Conservation Success Index: Snake River Finespotted Cutthroat Trout

ONCORHYNCHUS CLARKII BEHNKEI

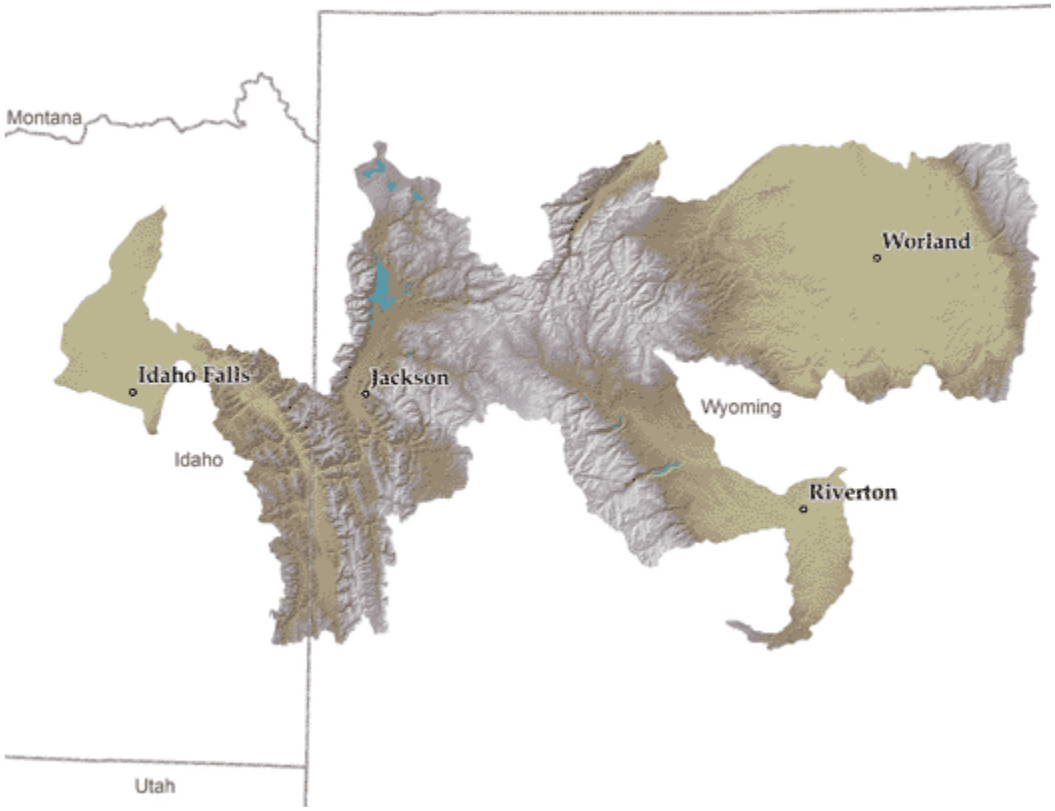
Rev. 2.0 - 9/2009

SPECIES SUMMARY

The Snake River finespotted cutthroat (SRFCT) is one of two cutthroat trout subspecies native to the upper Snake River in Wyoming and Idaho. The Yellowstone cutthroat, a large-spotted trout, also occurs in the Snake River and Yellowstone River drainages and is treated separately in the CSI and by most fishery management agencies.

The SRFCT are thought to have evolved from the Yellowstone cutthroat and highlight the difficulty in delineating between closely related yet distinct subspecies. Despite differences in spotting pattern, both subspecies occur in the Snake River drainage and may occasionally hybridize.

Historic Range Relief Map



The SRFCT occurs from Jackson Lake and the Gros Ventre River drainage southward in the Snake River system to the South Fork of the Snake downstream of Palisades Reservoir. The finespotted subspecies also occurs in headwaters of the Bighorn River according to data provided by May et al. in a 2003 in an assessment utilized in our CSI analysis.

Compared to other subspecies of cutthroat trout, the conservation status of the SRFCT is very good, especially in the upper Snake River drainage where most subwatersheds scored in the highest CSI category. Of all the intermountain cutthroat subspecies, only the SRFCT continues to dominate their native range in the face of introduced salmonids.

Within the Bighorn River system, the distribution of SRFCT is more patchy with apparent extirpations in many tributaries and mainstem of the Wind River.

We have little data on lake populations although there are indications that many lake-dwelling subspecies of cutthroat have declined. Jackson Lake has a long history of stocking with lake trout, for example, which has clouded our knowledge of the historic diversity of SRFCT in that lake basin although it is clear that substantial declines in native cutthroat populations have occurred. Other lake populations in Grand Teton National Park have similarly declined as a result of non-native lake trout stockings

Population Integrity and Habitat Integrity scores are relatively high for nearly all subwatersheds in the upper Snake River drainage and the Greybull River (Bighorn drainage). Lowest scores for Population Integrity are in the Wind River drainage, where populations are more isolated and in need of restorative work. Another highly isolated population occurs in the Nowood River drainage, where most historic populations are believed to be extirpated.

