

ENTIAT WATERSHED

Vol. I: 2008

ANNUAL REPORT

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CASCADIA
CONSERVATION DISTRICT

FISHING SEASON OPENS ON THE ENTIAT RIVER

“Getting the fishing season was very big ... This is something that was a primary motivator to be involved, to re-establish a fishery in the Entiat and have something to share with our children and grandchildren.” ~ Bob Whitehall, Landowner

Last summer the Entiat River opened to fishing for the first time in more than a decade. Spring Chinook salmon fishing opened on July 15th as a result of coordinated efforts by state and federal agency staff and tireless work by local landowners.

The diligence of committed individuals was only part of the successful re-opening. A combination of factors allowed the season to open — the primary trigger was reaching an adequate number of harvestable returning fish. Once this was achieved, a permit from the National Oceanic and Atmospheric Administration, or NOAA, had to be obtained.

When the Washington State Department of Fish and Wildlife finally received the permit from NOAA and completed the necessary actions to allow for a season, such as updating the fishing regulations, there was a collective sigh of relief in the Entiat Valley. The opening of the fishing season in 2008 marked one of a series of major milestones in the development and implementation of the Entiat Watershed Plan.

There was gratification in seeing people fishing on the Entiat again. The opening of the fishing season on the Entiat represents a significant reward and the landowners and community should be congratulated for the time and energy invested in working toward solutions to local watershed management issues.



Tony Bird with an Entiat River Spring Chinook salmon caught last summer.



Dear Reader,

The Cascadia Conservation District, on behalf of the Entiat Watershed Planning Unit (EWPU), is proud to provide you with the inaugural Entiat Watershed Annual Report. This report describes accomplishments in the Entiat River between 2006 and 2008 as a result of implementing the Entiat Watershed Plan and associated monitoring efforts. This document only includes the most recent projects in a long-term effort to address the water quantity, water quality and habitat issues in the watershed.

It will be apparent while reading this report that a tremendous amount of work has been completed and is actively being carried out by many, many people. And yet this report only reflects what has been done in the last three years! More importantly, these achievements are based on the grass roots support of local landowners and agency representatives working towards a common goal of improving and maintaining water supply for people and fish in the Entiat River watershed. This grass roots effort first began over 15 years ago and continues to be a successful model for other parts of Washington State. Extensive monitoring is in place to track the results of this hard work.

I encourage you, as you read this report and become familiar with all that is taking place, to consider joining your neighbors and other members of the EWPU and become actively involved in this effort. It is only through extensive support and participation of many landowners and partners that this work is accomplished. We hope this Annual Report will increase your awareness of the effort and inspire you to join the growing group of landowner partners. Please contact me to learn more about the process and how you can be involved.

I feel a deep sense of obligation to ensure that landowner rights and wishes are respected during work conducted on behalf of the watershed plan, and a similar sense of obligation to continue the great work of those that have held this role before me.

Finally, 2008 marked the beginning of a ten year agreement between the Cascadia Conservation District and the Bonneville Environmental Foundation that will fund this and subsequent reports. Through this partnership we will also develop additional means to provide annual updates on the accomplishments of the Entiat Watershed Planning Unit and partners.

Respectfully,

A small rectangular box containing a handwritten signature in black ink. The signature appears to be 'Mike' followed by a flourish.

Michael J. Rickel
Program Manager
Cascadia Conservation District



Ray Sandidge, Sr.

Ray Sandidge is a community-oriented, conservation-minded orchardist and founding member of the Coordinated Resource Management Planning group and the Entiat Watershed Planning Unit. These attributes have resulted in his selection as this year's Entiat River watershed "Featured Landowner".

Ray has been living and farming in the Entiat River valley since the 1970's when he acquired 20 acres of land located near Dinkelman Canyon now referred to as SANRAY ORCHARDS. The land supports a commercial apple and pear orchard, private residence, and valuable fish and wildlife habitat. There's a lot of good that has come from the farm, including Ray's volunteer efforts to improve the community.

In the early 1990's Ray was among a group of citizens who were concerned about unrest in the valley, stemming from proposed public land management and regulatory enforcement actions. Ray worked with Al Shannon of the Entiat Chamber of Commerce and Karin Whitehall of the U.S. Forest Service to bring valley residents, government agencies, and environmental groups together to cooperatively solve problems. This led to the formation of the Coordinated Resource Management Planning, or CRMP, group which later evolved into the Entiat Watershed Planning Unit or EWPU. Over time, the EWPU has found creative solutions to resource management problems. Other watershed planning groups in Washington State have looked to the EWPU as an example. Solutions developed through EWPU planning efforts have been recognized for their originality and appropriateness in a letter from former Governor Gary Locke, and through various national, regional and local awards.

It hasn't always been so good, though. In public meetings, Ray has reminded the EWPU and others that when things got started *"everyone was walking around stiff-legged like a bunch of long-tailed cats in a room full of rocking-chairs. Over time, the rough corners got rounded off and we learned to trust each other."* A lot of good has come from that trust.

Ray has been a quiet leader as well. He has volunteered time on the Hanan-Detwiler and Knapp-Wham irrigation ditch consolidation project, pioneered use of on-farm irrigation efficiency methods, and hosted tours to share the benefits of conservation methods he has applied on his land with others. Ray has supported aquatic habitat restoration with the installation of several instream habitat enhancement projects in the river adjacent to his property, permitted habitat and biologic monitoring on his property, and continuously sought innovative solutions. In fact, Ray is among a small group of Entiat landowners who devised the Habitat Farming Enterprise Program, or HFEP. The program tests the feasibility of a financial incentive program for orchardists willing to convert commercial orchard land to riparian habitat.

