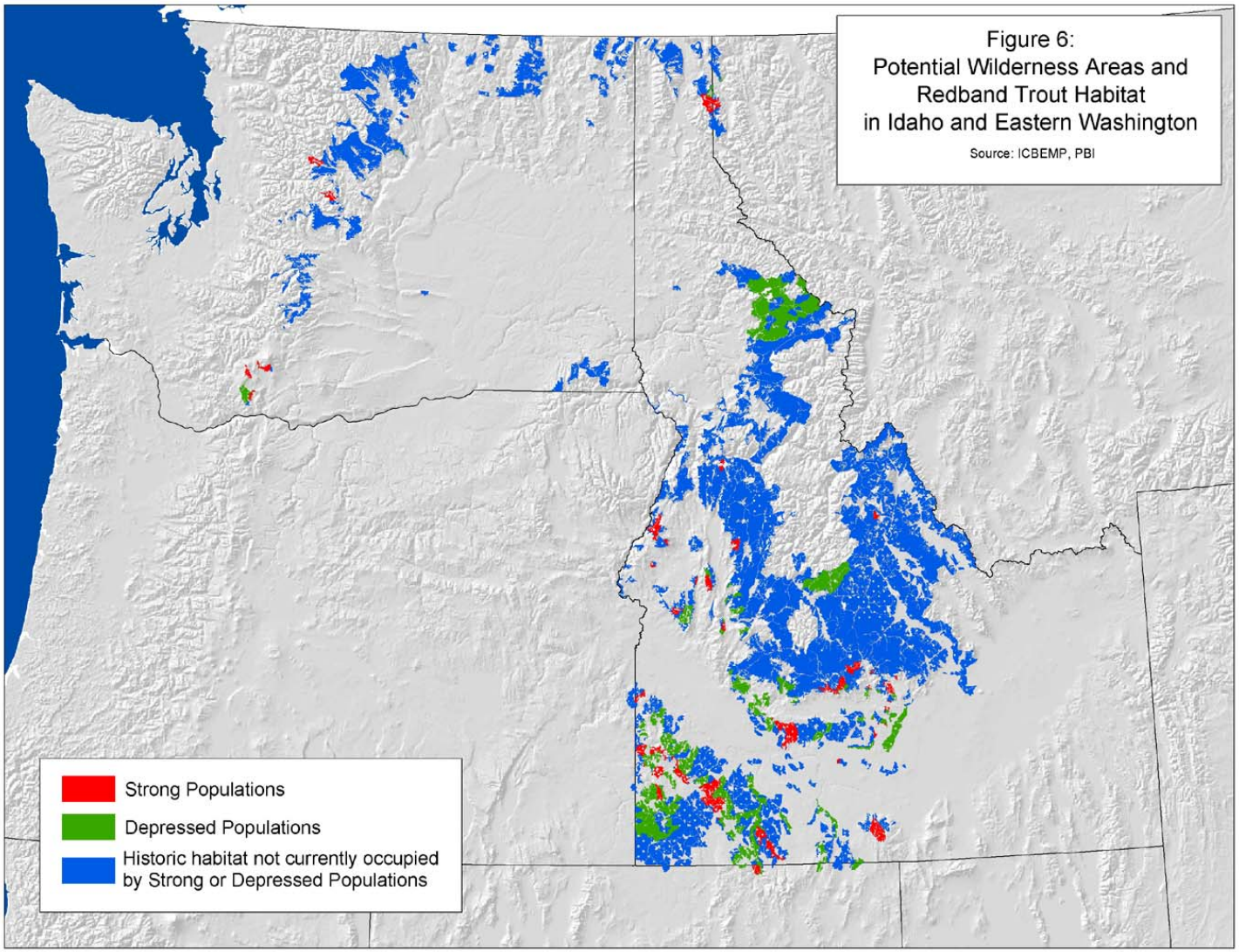

Figure 7. The distribution of remaining depressed and strong populations overlaid on top of the historic habitat of stream-type (spring/summer) Chinook salmon in Idaho and Eastern Washington.

