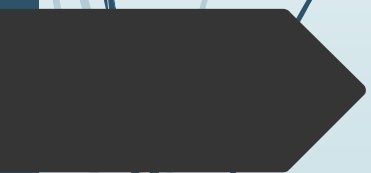


2016 EAHCP Water Quality & Biological Monitoring Work Groups Report

Science/Implementing Committee

June 22 & 23, 2016





Outline

Introduction

- ▶ Background
- ▶ Charges

Operating Principals

Expanded Water Quality Monitoring Work Group

- ▶ Process of Deliberating Alternatives
- ▶ Final Recommendations

Biological Monitoring Work Group

- ▶ Process of Deliberating Alternatives
- ▶ Final Recommendations

Synergies



Background

- ▶ **March 2015:** The National Academy of Sciences made recommendations for improving the Biological and Expanded Water Quality Monitoring Programs.
- ▶ **July 2015:** NAS Recommendations Review Work Group recommended a holistic review of both monitoring programs.
- ▶ **February 2016:** Implementing Committee approved the creation of the 2016 Monitoring Program Work Groups.



Charges

“...to carry out a holistic review of the WQP and/or BioMP, taking into account the recommendations of NAS, lessons learned, the input of the Science Committee, the Permittees, and subject matter experts.

The purpose of the Work Group is to produce a final report for review by the Implementing Committee.”



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Operational Guidelines

1. Consensus
2. Species-driven
3. Eliminate duplication
4. Stewardship of dollars (no increase in budget)



Points to Consider

1. Eliminate duplication
2. Evaluate long-term trends
3. Integrate with existing programs
4. Understand effectiveness of conservation measures
5. Consider point and non-point sources
6. Demonstrate an awareness of all strategies

Water Quality Monitoring Work Group



Water Quality Monitoring Work Group Membership

- ▶ Melani Howard (City of San Marcos/Texas State University)
- ▶ Charles Kreitler (Science Committee)
- ▶ Steven Raabe (Stakeholder Committee/SARA)
- ▶ Benjamin Schwartz (Texas State University)
- ▶ Ken Diehl (SAWS)
- ▶ Michael Urrutia (GBRA)





Purpose: Expanded Water Quality Monitoring Program

- ▶ provide early detection of water quality impairments ...that may negatively impact the Covered Species...
- ▶ identify the point and nonpoint sources of those impairments, ...by allowing for investigation and adoption of any necessary measures through the Adaptive Management Process...



Proposed Modification to Sampling Design

Alternatives 1 & 2 to the Original Scope of Work were developed based on input from:

- ▶ the Science Committee,
- ▶ Work Group,
- ▶ Implementing Committee,
- ▶ the National Academy of Sciences,
- ▶ EAHCP staff and
- ▶ subject matter experts.



Alternatives 1 & 2

► Alternative 1

- Status quo
- added PPCP
- Removed surface water and groundwater wells
- Tested for Golf Course operations

► Alternative 2

- Out of the box approach
- Fish tissue analysis
- Added PPCP
- Removed Sediment sampling
- Removed Stormwater sampling










Alternative 3

The Work Group identified aspects of each alternative that they supported and asked staff to draft Alternative SOW #3.

- Additional Real-time stations
- The reduction of frequency and timing was OK; but the baseline must continue to be supplemented
- Stormwater sampling is important; and additional samples across the hydrograph were supported
- Some stormwater sampling should focus on the golf courses
- Fish Tissue sampling
- PPCP sampling

2016 WQWG Conclusions

Achieved consensus on:

WQ Program Sampling Methods	Revised WQ Program Sampling - Alternative #3	
	Odd Years – 2017	Even Years - 2018
Surface water 	Remove	Remove
Sediment 	Remove	Reduce to once/year
Real-time 	Add +1 station per system	Add +1 station per system
Stormwater 	Reduce to one sampling/year Test only IPMP-listed chemicals & atrazine; add two samples to the rising limb of the hydrograph for a total of 5 samples/location; priority given to locations at tributary outflows	Reduce to one sampling/year; add two samples to the rising limb of the hydrograph for a total of 5 samples/location; priority given to locations at tributary outflows
PDS 	Add PPCP membrane at most downstream site	Add PPCP membrane at most downstream site
Groundwater 	Remove	Remove
Tissue 	Conducted once/year in odd years	Not conducted in even years



