

Nutrient Monitoring of The Los Piños River in 2011



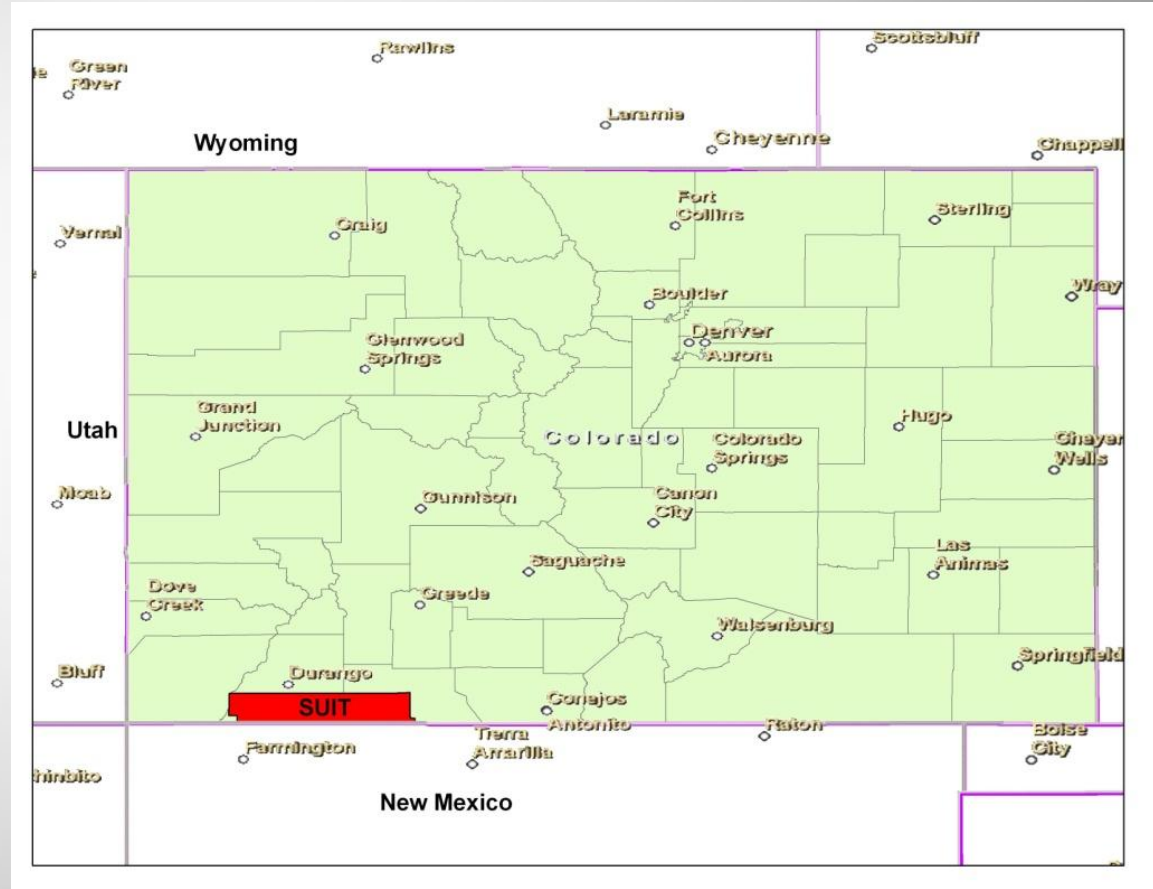
Kirk Lashmett
Senior Water Quality Specialist-§ 106

Katie Frye
Water Quality Technician

Environmental Programs Division
Southern Ute Indian Tribe

SUIT BACKGROUND INFORMATION

- The Southern Ute Indian Tribe (SUIT) is located in Southwestern Colorado
- SUIT shares its southern border with New Mexico



SUIT BACKGROUND INFORMATION

- The Reservation is a checkerboard of Tribal Trust land and fee land
- The exterior boundaries encompasses 710,000 acres of which approximately half is Tribal Trust land
- Seven major rivers flow through the Reservation
- The Los Piños River flows through Ignacio, CO, the Tribal headquarters
- There are about 1,400 SUIT Tribal members, of which, about 900 live on the Reservation

WATER QUALITY PROGRAM AND § 106 BACKGROUND

- The SUIT Water Quality Program was initiated in 1990
- The Current § 106 Program is supported through EPA grant funding under the Clean Water Act
 - Surface Water Monitoring
 - Reservoir Limnological Evaluations
 - Developing Water Quality Standards
 - Determining Designated Uses
 - Groundwater Monitoring
 - Nutrient Enrichment Studies

NUTRIENT MONITORING OF THE LOS PIÑOS RIVER, CO 2011

- Funded through an EPA Section 106 Supplemental Grant for FY 2011-extended through March 2012
- Purpose: To develop both narrative and numeric nutrient criteria for the Los Piños River by assessing various nutrient enrichment effects on the river's limnological characteristics

FACTS ABOUT THE LOS PIÑOS RIVER

- Headwaters located in the San Juan Mountains north of the Reservation
- River flow through the Reservation is largely based upon releases from Vallecito Reservoir
- Dam releases are made:
 - To meet downstream water rights (primarily irrigation)
 - Magnitude of spring run-off (flood control)

WATER QUALITY ISSUES FOR THE LOS PIÑOS RIVER

- Flow Depletion
 - Irrigation-water quality degradation
 - Municipal
 - There is currently no instream flow protection for aquatic life during irrigation season
- Eutrophication-Lower Los Piños River

HOW DO NUTRIENTS ENTER LOS PIÑOS RIVER?

- **NONPOINT SOURCES**

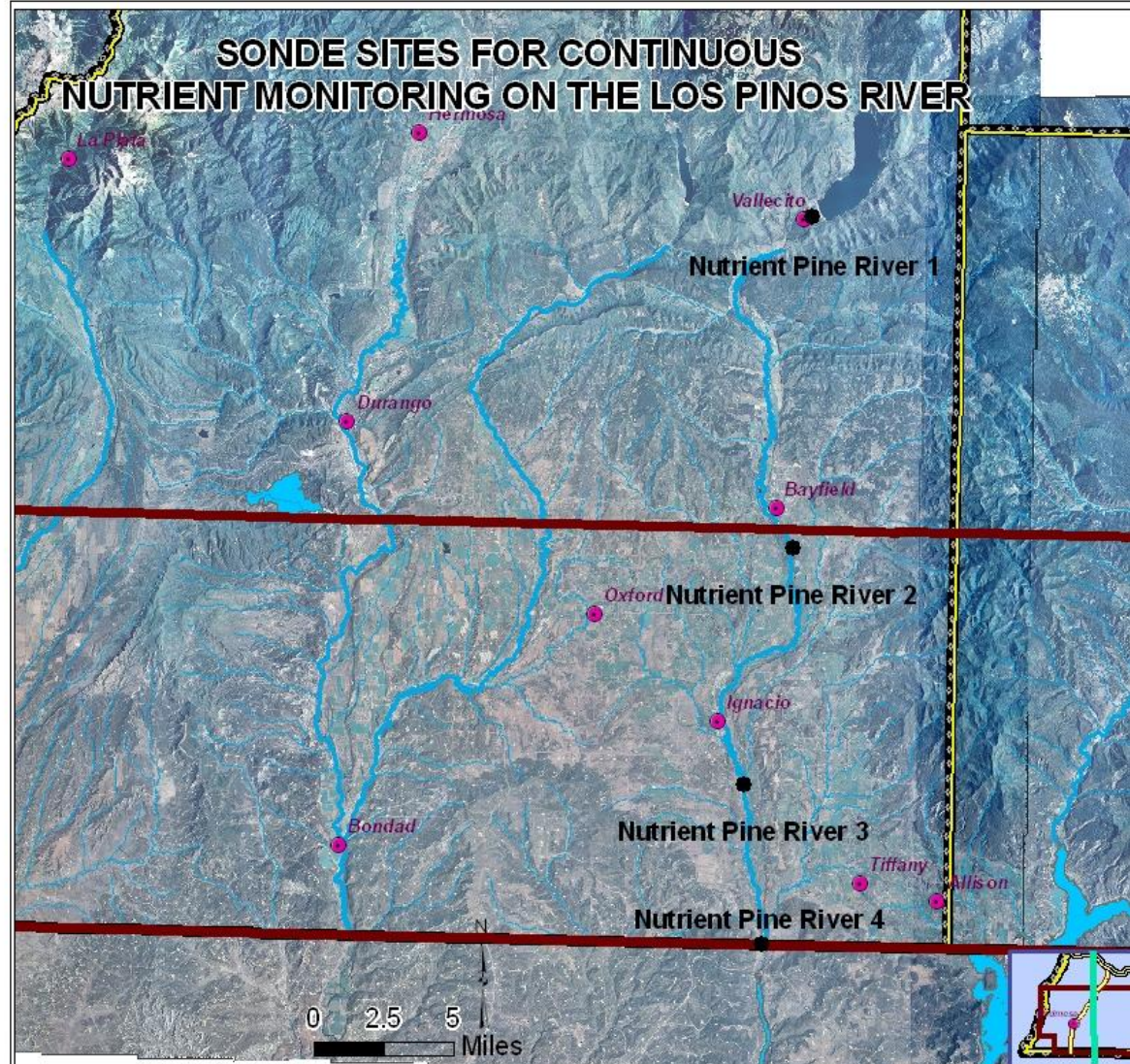
- Fertilizers (irrigation return flows)
- Fecal Material (surface run-off)
- Atmospheric Deposition

- **POINT SOURCES**

- Waste Water Treatment Plants
- Vallecito Reservoir
 - Technically not recognized as a “point source but treated as such for our study purposes”

FOUR PERMANENT MONITORING STATIONS ON THE LOS PIÑOS RIVER

Vallecito
Reservoir to
CO/NM
Stateline is
about 35
miles



MATERIALS AND METHODS

- Four unattended Multi-probe water quality measuring devices
- These instruments were programmed to collect data unattended at regular intervals over extended time frames
 - SUIIT chose 30 minutes intervals
 - April through September
 - Spring run-off and Summer Irrigation season

YSI SONDE 600 XLM V2



- To protect the instrument from damage and theft, a protective housing “cage” was fabricated.
- A high strength chain secured the cage to the shore and padlocked to a secure object.