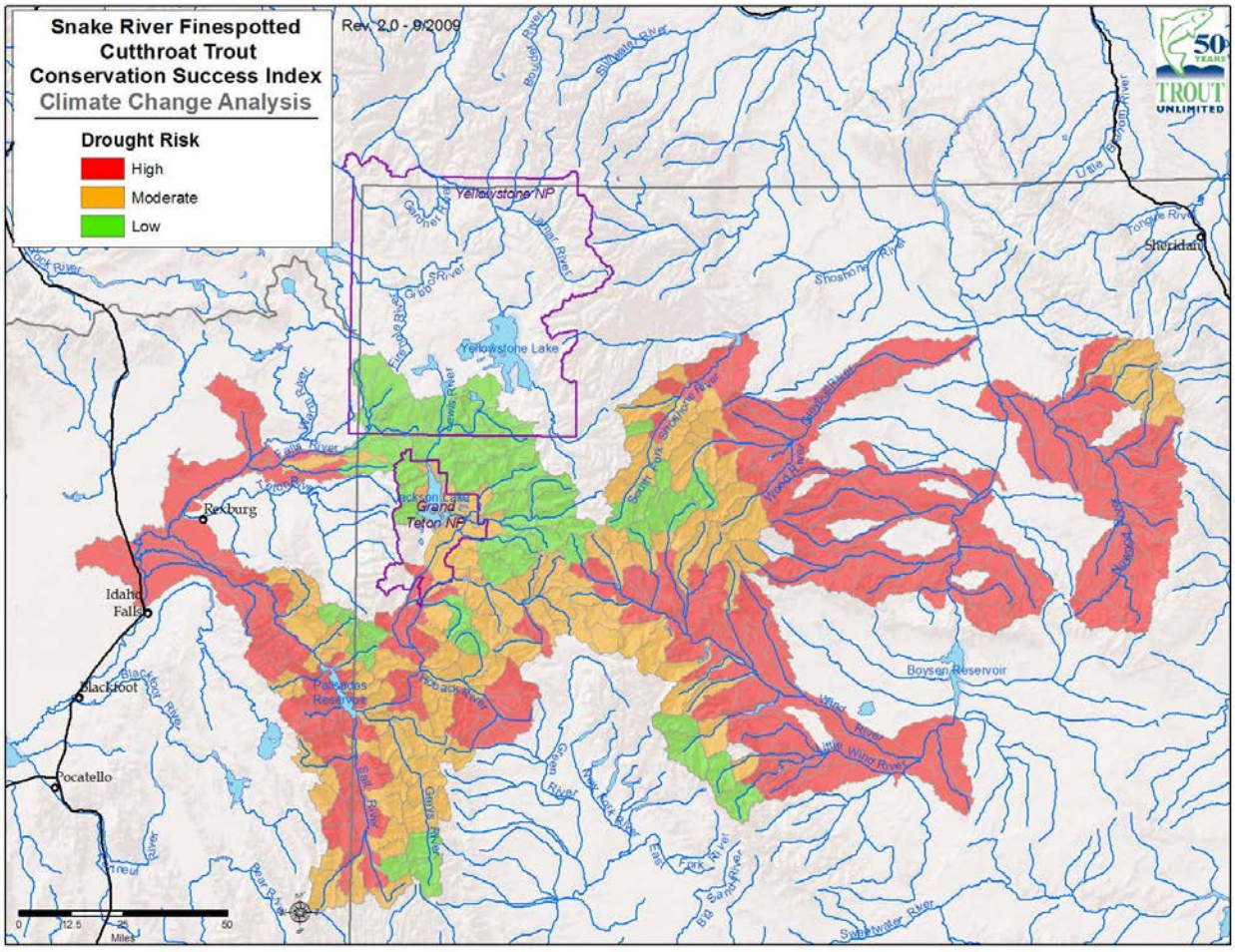
Key CSI Findings

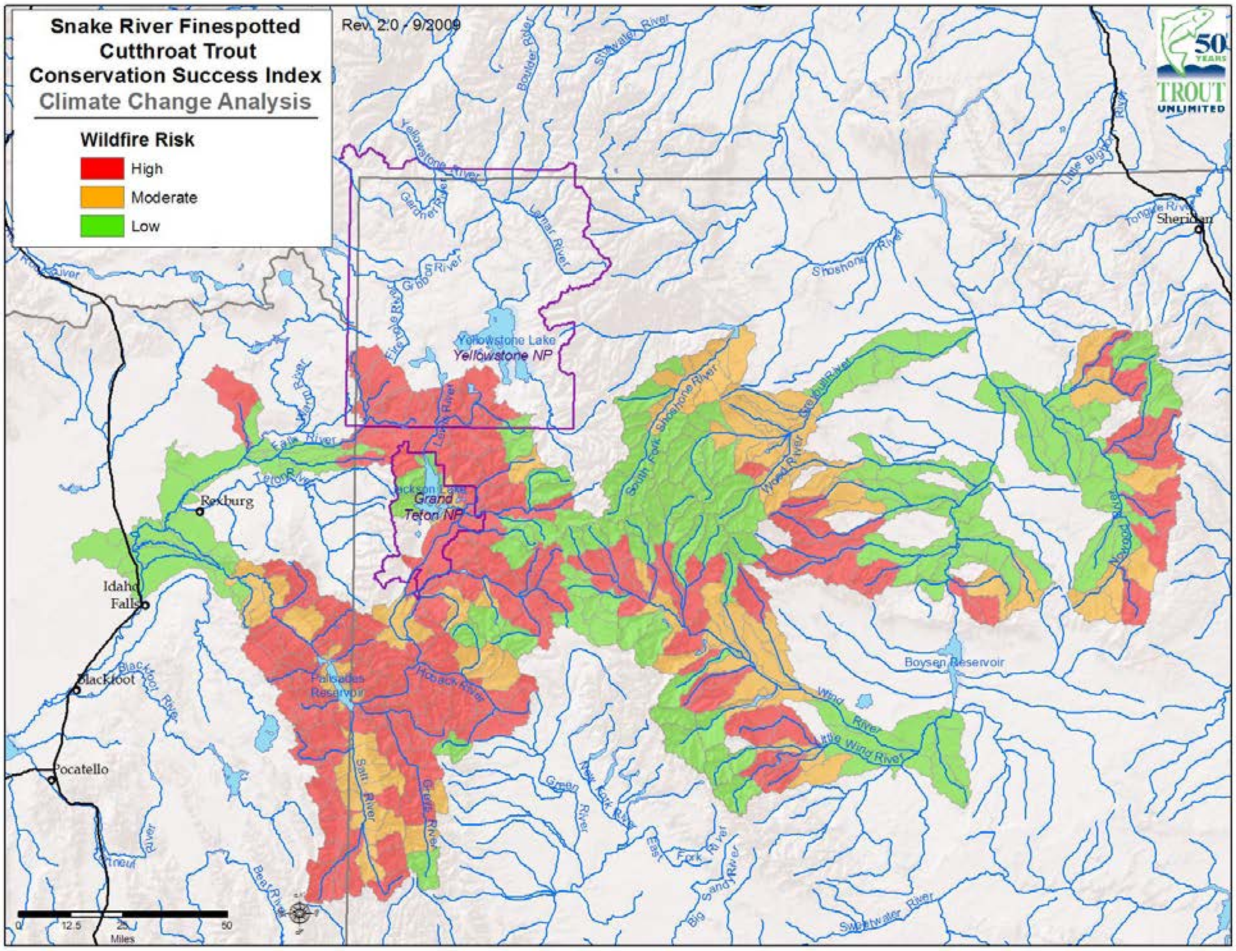
- Much of the historic habitat in the Snake River drainage ranks high integrity
- Nearly half (49%) of historic range is occupied as measured by subwatersheds
- Total CSI scores are relatively high: 80% of range-wide subwatersheds with current populations score 81/100 or higher
- Only 3% of occupied subwatersheds have total CSI scores less than 70/100

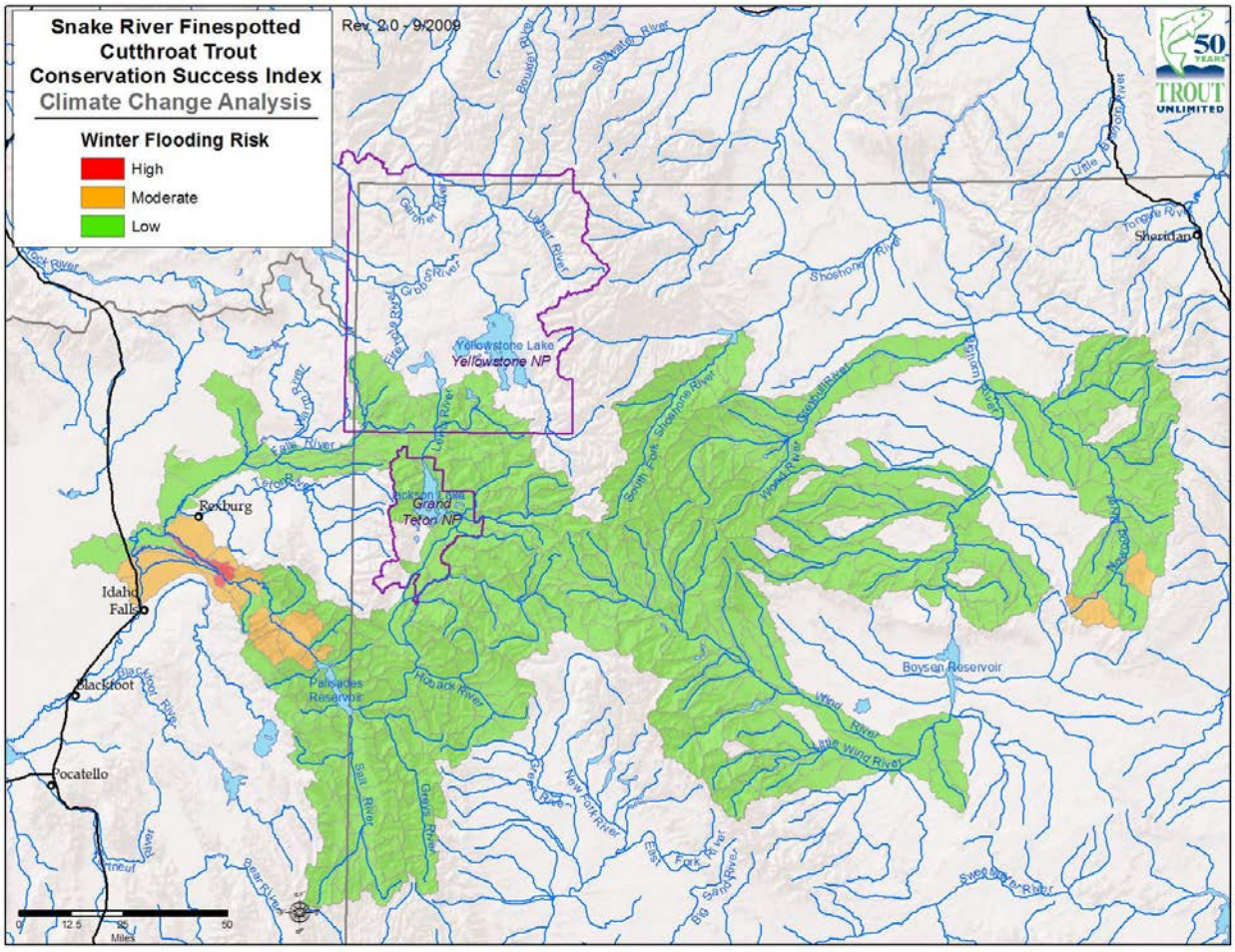
- Introduction of non-native trouts is the greatest remaining threat to many populations