Final Recommendations

Sampling Method	Final Recommendations	Rationale
Surface water (base flow)	Remove from program	Duplication- utilize CRP data
Sediment	Biannually in even years	Data will not change
Real-time monitoring	Add one sampling station per system	Valuable source of information
Stormwater	<ul style="list-style-type: none"> • Reduce to one sampling event each year; • Test only for IPMP chemicals in odd years, • Test full suite in even years as currently done, • Add two samples to the rising limb of the hydrograph for a total of 5 samples/location; • Priority given to locations at tributary outflows 	System turn over rate
PDS	Add PPCP membrane only at furthest downstream site	Provides index of good information
Groundwater (well)	Remove from program	Duplication- utilize EAA data
Tissue sampling	Add to program, one sample in odd years	Direct link to species health

Final Recommendations

Determined historic data sets for comparison in springs systems to measure Key Management Objectives outlined in the EAHCP

- ▶ Water Quality should not exceed a 10% deviation (daily average) from average long-term water quality conditions.

Fountain darters	Variable Flow Study – FD Drop Net Sampling
Invertebrates	EAA monitoring of Comal Springs
Salamanders	EAA monitoring of Spring Lake spring openings

Final Recommendations

Recommendations of criteria for analytical limits

Sampling Method	WQWG Approved Limits
Surface (base flow)	Aquatic life protection
Stormwater	Aquatic life protection
Real-time monitoring	Historical long-term averages
Sediment	Literature
PDS	Create baseline
Tissue sampling	Create baseline

Nutrients of Concern within Spring Systems

The Work Group agreed that the following three nutrients were needed for the EAHCP:

- **Nitrate** is of concern because it is a readily available plant nutrient
- **Ammonia** is of concern because it is readily converted to NO_3 ...can also be toxic to aquatic organisms (0.6 – 2.0 mg/l).
- **Soluble reactive phosphorus (SRP)** is of concern because it is the limiting nutrient in the San Marcos and Comal aquatic ecosystems.

[Source: Association Between Nutrients, Habitat, and the Aquatic Biota in Ohio Rivers & Streams; Ohio EPA Technical Bulletin MAS/1991-1-1]



Nutrient Sampling Through EAHCP & Other Programs

Current Detection Limits:

Analytes	Results	EAHCP <u>WQ</u>		EAHCP <u>BioMP</u>		CRP	
		Tested?	Method Detection Limit	Tested?	Method Detection Limit	Tested?	Ambient Water Reporting Limit
Nitrate	Minimum 110-180 µg/L CS, SM	Yes	25 µg/L	Yes	50 µg/L	Yes	50 µg/L
Ammonia	Ammonia detection limits meet TCEQ approval	No	-	No	-	Yes	100 µg/L
SRP	~95% non-detects	No	-	Yes	50 µg/L	No	-



