

ONCORHYNCHUS CLARKII PLEURITICUS

Rev. 2.1 - 4/2010

## SPECIES SUMMARY

Historically, the Colorado River cutthroat trout (CRCT) occupied numerous tributary systems of the Colorado River upstream of the Grand Canyon. The Upper Green River system in Wyoming and Utah contains many extant populations, including remaining strongholds. Additional, but mostly scattered populations remain in the upper Colorado River, upper Gunnison, upper Dolores, upper Yampa, Little Snake, upper White, upper Duchesne, upper Escalante, and upper San Juan systems.

Robert Behnke reported on early pioneer records that CRCT reached weights of 17 to 20 pounds. If true, the fish may have grown to such large proportions in bigger lakes and larger stream systems than they typically inhabit today.

Key CSI Findings

- 16% of subwatersheds (213/1351) within historic range are occupied by CRCT
- Most populations are fragmented and restricted to smaller headwater streams
- Only 1% of populations were classified in highest Population Integrity category
- Genetically unaltered CRCT may occupy as much as 51% of currently occupied range
- The CRCT Conservation Team has identified 285 separate CRCT "conservation populations" with important genetic and life history traits
- Reintroductions into unoccupied habitat were the highest management priority. High

# Proceeding I de no Casper Wyoming Salt Lake City Utah Utah Grond Juretion Coincado Darange Arizone Remington New Mexico

#### **Historic Range Relief Map**

priority reintroduction sites were identified throughout the range.



Photo courtesy Colorado Division of Wildlife

In more recent years, CRCT have been pushed into higher elevation streams by the same cast of problems that plague most native trout in the West: introductions of non-native trout, habitat degradation from timber harvest and overgrazing, excessive fish harvest, and fragmentation of stream habitat by water diversions and other barriers. In 1996, Michael Young and colleagues from the U.S. Forest Service estimated that 318 populations of CRCT existed in their native range.

Strongholds for CRCT are very few and occupy limited habitat compared to most other western trouts. Two stronghold areas were identified in the CSI, both in the upper Green River drainage. One, the LaBarge Creek system, occurs in the Bridger-Teton National Forest of Wyoming. The other, the Blacks Fork drainage, occurs in the Ashley National Forest and along the Wyoming-Utah border.

Non-native trout stockings and their subsequent invasion into higher elevation habitats has been a major cause of declines and continues to have a major negative influence on remaining CRCT. Most migratory life histories and interconnected habitats have been lost. Dams and water diversions limit downstream movement, but ironically, may also serve as barriers to upstream invasion by non-native trouts. One of the most challenging needs for CRCT is the reestablishment of large, interconnected habitat areas where fluvial and adfluvial populations can exist free of non-native trout species.

Non-native species control and reintroduction efforts are the highest priority recovery actions. Existing watershed condition is relatively high throughout the historic range, with 19% of subwatersheds in the highest condition category. Protection of remaining strongholds also is vital, particularly in the face of widespread energy development on public lands. Currently, 51% of CRCT habitat in Wyoming lies in unprotected National Forest roadless areas.

We have very little data to assess lake populations and encourage various state and federal agencies to more closely monitor and report their status in the future.

Prepared by Jack E. Williams, TU, 4/23/2007





















## **Conservation Success Index**

Colorado River Cutthroat Trout Rule Set

#### **Range-wide Conditions**

Scored for conservation populations as defined by assessment.

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.

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

- Source: Hirsch, Christine L., et al. Range-Wide Status of Colorado River Cutthroat Trout (*Oncorhynchus clarkii pleuriticus*): 2005. 2006. Colorado River Cutthroat Trout Conservation Team.
- 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: Hirsch et al. 2005.

U.S. Geologic Survey, Subbasins (4<sup>th</sup> order HUCs), 1:2,000,000, July 2005.

3. Percent historically occupied subwatersheds currently 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: Hirsch et al. 2005.

U.S. Department of Agriculture, Forest Service, Natural Resources Conservation Service, Wyoming Geographic Information Science Center, Sub-watersheds, 6<sup>th</sup> order HUCs.

4. Habitat by stream order occupied.

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

Source: Hirsch et al. 2005.

