

An aerial photograph of a river system flowing through a lush, green forest. The river is a mix of dark and light green, with several large, light-colored gravel bars and sandbars. The surrounding forest is dense and appears to be a mix of coniferous and deciduous trees. The river winds from the upper right towards the lower left of the frame.

Yurok Tribe's NPS Implementation and Monitoring Programs

Ken Fetcho

1st Annual National Tribal CWA

106 and 319 Conference

Santa Fe, NM

November 16, 2011

The Yurok Reservation and Ancestral Territory

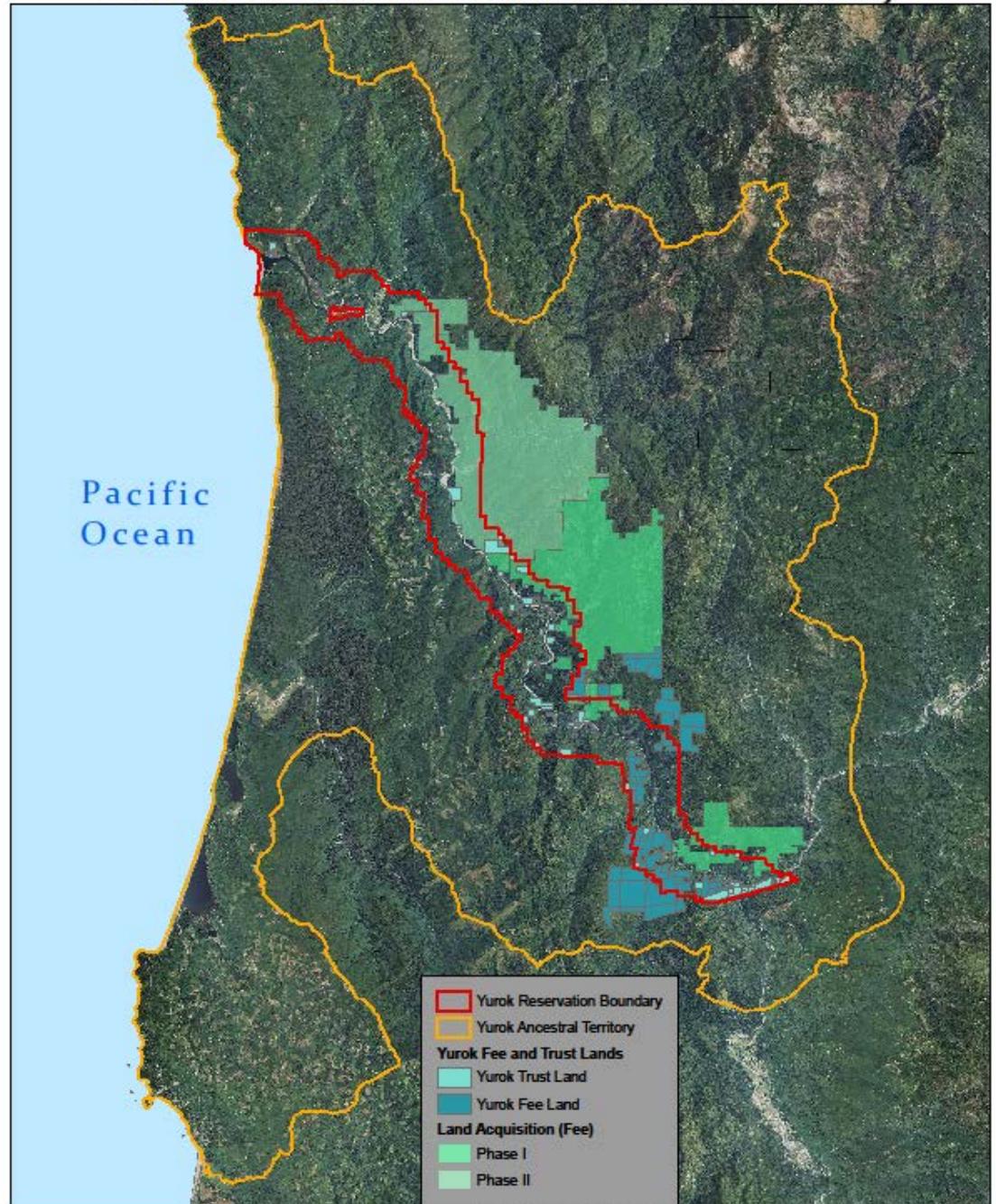
Reservation Total = 55,890 acres

Trust Lands = 2,657 acres

Tribally owned fee lands = 31,063 acres

Phase I (recently purchased) = 22,262 acres

Phase II = 25,532 acres (future purchase)



Major Issues Guiding YTEP's Hydrologic Monitoring Activities

- ▣ Majority of lands draining into Lower Klamath River Sub-basin have been logged and are heavily roaded
- ▣ Klamath River fish populations are in decline some species are extinct others on ESA list
- ▣ Yurok Tribe Fisheries and Watershed Restoration Programs performing restoration activities
- ▣ Yurok Tribe is developing the Reservation



Permanent Hydrologic Monitoring Stations

- ▣ Operate stations Real-Time to provide access to data
- ▣ Establish a record of streamflow
 - ▣ -baseline conditions and long-term trends
 - ▣ -share data with fisheries department for use in telemetry studies
- ▣ Monitor turbidity and suspended sediment to evaluate land management practices and restoration activities
- ▣ Collect rainfall and water temperature data

SITE SELECTION

Spatial Distribution – Sites located in the lower reaches of watersheds that characterize the water quality and watershed health condition throughout the lower Klamath.

Activity Specific - Sites located in watersheds to evaluate specific activities that may impact water quality and/or watershed health.

Watershed Restoration Activities – Sites located in watersheds that have active or proposed restoration activities.

Proposed Future Development – Sites near locations of resource and proposed resource development.