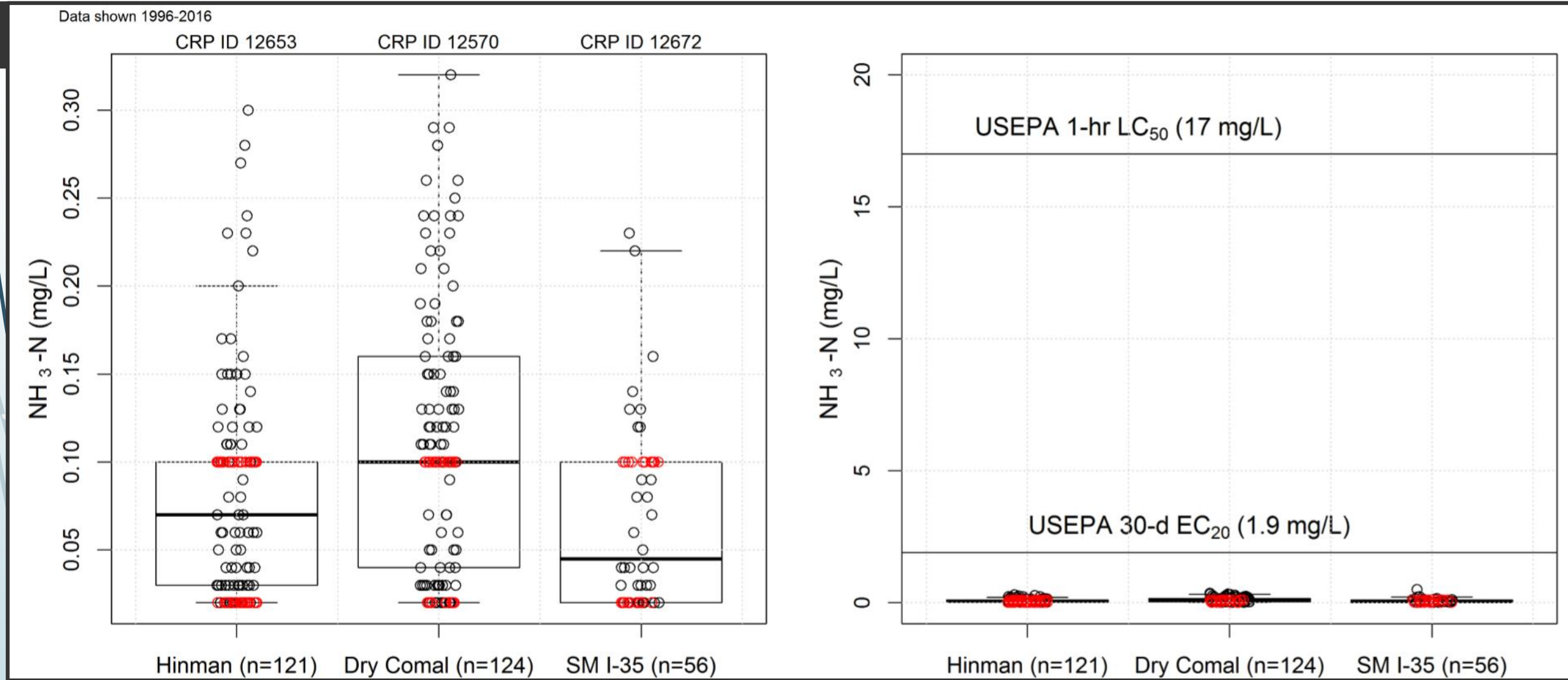
Nutrient Sampling - Ammonia

EAHCP staff:

- 1. reviewed the literature** on ammonia in freshwater ecosystems,
- 2. analyzed Clean Rivers ammonia data for both systems,** and
- 3. consulted with subject matter experts** concerning ammonia conditions within both spring systems



Analysis of Existing Ammonia Data



Source: U.S Environmental Protection Agency (2013). *Aquatic Life Ambient Water Quality Criteria for Ammonia - Freshwater* (2013) (822-R-13-001). U.S EPA: Washington, D.C.

