National Biological Assessment and Criteria Workshop

Advancing State and Tribal Programs

Coeur d'Alene, Idaho
31 March – 4 April, 2003

TRIBE 101

TRIBAL BIOLOGICAL ASSESSMENT AND CRITERIA PROGRAMS

Course Presenters and Contributors
Michael Barbour, Dan Mosley, Deb Madison, James Snitgen, Nancy Costa, Karen Vargas

National Biological Assessment and Criteria Workshop

Advancing State and Tribal Programs

Coeur d'Alene, Idaho
31 March – 4 April, 2003

TRIBE 101

Introduction

Presented by
Michael Barbour, Tetra Tech, Inc.

PURPOSE OF TRIBE 101

- Understand key elements of a bioassessment program
- Sharing of technical experiences
- Problem solving for tribal issues

TRIBE 101 OUTLINE

8am – 8:10	**Introduction**
8:10 – 9:10	**Case Examples of Technical Issues**
9:10 – 9:40	**Round-table Discussion of Technical Issues**
9:40 –10:20	**Exercise: Calculation of Benthic Metrics**
10:20 – 10:30	**BREAK**
10:30 – 11:30	**Case Examples of Programmatic Implementation of Bioassessment**
11:30 – 12:00pm	**Round-table Discussion of Programmatic Implementation**

TECHNICAL ISSUES

- Establishing reference conditions on tribal lands
- Developing the foundation for a biological index
- Identifying and characterizing stressors
- Collaborating with States to enhance biological assessments

PROGRAMMATIC IMPLEMENTATION OF BIOASSESSMENT

- Reporting of environmental condition
- Use in non-point source investigations and TMDLs
- Implementing bioassessments into water quality standards

CASE EXAMPLE PRESENTATIONS

Dan Mosley
Pyramid Lake Paiute Tribe (NV)

Deb Madison

Fort Peck Assiniboine & Sioux Tribes (MT)

Jim Snitgen

Oneida Tribe of Indians of Wisconsin

Nancy Costa

Fond du Lac Reservation (MN)

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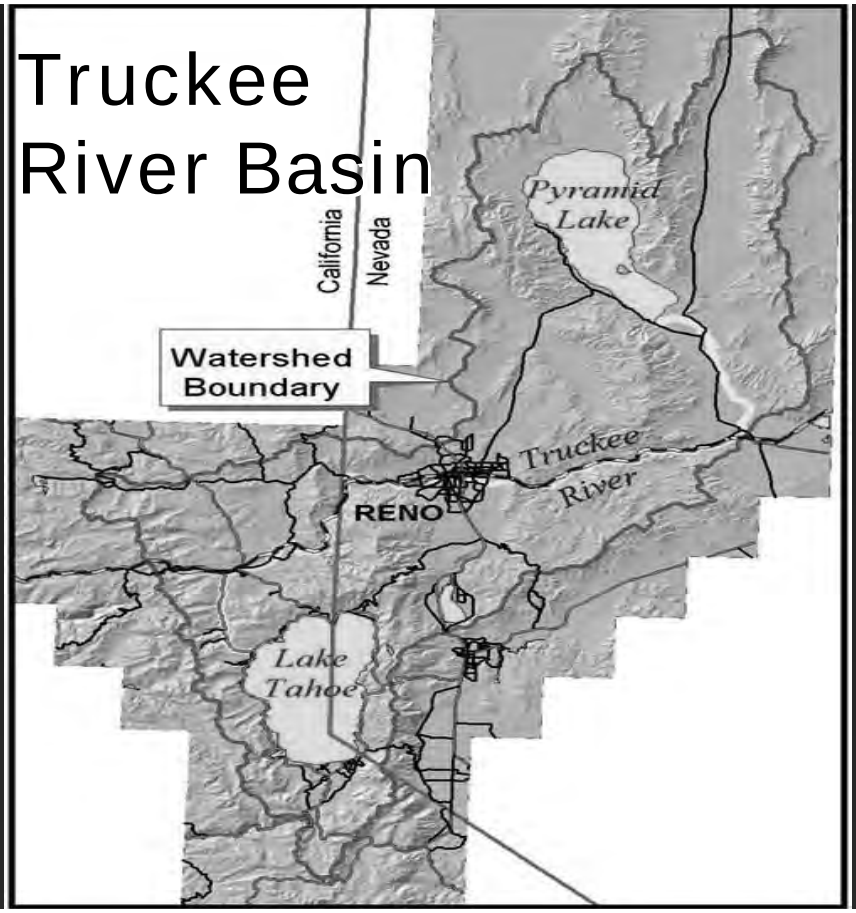
TRIBE 101

Pyramid Lake Paiute Tribe: Bioassessment Program Technical Issues

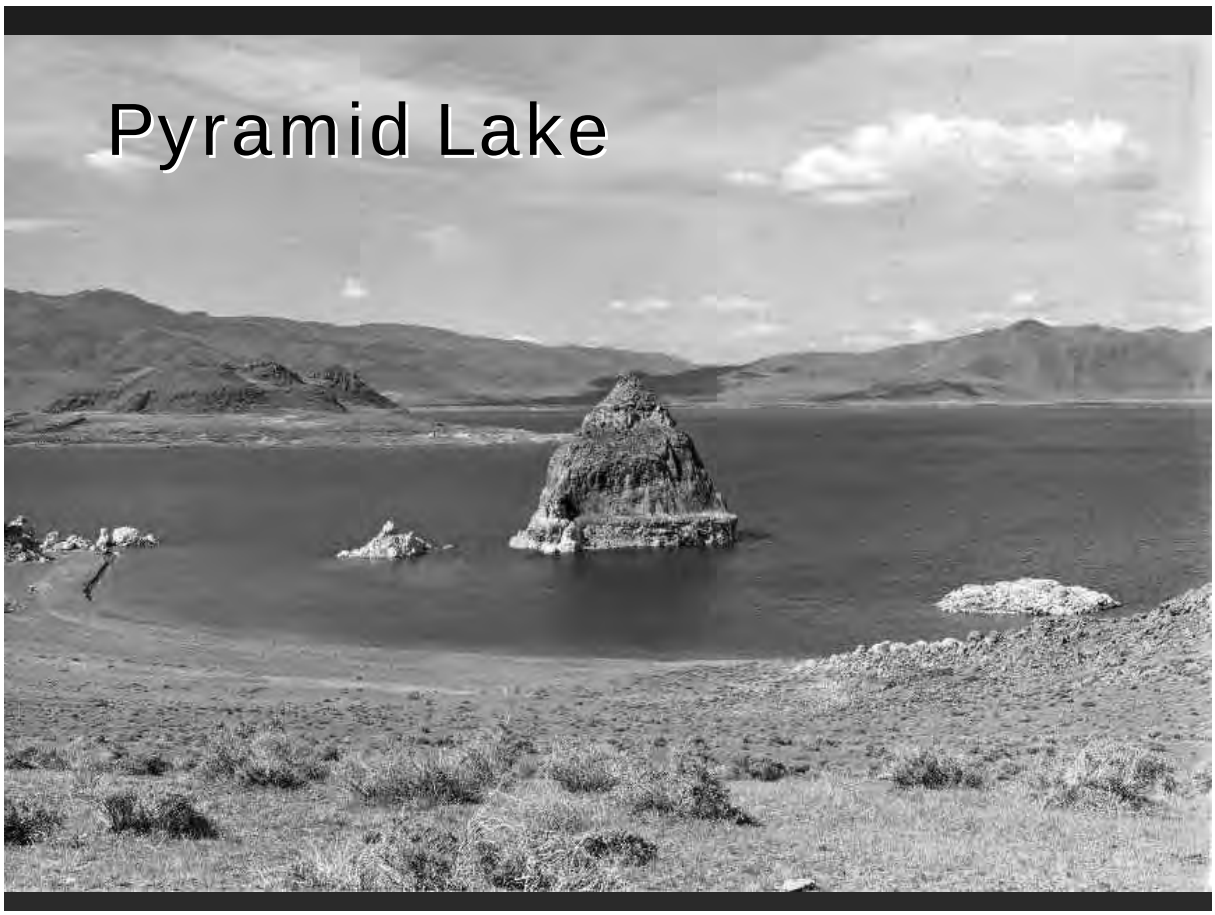
Presented by

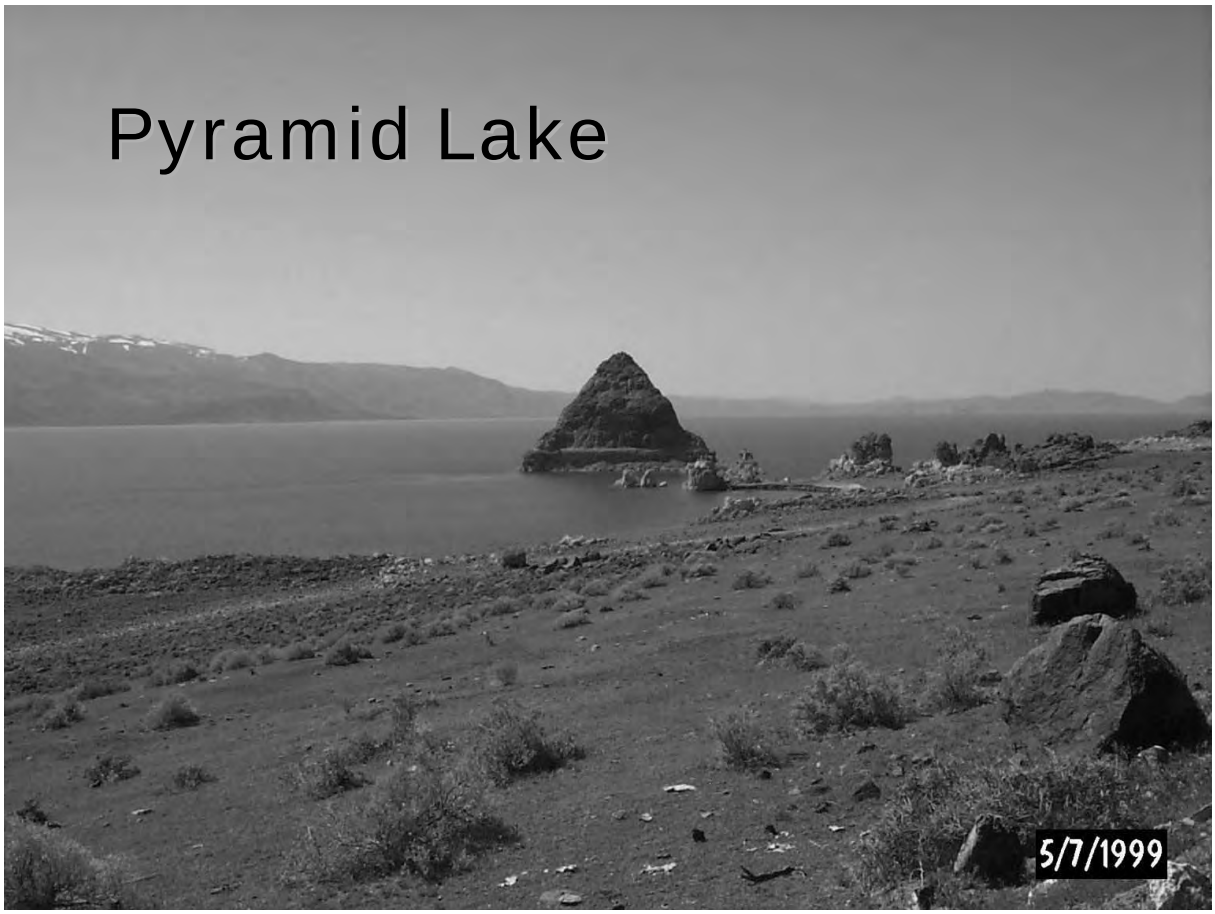
Daniel Mosley, Pyramid Lake Paiute Tribe

Truckee River Basin



Pyramid Lake





Biocriteria

- WQCP: Narrative Standards
  - Species Composition

Communities and populations of aquatic biota, including invertebrate, vertebrate and plant species, shall not be degraded as a result of point source or nonpoint source discharge. This applies to transient as well as cumulative conditions. Short-term variances from these objectives may be allowed for actions that are being taken to fulfill statutory requirements under Tribal law or the federal Endangered Species Act.