Site Selection Criteria Matrix

Stream Name	Primary Criteria	Secondary Criteria	Other	Sampling Frequency
Upper Turwar	1	3	2	Once a Year
Lower Turwar	1	3	2	Once a Year
McGarvey	3	1		Once a Year
Lower Blue	1	3	2	Once a Year
Tully	1	4	2	Once a Year
South Fork Tectah	3	1		Every other year
North Fork Tectah	3	1		Every other year
Mainstem Tectah	3	1		Every other year
Johnsons	2	1		Every other year
East Fork Pecwan	1	4		Every other year
West Fork Pecwan	1	4		Every other year
Mettah	3	1		Every other year
Roach	1	3		Every other year

1. Spatial Distribution

2. Activity Specific

3. Watershed Restoration

4. Proposed Development



Field Methods

Flow Measurements

- ▣ Wadable
- ▣ Non-wadable
- ▣ Pygmy or Price AA
- ▣ Bank, cableway, bridge, or ADCP
- ▣ Follow USGS methods

Suspended Sediment Sampling

- ▣ Wadable DH-48
- ▣ Non-wadable D-74
 - 1) Bridge
 - 2) Cableway
- ▣ Follow USGS methods - Equal width increment (EWI) depth integrated (DI)

Depth Integrated Suspended Sediment Sampling

- ▣ Equal Width Increment(USGS)
- ▣ 100' wide, 10 measurements= every 10'
- ▣ Rate of Transit (rate of descent and ascent through the water column (ft/sec)
- ▣ Deepest fastest part of transect at a rate to fill one bottle 60% to 90%



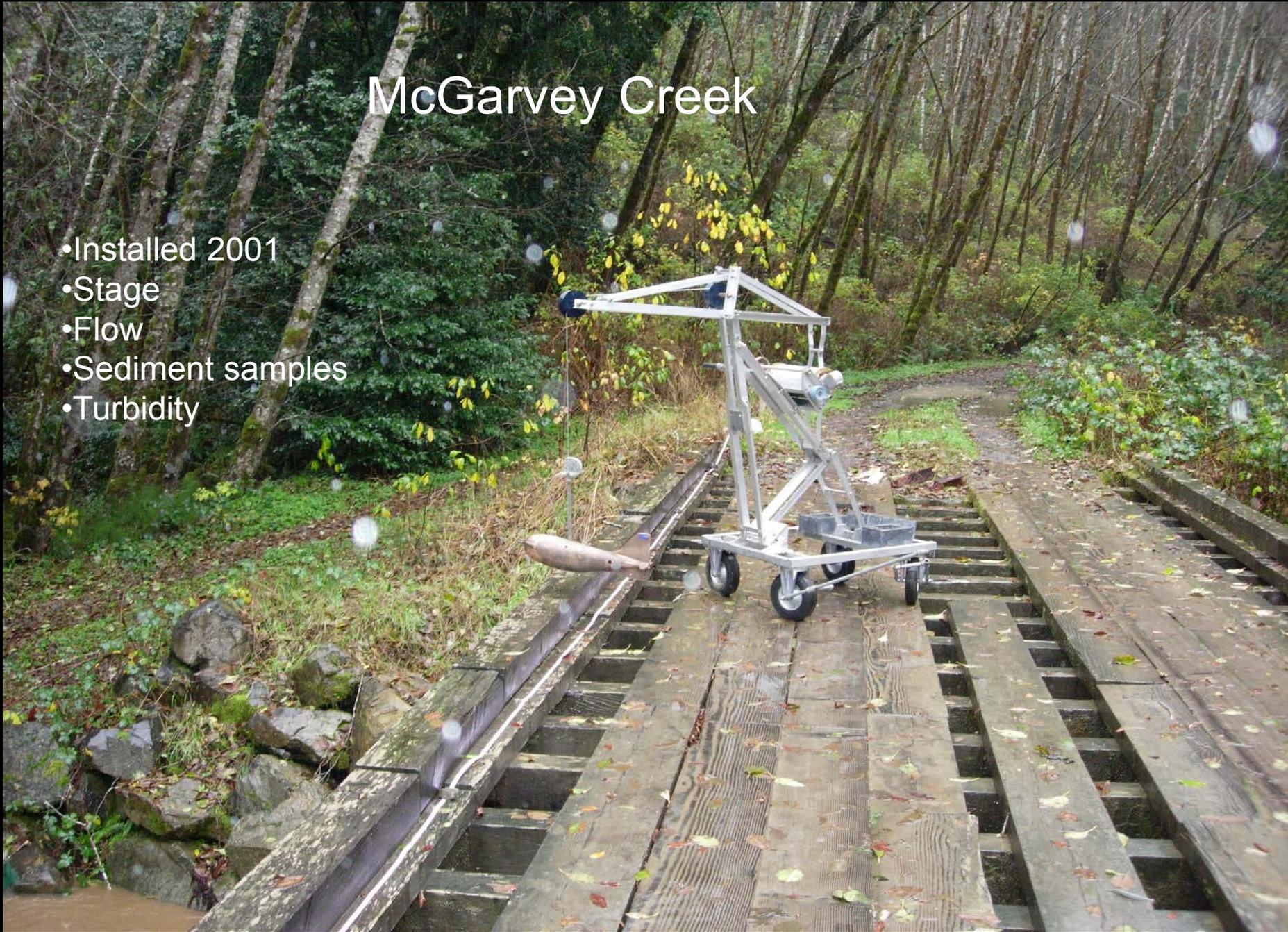
Site visits

- ▣ Monthly visits
- ▣ SOP's
- ▣ Data download
- ▣ Flow maybe sediment sample
- ▣ Detailed log books
- ▣ Equipment inspection

- ▣ Additional sampling during storm events

McGarvey Creek

- Installed 2001
- Stage
- Flow
- Sediment samples
- Turbidity





Laser Based Optics

The DTS-12 uses optical backscatter technology with a 780-nm laser emitter with automatic power control. It measures suspended solids with an infrared measurement system incorporating optical feedback and synchronous detection to reject ambient light. The DTS-12 features high accuracy, excellent thermal and long-term stability, and nearly linear response over three orders of magnitude.