Nutrient Sampling – Soluble Reactive Phosphorus

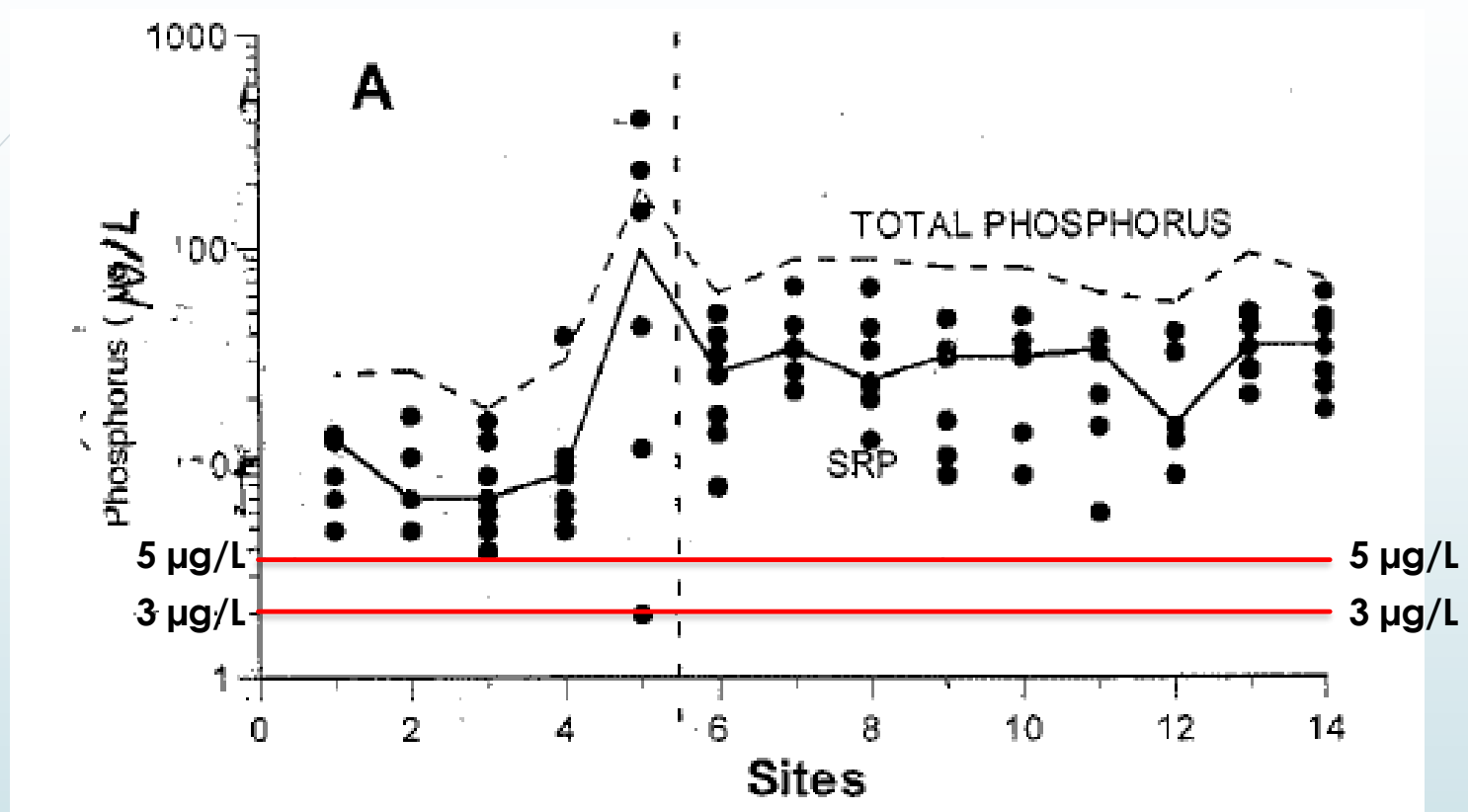


Figure 5. Phosphorus (A), nitrate-N (B), and ammonium-N (C) concentrations on seven dates at sites along the San Marcos River. The vertical dotted line is the confluence with the Blanco River. In A, the points represent SRP concentrations and the solid line is the SRP median concentration. The dotted horizontal line is the median concentration of total phosphorus.



Final Recommendations - Nutrients

- ▶ Discontinue current nutrient sampling;
- ▶ Primary concern: nitrate, ammonia, and soluble reactive phosphorus (SRP);
- ▶ SRP detection limits ≤ 5 mg/L and continue use of 100 mg/L for ammonia.

Final Recommendations

Recommendations from NAS Report 1	Final Recommendations
Expand reaches to system-wide sampling.	Continue to use LTBG.
Consider household chemicals, personal care products, & residential herbicides.	Include Golf course IPMP sampling in stormwater sampling and include PPCP in PDS sampling
Reduce frequency/locations if no significant concentrations of given contaminant are observed.	Surface water quality, nutrients, others
Nutrients detection limits should be reduced.	(1) Discontinue nutrient sampling; (2) Primary concern: nitrate, ammonia, and soluble reactive phosphorus (SRP); (3) SRP detection limits \leq 5 mg/L and continue use of 100 mg/L for ammonia.
WQMP should focus on parameters and limits used for Covered Species.	Operational Guidelines of Work Group includes the focus on the Covered Species
PDS might be a more cost-effective.	Continue PDS monitoring
Increased coordination and integration of the monitoring.	Synergies between monitoring programs



Fish Tissue Meeting

Purpose: to design a fish tissue sampling protocol within the water quality program

