



# ELODEA IN SOUTHCENTRAL ALASKA

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## Early Detection and Rapid Response in Action

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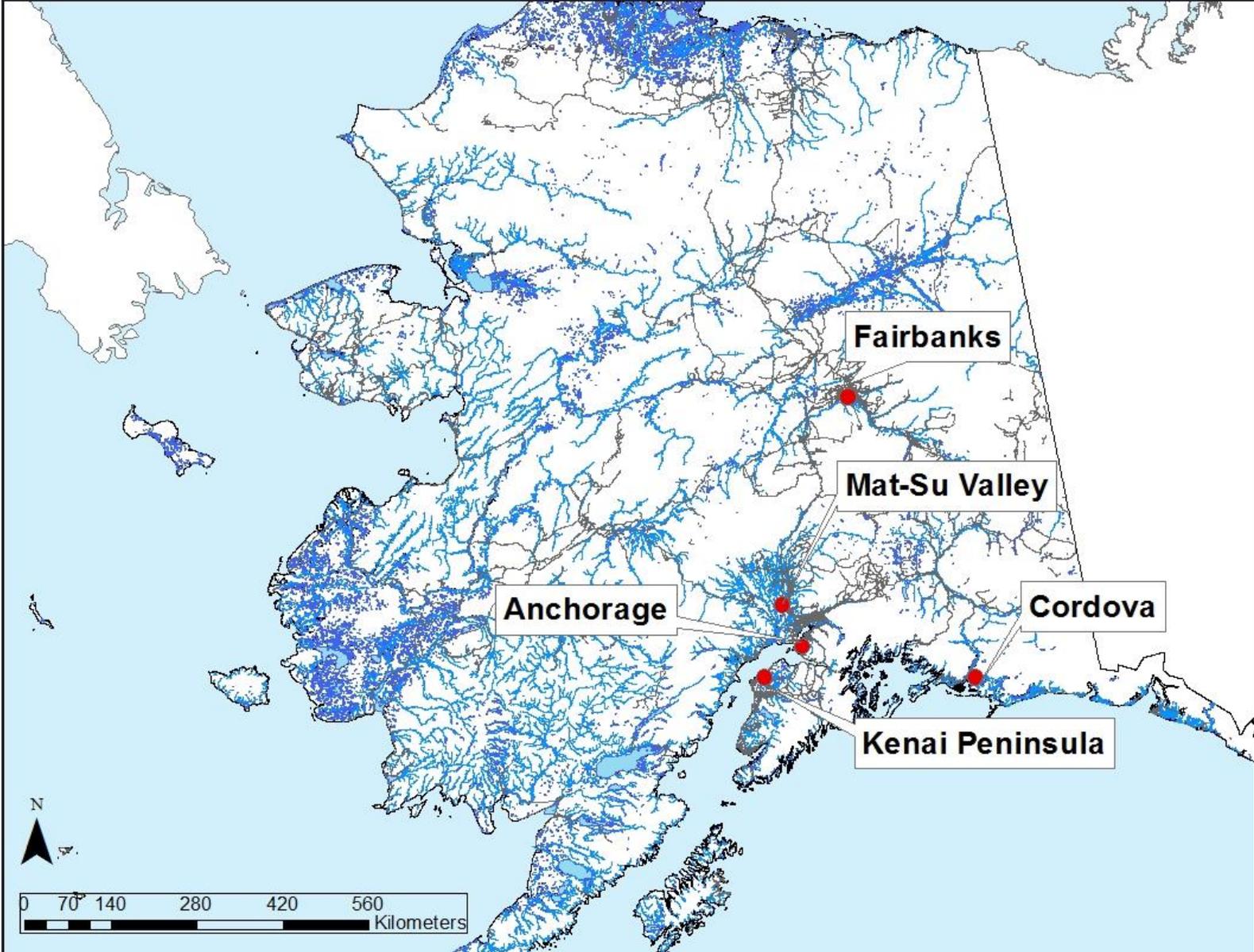


# Elodea in Alaska

- First recorded in 1982 in Eyak Lake in Cordova
- Recorded in Fairbanks area in 2009
- Found in 3 Anchorage area lakes around that time
- Found on the Kenai Peninsula in 2012, more found in 2013
- More populations found around Cordova in 2012-2014
- More populations found in the Matanuska-Susitna Valley north of Anchorage in 2014



# Statewide Distribution

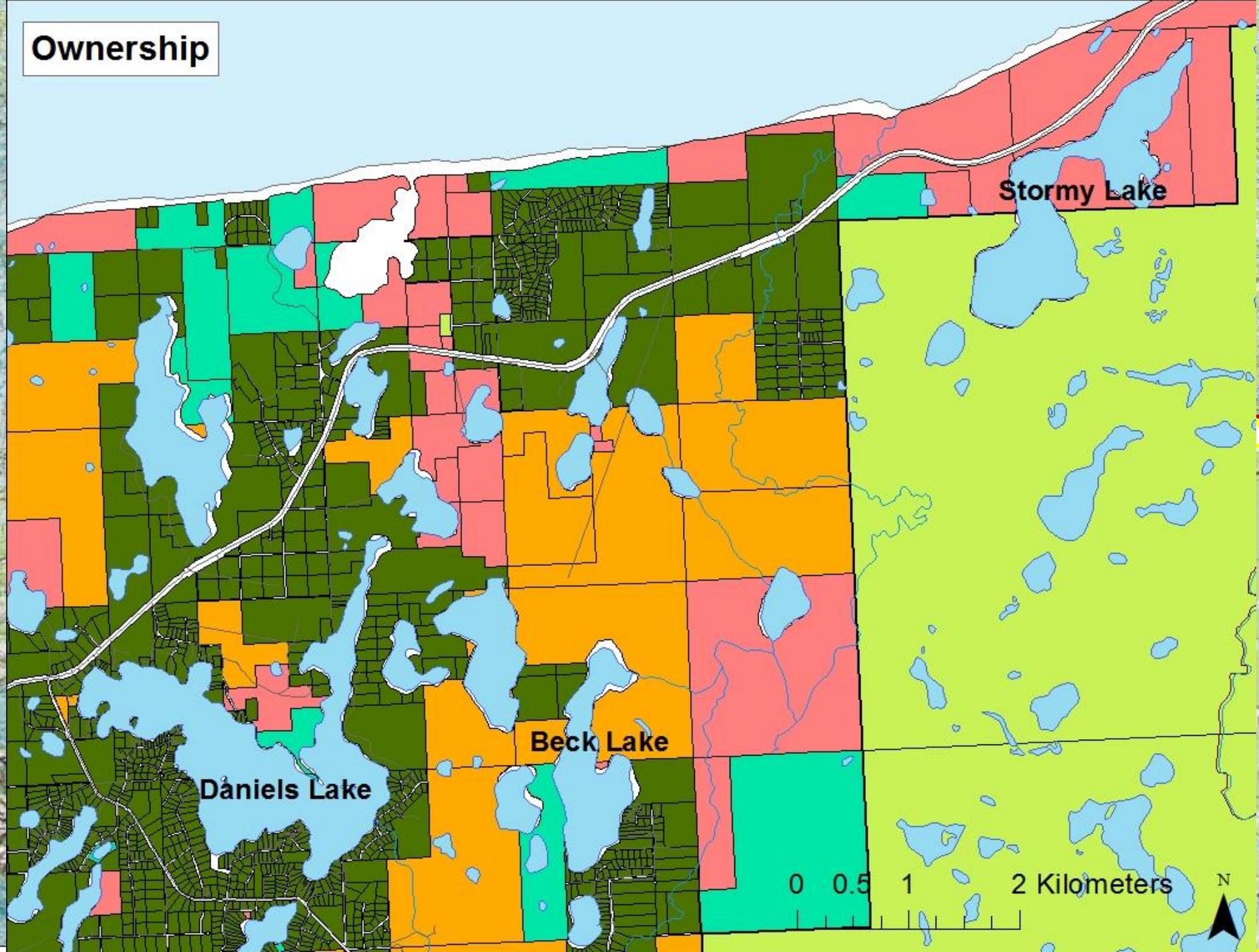


# Elodea on the Kenai

- First found in September 2012 in Stormy Lake (being treated for northern pike with rotenone)
- Fragment found in Daniels Lake soon after
- Stormy Lake infestation surveyed in winter 2013
- Complete survey in Daniels Lake, winter & spring 2013
- Beck Lake infestation found in summer 2013
- Source could be a pet/aquarium shop in Nikiski that closed in 1990s? A float plane? Uncertain.



# Ownership



Stormy Lake

Beck Lake

Daniels Lake

0 0.5 1 2 Kilometers

N

# Sounding the Alarm



October 21, 2013 | 11:09 am

## PENINSULA CLARION

Site Web Search by YAHOO!

Home News Sports Opinion Obituaries Community Outdoors Entertainment Dispatch e-Ed  
Explore the Kenai Tight Lines Fishing Homer Recreation Guide Outdoors News 2013 Recreation Guide

Weather sponsored by: 37°  
Few Clouds [MORE WEATHER](#)

HOME > OUTDOORS

### Aquarium plant threatens Peninsula waterways

Posted: September 13, 2012 - 3:56pm | Updated: September 14, 2012 - 8:28am

[Back](#) | [Next](#)

By Libby Bella  
Kenai National Wildlife Refuge

Interagency biologists working on northern pike control last week in Captain Cook State Recreation Area noticed fragments of a bright green, whorled-leaf aquatic plant washed up on the shore near a boat launch. This unusual plant was identified as a species of *Elodea*, likely *Elodea canadensis*, the Canadian waterweed. *Elodea* is known from several locations in Alaska including Fairbanks, Anchorage, and Cordova...and now Stormy Lake on the Kenai Peninsula. This is the first aquatic freshwater

It's possible that this photo was staged, but the message is clear.

