2026 All Hands on Deck for Early Detection After Action Report

Collaborative Training for Invasive Zebra and Quagga Mussel Sampling in Alaska

May 6 - 7, 2026

Funded by US Fish & Wildlife Service (USFWS) through the *Surveillance of Invasion Hotspots in Southcentral Alaska* project

Co-hosted by the University of Alaska Anchorage Alaska Center for Conservation Science (ACCS) and the Kachemak Bay National Estuarine Research Reserve (KNBERR), in collaboration with the Alaska Department of Fish & Game (ADFG), USFWS, and the Kenai Peninsula Cooperative Invasive Species Management Area

Report prepared by Katherine Schake and Syverine Bentz, KBNERR

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Executive Summary

Southcentral Alaska was identified as a geographic ‘hotspot’ for terrestrial, freshwater, and marine invasions given that non-native species often arrive through ports of entry with high human population density or activity. The US Fish & Wildlife Service (USFWS) National Early Detection and Rapid Response Framework identified national pilot projects and in 2025 funded the Alaska Center for Conservation Science (ACCS) at the University of Alaska Anchorage (UAA) to implement the “Surveillance of Invasion Hotspots in Southcentral Alaska” project. Recognizing that Alaska is relatively free of invasions compared to southern latitudes, and the high ecological, economic, and cultural value associated with these intact ecosystems, the goal of this hotspot pilot project is to fill a gap in early detection surveillance in an area increasingly vulnerable to invasive species, using existing decision support tools and standing partnerships.

Following the 2024 All Hands on Deck for Early Detection Training for Invasive Zebra and Quagga Mussels that took place in Big Lake, Alaska, and the associated After-Action Report, a need was identified for a sequel workshop to be offered to partners within the Alaska Invasive Species Partnership located outside of the hub of Anchorage and the Matanuska-Susitna Valley . The objectives of this “2026 All Hands on Deck for Early Detection” workshop was to provide collaborative, in-depth training and hands-on experiential learning activities to improve statewide partners’ ability to monitor and detect invasive freshwater mussels.

Training Workshop Objectives

- Participants will learn sampling and surveillance methods for zebra and quagga mussels to be applied during the summer of 2026 and beyond.
- Participants will build collaborative relationships with state, federal, and local partners who will also be conducting field work during the summer of 2026 and beyond.

Planned and cohosted by AKISP members from US Fish and Wildlife Service (USFWS), Alaska Department of Fish and Game (ADF&G), Alaska Center for Conservation Science (ACCS) and Kachemak Bay National Estuarine Research Reserve (KBNERR) at UAA, the hands-on training was a two-day event featuring an Aquatic Invasive Species Classroom Session as part of the Kenai Peninsula Cooperative Invasive Species Management Area (KP-CISMA) spring training, and a dreissenid sampling field day at Skilak Lake. A wide range of local, tribal, state, and federal agencies and organizations participated, including the Anchorage and Homer Soil and Water Conservation Districts, Kenai National Wildlife Refuge, Kenaitze Indian Tribe, Kenai Watershed Forum, Auburn University Molecular Lab, the USFWS Conservation Genetics Lab, and environmental consulting firms. Participants came from across Southcentral Alaska. The classroom session took place on May 6th at the

Kenai National Wildlife Refuge Visitor Center, and the field day took place on May 7th at Skilak Lake on the central Kenai Peninsula.

The training was the next proactive step to increase early detection surveillance for invasive freshwater mussels in Alaska. Although dreissenid mussels are not known to occur in Alaska, these highly invasive and destructive mussels have been discovered annually in new waterbodies in North America. Early detection techniques taught in the two-day training are critical for a rapid response should dreissenid mussels be found in Alaska.

Content provided in this After Action Report includes agendas, participant recruitment, flyers, identified action items, evaluation questions and responses, and workshop highlights. These materials will streamline future training workshops and support continued capacity for dreissenid sampling statewide.

Participants

Planning Team

The KBNERR Coastal Training and Engagement Program Coordinator, Syverine Bentz, led the collaborative planning efforts and facilitated the planning committee. The workshop planning committee consisted of KBNERR Manager and Hotspot Project Coordinator, Katherine Schake; UAA Graduate Student Aurelia Umholtz; ADF&G Invasive Species Program Coordinator, Tammy Davis; and USFWS AK Regional Invasive Species Coordinator, Kim Holzer.

Participant Recruitment List

First Name	*Last Name*	*Email*	*Organization*
Ava	Thompson	ava@homerswcd.org	Homer Soil and Water Conservation District
Caleb	Eckert	caleb@homerswcd.org	Homer Soil and Water Conservation District
Casey	Matney	camatney@alaska.edu	UAF CES
Charlotte	Hussain	charlotte_hussain@fws.gov	USFWS Refuge Inventory and Monitoring
Christopher	Haberbush	christopher@kenaiwatershed.org	Kenai Watershed Forum
Danny	Tanis	dtanis@ciaanet.org	Cook Inlet Aquaculture Association
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Hannah	Thompson	hannah@anchorageswcd.org	Anchorage Soil and Water Conservation District
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Josh	Brewer	Jibgreenmachine@gmail.com	non affiliated
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David	Knight	david@inletkeeper.org	Cook Inletkeeper

DNR			AK DNR - Mining Lands and Water
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Planned Facilitators / Hosts / Presenters

First Name	*Last Name*	*Email*	*Organization*
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Workshop Participants

May 6th & 7th, 2026

First Name	*Last Name*	*Email*	*Organization*
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Christopher	Haberbush	christopher@kenaiwatershed.org	Kenai Watershed Forum
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Emma	Parker	benyamin_wishnek@fws.gov	US Fish and Wildlife Service EDRR
Hannah	Thompson	hannah@anchorageswcd.org	Anchorage Soil and Water Conservation District
Isaac	Aguayo	isaacaguayo957@gmail.com	SGS
Jannelle	Trowbridge	jannelle_trowbridge@fws.gov	USFWS Togiak Wildlife Refuge
Josh	Brewer	Jibgreenmachine@gmail.com	non affiliated
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Workshop Facilitators / Hosts / Presenters

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Ashley	Lutto	ashley_lutto@fws.gov	US Fish and Wildlife Service
Stacey	Buckelew	stacey_buckelew@fws.gov	US Fish and Wildlife Service
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Participant Communication

The following email was sent one week prior to the training workshop:

Greetings!
Thank you for registering for the KP-CISMA Spring Training and the field day training on Thursday, May 7 for All Hands on Deck for Early Detection of Invasive Zebra and Quagga Mussels. Please see below important information in preparation for the field day.

When: Thursday, May 7 from 9:30 am to 3:30 pm
Where: Lower Skilak Lake Campground and Boat Launch. Our location has shifted due to ice free water conditions, we look forward to meeting you at the Campground and Boat Launch on the west end of Skilak Lake. Location linked here google map, it is ~25 miles or 45 min north of Soldotna.
What to bring:

- Bring your own lunch, and a camp chair for a campground lunch chat between sessions.
- If you have a tablet you use in the field, we encourage you to bring it and preview the Dreissenid Mussel Survey123 Form: (https://arcg.is/1my08q1)
- Please dress for the weather and be prepared to spend the day outdoors. There will be boat based and shore based sessions, waders are not required, but recommended.

Forecast: Mostly cloudy with a chance of rain showers and snow showers. Highs in the mid 40s to lower 50s. Lows in the lower 30s. Skilak Lake Road is a dirt road and can take some extra time to travel if conditions are poor- please plan to arrive in time to start at 9:30 am. We encourage carpooling, please reach out if you would like to coordinate with others for a ride, or connect with others at the classroom session on May 6.

If you have any questions or if something arises that prevents your participation, please contact Syverine Bentz: syverine@alaska.edu (907)299-7769 (cell phone)

Event Flyer

Agendas

Process Agenda

Developed by KBNERR Coastal Training and Engagement Program

All Hands on Deck for Early Detection: Collaborative Training for Invasive Zebra and

Quagga Mussel Sampling in Alaska
Lower Skilak Lake Campground and Boat Launch
May 7th, 9:00 AM to 4:30 PM

~ WORKSHOP PURPOSE ~

Southcentral Alaska was identified as a geographic 'hotspot' for terrestrial, freshwater, and marine invasions given that nonnative species often arrive through ports of entry with high human population density or activity.
Recognizing that Alaska is relatively free of invasions compared to southern latitudes, and the high ecological, economic, and cultural value associated with these intact ecosystems, the goal of the "Surveillance of Invasion Hotspots in Southcentral Alaska" project is to fill a gap in early detection surveillance in an area increasingly vulnerable to invasive species, using existing decision support tools and standing partnerships.

~ OBJECTIVES~

Participants will

- Learn sampling and surveillance methods for zebra and quagga mussels to be applied during the summer of 2026.
- Build collaborative relationships with additional state, federal, and local partners who will also be conducting field work during the summer of 2026.

RSVP with the KP-CISMA Spring Training Here: https://forms.gle/jxtbMBdhsuXZr6Us9
KP-CISMA Registration List for All Dates
Participant RecruitmentList All Hands Training May 2026

~ PROCESS AGENDA~
Wednesday May 6th

Time	ACTIVITIES AND OBJECTIVES	Set up / materials
7:00 - 9:00 1.5 hour drive from Homer	**Arrive Kenai National Wildlife Refuge Visitor Center, 33398 Ski Hill Road, Soldotna** ● Stage equipment for later tabletop session	Early arrival team: Katherine, Jasmine, Kim
10:30	**Dreissenid Mussels Topics** ● Introduction to Dreissenid Mussels and Threats ● Status of Dreissenid Mussels in AK, Management, Prevention ● Preview of May 7 Field Training: Surveillance Techniques	Aurelia Umholtz, Kim Holzer, Tammy Davis
11:00	**Trivia and Tabletop Expo of Sampling Equipment for Aquatic**	

	Invasive Species (Open Mic) All Aquatics Speakers Mingle with tools, trivia about gear eDNA: ● eDNA Backpack/Citizen Sci pump and accessories- Ora Plankton: ● Plankton Nets -Aurelia ● YSI, Sechi Dish - Jasmine ● Freshwater Native Species ● Microscope - Eric ● Preserved veliger - Jasmine ● Plastic petri dish & pipet - Jasmine Substrate: ● Settling plates - Eric, Tactile boards, hanging plate - KBNERR Ponar: ● Ponar dredge, Sieves and trays -Eric Plant Shakedown: ● Rake for 'Plant Shakedown' and elodea sampling (Ben) Decon: ● Tubs and vinegar for people to practice/clean gear	Printed graphics with table stands