NPR 1-Mile 0

STATION SELECTION

NPR 2-Mile 17



NPR 3-Mile 29

NPR 4-Mile 35



Mile "0" (NPR1) of Study Area



Vallecito Reservoir
Elevation 7560'



Los Piños River Below
Vallecito Reservoir

Mile "35" (NPR4) of Study Area



Los Piños River Near
CO/NM Stateline
Elevation 6150'

SONDE MAINTENANCE



DATA COLLECTED CONTINUOUSLY

- Date and Time
- Specific conductivity
- Conductivity
- Temperature
- pH
- Dissolved Oxygen

SAMPLES COLLECTED ONCE A MONTH

- **Water Chemistry**
 - Total Nitrogen and Ammonia
 - Total and Ortho Phosphorus
 - Total Suspended Solids (TSS)
 - Field Blanks and Duplicates were also collected
- **Biological**
 - Periphyton-to determine benthic chlorophyll-a concentrations
 - Macroinvertebrates were collected in April, July and September

SUIT Will Develop Criteria To Declare Impairment Based Upon A "Weight of Evidence" Approach

- If three of the criteria designated for these parameters are exceeded for two consecutive years the reach will be declared impaired
 - Dissolved Oxygen Concentration*
 - pH Levels*
 - Periphyton Biomass Measured as Chlorophyll 'a'*
 - Macroinvertebrate Communities*
 - Concentration of Total Nitrogen*
 - Concentration of Total Phosphorus*

* To be Defined

A significant increase in nutrients in a stream can lead to:

- Increased levels of chlorophyll 'a'
 - May have a negative effect on aesthetics of drinking water (odor and/or taste)
 - Lead to an increase in the cost of treating water for human consumption
- High levels of macrophytes in streams can impact recreational use, i.e. fishability
- Diurnal swings of Dissolved Oxygen and pH
 - May be sub-lethal and/or lethal to aquatic life