It's been said that you get out of life what you put into it. Well ... Ray must get a lot out of life, and in spite of the gray hair on his head and the claim that he's trying to slow down, he continues to provide unflinching support to the Entiat River watershed, the EWPU, his farm and his community.



"everyone was walking around stiff-legged like a bunch of long-tailed cats in a room full of rocking-chairs. Over time, the rough corners got rounded off and we learned to trust each other."



This page illustrates finances managed by the Cascadia Conservation District on behalf of the Entiat Watershed Planning Unit. Funding is compiled from numerous sources and used to support the implementation of the Entiat River Watershed Plan. The funds are used for project construction & oversight, monitoring and administration purposes. By far the majority of funds go to project implementation and monitoring. A review of administrative costs reveals that a relatively small amount goes toward administrative tasks such as accounting, contracting, and general program support. The coordination task, however, requires substantially more effort due to the complexity of project implementation, coordination between numerous landowners and EWPU members, and the organization and facilitation of the EWPU itself. It is hoped that by providing this budget breakdown it will be apparent that funds are managed in a responsible manner toward the goal of improving water supply for people while improving the condition of fish habitat in the Entiat River.

It is also important to note the significant contributions of partner agencies and individuals. Funding associated with the Integrated Status and Effectiveness Monitoring Program (ISEMP) is illustrated in the bottom-right pie chart. ISEMP is only one of several sources of partner support in the Entiat. Other substantial support, not illustrated, includes the U.S. Bureau of Reclamation, Bonneville Power Administration, Washington State Salmon Recovery Funding Board, Yakama Nation, Upper Columbia Salmon Recovery Board, Bonneville Environmental Foundation, U.S. Forest Service, Washington State Department of Ecology and countless landowner hours. Although not illustrated, these and other partners provide considerable personnel and funding support for watershed plan project development, implementation, and monitoring.

ADMINISTRATION

Accounting	\$62,827
Coordination	\$171,224
Contracts	\$17,560
Support	\$18,120
TOTAL	\$269,731



PROJECT

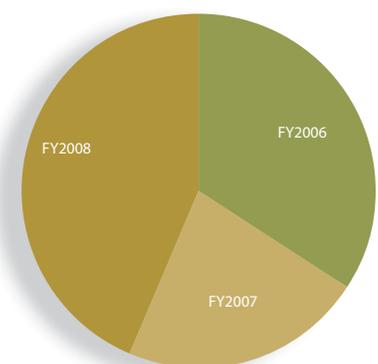
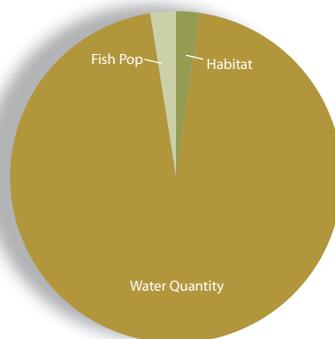
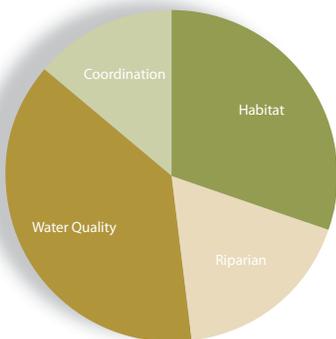
Habitat	\$300,381
Riparian	\$174,782
Water Quantity	\$378,480
Coordination	\$134,715
TOTAL	\$ 988,358

MONITORING

Habitat	\$10,000
Water Quantity	\$382,257
Fish Population	\$9,960
TOTAL	\$ 402,217

Integrated Status and Effectiveness Monitoring Program (ISEMP)

2006	\$497,628
2007	\$324,805
2008	\$630,928
TOTAL	\$ 1,453,361





Meetings and Events 2009

JANUARY	FEBRUARY	MARCH
<ul style="list-style-type: none"> ▶ 14th: EWPU Meeting ▶ 27th: EWPU Habitat Sub Committee Meeting 	<ul style="list-style-type: none"> ▶ 19th: Water Banking Steering Committee Meeting ▶ 19th: EWPU Habitat Sub Committee Meeting 	<ul style="list-style-type: none"> ▶ 3rd: Upper Columbia Implementation Team Meeting ▶ 18th: EWPU Water Quality and Quantity Sub Committee Meeting ▶ 24th: EWPU Habitat Sub Committee Meeting
APRIL	MAY	JUNE
<ul style="list-style-type: none"> ▶ 1st: EWPU Meeting ▶ 28th: EWPU Habitat Sub Committee Meeting 	<ul style="list-style-type: none"> ▶ 26th: EWPU Habitat Sub Committee Meeting 	<ul style="list-style-type: none"> ▶ 2nd: Upper Columbia Implementation Team Meeting ▶ 17th: EWPU Water Quality and Quantity Sub Committee Meeting ▶ 23rd: EWPU Habitat Sub Committee Meeting
JULY	AUGUST	SEPTEMBER
<ul style="list-style-type: none"> ▶ 1st: EWPU Meeting ▶ 28th: EWPU Habitat Sub Committee Meeting 		<ul style="list-style-type: none"> ▶ 1st: Upper Columbia Implementation Team Meeting ▶ 16th: EWPU Water Quality and Quantity Sub Committee Meeting ▶ 22nd: EWPU Habitat Sub Committee Meeting
OCTOBER	NOVEMBER	DECEMBER
<ul style="list-style-type: none"> ▶ 7th: EWPU Meeting ▶ 27th: EWPU Habitat Sub Committee Meeting 	<ul style="list-style-type: none"> ▶ 24th: EWPU Habitat Sub Committee Meeting 	<ul style="list-style-type: none"> ▶ 1st: Upper Columbia Implementation Team Meeting ▶ 16th: EWPU Water Quality and Quantity Sub Committee Meeting ▶ 22nd: EWPU Habitat Sub Committee Meeting

EWPU meetings are held at the Entiat Grange Hall at 14108 Kinzel Street in Entiat. All other Subcommittee meetings are held at the Chelan County Fire District #8 Fire Station at 4491 Entiat River Road in Entiat. Upper Columbia Implementation Team meetings are held at various locations throughout North Central Washington.