# Winter Surveys

- Test protocol visit to Stormy Lake in January
  - Snowmachine access, gas-powered auger, chimney brush, underwater camera
- Complete survey of Daniels Lake in February
- Genetic testing of both lake's populations by Dr. Donald Les at University of Connecticut
  - Determined to be a hybrid between *E. canadensis* and *nuttallii*





Stormy Lake test survey, January 2013



Daniels Lake full  
survey, February  
2013



# Stakeholder Inclusion Process

- Include all agencies, organizations, local government, and citizens in planning process
- All property owners on Daniels Lake contacted, January 2013
  - Public meeting February 19, 2013, to discuss issues
  - Aquatic invasion expert, Dr. Lars Anderson, joined us from UC-Davis/ARS
- Sustained outreach – phone updates, citizen group lead, meetings, development & distribution of public service announcements, brochures, flyers



# Community Elodea Information Meeting

Nikiski Community Recreation Center  
Mile 23.4 Kenai Spur Highway

Tuesday February 19<sup>th</sup>, 2013  
6 - 8:30PM



Please join us for a community meeting to discuss what to do about the discovery of Elodea in Stormy & Daniels Lakes.

Dr. Lars Anderson (USDA Agricultural Research Service and University of California-Davis), an aquatic invasive plant expert, will be at the meeting to provide information about Elodea, discuss options for management, and share his experiences in coping with aquatic infestations.

Elodea is not native to the Kenai Peninsula, and can cause serious, irreversible harm to fish and aquatic habitats if allowed to spread unchecked.

Elodea presence has recently been confirmed in Stormy and Daniels Lake on the Kenai Peninsula, and in some slow-moving waters in Anchorage, Fairbanks, and Cordova.

Meeting Open to the Public  
For more information, please contact Janice Chumley at UAF-Cooperative Extensive Service, 907-262-5824



Elodea is a highly invasive submerged aquatic plant.

## Why we don't want Elodea

**Nuisance:** impedes boat and float plane launching, navigation, and fishing

**Ecological:** degrades salmon spawning habitat

**Safety:** fouls float plane rudders and boat propellers

**Economic:** reduces property values by fouling launch sites and shore habitats



Aquatic Invasive Species!

# Elodea

This aquatic plant is **NOT NATIVE** to Alaska. *Elodea* survives freezing and can spread by tiny fragments.



Elodea will cause serious, irreversible harm to aquatic habitats, resulting in degraded fisheries if allowed to spread unchecked.

### Distinguishing Features of *Elodea*:

**Leaf:** Leaves are arranged in whorls of 3 (occasionally 4) and are densely packed along the stem. Leaves are about 1cm long and are finely toothed along the edges.

**Stem:** Long, slender, generally branched and typically lighter in color than leaves.

*Elodea* remains submersed and forms tangled masses in lakes, ponds, and slow moving streams. Individual plants can vary in appearance, with some robust and others with long inter-nodes

Please help prevent the spread of aquatic invasives:



CLEAN



DRAIN



DRY

Report aquatic invasive sightings to 1-877-INVASIV

## Native Alaskan aquatic plants that can be confused with Elodea



### *Potamogeton richardsonii* - Richardson's Pondweed

Description: Densely spaced, alternate lance-shaped leaves 2-13 cm long. Leaves have wavy or crinkled margins often curled backwards with 7 or more veins.



### *Ceratophyllum demersum* - Coontail

Description: Branched stems with stiff whorls of 5-12 forked olive-green to almost black leaves. Leaves are 2.5-4cm long. It lacks roots and floats freely.



### *Hippuris vulgaris* - Common Mare's Tail

Description: Looks like a robust green bottle brush growing in patches, primarily in shallow areas, emergent from water late in the season. Has unbranched stems, 8-12 whorled leaves (5 to 3.5 cm long).



### *Callitriche hermaphrodita* - Northern Water Starwort

Description: Small delicate plants usually found in shallow waters. Loosely rooted to the bottom with 2 opposite, narrow flat, underwater leaves (up to 50mm wide and 5-30mm long). Leaf tips have two lobes forming a U-shape.



### *Myriophyllum sibiricum* - Siberian Milfoil

Description: Feather-like olive-green submersed leaves are arranged in whorls of 3-4 with fewer than 18 leaflet pairs, each leaf to 4 cm long.

This project was partially funded by NOAA Pacific Coast Science Recovery Grant administered by the Alaska Department of Fish and Game and the Alaska Sustainable Salmon Fund.



Flyer courtesy Darcy Etcheverry

# ELODEA

spread the word,  
not the weed!

**Elodea** is a very invasive submerged aquatic plant. It survives freezing & spreads by tiny fragments introduced by float planes, boats, trailers, school/home aquariums, and equipment. **It is not native to Alaska.**

## We DON'T want Elodea in Alaska

- **Safety:** fouls float plane rudders & boat propellers
- **Nuisance:** impedes boat & float plane launching, navigation, & fishing
- **Ecological:** degrades salmon spawning habitat
- **Economic:** reduces property values by fouling launch sites/habitats

## Confirmed infestations

- **Anchorage:** Sand, Delong, & Little Campbell Lakes
- **Fairbanks:** Chena Lake, River & Slough
- **Cordova:** Eyak, McKinley, Martin Lakes
- **Kenai Peninsula:** Stormy & Daniels Lakes

## Float Plane Operators - Alas

- Inspect & clean your aircraft before**
- Before entering the aircraft remove visible
  - Before takeoff don't taxi through heavy pig
  - After takeoff raise/lower rudders to free p
  - Watch "Sea Plane Inspection and Deco

## Report sightings & help identify new

- Note location (GPS or mark on map) and
- Take a specimen if possible (photo at a mi
- Call 1-877-INVASIV to report sightings!

## Support eradication efforts!



## Recent sunny weather may mean a bumper crop for Alaska's Elodea infestations!



Fishes swim under ice. This specimen is from Stormy Lake on the Kenai Peninsula.

Elodea. Believed to be Alaska's first fully submerged aquatic invasive plant, you may have seen Elodea choking out areas of Sand Lake, Little Campbell Lake, or Delong Lake in Anchorage and Chena Slough in Fairbanks. It's also being found in a growing number of lakes and slow moving rivers/sloughs in Cordova and on the Kenai Peninsula.

**Should we be concerned?**  
Yes! Elodea survives under ice. When introduced to a new waterway, Elodea grows rapidly, overtaking native

plants, filling the water column, and changing the habitat conditions to which native fish and wildlife are adapted. Thick mats form at or just below the water surface and can foul boat propellers and floatplane rudders, causing a hazard. In addition to impeding fishing, navigation, boat launching, and paddling, it can also reduce waterfront property values.



Team founder of the Anchorage Rowing Association and long-time rower Marietta "Ed" Hall explained,

"As a rower on Sand Lake since 1988, the recent exponential growth in Elodea has been shocking. When I pass over certain sections of the lake Elodea snags my small six inch boat and nearly capsizes me. It's obvious how damaging this weed will become to all users if it's not controlled."

The growing negative impact of Elodea can most recently be seen in the closure of Stormy Lakes located within the Captain Cook State Recreation Area near Nikiljok to watercraft and aircraft for the 2011 summer season in an effort to prevent its spread.

**How does it spread?** Fragments of Elodea snagged by watercraft, trailers, float planes or other outdoor equipment are easily spread to new waters. New infestations can also result from intentional (albeit well-meaning) releases from school/home aquariums (In Alaska, live specimens of Elodea are used to teach students about cell structure—it's also a popular aquarium plant).

Although Elodea has only been confirmed in 13 waterbodies in Alaska to date, its foothold in float plane lakes like Sand Lake (only three miles away from Alaska's busiest float plane base, Lake Hood) make it only one step away from invading any number of additional waters across the state.

Elodea fragments along the shoreline of Sand Lake in Anchorage. Snagged by watercraft, trailers, and float planes, these fragments are easily transported to new waters.

## Report this plant!

If you think you have seen this plant, take a sample, photograph, and note location.

Contact:

Alaska Department of Fish & Game  
1-877-INVASIV (468-2748) or  
Fairbanks CWMA  
479-1213, FCWMA.tech@gmail.com

## Identification:

- Leaves in whorls of 3 (occasionally 4)
- Stem lighter green than leaves
- Stems grow in tangled mass



(C) Paul Skawinski, 2009



Leaves:  
is  
1/4 - 1/2" long  
1/8" wide, edges  
finely toothed

## Stop the spread of Aquatic Invasive Species!



## Follow these simple guidelines:

Remove all visible mud, plants, fish/animals from equipment

Eliminate water from all equipment before transporting  
Much of the recreational equipment we use can collect water and harbor hitchhikers

Clean and dry anything that came in contact with water

Use hot (140°F) or salt water  
If possible, allow 3 days of drying before entering new waters

Never release plants, water, fish, or animals into a body of water unless they came from that water body.

Aquarium plants and animals may be able to survive in our Alaskan waters! Dispose of aquariums responsibly.

For more specific prevention guidelines, visit:



## STOP AQUATIC HITCHHIKERS!

Prevent the transport of nuisance species.  
Clean all recreational equipment.  
[www.ProtectYourWaters.net](http://www.ProtectYourWaters.net)

Fairbanks Cooperative Weed

Invasive Waterweeds,  
*Elodea spp.*

An invasive plant threat  
to Alaskan waters



Don't let this happen to Alaska!



with plants



## ELODEA

Submersed aquatic plants in the genus *Elodea* are not native to Alaska. *Elodea* survives freezing, and can spread by tiny fragments. **These traits make it extremely invasive.**

*Elodea* has been confirmed in lakes and slow-moving rivers/streams in Anchorage, Fairbanks, Cordova, and most recently the Kenai Peninsula. It's a popular aquarium plant in Alaska and can spread if released: boats, trailers, floatplanes, waders, and equipment can act as vectors. **Elodea will cause serious, irreversible harm to fish and aquatic habitats in Alaska if allowed to spread unchecked.**

## We don't want Elodea in Alaska

- **Safety:** fouls boat propellers & float plane rudders
- **Nuisance:** impedes boat launching, navigation, and fishing
- **Economic:** reduces property values by fouling launch sites/nearshore habitats
- **Ecological:** has been shown to degrade salmon spawning habitat



Elodea in Chena Slough/Fairbanks, Alaska



Always remove aquatic plants from your trailer after leaving/ before entering a new waterbody.

