

FRESHWATER MUSSEL COLLABORATIVE STUDY FOR WASTEWATER TREATMENT PLANTS

Background:

- In 2013, U.S. EPA issued revised national recommended water quality criteria for ammonia (78 FR 163, August 22, 2013)
- In April 2014, Central Valley Water Board issued a California Water Code Section 13267 letter to Central Valley POTWs describing the criteria and actions that the POTWs could take to provide the information needed to implement the new criteria in NPDES permits.
- A total of 42 agencies representing 47 Central Valley POTWs elected to participate in a coordinated effort to evaluate the presence or absence of freshwater mussels in their receiving water bodies
- CVCWA contracted with consulting team of Robertson-Bryan, Inc., Larry Walker Associates, and Pacific EcoRisk to implement a FW Mussel Special Project in fall of 2014.
- On February 1, 2017, Central Valley Water Board announced a proposal to evaluate ammonia water quality objectives for the Central Valley and associated amendment to the Basin Plan

Completed Work:

Phase I: (Sept 2014-July 2015)

- a. *State of Knowledge Report* for FW Mussels in the Central Valley
- b. *Field Study Guidance Methodology Report* (how best to survey for FW Mussels)

Key findings:

- Mussels distribution cannot be accurately predicted by habitat conditions
- Mussels are not found in all water bodies or even throughout all reaches of a given water body
- Use of environmental DNA (eDNA) is likely the most cost-effective means of determining mussel presence and absence

Phase IIa: (Aug 2015-May 2016)

Determine efficacy of eDNA technology for determining mussel presence/absence

Key Findings:

- eDNA methodology works very well for determining mussel presence/absence in CV water bodies, including the Delta
- Far more cost-effective and definitive than traditional survey methods

Phase IIb: (May 2016-May 2017)

Better determine ability to detect eDNA at distance from known mussels and further develop the field sampling approach for large rivers

Key Findings:

- Can detect eDNA of mussels up to 5 miles away under some conditions, and routinely up to 1 mile away
- Technique well suited to determine presence/absence
- field sampling considerations are now well understood

Planned Work:

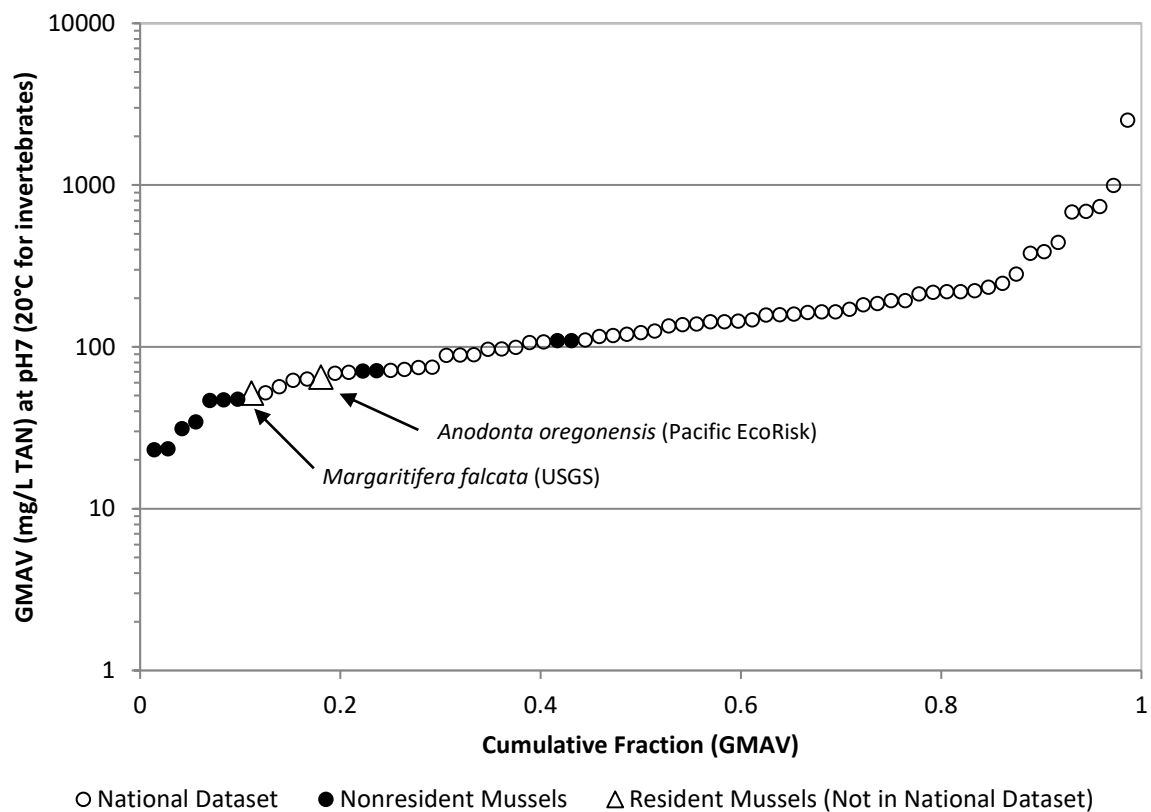
- A) POTWs will ultimately need to determine mussel presence/absence in their RW