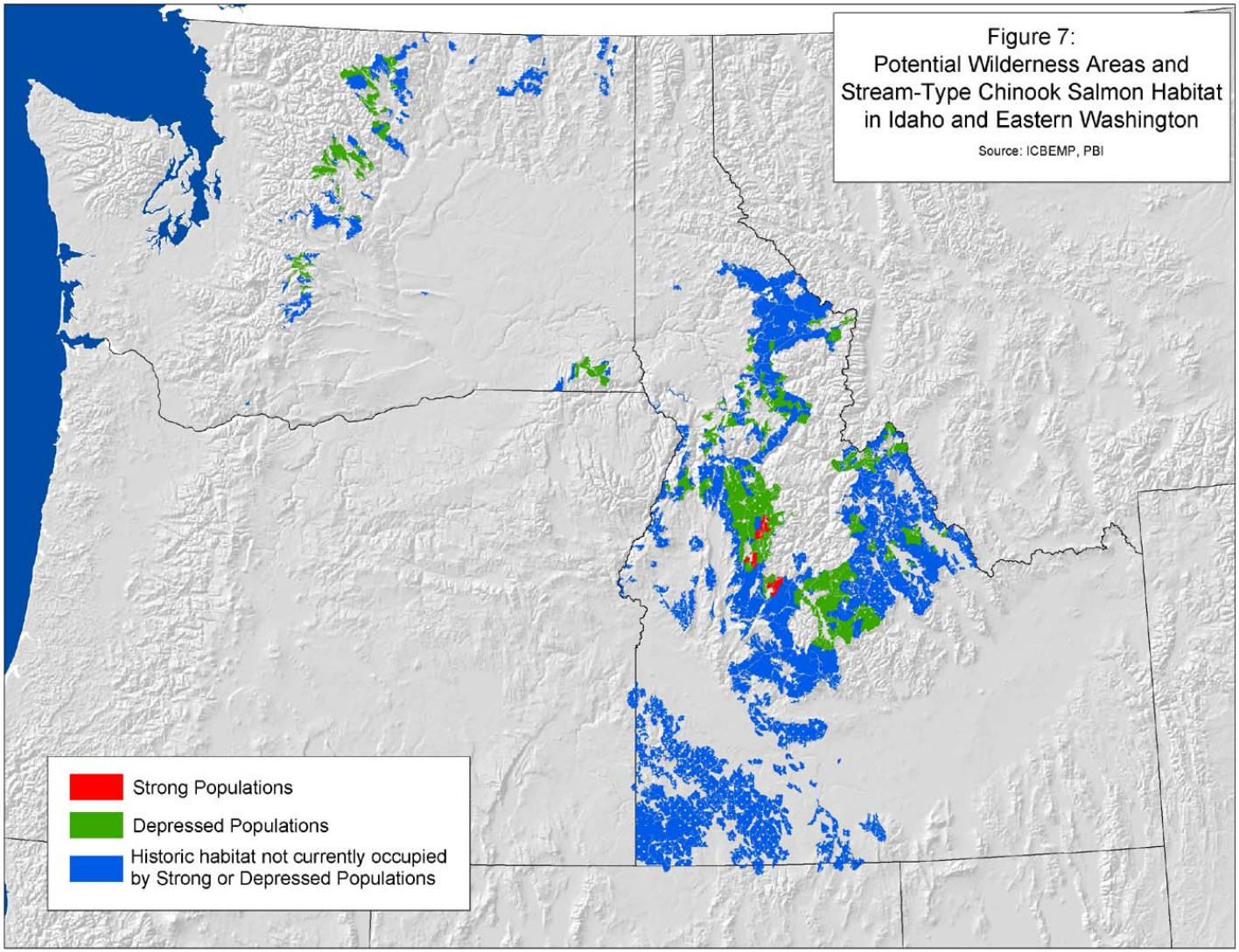

Figure 8. The distribution of remaining depressed and strong populations overlaid on top of the historic habitat of ocean-type (fall) Chinook salmon populations in Idaho and Eastern Washington.