AUGUST LONGITUDINAL SURVEY – UPPER LOS PIÑOS RIVER



FLOW DEPLETIONS



Pine Ditch Diversion

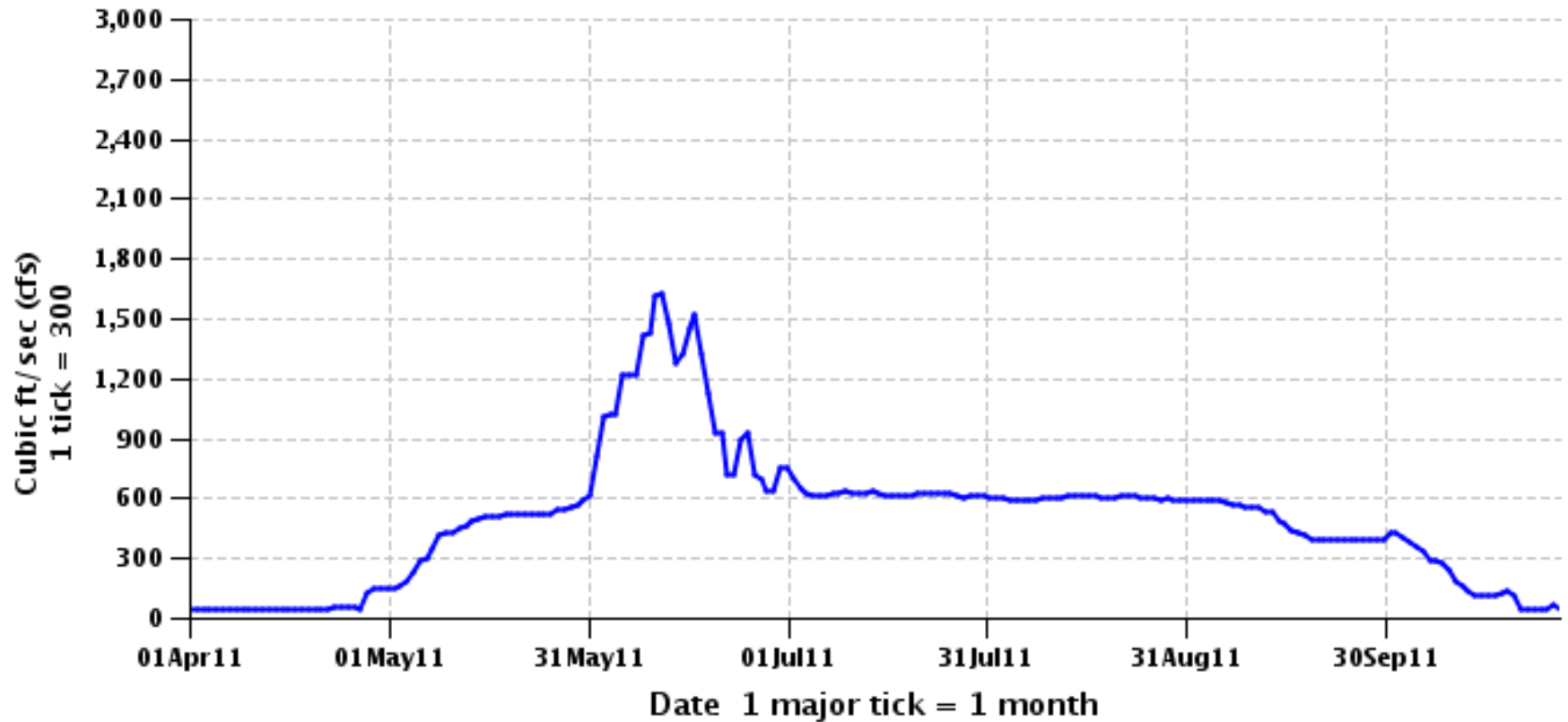


Los Piños River Downstream of Pine Ditch Diversion

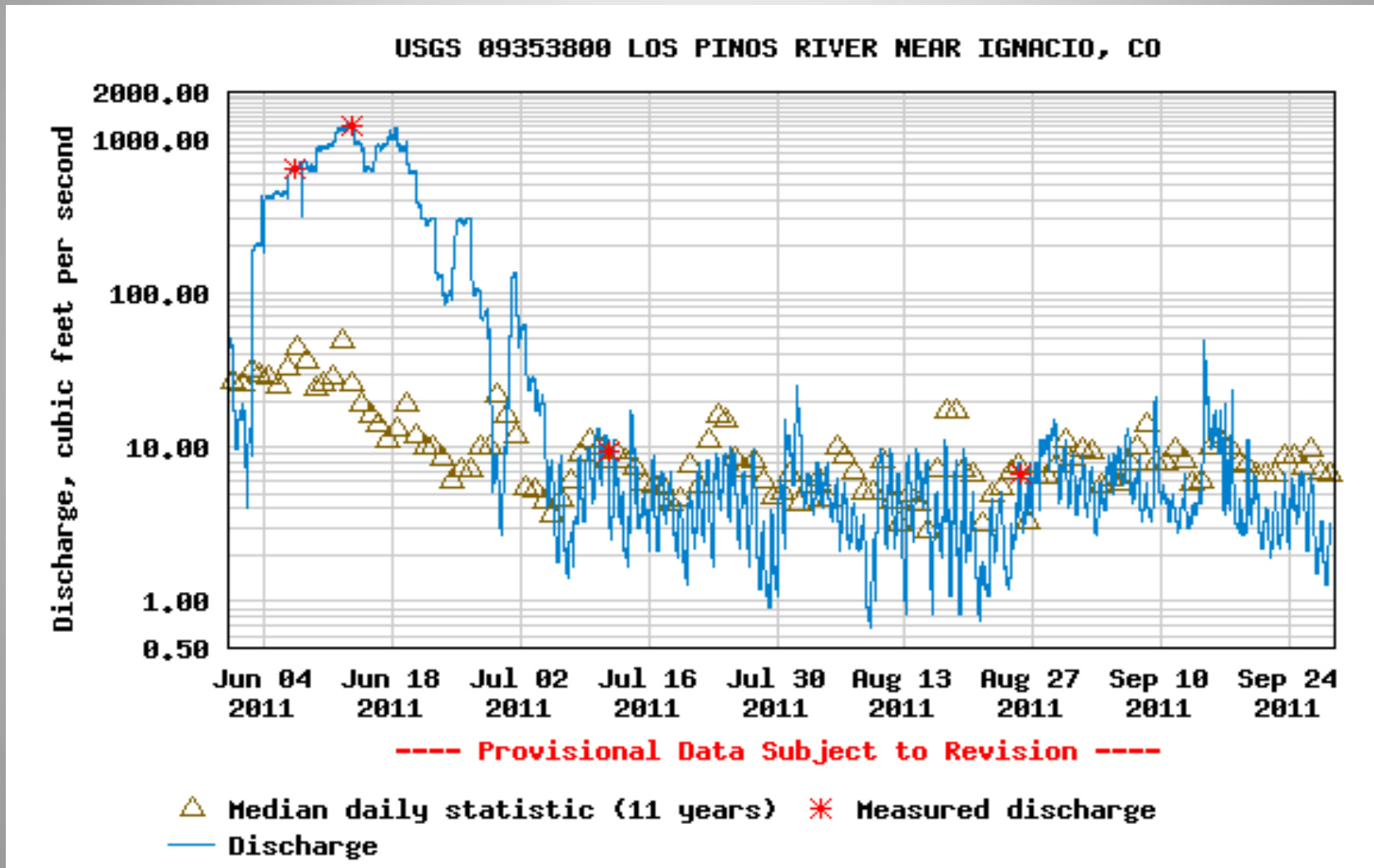
AUGUST LONGITUDINAL SURVEY - LOWER LOS PIÑOS RIVER



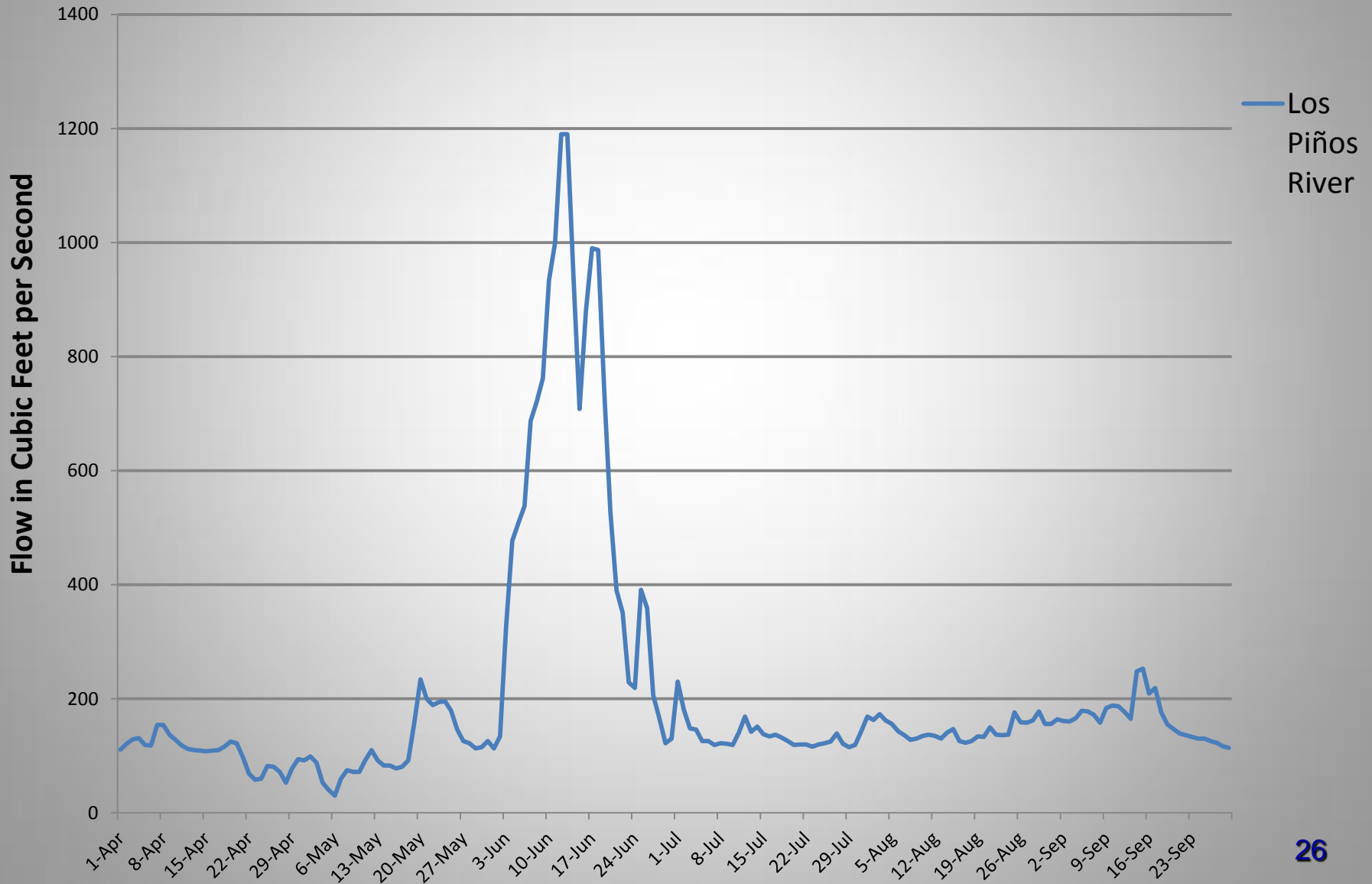
Vallecito Reservoir Releases/April-September 2011

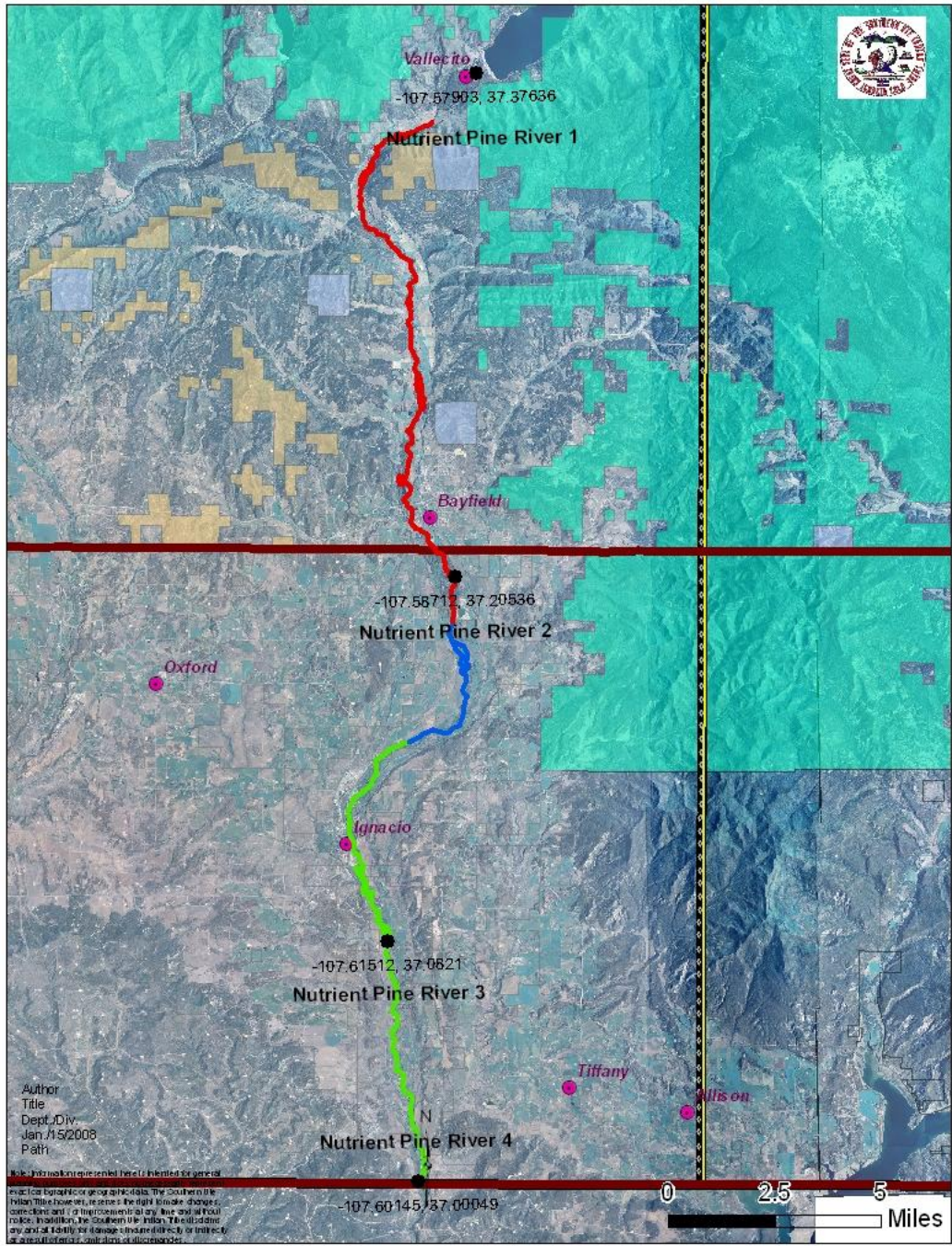


Los Piños River Flow Below Pine Ditch Diversion (Mile 20) From June Through September 2011