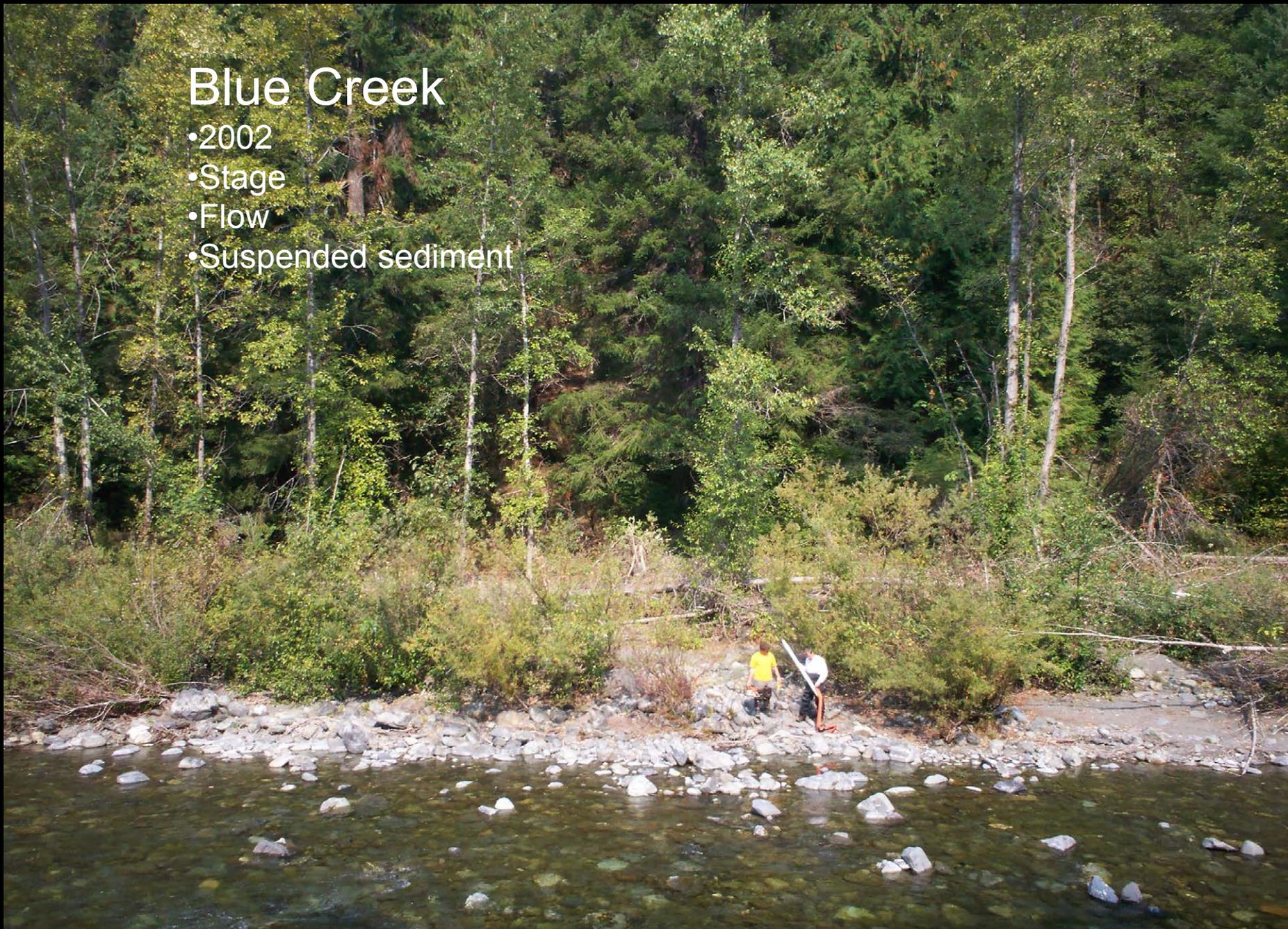






Blue Creek

- 2002
- Stage
- Flow
- Suspended sediment







Upper Turwar Creek

- Installed 2002
- Stage
- Turbidity w/DTS on orifice



Tully Creek

- Installed 2005
- Stage
- Flow
- Suspended sediment samples
- 2006
- Tipping bucket





01.05.2006

Lower Turwar

- 
- A photograph showing a stream bed composed of grey rocks and gravel. On the left side, a white measuring pole is placed vertically against the rocks. The background is filled with dense green trees and bushes. The scene is viewed from under a concrete bridge structure.
- Installed 2007
 - Stage
 - Flow
 - Turbidity boom w/
DTS 12
 - Sediment samples





Yurok Tribe

Watershed
Restoration
Department



Process

- ▣ Identification
- ▣ Assessment
- ▣ Prioritization
- ▣ Funding Acquisition
- ▣ Permitting (#\$@%!&*)
- ▣ Pre-Project surveying
- ▣ Implementation
- ▣ Winterization
- ▣ Reporting
- ▣ Monitoring
- ▣ (Repeat)

Survey Techniques



Richard, Arlen & Michelle

Pre-Survey



BOT of Site #5 Upslope PC-14

Old Culverts...









...Are Fish Barriers





2004





Hard at Work in McGarvey Creek

Our 850C



Careful Coordination Between Dozer Operators and Excavator Operators





Teamwork and Careful Coordination on the Worksite.

Project Completion



Richard and Michelle Spreading Hay



Pre-work photo Turwar Creek Project Site



Work in Progress - Turwar Creek



Post-work site number 13 on T1.6 Terwer Creek



Instream work – willow baffles



Instream work – willow baffles



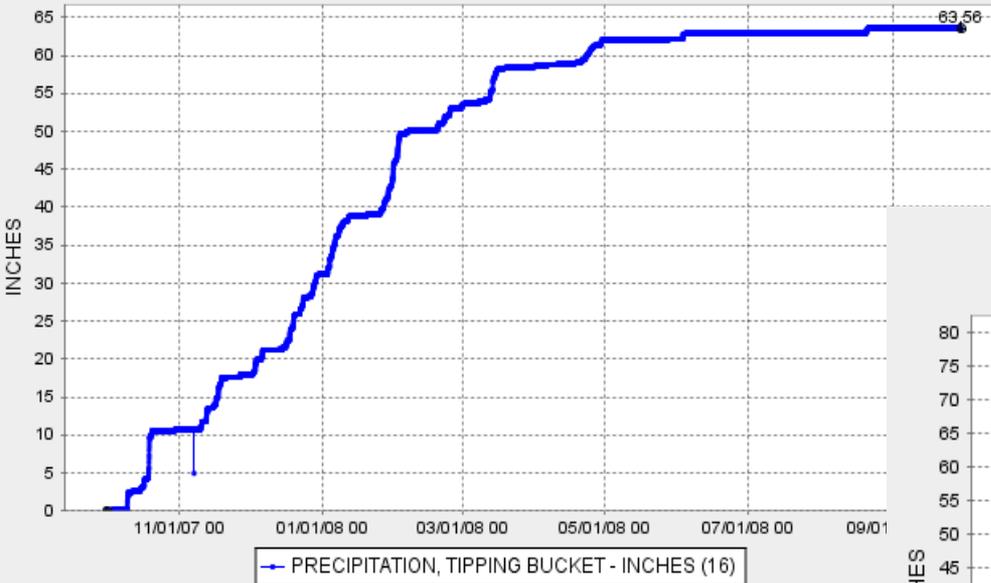
Data Analysis

- ▣ Determine Effects of Land Management and Restoration Actions over time

KLAMATH R NR KLAMATH (TURWAR CREEK) (TUR)

