

Maryland FRO HACCP plan

HACCP Step 1 - Activity Description	
Facility: Maryland Fishery Resources Office	Site: Aquatic habitats near Annapolis, MD
Project Coordinator: Steve Minkkinen	Project Description: Fishery Resource Management
Site Manager: Staff (Steve Minkkinen, Mike Mangold, Sheila Eyer, John Gill, Ian Park, Matt Breece, and Julie Devers)	
Address: 177 Admiral Cochrane Dr. Annapolis, MD 21401	
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Project Description (Who, What, Where, When, How & Why)
Maryland Fishery Resources Office (MFRO) staff conducts fishery surveys, tagging, spawning and monitoring of Atlantic and shortnose sturgeon, American eel, horseshoe crabs, freshwater mussels, northern snakehead, American shad and other aquatic species. Sampling methods include boat and backpack electrofishing, snorkel surveys, trawling, gill netting, trapping (fyke and hoop nets), and field testing fish passageways. These activities are conducted in the Delaware River, Hudson River and major tributaries to the Chesapeake Bay including the Potomac, Choptank, Susquehanna, Severn, South, and Blackwater Rivers.

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HACCP Step 2 - Potential Hazard Identification

Vertebrates:

Channa argus (northern snakehead)

Invertebrates:

Eriocheir sinensis (Chinese mitten crab)

Dreissena polymorpha (zebra mussel)

Plants:

Didymosphenia geminata (didymo), *Hydrilla verticillata* (hydrilla)

Other Biologics:

Others:

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HACCP Step 3 - Flow Diagram

Task # 1	Arrive at location, dress in personal gear and prepare gear needed for the sampling effort
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Task # 2	Drive boat or walk to sampling location
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Task # 3	Conduct sampling (deploy nets, snorkel, electrofish, check fish ladders)
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Task # 4	Identify species, measure length, and collect samples of aquatic species
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Task # 5	Measure water quality, qualify habitat, and collect GPS coordinates at sampling locations
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Task # 6	After survey is complete, return to truck and load sampling gear and personal gear
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Task # 7	Return to office
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Task # 8	If specimens have been collected, process samples, place in aquaria or freeze for later analysis
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Task # 9	Unload and attend to sampling gear and personal gear
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HACCP Step 4 - Hazard Analysis					
Task	Hazard	Probable?	Justification	Control Measures	CCP?
Arrive at location, dress in personal gear and prepare gear needed for the sampling effort	Vertebrate: <i>Channa argus</i> (northern snakehead)	No	if gear has been properly attended to following prior sampling events, there should be no transport		No
	Invertebrate: <i>Eriocheir sinensis</i> (Chinese mitten crab)	No	if gear has been properly attended to following prior sampling events, there should be no transport		No
	Plant: <i>Didymosphenia geminata</i> (didymo), <i>Hydrilla verticillata</i> (hydrilla)	No	if gear has been properly attended to following prior sampling events, there should be no transport		No
	Invertebrate: <i>Dreissena polymorpha</i> (zebra mussel)	No	if gear has been properly attended to following prior sampling events,		No

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			there should be no transport		
Drive boat or walk to sampling location	Vertebrate: <i>Channa argus</i> (northern snakehead)	No	if gear has been properly attended to following prior sampling events, there should be no transport		No
	Invertebrate: <i>Eriocheir sinensis</i> (Chinese mitten crab)	No	if gear has been properly attended to following prior sampling events, there should be no transport.		No
	Plant: <i>Didymosphenia geminata</i> (didymo), <i>Hydrilla verticillata</i> (hydrilla)	No	if gear has been properly attended to following prior sampling events, there should be no transport		No
	Invertebrate: <i>Dreissena polymorpha</i> (zebra mussel)	No	if gear has been properly attended to following prior sampling events, there should be no		No

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			transport		
Conduct sampling (deploy nets, snorkel, electrofish, check fish ladders)	Vertebrate: <i>Channa argus</i> (northern snakehead)	Yes	northern snakeheads could be transported from one sample location to another	secure northern snakeheads in enclosed tanks when travelling between sites	No
	Invertebrate: <i>Eriocheir sinesis</i> (Chinese mitten crab)	Yes	mitten crabs could be transported from one sample location to another	check nets for mitten crabs and remove before moving to another sample location	Yes
	Plant: <i>Didymosphenia geminata</i> (didymo), <i>Hydrilla verticillata</i> (hydrilla)	No	sampling will be conducted in a single watershed in a localized area		No
	Invertebrate: <i>Dreissena polymorpha</i> (zebra mussel)	No	sampling will be conducted in a single watershed in a localized area		No
Identify species, measure length, and collect samples	Vertebrate: <i>Channa argus</i> (northern snakehead)	No	this process occurs at one location		No
	Invertebrate: <i>Eriocheir sinesis</i> (Chinese mitten	No	this process occurs		No