Los Piños Flow @ STATELINE (Mile 35) From June Through September 2011



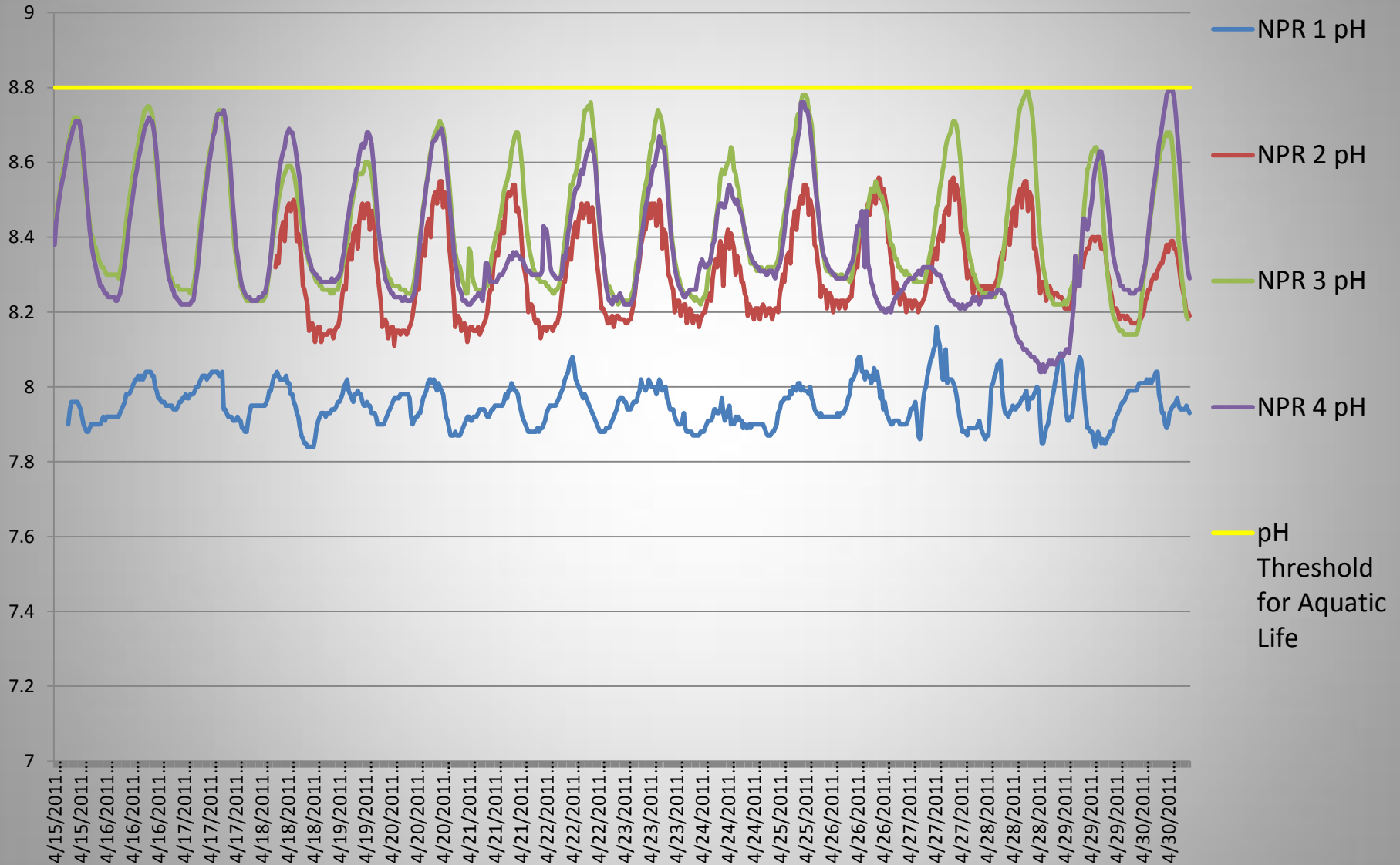


FLOW AUGMENTATION

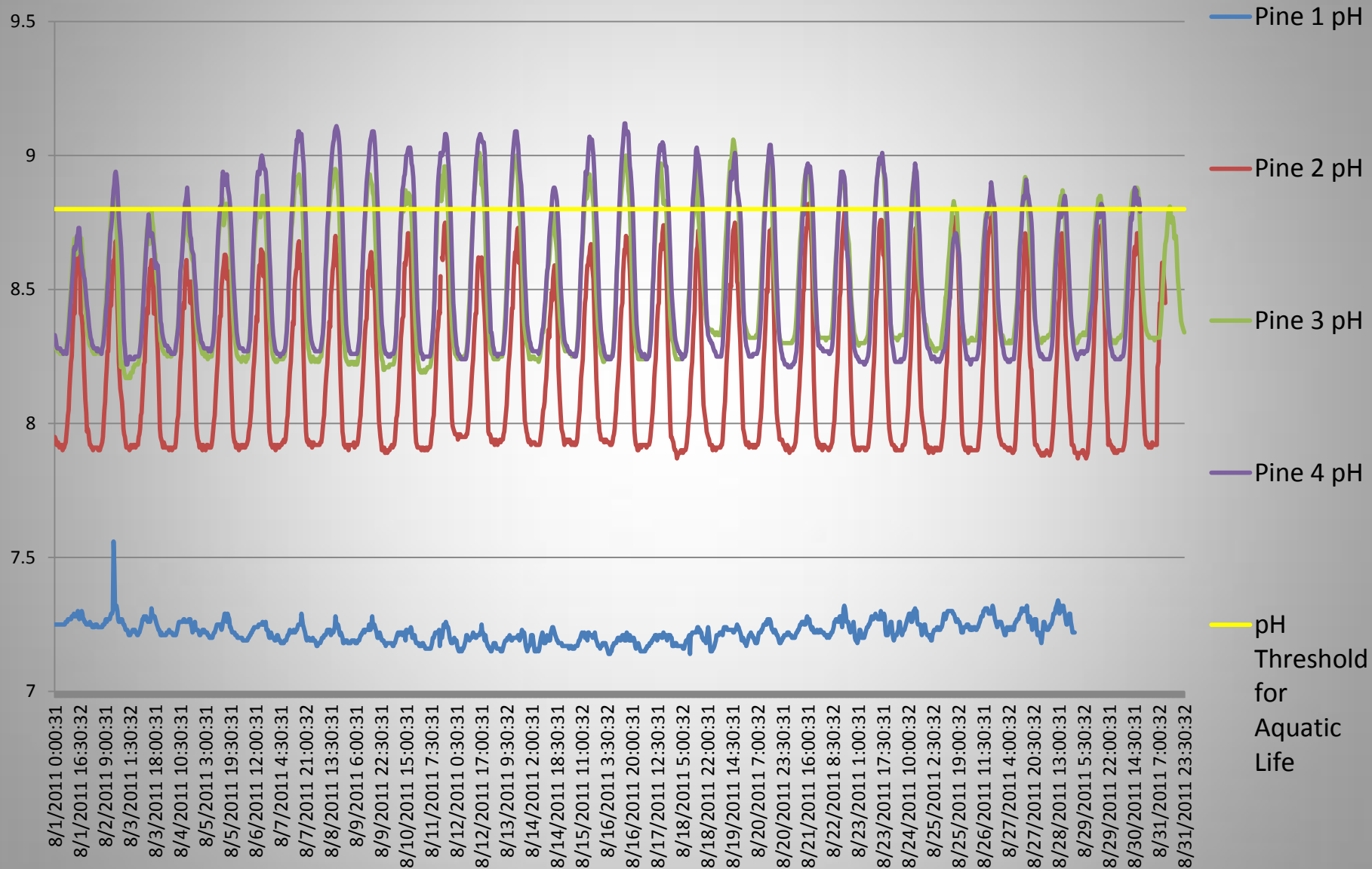
During the summer, Irrigation Return Flows are largely responsible for the flow in the Los Piños River Downstream of the Pine Ditch Diversion.