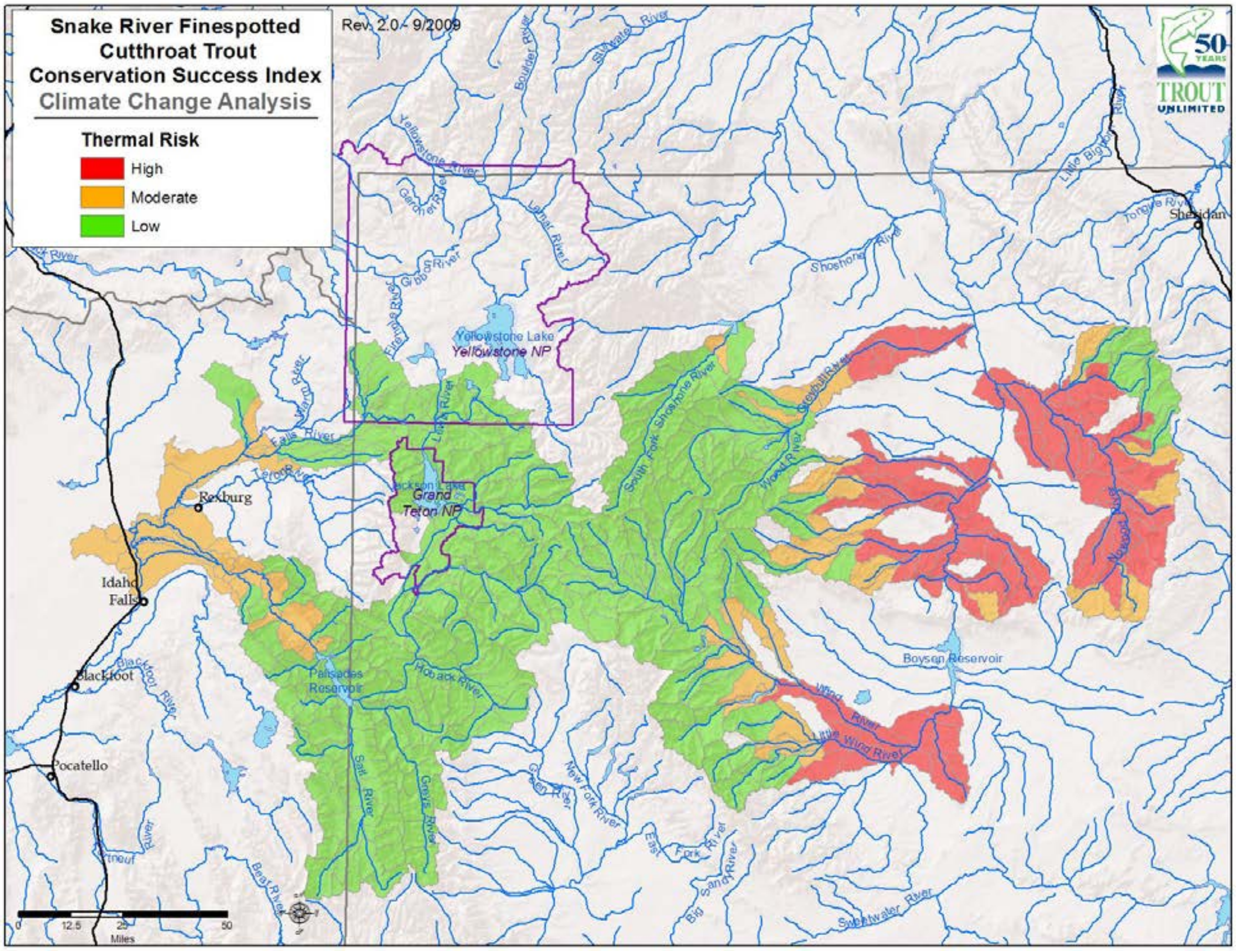
Despite recent assessments, our CSI reveals many important gaps in our understanding of the SRFCT, including genetic and taxonomic relationships with the Yellowstone cutthroat. Lake populations appear more threatened than stream forms but data on lake populations are scarce.

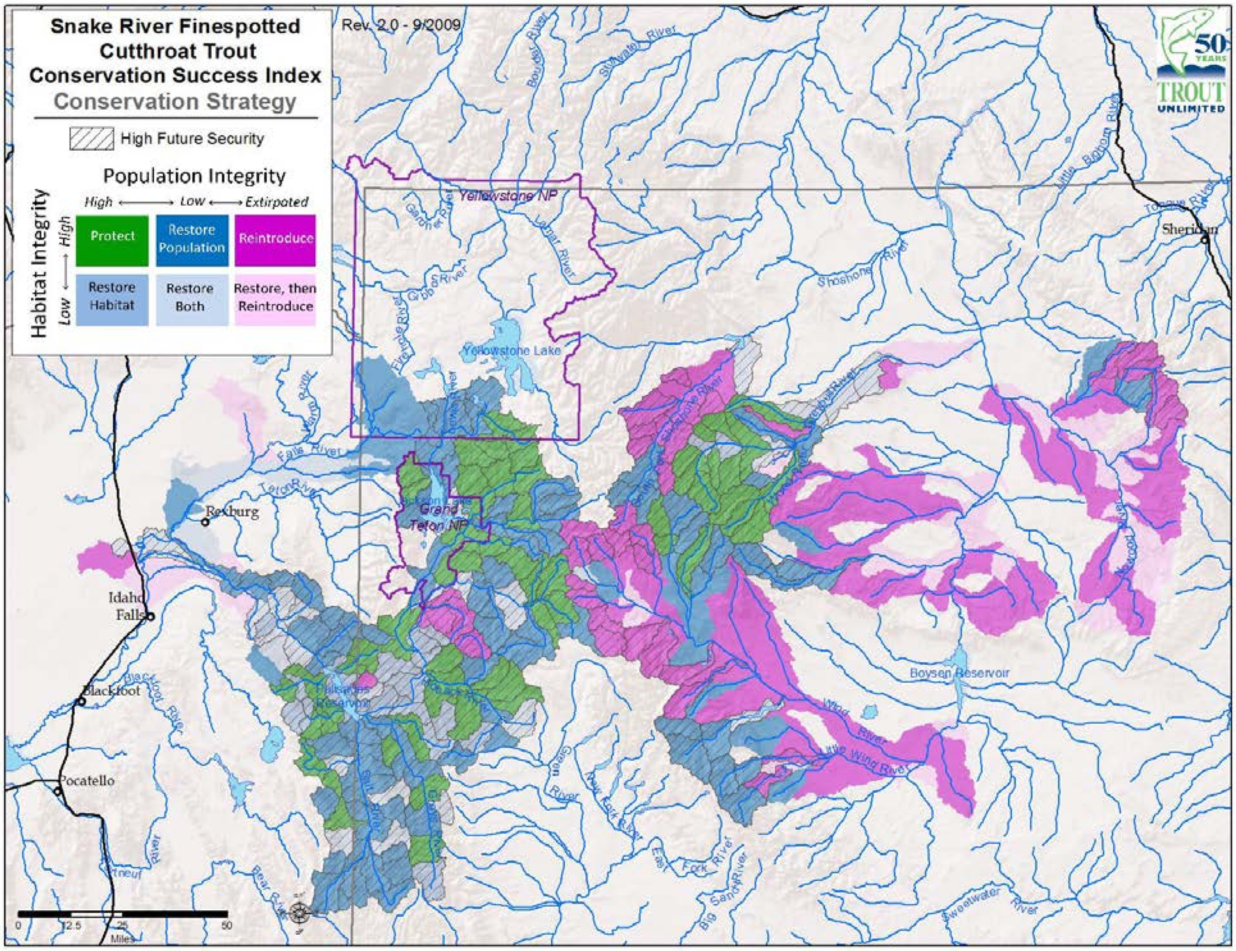
Prepared by Jack E. Williams, TU, 12/1/2006