Please note that meeting dates and locations are subject to change.

Contact the Cascadia Conservation District at (509) 664-9370 or www.cascadiacd.org for updated information .



BRIDGE-TO-BRIDGE PHASE II: Harrison Side Channel Reconnection

The Harrison Side Channel project is located in the Lower Entiat River between river mile 3.7 and 4.1, the highest priority restoration area in the Entiat River watershed. Project goals consisted of reconnecting an old side channel and re-activation of the floodplain in order to promote stream function that will improve and sustain habitat for anadromous fish species.

Upper Columbia spring Chinook salmon, steelhead and bull trout use habitat within the project site for juvenile rearing, overwintering, and migration. Steelhead also spawn within the project site.

The Chelan County Natural Resources Department was the project sponsor and awarded the contract to Solid Rock Contractors for \$74,035 in June 2008. A unique construction requirement for the project included the installation of a temporary bridge across the Entiat River to access the construction site. While this was anticipated to be a major challenge and cost for the project, it was accomplished at a very reasonable price because the contractor already had a temporary bridge.

The side channel was reconnected by removing approximately 250 feet of a levee.

The excavated channel allows the Entiat River access to the side-channel across a wide range of flows, restoring off-channel habitat and floodplain function throughout an area approximately 2.7 acres in size. Approximately 2,000 cubic yards of material was hauled off site. Four large woody debris structures were placed in the side channel to provide off-channel habitat for juvenile salmonids. Areas where riparian vegetation was removed during construction were replanted with native vegetation. The project was completed in September 2008.

“Dr. Phil Harrison deserves a lot of credit for this project moving forward. Not only did he agree to allow the habitat enhancement project to move forward, but he worked collaboratively with Chelan County to develop creative solutions to difficult land-use management challenges at the site.”

*– Ron Walter,
Chelan County Commissioner*



BEFORE: The mainstem Entiat River at the Harrison project site, like most of the lower river, is a single-thread channel that is predominantly a riffle habitat type. (June 2008)



AFTER: The present-day Entiat River at the Harrison project site is now a multi-thread channel with a wide variety of habitat types (riffle, pool, glide). In addition, large woody debris was added to the side-channel to enhance the habitat. (September 2008)

BRIDGE-TO-BRIDGE PHASE II: Harrison Side Channel Reconnection

PURPOSE AND OBJECTIVE

- ▶ Reconnect river with floodplain and old side channel.
- ▶ Restore/provide habitat for anadromous fish species.

ACTIONS

- ▶ Partial removal of levee.
- ▶ 2,000 Cubic yards of material removed to form channel.
- ▶ 4 Large woody debris structures installed.

EXPECTED BENEFITS

- ▶ Increased channel complexity and improved stream function.
- ▶ Reduced water temperatures over time as riparian plantings and overall structure mature.
- ▶ Improved aquatic habitat and increased species use including spring Chinook salmon, steelhead, and bull trout.

PARTNERS INCLUDE

- ▶ Dr. Phil Harrison (landowner)
- ▶ Chelan County Natural Resources Department
- ▶ Cascadia Conservation District
- ▶ U.S. Bureau of Reclamation

PROJECT COSTS

- ▶ \$140,000



HANAN-DETWILER CROSS-VANE & LARGE WOODY DEBRIS INSTALLATION

- ▶ Installation of instream structures to improve habitat and maintain conveyance into an irrigation ditch while reducing annual instream disturbance due to diversion maintenance.
- ▶ July – October 2007
- ▶ Sponsored by Chelan County Natural Resources Department and the Cascadia Conservation District
- ▶ Cost: \$200,000



TILLICUM AND INDIAN CREEKS FENCE INSTALLATION & RIPARIAN AREA PROTECTION

- ▶ Installation of fencing to exclude livestock from approximately 0.5 linear miles of stream banks and riparian areas adjacent to critical steelhead spawning habitat.
- ▶ April – May 2008
- ▶ Sponsored by U.S. Forest Service Wenatchee National Forest, Entiat Ranger District and Cascadia Conservation District
- ▶ Cost: \$60,433



BRIDGE-TO-BRIDGE REACH RESTORATION: PHASE II

- ▶ Reconnect side channel and re-activate floodplain to promote stream function that will sustain habitat for anadromous fish species.
- ▶ September 2008
- ▶ Sponsored by Chelan County Natural Resources Department
- ▶ Cost \$140,000



BRIDGE-TO-BRIDGE REACH RESTORATION: PHASE I

- ▶ Installation of instream structures to provide habitat for juvenile salmonids.
- ▶ July - October 2005
- ▶ Sponsored by Cascadia Conservation District
- ▶ Cost \$200,000



LWD ROOTWAD ACQUISITION FOR ENTIAT RIVER RESTORATION PROJECTS

- ▶ Acquisition of large woody debris and rootwads to be used in various restoration projects constructed in 2008 and 2009.
- ▶ 2008–2009
- ▶ Sponsored by the Cascadia Conservation District
- ▶ Cost: \$24,600



MIDDLE STILLWATER RIPARIAN RESTORATION

- ▶ Increase riparian habitat and improve instream temperatures in the Entiat River.
- ▶ October – November 2008
- ▶ Sponsored by Cascadia Conservation District
- ▶ Cost \$20,000