Date from 10/01/2007 01:00 through 09/30/2008 00:00 Duration : 364 days

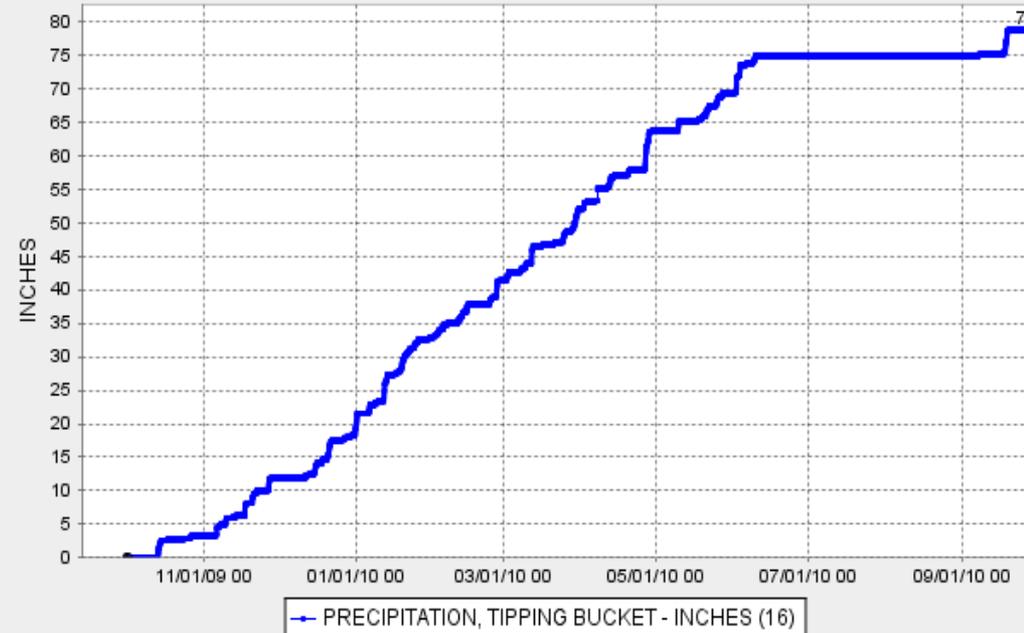
Max of period : (09/30/2008 00:00, 63.56) Min of period: (10/01/2007 01:00, 0.0)



KLAMATH R NR KLAMATH (TURWAR CREEK) (TUR)

Date from 10/01/2009 01:00 through 09/30/2010 00:00 Duration : 363 days

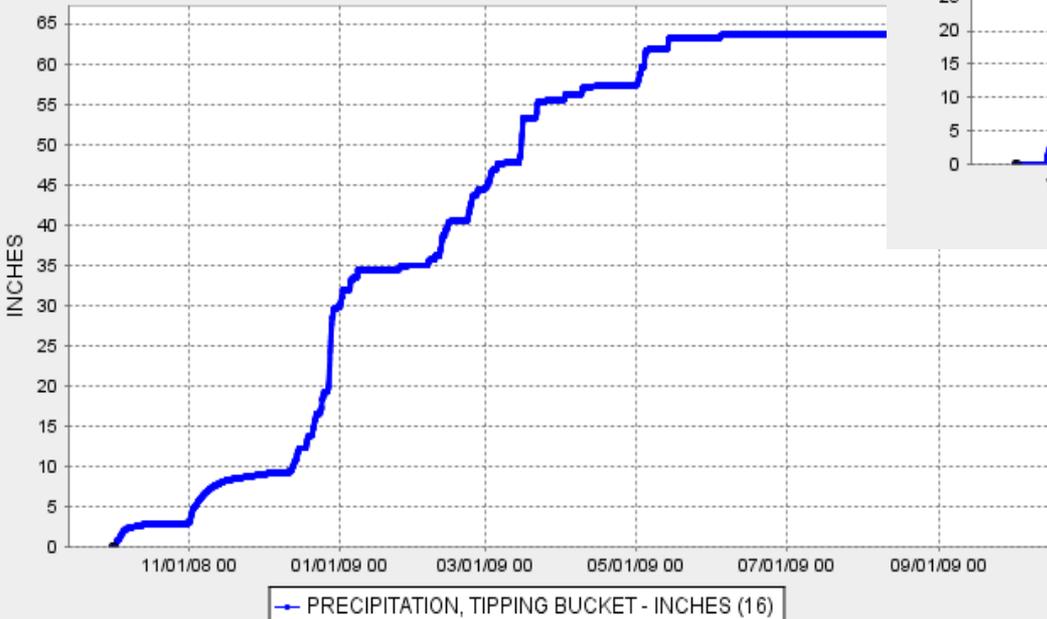
Max of period : (09/30/2010 00:00, 78.8) Min of period: (10/01/2009 01:00, 0.0)



KLAMATH R NR KLAMATH (TURWAR CREEK) (TUR)

