

HACCP Step 1 – Freshwater Mussel Conservation Activities

Activity Description	
Facility: Genoa National Fish Hatchery	Site: Upper Mississippi River
Project Coordinator: Roger Gordon	Activity: Freshwater Mussel Conservation Activities
Site Manager: Doug Aloisi	
Address: S 5689 State Hwy 35 Genoa, WI 54632	
Phone: 608-689-2605	

Project Description i.e. Who; What; Where; When; How; Why
<p>Genoa National Fish Hatchery currently is involved in the production of freshwater mussels in the Upper Mississippi River Basin. The station currently houses adult mussels in captivity, and collects wild adult mussel broodstock to produce juvenile mussels using cultured fish as hosts. Approximately 20 mussel species are being held in captivity at the station, and wild broodstock of various species are brought in throughout the season, stripped of their larval glochidia, and returned to the wild. Cultured fish are then infested with the glochidia, held for an indefinite amount of time, and released into the upper Mississippi River basin.</p>

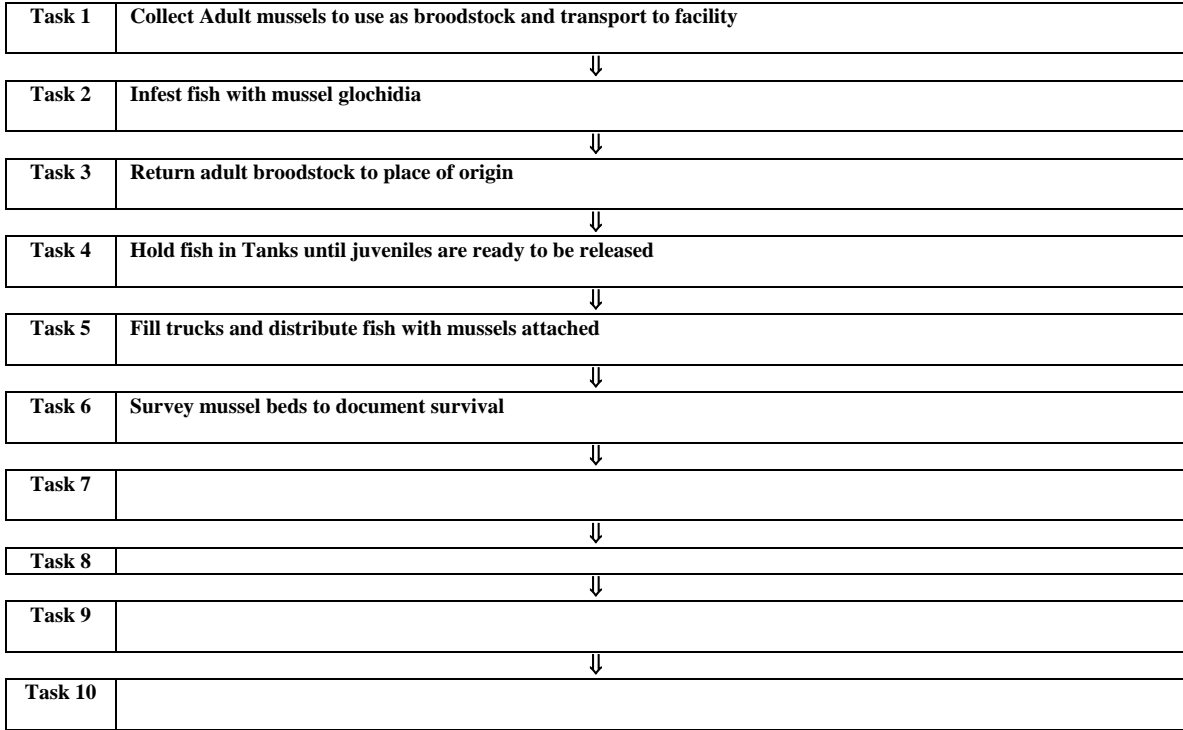
HACCP Step 2 – Identify Potential Hazards

(to be transferred to column 2 of HACCP Step 4 – Hazard Analysis Worksheet)

Hazards: Species Which May Potentially Be Moved/Introduced
Vertebrates: Green sunfish <i>Lepomis cyanellus</i> Brook stickleback <i>Culaea inconstans</i> Black bullhead <i>Ameiurus melas</i> Green frog <i>Rana clamitans</i> Leopard frog <i>Rana pipiens</i> Bullfrog <i>Rana catesbeiana</i>
Invertebrates: Zebra mussel <i>Dreissena polymorpha</i> Freshwater snail <i>Gastropoda</i> spp. Asian clam <i>Corbicula</i> spp. Rusty crayfish <i>Orconectes rusticus</i>
Plants: Eurasian watermilfoil <i>Myriophyllum spicatum</i>
Other Biologics (e.g. disease, pathogen, parasite): Largemouth Bass Virus Spring Viremia of Carp Bluegill Virus Infectious Pancreatic Necrosis Furunculosis <i>Aeromonas salmonicida</i> Enteric Redmouth Disease <i>Yersinia ruckeri</i> Bacterial Kidney Disease <i>Renibacterium salmoninarum</i> Other Assorted fish and mussel parasites/pathogens commonly found in the upper Mississippi River Basin
Others (e.g. construction materials, etc.):

HACCP Step 3 – Flow Diagram

**Flow Diagram Outlining Sequential Tasks to Complete Activity/Project
Described in HACCP Step 1 – Activity Description
(to be transferred to column 1 of the HACCP Step 4 – Hazard Analysis Worksheet)**