LOWER ENTIAT OFF-CHANNEL WELLS

- ▶ Installation of two groundwater wells to replace an instream diversion in order to increase instream flows and eliminate low flow fish passage barrier.
- ▶ November 2006 – May 2007
- ▶ Sponsored by U.S. Bureau of Reclamation and Chelan County Natural Resources Department
- ▶ Cost: \$69,498



KNAPP-WHAM HANAN-DETWILER IRRIGATION SYSTEM CONSOLIDATION

- ▶ Conserve instream flows thereby improving water quality, eliminating low flow fish passage barrier and adding instream pool habitat
- ▶ April 2008 to present
- ▶ Sponsored by Cascadia Conservation District
- ▶ Cost: \$415,425



4-MILE WELLS

- ▶ Installation of two groundwater irrigation wells to replace an instream diversion in order to eliminate the potential for fish entrainment in a fish screen.
- ▶ September 2006
- ▶ Sponsored by Cascadia Conservation District, U.S. Bureau of Reclamation and Bonneville Power Administration
- ▶ Cost: \$64,432



MILNE RESTORATION

- ▶ Installation of instream structures in order to improve habitat complexity within the lower Entiat River.
- ▶ July – October 2007
- ▶ Sponsored by Chelan County Natural Resources Department
- ▶ Cost: \$140,000



Types of Monitoring

Physical and biologic factors are studied in the watershed for many reasons, generally categorized as status, trend, compliance, or effectiveness monitoring. The physical and biologic factors studied generally fit within the following categories: Aquatic Biology, Water Quantity, Water Quality, and Habitat. The focus of these four monitoring categories is summarized below.



Aquatic Biology – Information obtained through biologic monitoring is used by the Entiat Watershed Planning Unit and partners with habitat monitoring information to track species recovery, the effectiveness of habitat restoration efforts, and to make decisions about fishery management (e.g. whether or not to open a fishing season). Spawner surveys are examples of status monitoring, as results are used to track the condition of the fish population. For examples of aquatic biology monitoring results, see the spawner survey data displayed on pages 12 and 13.



Water Quantity – Streamflow sustains both instream and out-of-stream uses in the watershed. Streamflow and related water availability monitoring activities (e.g. well measurement) are particularly important for the Entiat Watershed Planning Unit to work collaboratively with State agencies to manage water resources in the watershed. Streamflow hydrographs are examples of trend monitoring, as the information is used to track water availability throughout a year and from year-to-year. See page 14 for examples of water quantity monitoring results.



Water Quality – Water must be of a high quality to sustain instream and out-of-stream uses. Water quality monitoring is done to determine if the resource can sustain these purposes, and to ensure regulatory compliance. Attaining and maintaining compliance is important to ensure regulatory relief under the Federal Clean Water Act (CWA). To date, voluntary programs and monitoring in the watershed have precluded the need for CWA enforcement measures. This is an example of compliance monitoring. For examples of water quality results see the water temperature data displayed on pages 14 and 15.



Habitat – Bull trout, steelhead, and spring Chinook are protected under the Federal Endangered Species Act in the Entiat River watershed. Habitat is monitored to determine if the needs of these fish and other aquatic species are met. Also, the EWPU and partners use the habitat information to develop and implement projects, monitor project effectiveness, and track progress toward recovery. Monitoring done to determine if projects are achieving protection and restoration objectives is an example of effectiveness monitoring. Effectiveness monitoring of habitat and other features collected as a part of the Integrated Status and Effectiveness Monitoring Program, or ISEMP, is summarized on page 15.



Integrated Status and Effectiveness Monitoring Program (ISEMP)

Funded through the Bonneville Power Administration, the Integrated Status and Effectiveness Monitoring Program (ISEMP) has been involved with effectiveness monitoring in the Entiat River subbasin since 2005. The ISEMP is primarily interested in the fish population response to restoration and has taken a watershed-scale approach to effectiveness monitoring. Consequently, ISEMP is funding habitat and macroinvertebrate data collection, snorkel and steelhead spawning surveys, smolt trapping, water temperature, water quality, and fine sediment monitoring throughout the Entiat River subbasin. Some of the efforts that ISEMP has been supporting are further described below.

PIT tags—ISEMP is using Passive Integrated Transponders, or PIT tags, to study the growth, survival, and migratory patterns of juvenile steelhead and spring Chinook. Little is known about juvenile movement and survival rates within the watershed, so under ISEMP the U.S. Fish and Wildlife Service and the Washington Department of Fish and Wildlife have been tagging non-migratory wild steelhead and spring Chinook rearing throughout the watershed. In 2007, 464 fish were caught, tagged and released. Three instream PIT tag detection arrays were installed last year in the upper and lower Entiat River and in the Mad River to detect fish movement within the watershed and allow calculation of survival rate estimates.



This upstream view of the Entiat River shows biologic monitoring tools. The gray pipes contain part of the PIT tags antenna system and the stainless steel “boat” with nets is the rotary screw trap.

Screw Traps—The ISEMP funds the operation of two rotary screw traps by the U.S. Fish and Wildlife Service at the mouth of the river (operating since 2005) and at river mile 6 (operating since 2006). The primary goal of this study is to detect a response to restoration activities at the population scale by providing long-term monitoring information about the productivity and migration timing of spring Chinook salmon and steelhead. Results help answer questions such as “*Have restoration actions resulted in more fish being produced in the Entiat River subbasin?*” The traps are run continuously as conditions allow. From August through November 2007, 3,886 spring Chinook and 724 steelhead were captured, counted and released.

Snorkel Surveys—Under ISEMP, the U.S. Fish and Wildlife Service monitors the effectiveness of in-stream restoration work using summer and winter snorkel surveys. Snorkel surveys are designed to detect if treated sites have more fish compared to untreated sites, and if treated sites are being used as rearing habitat in the summer or overwintering habitat. Monitoring was conducted at 30 sites along the entire river in 2008 with more sites to be added in the future. The Yakama Nation also conducts annual snorkel surveys at 25 randomly located sites throughout the watershed to provide a measure of the trend in fish density across the subbasin.