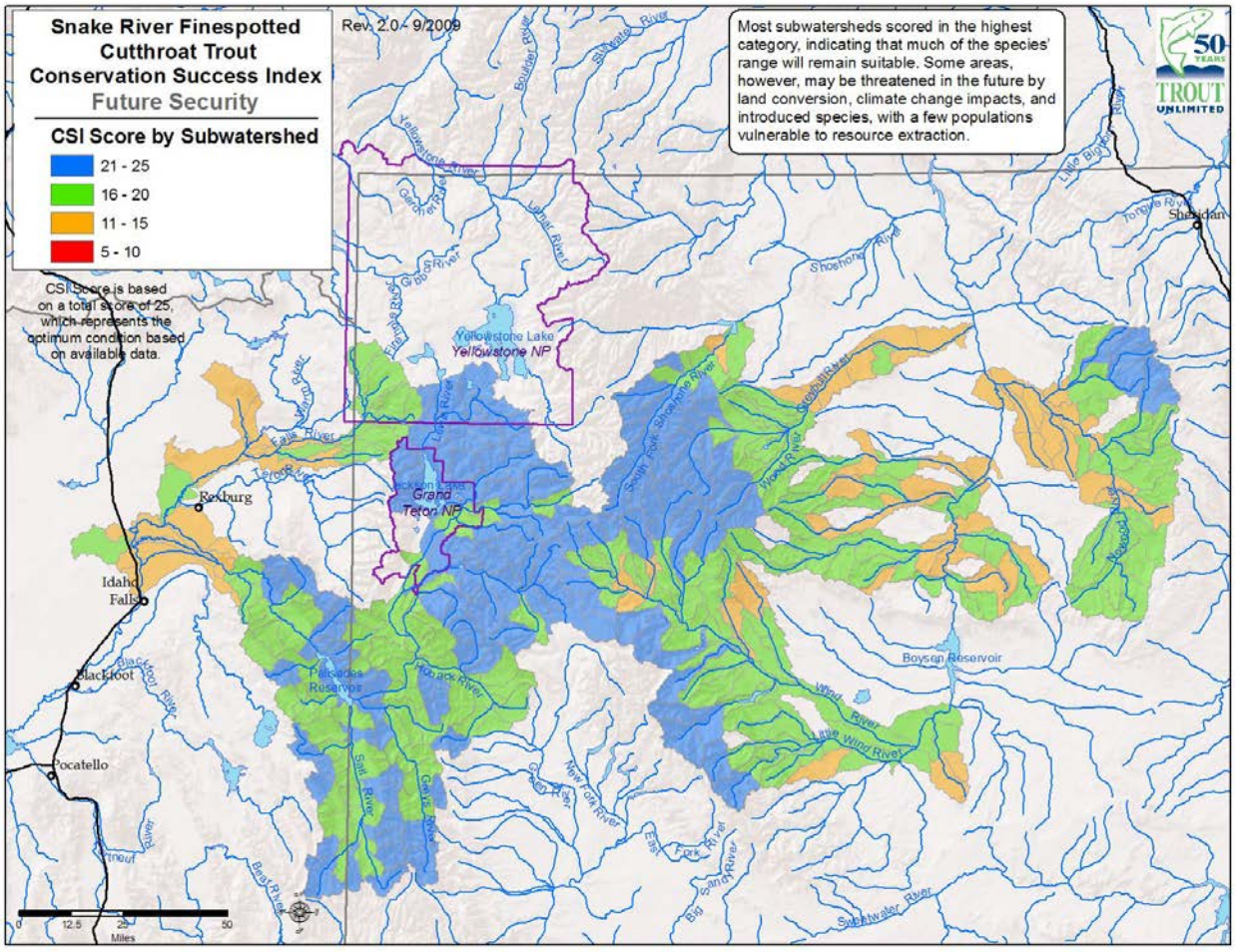

Snake River Finespotted Cutthroat Trout Conservation Success Index
Climate Change Analysis
Drought Risk
High
Moderate
Low
Rev. 2.0 - 9/2009
Yellowstone NP
Grand Teton NP
Yellowstone Lake
Jackson Lake
Rexburg
Idaho Falls
Blackfoot
Pocatello
Palisades Reservoir
Boysen Reservoir
Sheridan
0
12.5
25
50
Miles

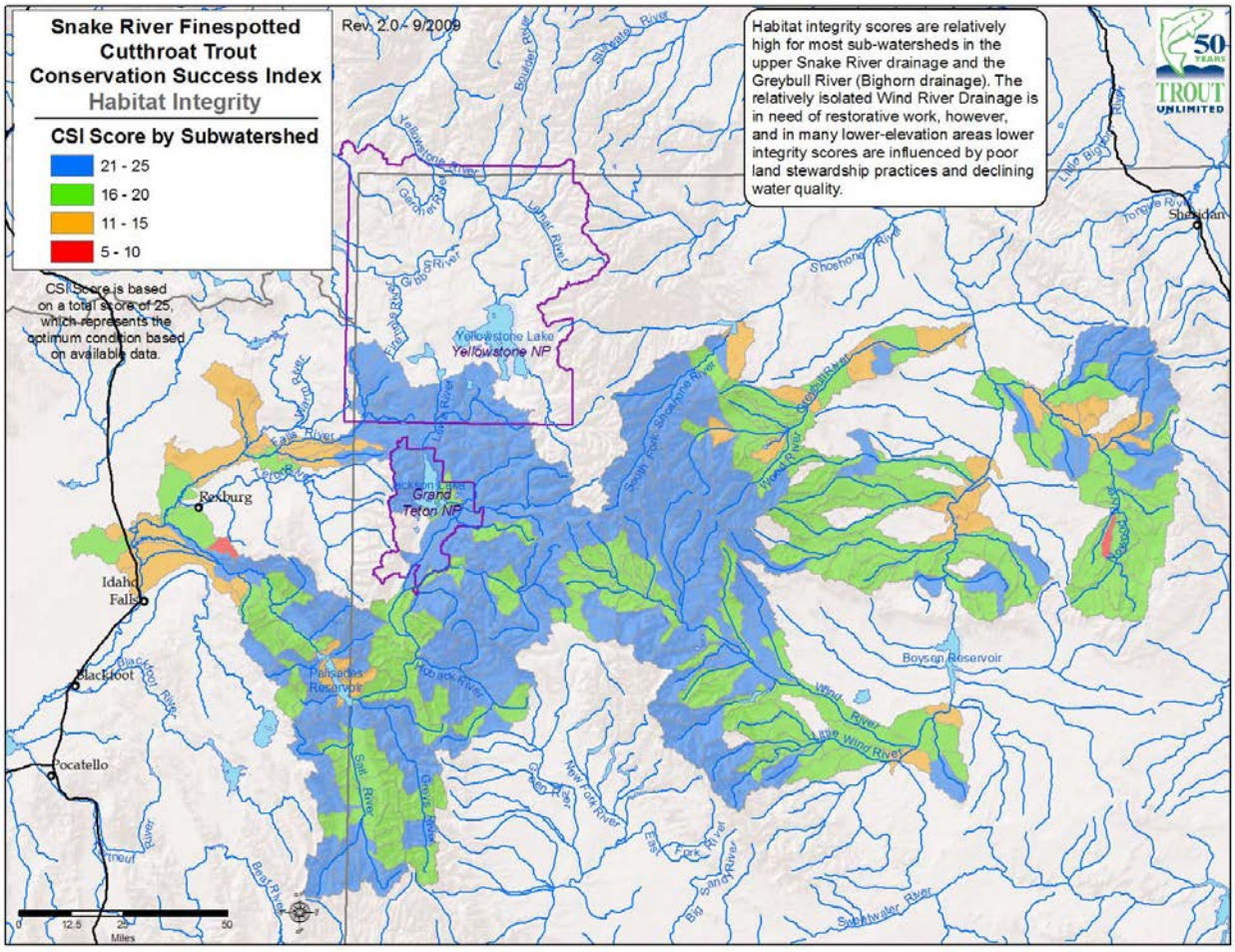

Snake River Finespotted
Cutthroat Trout
Conservation Success Index
Climate Change Analysis
Wildfire Risk
High
Moderate
Low
Rev. 2.0 - 9/2009
Yellowstone Lake
Yellowstone NP
Grand
Teton NP
Rexburg
Idaho
Falls
Blackfoot
Pocatello
Sheridan
Boysen Reservoir
Palisades
Reservoir
Miles