## If you find Elodea:

- ◆ **Note its location:** GPS coordinates and/or a mark on a map with description.
- ◆ **Note its habitat:** did you find it in a river or lake? how deep was the water? was the water clear or slightly muddy?
- ◆ **Take a specimen:** At minimum, take a photo. Take as much of the entire plant as you can, including the flower if present. Put it in a zip lock bag and store in a cool place. If you don't have a bag, press it in a book or inside wax paper and keep it somewhere safe so it doesn't break up. Aquatic plants dry quickly.
- ◆ **Report it:** Call the Alaska Department of Fish and Game's invasive species hotline: At that time someone will let you know where to send the sample. **1-877-INVASIV (468-2748)**



## STOP AQUATIC HITCHHIKERS!

Prevent the transport of nuisance species.  
Clean all recreational equipment.  
[www.ProtectYourWaters.net](http://www.ProtectYourWaters.net)

**CLEAN:** Rinse and remove visible mud, plant debris from boats, trailers, floatplanes, and gear.  
**DRAIN:** Empty coolers, bilge pumps, buckets and wring out gear before leaving a waterbody.  
**DRY:** Completely dry equipment and gear between visits to fish water systems.  
**Never release plants, fish, or other animals into a body of water.**

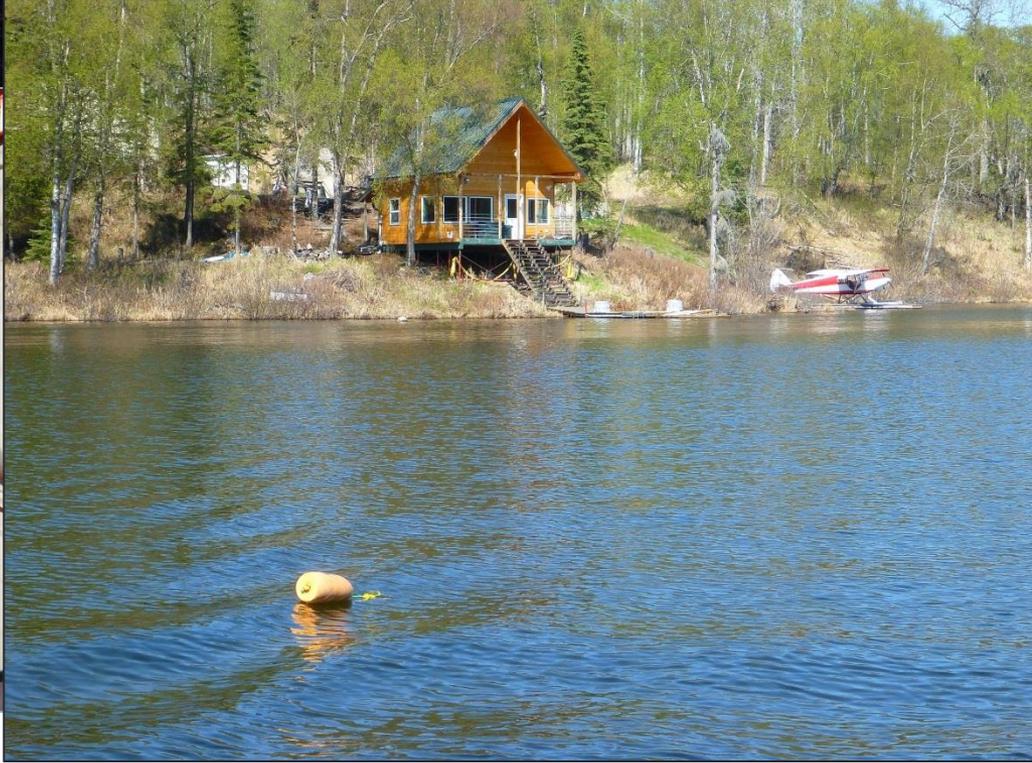
ADF&G in action at the public meeting



Agency debriefing (with independent expert Dr. Lars Anderson)



Daniels Lake Spring Revisit,  
May 2013



# Regulatory Process

- NEPA – Environmental Assessment
  - EA Draft available for public comment: June 23 - July 12, 2013
  - EA submitted to USFWS August 1, 2013
  - EA finalized September 2013
- NPDES-PGP (National Pollutant Discharge Elimination System – Pesticide General Permit) - DEC
  - NOI (Notice of Intent) filed with DEC: March 20, 2013
  - General Permit Authorization: March 26, 2013
  - NOI updated to include Bishop Creek: May 30, 2013
  - General Permit Update Authorized: June 14, 2013
- Diquat (Reward) PUP (Pesticide Use Proposal) - DEC
  - Application Submitted to DEC: April 3, 2013
  - DEC approve application to proceed with public comment: April 9, 2013
  - Public comment period: April 12 - May 13, 2013
  - Permit Issued: June 3, 2013
  - Permit effective: July 13, 2013

# Regulatory Processes

- Fluridone (Sonar) PUP - DEC
  - Permit application initially submitted April 30, 2013
  - PUP application revised by project team and at the request of DEC and resubmitted May 30, 2013
  - DEC requested additional information July 3, 2013
  - Permitted in early 2014
- Other Permits
  - ADF&G: Fish Habitat Permit
  - DNR ML&W: Lands Use Permit
  - Both were initially submitted in August 2013, revised over winter 2013-2014, final in late 2014
- IPM Completed June 2014



**FOR IMMEDIATE RELEASE**  
**May 22, 2013**

**CONTACT:**

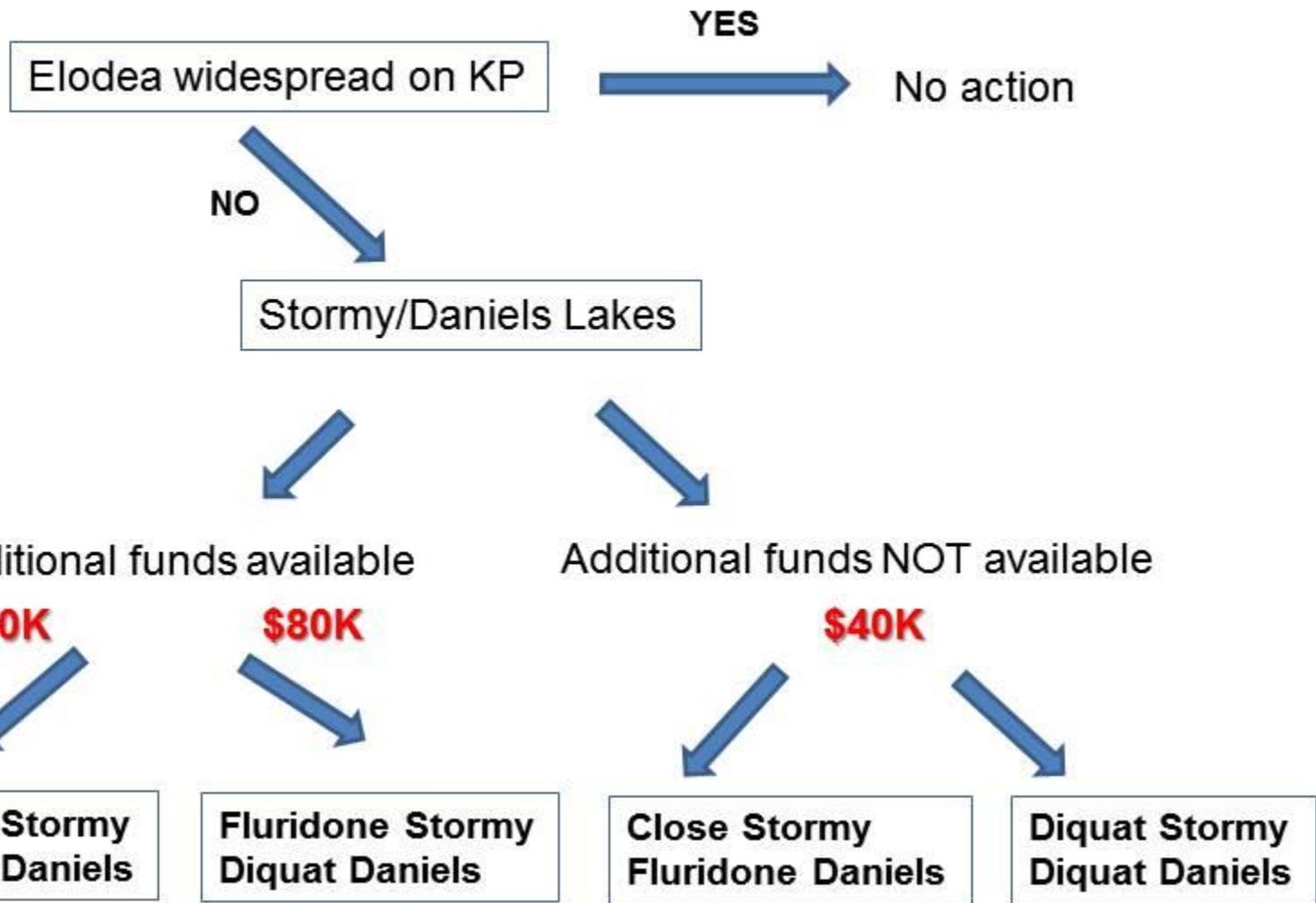
**Division of Parks & Outdoor Recreation, Kenai/Prince William Sound Area**  
**Jack Blackwell, Superintendent, 907-262-5581, [jack.blackwell@alaska.gov](mailto:jack.blackwell@alaska.gov)**

**Stormy Lake closed to watercraft and aircraft this summer due to Elodea**

(Soldotna, AK) – Stormy Lake is closed to watercraft and aircraft for the summer season while government officials assess and seek to control spreading of the invasive aquatic plant, Elodea.