~ PROCESS AGENDA~

Thursday May 7th

Time	ACTIVITIES and OBJECTIVES	Set up and materials
8:30 Early arrival team: Rosie, Syverine, Katherine	**1. Meet to carpool at Kenai National Wildlife Refuge Visitor Center, 33398 Ski Hill Road, Soldotna** 1 hour long drive* or **Drive independently to Lower Skilak Lake Boat Launch arrive by 9:10** - 60°28'16.9"N 150°28'15.6"W - Considerations: bathroom access	Inreach for safety communication Bear spray Extra Rain gear Pop Up Tents Aid Station: Tables Toilet paper, Towels, Trash Can Hand Sanitizer Kaladi- coffee, cocoa, hot water First aid kit-

		vehicle
9:30 *Syverine* *Kim S., Aurelia, Dan Saxton, Eric, Tammy, Jasmine, Katherine, Kim H., Ben W., Ora, Rosa, Jessica, Stacey*	**Welcome, Introductions and Goals** What to expect from the field day, site orientation and safety briefing Dreissenid Mussel Survey123 Form Introduction Overview of Field Stations by instructors (A) Plankton Tow — boat based (B) Ponar Grab — boat based (C) eDNA methods (D) Artificial Substrate and Existing Substrate, Visual Survey and Plant Shakedown Split into groups of 5-7 people. Organize by groups who needs specific techniques first Gear check and adjustments	Survey 123 Form (https://arcg.is/1my08q1) *See Full Equipment List* Clipboards
10:00 *Participants rotating between stations*	**3. Morning Session (2 hours)** Participants will rotate through two field stations - 45 minutes allotted for each station. Stations not covered will be visited during the afternoon sessions. Rotations: Groups of 5-7 participants experience 2 of the 4 Field Stations Rotation 1: (45 min) Transition (15 min) Rotation 2: (45 min) Transition and Reconvene (15 min)	Timekeepers tracking rotations, Break up into groups of 5 w/ 2-3 instructors per group
12:00 *Rosie Masui - Notetaker*	**4. Lunch and "Open Mic"** Participants discuss and reflect on what they learned during the first two station rotations during lunch. ● Extra tablets: survey 123 form downloaded on them ● Invader pictionary (if time) - flip charts & markers ● Discussion time: who to contact	Participants bring their own lunch, camp chairs. Folding tables, Water Jugs Disposable cups Trash bags Trash Can

		Extra tablets: survey 123 form
1:00 *Participants rotating between stations*	**Afternoon Session (2 hours)** Groups of 5-7 participants experience 2 of the 4 Field Stations Rotation 3: (45 min) Transition (15 min) Rotation 4: (45 min) Transition and reconvene (15 min)	Timekeepers tracking rotations,
3:00 *Planning Team/ Facilitator*	**5. Closing and Wrap Up** Participants will reconvene as a whole group to provide initial feedback on training. Training hosts will share plans for next steps and evaluation. ● Summary of training and follow up communications ● Pack and Decontaminate Gear	Equipment: Big tubs, vinegar
3:30 -4:30	**Adjourn, Breakdown camp and clean up**	

Station	**Field Station Equipment and Process**	**People and links to lists**
Station A Details 	Field Station Equipment and Process (A) Plankton Tow —FWS: 8 people with the operator included Dan Saxton - Include shore based sampling for horizontal tow Protocols: (modified from BOR protocol) Western Regional Panel Updated protocol Equipment needs: wq, Depth finder, nets, bottles, line, Distilled Water, Tris Buffer, 90% ethanol, rinse bottle, measuring tape or ruler with mm marks, Adhesive labels & Packing tape, Pencils, Electrical Tape/parafilm Sample cooler & ice packs Data sheet: date, time, sampler/agency, volume, water temp, pH, GPS, location, net diameter, number of tows Preserved Native Species, Sample pipe w/ preserved dreissenids	**(Kim S, Aurelia, Dan Saxton, Matt Bowser)** *See Full Equipment List*

Station B Details 	Field Station Equipment and Process (B) Ponar Grab — ADFG: 6 people including operator - Split group into two with some folks supporting grab analysis on shore Protocols: ISDA SOP Equipment needs: dredge system, sieves (Ben W), cooler with ice packs, tweezers or small spatula, measuring tape or ruler, waterproof marker and pencils, large tub (~18 gal), hand lense/pocket magnifier, plant press, underwater viewing tube, pfds Ziploc bags - quart and gallon, Sharpies	**(Eric, Tammy, ADFG operator)** *See Full Equipment List*
Station C Details 	Field Station Equipment and Process (C) eDNA methods Quick introduction to eDNA study design factors with Alaska considerations, general contamination prevention, filtering equipment Do's/Don'ts and filter anatomy. We take everyone through an exercise with their own filter in hand + their own individual tubing to learn proper connection/contamination avoidance, and then they can use their individual filters to take turns filtering with equipment shoreside. Protocols: Equipment needs: Backpack/Citizen Sci pump and accessories	**(Ora, Roza, Jessica, Sarah)** *See Full Equipment List*
Station D Details 	Field Station Equipment and Process (D) Artificial Substrate and Existing Substrate, Visual Survey and Plant Shakedown Settling panels and in-water infrastructure Protocols: ISDA SOP- deploy in advance? Equipment needs: built settling plates (Kim H), collection tubs, gloves, 1 mm sand panels, buoy Visual Survey and Plant Shakedown — shoreline Protocols: ISDA SOP Equipment: guides, rakes, plastic bags, tubs/trays, Ziploc bags, sharpies	**(Jasmine, Katherine)** **(Kim H, Ben W)** *See Full Equipment List*

Participant Agendas

Classroom Session Agenda

All Hands on Deck for Early Detection

Collaborative Training for Invasive Zebra and Quagga Mussel Sampling in Alaska

Content at the KP-CISMA Spring Training

Wednesday, May 6, Aquatic Invasive Species Sessions

Time	Topic
8:30 a.m. 10:30 a.m.	**Opening for day 2 of KP-CISMA Training, Morning Sessions** Kenai National Wildlife Refuge Visitor Center 33398 Ski Hill Road, Soldotna
10:30 a.m. 30 min	**Dreissenid Mussels Topics:** **Aurelia Umholtz, Kim Holzer, Tammy Davis** ● Introduction to Dreissenid Mussels and Threats ● Status of Dreissenid Mussels in AK, Management, Prevention ● Preview of May 7 Field Training: Surveillance Techniques
11:00 a.m. 60 min	**Trivia and Tabletop Expo of Sampling Equipment for Aquatic Invasive Species (Open Mic)** ● All Aquatics Speakers available ● Mingle with tools, trivia about gear
12:00- p.m. **1:00 p.m.**	**Lunch, travel & reconvene at Arc Lake** ** Arc Lake is located on the east side of the Sterling Highway, approximately 1.9 mi south of the Funny River intersection, at 46603 Sterling Highway (60.45000, -151.10543)
1:00 p.m. -3:00 p.m.	Arc Lake **Aquatic Demo Stations: Ben Wishnek** • Rake throwing for Elodea • Post-survey decontamination • Dreissenid Mussels Surveillance (protocol-lite options)
3:00	**Adjourn for the day**

Field Day Agenda

All Hands on Deck for Early Detection

Collaborative Training for Invasive Zebra and Quagga Mussel Sampling in Alaska

Lower Skilak Lake Campground and Boat Launch

Thursday, May 7, Dreissenid Surveillance Field Day

Time	Activity
8:30	**Meet to carpool at Kenai National Wildlife Refuge Visitor Center, 33398 Ski Hill Road, Soldotna** or **Drive independently to Lower Skilak Lake Boat Launch** 60°28'16.9"N 150°28'15.6"W
9:30	**Welcome, Introductions and Goals** What to expect from the field day, site orientation and safety briefing Dreissenid Mussel Survey123 Form Introduction Overview of Field Stations by instructors (A) Plankton Tow — boat based (B) Ponar Grab — boat based (C) eDNA methods (D) Artificial Substrate and Existing Substrate, Visual Survey and Plant Shakedown
10:00	**Morning Session (2 hours)** Groups of 5-7 participants experience 2 of the 4 Field Stations **Rotation 1**: (45 min) Transition (15 min) **Rotation 2**: (45 min) Transition and Reconvene (15 min)
12:00	**Lunch** and "Open Mic" Bring your own lunch and camp chair
1:00	**Afternoon Session (2 hours)** Groups of 5-7 participants experience 2 of the 4 Field Stations **Rotation 3**: (45 min) Transition (15 min) **Rotation 4**: (45 min) Transition and reconvene (15 min)
3:00	**Closing and Wrap Up** Invader Pictionary Summary of training and follow up communications Pack and Decontaminate Gear
3:30	**Adjourn and Depart Lower Skilak Lake Boat Launch**

About All Hands on Deck for Early Detection

Collaborative Training for Invasive Zebra and Quagga Mussel Sampling in Alaska

Purpose: Southcentral Alaska was identified as a geographic 'hotspot' for terrestrial, freshwater, and marine invasions given that nonnative species often arrive through ports of entry with high human population density or activity. Recognizing that Alaska is relatively free of invasions compared to southern latitudes, and the high ecological, economic, and cultural value associated with these intact ecosystems, the goal of the "Surveillance of Invasion Hotspots in Southcentral Alaska" project is to fill a gap in early detection surveillance in an area increasingly vulnerable to invasive species, using existing decision support tools and standing partnerships.

Photos by Connor Morrow/USFWS

Participants: A wide range of local, tribal, state, and federal agencies and organizations are invited to participate, focused on members of the Alaska Invasive Species Partnership, members of Cooperative Invasive Species Management Area, and including Tribal and Soil and Water Conservation Districts, Alaska Department of Natural Resources, National Park Service, US Forest Service, Alaska Department of Fish and Game and others. Participants are welcome from across Alaska--Southcentral, Interior, and Southeast regions.

Place: This hands-on training will be a two-day event featuring classroom content and field sampling techniques. The classroom sessions will be part of the KP-CISMA Spring Training and the field stations will be hosted at **Lower Skilak Lake** near Soldotna, AK.