Meeting: June 15, 2016

Membership:

- ▶ Chad Furl – EAA/HCP
- ▶ Rebecca Reeves – SARA
- ▶ Pete Diaz – USFWS
- ▶ Bryan Brooks – Baylor University



Fish Tissue Sampling

- ▶ Fountain darters and a predator species will be sampled for contaminant analysis at two locations for each system.
 - ▶ One location will be located near the spring orifices and the other will be at the most downstream biomonitoring reach
- ▶ Chemical Analysis will include:
 - ▶ PCBs
 - ▶ PAHs
 - ▶ SVOCs
 - ▶ Metals
 - ▶ PPCPs

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Regular Review and Analysis of Data

- ▶ Collaborate with GBRA Clean Rivers Program and other complementary programs (EAA Aquifer Science Department and EAHCP Biological Monitoring Program).
- ▶ Regular analysis of data should include past years information to determine if any trends exist.
- ▶ Re-evaluate sampling methodologies as land use changes.

Budget

Monitoring Component	Table 7.1	2016	Estimated 2017
WQ Monitoring	\$200,000	\$474,430	\$300,000
Other Costs	-	\$23,100	\$37,750
Total	\$200,000	\$497,530	\$337,750

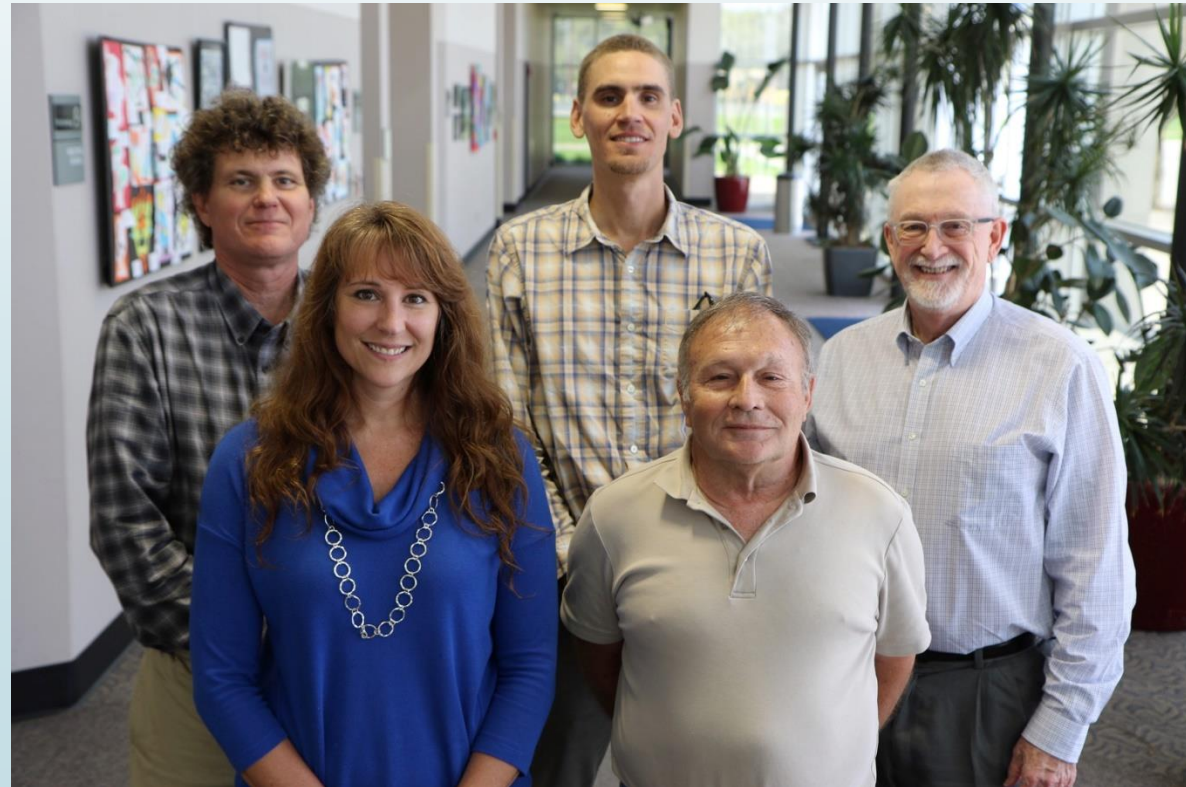
*Estimated savings of \$159,780

Biological Monitoring Work Group




Biological Monitoring Work Group Membership

- ▶ Tyson Broad (Texas Tech University)
- ▶ Jacquelyn Duke (Science Committee/Baylor University)
- ▶ Mark Enders (City of New Braunfels)
- ▶ Rick Illgner (EAA)
- ▶ Doyle Mosier (Science Committee)