The director's order closing Stormy Lake – located within the Captain Cook State Recreation Area near Nikiski – was signed on Monday. The closure was recommended by a state and federal agency working group seeking to address Elodea infestation on the Kenai Peninsula.

# Decision Tree for Treatment in 2013



# Pesticide Selection

- Both approved for use in Alaska
- Diquat (Reward, Aquacide, etc.)
  - Contact herbicide
  - Lower or localized application, but less effective
  - Cheaper
- Fluridone (Sonar) – SePRO
  - Sent elodea samples for company to grow
  - Titration/calibration tests to determine correct amount for lake based on volume and temperature
  - Slow-acting, systemic herbicide
  - May require whole-lake or larger-area application

# 2013 Surveys

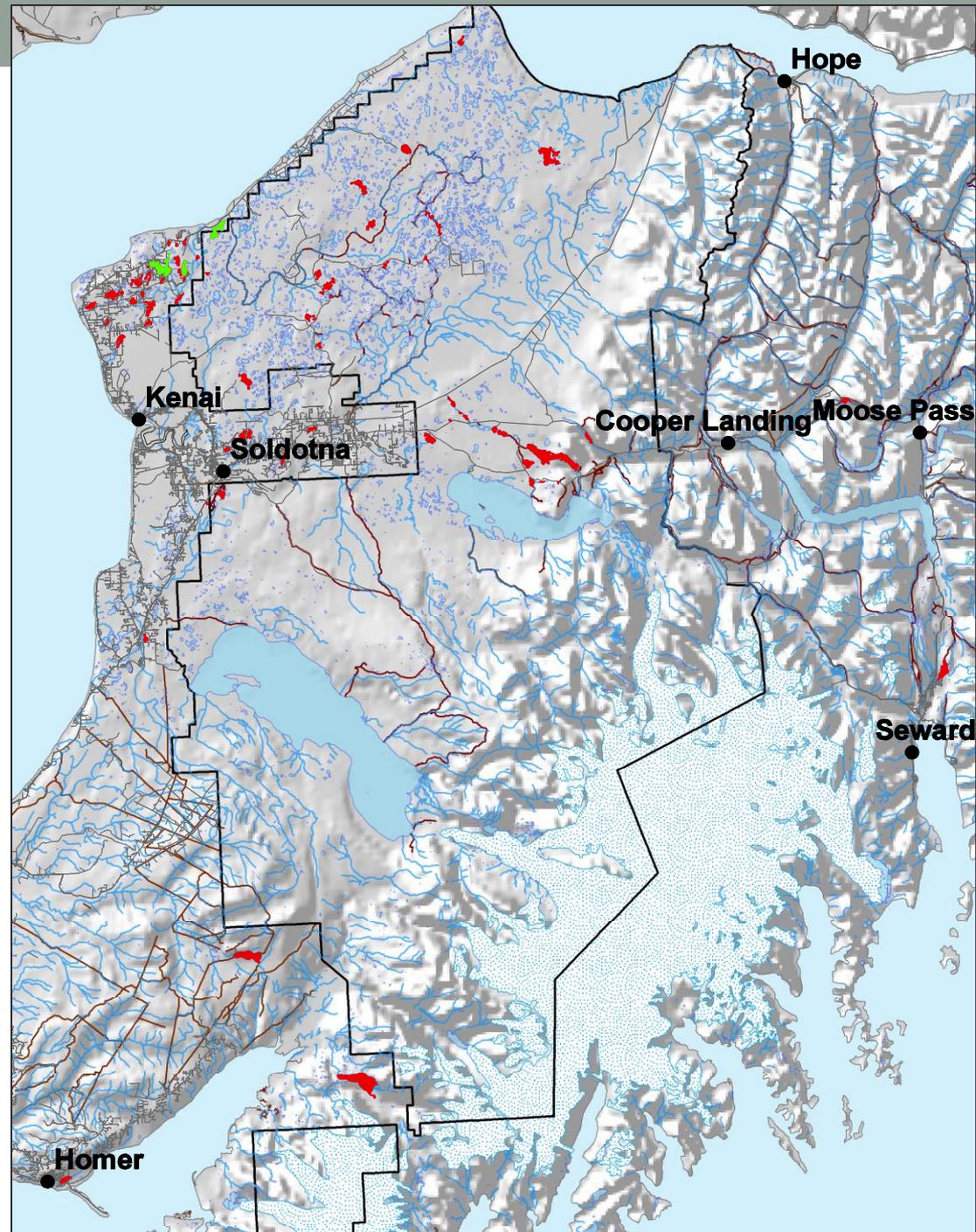
- Group Effort (field office, refuge, ADF&G)
  - 2 lakes, 256 points, 1010 acres
- Field office survey
  - 17 lakes, 279 points, 2005 acres
  - Aquatic plant data per lake
- Refuge staff survey
  - 6 lakes, 71 points, 1534 acres
  - Aquatic plant data per point
- Friends of Alaska Refuge volunteer survey, administered by Refuge office
  - 39 lakes, 196 points, 4730 acres
  - Some aquatic plant data per point/lake, Sonde water quality data
- Incidental observations and calls, other surveys
  - Private citizens, Kenai Airport float plane basin, Homer area



Kenai Airport  
Floatplane  
basin...luckily all  
natives like Siberian  
watermilfoil

# Mapping

- 2013 - 68 lakes surveyed
- 2014 – Additional 10 lakes surveyed



## Field Office surveys



Photos courtesy Cheryl Anderson

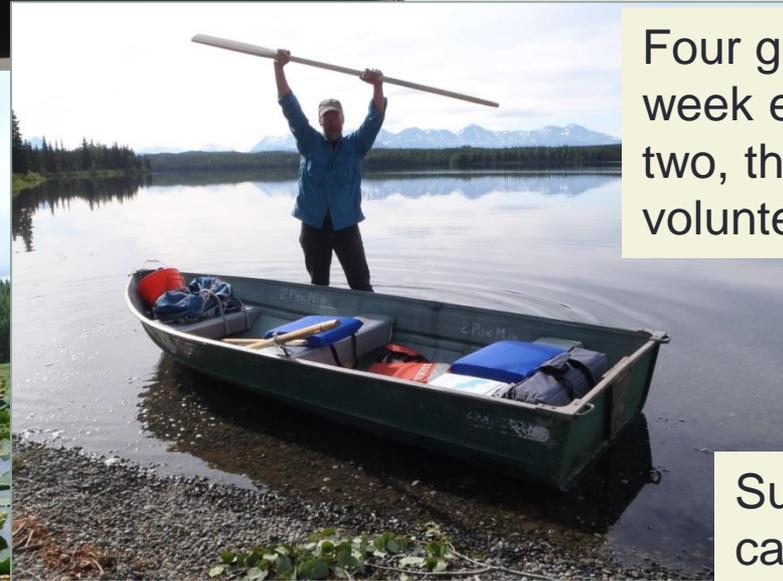


Beck Lake elodea jackpot  
(Cheryl Anderson)

Friends of Alaska  
Wildlife Refuges  
Volunteer Survey



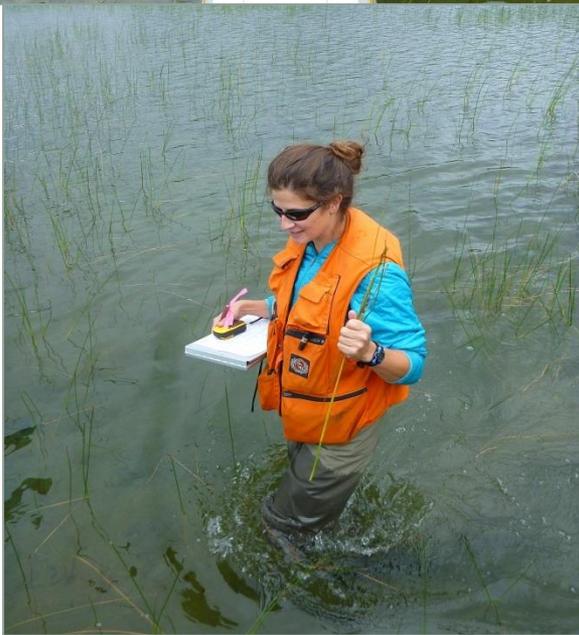
Four groups of two, one week each; one group of two, three weeks = 10 volunteers, 7 weeks



Survey by rowboat or canoe



Remote lake surveys –  
Refuge staff



Timberlost Lake - trailing vegetation from the supercub...