- Can use the eDNA method to determine presence/absence at any time, with ability to detect being greatest during spring spawning season (April-early July)

B) Phase IIc: Toxicity testing with resident mussel species and use of U.S. EPA Recalculation Procedure to develop Central Valley specific ammonia criteria

- Objectives:
- Develop toxicity values for resident freshwater mussels, and
 - Perform ammonia criteria recalculation applicable to entire Basin

- The relative sensitivity of California resident freshwater mussels to ammonia is currently not fully known – are they more or less sensitive than the mussels driving U.S. EPA’s 2013 criteria update?
- Where resident freshwater mussel ammonia sensitivity is known, resident species are very sensitive but not as sensitive as those non-resident eastern species that drive the U.S. EPA 2013 ammonia criteria (see figure below)



- To derive ammonia criteria applicable to the resident species composition of the Central Valley (i.e., site specific objective), a single acute toxicity value for *Gonidea angulata* is necessary in order to complete a criteria recalculation.

- Upon completion of a criteria recalculation, Central Valley specific water quality objective(s) for ammonia could be adopted into the Basin Plan, and used as the basis for issuing ammonia limitations in NPDES permits.

Timeline:

- A) POTWs can make use of eDNA to determine presence/absence of FW mussels in their RW at any time, and will ultimately need this information to obtain appropriate ammonia limitations
- B) Phase IIc work:
 - i. Wild mussel collection, culturing, and toxicity testing to occur spring/summer of 2017
 - ii. Criteria recalculation and reporting to occur fall/winter 2017

RWB Regulatory Efforts Related to this Special Project and Effects on POTWs:

- A) POTWs will receive ammonia limitations in NPDES permits based on whether FW mussels are present or absent in RW
- B) Phase IIc: Information intended to support a RWB-led Basin Plan amendment to possibly adopt Central Valley specific ammonia objectives
 - i. Public review draft of Central Valley Water Board staff report available spring 2018
 - ii. Board adoption of water quality objectives and/or Basin Plan Amendment spring 2018

Benefits of a Collaborative Special Project:

- Developed substantial new science pertaining to FW mussels in the Central Valley
- Now know how to cost-effectively and confidently determine mussel presence/absence by water body
- Information obtained from study benefits both regulators and regulated parties equally
- The collaborative process results in the RWB and POTWs developing the best science and policy together, which:
 - a. Improves collective understanding based on sound science
 - b. Improves regulations pertaining to ammonia, resulting in permitting the most appropriate ammonia limitations for each POTW
 - c. Provides regional consistency in application and implementation
 - d. Avoids surprises (for both parties) in the NPDES permitting process
 - e. Accomplishes these things cost-effectively for each POTW