Highlights and Action Items

All Hands on Deck for Early Detection - **Action Items and Team Follow Up Notes**
All hyperlinks are retained as examples, and more details, photos and graphic illustrations are available upon request through KBNERR. Contact Hotspot Coordinator & KBNERR Manager, Katherine Schake: kschake@alaska.edu or KBNERR CTEP Coordinator, Syverine Bentz: isbentz@alaska.edu

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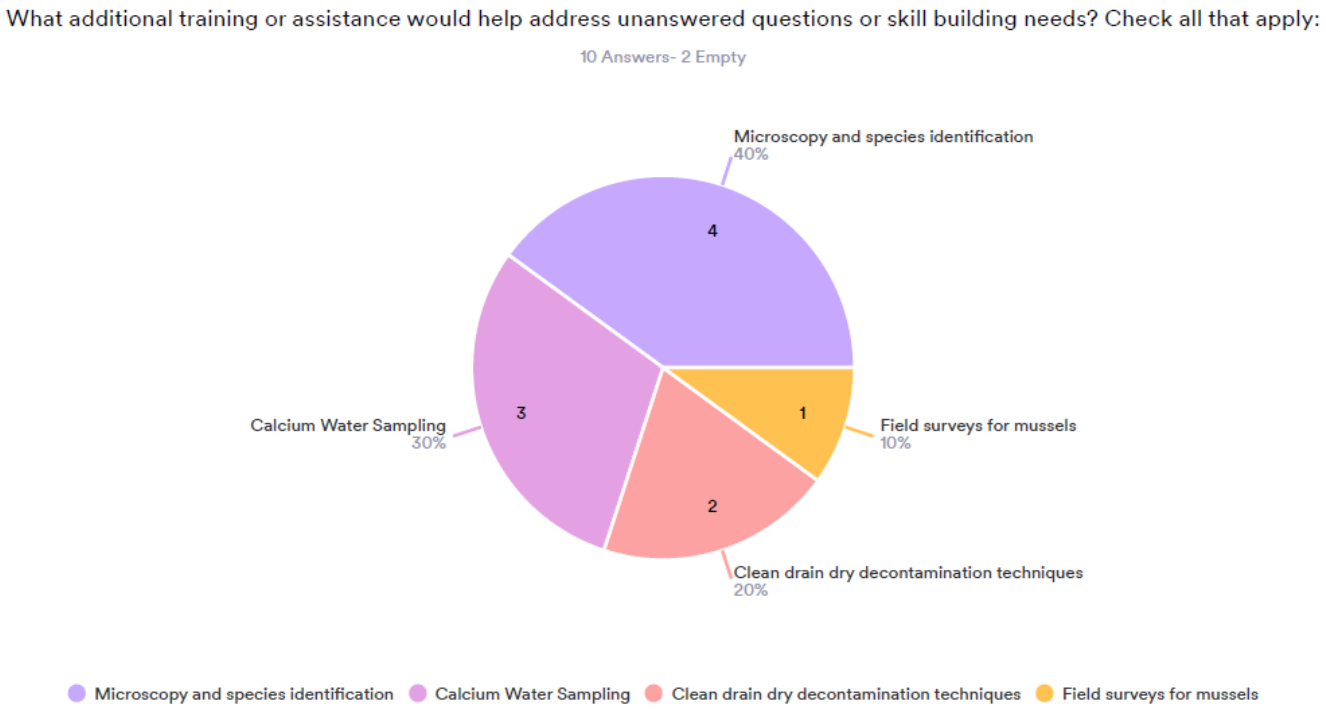
Team Action Items and Status

- Poll to group for team follow up meeting for accountability on identified action items -Syverine
    - https://whenisgood.net/xhrc4xg
    - Scheduled for June 15, 2 pm
- Participant Communications -Syverine
    - Draft email with links to resources -see last page this document
    - Evaluation https://form.jotform.com/261305804395154
    - Results All Hands Early Detection Training Evaluation - Excel Report(2026-06-15).xlsx
    - June 30 - reminder email
- Chemical Purchases and Logistics - Aurelia
    - Alternatives (Glycol) - Aurelia followed up on this with Justin, Matt Bowser
        - Use a subsample of veligers with glycol to view under microscope/xpolars (goopy?) Does viscosity affect settling?
        - Replace fluid once at lab for storage/viscosity (smaller mesh size filter)
    - Review discuss with Jasmine & confirm with BOR (Aurelia)
    - Refine instructions for SOPs Dreissenid Mussel Monitoring SOPs
- Comprehensive Protocol Guide for Alaska (all Methods) - Jasmine, Aurelia
    - All protocols full draft invasivemussel_fieldSOPs_AK_2026
    - Ben suggested a similar AK EGC Monitoring Manual?
- Blanket Permit for Shoreline/Tactile Surveys - Tammy
    - ADFG Aquatic Resource Permit
    - Assuming a blanket permit for dreissenids would be for the purpose of completing shoreline surveys, it may not be as clear whether the mussel is dead or alive.
    - A person can possess and transport an individual (1 organism, dead or alive) for purposes of id

    - Permit for shells only? Dead and preserved?
- Survey123 Data Access - Katherine connect with Dustin **Data Access:**
    - **Survey123 Online -** Data submitters with an active ArcGIS online account can log in to Survey123 and find their results by clicking on the "Surveys I can view results for" in the dropdown menu under "My Surveys"
    - **ArcGIS Online -** Both anonymous and credentialed users can view the results in ArcGIS Online by using the link for the results or searching for "Dreissenid Mussel Surveys - ADF&G and partners_results" on the ACCS Maps ArcGIS Home Page and selecting "view details". Anonymous users can view the results in the data tab while credentialed users can view and export the data to a format of their choosing.
    - **Arcgis Pro -** Credentialed users may also open the layers directly in ArcGIS Pro and explore/format the results with all the tools available in ArcGIS.
    - **ArcGIS for Excel -** Credentialed users can search for " Dreissenid Mussel Surveys - ADF&G and partners_results" in the arcgis add-in and view tables directly in excel.
- Equipment Cache for sampling methods- Kim Holzer, Katherine Schake
    - Start with infrastructure and go into equipment
        - Labs
        - Hotwash Stations
        - Equipment inventory (for lending)
        - Calcium Water sampling supplies
- Additional Equipment Needs - Katherine, Kim
    - Nets, Wq meters
    - Identify funding (carryover funds spend plan) Kim
- Future Trainings or Events? All Hands Early Detection Training Eval Visual Report
        - EDRR Drill
        - Microscopy Training- Dependent on BoR availability
        - Clean Drain Dry
- Field Guide for Alaska for Adult and Larval Invertebrates
    - Tammy find contact Nora Foster (Fairbanks) Private consulting norarfoster@gmail.com
    - John Hudson
    - Dan Bogan
    - Aquatic Insects in Alaska https://store.aleutians.org/product/aquatic-insects-in-alaska/334
- Brainstormed Outreach/Education Next Steps and Tools
    - Trifold/flyer/Pamphlet
    - 1 pager for gov relations committee- not finalized, recirculate to committee
    - Comprehensive protocol guide (Aurelia working on)

- Reporting Needs for After Action Supplement (2 pgs?) ADA Compliant - Content is assembled in training folder 2026 All Hands Meeting



Katherine After Action Report

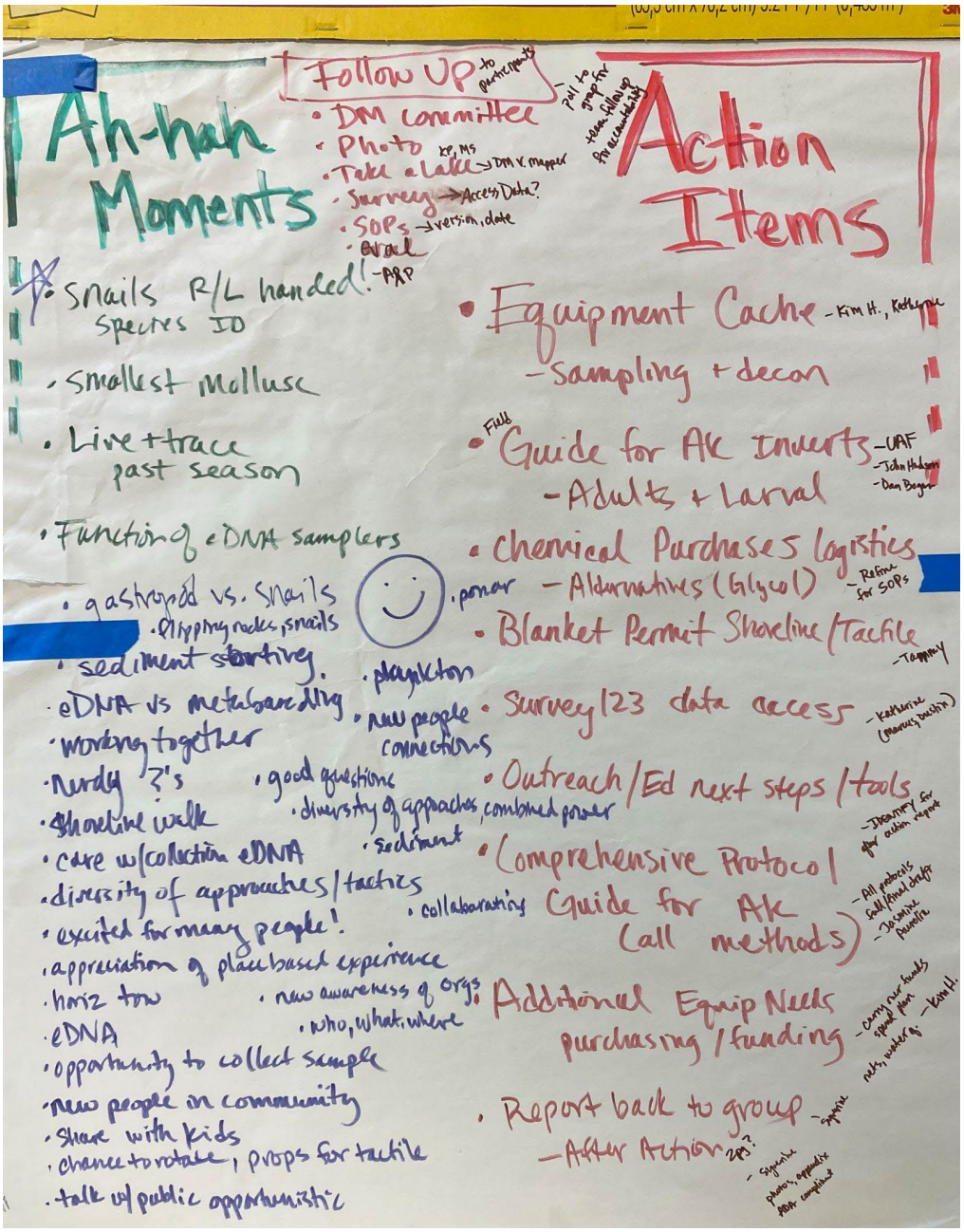
Goals:

- Document for future use and designing trainings
- Share success and communicate about project (leadership, funding)
- Basis for education/outreach materials

Content:

- Organizations Participant List All Hands Training May 2026
- Participant Agenda All Hands on Deck for Early Detection May 6-7 2026 Agenda
  - Station leads give synopsis of how the station went - tips/tricks
- Photos
- Graphic Illustrations
- Evaluation Summary: Jotform Results All Hands Early Detection Training Evaluation - Excel Report(2026-06-15).xlsx and Flip Chart Notes (below)
- Recommendations for Future:
  - Trainings
  - Outreach

- Activities
- Appendices
  - [Dreissenid Mussel Monitoring SOPs]



Participant Takeaways

Snails can be right or left handed, helps with species ID
Suggest Smallest Mollusc Trophy for good eyesight
Looking for live organisms and traces of past seasons
Function of eDNA Water Samplers
Difference between gastropod biological class and snail species
Flipping rocks
Sediment sorting
Ponar grab
Working together
Nerdy questions
Shoreline walk
Diversity of approaches/tactics
Place based experience
Plankton tow
eDNA
Opportunity to collect sample
New people in community
Share with kids
Chance to rotate
Props for tactile
Talk with public opportunistically
New people connections
Good questions
Combined power with all approaches
Sediment
Collaborations
New awareness of orgs
Who, what, where
eDNA vs metabarcoding
Care with collection for eDNA
Working with so many people

Follow up with Participants

Syverine sent to 36 people:

Greetings!
On behalf of the planning team I would like to thank you for your active participation at the recent training - All Hands on Deck for Early Detection of Invasive Zebra and Quagga Mussels. We are sharing resources and opportunities to continue learning together below, and would appreciate your feedback by answering a few questions on this **training evaluation by Thursday May 28th: https://form.jotform.com/261305804395154**

- Invite to AKISP Dreissenid Mussel Group Meetings:
    - Last Friday of the month at 11 am: The next meeting will be May 29th, and is co-chaired by Kim Holzer kim_holzer@fws.gov and Tammy Davis tammy.davis@alaska.gov. Contact Tammy to receive calendar invites with call information.
- Aquatic Resource Permit:
    - Aquatic Resource Permit (ARP) Application
    - More info: ADFG Aquatic Resource Permit
- Standard Operating Procedures for Dreissenid Mussels:
    - Current versions as of 5.12.2026 in this Google Folder Dreissenid Mussel Monitoring SOPs. Stay tuned for additional Alaska specific revisions.
- Monitoring Mapper and Take a Lake List:
    - Invasive Dreissenid Mussel Monitoring and Calcium Sampling Web Mapper: Please reach out to Katherine Schake for the Take a Lake Lists: kschake@alaska.edu
- Dreissenid Mussel Survey Form:
    - Survey123 Form: https://arcg.is/1my08q1 contact Katherine Schake or Marcus Geist with questions or to access data: kschake@alaska.edu mageist@alaska.edu
- Alaska Aquatic Invasive Species Clearinghouse
    - All Dreissenid monitoring data collected needs to be submitted to AKAqua annually. Questions about submissions? Reach out to Kim Schuster: kkschuster@alaska.edu

Group Photos (C. Eckert)

Evaluation

Evaluation Questions

- How would you characterize your affiliation?
- Participation in this workshop was a good use of my time:
- What aspects of the training did you find most enjoyable or useful?
- Prioritization: How much did participation in the training increase your knowledge or awareness of how to prioritize early detection monitoring locations?
- Data Collection: How much did participation in the training increase your knowledge or awareness of surveillance data collection tools?
- Identification: How much did participation in freshwater mussel training sessions increase your knowledge or awareness of how to identify freshwater mussels?
- Did you learn something new that you will apply in your work or future decisions?
- If yes, can you give an example of how you might apply what you gained from this training in your work?
- Within your role, what capacity do you have for addressing freshwater invasive mussels? (includes monitoring, calcium sampling, outreach and education, and/or rapid response)
- What additional training or assistance would help address unanswered questions or skill building needs? Check all that apply:
    - Clean Drain Dry decontamination techniques
    - Calcium water sampling
    - Microscopy and species identification
    - Field surveys for mussels
- What additional ideas do you have to reduce invasion risk of freshwater mussels-related to either changing people's habits or to improve detection rates?
- What suggestions do you have to improve trainings like this in the future?

- Do you have additional feedback for the workshop organizers? Please share below.

See Appendix A for Jot Form Evaluation Result Visual Report and Appendix B for excel report.

Recommendations for the Future

Outreach and Education

In summary, partners recommend further investment in building capacity for outreach and education of the general public, including new and improved invasive mussel educational materials and funding for partners to attend statewide conferences and outreach events to reach a wide variety of audiences. Continued dreissenid monitoring training within the AKISP statewide partnership is highly recommended to increase chances of early detection.

Rapid Response Drill

It is highly recommended that a training or workshop focused on a rapid response scenario/drill be pursued. While the past two years of AKISP training have increased capacity for dreissenid monitoring, we have yet to address the steps and actions to be taken should we receive a positive detection of invasive freshwater mussels.

Data Management

Continued investment in data management tools, for both data collection and managing long-term monitoring data is critical to maintain statewide, multi-agency, organization and tribal entity collaboration. This includes supporting the Dreissenid vulnerability mapper, the Alaska Aquatic Invasive Species Clearinghouse, and associated ESRI field tools such as Survey 123 and ESRI Field Maps for ease of data collection and streamlining data management.

Appendix

Appendix A: Jot Form Evaluation Results Visual Report

Appendix B: Evaluation Survey Results Excel Report

Appendix C: Standard Operating Procedure: Field Sampling Methods for Invasive Mussel Early Detection (Version 1: 2026)

APPENDIX A

All Hands Early Detection Training Evaluation

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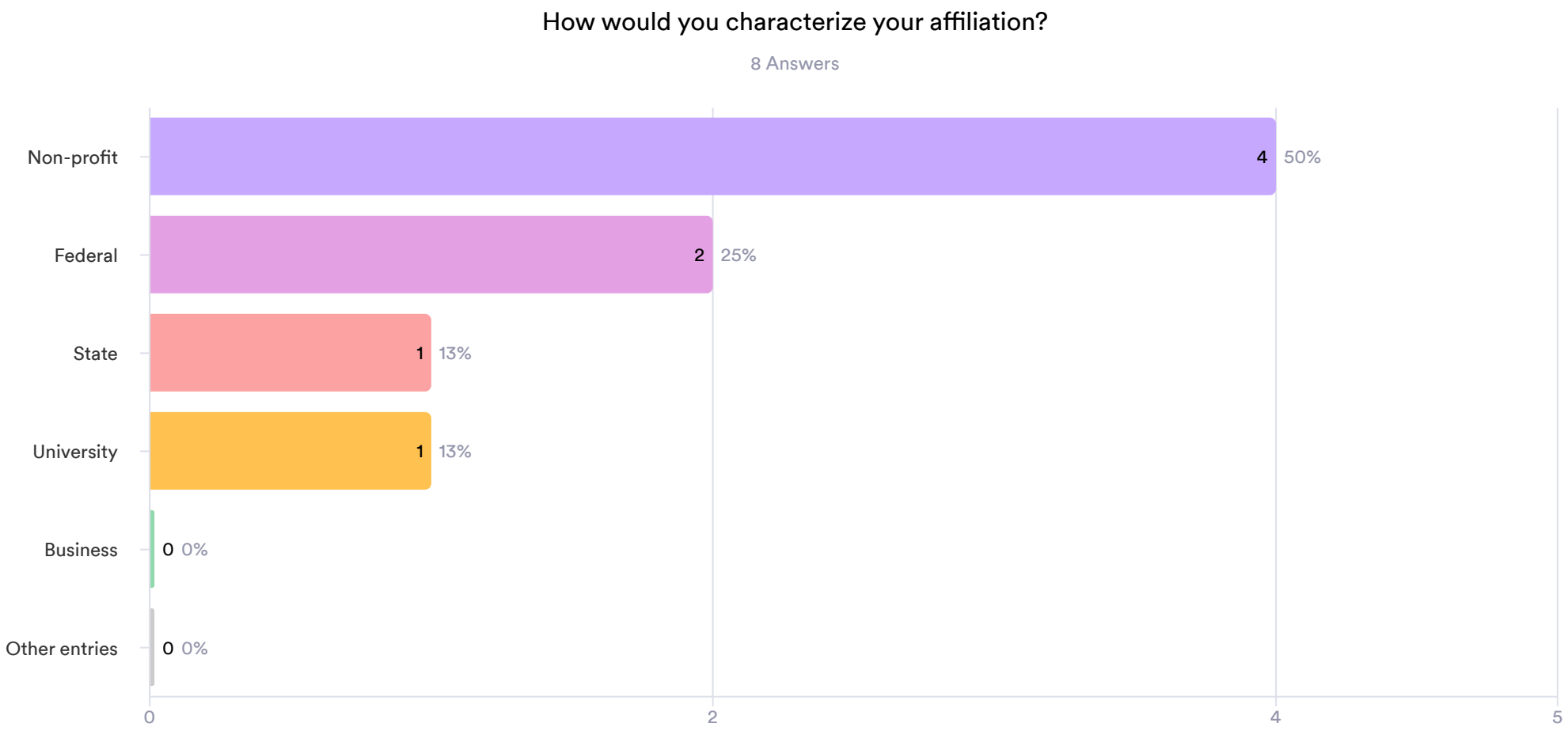
All Hands Early Detection Training Evaluation



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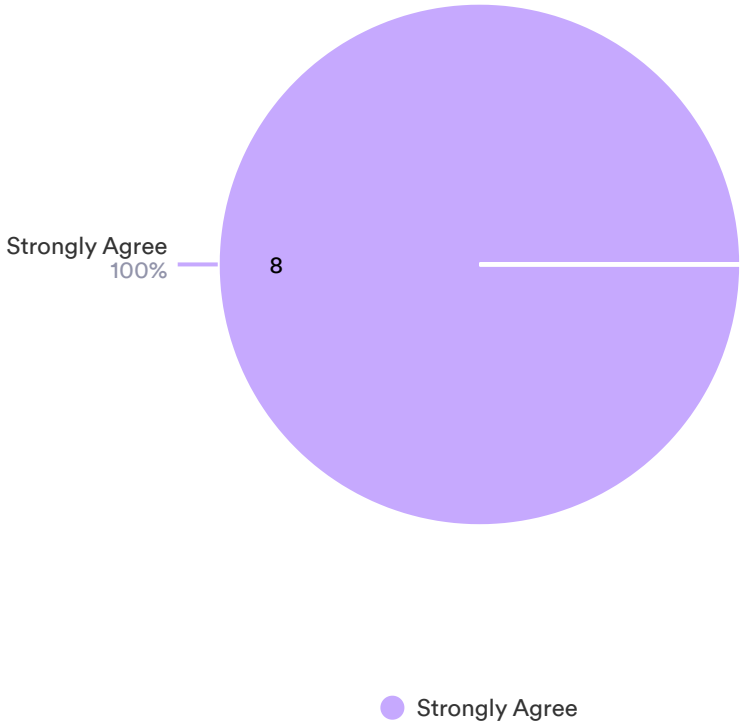
All Hands Early Detection Training Evaluation

Participation in this workshop was a good use of my time:

8 Answers



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All Hands Early Detection Training Evaluation

What aspects of the training did you find most enjoyable or useful?