# Treatment Calibration



- SePRO, manufacturer of Sonar
  - Sent live samples to lab in CO for growth in tanks
  - Grew best in cold water
  - Titration tests to determine maximum result with minimum application level
- Bathymetry/Sonar information to calculate volume of application by depth and vegetation density
- Survey location information to determine locations in partial-lake treatments



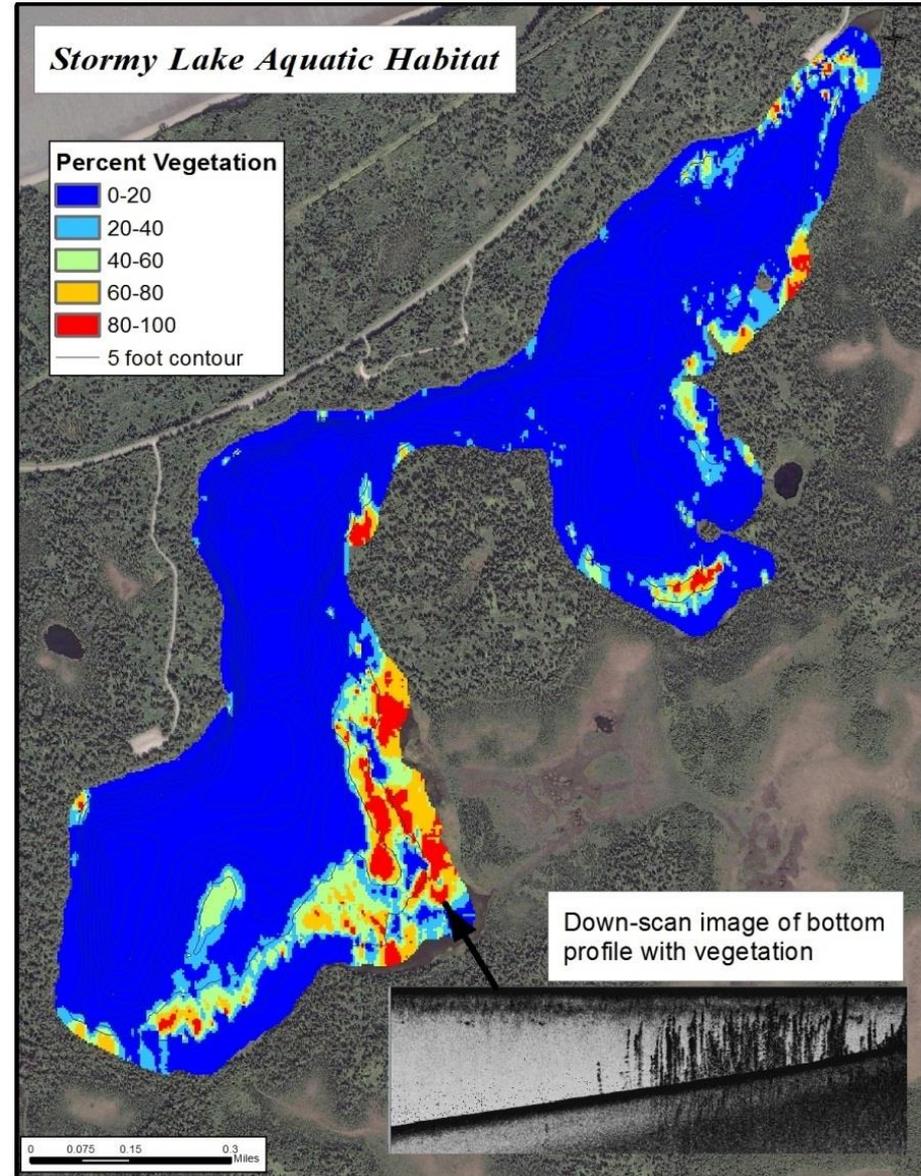
# Application Cost and Schedule

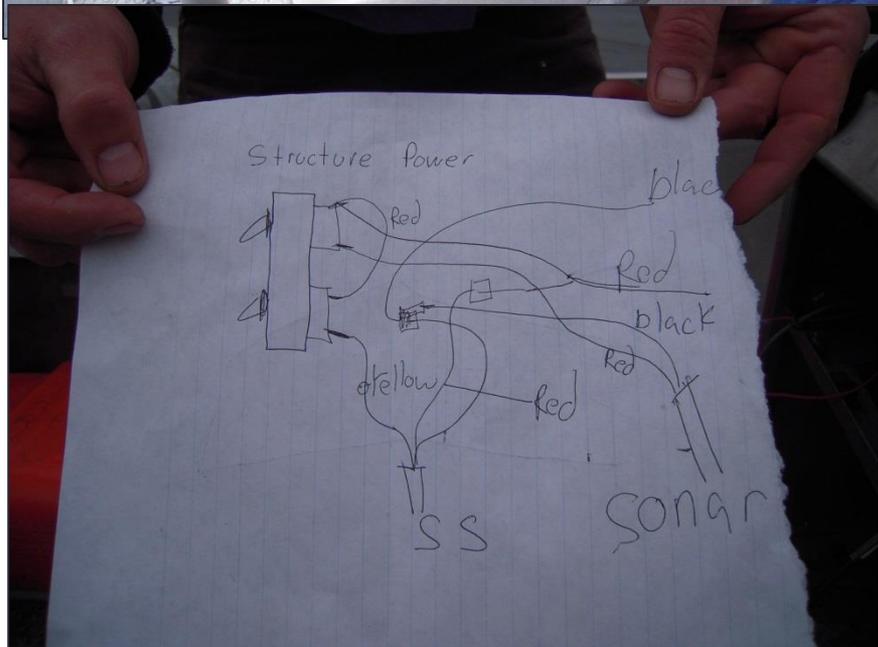
Table 4. Prescribed partial-lake treatments of Daniels Lake with pelleted (SonarONE®) formulation of fluridone in 2014-16. In addition, a one-time treatment of diquat bromide (Reward®) will be applied in June 2014 to prevent elodea from continuing to spread in Daniels Lake.

PARTIAL LAKE TREATMENTS					SonarONE® PRESCRIPTIONS								
					June 2014		Sept 2014		June 2015		June 2016		Σ
Treatment Area	Acres	Depth (ft)	Mean volume (ac-ft)	% lake volume	ppb	lbs	ppb	lbs	ppb	lbs	ppb	lbs	
1	52.1	8	416.8	3.8	60	1350	30	675	30	675	30	675	3375
2	29.1	5	145.5	1.3	60	471	30	236	30	236	30	236	1179
3	10.1	4	40.4	0.4	90	196	45	98	45	98	45	98	490
4	9.2	3	27.6	0.3	90	134	45	67	45	67	45	67	335
5	8.0	8	64.0	0.6	90	311	45	156	45	156	45	156	779
TOTAL PRODUCT (lbs)						2,151		1,076		1,076		1,076	<b>6,158</b>
COST						\$69,100		\$34,500		\$34,500		\$34,500	<b>\$172,600</b>
Theoretical lake-wide concentration (ppb)						4.21		2.10		2.10		2.10	
Theoretical in-water concentration (ppb)						2.52		1.26		1.26		1.26	

# Pre-Treatment Surveys

- Booms put on lake outlets
- Bathymetry mapping
  - Lawrence HDS Charter/Sonar with StructureScan (downscanning and side scanning)
  - calculate volume of application by depth and vegetation density
- Systematic vegetation survey
  - 50 segments per lake
  - Rake throws lakeward and shoreward



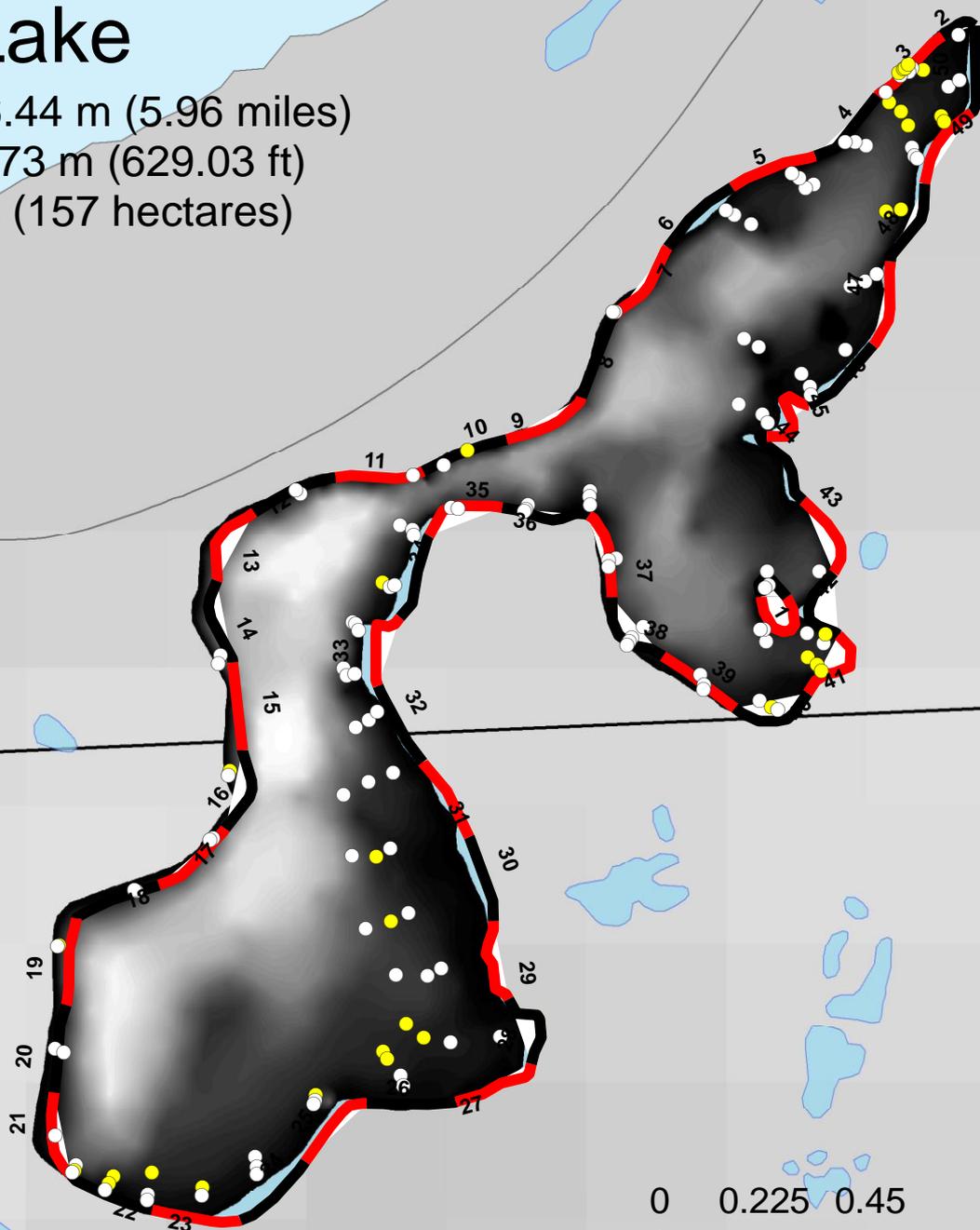


# Stormy Lake

Perimeter: 9586.44 m (5.96 miles)