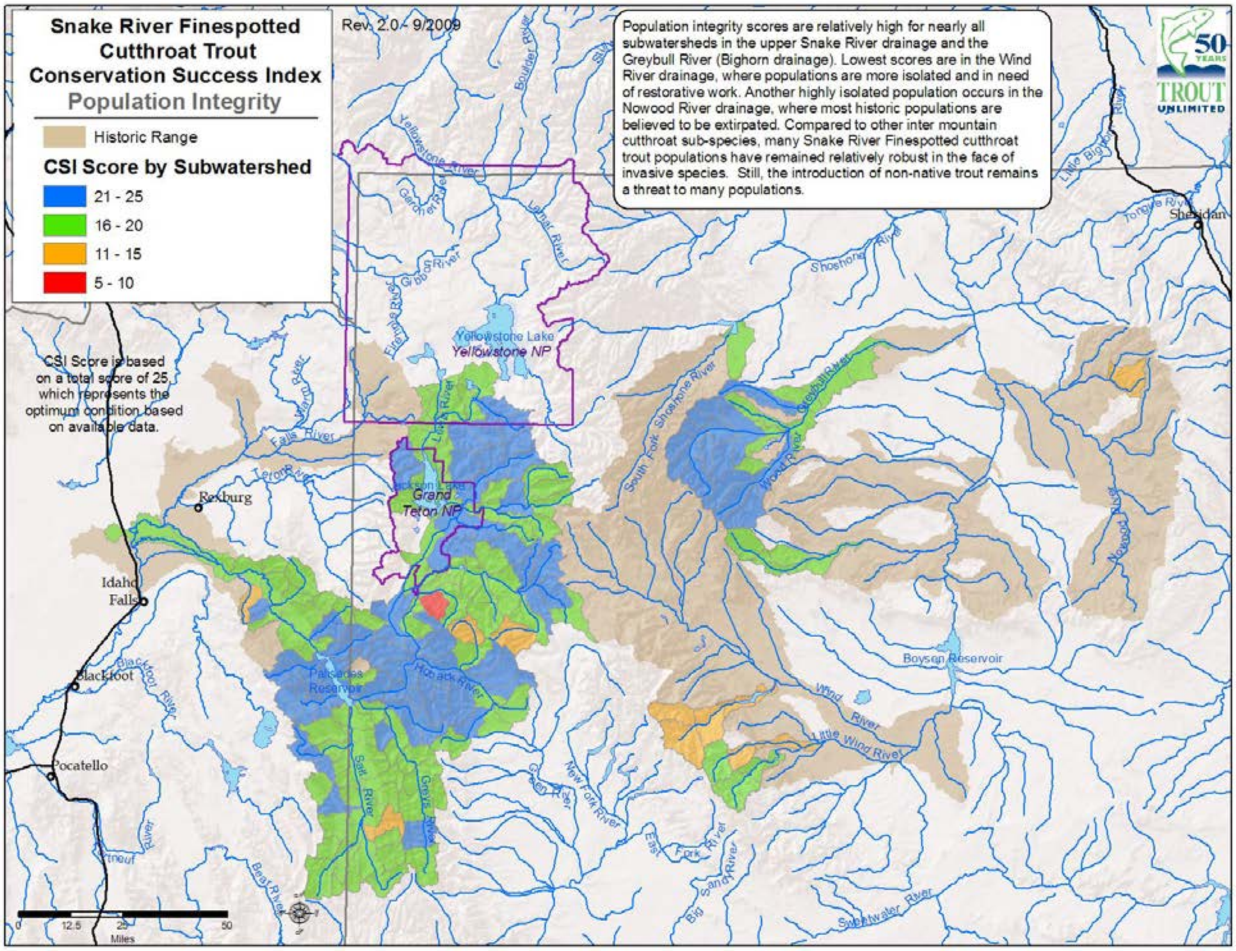

Snake River Finespotted Cutthroat Trout Conservation Success Index
Climate Change Analysis
Winter Flooding Risk
High
Moderate
Low
Rev. 2.0 - 9/2009
50 YEARS
TROUT UNLIMITED
Yellowstone Lake
Yellowstone NP
Grand Teton NP
Rexburg
Idaho Falls
Blackfoot
Pocatello
Palisades Reservoir
Boysen Reservoir
Sheridan
Miles