7 Answers- 1 Empty

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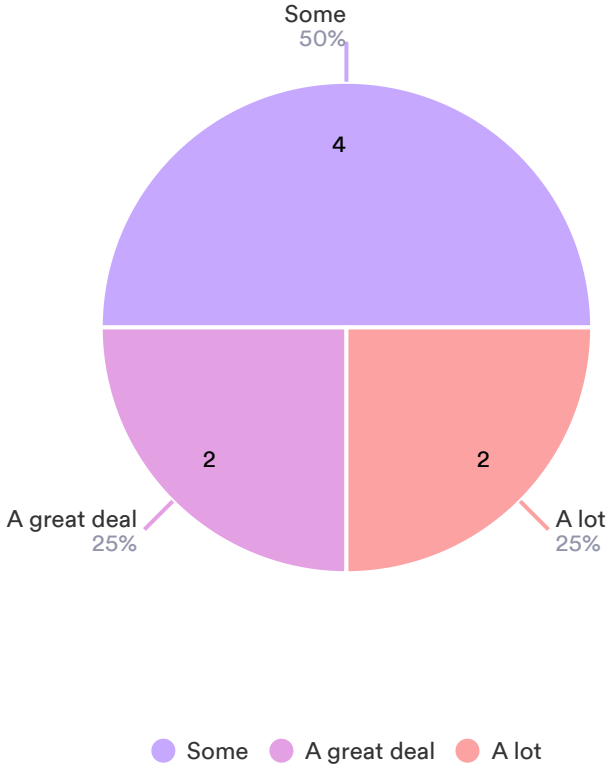
All Hands Early Detection Training Evaluation

Prioritization: How much did participation in the training increase your knowledge or awareness of how to prioritize early detection monitoring locations?

8 Answers



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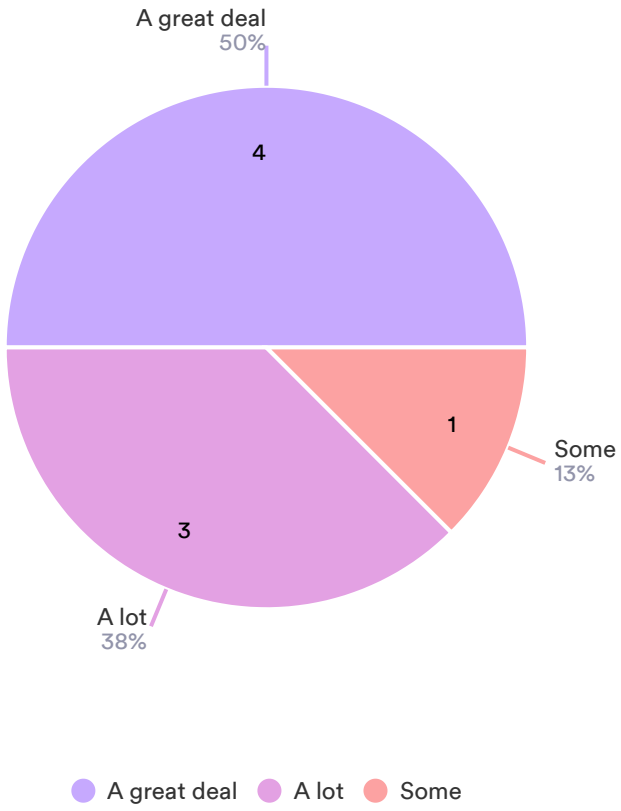
All Hands Early Detection Training Evaluation

Data Collection: How much did participation in the training increase your knowledge or awareness of surveillance data collection tools?

8 Answers



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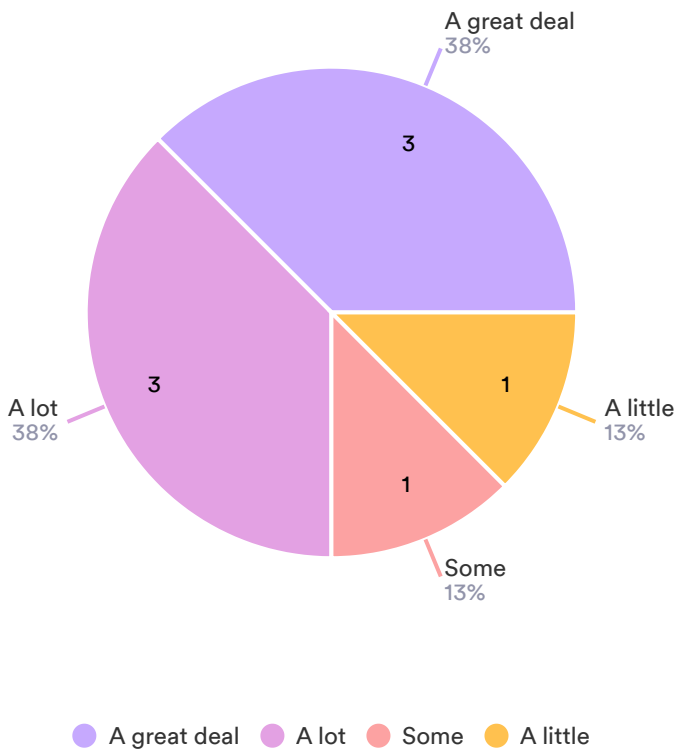
Identification: How much did participation in freshwater mussel training sessions increase your knowledge or awareness of how to identify freshwater mussels?

8 Answers



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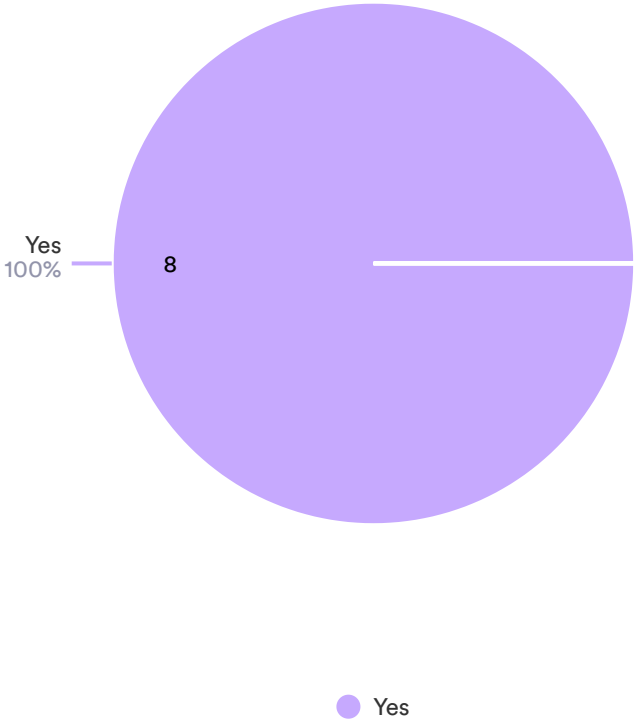
All Hands Early Detection Training Evaluation

Did you learn something new that you will apply in your work or future decisions?

8 Answers



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All Hands Early Detection Training Evaluation

If yes, can you give an example of how you might apply what you gained from this training in your work?

8 Answers

Better clean/dirty hand practices

implementing the low-cost techniques as part of field projects

Shoreline walks while on monitoring trips

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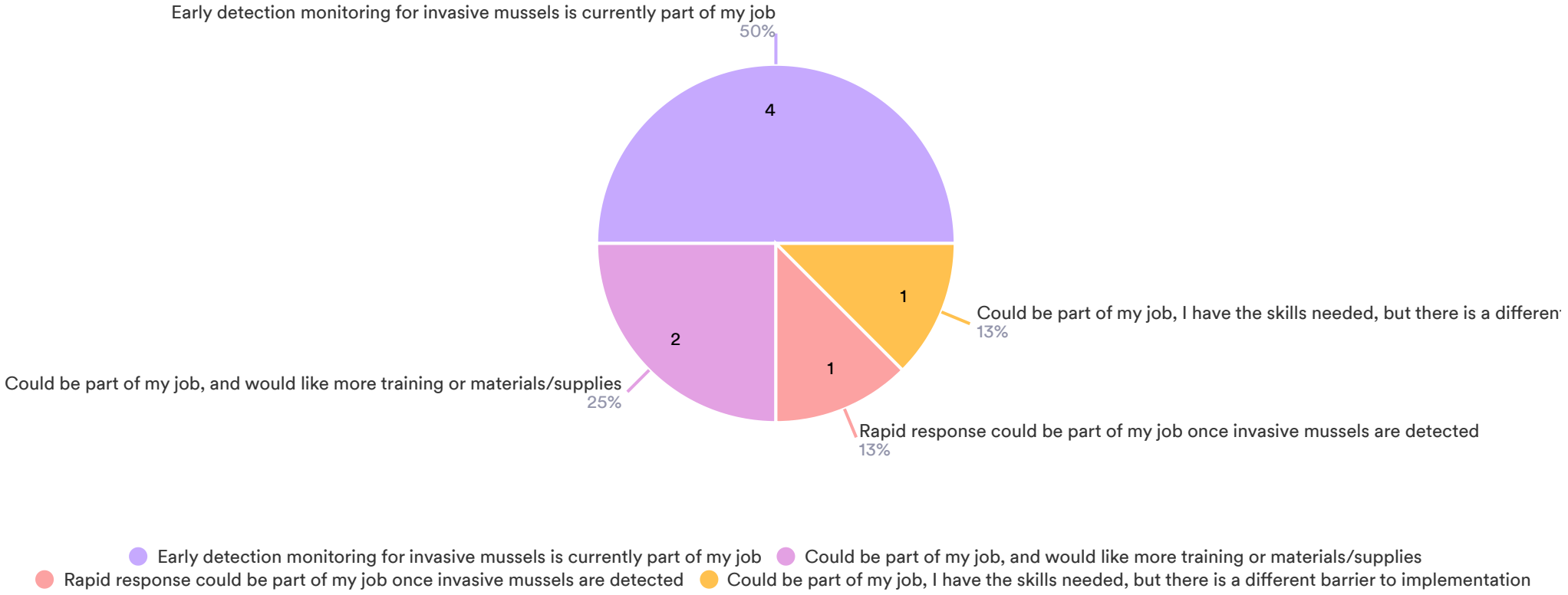
All Hands Early Detection Training Evaluation