Segments: 191.73 m (629.03 ft)

Area: 388 acres (157 hectares)



● Elodea Present  
○ Elodea Absent

**Depth (m)**  
High : 49  
Low : 0

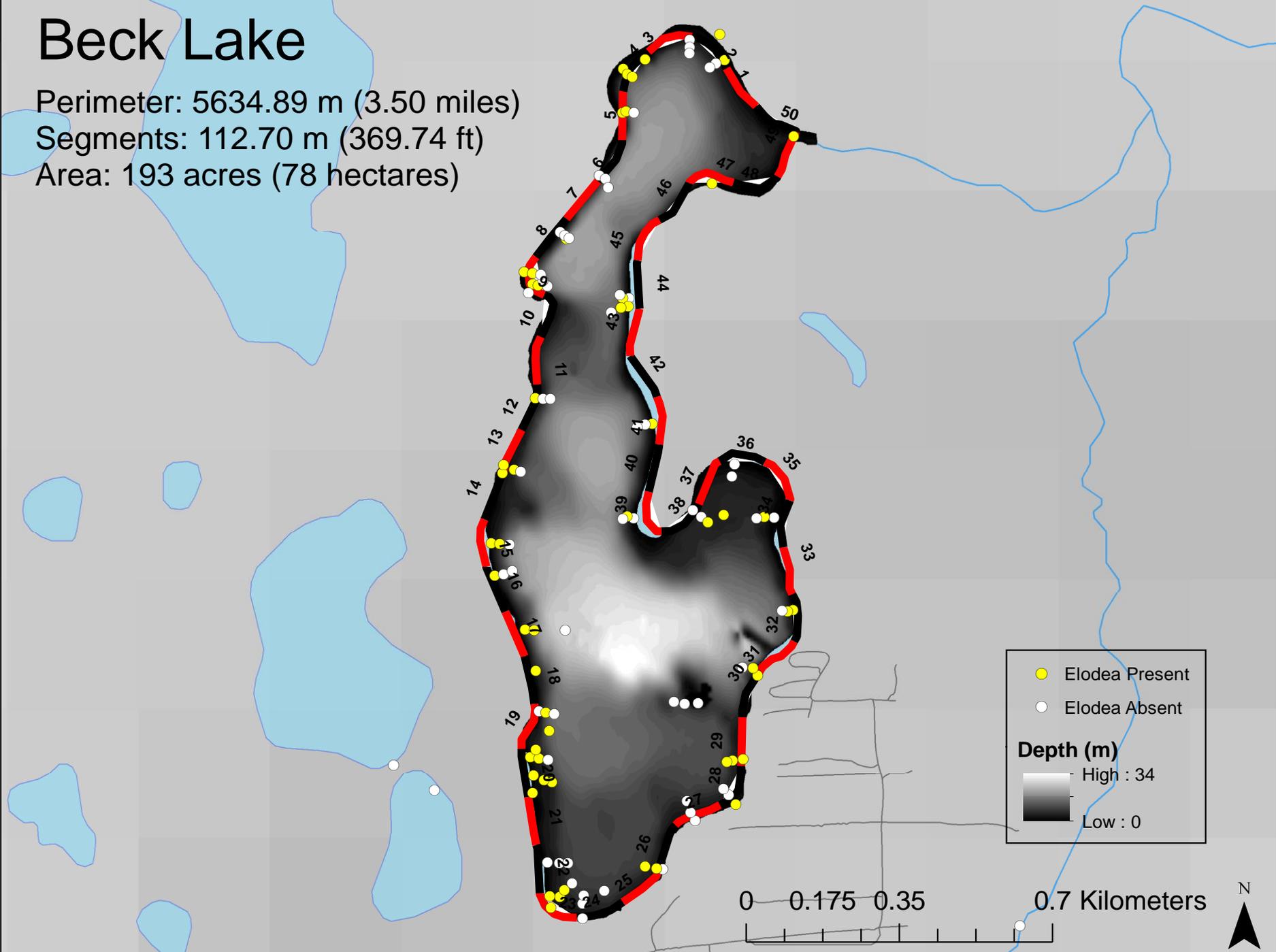


# Beck Lake

Perimeter: 5634.89 m (3.50 miles)

Segments: 112.70 m (369.74 ft)

Area: 193 acres (78 hectares)

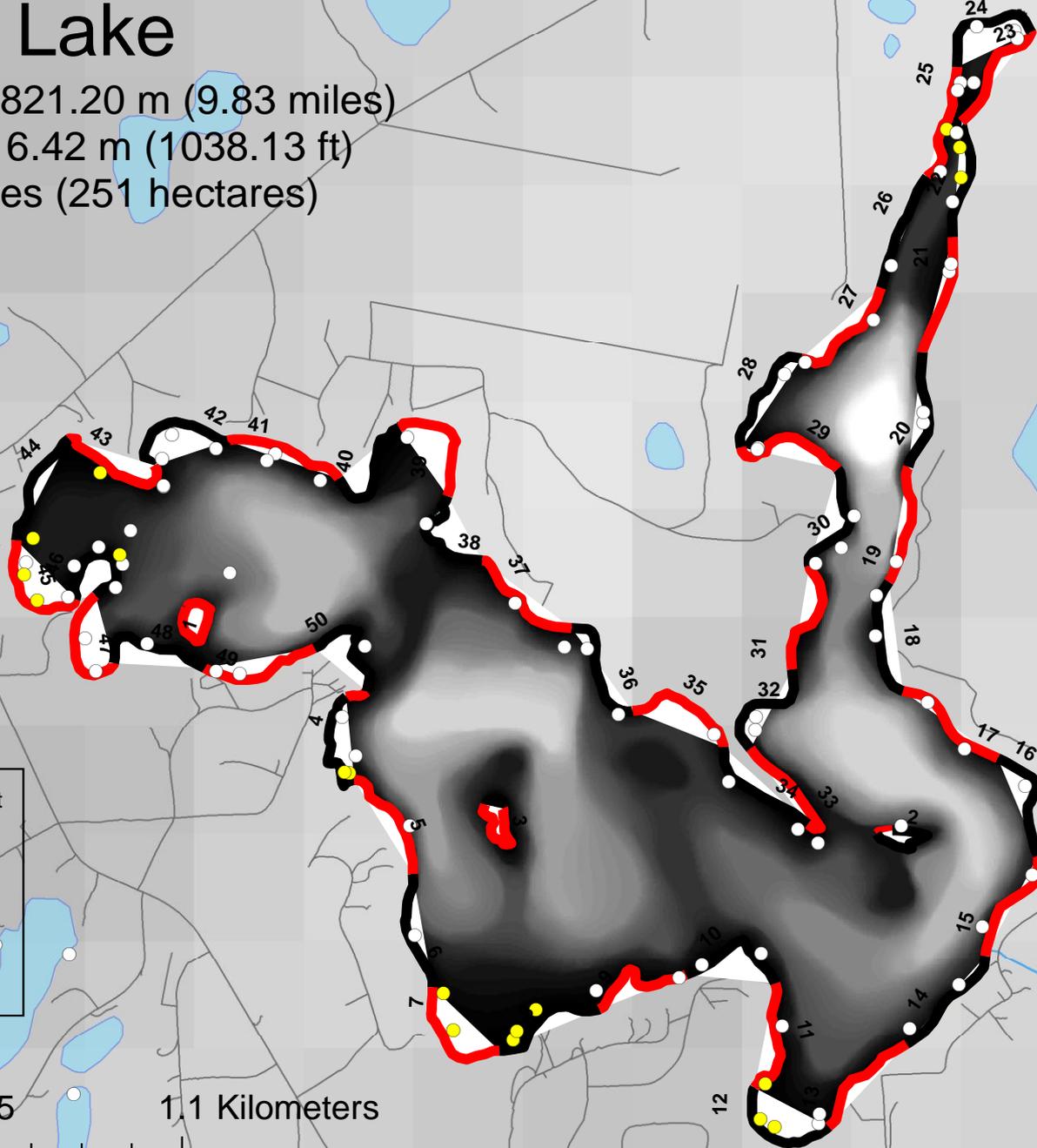
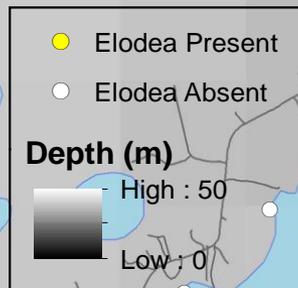