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

5. Historic lake habitat occupied.

Historic lake populations only considered natural lakes while current populations have been identified in reservoirs thus leading to an increase in lake habitat for some subwatersheds.

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

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

## **Population Integrity**

Scored for conservation populations. Lake populations were incorporated as a linear distance.

1. Density – where multiple populations exist within a subwatershed, density was calculated as stream length weighted average. Use actual values for population total rather than classes listed in assessment.

Fish per mile	<b>Total Population</b>	CSI Score
1 - 50	LT 500	1
1 - 50	GE 500	2
51 - 150	GE 1	3
151 - 400	GE 1	4
GT 400	GE 1	5

Source: Hirsch et al. 2005.

2. Population Extent - based on table HUC Connectedness

Degree of connectedness	CSI Score
4 (Population Isolated)	1
3 (Weakly Connected)	2
2 (Moderately Connected)	4
1 (Strongly Connected)	5

Source: Hirsch et al. 2005.

3. Genetic Purity – based on table Genetic Status

Genetic Stability Ranking	CSI Score
4 (< 80%)	1
3, 6 (80% - 89%, Not Tested –	2
Hybridized)	
7 (Co-existence)	3
2 (90% - 99%)	4
1, 5 (Unaltered, Not Tested –	5
Unaltered)	

Source: Hirsch et al. 2005.

Disease Influence Risk	CSI Score
Ranking	
5 (Population is Infected)	1
4 (Significant Disease Risk)	2
3 (Moderate Disease Risk)	3
2 (Minimal Disease Risk)	4
1 (Limited Disease Risk)	5

4. Disease Vulnerability – based on table Disease Risk

## Source: Hirsch et al. 2005.

.

5. Life History Diversity – Life History table; resident, fluvial, and ad-fluvial

<b>Conservation population</b>	CSI Score
One life history form present:	1
Resident only	
	2
Two life histories present: Fluvial	3
and Resident with historic lakes	
but no current adfluvial forms	
	4
Two or three life histories	
present: Fluvial and resident with	5
no lake populations;	
Any combination with Adfluvial	
present	

Source: Hirsch et al. 2005.

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

Habitat Integrity

Scored for all subwatersheds in historic range.

Protected occupied	Subwatershed	CSI Score
habitat*	protection	
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

1.	Land Stewardship	- score using AND	between two indicators

\*If subwatershed only contains currently unoccupied habitat then scores are based only on subwatershed protection: <25% =1; 25 - 50% =3; >50% =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 includes both perennial and intermittent streams.

Number of stream/canal intersections	Current/historic connectivity 6th	CSI Score
GE 12	LT 50%	1
8-11	50 - 74%	2
5 - 7	75 - 89%	3
1 - 4	90-94%	4
0	95 - 100%	5

Current/historic connectivity 4<sup>th:</sup>

- GT 90%: +1
- LT 50%: -1 Score for worst case

Source: Hirsch et al. 2005.

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.

- Colorado Division of Wildlife: Colorado GAP Analysis Project (100 meter) Land cover/land use.
- U.S. Geologic Survey, Utah, Wyoming GAP Analysis Project (100 meter). Land cover/Land use.
- 4. Water Quality

Miles 303(d)	Percent	Number	Rd mi/	CSI
Streams	<b>Agricultural Land</b>	<b>Active Mines</b>	Str mi	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: Colorado Division of Wildlife: Colorado GAP Analysis Project (100 meter) Land cover/land use.

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, Utah, Wyoming, New Mexico GAP Analysis Project (100 meter) Land cover/Land use.
- U.S. Geological Survey, 2005, Mineral Resources Data System: U.S. Geological Survey, Reston, Virginia. Active Mines
- 5. Flow Regime

Number of	Miles of	Storage (acre-	CSI Score
dams	Canals	ft)/stream mile	
GE 5	GE 20	GE 2,500	1
3-4	10 - 19.9	1,000 - 2,499	2
2	5 – 9.9	250 - 999	3
1	1 - 4.9	1-249	4
0	0 - 0.9	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

Forest	Hard Metal	CSI
management	Mine Claims	Score
51-100%	51 -100%	1
26 - 50%	26-50%	2
11 - 25%	11-25%	3
1 - 10%	1 - 10%	4
0%	0%	5

Score for worst case.