Within your role, what capacity do you have for addressing freshwater invasive mussels? (includes monitoring, calcium sampling, outreach and education, and/or rapid response)

8 Answers



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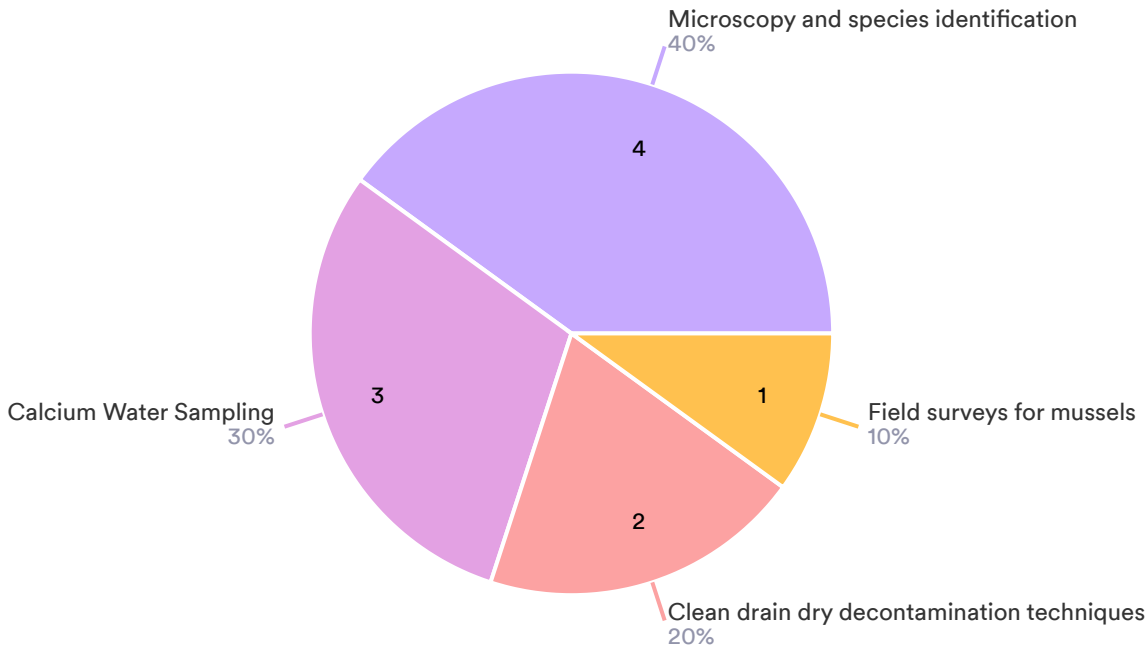
All Hands Early Detection Training Evaluation

What additional training or assistance would help address unanswered questions or skill building needs? Check all that apply:

10 Answers- 2 Empty



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All Hands Early Detection Training Evaluation

What additional ideas do you have to reduce invasion risk of freshwater mussels- related to either changing people's habits or to improve detection rates?

4 Answers- 4 Empty

Continue to increase outreach and education efforts statewide

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All Hands Early Detection Training Evaluation

What suggestions do you have to improve trainings like this in the future?

4 Answers- 4 Empty

N/A

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All Hands Early Detection Training Evaluation

Do you have additional feedback for the workshop organizers? Please share below.

5 Answers- 3 Empty

Data	Answers
Thanks for leading an excellent workshop and for all the work you do!	1
It was a great workshop and very glad I was able to attend! Meeting and working alongside everyone was inspiring and invigorating!	1
I really liked how the stations were split up so each person got the chance to practice the methods hands-on. I think that's very important for everyone to grasp the knowledge and procedures involved.	1
This came together great- I know it was alot of last minute scrambling but it was very useful and well-put-together.	1
Great job - thank you for your hardwork!	1

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Thank You!

All Hands Early Detection Training Evaluation

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Appendix B

IP	Submission ID	Submission Date	How would you characterize your affiliation?	Participation in this w	What aspects of the training did you find most enjoyable or useful?
23.234.81.51	6563192831512754037	2026-06-03 10:08:03	State	Strongly Agree	All the hands-on demos were super effective at demonstrating the variety of entrypoints for sampling thoroughness/intensity
74.124.98.246	6561527096428249116	2026-06-01 11:51:50	Non-profit	Strongly Agree	Collaberation with experts in a variety of disciplines
162.211.24.111	6559150571119665755	2026-05-29 17:50:57	Federal	Strongly Agree	Hands-on
65.74.88.99	6557538439989769130	2026-05-27 21:04:03	Non-profit	Strongly Agree	Stations format and community building
147.160.173.120	6557241210214811711	2026-05-27 12:48:41	Non-profit	Strongly Agree	I liked that we got hands-on practice with the survey methods. That way we know how to conduct these methods when surveying ourselves.
162.211.24.111	6550396971119868932	2026-05-19 14:41:37	Federal	Strongly Agree	
192.145.248.103	6550121623016403562	2026-05-19 07:02:42	Non-profit	Strongly Agree	Benthic demo
104.254.225.34	6549567294355717047	2026-05-18 15:38:49	University	Strongly Agree	Hands-on, tactile experience with equipment and practice with protocols

Prioritization: How much did participation in the training increase your knowledge or awareness of how to prioritize early detection monitoring locations?	Data Collection: How much did participation in the training increase your knowledge or awareness of surveillance data collection tools?	Identification: How much did participation in freshwater mussel training sessions increase your knowledge or awareness of how to identify freshwater mussels?	Did you learn something new that you will apply in your work or future decisions?
A great deal	A great deal	A lot	Yes
A great deal	A great deal	A great deal	Yes
Some	Some	A lot	Yes
Some	A great deal	A great deal	Yes
A lot	A great deal	Some	Yes
Some	A lot	A little	Yes
A lot	A lot	A great deal	Yes
Some	A lot	A lot	Yes

If yes, can you give an example of how you might apply what you gained from this training in your work?	Within your role, what capacity do you have for addressing freshwater invasive mussels? (includes monitoring, calcium sampling, outreach and education, and/or rapid response)
Implementing monitoring in 2026 to do dreissenid surveys, and we will be integrating practical knowledge from this training into our organizational early detection toolbelt	Early detection monitoring for invasive mussels is currently part of my job
Surveying techniques and so much knowledge that I was unaware of before	Early detection monitoring for invasive mussels is currently part of my job
implementing the low-cost techniques as part of field projects	Rapid response could be part of my job once invasive mussels are detected
Shoreline walks while on monitoring trips	Could be part of my job, and would like more training or materials/supplies
I can implement the decontamination into my own field work each day	Could be part of my job, I have the skills needed, but there is a different barrier to implementation
educational materials for feeling mussels, using pistachio shells to hide as mussels	Early detection monitoring for invasive mussels is currently part of my job
Better clean/dirty hand practices	Could be part of my job, and would like more training or materials/supplies
The timing of when to sample (e.g., after water temps reach a specific threshold) was incredibly useful for planning summer field seasons. See the eDNA, the plankton tow and the tactile inspection were helpful in planning for how much time a survey might take.	Early detection monitoring for invasive mussels is currently part of my job

What additional training or assistance would help address unanswered questions or skill building needs? Check all that apply:	What additional ideas do you have to reduce invasion risk of freshwater mussels- related to either changing people's habits or to improve detection rates?	What suggestions do you have to improve trainings like this in the future?
	Targeted creative public outreach campaign(s) to boaters, float plane companies, etc.	A bit extra time/notification of time in the first round of hands-on breakout groups—instructors ran out of time to complete the plankton tow demo thoroughly
Microscopy and species identification	Public outreaching education at all border entries and water access sites	N/A
Microscopy and species identification		
Clean drain dry decontamination techniques - Calcium Water Sampling		
Calcium Water Sampling		
	continued investment in educational materials, particularly those geared toward non-motorized watercraft. New/more invasive mussel specimens, like those in the pipe. Creation of short videos detailing detection techniques for review later or by additional people that could not participate.	Continuing to keep group sizes small/similar to this. It allowed for participation in each of the stations.
Calcium Water Sampling - Field surveys for mussels - Microscopy and species identification		
Clean drain dry decontamination techniques - Microscopy and species identification	Continue to increase outreach and education efforts statewide	This was a great training, no suggestions except perhaps a warmer spring with more ice-free area.

Do you have additional feedback for the workshop organizers? Please share below.
Thanks for leading an excellent workshop and for all the work you do!
It was a great workshop and very glad I was able to attend! Meeting and working alongside everyone was inspiring and invigorating!
I really liked how the stations were split up so each person got the chance to practice the methods hands-on. I think that's very important for everyone to grasp the knowledge and procedures involved.
This came together great- I know it was alot of last minute scrambling but it was very useful and well-put-together.
Great job - thank you for your hardwork!

APPENDIX C

Standard Operating Procedure: Field Sampling Methods for Invasive Mussel Early Detection

Field Sampling Standard Operating Procedure (SOP) Version 1 (Date Revised: 2026)

Adapted from the Bureau of Reclamation Ecological Research Laboratory SOP (2025) and Idaho State Department of Agriculture (2019) by AKISP

AKISP Vision and Mission Statement

Vision Statement:

Alaska's diverse environmental, cultural, and economic resources are free from the impacts of invasive species.

Mission Statement:

We provide statewide leadership to prevent, detect and manage invasive species in Alaska by facilitating and fostering invasive species awareness, knowledge and information sharing, and collaboration among diverse stakeholders.

Cover photo: Plankton tow on Skilak Lake, 2026. Courtesy of Caleb Eckert, HSWCD

Standard Operating Procedure:
Field Sampling Methods for
Invasive Mussel Early Detection

Field Sampling Standard Operating Procedure (SOP)
Version 1 (Date Revised: 2026)

Adapted from:

Bureau of Reclamation
Technical Service Center
Field Sampling Standard Operating Procedure (SOP) (revised 2025)
Hydraulic Investigations and Laboratory Services Ecological Research Laboratory
Document No. EcoLab-F436A-2024-06

Idaho State Department of Agriculture
Idaho Waterways Survey, version 2 (updated 2019)
Authors: Jeremy Varley, Section Manager, Noxious Weeds
Nicolas Zurfluh, Section Manager, Invasive Species

Previous Versions: N/A

KBNERR ACCS AKISP USFWS
2026

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Plankton Tow

Adapted from the Bureau of Reclamation's Field Sampling Standard Operating Procedure (revised 2025).