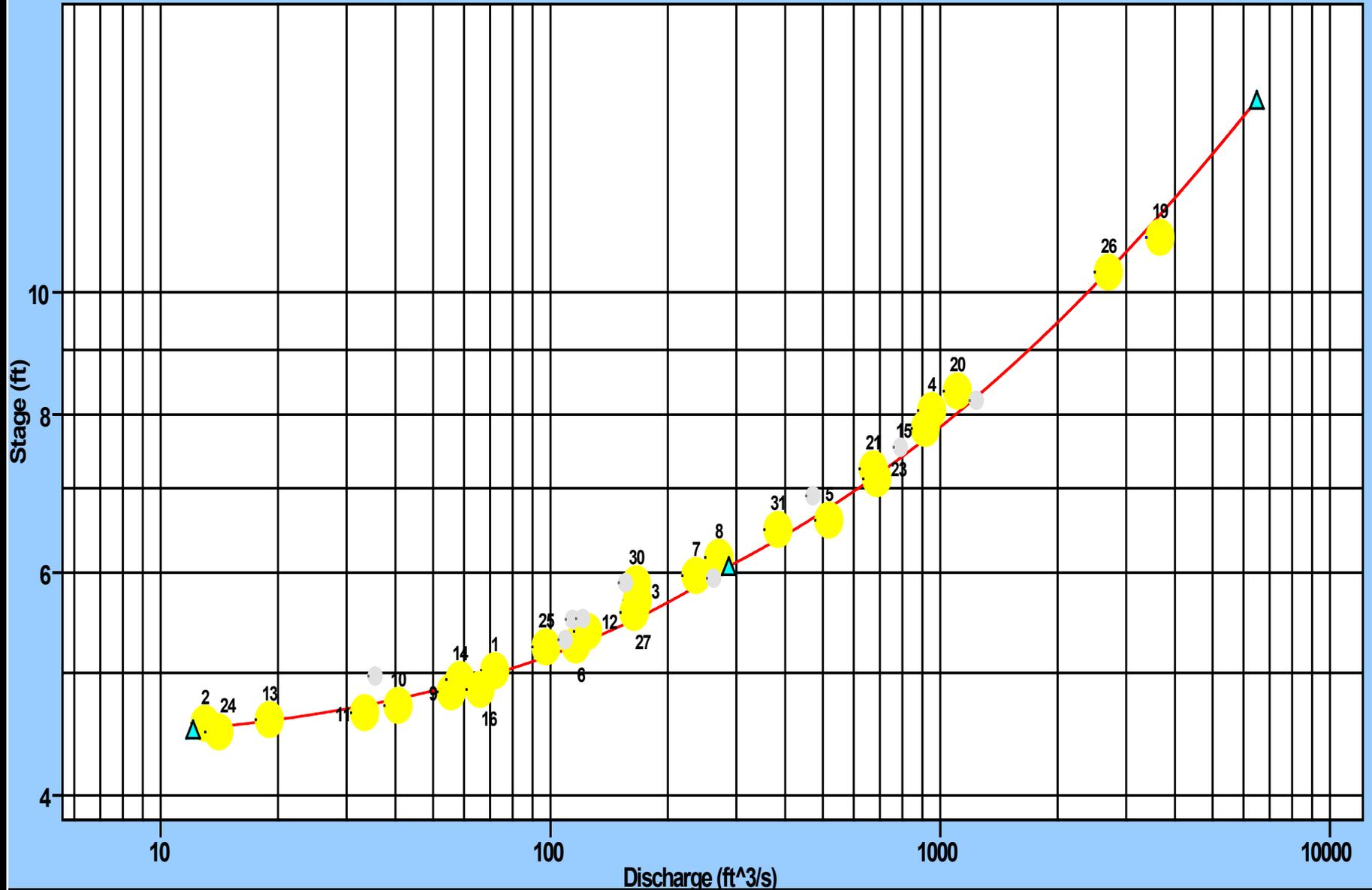
Date from 10/01/2008 01:00 through 09/30/2009 00:00 Duration : 363 days

Max of period : (09/30/2009 00:00, 64.12) Min of period: (10/01/2008 01:00, 0.0)



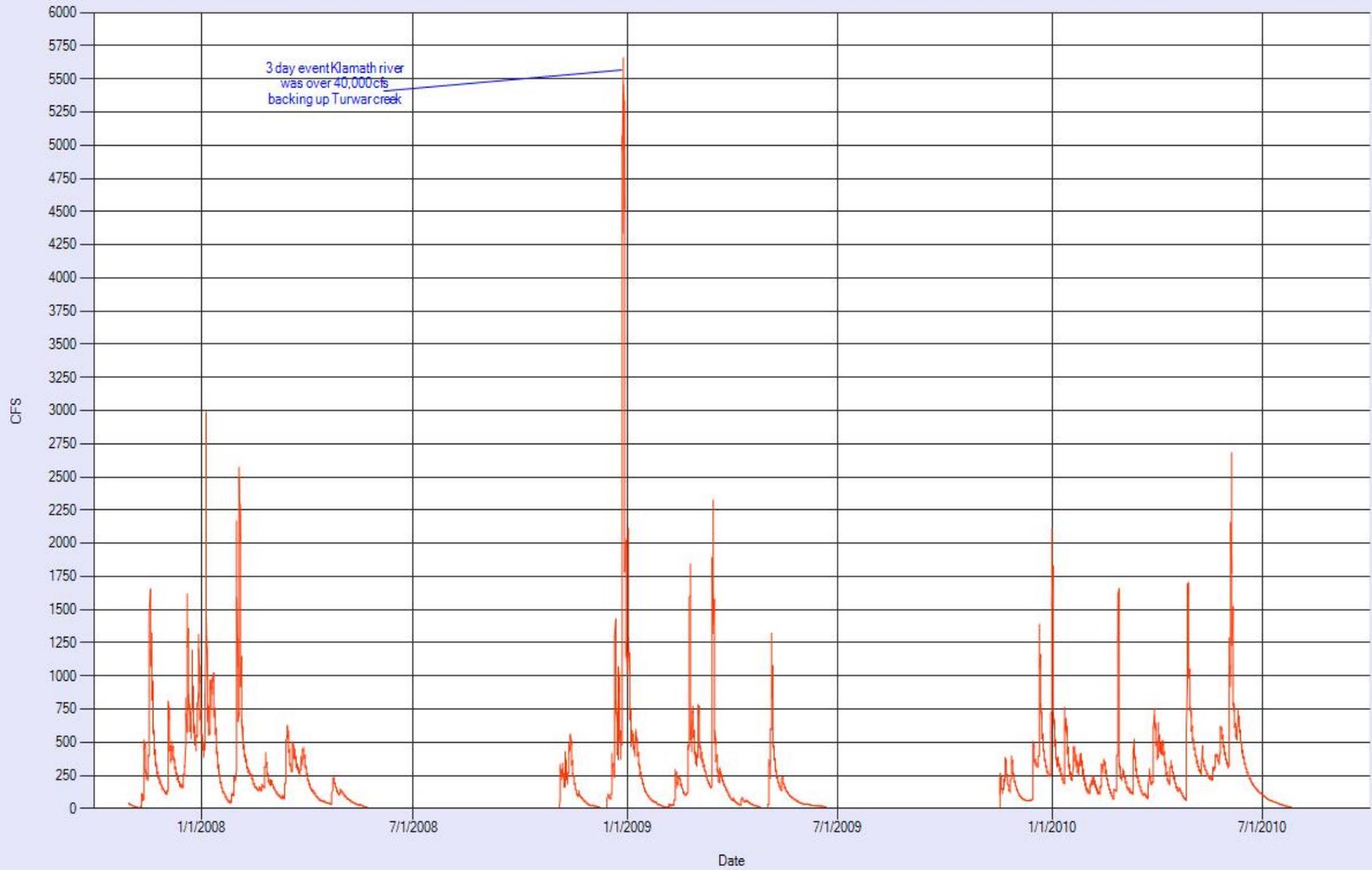
001 - Lower Turwar Creek - DD: 1 Rating: 001