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of captured aquatic species	crab)		at one location		
	Plant: <i>Didymosphenia geminata</i> (didymo), <i>Hydrilla verticillata</i> (hydrilla)	No	this process occurs at one location		No
	Invertebrate: <i>Dreissena polymorpha</i> (zebra mussel)	No	this process occurs at one location		No
Measure water quality, qualify habitat, and collect GPS coordinates at locations	Vertebrate: <i>Channa argus</i> (northern snakehead)	No	this process occurs at one location		No
	Invertebrate: <i>Eriocheir sinensis</i> (Chinese mitten crab)	No	this process occurs at one location		No
	Plant: <i>Didymosphenia geminata</i> (didymo), <i>Hydrilla verticillata</i> (hydrilla)	No	this process occurs at one location		No
	Invertebrate: <i>Dreissena polymorpha</i> (zebra mussel)	No	this process occurs at one location		No
After survey is complete, return to truck and load sampling gear and personal gear	Vertebrate: <i>Channa argus</i> (northern snakehead)	Yes	northern snakeheads are often transported back to the office for experiments or for	secure northern snakeheads in enclosed tanks when travelling	Yes

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			disposal		
	Invertebrate: <i>Eriocheir sinensis</i> (Chinese mitten crab)	Yes	mitten crabs could get entangled in nets	Visually inspect nets at the completion of each sampling event	No
	Plant: <i>Didymosphenia geminata</i> (didymo), <i>Hydrilla verticillata</i> (hydrilla)	Yes	didymo could be attached to sampling and/or personal gear	remove vegetation and mud from boats and gear, if travelling outside the watershed, power wash boat and trailer and bleach the live well	Yes
	Invertebrate: <i>Dreissena polymorpha</i> (zebra mussel)	Yes	zebra mussels could be attached to sampling and/or personal gear	remove vegetation and mud from boats and gear, if travelling outside the watershed, power wash boat and trailer and bleach the live well	Yes
Return to office	Vertebrate: <i>Channa argus</i> (northern snakehead)	No	boats and gear will be visually cleared before the return trip		No

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			to the office		
	Invertebrate: <i>Eriocheir sinensis</i> (Chinese mitten crab)	No	boats and gear will be visually cleared before the return trip to the office		No
	Plant: <i>Didymosphenia geminata</i> (didymo), <i>Hydrilla verticillata</i> (hydrilla)	No	boats and gear will be visually cleared before the return trip to the office		No
	Invertebrate: <i>Dreissena polymorpha</i> (zebra mussel)	No	boats and gear will be visually cleared before the return trip to the office		No
If specimens have been collected, process samples, place in aquaria or freeze for later analysis	Vertebrate: <i>Channa argus</i> (northern snakehead)	No	specimens will be held in aquaria or killed and disposed of properly		No
	Invertebrate: <i>Eriocheir sinensis</i> (Chinese mitten crab)	No	specimens will be held in aquaria or disposed of properly, aquaria will be inspected for introduction of		No

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			mitten crabs		
	Plant: <i>Didymosphenia geminata</i> (didymo), <i>Hydrilla verticillata</i> (hydrilla)	No	specimens will be held in aquaria or disposed of properly, aquaria will be inspected for introduction of didymo		No
	Invertebrate: <i>Dreissena polymorpha</i> (zebra mussel)	No	specimens will be held in aquaria or disposed of properly, aquaria will be inspected for introduction of zebra mussels		No
Unload and attend to sampling gear and personal gear	Vertebrate: <i>Channa argus</i> (northern snakehead)	No	northern snakeheads will be held in aquaria or disposed of properly		No
	Invertebrate: <i>Eriocheir sinensis</i> (Chinese mitten crab)	No	nets will be visually inspected prior to return to the office		No
	Plant: <i>Didymosphenia geminata</i> (didymo), <i>Hydrilla</i>	Yes	didymo could be attached to	Clean personal and sampling gear using	Yes