<u>Source</u>: Timber management potential identifies productive forest types using the existing vegetation type in the Landfire dataset. The number of mining claims was determined using Bureau of Land Management data, and each claim was assumed to potentially impact 20 acres. Protected areas data were compiled from the ESRI, Tele Atlas North American / Geographic Data Technology dataset on protected areas and the U.S. Department of Agriculture, Forest Service's National Inventoried Roadless Areas dataset.

#### 3. Energy Development

Leases or			CSI Score
reserves	New Dams 4 <sup>th</sup>	New Dams 6 <sup>th</sup>	
51-100%	≥0	≥1	1
26 - 50%	3		2
11 - 25%	2		3
1 - 10%	1		4
0%	0		5

Score for worst case.

<u>Source</u>: Wind resources ("Good" and better) from Wind Powering America/National Renewable Energy Lab (NREL). Coal leases are mineable types from the Coal Fields of the United States dataset. Geothermal known and closed lease areas and oil and gas leases and agreements from BLM Geocommunicator.\* Potential dam sites are based on Idaho National Laboratory (INL)

<sup>\*</sup> Several geospatial data types are available from Geocommunicator, and they have the following definitions:

Lease: Parcel leased for oil and gas production.

Agreement: An 'agreement' between operator and host (private or public) to evaluate geological, logistic, geophysical, etc issues involving a concession. The agreement essentially allows a technical evaluation of lease feasibility.

hydropower potential data. Protected areas data were compiled from the ESRI, Tele Atlas North American / Geographic Data Technology dataset on protected areas and the U.S. Department of Agriculture, Forest Service's National Inventoried Roadless Areas dataset.

#### 4. Climate Change

TU Climate Change Analysis		
Climate Risk Factors	<b>CSI Score</b>	
High, High, Any., Any	1	
High, Any, Any, Any	2	
Mod., Mod., Mod, (Mod or Low)	3	
Mod, Mod, Low, Low	4	
Low, Low, Low, (Mod or Low)	5	

<u>Source</u>: Temperature and precipitation data were obtained from the PRISM Group. Elevation data was obtained from the National Elevation Dataset, and LANDFIRE data for the Anderson Fire Behavior Fuel Model 13 was used as input for wildfire risk. The Palmer Drought Severity Index was used for drought risk, but was adjusted for elevation (elevations above 2690 have lower risk) and the deviation from mean annual precipitation (areas with more precipitation on average have lower risk).

5. Introduced Species – primary scoring based on Genetic Risk table (unknown = present)

Present in 4th	Present in 6th	Road Density	CSI Score
Yes	Yes	Any	1
Yes	No	GT 4.7	2

Unit Agreements: Multiple entities go in collectively on an agreement. Implied: there are limits to the number of agreements that one individual entity can have outstanding, and a unit agreement allows them to get around the limit.

Communitization: Combining smaller federal tracts to meet the necessary minimum acreage required by the BLM (for spacing purposes).

Authorized: Bid on and sold lease or authorization, ready for production.

*Lease Sale Parcel*: Parcel slated for auction but not yet sold.

*Closed*: Not retired, just expired and may become available and open to resubmittal.

Other Agreements: Catch-all for other agreement types.

Yes	No	1.7 - 4.7	3
Yes	No	LT 1.7	4
No	No	Any	5

If genetic risk data is not available for the 6<sup>th</sup> order HUC

Present in	<b>Road Density</b>	CSI Score
4th		
Yes	GT 4.7	1
Yes	3.7 - 4.7	2
Yes	2.7 - 3.7	3
Yes	LT 2.7	4
No	any	5

If genetic risk data is not available for the 6<sup>th</sup> or 4<sup>th</sup> order HUCs

<b>Road Density</b>	CSI Score
GT 4.7	1
3.7 – 4.7	2
2.7 - 3.7	3
1.7 - 2.7	4
LT 1.7	5

Source: Hirsch et al. 2005.

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