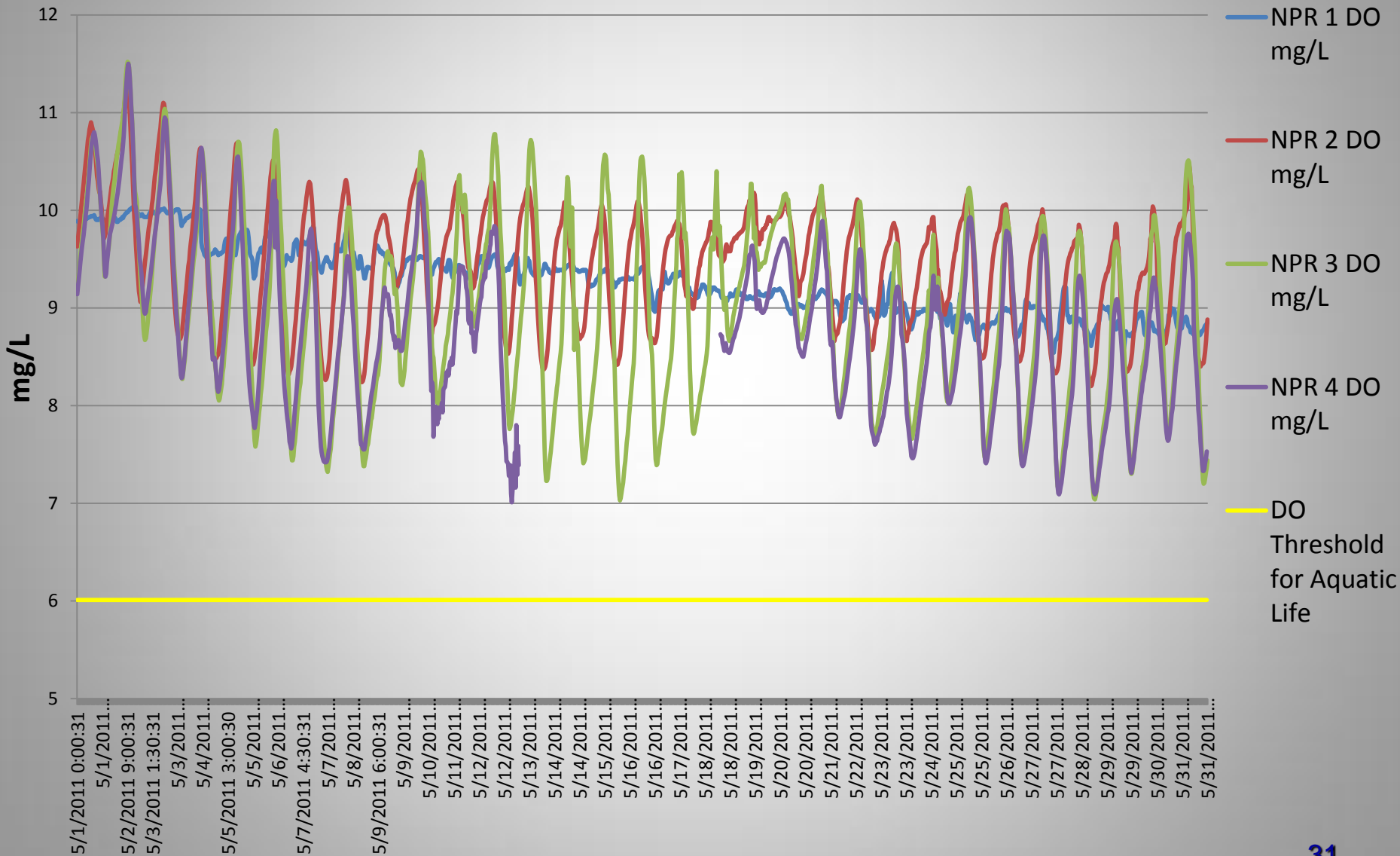
pH LEVELS IN THE LOS PIÑOS RIVER FOR APRIL 2011



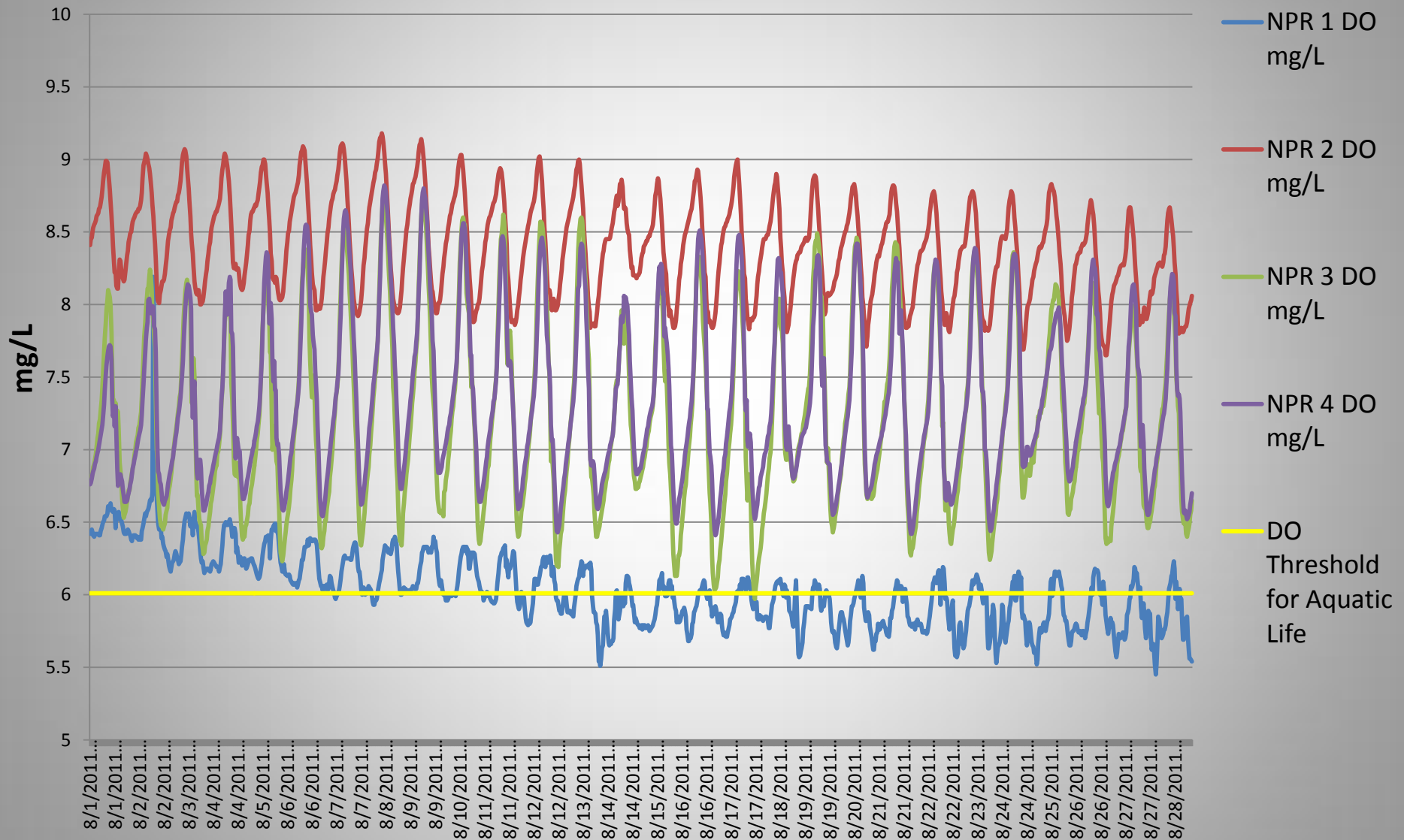
pH LEVELS IN THE LOS PIÑOS RIVER FOR AUGUST 2011