Snorkelers in the Entiat River count fish as part of the effort to evaluate the biologic response to watershed restoration work. Habitat monitoring is also done at snorkel survey sites to evaluate the physical response to restoration efforts.

Habitat—Habitat effectiveness monitoring occurs at the same treated and untreated sites as the snorkel surveys, where a plethora of information is collected on many different habitat characteristics, such as bank stability and riparian vegetation, and other habitat features important for fish use, including numbers of pools and large woody debris. Samples of macroinvertebrates, an important salmonid food and a good indicator of stream health, are also collected. In addition to the effectiveness monitoring sites, habitat monitoring is conducted at 25 randomly located sites throughout the watershed to provide a measure of the trend in habitat changes across the subbasin.



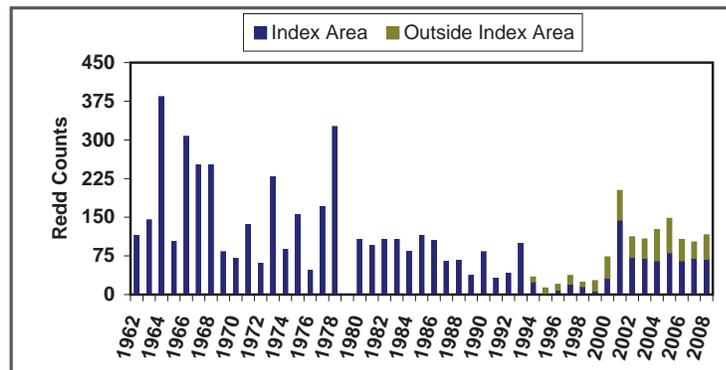
The charts and graphs on pages 12 - 15 are graphic representations of aquatic biology, water quantity, water quality, and habitat monitoring data collected annually by partner agencies to assess the condition of the environment and track progress toward the implementation of the Entiat Watershed Plan and the recovery of threatened and endangered fish species.

AQUATIC BIOLOGY MONITORING RESULTS

SPRING CHINOOK SALMON REDD COUNTS:

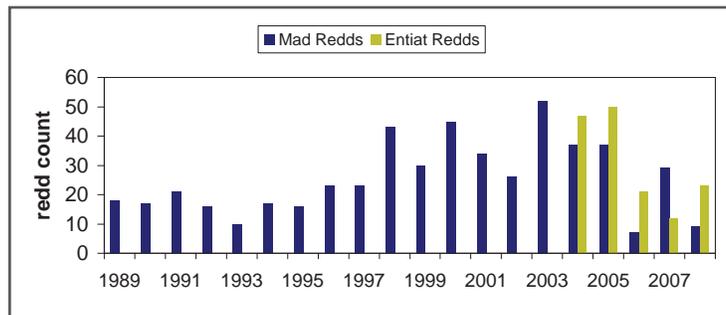
From Annual Surveys in the Entiat River 1962-2008

- ☒ survey area is river mile 16 to 30
- ☒ 2008 count was 116 redds
- ☒ long-term average is 104 redds for study period
- ☒ stable trend over the last 8 years
- ☒ very low counts in 1990's
- ☒ recovery criteria requires at least 500 naturally produced spawners (based on 12-year geometric mean) which is equivalent to approximately 210 spring Chinook redds per year



BULL TROUT REDDS:

Mad and Entiat River Index Reaches 1989-2008

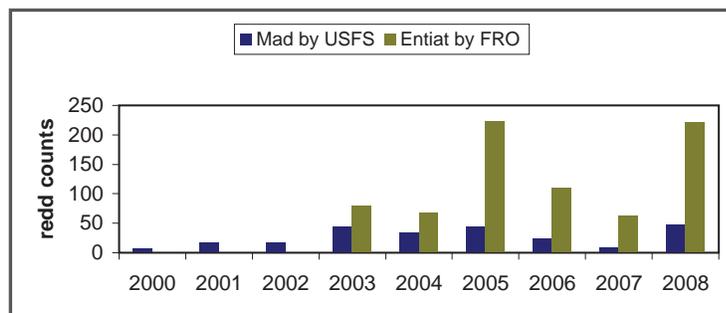


- ☒ Mad River survey area is river mile 12.3 to 19.8
- ☒ Entiat River survey area is river mile 28 to 34
- ☒ 2008 counts were 9 redds in the Mad River and 23 redds in the Entiat River
- ☒ increasing trend from 1996 to 2003 has fallen off 2006 to 2008
- ☒ recovery criteria requires at least 298 naturally produced spawners (based on 12-year geometric mean) which is equivalent to approximately 150 bull trout redds per year

STEELHEAD REDD COUNT COMPARISONS:

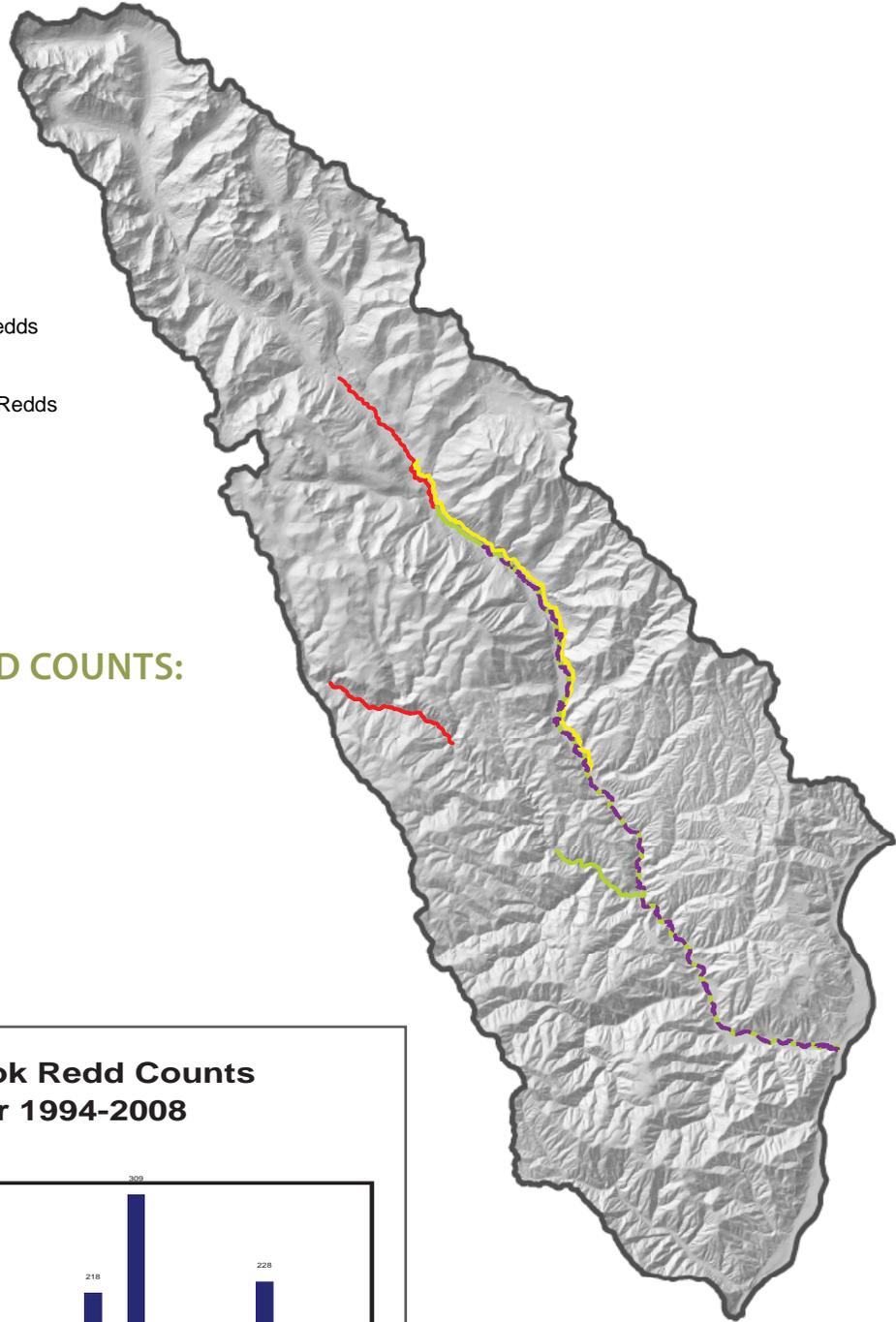
Mad and Entiat River 2003-2008

- ☒ Mad River survey area is river mile 0 to 7.2
- ☒ Entiat River survey area is river mile 0.5 to 28
- ☒ 2008 counts were 48 redds in the Mad River and 222 redds in the Entiat River
- ☒ variable trend; although some years show promise such as 2005 and 2009
- ☒ recovery criteria requires at least 500 naturally produced spawners (based on 12-year geometric mean) which is equivalent to approximately 250 steelhead redds per year



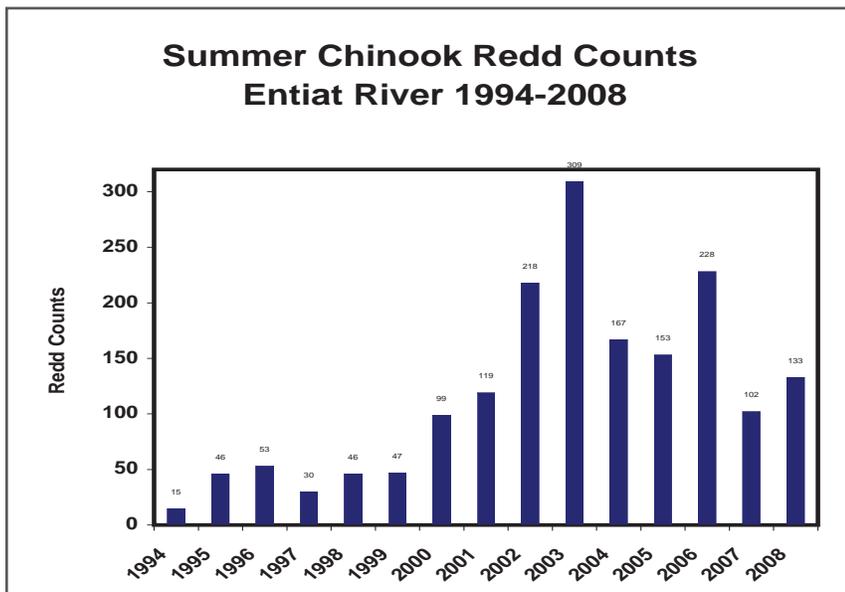


-  Bull Trout Redds
-  Spring Chinook Redds
-  Steelhead Redds
-  Summer Chinook Redds



SUMMER CHINOOK REDD COUNTS: Entiat River 1994–2008

- ☒ survey area is river mile 0.5 to 26
- ☒ 2008 count was 133 redds
- ☒ long-term average is 118 redds
- ☒ increasing trend 1997-2003, decreasing since then
- ☒ low counts in mid-1990's attributed to poor ocean survival