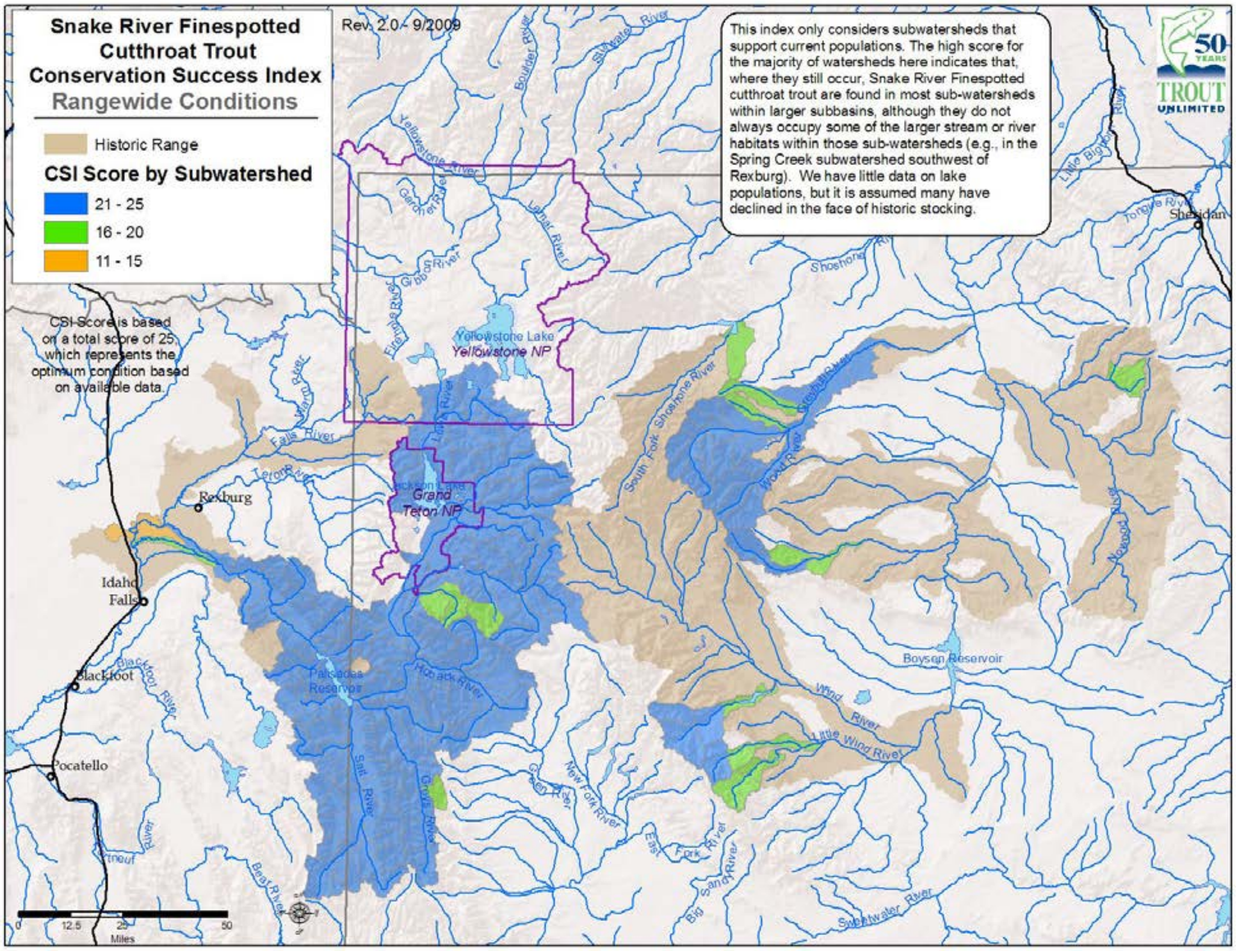

Snake River Finespotted Cutthroat Trout Conservation Success Index
Climate Change Analysis
Thermal Risk
High
Moderate
Low
Rev. 2.0 - 9/2009
Yellowstone Lake
Yellowstone NP
Jackson Lake
Grand Teton NP
Rexburg
Idaho Falls
Blackfoot
Pocatello
Sheridan
Palisades Reservoir
Boysen Reservoir
Yellowstone River
Gardiner River
Lamar River
Gibbon River
Firehole River
Falls River
Teton River
Lewis River
Hoback River
Salt River
Greys River
Green River
New Fork River
East Fork River
Big Sandy River
Sweetwater River
Wind River
Little Wind River
Shoshone River
South Fork Shoshone River
Wood River
Greybull River
Nowood River
Blackfoot River
Tongue River
Bear River
0
12.5
25
50
Miles

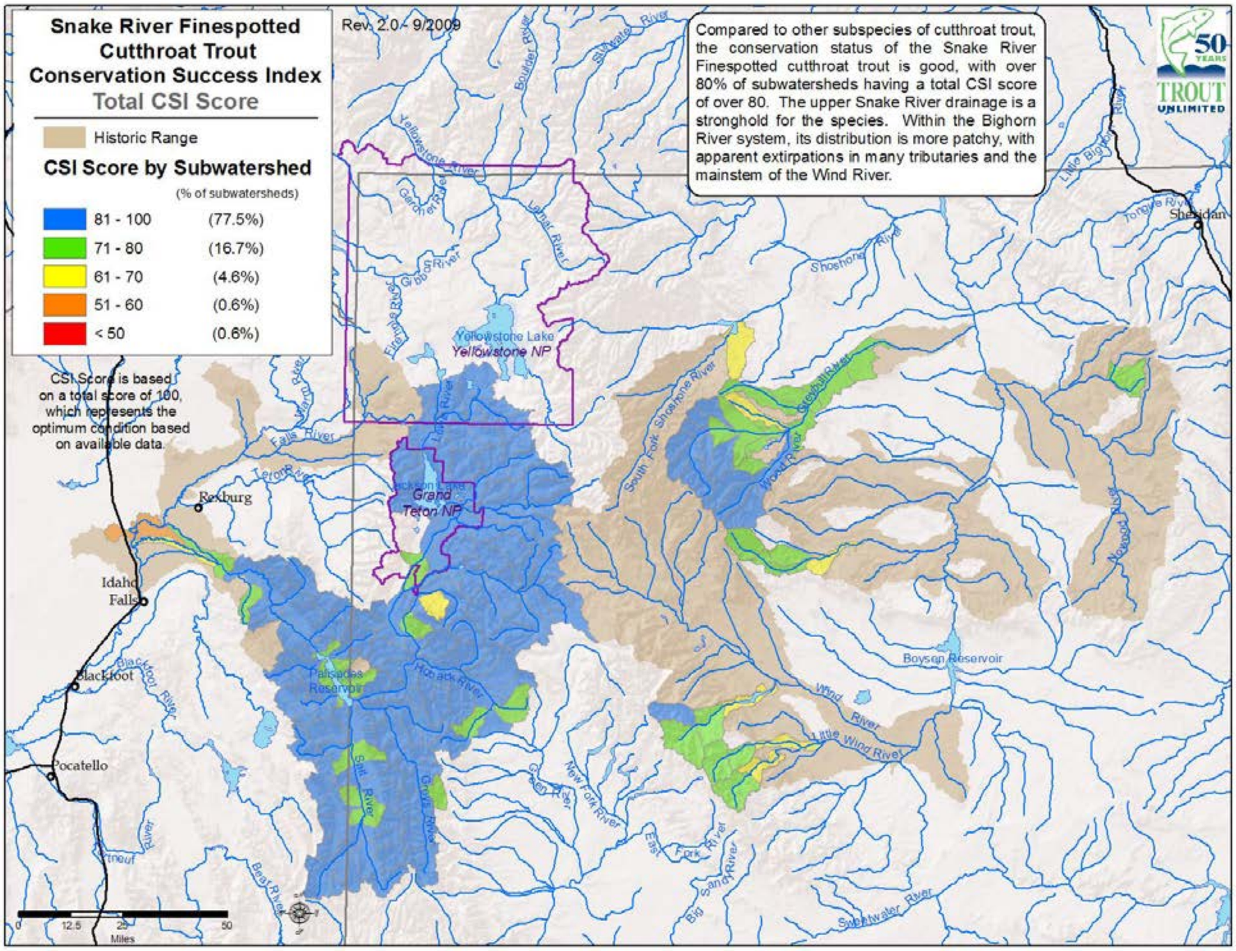

Snake River Finespotted
Cutthroat Trout
Conservation Success Index
Conservation Strategy
High Future Security
Population Integrity
High ←→ Low ←→ Extirpated
Habitat Integrity
Low ←→ High
Protect
Restore Population
Reintroduce
Restore Habitat
Restore Both
Restore, then Reintroduce
Rev. 2.0 - 9/2009
Yellowstone NP
Yellowstone Lake
Grand Teton NP
Rexburg
Idaho Falls
Blackfoot
Pocatello
Sheridan
Boysen Reservoir
Shoshone River
Wind River
Little Wind River
Falls River
Teton River
Green River
New Fork River
East Fork River
Big Sandy River
Sweetwater River
Bear River
0 12.5 25 50
Miles


Snake River Finespotted Cutthroat Trout Conservation Success Index
Future Security
CSI Score by Subwatershed
21 - 25
16 - 20
11 - 15
5 - 10
Rev. 2.0 - 9/2009
Most subwatersheds scored in the highest category, indicating that much of the species' range will remain suitable. Some areas, however, may be threatened in the future by land conversion, climate change impacts, and introduced species, with a few populations vulnerable to resource extraction.
CSI Score is based on a total score of 25, which represents the optimum condition based on available data.
50 YEARS
TROUT UNLIMITED
Yellowstone Lake
Yellowstone NP
Grand Teton NP
Jackson Lake
Palisades Reservoir
Boysen Reservoir
Sheridan
Rexburg
Idaho Falls
Blackfoot
Pocatello
0 12.5 25 50
Miles