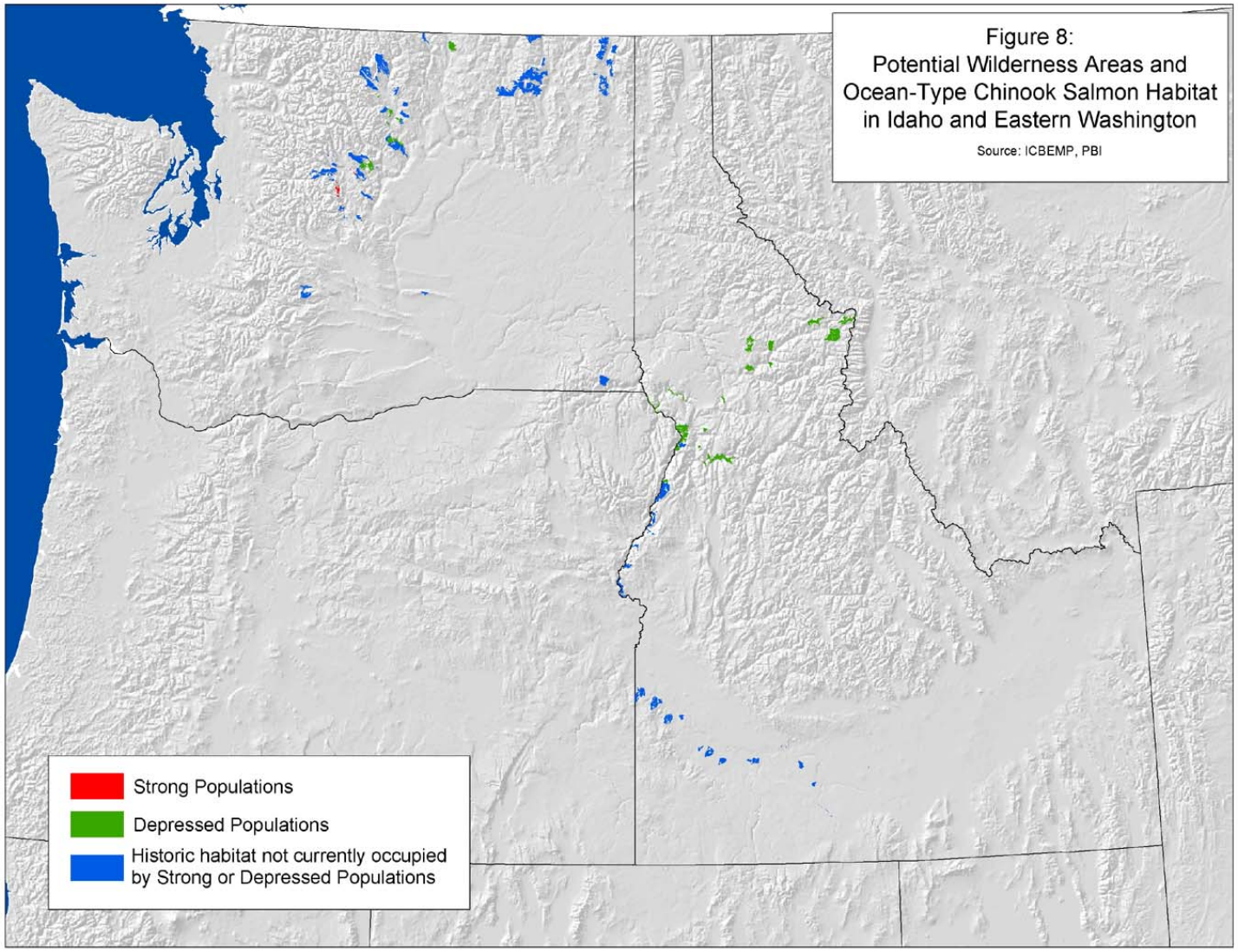

Figure 9. A composite view of potential wilderness within historic ranges, and those with depressed and strong populations for all of the salmonid species with distribution data within our analysis area. Areas with a strong populations for at least one of the species were mapped solely in terms of the number of species with strong populations present, so may also contain depressed populations of some species and be within historic ranges of some salmonid species. Areas with a depressed population for at least one of the salmonid species were mapped solely in terms of the number of species with depressed populations present, and may also be within historic ranges of some salmonid species. Areas mapped as historic ranges are currently unoccupied by native salmonids.
(Note: Figure 9 can be viewed at http://www.westerntrout.org/trout/maps/id_wa_roadless2.jpg)