Reference Condition Process

1981	LTR comprehensive survey
1989	Began using EPA RBP protocols
1998	Began attending workshops/ trainings, and developing working relationships with other agencies
2002	Began evaluating LTR BMI data

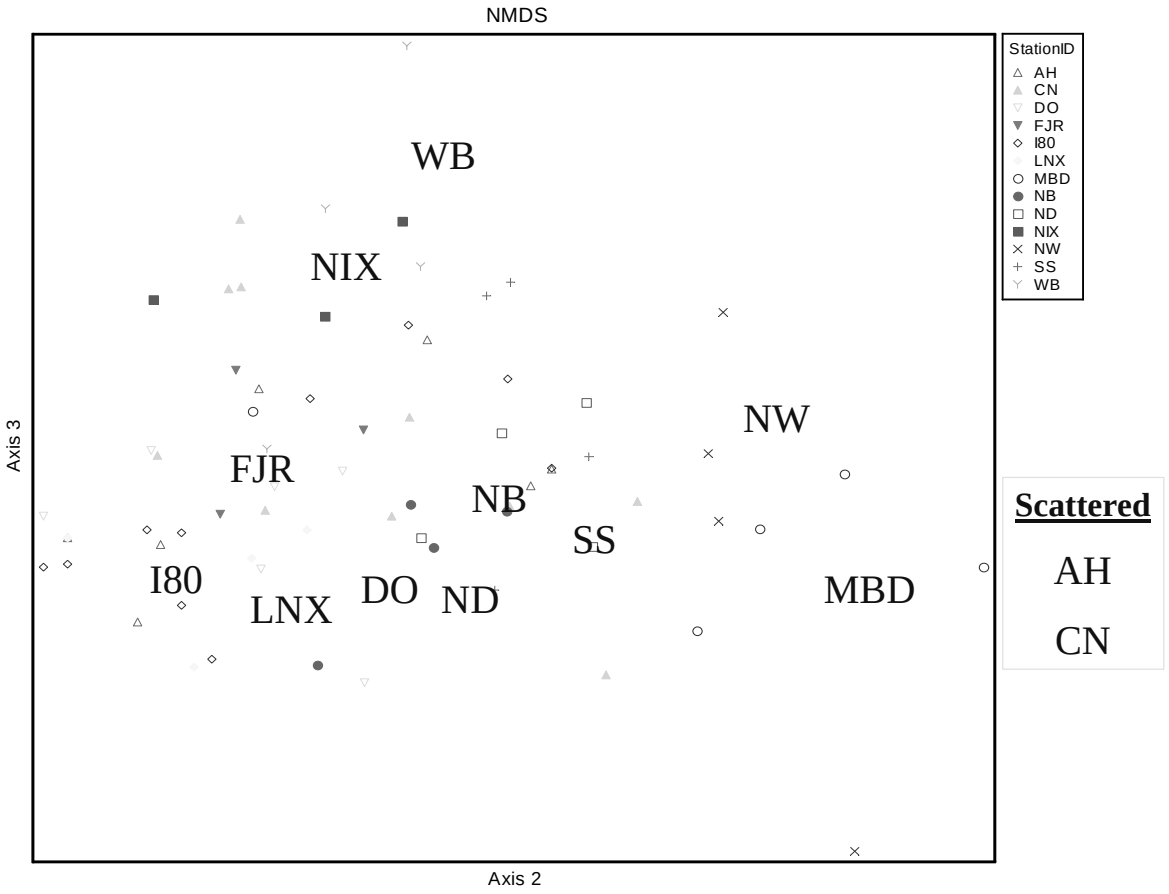
Biotic Index Values

0.0 – 3.5	Excellent (Pristine water)
3.5 – 4.5	Very Good Water Quality
4.5 – 5.5	Good WQ (some pollution)
5.5 – 7.0	Fair (Moderately polluted)
7.0 – 8.0	Poor (seriously polluted)
8.5 – 10.0	Very Poor (extremely polluted waters)

Identifying Stressors:

- **Point source**: Waste Water Treatment Plant
- **Nonpoint sources**: North-Tahoe Drain, Steamboat Creek, urban storm water runoff, and Irrigation return flows back into the river.
- **Exotic species**: Non-native salmonids, like Rainbow trout, compete and hybridize with native Lahontan Cutthroat trout (LCT). Brown and Rainbow trout are more aggressive, and effectively compete with LCT. Tall Whitetop, purpleloose strife, and the aquatic Eurasian watermilfoil are competing with native plants.

Year	Sampling Method	Counting Method
1981	Surber	Total
1982-1988	NO DATA	
1989	Surber	Total
1990	Surber	Total
1991	NO DATA	
1992	Kicknet	Estimated
1993	Kicknet	Estimated
1994	Surber	Presence/Absence
1995	Surber	Presence/Absence
1996	Surber	Total
1997	NO DATA	
1998	NO DATA	
1999	Surber	Total
2000	Surber	Total



The PLPT Biological Index consists of 4 core metrics:

- Taxa Richness
- Percent EPT Individuals
- Percent Tolerant Individuals
- Percent Dominant Taxon

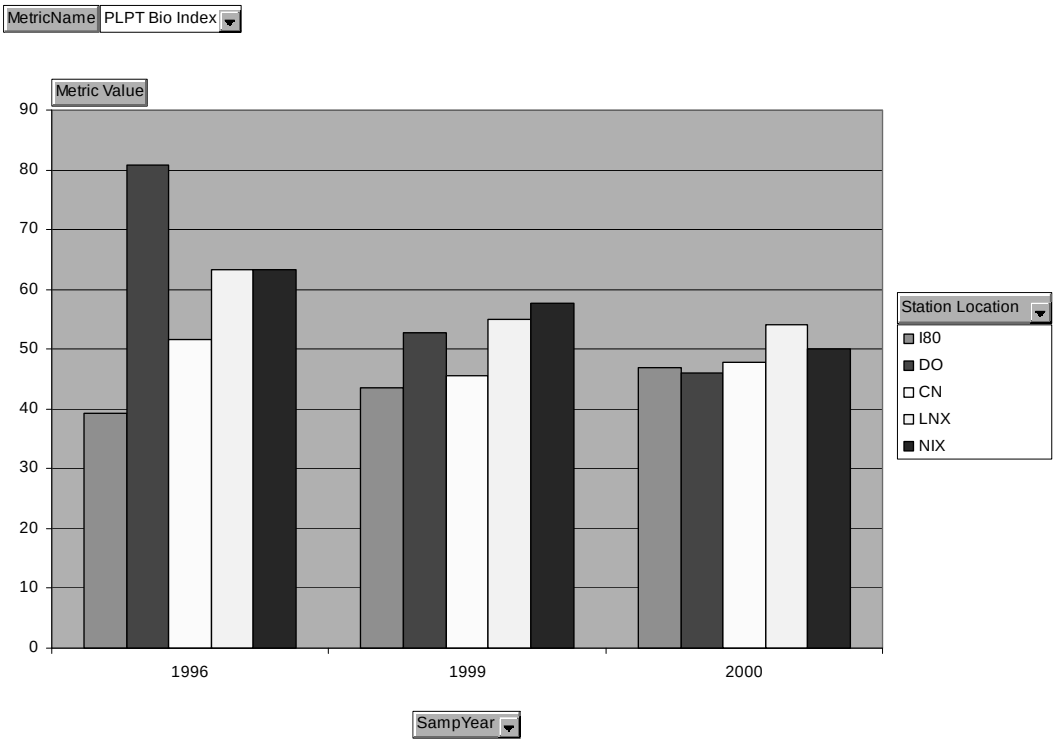
Approximate Upstream Distance (miles) from MBD	Station ID	Year							Average
		1981	1989	1990	1996	1999	2000	2001*	
22.5	**I80**	63.6			39.3	43.6	47.0	51.2	48.9
20	WB		18.7	35.8	46.5				33.7
19	AH				47.0	51.2			49.1
17.5	**FJR**	52.8	25.1				59.4	51.2	47.1
14.5	SS				47.3				47.3
11.5	NW		38.9		80.8				59.9
10.5	**DO**	60.5	39.0	59.3		52.7	45.9	*	51.5
8	**CN**	34.2		50.5	51.7	45.5	47.9	*	45.9
6.5	ND				40.1				40.1
5	**LNX**	73.8		35.3		55.1	54.1	*	54.6
3.5	NB		28.3		63.3				45.8
2	**NIX**	71.0		45.4		57.6	50.1	*	56.1
0	MBD	58.2	16.3	44.7	45.5	25.6			38.1
Average		59.2	27.7	45.2	51.3	47.3	50.7	51.2	47.5

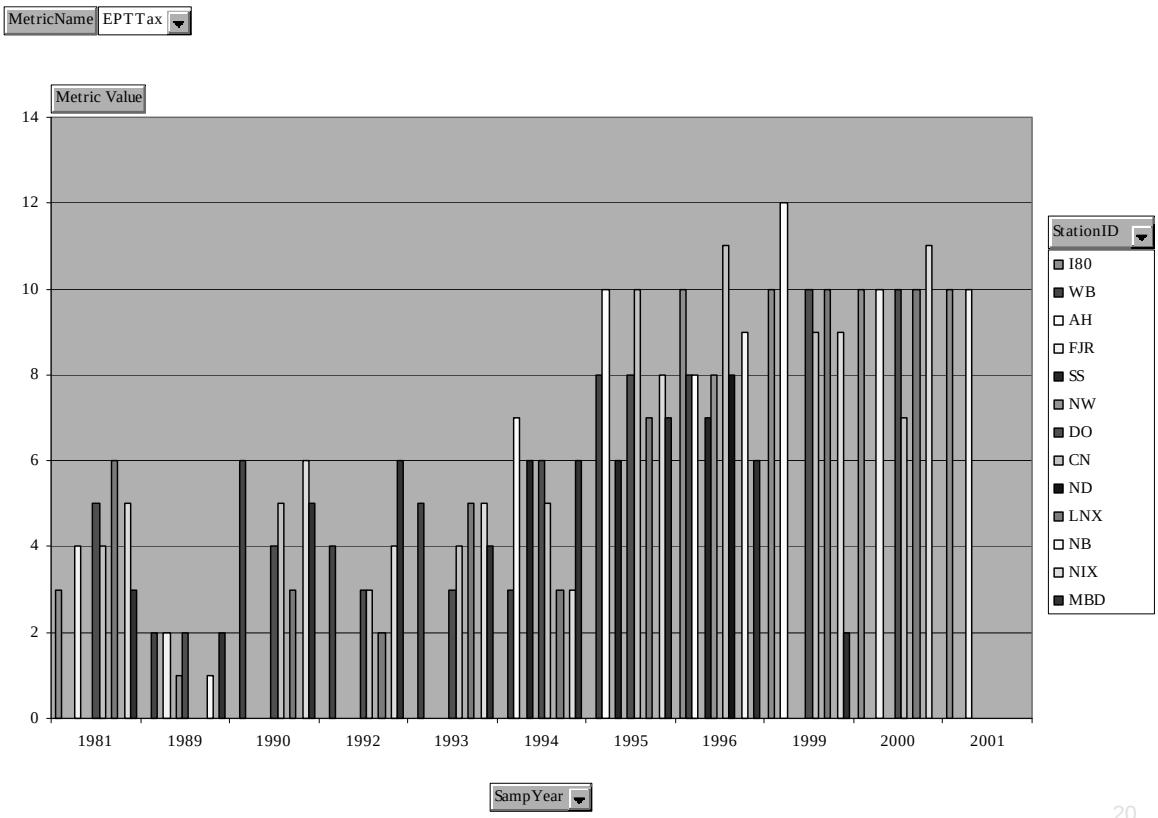
*Only 2 of 6 sites for 2001 had been processed and ready for this analysis.
BOLD sites are sites that will be part of the future sampling scheme.