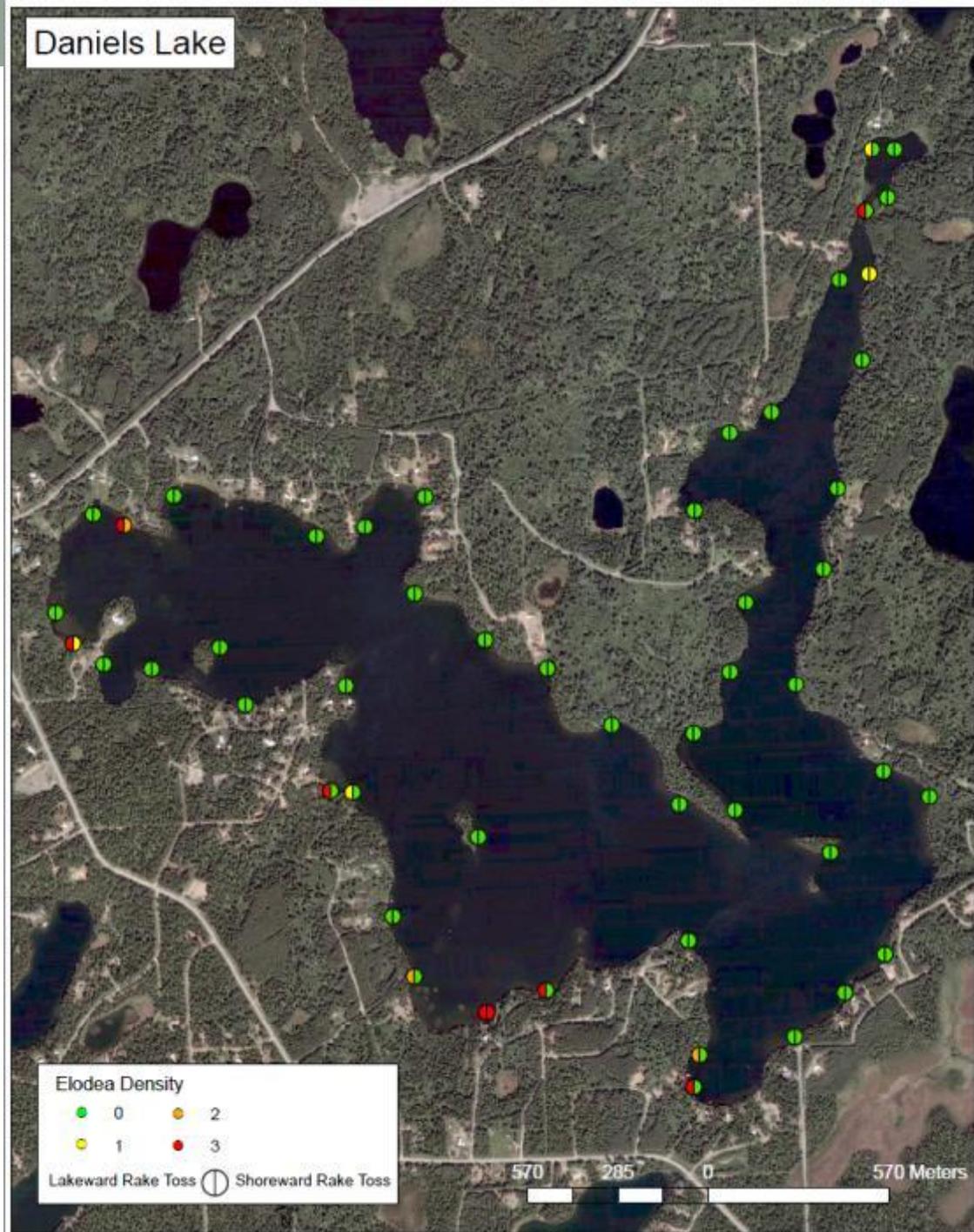
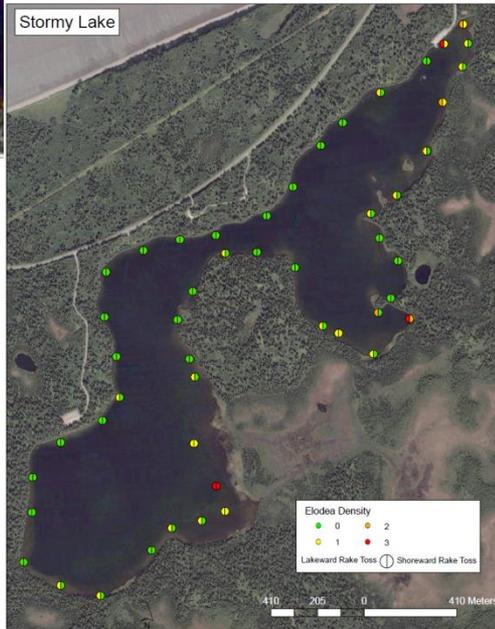
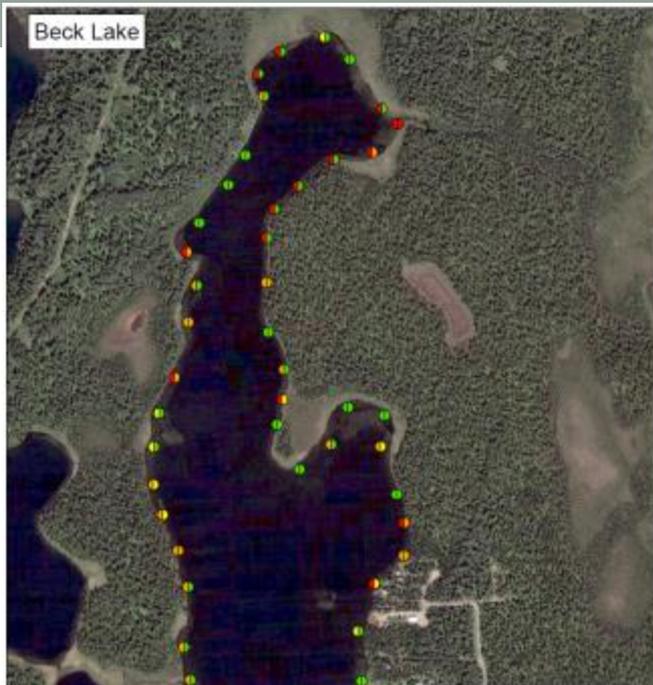
# Daniels Lake

Perimeter: 15821.20 m (9.83 miles)

Segments: 316.42 m (1038.13 ft)

Area: 621 acres (251 hectares)



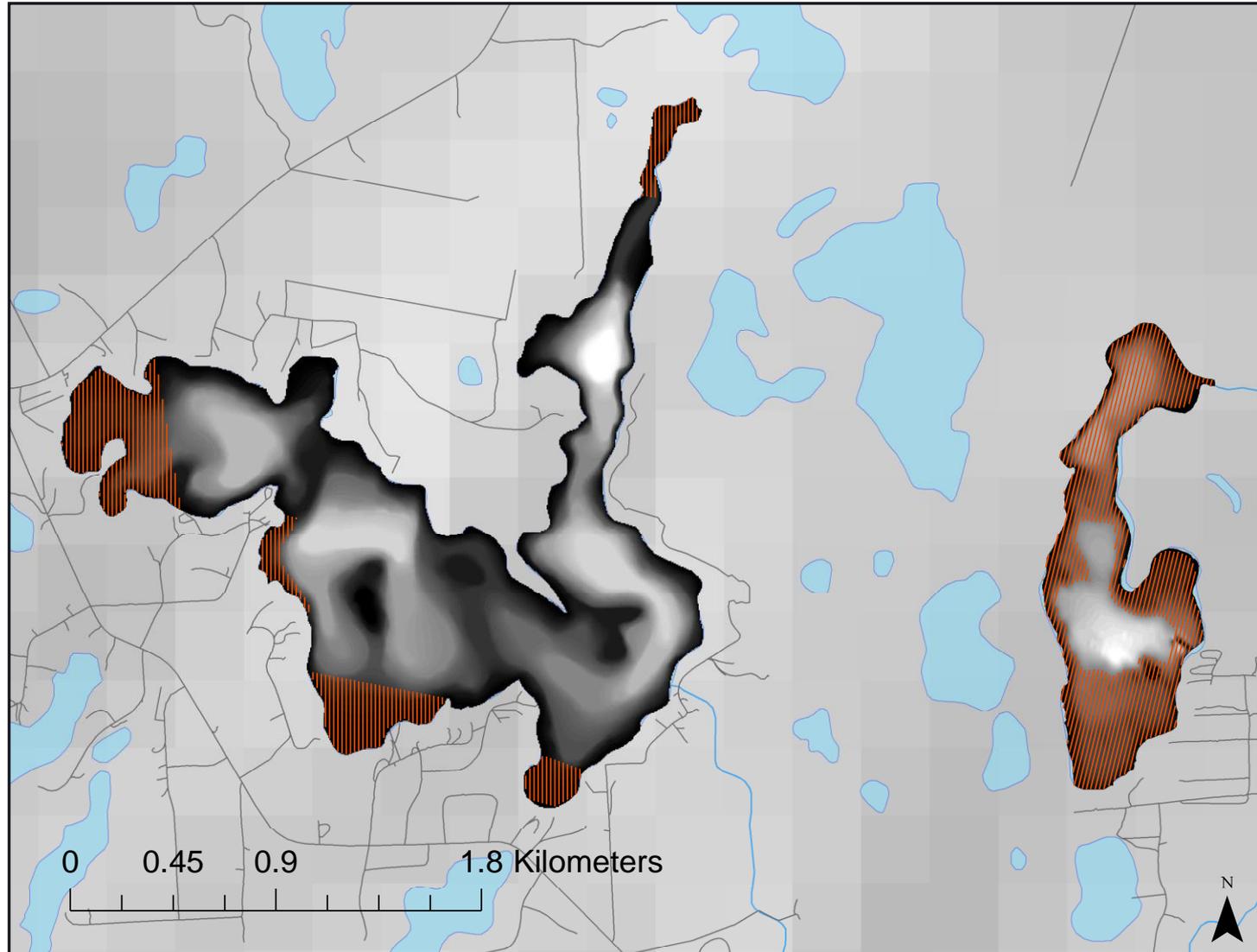


# Equipment and Preparation

- Staged at Kenai Refuge HQ
- Launch sites selected at Daniels and Beck Lakes with private owner's permission
- Three boats – one diquat pellet machine, one liquid fluridone tank, and one concierge boat to deliver and rinse
- Posted signs, contacted landowners, public notices, contacted landfill
- PPE and training