Rating period from 10/01/2007 to 10/01/2010



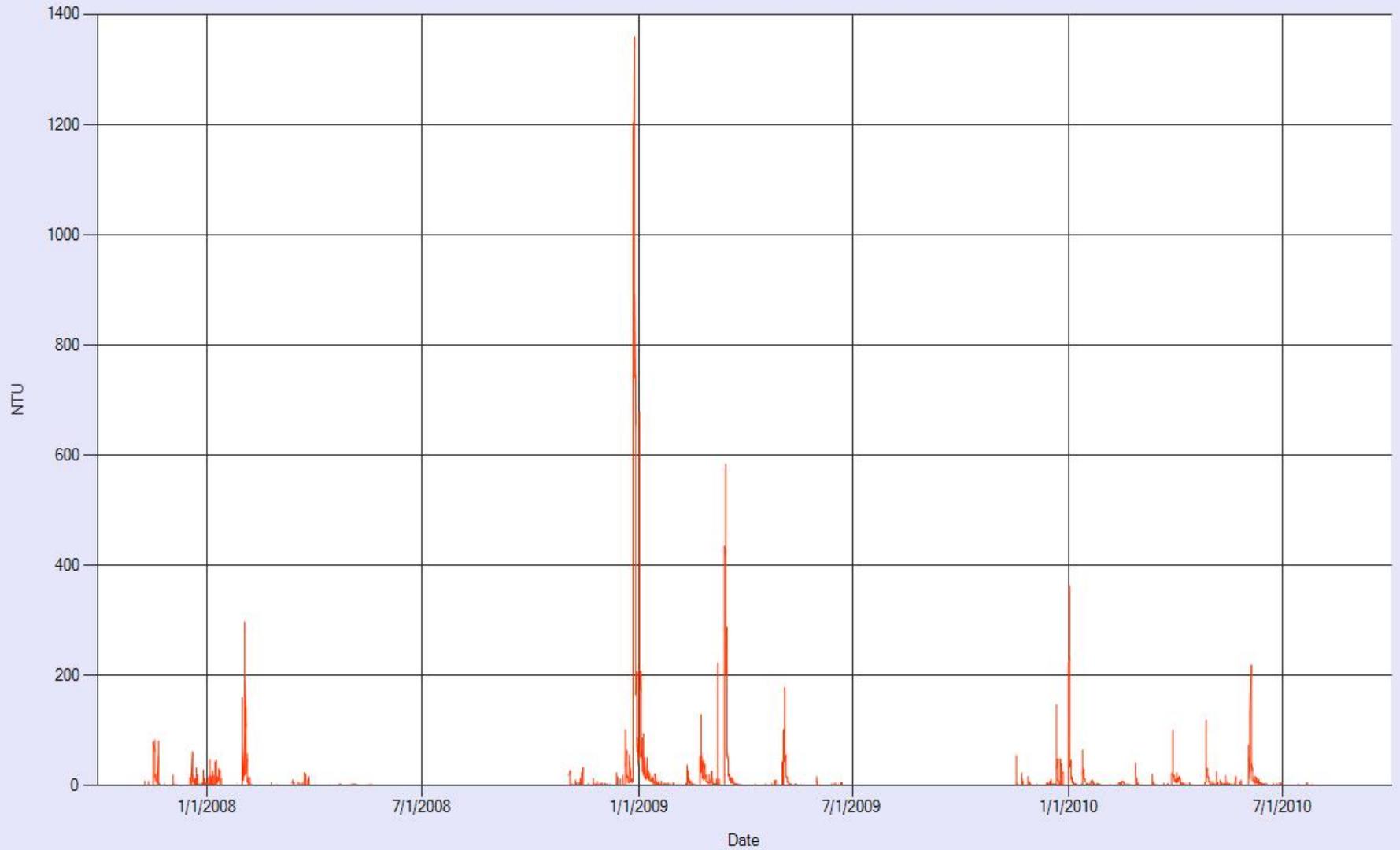
Lower Turwar discharge 2008_2010

Discharge