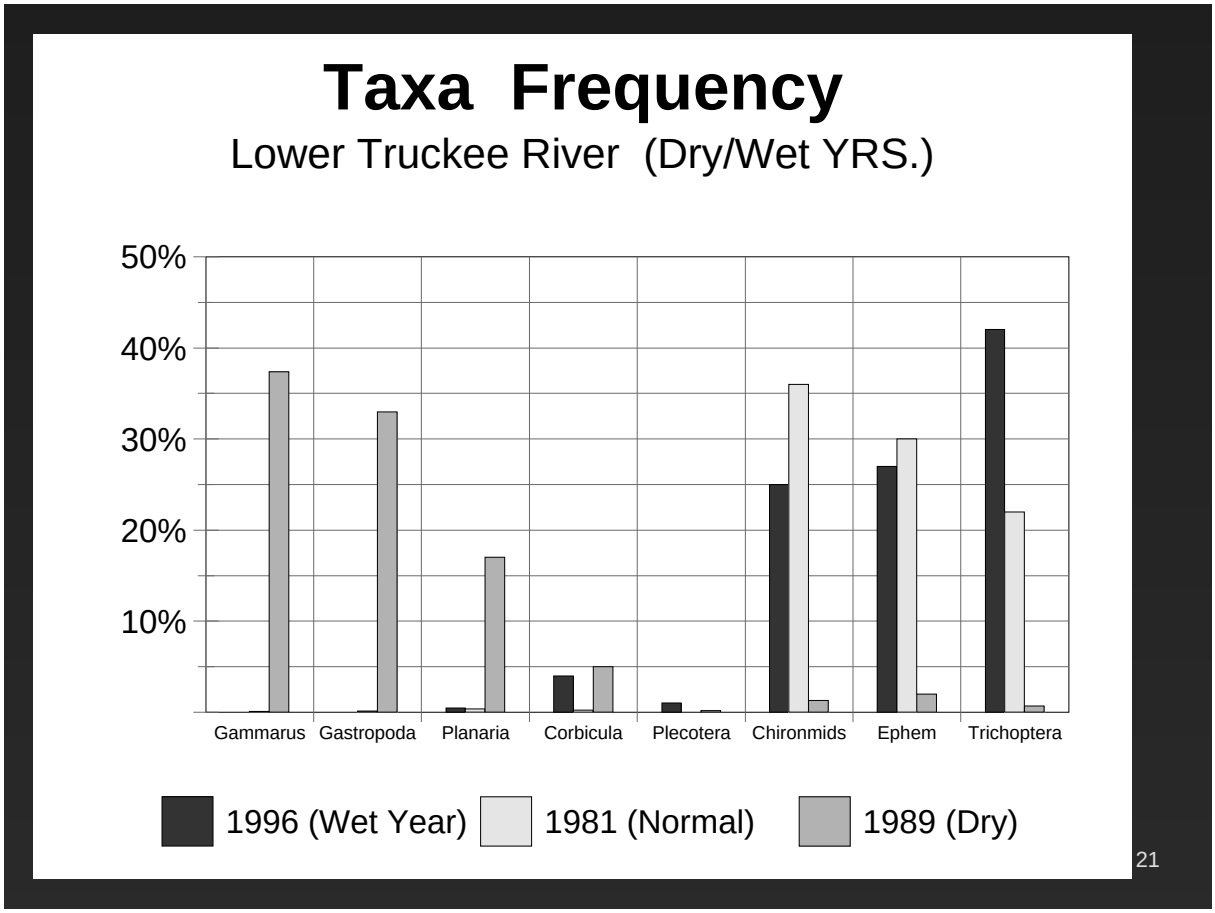
PLPT Biological Index Score and Narrative Rating

100-80	Excellent	69-60	Good	49-40	Poor
79-70	Very Good	59-50	Fair	39-0	Very Poor

Spatial and Temporal Trends







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TRIBE 101

Developing Biological Criteria: Fort Peck's Experience

Presented by
Deb Madison, Fort Peck Assiniboine & Sioux Tribes

Historical Overview of Surface Water Quality (106) Program

- Quarterly Physicochemical Sampling
- Rapid Bioassessment Protocol (RBP)
  - Fish
  - Benthic Macroinvertebrates
  - Habitat Assessment

Rapid Bioassessment Protocol Pilot Project (1991)

- Conducted monthly sampling (April - Sept.)
- Sampled benthic macroinvertebrates (kicknet)
- Sampled fish (electrofishing)
- Intensive habitat assessment (2 methods)
- Defined index period (June 1 to July 15)

RBP-Benthic Macroinvertebrates

- Field sampling with kicknet
- Laboratory analysis
  - 100-organism sub-samples
  - Family-level identification

RBP-Benthic Macroinvertebrates

- Metric Selection
- Reference Site/Condition
- Metric Scoring Criteria
- Impairment Ratings
- Develop Biocriteria

Metric Selection (1991-1994)

- Taxa Richness
- EPT Richness
- Family Biotic Index (FBI)
- % Scraper/Filterer
- EPT/Chironomid Ratio
- Community Loss Index (CLI)
- % Shredders

Metric Selection (1995)

- Retained in 1995
  - Taxa Richness
  - EPT Richness
  - FBI
  - % Dominant Family
- Eliminated in 1995
  - % Scraper/Filterer
  - EPT/Chironomid Ratio
  - Community Loss Index
  - % Shredders

Metric Selection (1995-Present)

- Retained from 1994
  - Taxa Richness
  - EPT Richness
  - FBI
  - %Dominant Family
- Adopted in 1995
  - % Collectors
  - % EPT
  - % Diptera + non-insect
  - %Shredders + Scrapers

Reference Site/Condition

- 1991-1994 = Reference Site (West Fork of the Poplar River)
- 1995-present = Reference Condition (Least Impaired/Disturbed Sites)

Metric Scoring Criteria

- 1991-1994
  - 6 (non-impaired)
  - 3 (moderately impaired)
  - 0 (severely impaired)
- 1995-present
  - 3 (non-impaired)
  - 2 (slightly impaired)
  - 1 (moderately impaired)
  - 0 (severely impaired)

Metric Scoring Criteria

Quartile	Score
>75th	3
>50th-75th	2
>25th-50th	1
0-25th	0

Impairment Rating

- Non-Impaired
- Slightly Impaired
- Moderately Impaired
- Severely Impaired

Designated Use Classification

- Class I Cool Water Aquatic Life
- Class I Warm Water Aquatic Life
- Class II Cool Water Aquatic Life
- Class II Warm Water Aquatic Life

Biological Criteria

- Narrative Biocriteria
- Numeric Biocriteria

Narrative Biocriteria

- Reservation waters shall be “free from” substance in concentration or combinations that would adversely alter the structure and function of aquatic communities, as defined by the reference condition.

Numeric Biocriteria

Any site failing to attain minimum values for Taxa Richness/EPT Index or exceeding maximum values for FBI would be categorized as failing to meet designated aquatic life use designation.

Numeric Biocriteria

Designated Use	Taxa Richness	FBI	EPT Index
Class I Cool	5	6.5	3
Class I Warm	5	7.0	2
Class II Cool	5	7.5	1
Class II Warm	4	7.5	1

Preliminary Use of Biocriteria

- Identify priority sites for stream restoration and water quality improvement projects (Section 319 funds)

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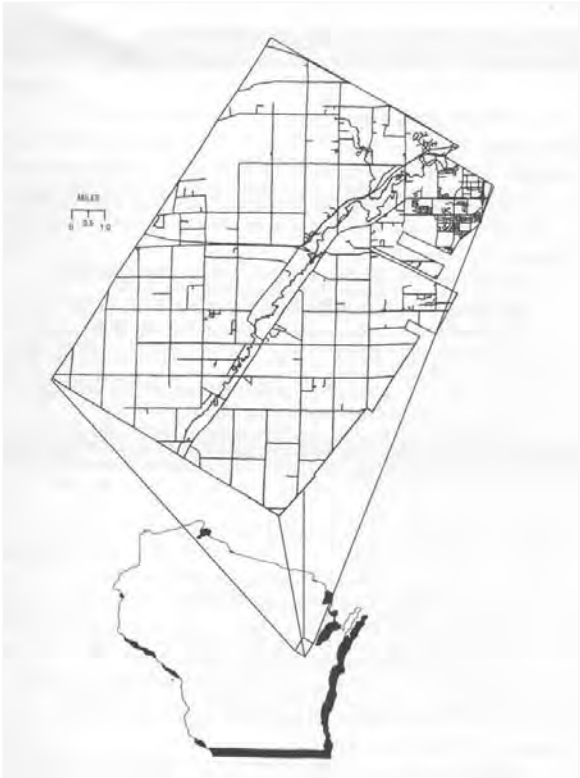
TRIBE 101

Establishment of Reference Sites on the Oneida Reservation in Wisconsin

Presented by

James L. Snitgen
Oneida Tribe of Indians of Wisconsin

Steps taken in reference site selection and uses of data gathered



Location of Oneida Reservation in Wisconsin

Uses of Reference Sites

- Development encroaching – baseline data needed to determine possible future degradation
- Biocriteria for representative stream and lake types in Oneida Water Quality Standards, regulatory uses
- Knowledge of stream and lake biota used to increase awareness, value, protection by public and other agencies
- Gauging restoration project successes