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	<i>verticillata</i> (hydrilla)		sampling or personal gear (especially the bottoms of felt waders)	a 5% salt solution. Pressure wash trailer and outside of boat, bleach the live well, and dry completely before moving to a new watershed.	
	Invertebrate: <i>Dreissena polymorpha</i> (zebra mussel)	Yes	Zebra mussel larvae could be attached to sampling or personal gear (especially the bottoms of felt waders)	Clean personal and sampling gear using a 5% salt solution and hang to dry. Pressure wash trailer and outside of boat, bleach the live well, and dry completely before moving to a new watershed.	Yes

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HACCP Step 5 - HACCP Plan

Critical Control Point #1:

Task # 3: Conduct sampling (deploy nets, snorkel, backpack electrofish, check fish ladders)

Significant Hazards:

Invertebrate: *Eriocheir sinensis* (Chinese mitten crab)

Control Measures:

check nets for mitten crabs and remove before moving to another sample location

Limits for Control Measures:

visually inspect nets as they are being packed into tubs

Monitoring: What?

that mitten crabs are removed from nets before they are packed

Monitoring: How?

visually

Monitoring: Frequency?

every time nets are pulled in

Monitoring: Who?

Biologists

Evaluation & Corrective Actions:

nets can be unpacked at the office and reinspected

Supporting Documentation: Britton, David. *Zebra Mussel (Dreissena polymorpha)*. ANS Taskforce Web site. 2006. <http://www.anstaskforce.gov/spoc/zebra_mussels.php> (Accessed December 1, 2008).

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Critical Control Point #2:

Task # 6: After survey is complete, return to truck and load sampling gear and personal gear

Significant Hazards:

Vertebrate: *Channa argus* (northern snakehead)

Control Measures:

secure northern snakeheads in enclosed tanks when travelling between sites

Limits for Control Measures:

snakeheads will be placed in a secure tank for transport

Monitoring: What?

that the tank is closed and secured

Monitoring: How?

visually

Monitoring: Frequency?

each time a snakehead is caught and transported

Monitoring: Who?

biologists

Evaluation & Corrective Actions:

if no lid is available for a snakehead tank, either transport snakehead inside the truck or kill it before transporting

Supporting Documentation: Courtenay, Walter Jr., and Williams, James D. *Snakeheads (Pisces, Channidae) — A Biological Synopsis and Risk Assessment*. US Geological Survey Circular 1251. <http://fisc.er.usgs.gov/Snakehead_circ_1251/circ_1251_courtenay.pdf> (Accessed December 1, 2008).

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Critical Control Point #3:

Task # 6: After survey is complete, return to truck and load sampling gear and personal gear

Significant Hazards:

Plant: *Didymosphenia geminata* (didymo), *Hydrilla verticillata* (hydrilla)

Control Measures:

remove vegetation and visible sediment from boats and gear, if travelling outside the watershed, power wash boat and trailer and bleach the live well

Limits for Control Measures:

Remove vegetation and mud from boats and gear

Monitoring: What?

That boats and gear are clean

Monitoring: How?

visually

Monitoring: Frequency?

each time the truck is packed for return to the office, additional steps (pressure washing boat and bleaching live well) will be taken if travelling outside of the watershed

Monitoring: Who?

biologists

Evaluation & Corrective Actions:

If boat and trucks are extremely muddy, trucks and boats will be washed at a car wash before leaving the watershed

Supporting Documentation: Elwell, Leah., Spaulding, Sara. 2007. *Increase in nuisance blooms and geographic expansion of the freshwater diatom *Didymosphenia geminata**. White paper. <<http://www.macff.org/pdf/ScientificKnowledgeofDidymo.pdf>> (Accessed December 1, 2008).

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Critical Control Point #4:

Task # 6: After survey is complete, return to truck and load sampling gear and personal gear

Significant Hazards:

Invertebrate: *Dreissena polymorpha* (zebra mussel)

Control Measures:

remove vegetation and visible sediment from boats and gear remove vegetation and visible sediment from boats and gear, if travelling outside the watershed, power wash boat and trailer and bleach the live well

Limits for Control Measures:

Remove vegetation and mud from boats and gear

Monitoring: What?