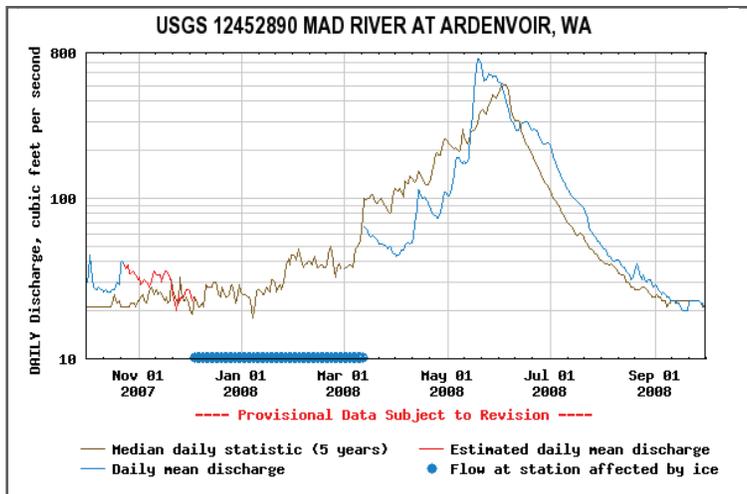
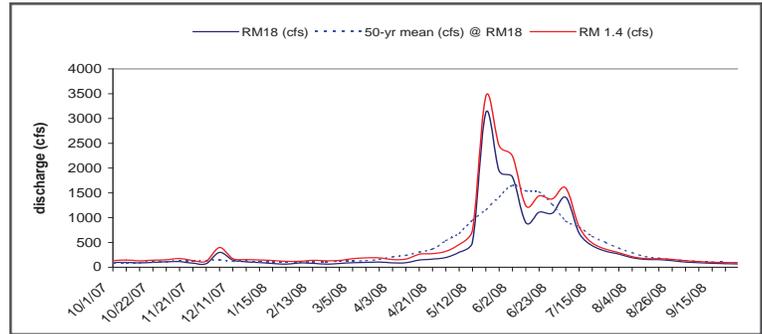
WATER QUANTITY MONITORING RESULTS

ENTIAT RIVER STREAMFLOW:

River Mile 1.4 & 18

Water Year 2007-2008

- ☒ chart shows volume of water, or discharge, in the Entiat River at two USGS flow gages at river mile 1.4 (Keystone) and river mile 18 (near Stormy Creek) compared to the 50-year mean at river mile 18
- ☒ peak runoff occurred about 2 weeks earlier than average and was about two times the average volume
- ☒ the secondary peak occurred about 2 weeks later than average
- ☒ real-time data are available online at <http://waterdata.usgs.gov/wa/nwis/rt>
- ☒ data are used for instream flow compliance monitoring, irrigation operation adjustments, and fish and habitat surveys



MAD RIVER STREAMFLOW: Mean Daily Discharge

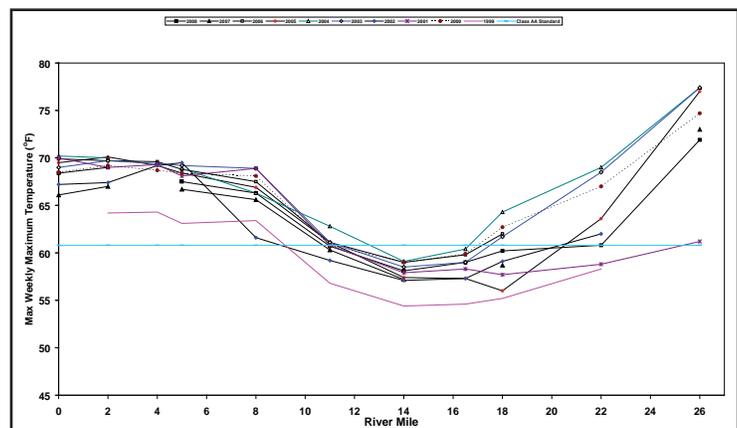
- ☒ chart shows volume of water, or discharge, in the Mad River at the USGS flow gage at river mile 0.2 (Mill Camp) compared to the 5-year median at that site
- ☒ peak runoff occurred about one week earlier than average and was slightly more than the average volume
- ☒ no valid data was recorded from December through March because flow at the station was affected by ice
- ☒ this is not a realtime data station
- ☒ data are used for instream flow compliance monitoring, irrigation operation adjustments, and surveys of fish and habitat

WATER QUALITY MONITORING RESULTS

MAD RIVER:

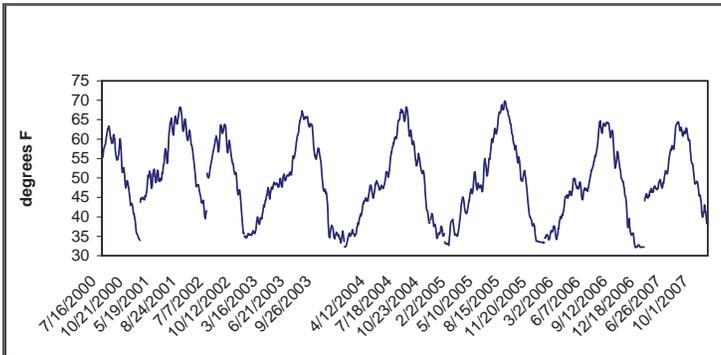
Maximum Weekly Temperature

- ☒ chart shows warmest water temperature of the year at 11 monitoring sites for each of the last 10 years
- ☒ consistent pattern – warmer in headwaters, gradually cooling downstream then rewarming to mouth
- ☒ warmest temperatures typically in late July or early August
- ☒ only 3 sites (Cougar Creek to Berg Creek) do not exceed water quality standards
- ☒ these 3 sites are the bull trout spawning area of the Mad River
- ☒ for the 10-year period shown, 1999 was coolest and 2004 was warmest
- ☒ chapter 8 of the Entiat Watershed Plan provides an explanation of the causes of the observed trend; a copy of the plan can be found online at <http://www.cascadiacd.org>