Technical Issues

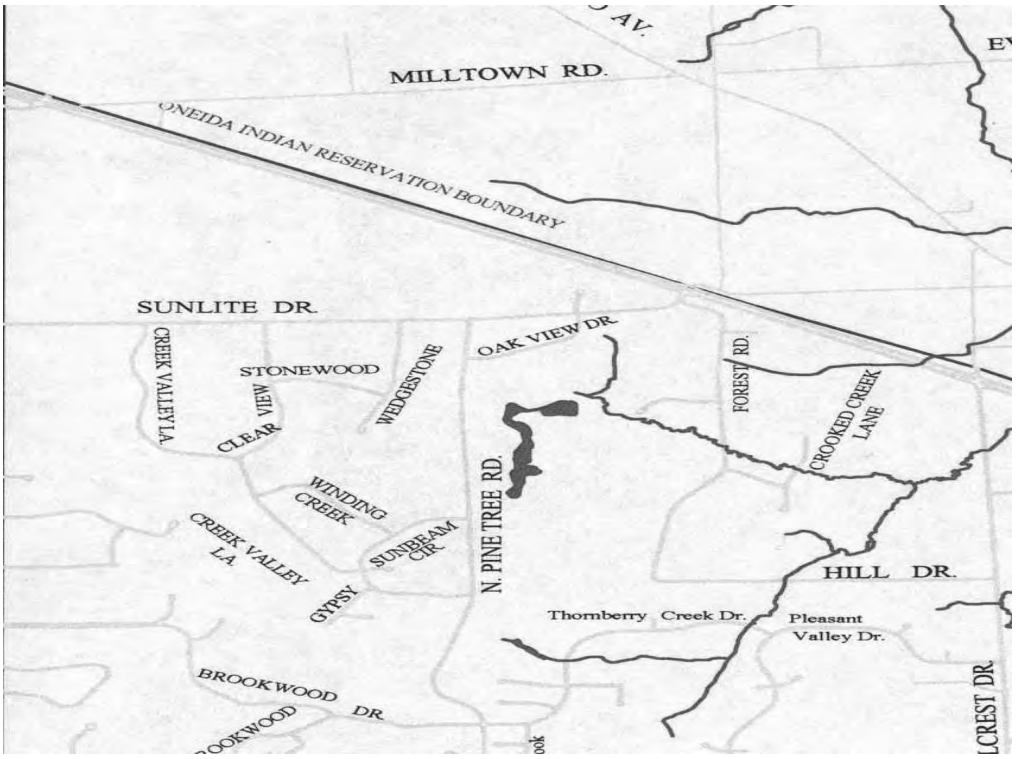
Case Example: Thornberry Creek

Thornberry Creek

- First order stream
- Designated Use: Aquatic Life, Cold Water Ecosystem.
- Water Quality Data indicated “pristine” system.
- Invertebrate community data verified.

- Invertebrate data used to ally agencies in protection.
- The decision to classify as only Class I trout stream in region made when fisheries data reflected invertebrate community data.

Thornberry Creek



Location of Thornberry Creek on Oneida Reservation

Identification of Stressors, Selection of Metrics

Stressor	Method of determination	Metric used to determine effect
Sedimentation	Habitat assessment, WQ data, land use	EPT, Taxa Richness, ..
Nutrification	WQ data, land use	HBI, ..
Pesticides, herbicides	WQ data, land use	Taxa Richness, ..

Factors Used in Identification of Stressors

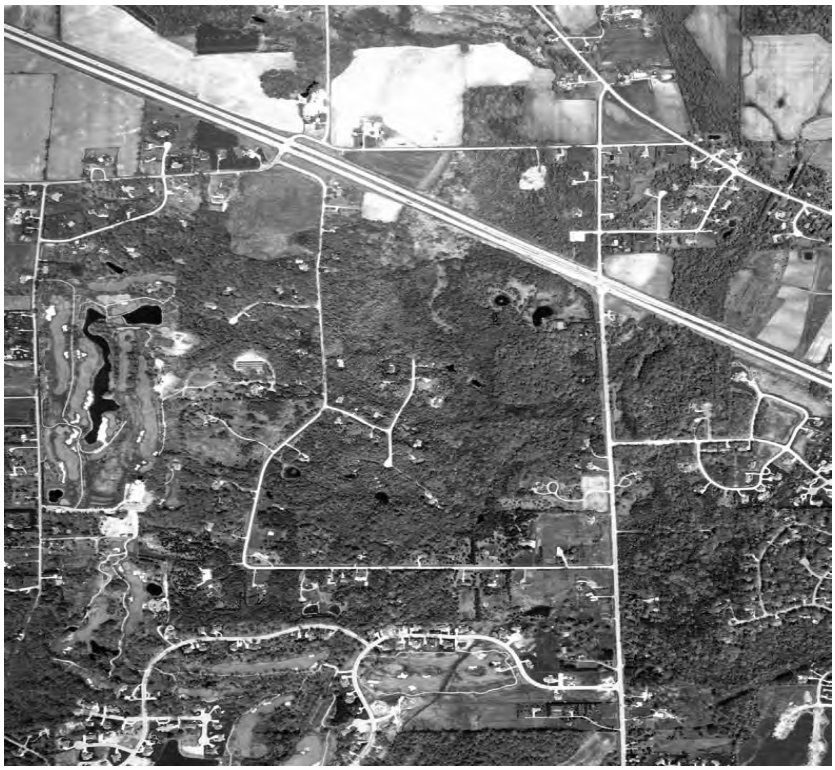
- Land Use (Aerial photographs, site visits)
- Specific knowledge of watershed activities
- Water Quality Data
- Habitat Assessments
- Fishery surveys

Headwater wetland area before removal of understory

Headwater wetland area before removal of understory

Headwater wetland area after removal of understory

Headwater wetland area after removal of understory



Aerial photo showing land use surrounding Thornberry Creek

Benthic Macroinvertebrate Data for Thornberry Creek (1999 – 2001)

Data Set and type	HBI	Taxa Richness	EPT
8/99 Qualitative	4.0 (very good)	34	6
6/00 Qualitative	3.3 (excellent)	21	6

•This is a spring-fed, low gradient, first order stream. Some common metrics are not representative of its ecological health (i.e., dominance, %P, etc.).
•Community is dominated (51%) by the amphipod *Gammarus pseudolimaneus*, with the second most numerous organism (9.6%) being the caddisfly *Lepidostoma* sp. (2000 sample).
•All (663) organisms were picked for the 1999 baseline, qualitative sample.
•Standardized protocols were used for the 2000 qualitative sample (300 organisms picked).
•We will be sampling quantitatively again this coming June (2001 quantitative data not given here).

Collaboration With State of Wisconsin

- Fisheries studies and designations
- Partnerships sharing data, regulatory "team" efforts
- State Biocriteria Group
  - No local benthic invertebrate people

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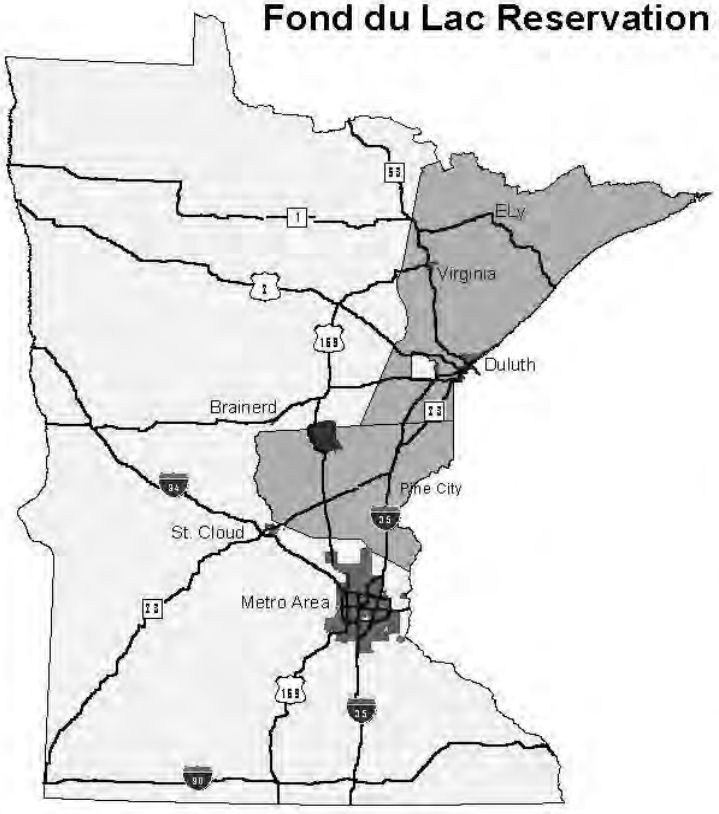
TRIBE 101

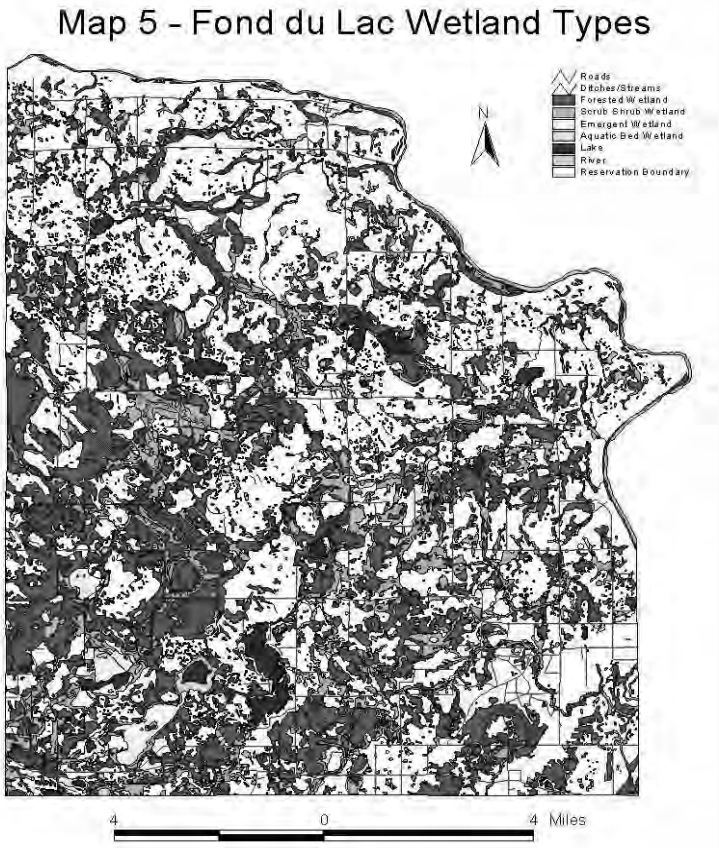
Fond du Lac Reservation Water Quality Program

Presented by

Nancy Costa
Fond du Lac Reservation

Fond du Lac Reservation and Ceded Territories





WQS Framework

- Tribal WQS adopted in 1998; approved by EPA Region 5 in 2001
- Designated uses include cultural and aesthetic
- Protective of human health in the context of a subsistence lifestyle
- “Outstanding Reservation Resource Waters”