Snake River Finespotted Cutthroat Trout Conservation Success Index
Habitat Integrity
CSI Score by Subwatershed
21 - 25
16 - 20
11 - 15
5 - 10
Rev. 2.0 - 9/2009
Habitat integrity scores are relatively high for most sub-watersheds in the upper Snake River drainage and the Greybull River (Bighorn drainage). The relatively isolated Wind River Drainage is in need of restorative work, however, and in many lower-elevation areas lower integrity scores are influenced by poor land stewardship practices and declining water quality.
CSI Score is based on a total score of 25, which represents the optimum condition based on available data.
50 YEARS
TROUT UNLIMITED
Yellowstone River
Boulder River
Stillwater River
Clarks Fork Yellowstone River
Lamar River
Gardner River
Gros Ventre River
Yellowstone Lake
Yellowstone NP
Little Bighorn River
Tongue River
Sheridan
Shoshone River
Wind River
Falls River
Teton River
Jackson Lake
Grand Teton NP
Rexburg
South Fork Shoshone River
Greybull River
Wood River
Nowood River
Idaho Falls
Blackfoot
Blackfoot River
Palisades Reservoir
Toboggan River
Boysen Reservoir
Wind River
Little Wind River
Pocatello
Salt River
Greys River
Snake River
Bear River
New Fork River
East Fork River
Big Sandy River
Sweetwater River
0
12.5
25
50
Miles


Snake River Finespotted Cutthroat Trout Conservation Success Index
Population Integrity
Historic Range
CSI Score by Subwatershed
21 - 25
16 - 20
11 - 15
5 - 10
Rev. 2.0 - 9/2009
Population integrity scores are relatively high for nearly all subwatersheds in the upper Snake River drainage and the Greybull River (Bighorn drainage). Lowest scores are in the Wind River drainage, where populations are more isolated and in need of restorative work. Another highly isolated population occurs in the Nowood River drainage, where most historic populations are believed to be extirpated. Compared to other inter mountain cutthroat sub-species, many Snake River Finespotted cutthroat trout populations have remained relatively robust in the face of invasive species. Still, the introduction of non-native trout remains a threat to many populations.
50 YEARS
TROUT UNLIMITED
CSI Score is based on a total score of 25, which represents the optimum condition based on available data.
Yellowstone Lake
Yellowstone NP
Grand Teton NP
Rexburg
Idaho Falls
Blackfoot
Pocatello
Sheridan
Boysen Reservoir
Palisades Reservoir
Hoback River
Salt River
Greybull River
Wood River
South Fork Shoshone River
Shoshone River
Wind River
Little Wind River
Nowood River
New Fork River
Green River
East Fork River
Big Sandy River
Sweetwater River
Bear River
Falls River
Teton River
Yellowstone River
Gardner River
Lamar River
Gibbon River
Boulder River
Tongue River
0 12.5 25 50
Miles


Snake River Finespotted
Cutthroat Trout
Conservation Success Index
Rangewide Conditions
Historic Range
CSI Score by Subwatershed
21 - 25
16 - 20
11 - 15
Rev. 2.0 - 9/2009
This index only considers subwatersheds that support current populations. The high score for the majority of watersheds here indicates that, where they still occur, Snake River Finespotted cutthroat trout are found in most sub-watersheds within larger subbasins, although they do not always occupy some of the larger stream or river habitats within those sub-watersheds (e.g., in the Spring Creek subwatershed southwest of Rexburg). We have little data on lake populations, but it is assumed many have declined in the face of historic stocking.
CSI Score is based on a total score of 25 which represents the optimum condition based on available data.
50 YEARS
TROUT UNLIMITED
Yellowstone Lake
Yellowstone NP
Grand
Teton NP
Rexburg
Idaho
Falls
Blackfoot
Pocatello
Sheridan
Boysen Reservoir
Palisades Reservoir
Yellowstone River
Gardiner River
Lamar River
Falls River
Teton River
Hoback River
Salt River
Green River
New Fork River
Wind River
Little Wind River
Sweetwater River
Shoshone River
South Fork Shoshone River
Wood River
Blackfoot River
Bear River
0
12.5
25
50
Miles


Snake River Finespotted
Cutthroat Trout
Conservation Success Index
Total CSI Score
Historic Range
CSI Score by Subwatershed
(% of subwatersheds)
81 - 100 (77.5%)
71 - 80 (16.7%)
61 - 70 (4.6%)
51 - 60 (0.6%)
< 50 (0.6%)
Rev. 2.0 - 9/2009
Compared to other subspecies of cutthroat trout, the conservation status of the Snake River Finespotted cutthroat trout is good, with over 80% of subwatersheds having a total CSI score of over 80. The upper Snake River drainage is a stronghold for the species. Within the Bighorn River system, its distribution is more patchy, with apparent extirpations in many tributaries and the mainstem of the Wind River.
CSI Score is based on a total score of 100, which represents the optimum condition based on available data.
50 YEARS
TROUT UNLIMITED
Yellowstone Lake
Yellowstone NP
Grand Teton NP
Rexburg
Idaho Falls
Blackfoot
Pocatello
Sheridan
Boysen Reservoir
Palisades Reservoir
Yellowstone River
Gardiner River
Lamar River
Gibbon River
Falls River
Teton River
Shoshone River
South Fork Shoshone River
Greybull River
Wood River
Wind River
Little Wind River
Hoback River
Salt River
Greys River
Green River
New Fork River
East Fork River
Big Sandy River
Sweetwater River
Bear River
Blackfoot River
Boulder River
Stillwater River
Tongue River
Nowood River
0 12.5 25 50
Miles

Conservation Success Index
Yellowstone and Snake River Fine Spotted Cutthroat Trout Rule Set

April 2008

Range-wide Conditions

Scored for conservation populations as defined by assessment using different historic ranges for the two species.

Historic habitat is all perennial streams and connected, natural lakes across historic range. Lakes less than 2 hectares that are connected to streams are considered stream habitat while lakes greater than 2 hectares or isolated lakes are calculated as lake habitat.

1. Percent historic stream habitat occupied. Portions of the stream network that coincide with natural lakes in the assessment data should be excluded as stream habitat.

Occupied stream habitat	CSI Score
0 – 9%	1
10 – 19%	2
20 – 34%	3
35 – 49%	4
50 – 100%	5

May, B.E., W. Urie, B.B. Shephard and the Yellowstone Cutthroat Interagency Coordination Group. 2003. Range-wide status of Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*): 2001. Yellowstone Cutthroat Interagency Coordination Group, Boise, Idaho.

2. Percent subbasins occupied.

Percent subbasins occupied	CSI Score
1-49%	1
50-69%	2
70-79%	3
80-89%	4
90-100%	5

Source: May et al. 2003.

U.S. Geologic Survey, Subbasins (4th order HUCs), 1:2,000,000, July 2005.
3. Subwatersheds occupied within subbasin.

Percent subwatersheds occupied by subbasin	CSI Score
1 – 20%	1
21-40%	2
41-60%	3
61-80%	4
81-100%	5

Source: May et al. 2003.

U.S. Department of Agriculture, Idaho, Wyoming Geographic Information Science Center, Idaho Department of Water Resources, Montana Natural Resources Information System. Sub-watersheds, 6th order HUCs

4. Habitat by stream order occupied.

Occupied 2nd order streams and higher	CSI Score
0 – 9%	1
10 – 14%	2
15 – 19%	3
20 – 24%	4
25 – 100%	5

Source: May et al. 2003.

US Geological Survey, National Hydrography Dataset Plus, 1:100,000.

5. Historic lake habitat occupied.

All natural lakes within historic range are counted as historic lake habitat. Current lake habitat is based on intersection of stream network for conservation populations with lakes.

Occupied lake habitat	CSI Score
0 – 9%	1
10 – 19%	2
20 – 34%	3
35 – 49%	4
50 – 100%	5

Source: May et al. 2003.

US Geological Survey, National Hydrography Dataset Plus, 1:100,000.

Population Integrity

Scored for conservation populations based on rangewide assessment.
Lake populations were incorporated as a linear distance.

1. Density – uses tables on Population Size and Fish Presence/Abundance.

Presence/Abundance	Population Size	CSI Score
R (rare)	any	1
C (common)	4 (< 50)	2
C (common)	3 (50 – 500)	3
C (common)	2 (500 – 2,000)	4
C (common)	1 (GT 2,000)	5
A (abundant)	any	5

Source: May et al. 2003.