That boats and gear are clean

Monitoring: How?

visually

Monitoring: Frequency?

each time the truck is packed for return to the office or to a different watershed, additional steps (pressure washing boat with hot water and bleaching live well) will be taken if travelling outside of the watershed

Monitoring: Who?

biologists

Evaluation & Corrective Actions:

If boat and trucks are extremely muddy, trucks and boats will be washed at a car before leaving the watershed

Supporting Documentation: Britton, David. *Zebra Mussel (Dreissena polymorpha)*. ANS Taskforce Web site. 2006.<http://www.anstaskforce.gov/spoc/zebra_mussels.php> (Accessed December 1, 2008).

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<p>Critical Control Point #5:</p> <p>Task # 9: Unload and attend to sampling gear and personal gear</p>
<p>Significant Hazards:</p> <p>Plant: <i>Didymosphenia geminata</i> (didymo), <i>Hydrilla verticillata</i> (hydrilla)</p>
<p>Control Measures:</p> <p>Clean personal and sampling gear using a 5% salt solution. Pressure wash trailer and outside of boat, bleach the live well, and dry completely before moving to a new watershed.</p>
<p>Limits for Control Measures:</p> <p>Soak and scrub gear in a 5% salt solution for at least one minute (allow neoprene waders, wet suits and life jackets to soak longer), rinse with tap water and allow to dry before use in a different body of water, if travelling outside the watershed, power wash boat and trailer, bleach the live well, and allow 48 hours of drying time</p>
<p>Monitoring: What?</p> <p>That gear is dipped and hung out to dry and boats are washed and dried</p>
<p>Monitoring: How? visually</p>
<p>Monitoring: Frequency?</p> <p>at the completion of sampling, before gear is used in another body of water</p>
<p>Monitoring: Who?</p> <p>biologists</p>
<p>Evaluation & Corrective Actions:</p> <p>If mud persists, scrub and dip in salt solution again.</p>
<p>Supporting Documentation: Elwell, Leah., Spaulding, Sara. 2007. <i>Increase in nuisance blooms and geographic expansion of the freshwater diatom Didymosphenia geminata</i>. White paper. <http://www.macff.org/pdf/ScientificKnowledgeofDidymo.pdf> (Accessed December 1, 2008).</p>

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<p>Critical Control Point #6:</p> <p>Task # 9: Unload and attend to sampling gear and personal gear</p>
<p>Significant Hazards:</p> <p>Invertebrate: <i>Dreissena polymorpha</i> (zebra mussel)</p>
<p>Control Measures:</p> <p>Clean personal and sampling gear using a 5% salt solution. Pressure wash trailer and outside of boat, bleach the live well, and dry completely before moving to a new watershed.</p>
<p>Limits for Control Measures:</p> <p>Soak and scrub gear in a 5% salt solution for at least one minute (allow neoprene waders, wet suits and life jackets to soak longer), rinse with tap water and allow to dry before use in a different body of water, if travelling outside the watershed, power wash boat and trailer, bleach the live well, and allow 48 hours of drying time</p>
<p>Monitoring: What?</p> <p>That gear is dipped and hung out to dry and that boats are completely dry before changing watersheds and that boats and trailers are washed and dried</p>
<p>Monitoring: How? visually</p>
<p>Monitoring: Frequency?</p> <p>at the completion of sampling, before gear is used in another body of water</p>
<p>Monitoring: Who?</p> <p>biologists</p>
<p>Evaluation & Corrective Actions:</p> <p>If mud persists, scrub and dip in salt solution again.</p>
<p>Supporting Documentation: Britton, David. <i>Zebra Mussel (Dreissena polymorpha)</i>. ANS Taskforce Web</p>

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site. 2006.<http://www.anstaskforce.gov/spoc/zebra_mussels.php> (Accessed December 1, 2008).