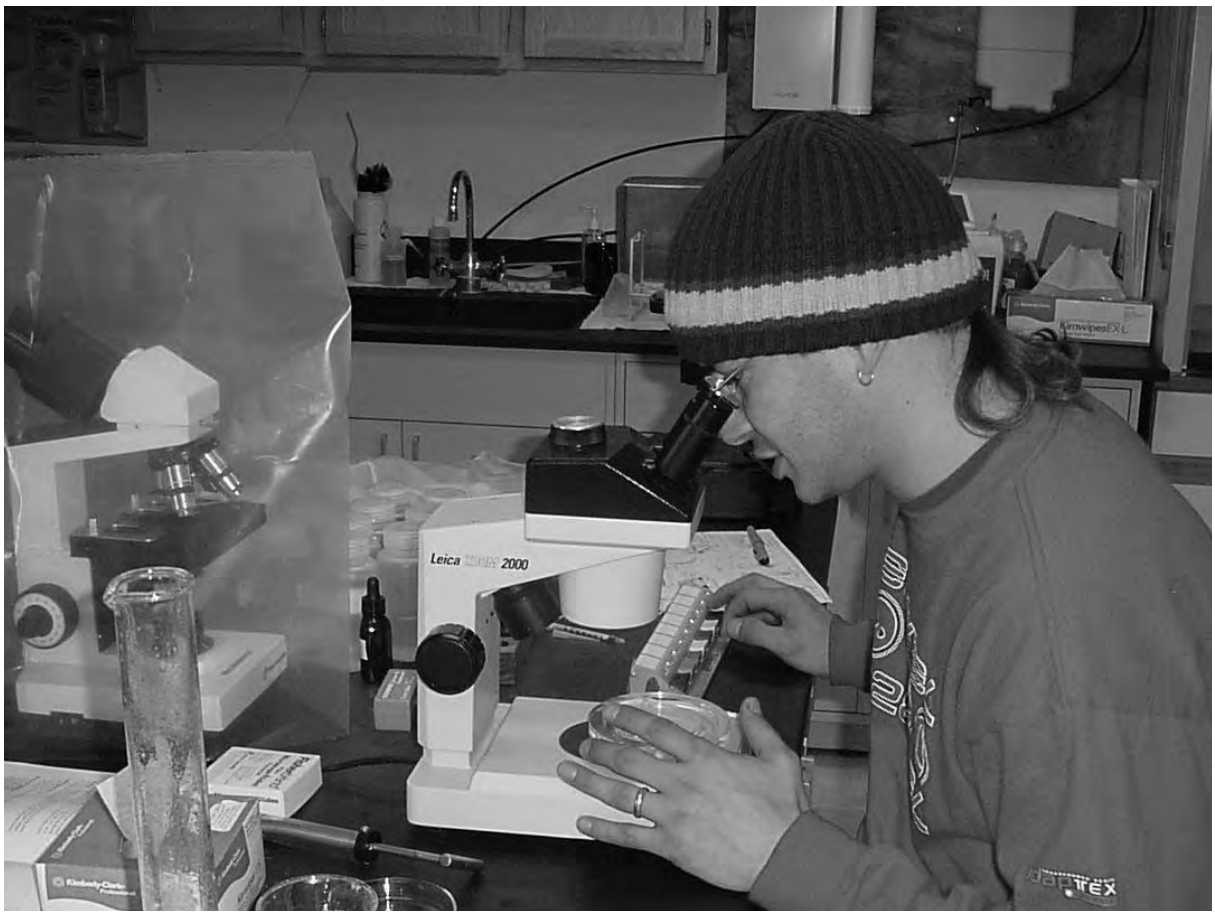

HH

Monitoring Program

- Tiered strategy developed (use classes, priority)
- Physical, chemical and biological parameters measured
- Determine if designated uses attained, or impairment
- Capture seasonal, annual variability

Biological Assessments

- With no permitted dischargers on the reservation, needed to focus on biological integrity
- Stream habitat assessments following RBP for low-gradient streams
- Two or three trophic levels sampled in lakes and streams
- Beach testing (coliform, *E. coli)*


Leica
2000

Expand Biomonitoring

- Beginning extensive littoral zone macrophyte surveys; biological survey approach, then refine quantitative methods
- Beginning lake benthos sampling; integrate with sediment studies
- Lake fish community surveys
- Establish St. Louis River monitoring

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Pyramid Lake Paiute Tribe: Programmatic Implementation of Bioassessment

Presented by

Daniel Mosley, Pyramid Lake Paiute Tribe

Pyramid Lake Paiute Tribe's Key NPS concerns

- Environmental impacts to the Truckee River & Pyramid Lake aquatic life, and long term bio-accumulation of TDS and toxic substances.
- Human health impacts.
- Impacts to federally listed endangered and threatened species of fish.
- Cultural/ Social Impacts.
- Impacts from upstream sources.

NPS Assessment & Management Plan

- To identify nonpoint sources which add significant pollution to surface water bodies within the PLIR.
- Rank and prioritize.
- Conduct an assessment/ ID BMP's (WRAS)
- Develop monitoring program to evaluate the effectiveness of BMP's.
- Write an Executive Summary of the NPS assessment and management plan for the PLIR.

NPS & Agricultural Return Flows

- High TP, TN (1531, 277 pounds per season)
- Low Dissolved Oxygen
- 30% return flow to river

High Temps/ Low DO's

BMP's

Fencing/ Range Mgt Plan: Improves riparian/range health, shading, WQ, lowers water temps which benefits aquatic life, birds, amphibians, wildlife

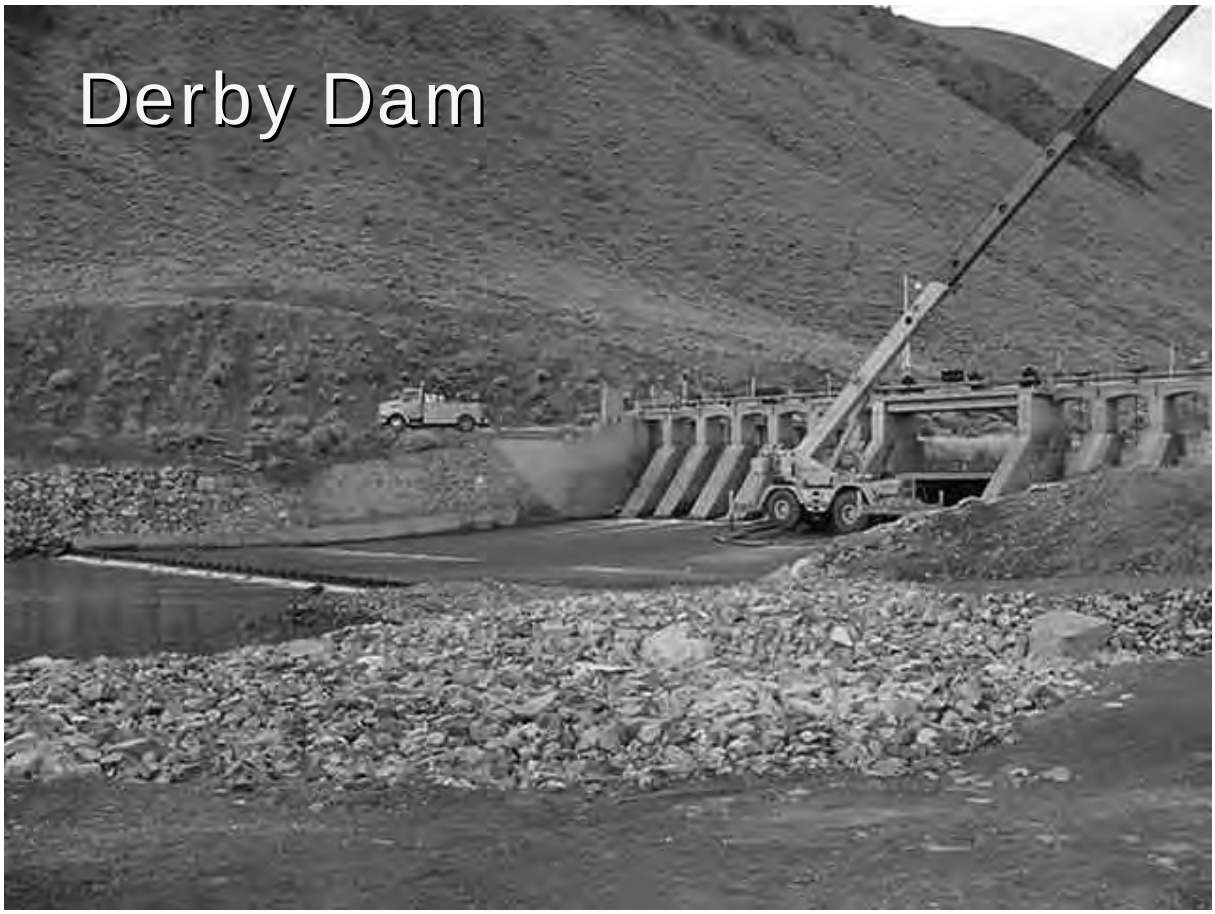
Laser Leveling Ag. Fields: Increases water use efficiency, decreases runoff, improves WQ

WQ, fish, and river restoration coordination mtgs

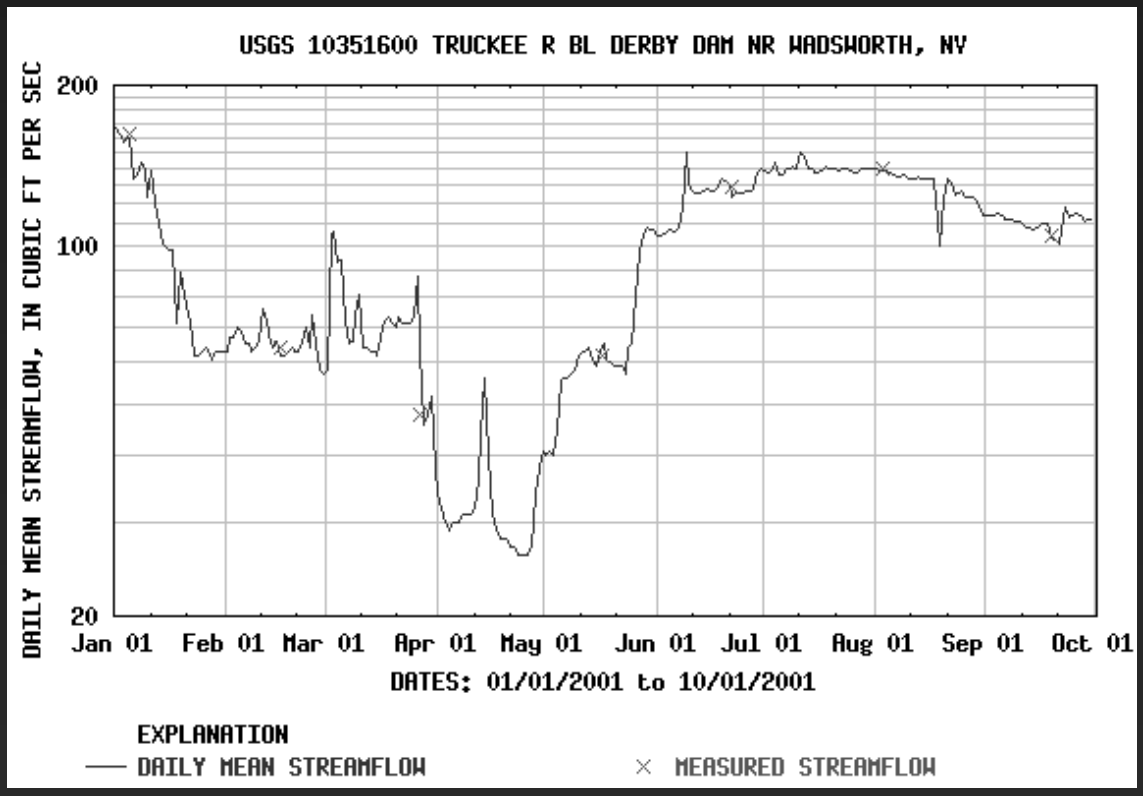
Replace open dumps with Transfer Stations