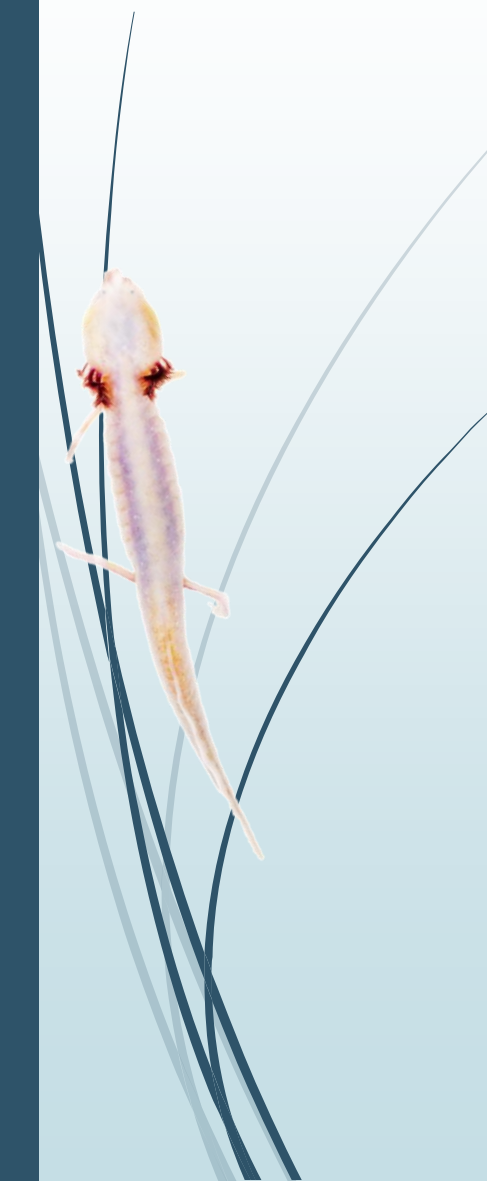


Purpose: Biological Monitoring Program

- 
- ▶ fill important gaps in knowledge about, and to refine estimates of, the ecological condition of the...ecosystems through an ongoing program of collection of...data.
 - ▶ provides a means of monitoring changes to habitat availability and population abundance of the Covered Species ...



History of Variable Flow

- ▶ The program has been collecting data since 2000
 - ▶ Extensively vetted by leading experts in their field
 - ▶ The EARIP used the this data set as a basis for the EAHCP
 - ▶ Does not require significant changes to the existing program
- 

2016 BioWG Conclusions

<u>Bio Program Sampling Methods</u>	<u>Revised Bio Program Sampling</u>
Fixed station photography	Valuable historical baseline
Aquatic veg mapping, including TWR	Valuable baseline, trend, & compliance information
Fountain Darter sampling	Valuable indices to fish population health
Fish community sampling	Provides macro information pertinent to Covered Species
Invertebrate sampling – Covered Species	Necessary to monitor population health
Macroinvertebrate food source monitoring	Recommendation: substitute rapid bioassessments Option #1
Salamander visual observations	Necessary to monitor population health
Comal Springs discharge measurement	Important environmental measure
Flow partitioning within Landa Lake	Recommendation: Remove from Program Done through EAA
Water quality grab sampling	Continue—important accompaniment to bio info
Critical period (high and low-flow events)	Important index during critical periods
ITP (Take, 10% Disturbance)	Required for permit



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Final Recommendations

Determined program would require minimal changes:

- Substitute macroinvertebrate food source sampling with rapid bioassessments for macroinvertebrates
- Remove flow partitioning within Landa Lake from the program (will be done by EAA)