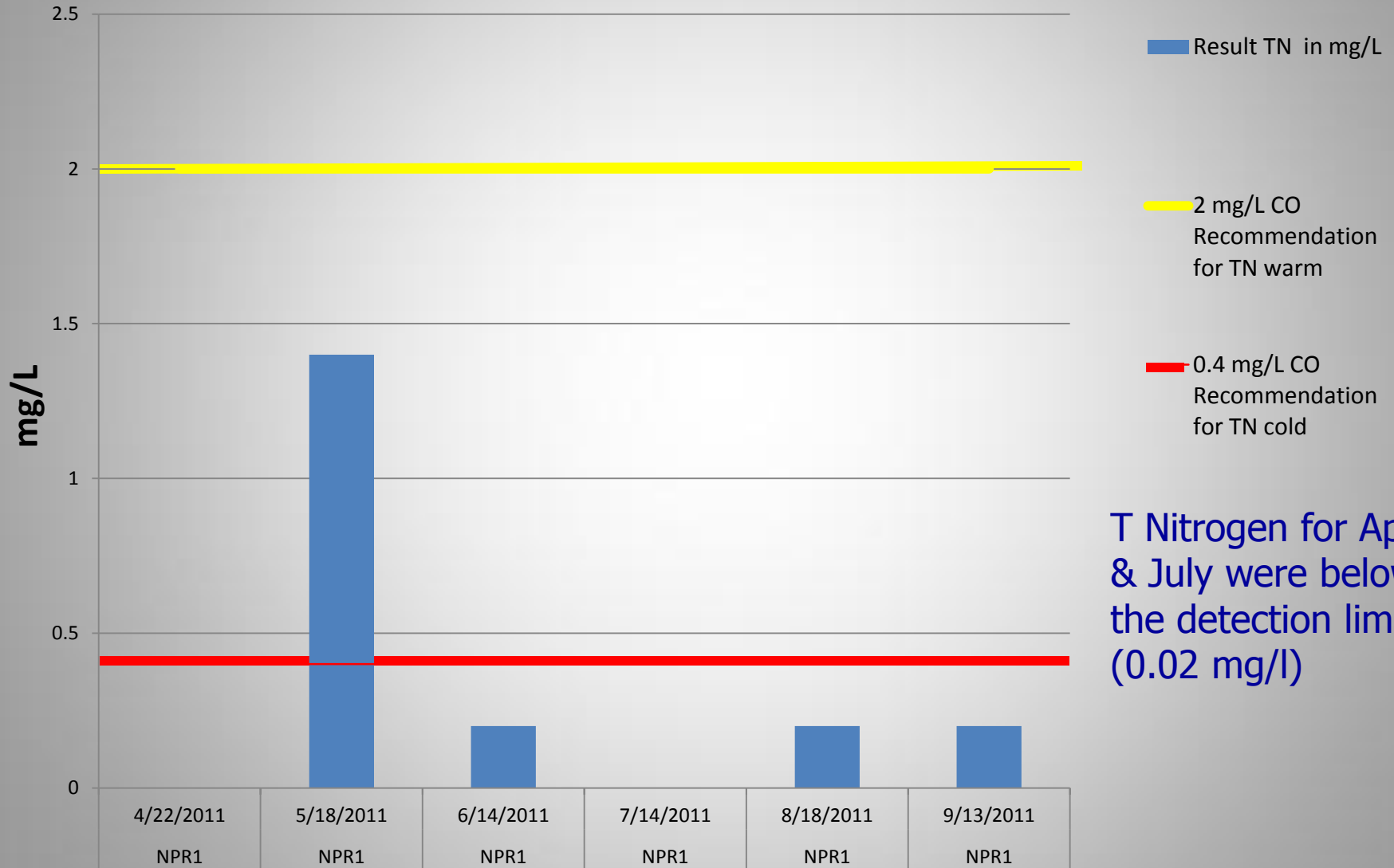
DISSOLVED OXYGEN LEVELS IN THE LOS PIÑOS RIVER FOR MAY 2011



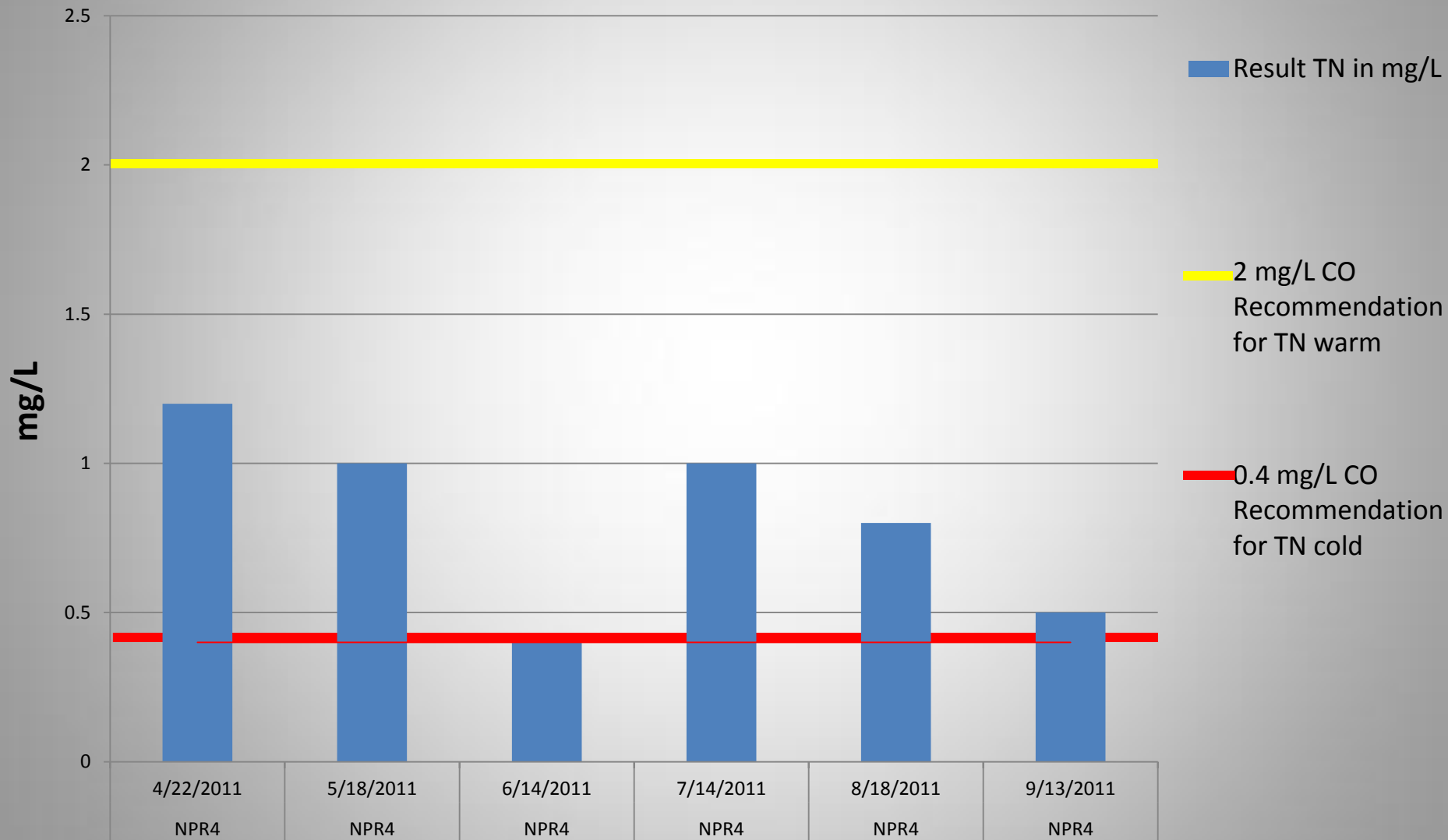
DISSOLVED OXYGEN LEVELS IN THE LOS PIÑOS RIVER FOR AUGUST 2011



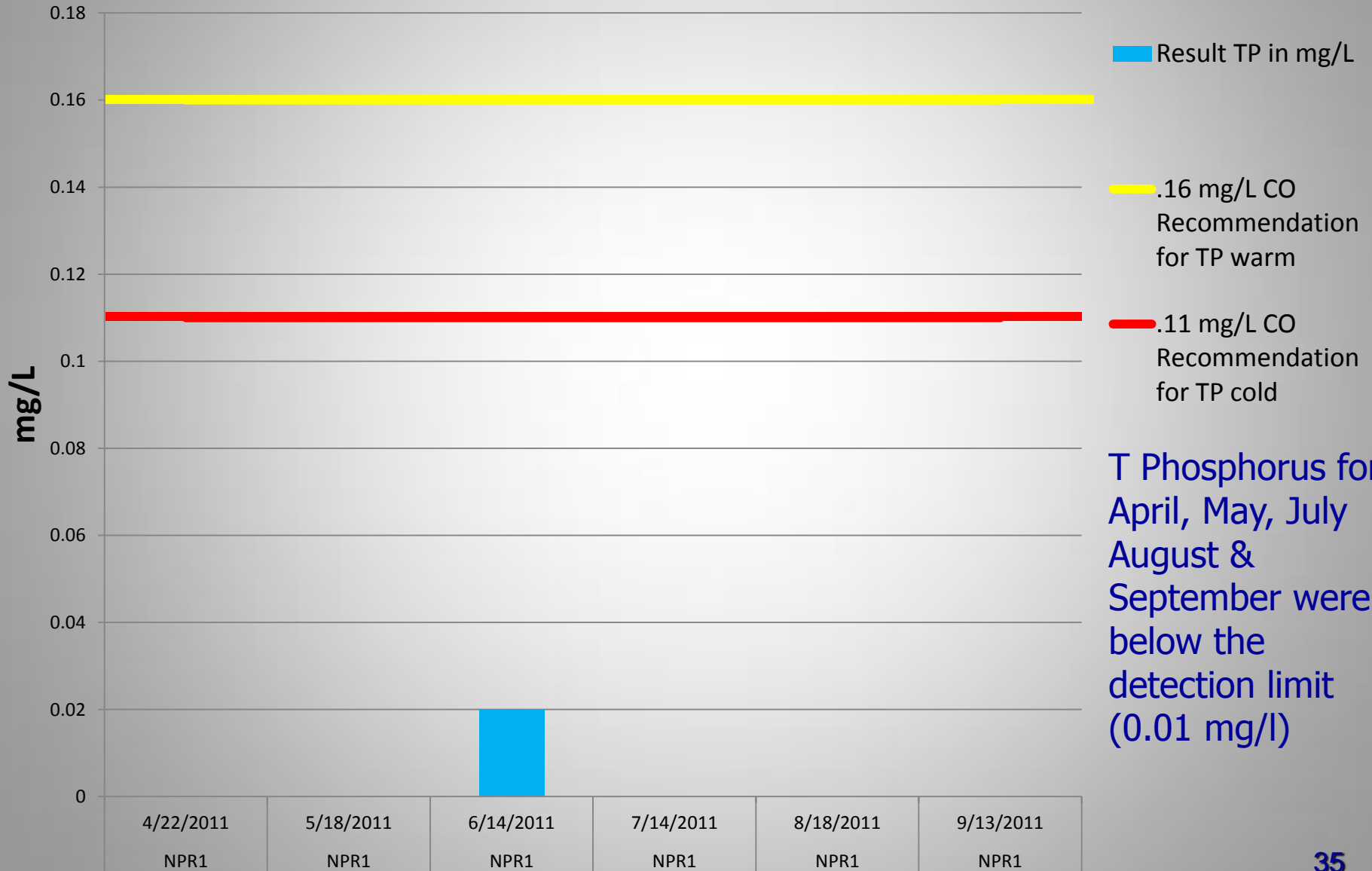
T Nitrogen Levels at **NPR1** Site for April – September 2011