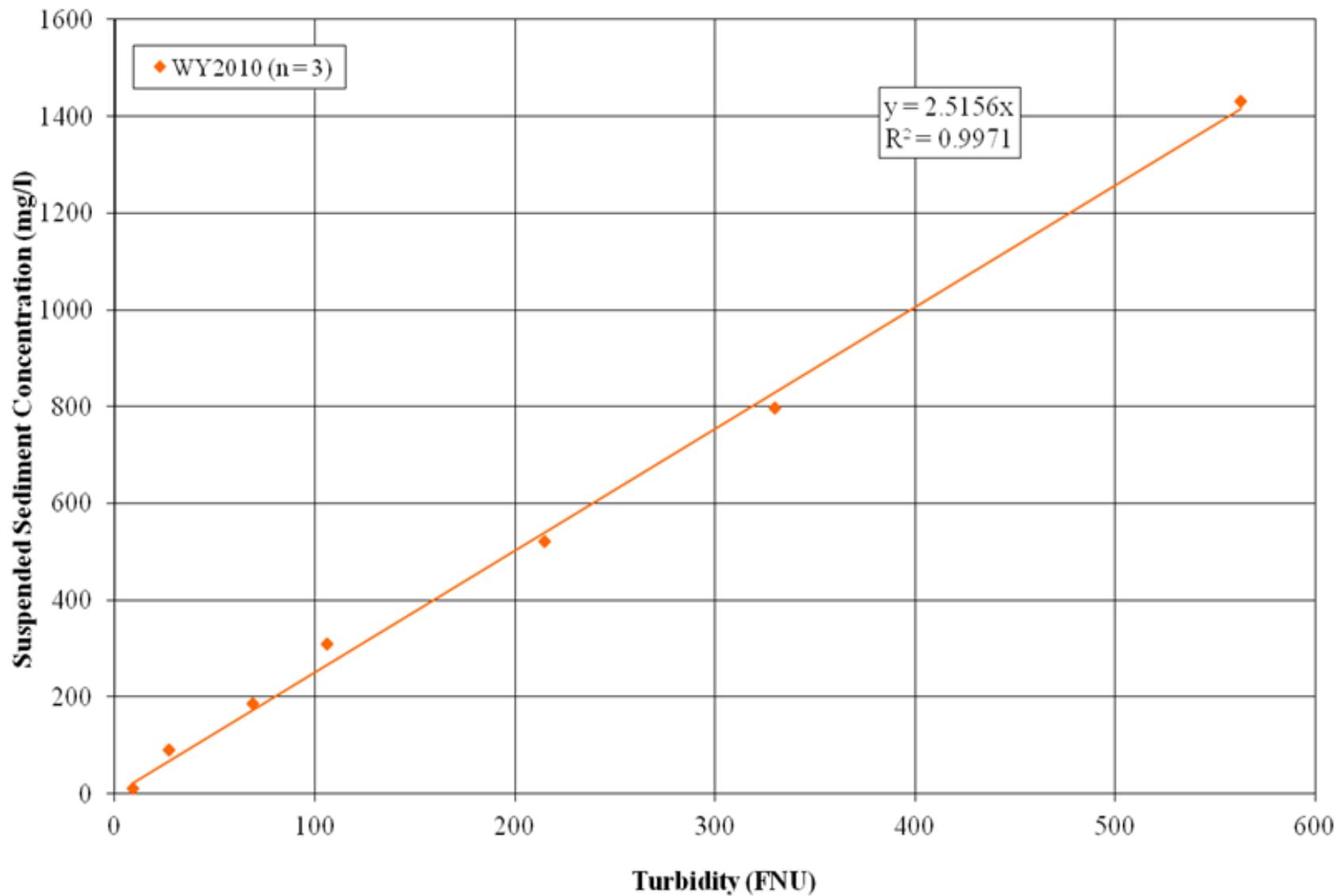


Lower Turwar Creek WY 2008-2010 Turbidity

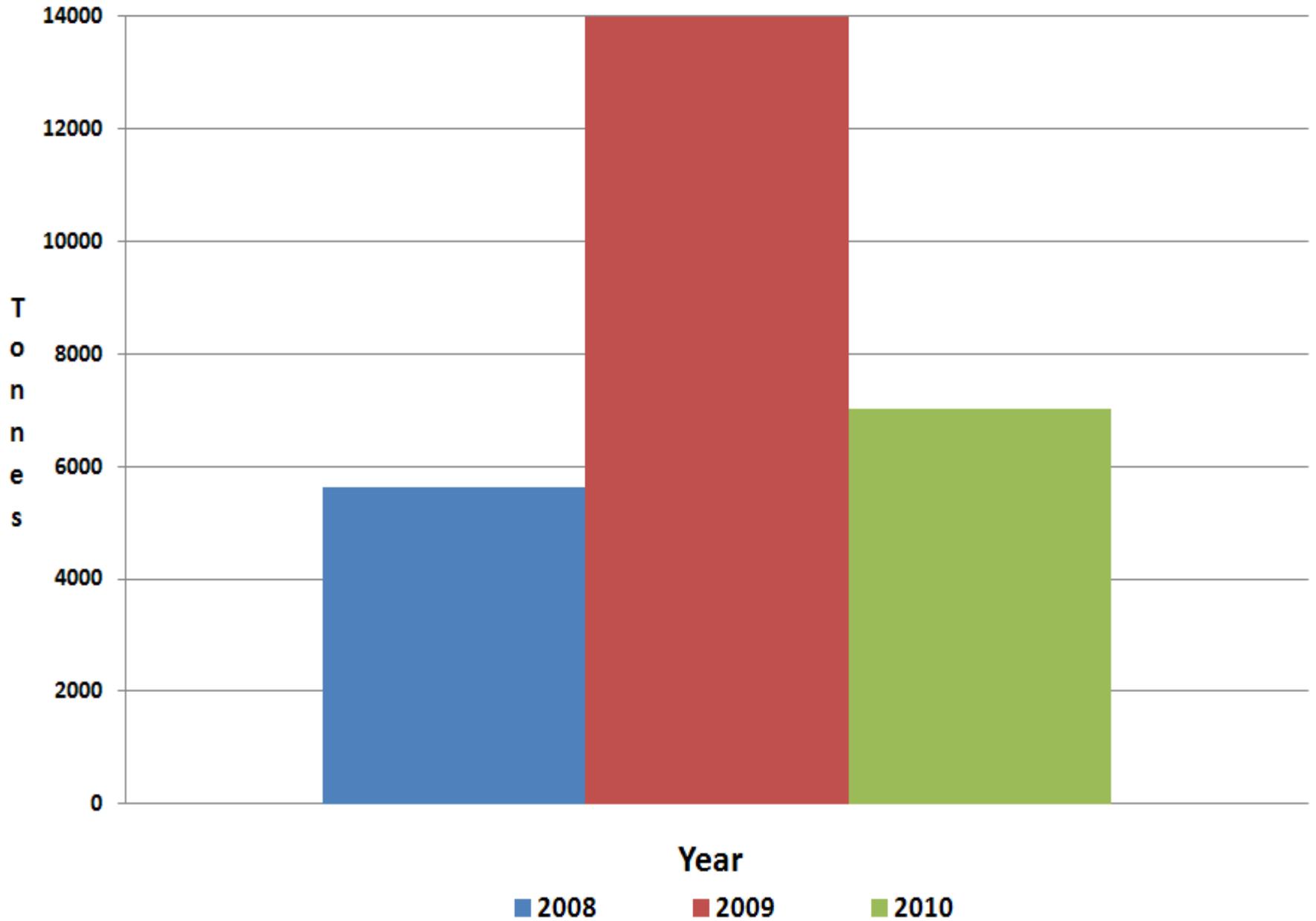
Turbidity LTturb07_10 Turbidity
- Corrections