Final Recommendations

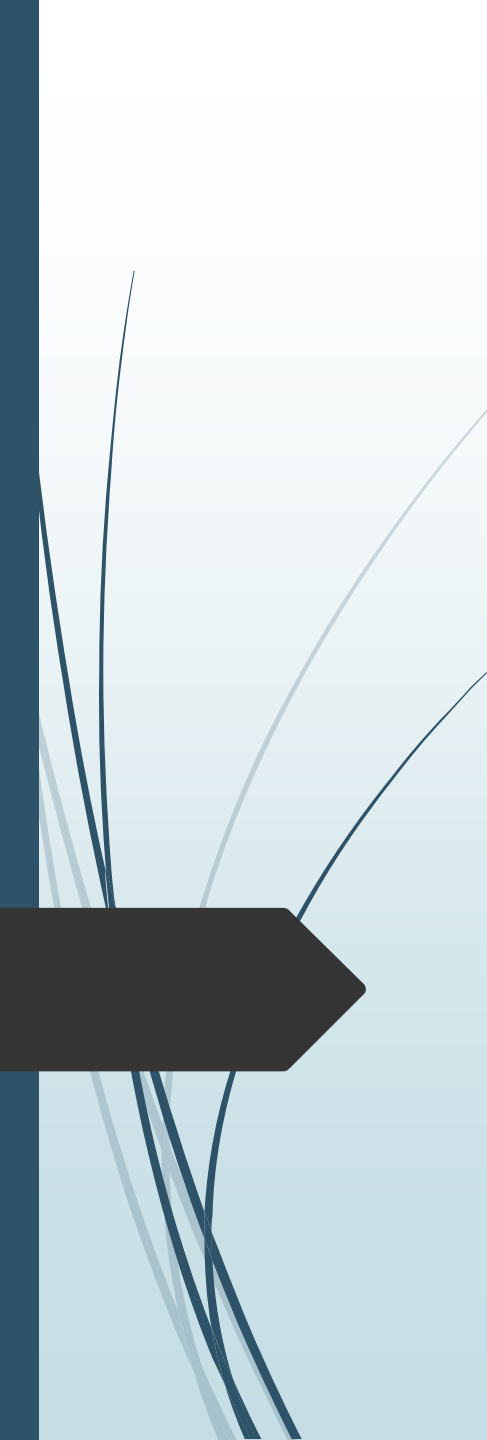
Provided recommendations from NAS Report:

NAS Report 1	BioMWG Recommendations
Expand reaches to system-wide sampling.	Extrapolation unnecessary. Continue to use Long-term Biological Goal Reaches.
Cotton-lure approach for riffle beetle sampling needs to be improved.	Addressed by Comal Springs Riffle Beetle Cotton-lure SOP Work Group.
Increased coordination and integration of the monitoring activities is needed.	WQWG and BioMWG addressed the coordination and integration which is summarized in the next section.
Nutrient detection limits should be reduced to enhance detection of possible water quality requirements.	Lower soluble reactive phosphorus detection limits to at least 5 mg/L, and continue use of 100 mg/L for ammonia

Budget

Biological Monitoring	Table 7.1	2016	Estimated 2017
San Marcos	\$200,000	\$208,514	\$218,515
Comal	\$200,000	\$208,514	\$218,515
Total	\$400,000	\$417,028	\$437,030

*Estimated increased cost of \$20,002



Synergies Between the Water Quality and Biological Monitoring Work Groups



Synergies

- ▶ Using rapid bio-assessments (EAHCP Bio-Monitoring) to help identify water quality impairments and measure ecosystem health
- ▶ Using water quality data, such as soluble reactive phosphorus, from Bio-Monitoring program to measure nutrient impairments and ammonia.
- ▶ Analyzing data from Water Quality, Biological, EAA Well Sampling & Clean Rivers Program, collectively

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Synergies

- ▶ Collecting more real-time water quality data because it is more biologically-relevant
- ▶ Requiring monitoring of riparian conditions as a part of Permittees' Work Plans
- ▶ **After exploring the feasibility of coordinating sampling locations, it was determined no changes are needed in either program.**



Questions/Comments?

Thank you!