Noxious Weed/ Pesticide Program

Replace Septic Tanks w/ community sewer system



LTR Graph of Flows

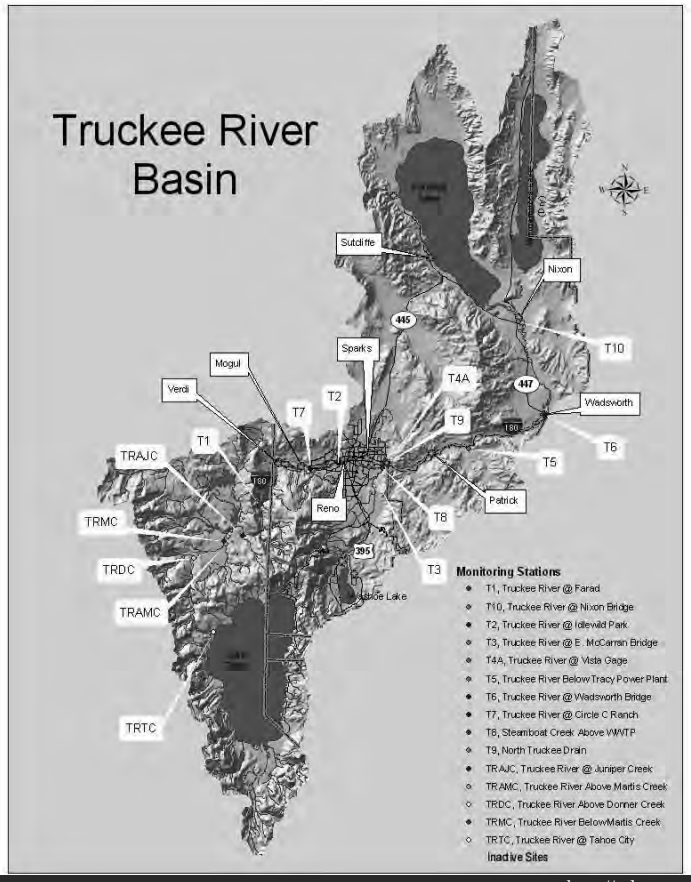


Biotic Index Values

0.0 – 3.5	Excellent (Pristine water)
3.5 – 4.5	Very Good Water Quality
4.5 – 5.5	Good WQ (some pollution)
5.5 – 7.0	Fair (Moderately polluted)
7.0 – 8.0	Poor (seriously polluted)
8.5 – 10.0	Very Poor (extremely polluted waters)

August 1994 LTR BMI data (flows 0-44 cfs)

Taxa	McCarran	Lockwood	Clark	S Bar S
Ephemeroptera	0	0	40	49
Trichoptera	0	1	66	3
Elmidae	0	3	2	13
Chironomids	0	109	12	64
Simulium	0	3	0	0
Planaria	0	1047	14	322
Oligochaeta	0	4	0	3
Gastropoda	0	227	0	16
Corbicula	0	6	3	6
Salmonids (LCT)	0	0	0	3 (0)
Cyprinids/ Catostomids		834/ 108	404/ 63	290/ 6
EPT %	**0%**	**0%**	**83%**	**10%**
Biotic Index	**0**	**8.57**	**5.63**	**7.75**



http://ndep.state.nv.us/bwqp/truckeemap.html

August 1995 LTR BMI data (flows 654-712 cfs)

Taxa	McCarran	Lockwood	Clark	S Bar S
Ephemeroptera (6)	224	243	579	145 (1)
Skawla	25	76	0	0
Trichoptera (5)	17	99	247	21(2)
Elmidae	0	1	0	0
Chironomidae	18	589	581	22
Simulium	6	170	19	12
Planaria	0	2	0	0
Oligochaeta	0	4	14	0
Salmonids (LCT)		14 (0)	2 (0)	4 (0)
Cyprinids/ Catostomids		18/ 22	12/ 16	25/ 20
EPT %	**91%**	**35%**	**57%**	**83%**
Biotic Index	**3.98**	**5.19**	**5.05**	**5.16**

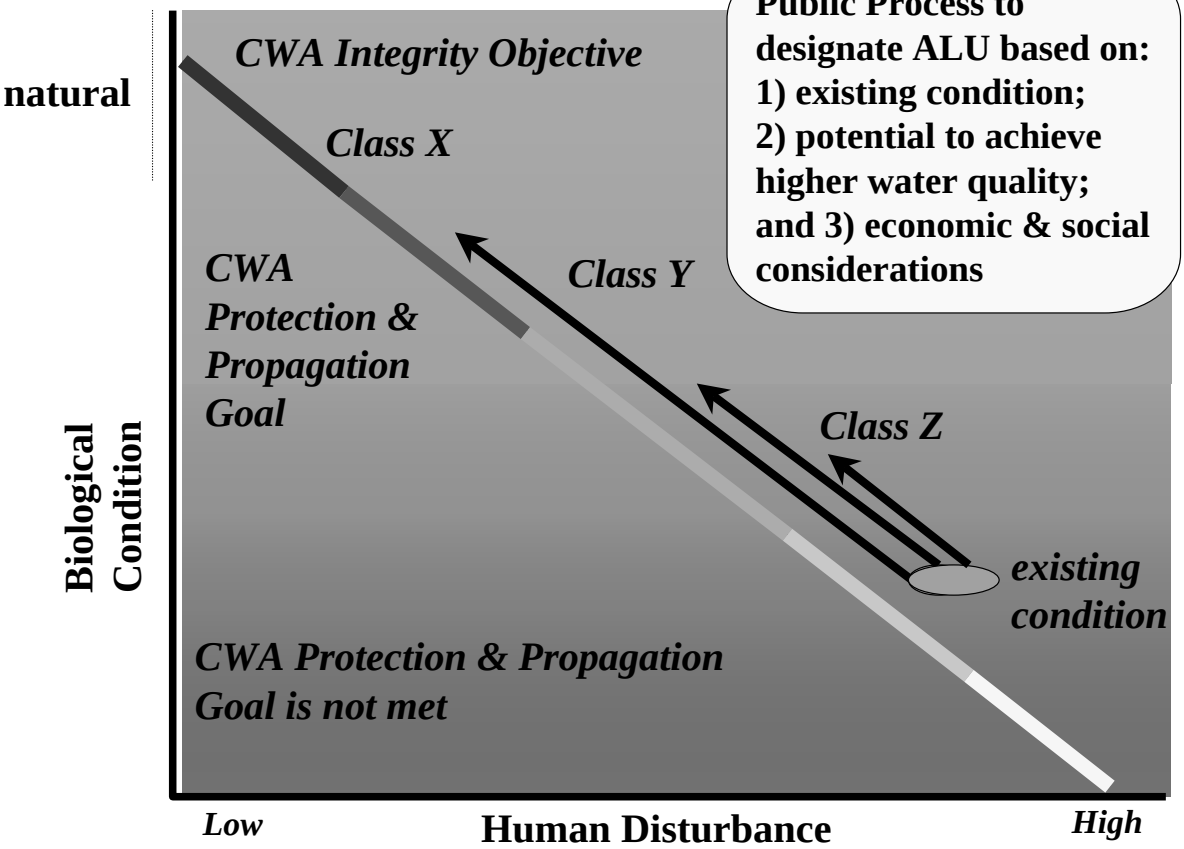
July 1999 LTR BMI data (flows 357-482 cfs)

Taxa	McCarran	Lockwood	Clark	S Bar S
Ephemeroptera	45 (4)	91 (3)	467 (3)	77 (2)
Plecoptera	19 (1)	16 (2)	2 (1)	62 (1)
Trichoptera	148 (4)	183 (4)	45 (2)	177 (1)
Chironomidae	62	92	179	31
Oligochaeta	3	0	6	0
Empididae	5	0	0	0
Salmonids (LCT)		28 (6)	4 (1)	27 (1)
Cyprinids/Catostomids		0/ 0	36/ 55	0/ 3
EPT %	**74%**	**76%**	**74%**	**91%**
Biotic Index	**2.76**	**4.05**	**4.55**	**3.64**

Nov. 2001 LTR BMI data (flows 39-350 cfs)

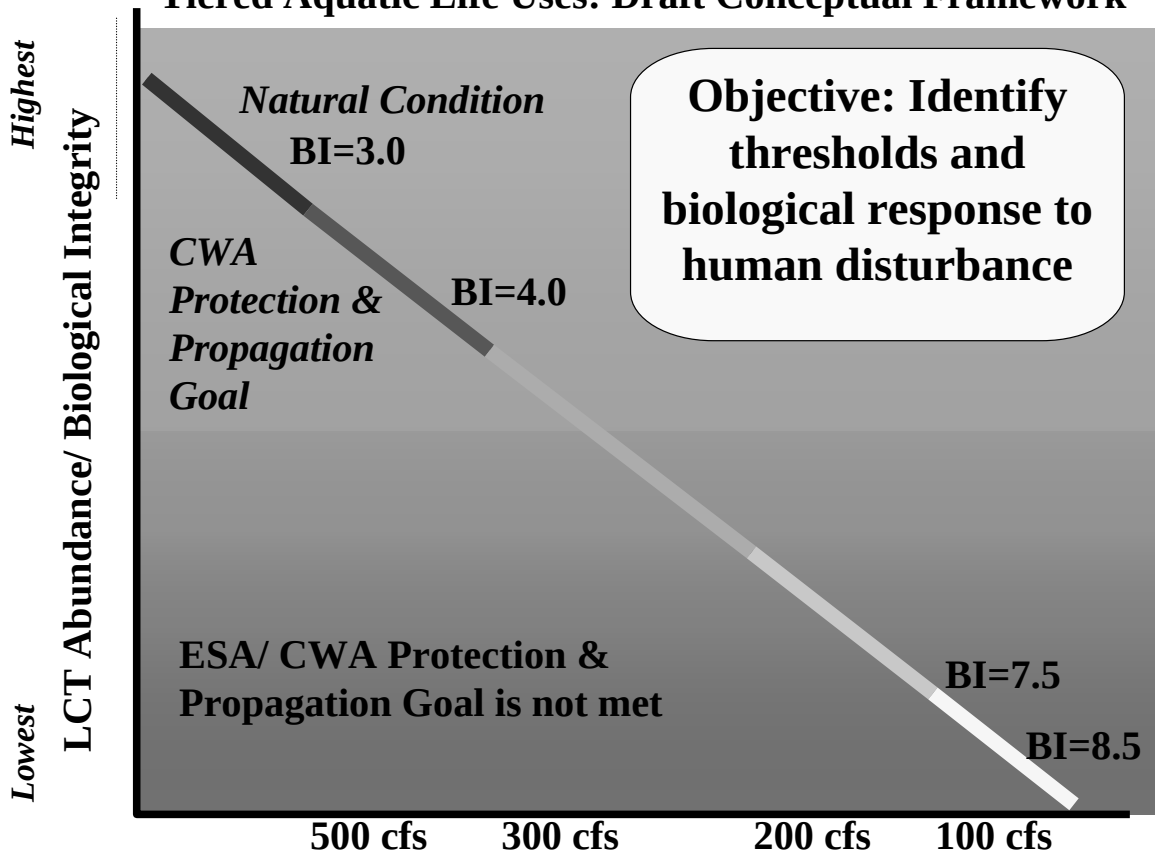
Taxa	McCarran	Lockwood	Clark	S Bar S
Ephemeroptera	133 (2)	1247 (3)	110 (2)	96 (2)
Plecoptera	4 (1)	0 (0)	0 (0)	0 (0)
Trichoptera	150 (2)	132 (1)	14 (2)	4 (1)
Chironomids	14	19	22	6
Planaria	0	0	38	92
Oligochaeta	0	3	0	0
Elmidae	0	7	2	48
Corbicula	0	0	42	46
Salmonids (LCT)		14 (0)	8 (0)	6 (0)
Cyprinids/ Catostomids		52/ 4	413/ 76	174/ 36
EPT %	**89%**	**92%**	**43%**	**34%**
Biotic Index	**5.20**	**5.90**	**6.66**	**7.14**