Overview

Plankton tows are collected by a field crew and analyzed through cross-polarized microscopy by a laboratory technician. This method targets the larval lifestage of mussels: free-swimming zooplankton called veligers. One of the most costly and materially-intensive detection methods of dreissenids, it is also one of the most effective, nationally recognized as the gold standard early detection method. Alaska is still in the early stages of a dreissenid monitoring program with three labs in Southcentral housing cross-polarized microscopes and trained technicians: Kachemak Bay National Estuarine Research Reserve (KBNERR) in Homer, contact Jasmine Maurer jrmaurer@alaska.edu; the Alaska Department of Fish & Game (ADF&G) Soldotna Area Office, contact Eric Wood eric.wood@alaska.gov; and the Alaska Center for Conservation Science (ACCS) in Anchorage, contact Aurelia Umholtz alumholtz@alaska.edu . At the time of this version's writing, non-state government partners should coordinate with Jasmine Maurer and send their plankton tow samples to KBNERR's lab. State of Alaska partners should coordinate with Eric Wood at ADF&G.

Materials

Sampling:

- Signed Aquatic Resource Permit from ADF&G (required). Contact Tammy Davis tammy.davis@alaska.gov (State of Alaska Invasive Species Program Coordinator) for information on the blanket sampling permit for dreissenids, which expires Dec. 2026.
- Chain of Custody (COC) paper form (Appendix A)
- Data collection device (tablet) with Survey123 and Dreissenid Mussel Surveys form downloaded
- Plankton net (64-µm mesh) with weighted cod-end (64-µm mesh, 90cm length) Simple Plankton Net 30cm Diameter
- Cloth storage bag, one for each net. A pillowcase works.
- Rope for plankton net, marked in 1-meter increments up to 50-meters
- Labeled sample bottles Wide Mouth Field Sample Bottles 500mL
- Secchi disk Secchi Disk
- OR depth finder
- Measuring Tape 50M Tape Measure Reel
- Water quality instrument (YSI multiprobe or comparable)
- Permanent marker
- Pencil
- Electrical tape to seal sample bottles
- Distilled water (1 gallon + for each waterbody)
- Decontamination buckets or tubs
- Disposable dropper to add Tris buffer to sample Fisherbrand Transfer Pipette
- Ethanol (90% or greater ethyl) Decon Labs 200 Proof Ethanol
- Tris buffer, 4 molar [4M], pH 7.5 (4M Tris-HCl, pH 7.5. 250mL, RNase/DNase Tested.

Sterile. | Teknova, product number T5575)

- Vinegar for decontamination (suggest 2-3 gallons from grocery store)

Shipping:

- Cooler or styrofoam fish box
- Ice packs
- Ziplock bags (for COC) Packing tape to seal cooler

Site Selection

Water must reach minimum spawning temperature for veligers to be present. Only sample if water is above 5°C, and optimally, above 12°C. Veliger distribution can be highly localized; therefore, to increase the potential for detection, sampling should occur at several spatially distinct sites across the waterbody. Three sampling sites per waterbody is recommended. Sampling sites should include areas of high use and likely sites of mussel introductions such as boat docks, boat launch ramps, floating restrooms, marinas, and waterbody inlets/outlets (e.g., mouth of tributaries and dams). Sampling can be conducted in both open water and near shore depending on ease of access.

Sampling

Field-blank Sample Collection Method:

Field blanks are used to confirm that nets have been properly cleaned before sampling and will help to validate any positive DNA (genetic) findings. A single field-blank sample should be collected each time a net is used. If you are using the same net to collect samples at multiple waterbodies during a single day or trip, one field blank should be collected AT EACH WATERBODY. Nets should still be decontaminated between waterbodies, and the vinegar should be rinsed off prior to collecting the field blank. Field blanks should be collected before the first sample is collected.

1. Ensure the cod-end is secured on the threads of the plankton net.
2. Rinse the vinegar off the net in the waterbody you are preparing to sample by lowering the net vertically into the water but DO NOT submerge the ring of the net (i.e. do not allow water to spill over into the net).
3. Hold the net completely out of the water, with cod-end still secure, pour the 1 gallon of distilled water in and around the net, taking care to make contact with all surfaces of the net and cod-end. While water is draining from the cod-end, unscrew it and pour the distilled water "sample" into a sample bottle.
4. Field-preserve the blank the same as the "real" samples with Tris and ethanol, as described later in this protocol.

Plankton Tow Net Sampling:

Label bottles with date collected, waterbody, sample site (or field-blank), tow type (vertical or horizontal), number of tows in the bottle, length of tows, collector's agency and initials. Please use meters for all length and depth measurements (refer to Appendix B). Be sure to also include all of this information on the COC along with the sample site coordinates (in decimal degrees if possible). A separate bottle should be used for each sample site at a waterbody (i.e., if you are sampling three sites at a waterbody you should use three sample bottles). Collect 5 tows per site and combine all 5 tows into a single sample bottle. Be sure to empty and rinse the cod-end into the bottle after each tow.

Vertical plankton tow

At sites deeper than 4 meters, vertical plankton tows are preferred.

1. Be sure a field blank was done at the waterbody before beginning to sample.

2. Once at the desired site, check the total depth with a Secchi disk or depth finder, record total and visible depths in COC form (appendix A) and Survey123.
3. Collect water quality data with device if applicable, record in Survey123.
4. Prepare a sample bottle with a label (date, waterbody, sample site, tow type, number of tows, length of tows: "06/10/2026, Skilak Lake, Upper Boat Launch, vertical, 5 tows, 4 meters. UAA, AU").
5. Tie off the working end of the plankton net rope with enough excess to lower the cod-end 1 meter off the bottom (the net is over 1 meter from bridle to cod-end, we'll call it 1.5m; e.g. if the total depth is 20 meters, pay out just over 18 meters of rope).
6. Ensure the cod-end is screwed on tightly, with no cross-threading.
7. Lower the net, cod-end first, to the appropriate depth. It is recommended to lower the net slowly enough to feel if you hit the bottom.
8. If you hit the bottom, just rinse the net and begin the tow again. **Do not** include any tows with sediment; it interferes with analysis.
9. After each tow, raise the net and cod-end completely out of the water, then perform a rinse of the edges of the net by dipping the cod-end and net back into the water but do not allow the ring to submerge (so you aren't collecting more sample, just concentrating any plankton clinging to the net into the cod-end).
10. Allow water to drain out of the net and below the threads of the cod-end before unscrewing. **Only ever unscrew the cod-end over the boat.** Water will still be draining from the screened windows of the cod-end, but begin swishing the contents to get plankton in solution before pouring into the sample bottle. The volume of water doesn't matter at this point.
11. Repeat towing for a total of 5 tows per site.
12. After completing the 5th tow, pour contents of sample bottle back into the cod-end, swishing out all excess water but retaining all plankton in solution. The smaller the volume, the less ethanol you'll need, but it is important not to lose plankton to the cod-end. If much remains on the cod-end screen or sides, use a squeezy bottle of distilled water to pressure-wash the plankton into the sample bottle.
13. Field-preserve the sample with Tris and ethanol following the procedure below. Seal the bottle with electrical tape.

Horizontal plankton tow

If total depth is less than 4 meters, or in flowing water, perform a horizontal tow.

1. Be sure a field blank was done at the waterbody before beginning to sample.
2. Once at the desired site, check the total depth with a Secchi disk or depth finder, record total and visible depths in COC form (appendix A) and Survey123..
3. Collect water quality data with device if applicable, record in Survey123.
4. Prepare a sample bottle with a label (date, waterbody, sample site, tow type, number of tows, length of tows: "06/10/2026, Skilak Lake, Upper Boat Launch, vertical, 5 tows, 4 meters. UAA, AU").
5. Hold the net in one hand and the rope coil in the other. I am right-handed and I prefer to hold the net in my right hand. Throw the net as far as possible and reel it in.
6. Record the length of tow and try to throw a consistent distance for following tows.
7. Repeat for a total of 5 tows per site.
8. Do not allow the ring (opening) of the net to scrape the bottom. Sediment in samples will render them unusable. If sediment is in the cod-end, rinse out and start again.
9. As in the vertical tow, after the 5th tow, pour contents of sample bottle back into the cod-end,

swishing out all excess water but retaining all plankton in solution. The smaller the volume, the less ethanol you'll need, but it is important not to lose plankton to the cod-end. If much remains on the cod-end screen or sides, use a squeezy bottle of distilled water to pressure-wash the plankton into the sample bottle.

10. Field-preserve the sample with Tris and ethanol following the procedure below. Seal the sample bottle with electrical tape.

Sample Preservation:

Buffer each sample with at least 1 mL of Tris buffer to each 250 mL sample. It is important to add the Tris before the alcohol. **Do not use baking soda to buffer the sample**; this has the potential to render the sample unusable in the lab.

Alcohol must be added to the sample to prevent degradation. The labs prefer that samples are preserved with Ethanol (90% or greater ethyl). To calculate the amount of alcohol to add, measure the height of the collected sample (in centimeters or inches) and multiply by 3.0.

Decontamination

Best practice is to store the plankton net, rope, and cod-end in vinegar between sites. The acetic acid destroys genetic material and dissolves the shells and bodies of veligers, ensuring a clean net for each new site. Rinse the net in the sample waterbody before use by lowering the attached cod-end and net into the water, but do not allow the ring to go under the surface, so only water is entering the net through the mesh. At the end of each waterbody or sampling day, proper and thorough decontamination of all sampling gear and personal equipment (e.g. waders, boots) is of paramount importance. Even if the waterbody being sampled is not known to harbor any invasive species.

Shipment

If your cooler has a drain valve, make sure it is closed and sealed with tape. Make sure cooler is clean and dry. **DO NOT USE ICE**. Coolers that leak, sweat, or are wet in any way will be rejected by all shipping companies and may end up lost. Instead, use frozen ice packs to keep samples cool during shipping. If you are using gel ice packs, please enclose them in a Ziploc bag as they can tear open and create a slimy mess inside the cooler and on the sample bottles. Confirm that all information has been added to the COC and if you have any special instructions or would like the sample analysis to be prioritized due to special circumstances please provide instructions on the COC and email the lab coordinator (Jasmine Maurer jrmaurer@alaska.edu for the KBNERR lab, Aurelia Umholtz alumholtz@alaska.edu for the ACCS lab, or Eric Wood eric.wood@alaska.gov for the ADFG lab). Put the COC into a plastic bag and place on top of the samples. Tape lid and sides of cooler securely closed.

