Arizona Game and Fish Department
Quagga Mussel Sampling Methods

Sample Methods:

A plankton net or a sieve can be used to collect concentrated zooplankton samples to sample for the planktonic veliger stage of the quagga mussel. The plankton net size should be a 3:1 ratio, total net length to mouth diameter opening. Common mouth sizes used are 50 and 30 centimeter diameter. The net mesh size must be 63 micron. Nets can be ordered from Wildco or another net company that assembles zooplankton nets. Wildco, Wildlife Supply Company, Buffalo, NY, 1-800-799-8301.

A sieve can also be used. The sieve can be made from large diameter PVC pipe and a 63 micron mesh sheet. The sampler is constructed from a length of large-diameter PVC pipe and a connector is used to glue and hold the mesh material. The length of the pipe should not exceed 20 inches. The amount or organic material in the water column will determine the diameter of the PVC pipe that should be used. A six inch pipe is the minimum size and would work in waters with very high transparency, water with limited transparency would require a larger diameter sampler. This method also requires a pump, hoses, and associated equipment for sample collection.

Plankton net tows for veliger sampling are most commonly vertical tows, but horizontal tows can be used to collect samples. Net towing speeds should be slow enough to collect an accurate volume sample. The standard sample size is 1000 liters, but samples that have organic debris that fully clog the net mesh should be reduced. Samples that are collected in waters with little organic material may be larger that 1000 liters.

Sieve samplers work well for canal samples, but they also can be used for lakes and rivers. A bucket with liter measurement is preferred for measuring the pump flow rate. The sample is pumped for a determined time to collect a 1000 liter sample volume. If the sample is a lake sample, it is best to collect the sample from more than one depth; record the depths.

Wash the net with a squirt bottle and transfer the concentrated sample to a 500 milliliter or 1 liter sample bottle.

Equipment list: Plankton net, sieve, squirt bottles, 500 and 1 liter sample bottles, Ice chest and ice, pump, hoses, measuring bucket, hoses, battery, timepiece.

Sample Preservation:

Ethanol is the preferred preservative for samples that are to be held for analysis. The Bureau of Reclamation Laboratory specifies an estimated 25% of total volume with concentrated ethanol preservation for veliger enumeration and polymerase chain reaction

(PCR) analysis. It is best to have both 500 ml. and 1 liter bottles available as the sample size will vary with the amount of organic and inorganic material in the water column. The sample volume that is collected is marked on the bottle with permanent marker and labeled "Level 1". Ethanol is added to the sample at an estimated volume of 25% of the total volume and this level is labeled "ETOH". Place samples on Ice for transport.

Sample Label Information:

Water body
Location
GPS (UTM)
Date
Time
Sample Depth
Site Maximum Depth
Volume of filtered sample
Preservative
Sampler name and telephone

Equipment: Ethanol, sample bottle labels, permanent markers, GPS

Collect water quality data for pH, temperature, conductivity, and dissolved oxygen.

Fill out a Quagga Mussel datasheet with the information that applies to veliger and/or adult sampling information. Enter the information to the Quagga Mussel Database located on the Game and Fish Department U:drive.

Equipment Decontamination:

Equipment must be decontaminated between water bodies, veligers will stick to the sample net. Vinegar or a 5% acetic acid solution is used for decontamination. This solution will kill veligers and denature DNA for PCR analysis. A 1 hour contact time will kill veligers but overnight contact is recommended. A container to hold equipment and solution in a truck between sample sites is necessary to sample multiple sites in the same day. Hoses should be thoroughly flushed with water. Multiple hoses should be available when sampling more than one site on the same sample collection trip.

Equipment: Vinegar, decontamination containers.

Substrate Samplers:

Substrate samplers can be placed at sample locations to document the establishment of adult quagga mussels in a water body. They can also be used to determine mussel population growth and seasonal abundance, and they can be a convenience for samplers. Locate sample sites in an area of interest. Mussels are reported to prefer dark area, crevices, and undersides of boats.

Substrate samplers can be made from PVC, ceramic, or cement materials. PVC is the preferred plastic material. Acrylic and ABS plastics seem to not be a preferred material for adult attachment. Substrate samplers should be left in place 2 months and be covered by a biofilm, before being disturbed for monitoring. All substrate samplers should have an identification tag.

Substrate samplers can be attached to docks in a secure place. Sample locations that do not have a site for substrate attachment, can be placed with a buoy that has survey site signage and reflective material. Samplers that are placed in open water sites in boating areas must have reflective markers, and also permission, if there is an agency responsible for buoy placement. Navigational Aids has some material available and access to additional equipment.

PVC pipe substrate samplers can be made from 2 inch grey pipe cut into six inch lengths. Holes are drilled through the center of the pipe for rope attachment, and 4 additional ½ to ¾ inch holes are drilled in the sampler. The PVC pipe can be suspended along a rope or a chain at various depths. Additional washers and weights can be added. If the sampler has a cement block or anchor this provides an additional sampling substrate and depth.

Flat PVC samplers can also be used for substrate sampling. This sampler is made from 1/8 inch PVC sheeting cut into 6 inch squares, which can be center drilled and attached to eyebolts for placement. Other commercially available substrate samplers are available and can be used for adult mussel monitoring.

Quagga mussels have been reported to prefer lower lake depths. At sites where lower depth are available samplers can be placed in warmer surface waters and cooler water at depth.

Equipment: PVC pipe, PVC sheeting, rope and/or chain, washers, weights, eyebolts, cement block, identification tags, waterproof logo decals.

For additional information contact Kevin Bright, 602-78-3261.

Quagga Mussel Datasheet

Site: _____
Location: _____
GPS Zone: _____
Northing: _____
Easting: _____
NAD and Zone __

Samplr int/ wk unit _____
Elevation: _____
Water Code: _____

Drain Ref: _____
HUC: _____

Adult No./meter: _____
Adult X Size mm: _____
Veliger P/A: _____
Preservative: _____
Smpl Vol ml: _____
no./ liter: _____
Area Sampled _____

Corbicula P/A _____

Sample Depth M: _____
Site max Depth M. _____

Gear type:
Plankton Net 30 cm. _____
Plankton Net 50 cm. _____
Pump and Seive _____
Scuba _____
Observation _____

Date: _____
Time: _____
Sample Type:
Water Sample y/n _____
Veliger: _____
Adult: _____

Water Quality:
T. celsius: _____
pH su: _____
Cond umhos: _____
D.O. mg/l: _____
Secchi meters: _____
Redox mv: _____
Substrate Type:
PVC Plate _____
PVC Pipe _____
Canal _____
Sandy _____
Cobble _____
Rocky _____
Mud
Ambient _____

Lab:
TSS mg/l _____
TDS mg/l _____

Ca mg/l _____

Mg mg/l _____
Na mg/l _____
K mg/l _____
Chl a ug/l _____

Adult Quagga Mussel Lengths

If more than 20 mussels are found, chose 20 random mussels to measure.
If less than 20 mussels are found measure all mussels.

Number	Length mm
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

Average _____