Designation of Aquatic Life Uses



Public Process to designate ALU based on: 1) existing condition; 2) potential to achieve higher water quality; and 3) economic & social considerations

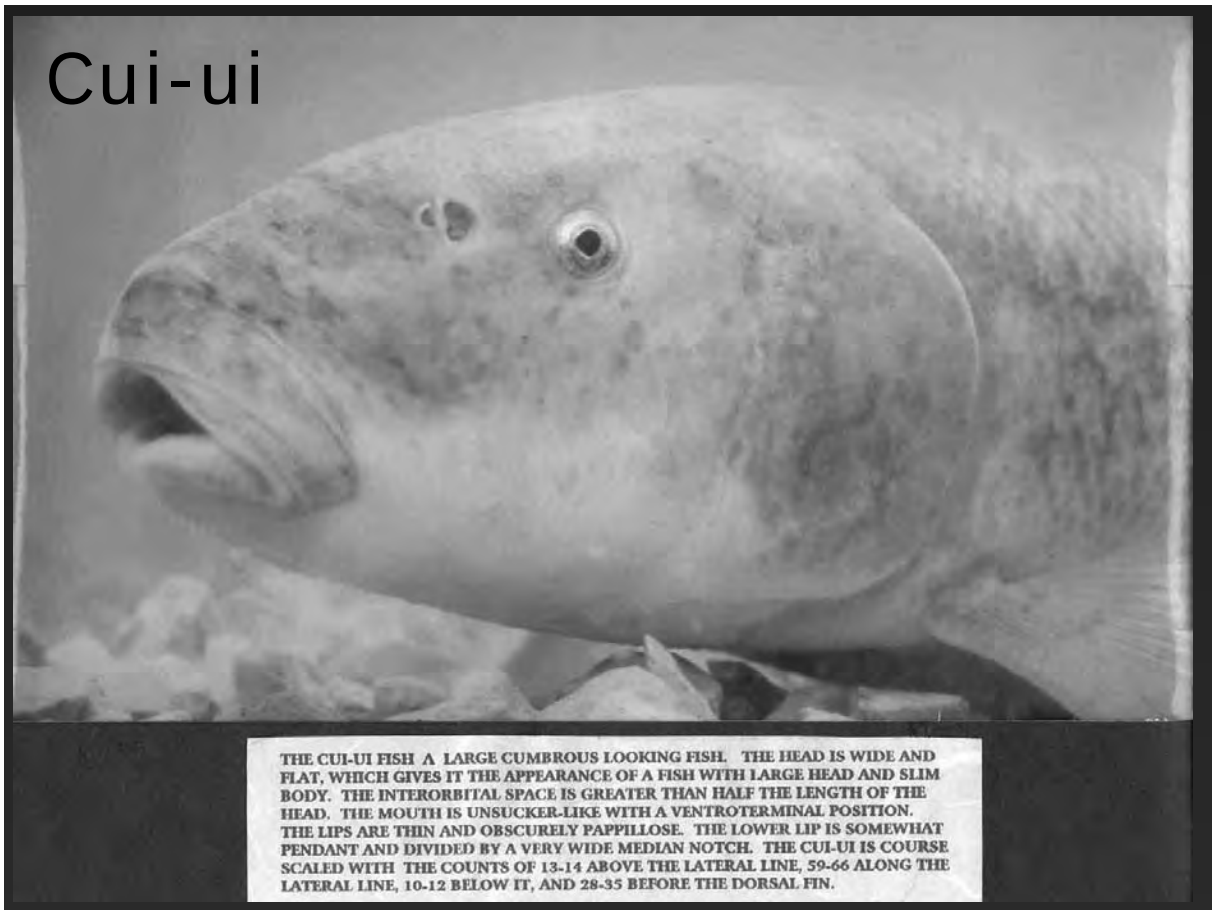
Tiered Aquatic Life Uses: Draft Conceptual Framework

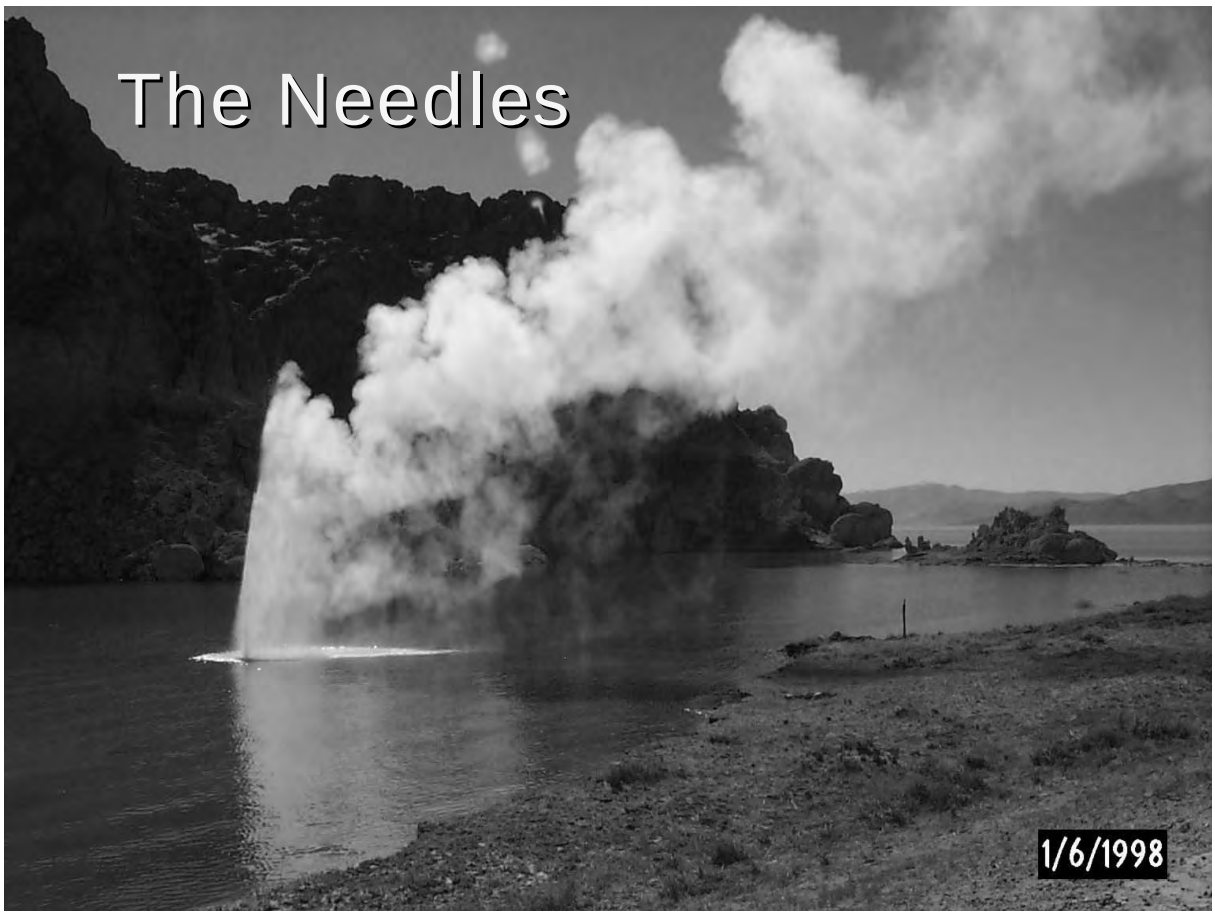


Objective: Identify thresholds and biological response to human disturbance

Next Steps:

- Continue bioassessment and WQ monitoring program
- Work with NDEP, EPA, FWS and others on a draft ALUS human disturbance gradient for the lower Truckee river
- Work with Tetra Tech on which metrics could best evaluate biological integrity, and develop numeric biocriteria standards for the river





National Biological Assessment and Criteria Workshop

Advancing State and Tribal Programs

Coeur d'Alene, Idaho
31 March – 4 April, 2003

TRIBE 101

Use of Biocriteria for 401 Certification

Presented by
Deb Madison, Fort Peck Assiniboine & Sioux Tribes

401 Certification Authority

- Obtained when Tribal WQ Standards are approved
- Triggered when any activity that requires a Federal permit may result in a discharge into navigable water
- Common activities include 404 permits (USACOE) and 402 permits (USEPA)

401 Certification Authority cont'd

- 401 Certifications are quasi-regulatory
- Tribe can attach conditions to 401 Certifications to ensure protection of water quality
- Conditions can require monitoring to ensure compliance with water quality standards

O'Connor Bridge 401 Certification

- Requested by the US ACOE & BIA in 4/98
- Tribe certified with conditions 7/98
- Conditions include:
  - Geomorphic Considerations
  - Erosion Controls
  - Revegetation and stabilization of banks
  - Monitoring upstream and downstream for physical and biological criteria

O'Connor Bridge Project

Water Quality Criteria

- O'Connor Bridge located on Poplar River on a segment designated as a Class I Cool Water
- Standards - Physical
  - Dissolved Oxygen $\geq$ 8.0
  - Temperature $\leq$ 23°
  - pH 6.5-9.0

Water Quality Criteria

- Standards – Biological
  - Taxa Richness ≥ 5
  - Family Biotic Index, (FBI) ≤ 6.5
  - EPT Index ≥ 3

Biological Data Collected

Date Collected 08/16/00

TAXA	Number of	FBI		*FFG				
Kicknet	Organisms	TV		SCR	C-F	SHR	C--G	Other
Nematoda (sludgeworm)	9	3	0.24					9
Coleoptera: gyrinidae	2	5	0.09					2
Diptera: chironomidae	1	7	0.06				1	
Diptera: simuliidae	8	6	0.43		8			
Ephemeroptera: heptageniidae	5	4	0.18					
Ephemeroptera: oligoneuriidae	83	2	1.50		83			
Trichoptera: hydropsychidae	3	4	0.11		3			
TOTAL	**111**		**2.61**	**0**	**94**	**0**	**1**	**11**
CPOM								
Gastropoda: physidae	1	8					x	
Amphipoda: talitridae	1	8					x	
Coleoptera: hydrophilidae	1	5						x
Diptera: simuliidae	12	6			x			
Ephemeroptera: heptageniidae	1	4		x				
Trichoptera: hydropsychidae	6	4			x			
	22							

*NOTE CF: Collector-Filterer; CG: Collector-Gatherer; SCR: Scraper; SHR: Shredder; OM: omnivore MH: macrophyte-herbivore(shredder) ; PH: piercer-herbivore(predator); PA: parasite; UN: unknown; XY: xylophage.

Sampling Results August, 2000

Upstream

Date Collected 08/16/00		
METRIC	**METRIC SCORE**	**RATING SCORE**
Taxa Richness	10	3
EPT Richness	3	0
Biotic Index	2.61	3
% Dominant Taxon	75%	0
%C-F + %C-G	86%	1
% EPT Taxa	82%	3
%SCR + %SHR	0	0
%Dipteran + %Non Insecta	16%	3
		13
	TOTAL	54%
SUPPORTABILITY	Partial Support, moderately impaired	

Downstream

O'Conner X-ing dwn strm		
Date Collected 08/16/00		
METRIC	**METRIC SCORE**	**RATING SCORE**
Taxa Richness	9	2
EPT Richness	3	1
Biotic Index	3.96	3
% Dominant Taxon	38%	2
%C-F + %C-G	95%	1
% EPT Taxa	60%	3
%SCR + %SHR	1%	0
%Dipteran + %Non Insecta	38%	2
		12
	TOTAL	50%
SUPPORTABILITY	Partial Support, moderately impaired.	