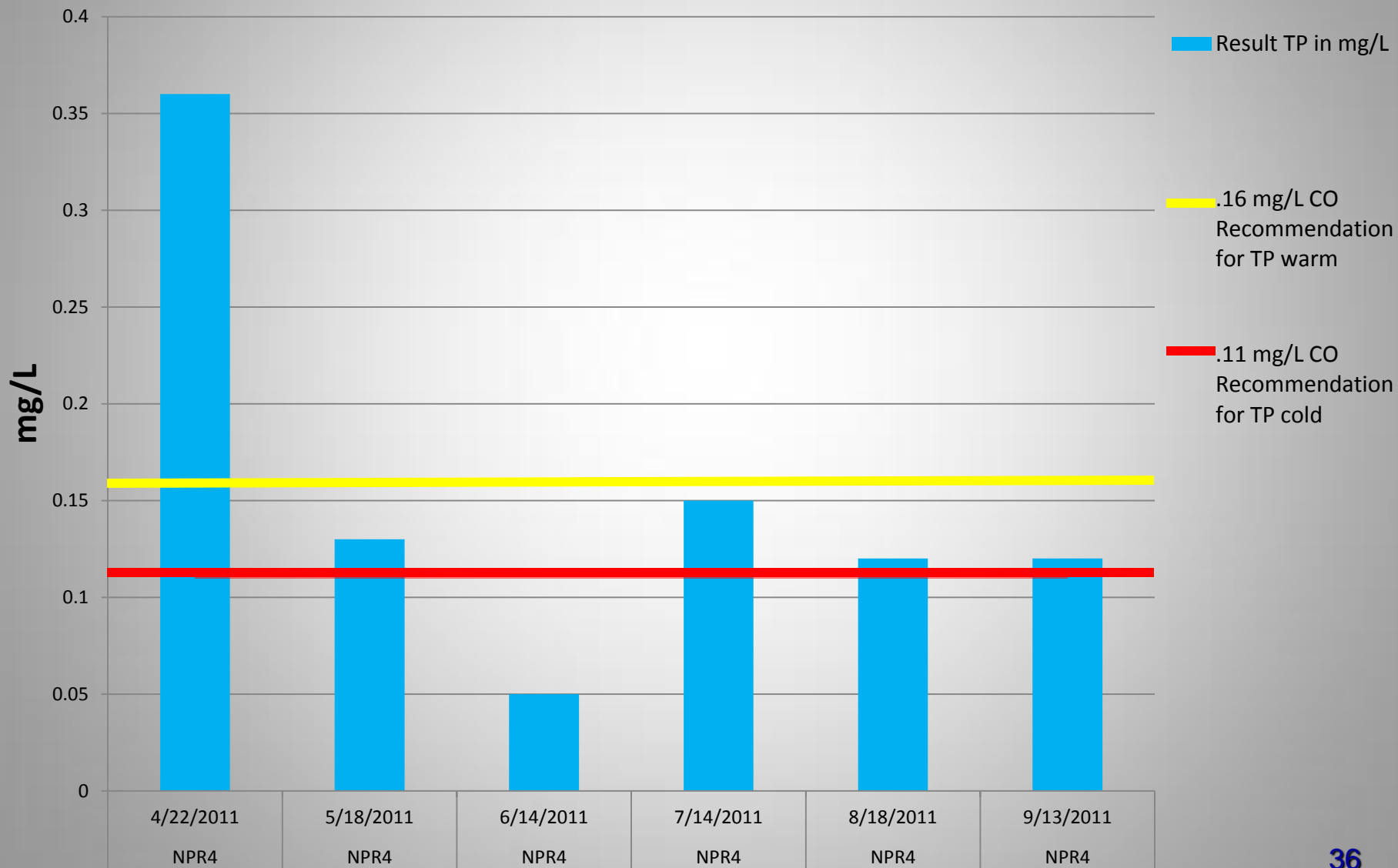
T Nitrogen Levels at **NPR4** Site for April – September 2011



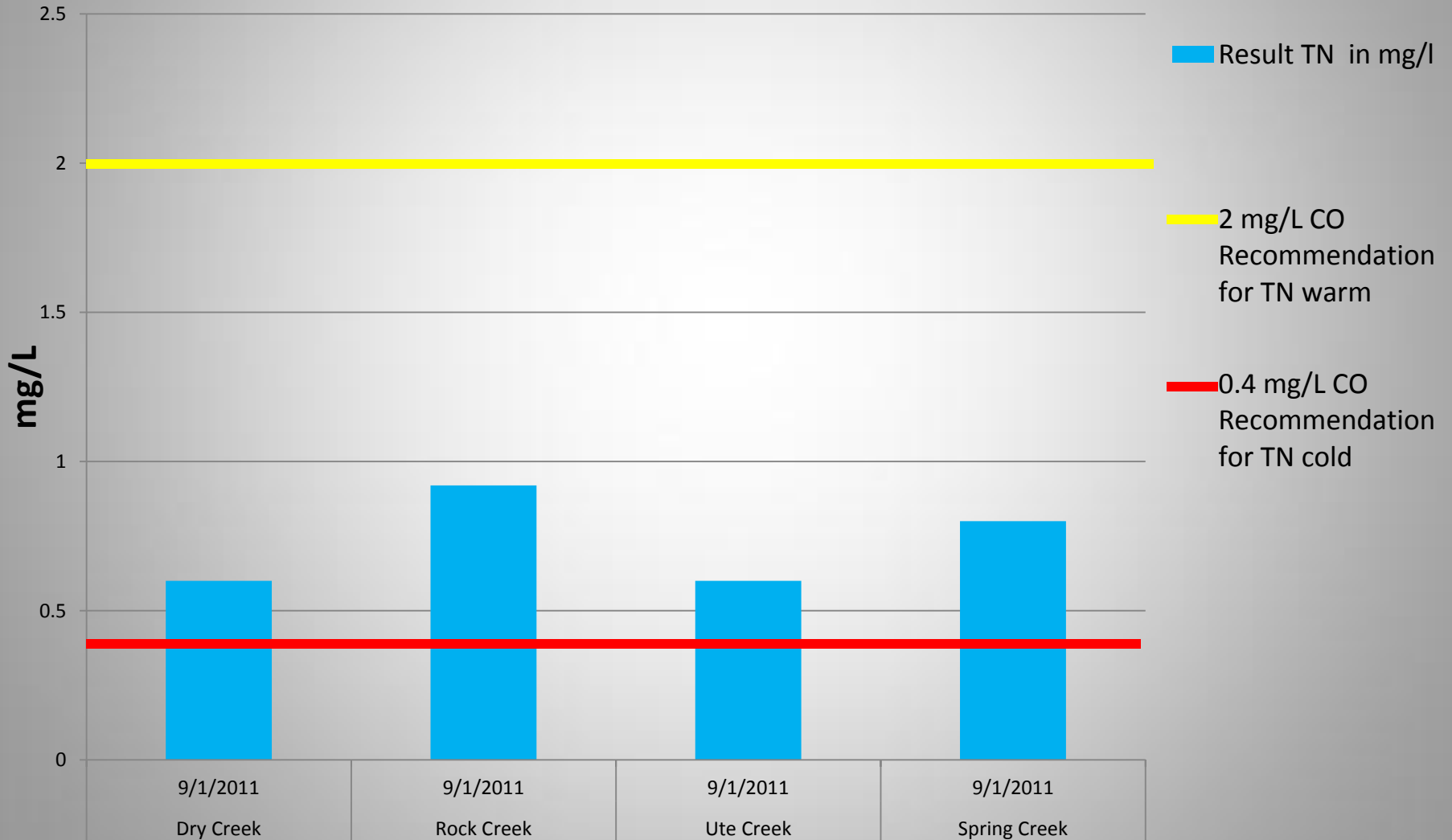
T Phosphorus Levels at **NPR1** Site for April – September 2011