Due to the increased volume of ethanol required to preserve samples, coolers may require special handling and shipping labels, depending upon the carrier being used. Ship samples immediately after collection to prevent degradation, ideally within 2 days of collection. If you would like email confirmation of sample arrival at the lab, email the tracking number to the coordinator of your intended lab (Jasmine Maurer jrmaurer@alaska.edu for the KBNERR lab; Aurelia Umholtz alumholtz@alaska.edu for the ACCS lab; or Eric Wood eric.wood@alaska.gov for the ADF&G lab).

Ship samples to the following address:

Kachemak Bay National Estuary Research Reserve
Attn: Harmful Species Program
2181 Kachemak Drive
Homer, AK 99603

Alaska Center for Conservation Science
University of Alaska Anchorage
Attn: Aquatic Ecology Laboratory
3211 Providence Dr.
Anchorage, AK 99508

Resources and Contact Information

This an abridged version of the full sampling protocol.

Jasmine Maurer	jrmaurer@alaska.edu
Aurelia Umholtz	alumholtz@alaska.edu
Eric Wood	eric.wood@alaska.gov

COC INVASIVE MUSSELS FIELD SAMPLING LOG

Sample Collector and Agency:_____Net Mesh Size and Diameter: _____

Ph ail: _____

one Number: _____ Type and % Alcohol Added: _____

Em Tris Buffer Added (circle): Y / N

Date Collected	Water Body	Sample Location	Tow Type (V or H)	Number of Tows	Length of Tows (M)	Total Water Depth (M)	Secchi Depth (M)	Coordinates (decimal degrees preferred)

Special Instructions: _____

Address to Return Cooler: _____ Page _____ of _____

Appendix B - Summary of Sampling Instructions

Secchi Depth Reading & Total Water Depth

Lower Secchi disk until black and white marking is indistinguishable and record Secchi Depth.

Lower disk to bottom of sample site and record Total Depth.

Sampling

Record all sample information on Chain of Custody sheet.

Collect a field-blank at each new waterbody. See full SOP for details.

Vertical Tow: Use in water deeper than 4 m. Lower plankton tow net vertically from dock or boat to 1 m above maximum depth, and slowly (~1 m/s) pull up.

Horizontal Tow: Use for shore sampling or flowing water. Throw net as far as possible and estimate distance. Slowly reel in keeping entire opening of net submerged but not dragging along the bottom.

Collect 5 tows per Sample Site and put in one bottle. (See "Collected Sample" in figure below).

Note: Leave room for alcohol. Sample can be swirled around in cod end to condense.

Preservation

Add 15 drops of Tris buffer per 250-500 mL sample

Add volume of alcohol equal to 3x volume of Collected Sample (See Figure).

Note: The final sample that is mailed should have an alcohol concentration of ~70%.

Do not fill bottle past shoulder! (See "Max Fill Line" in figure below)

Bottle Labeling

Label bottle with: date collected, water body and sample site, tow type (vertical or horizontal), number of tows, and length of tows (use meters for all measurements).

Net Hygiene

Use dedicated nets for any positive waterbody.

Ideally every waterbody (positive or not) should have its own net.

Soak net in vinegar between each site and rinse before next sample.

Water Quality Data

Collect as much water quality data as possible using a multiprobe.

Email water quality data to: bor-sha-ecolab@usbr.gov.

Shipping

Ship samples as soon as possible after collection, ideally within two days of collection.

Seal bottles with electrical tape and place in a plastic bag.

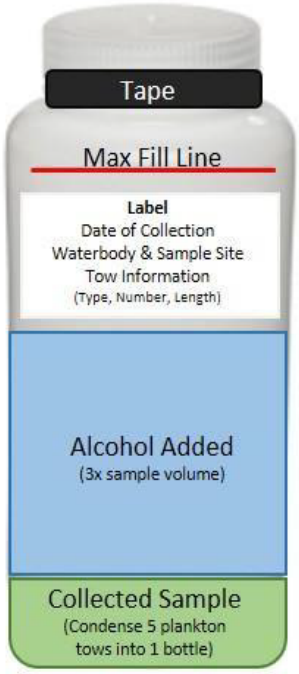
Pack sample bottles in a cooler with ice packs, NO WET ICE.

Address: KBNERR

Attn: Harmful Species Program

2181 Kachemak Drive

Homer, AK 99603



Sample Ready for Delivery

Contact Information

If you have questions or would like confirmation of cooler arrival email tracking number to:

jrmaurer@alaska.edu

Ponar

Adapted from the Idaho State Department of Agriculture's Idaho Waterways Survey (2019).

Materials

- Petite Ponar grab sampler, such as this option.
- Brass sieves.
- A tub or large Tupperware
- Ziplocs or sample vials for collecting specimens

Sampling

1. Choose areas in the water body where the lake bed is composed of gravel, small cobble, sand or mud to deploy the Ponar grab dredge. Before deployment, engage the spring-pin into the dredge and carefully lower the dredge keeping tension on the rope. Lower dredge until it settles in or on bottom. Once on the bottom, dredge pin will disengage, and you will feel the dredge spring-pin disengage.
2. Quickly retrieve dredge and dump contents into plastic sorting bin.
3. Pour liquid, debris, and sediment out of bin through sieve.
4. Inspect remaining contents for bivalves and snails. Discard debris.
5. Record activities in data unit.
6. Retain suspect specimens in sample container or Ziploc bag. Label sample. Place in cooler on ice.

Settlement plates

Materials

- PVC or particle board artificial substrate
    - Mussels prefer to settle on dark material, overhangs, and surfaces 90° to water's surface
- Rope: a little longer than the total depth of water at deployment site.
- Buoy and anchor (the cheaper and more inconspicuous the better)
- Appropriate permit from ADFG and entity who manages the lake (e.g. USFWS if on Refuge)
- Plastic paint scraper or putty knife
- Small plastic tub to hold organisms
- Gloves if desired
- Paper datasheet or tablet with Survey123 for recording data

Sampling

1. Obtain proper permits from ADFG and local water authorities before deploying artificial substrates!
2. Locate suitable, high traffic areas where mussels would likely be introduced (e.g. boat launches, docks).

3. Attach one end of the rope to an anchor.
4. Tie the settlement plate above the anchor. A few feet up from the bottom is recommended.
5. Affix the top of the rope to a buoy or structure (e.g. dock) with permit number, your organization, and phone number. Recommended: write 'Do Not Disturb', but sometimes encourages disruption.
6. Deploy substrate.
7. Sturdy gloves are recommended when pulling up settlement plate rope as fishing line and hooks can sometimes be entangled in rope.
8. Check regularly, frequency is up to you and your workload. Recommended is once a month in the summer season. More frequently if you notice accumulation of thick biofilm.
9. Remove gloves to check the plate. With bare hands, gently pat the substrate. Do not run your hand in strokes as some creatures may be abrasive.
10. Carefully peel or scrape biofilm away from the plate with the putty knife into the plastic tub. If you encounter hard organisms, stop and inspect. Dreissenid mussel settlers (juvenile lifestage) look and feel like sandy bumps that are difficult to rub off.
11. Take photos of or collect any suspect specimens. Native mussels do not attach to substrate, but you may see native snails or other mollusks or aquatic macroinvertebrates.
12. Record your visit in the Dreissenid Survey123.

Visual and tactile substrate survey

Adapted from the Idaho State Department of Agriculture's Idaho Waterways Survey (2019).

Materials

- Hand lens if desired
- Plastic baggie, vial, or other container for sample, if collected
- Label for sample, if collected
- Ice or icepacks and cooler, if sample is collected
- Paper datasheet or tablet with Survey123 for recording data.

Sampling

1. Locate suitable artificial/existing submerged surfaces to inspect. Accessible surfaces (i.e., within arm's reach) that are good candidates for visual and tactile inspections, include the undersides and sides of dock floats, floating bathrooms, buoys and mooring chains, and the underside and sides of rocks found in shoreline areas.
2. Carefully pat the surface with the palm of your hand and fingers. Do not run your hand along surfaces because of sharp objects. Note that periphyton may obscure attached bivalves and other specimens.
3. Remove hard protruding objects for visual inspection.
4. Any specimens retained should be frozen or preserved immediately.
5. Record activities in the data unit.

Shoreline visual survey

Adapted from the Idaho State Department of Agriculture's Idaho Waterways Survey (2019).

Materials

- Paper datasheet or tablet with Survey123 for recording data.
- Brass sieves if desired
- Ziploc plastic baggie or
- Plastic bin if desired for collecting and sorting organisms
- Hand lens for inspecting small organisms

Sampling

1. Walk in a zig-zag pattern parallel to shoreline in wade-able depths near boat launches and other areas that contain shells, cobble, gravel, and sand.
2. Stop every other step to pull out and flip loose rocks, cobble and woody debris and/or aquatic plants to visually inspect for mussels and snails. Always replace rocks in their original location and orientation to avoid further disturbance to aquatic life.
3. Visually inspect for bivalve shells partly buried in sand as well as dead shells on top of sediment.
4. If using sieves, sort benthic sediment over a plastic tub.
5. Record activities in data unit.
6. Retain suspect specimens in sample container or Ziploc bag. Label sample. Place in cooler on ice.

Plant shakedown

Adapted from the Idaho State Department of Agriculture's Idaho Waterways Survey (2019).

Materials

- Gallon-sized baggies (i.e Ziplocs)
- Thatch rake or modified aquatic vegetation rake (as used for *Elodea* surveys)
- Hand lens
- Brass sieve
- Vial and labels for samples if collected.
- Cooler with ice or icepacks if sample is collected.
- Paper datasheet or tablet with Survey123 for collecting data.

Sampling

1. Collect macrophytes with thatch rake or by hand and place in Ziploc bag with fresh water.
2. Vigorously shake the macrophytes in water to detach invertebrates.
3. Visually inspect contents for bivalves and snails on plants when placing plants into bag, and again when removing plants and sorting for macrophyte collection, using hand lens when appropriate.
4. Visually inspect the sides of bag for small, attached snails.
5. Pour liquid and debris out of bag through sieve.
6. Inspect remaining contents for bivalves and snails. Discard debris.
7. Record activities in data unit.
8. Retain suspect specimens in sample container or Ziploc bag. Label sample. Place in cooler on ice.

Decontamination

Proper and thorough decontamination of all sampling gear and personal equipment (e.g. waders, boots) is critical to invasive species work. Even if the waterbody being sampled is not known to harbor any invasive species, best practice is to decontaminate after each sampling event at the waterbody or at the office between sampling events.

Materials

- Distilled white vinegar
- Tap or distilled water (just not from waterbody)
- 5 gallon bucket or
- Large plastic tub
- Boot brush/hoof pick and/or
- Tooth brush
- OPTIONAL: Simple Green (1:10 dilution) is a common cleaning solvent used for boots, in tandem with a stiff-bristle brush.