2. Population Extent – based on risk table Temporal Variability.

Rank	CSI Score
4 (LT 10 km connected)	1
3 (10-25 km connected)	2
	3
2 (25-75 km connected)	4
1 (GE 75 km connected)	5

Source: May et al. 2003.

3. Genetic Purity – based on table Fish Presence Genetics.

Genetics Rank	CSI Score
C (hybridized GT 25%)	1
B (hybridized LT 25%)	2
J (suspected hybridized)	2
N (hybridized and pure)	3
H (potentially unaltered)	4
A (pure)	5

Source: May et al. 2003.

4. Disease Vulnerability – based on tables Fish Presence (competing species), Isolation Risk and Fish Presence Restoration Efforts .

Competing Species	Isolation	CSI Score
Yes	1/2	1
Yes	3/4	2
No	1	3
No	2	4
No	3/4	5

Source: May et al. 2003.

5. Life History Diversity – three potential: resident, fluvial, and ad-fluvial. Use risk table for Isolation Risk to determine if migratory (fluvial) is present. Otherwise assume resident and check for lake (ad-fluvial).

Isolation Risk	Lake	CSI Score
4 (isolated)	Historic yes, present no	1
3 (questionable)	Historic yes, present no	2
3 (questionable)	Historic yes, present yes or historic no, present no	3
1 or 2	Historic yes, present no	3
2 (migratory present but weak connection)	Historic yes, present yes or historic no, present no	4
1 (migratory forms present)	Historic yes, present yes or historic no, present no	5

Source: May et al. 2003.

US Geological Survey, National Hydrography Dataset Plus, 1:100,000.

Habitat Integrity

Scored for all subwatersheds in historic range.

1. Land Stewardship – score using AND between two indicators

Protected occupied habitat	Subwatershed protection	CSI Score
none	any	1
1 – 9%	LT 25%	1
1 – 9%	GE 25%	2
10 – 19%	LT 25%	2
10 – 19%	GE 25%	3
20 – 29%	LT 50%	4
20 – 29%	GE 50%	5
GE 30%	any	5

Source: National Atlas, Federal Land Status.

Tele Atlas/GDT, Protected areas, 1:100,000. 2004.

U.S. Department of Agriculture, Forest Service, Geospatial Service and Technology Center. Inventoried Roadless Areas.

2. Watershed Connectivity (use barriers data provided with assessment and dam data.)

Current/historic connectivity 6th	CSI Score
LT 50%	1
50 – 74%	2
75 – 89%	3
90 – 94%	4
95 – 100%	5

Current/historic connectivity 5th:

- GT 90%: +1
- LT 50%: -1

Source: May et al. 2003.

US Army Corps of Engineers, Dams, March 22, 2006.

US Geological Survey, National Hydrography Dataset Plus, 1:100,000.

3. Watershed Conditions

Land conversion	CSI Score
GE 30%	1
20 – 29%	2
10 – 19%	3
5 – 9%	4
0 - 4%	5

CSI score is downgraded 1 point if road density is GE 1.7 and LT 4.7 mi/square mile. If road density is GE 4.7 mi/square mile it is downgraded 2 points.

Source: Tele Atlas North America, Inc./Geographic Data Technology, Inc., ESRI. Roads. 2005.

U.S. Geologic Survey, Idaho, Oregon, Washington, Wyoming GAP Analysis Project (100 meter). Land cover/Land use.

4. Water Quality

Miles 303(d) Streams	Percent Agricultural Land	Number Active Mines	Strm mi/rd mi*	CSI Score
GT 0	58-100%	GE 10	0.5 – 1.0	1
	28-57%	7-9	0.25 – 0.49	2
	16-27%	4-6	0.24 - 0.10	3
	6-15%	1-3	0.05 – 0.09	4
	0-5%	0	0 – 0.04	5

Score for worst case.

Source: Tele Atlas North America, Inc./Geographic Data Technology, Inc., ESRI. Roads. 2005.

U.S. Environmental Protection Agency. 303(d) streams, 1:24,000; 2002.

US Geological Survey, National Hydrography Dataset Plus, 1:100,000.

U.S. Geologic Survey, Idaho, Oregon, Washington, Wyoming GAP Analysis Project (100 meter). Land cover/Land use.

U.S. Geological Survey, Mineral Resources Data System: U.S. Geological Survey, Reston, Virginia. Active Mines. 2005.

5. Flow Regime

Number of dams	Number of diversions	Storage (acre-ft)/stream mile	CSI Score
GE 5	GE 30	GE 2,500	1
3 – 4	20 – 29	1,000 – 2,499	2
2	10 – 19	250 – 999	3
1	5 – 9	1- 249	4
0	LT 5	0	5

Score for worst case.

Source: U.S. Army Corps of Engineers. Dams, March 22, 2006

US Geological Survey, National Hydrography Dataset Plus, 1:100,000.

Future Security
Scored for all subwatersheds in historic range.

1. Land Conversion – modeled based on slope, land ownership, roads, and urban areas.

Land Vulnerable to Conversion	CSI Score
81 – 100%	1
61 – 80%	2
41 - 60%	3
21 - 40%	4
0 – 20%	5

Sources: National Atlas, Land ownership.

Tele Atlas/GDT, Population centers, 1:300,000; 1997.

Tele Atlas/GDT, Road network, 1:100,000; 2002.

USGS Digital Elevation Model. 30 meter.

2. Resource extraction

Oil and gas leases/reserves	Mine Claims	CSI Score

	% of Subwatershed	
51-100%	51 -100%	1
26 – 50%	26-50%	2
11 – 25%	11-25%	3
1 – 10%	1 – 10%	4
0%	0%	5

Use percent of protected land within subwatershed as qualifier.
25 – 50% protected – 1 additional point
GT 50% protected – 2 additional points
Score for worst case.

Source: Hyndman, Paul C. , and Campbell, Harry W. , Digital Databases Containing Mining Claim Density Information for Arizona, California, Colorado, Idaho, Montana, Nebraska, New Mexico, Nevada, Oregon, South Dakota, Utah, Washington, and Wyoming Created From the BLM Mining Claim Recordation System: 1996: U.S. Geological Survey Open-File Report 99-325. Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, 6/30/2005, comap_v4_final_public

U.S. Department of Energy, EPCA. Oil and gas reserves, 2005.

3. Flow Modification – based on INEL hydropower potential data set.

New Dams 5th	New Dams 6th	CSI Score
GE 0	GE 2	1
GE 1	1	2
GE 0	1	3
GE 1	0	4
0	0	5

Source: U.S. Department of Energy, Idaho National Laboratory,Water energy resource assessment of the United States, 1995 - 1998.

4. Climate Change – Based on TU Climate Change analysis, which focuses on 3 identified risk factors related to climate change-

a. Increased Summer Temperature- loss of lower-elevation (higher-order) habitat
b. Increased Winter Flooding- Rain-on-snow events lead to more and larger floods

c. Increased Wildfire- earlier spring snowmelt coupled with warmer temperatures results in drier fuels and longer burning, more intense wildfire

TU Climate Change Analysis	
Climate Risk Factors	**CSI Score**
(High, Mod., Any)	1
(Mod., Mod., Mod.) OR (High, Low, Low)	2
(Mod., Mod., Low)	3
(Low, Low, Mod.)	4
(Low, Low, Low)	5

Source: PRISM Group, Oregon State University. Mean July Temperature, 1970 – 2000. 800 meter.

PRISM Group, Oregon State University. Monthly Precipitation Normals, 1970 – 2000. 800 meter.

U.S. Forest Service, LANDFIRE Fire Behavior Fuel Model 13. 2006.

USGS Digital Elevation Model. 30 meter.

5. Introduced Species – do not currently have rangewide data on introduced species.

Present in 5th	Present in 6th	Road Density	CSI Score
Yes	Yes	any	1
Yes	No	GT 4.7	2
Yes	No	1.7 - 4.7	3
Yes	No	LT 1.7	4
No	No	any	5

Source: May et al. 2003.

Tele Atlas North America, Inc./Geographic Data Technology, Inc., ESRI. Roads. 2005.