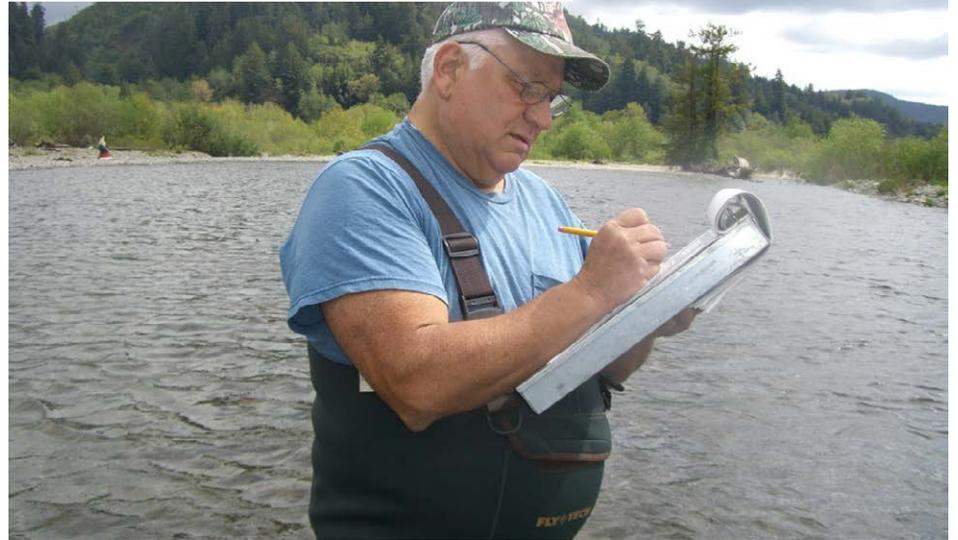
Lower Turwar Creek, WY2010



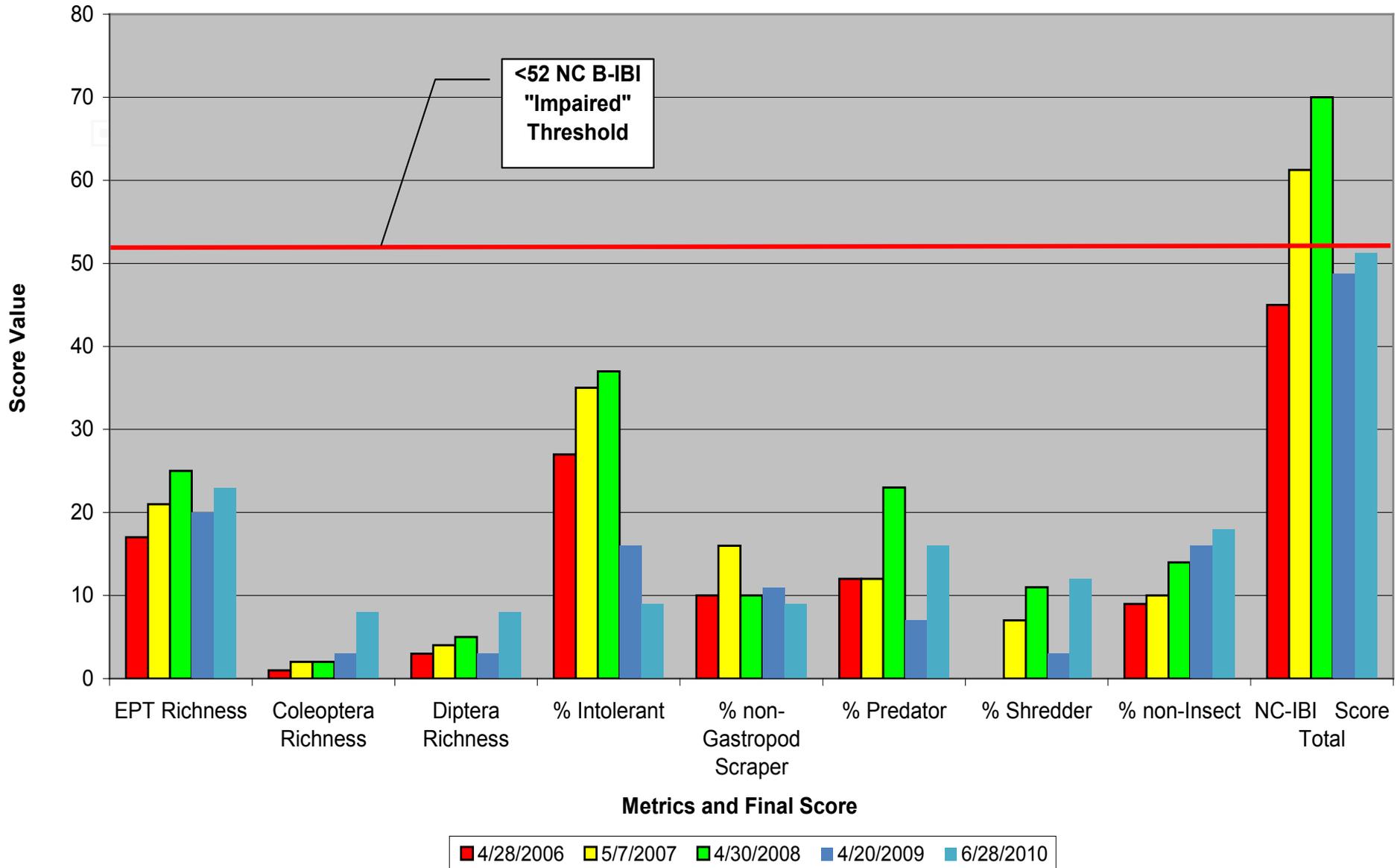
Lower Turwar Creek Sediment Loads 2008 - 2010



Lower Turwar



North Coast IBI Metrics and Final Score Lower Turwar Creek 2006 - 2010



Conclusions

- ▣ Turwar Creek affected by past land management practices and long term trends need to be analyzed to gauge restoration effectiveness .
- ▣ Future data collection will prove to be very valuable in this analysis.
- ▣ Fisheries is still performing in stream restoration on the lower portion of the stream.
- ▣ Yurok Watershed Restoration Program still performing upslope restoration in the watershed
- ▣ SSC sampling has been refined and samples have proven to be more accurate and representative.

Questions or comments?