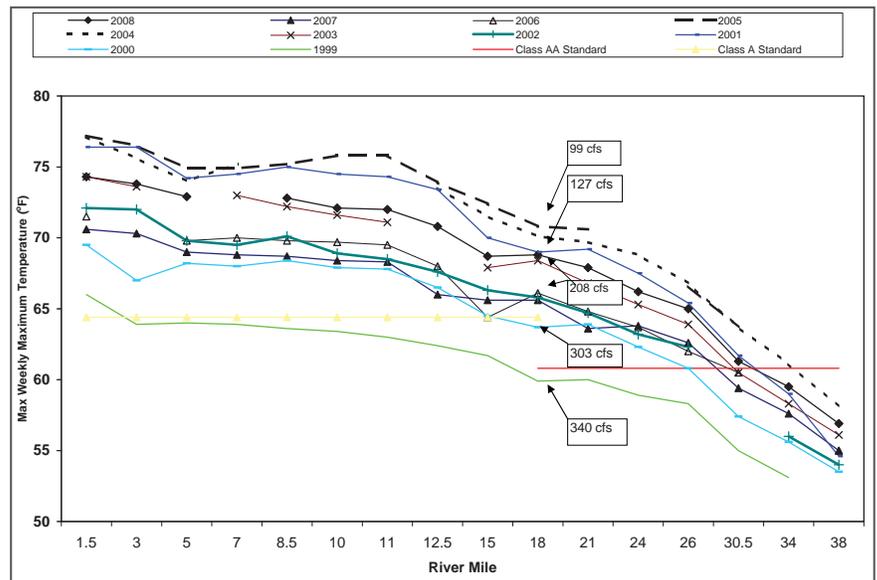
CONTINUOUS TEMPERATURE: Entiat River Mile 18 2000-2007



- chart shows annual variations in water temperature at one site (2000-2007)
- temperatures range from winter lows near freezing to summer highs in the 60s
- gaps are due to data loggers being lost during spring runoff
- data loggers record water temperature every 30 minutes
- data are used for water quality compliance monitoring

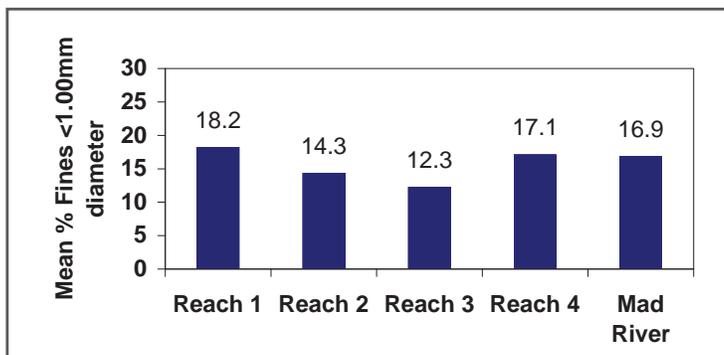
ENTIAT RIVER: Long Profile 1999-2008

- chart shows warmest water temperature of the year at 16 monitoring sites for each of the last 10 years
- consistent pattern – cooler in headwaters, gradually warming downstream
- warmest temperatures typically in August
- only 3 sites in the upper river do not exceed water quality standards
- for the 10-year period shown, 1999 was coolest and 2005 was warmest
- chapter 8 of the Entiat Watershed Plan provides an explanation of the causes of the observed trend; a copy of the plan can be found online at <http://www.cascadiacd.org>



HABITAT MONITORING RESULTS

15-YEAR GRAND MEAN PERCENT FINE SEDIMENT: Entiat and Mad Rivers 1993-2007



- chart shows percentage of fine sediment in spawning gravel averaged over 15 years (1993-2007)
- 20% or less is considered "good" quality spawning gravel - all sampled reaches have been below 20%
- Entiat River sample sites are located near the mouth at the city limit sign, Keystone, Stormy Creek, Dill Creek, Preston Creek, at the US Forest Boundary sign, Fox Creek, Silver Falls Campground, and below Entiat Falls
- Mad River samples are collected between the US Forest Boundary and Pine Flats Campground
- data are used for fish habitat status and trend monitoring



CASCADIA
CONSERVATION DISTRICT

215 Melody Lane
Wenatchee, Washington 98801

Postal Customer

ENTIAT WATERSHED ANNUAL REPORT 2008

This report is intended to provide an update on the implementation of actions identified in the Entiat Watershed Plan.

The plan was created by the Entiat Watershed Planning Unit, whose mission is to voluntarily bring people together to improve communication, reduce conflicts, address problems, reach consensus, and implement actions to improve natural resource management on associated private and public lands in the Entiat River watershed.

CONTACT

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PARTNERS

Bonneville Environmental
Foundation

Bonneville Power Administration

Chelan County Natural Resources
Department

Chelan County Public Utility District

Chelan-Douglas Land Trust

City of Entiat

Entiat Irrigation District

GeoEngineers

Integrated Status and Effectiveness
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Tributary Committee

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Upper Columbia Salmon
Recovery Board

USDA - Forest Service, Entiat
Ranger District

USDA - Forest Service, Pacific
Northwest Research Station

USDA - Natural Resources
Conservation Service

USDI - Bureau of Land Management

USDI - Bureau of Reclamation

USDI - Fish and Wildlife Service,
Mid-Columbia Fishery
Resource Office

Washington Rivers Conservancy

Washington State Department of
Ecology - Central Regional Office

Washington State Department of
Fish and Wildlife - Region 2

Yakama Nation