Facility: Maryland Fishery Resources Office	Activity: Fishery Resource Management
Address: 177 Admiral Cochrane Dr. Annapolis, MD 21401	
Signature:	Date:

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HACCP Checklist:

Fishery Resource Management

Facility Maryland Fishery Resources Office

Site Chesapeake Bay and Tributaries

Coordinator Steve Minkkinen

Manager Staff (Steve Minkkinen, Mike Mangold, Sheila Eyler, John Gill, Ian Park, Matt Breece, and Julie Devers)

Address 177 Admiral Cochrane Dr., Annapolis, MD 21401

- Task # 1: Arrive at location, dress in personal gear and prepare gear needed for the sampling effort**
- Task # 2: Drive boat or walk to sampling location**
- Task # 3: Conduct sampling (deploy nets, snorkel, backpack electrofish, check fish ladders)**

CRITICAL CONTROL POINT

- Hazards were contained
Hazards: Invertebrate: *Eriocheir sinensis* (Chinese mitten crab)
- Control measures were implemented
Control Measures: Check nets for mitten crabs and remove before moving to another sample location
- Control limits were maintained
Control Limits: Visually inspect nets as they are being packed into tubs.

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- Corrective actions were (performed if necessary)

Corrective Actions: Nets can be unpacked at the office and reinspected

- Task # 4: Identify species, measure length, and collect samples of captured aquatic species**
- Task # 5: Measure water quality, qualify habitat, and collect GPS coordinates at sampling locations**
- Task # 6: After survey is complete, return to truck and load sampling gear and personal gear**

CRITICAL CONTROL POINT

- Hazards were contained

Hazards: Vertebrate: *Channa argus* (northern snakehead)

- Control measures were implemented

Control Measures: secure northern snakeheads in enclosed tanks when travelling between sites

- Control limits were maintained

Control Limits: snakeheads will be placed in a secure tank for transport

- Corrective actions were (performed if necessary)

Corrective Actions: If no lid is available for a snakehead tank, either transport snakehead inside the truck or kill it before transporting

- Hazards were contained

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Hazards: Plant: *Didymosphenia geminata* (didymo), *Hydrilla verticillata* (hydrilla)

- Control measures were implemented

Control Measures: remove vegetation and visible sediment from boats and gear, if travelling outside the watershed, power wash boat and trailer and bleach the live well

- Control limits were maintained

Control Limits: remove vegetation and mud from boats and gear

- Corrective actions were (performed if necessary)

Corrective Actions: If boat and trucks are extremely muddy, trucks and boats will be washed at a car wash before leaving the watershed

- Hazards were contained

Hazards: Invertebrate: *Dreissena polymorpha* (zebra mussel)

- Control measures were implemented

Control Measures: remove vegetation and visible sediment from boats and gear remove vegetation and visible sediment from boats and gear, if travelling outside the watershed, pressure wash boat and trailer and bleach the live well

- Control limits were maintained

Control Limits: Remove vegetation and mud from boats and gear, boats should be pressure washed with hot water (>140°F if possible) and live wells should be treated with a bleach solution (at least 2%)

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- Corrective actions were (performed if necessary)

Corrective Actions: If boat and trucks are extremely muddy, trucks and boats will be washed at a car wash before leaving the watershed

- Task # 7: Return to office**
- Task # 8: If specimens have been collected, either process samples or place them in either aquaria or the freezer for later analysis**
- Task # 9: Unload and attend to sampling gear and personal gear**

CRITICAL CONTROL POINT

- Hazards were contained

Hazards: Plant: *Didymosphenia geminata* (didymo), *Hydrilla verticillata* (hydrilla)

- Control measures were implemented

Control Measures: Clean personal and sampling gear using a 5% salt solution. Pressure wash trailer and outside of boat, bleach the live well, and dry completely before moving to a new watershed.

- Control limits were maintained

Control Limits: Soak and scrub gear in a 5% salt solution for at least one minute (allow neoprene waders, wet suits and life jackets to soak longer), rinse with tap water and allow to dry before use in a different body of water, if travelling outside the watershed, power wash boat and trailer, bleach the live well, and allow 48 hours of drying time

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- Corrective actions were (performed if necessary)

Corrective Actions: If mud persists, scrub and dip in salt solution again.

- Hazards were contained

Hazards: Invertebrate: *Dreissena polymorpha* (zebra mussel)

- Control measures were implemented

Control Measures: Clean personal and sampling gear using a 5% salt solution. Pressure wash trailer and outside of boat, bleach the live well, and dry completely before moving to a new watershed.

- Control limits were maintained

Control Limits: Dip gear in a 5 % salt solution, rinse with tap water and allow to dry before use in a different body of water, if travelling outside the watershed, power wash boat and trailer, bleach the live well, and allow for several days of drying time

- Corrective actions were (performed if necessary)

Corrective Actions: If mud persists, scrub and dip in salt solution again.