Photo Comparison Upstream

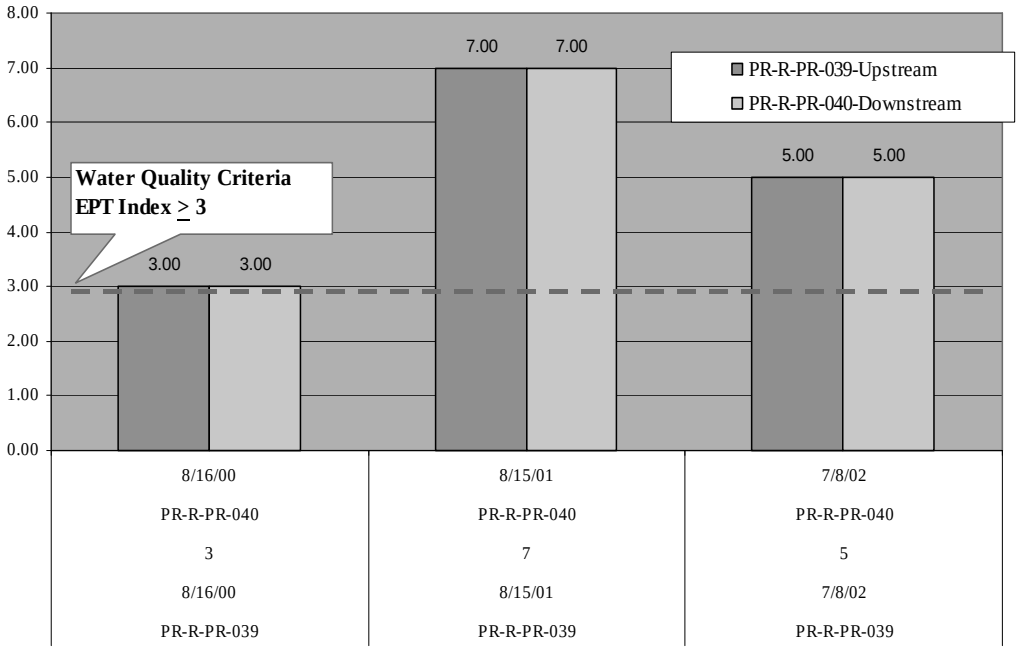
August 2000

August 2002

Photo Comparison Downstream

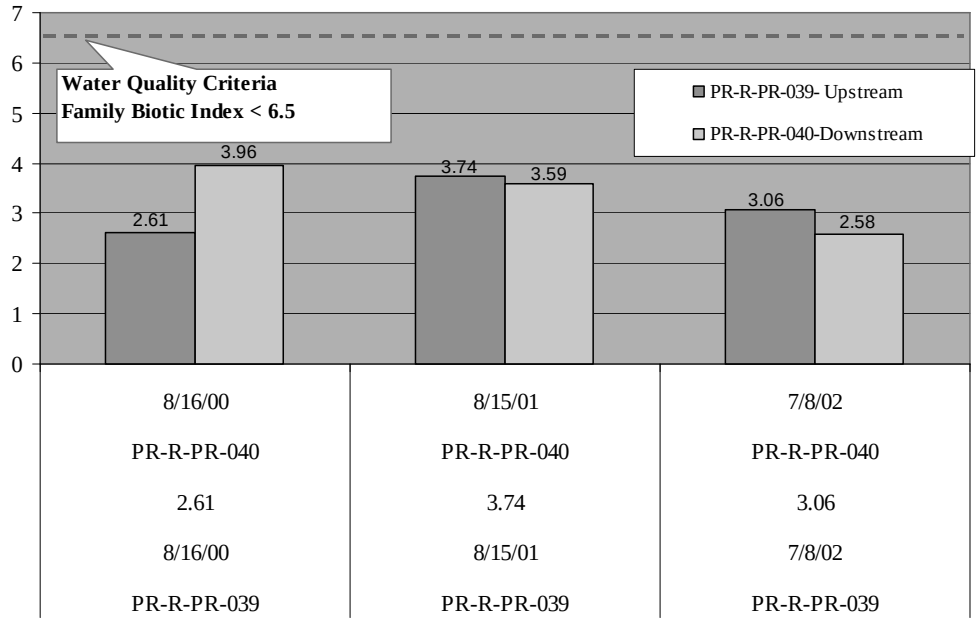
EPT RICHNESS - O'CONNER CROSSING

Fort Peck Indian Reservation, Poplar, Montana



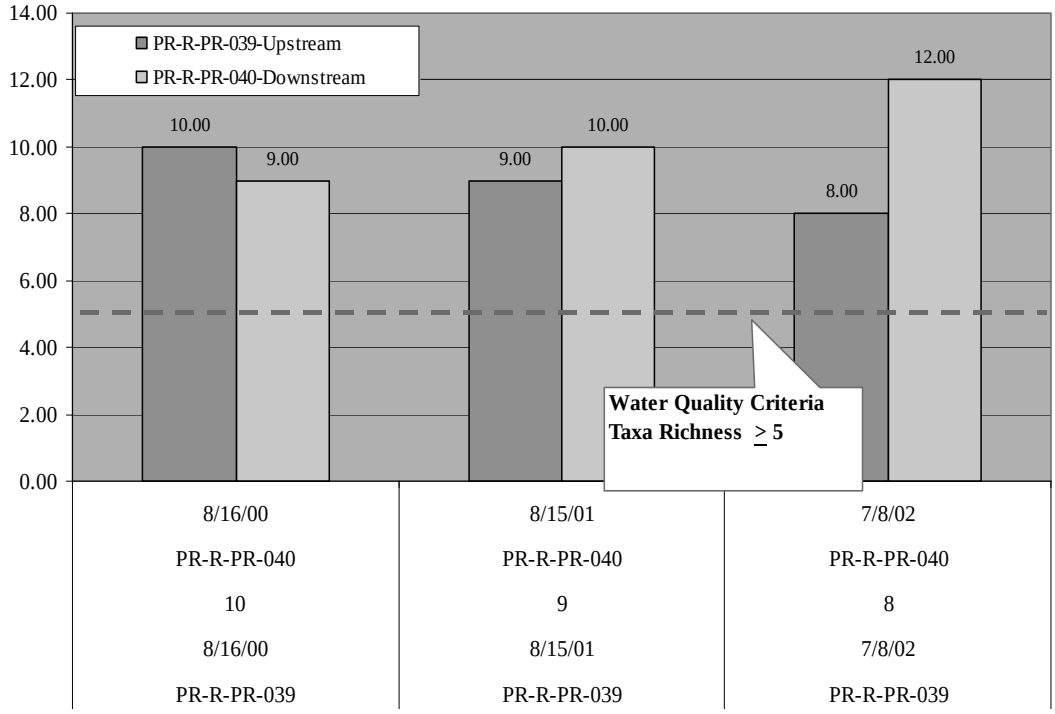
FAMILY BIOTIC INDEX - O'CONNER CROSSING

Fort Peck Indian Reservation, Poplar, Montana



TAXA RICHNESS - O'CONNER CROSSING

Fort Peck Indian Reservation, Poplar, Montana



Summary

- None of the biocriteria were violated after construction was completed although EPT values were at the standard.
- A slight trend of improvement over the course of three years after bridge completion

Future Plans

- Developing metrics for the Missouri River with EPA
- Contract for evaluation of the biological program with Tetra Tech
- Revise criteria with available information in the next triennial review of water quality standards

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TRIBE 101

Oneida Nation: Programmatic Implementation of Bioassessment

Presented by

James L. Snitgen
Oneida Tribe of Indians of Wisconsin

Oneida Nation Bioassessment Program Development

- Fishery surveys initiated in 1995
  - Spring, mid-Summer, Fall stream surveys until 2001, now mid-Summer IBIs only for streams. Boom shock lakes once a year.
- Benthic invertebrate monitoring initiated in 1999
  - Standardized protocols for qualitative and quantitative sampling of streams and lakes
  - SOPs prepared and approved
  - Picking and sorting sub-contracted out, taxonomy performed in lab developed in departmental office

Development of Oneida Nation Bioassessment Program (cont.)

- Benthic invertebrate monitoring (cont.)
  - Water quality and fisheries data used to guide in sampling location selections
  - Metrics researched, baseline qualitative sampling done at 4 candidate reference sites, as well as other study sites
  - Quantitative sampling, data entry and analysis
  - Data used in watershed protection, restoration activities

Use of Reference Site for Protection of Resource

- Enforcement action for unpermitted stormwater discharges
- Community awareness, appreciation
- Nearby developments scrutinized more closely with regards to stormwater and erosion control due to shared knowledge by agencies
- Will be used for biocriteria in WQS

Future of Reference Site Use on the Oneida Reservation

- Needs
  - More data
  - Data on streams outside Reservation for consideration in reference site designation for other types of streams
  - Time
  - Federally approved WQS, to use biocriteria to prevent degradation of stream

Future of Reference Site Use (cont.)

- Challenges
  - Getting reference sites/biocriteria into WQS
  - Keeping this as a priority with many other important activities for a small team (Phase II, restoration projects, other biomonitoring)
  - Will it still be a reference-caliber site when we are ready for inclusion in WQS?

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TRIBE 101

Fond du Lac Reservation: Programmatic Implementation of Bioassessment

Presented by

Nancy Costa
Fond du Lac Reservation

Nonpoint Source Assessment

- Secured funding through Minnesota Clean Water Partnership to assess NPS impacts, develop Management Plan
- Apply for Treatment as Affected State; eligible for tribal 319 funds
- Early in the process; monitoring the effectiveness of BMPs will be critical component of NPS Management Plan

NPS Issues

- Erosion control is most pervasive issue
- Wetland specialist responsible for site inspections, reviewing erosion control plans for tribal development projects
- Road construction, stream/wetland crossings have significant impact; culvert inventory of reservation

Big Lake Partnership

- Heavily developed recreational lake; high rate of noncompliant septic systems, with majority nontribal owners
- Clearwater, macrophyte-dominated lake
- Biological data indicates vulnerability to nutrient, human pathogen impacts
- Jurisdictional authority through tribal water quality standards

Alternatives Study

- CWP funding to study wastewater collection, treatment alternatives
- Partnership with lake association, county, local sanitary district
- Public outreach and education
- Determine best approach for this community to protect uses: fishable, swimmable, trophic status

Restoration activities

- Monitoring has identified problem areas, potential solutions
- Hydrologic impacts are significant (both human and beaver)
- Funding outside of EPA 106 program to do projects (Circle of Flight, EQIP)

Next Steps

- Tribal 305(b) report
- Evaluate monitoring strategy; sufficient data and appropriate quantitative methods?
- Define reference conditions for different waterbody classes
- Trienniel review of WQS: nutrient and biological criteria

Wild Rice nutrient cycling

- Partner with local university for NSF grant
- 4-year mesocosm study of nutrient cycling (N^{15} labeled straw)
- Determine if nitrogen availability controls annual production
- Data can also be used to determine wild rice lake-specific nutrient criteria

Assessments

- Biological data will be given greatest weight in waterbody assessments
- Waters in Northern Lakes and Forests Ecoregion (Heiskary) tend to be low in nutrients (oligo- to mesotrophic)
- Calculating TSI somewhat confounded by high DOC (tannins, humic acids)