HACCP Step 4 - Hazard Analysis Worksheet

1 Tasks (from HACCP Step 3 - Flow Diagram)	2 Potential hazards identified in HACCP Step 2	3 Are any potential hazards probable? (yes/no)	4 Justify evaluation for column 3	5 What control measures can be applied to prevent undesirable results?	6 Is this task a critical control point? (yes/no)
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Task 1 Collect Adult mussels to use as broodstock and transport back to hatchery	Vertebrates	no	Adult mussels are captured by hand, and placed into cooler for transport	All mussels sorted and inspected	yes
	Invertebrates	yes	Boat comes in contact with water inhabited by zebra mussels and corbicula adult zebra mussels can be on mussel broodstock	Boat and equipment quarantined from culture facilities until collection season is over, and steam- cleaned to destroy mussel veligers. Brood collection s conclude before water temp exceeds 55 degrees F to preclude veliger presence. Adult mussels inspected and brushed clean of zebra mussel adults. Adults quarantined with separate water discharge to minimize risk.	yes
	Plants	yes	Possibility exists of plant material immigrating to hatchery.	Any plant material is removed and isolated from mussels before transporting to facility	yes
	Others	yes	Mussel/fish diseases inherent in the wild populations in the basin.	River water brought back to be discarded, mussels to be quarantined with separate water discharge	yes

Task 2 Infest fish with mussel glochidia	Vertebrates	no	Unwanted species already removed in step 1	n/a	no
	Invertebrates	no	“		no
	Plants	no	“		no
	Others	no	“		no

Hazard Analysis Worksheet (continued)

1 Tasks (from HACCP Step 3 - Flow Diagram)	2 Potential hazards identified in HACCP Step 2	3 Are any potential hazards probable? (yes/no)	4 Justify evaluation for column 3	5 What control measures can be applied to prevent undesirable results?	6 Is this task a critical control point? (yes/no)
Task # 3 Return adult broodstock to place of origin	Vertebrates	no	Nothing brought back to station	n/a	no
	Invertebrates	yes	Boat exposed to zebra mussels and corbicula	Boat and equipment quarantined from culture facilities until collection season is over, and steam- cleaned to destroy mussel veligers.	yes
	Plants	yes	Minimal risk to disease exposure due to equipment contamination	Boat and equipment quarantined from culture facilities until collection season is over, and steam- cleaned to destroy mussel veligers.	no
	Others	yes	Minimal risk to disease exposure due to equipment contamination	Boat and equipment quarantined from culture facilities until collection season is over, and steam- cleaned to destroy mussel veligers.	yes
Task # 4 Hold fish in Tanks until juveniles are ready to be released	Vertebrates	no	No possibility of cross contamination exists	n/a	no
	Invertebrates	no	No possibility of cross contamination exists	n/a	no
	Plants	no	No possibility of cross contamination exists	n/a	no
	Others	no	No possibility of cross contamination exists	n/a	no

Hazard Analysis Worksheet (continued)

1 Tasks (from HACCP Step 3 - Flow Diagram)	2 Potential hazards identified in HACCP Step 2	3 Are any potential hazards probable? (yes/no)	4 Justify evaluation for column 3	5 What control measures can be applied to prevent undesirable results?	6 Is this task a critical control point? (yes/no)
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Task # 5 Fill trucks and distribute fish with mussels attached	Vertebrates	yes	ANS can be harvested that have been inadvertently introduced to the pond through contaminated bait stockings/immigrations	Use only clean sources of bait to reduced unwanted species, larger mesh net to ensure only desirable species stocked	yes
	Invertebrates	yes	Snails inherent in pond system can be transferred with fish during harvest	Reduce transfer of snails through careful harvesting	yes
	Plants	no	n/a	Milfoil not currently on hatchery grounds	no
	Others	yes	Disease transfer possibilities exist thru fish/mussel transfer	Fish tested in spring fish health test, truck disinfected between site.	yes

Task # 6 Survey mussel beds to document survival	Vertebrates	no	No cross contamination possibilities exist		no
	Invertebrates	yes		Boat and equipment quarantined from culture facilities until collection season is over, and steam- cleaned to destroy mussel veligers.	yes
	Plants	yes	ANS can be harvested that have been inadvertently introduced to the pond through contaminated bait stockings/immigration	Boat and equipment quarantined from culture facilities until collection season is over, and steam- cleaned to destroy mussel veligers.	yes
	Others	yes	Harvested fish may carry pathogens	Boat and equipment quarantined from culture facilities until collection season is over, and steam- cleaned to destroy mussel veligers.	yes

HACCP Step 5 – HACCP Plan Form

<p align="center">HACCP Plan Form (all CCP's or "yes's" from column 6 of HACCP Step 4 – Hazard Analysis Worksheet)</p>								
Critical Control Point (CCP)	Significant Hazard(s)	Limits for each Control Measure	Monitoring				Evaluation & Corrective Action(s) (if needed)	Supporting Documentation (if any)
			What	How	Frequency	Who		
Collect Adult mussels to use as broodstock and transport back to hatchery	Inv/Plants/Others		Eliminate undesirables	Quarantine and disinfection	Transport	Staff	Supervisor on boat responsible for careful attention to detail	Records in daily capture log book
Return adult broodstock to place of origin	Inv/Plants/Others		Eliminate ANS contamination	Disinfection/ Steamcleaning	On return trip	Staff	Production Supervisor	
Return adult broodstock to place of origin	Inv/Plants/Others		“	Disinfection/ Steamcleaning	Upon Return	Staff	Production supervisor	
Fill trucks and distribute fish with mussels attached	All		“	Truck disinfection/ large mesh net	Between fishlots	Staff	Production supervisor	
Survey mussel beds to document survival	Inv/Plants/Others		“	Disinfection/ Steamcleaning	Upon return	Staff	Production Supervisor	
					Activity:			
Address:								
Signature:					Date:			
HACCP Plan was followed.								