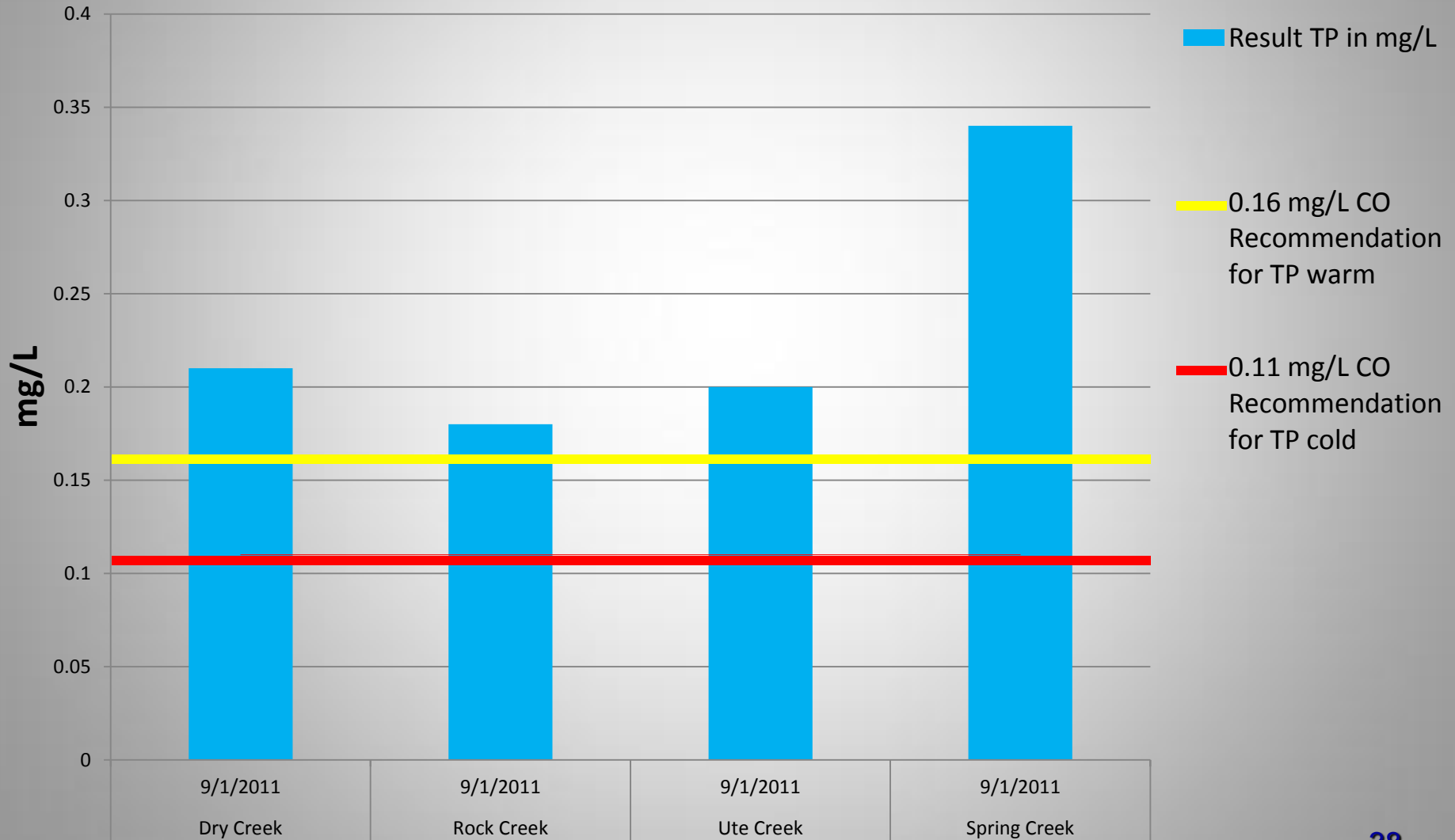
T Phosphorus Levels at **NPR4** Site for April – September 2011



T Nitrogen Levels at Selected Los Piños Tributaries, September 2011



T Phosphorus Levels at Selected Los Piños Tributaries, September 2011



Native Fish of the Los Piños River



Mottled Sculpin (*Cottus bairdii*)



Bluehead Sucker (*Catostomus discobolus*)



Speckled Dace (*Rhynchithys osculus*)



Flannelmouth Sucker (*Catostomus latipinnis*)

Native Fish of the Los Piños River



Non-native Salmonids of the Los Piños River



Rainbow Trout

Oncorhynchus mykiss



Brown Trout

Salmo trutta



Kokanee Salmon

Oncorhynchus nerka

Non-native Fish of the Los Piños River



Black Bullhead (*Ictalurus melas*)



Largemouth Bass (*Micropterus salmoides*)



Smallmouth Bass (*Micropterus dolomieu*)



Channel catfish (*Ictalurus punctatus*)

Non-native Fish of Los Piños River



Fathead Minnow (*Pimephales promelas*)



Common Carp (*Cyprinus carpio*)



Mosquitofish (*Gambusia affinis*)



White Sucker (*Catostomus commersoni*)⁴³

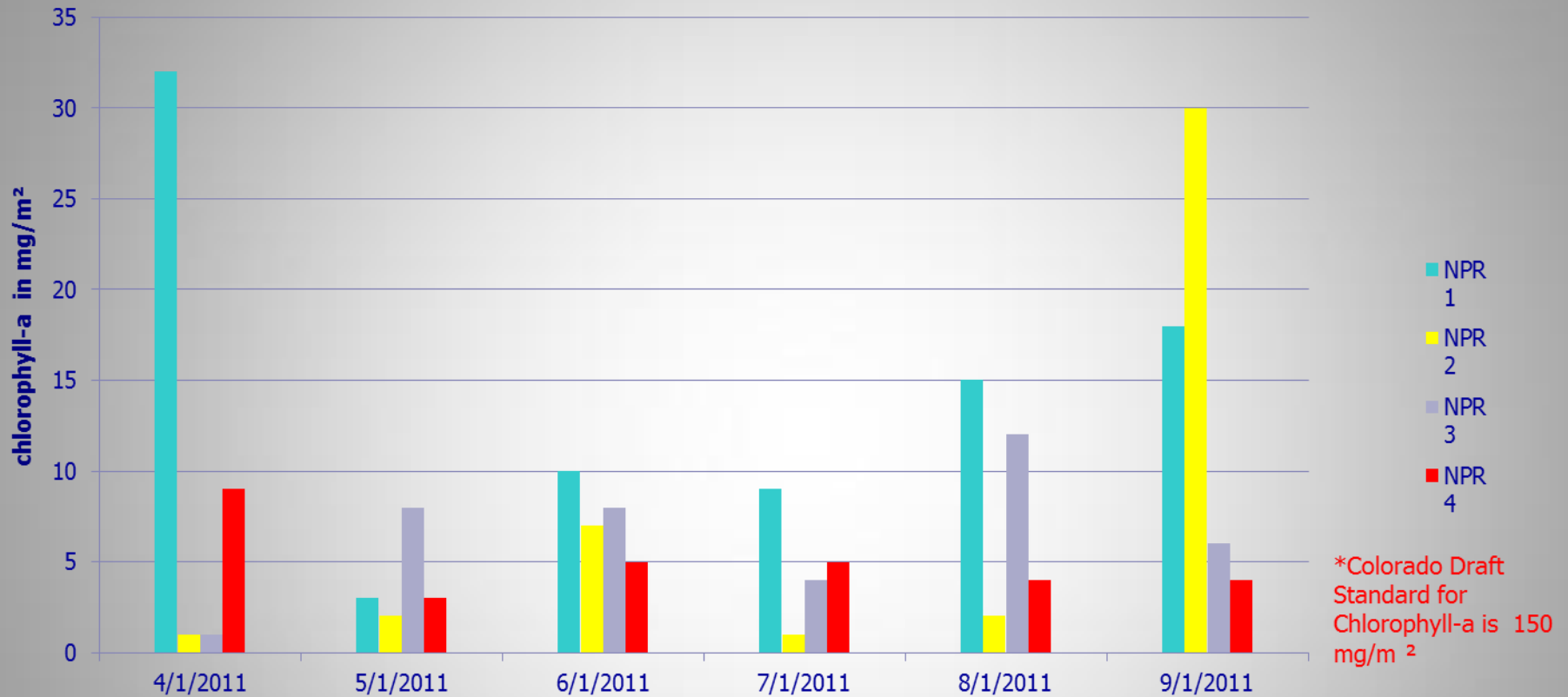
COLLECTING PERIPHYTON



Periphyton Collections



Chlorophyll 'a' Results



MACROINVERTEBRATES (TRICHOPTERA)



Brachycentrus



Arctopsyche



Hydropsyche



Leucotrichia pictipes

MACROINVERTEBRATES

(Diptera, Plecoptera, Ephemeroptera Coleoptera)



Simulium



Claassenia



Heptagenia



Elmidae

MACROINVERTEBRATES (Other)



Physa (Snail)



Orconectes (Crayfish)



Dugesia (Planaria)

LESSONS LEARNED

- Operation and Maintenance of Unattended Sondes is Time Consuming
- Sondes Will Likely Need to have Some Probes, i.e. pH, and Sonde Guards Replaced
- Periphyton Sampling Protocols are Variable and Results Are Likely to be Confounding
- Plan on Collecting Data Over Multiple Years
- There Will Likely be “No Smoking Gun”
- Do Not Expect Dissolved Oxygen Levels to Have Wide Diurnal Swings in Concentration

CHANGES TO THE 2012 NUTRIENT EVALUATION OF THE LOS PIÑOS RIVER

- Adding two More Sampling Stations to the Los Piños River
- Conducting two Longitudinal Surveys of the River
- Collect More N and P Data from Tributaries to the Los Piños River
- Attempt to more Specifically Identify Sources of Elevated Levels of N and P Entering the Los Piños River
- Considering expanding the study period in 2012 to include the early spring and late fall

SUMMARY

- Elevated Levels of Nitrogen and Phosphorus in lower river
- pH elevated in lower river, especially late summer
- Dissolved oxygen levels remained within aquatic life tolerance limits
- Chlorophyll 'a' levels overall very low
- Macroinvertebrate population diversity is yet to be determined

Data Analysis

- The WQP will be working with a consulting firm this winter to analyze data to include preparing a report of findings for the 2011 evaluation and making preliminary calculations of the total load of T nitrogen and T phosphorus entering Navajo Reservoir from the Los Piños River.

QUESTIONS

CONTACT INFORMATION

For more information or to have this presentation E-Mailed to you please contact either Kirk Lashmett or Katie Frye at:

klash@southern-ute.nsn.us

kfrye@southern-ute.nsn.us