# Application

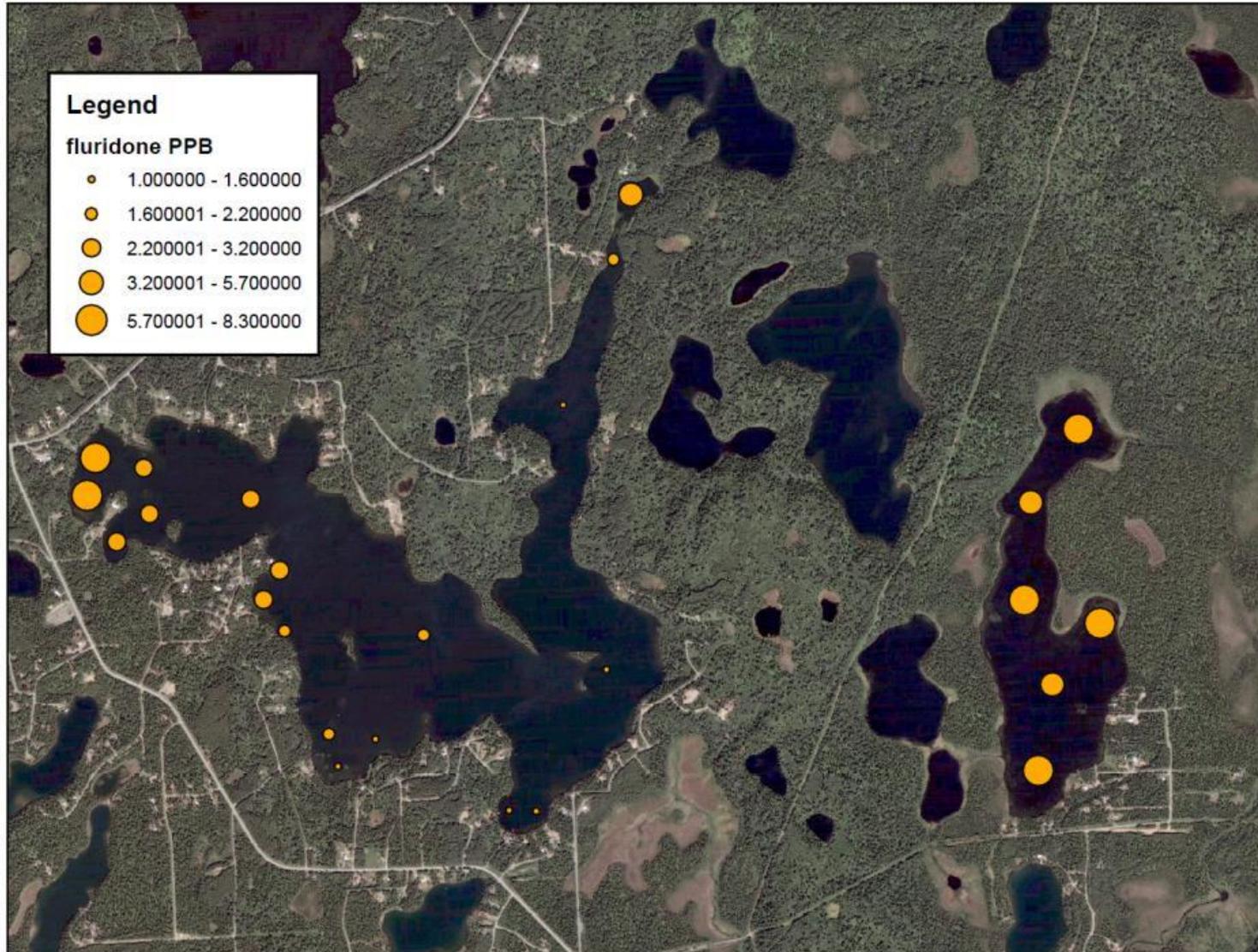
- Diquat by pellet, fluridone by liquid, delivered by boat in transects
- SePRO scientists came up to assist and set up equipment





# Monitoring

- FasTEST water analysis
- Vegetation segment resurveys
- Macro-invertebrate and plankton surveys



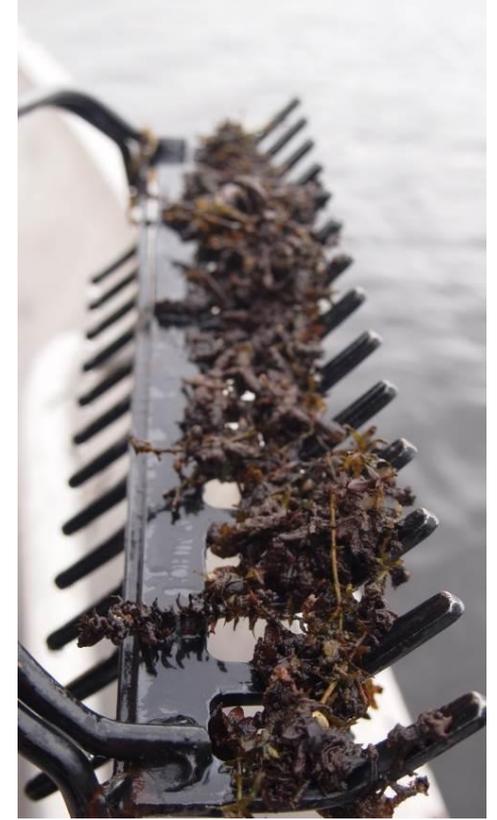
# Is it working?



**2 weeks (Stormy)**

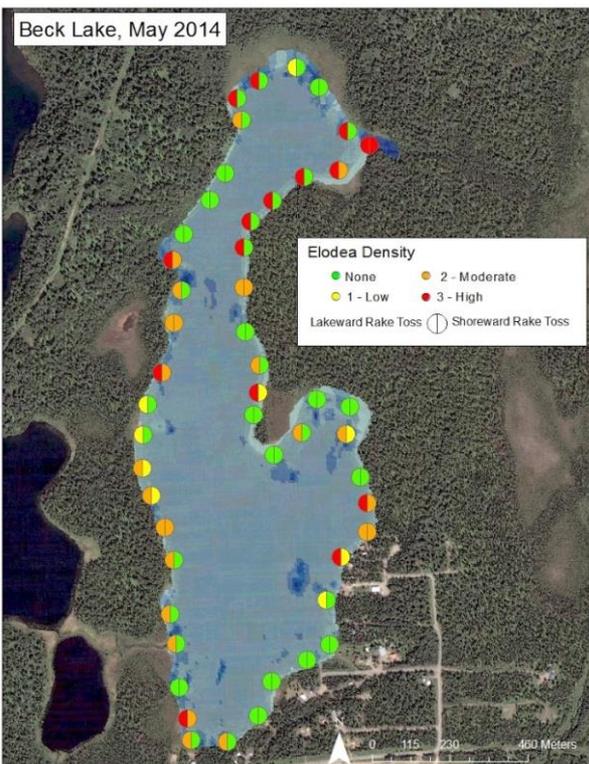


**8 weeks (Beck)**

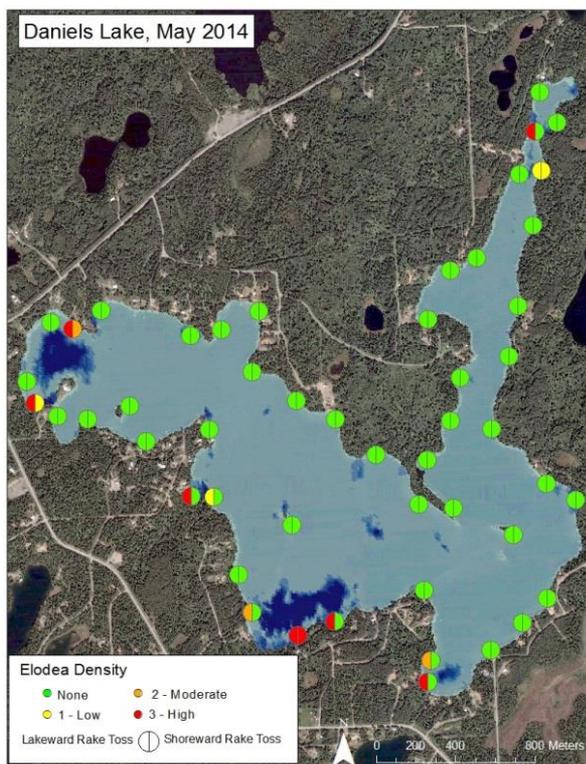


**14 weeks (Beck)**

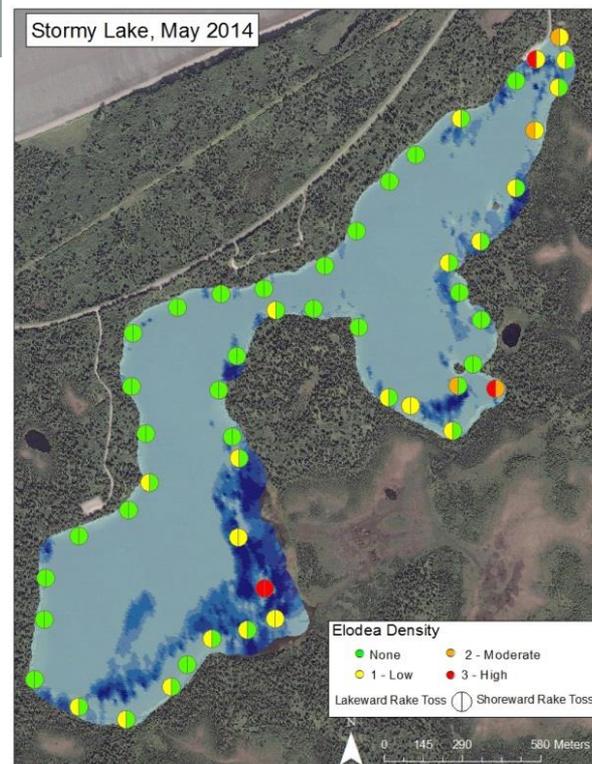
Beck Lake, May 2014



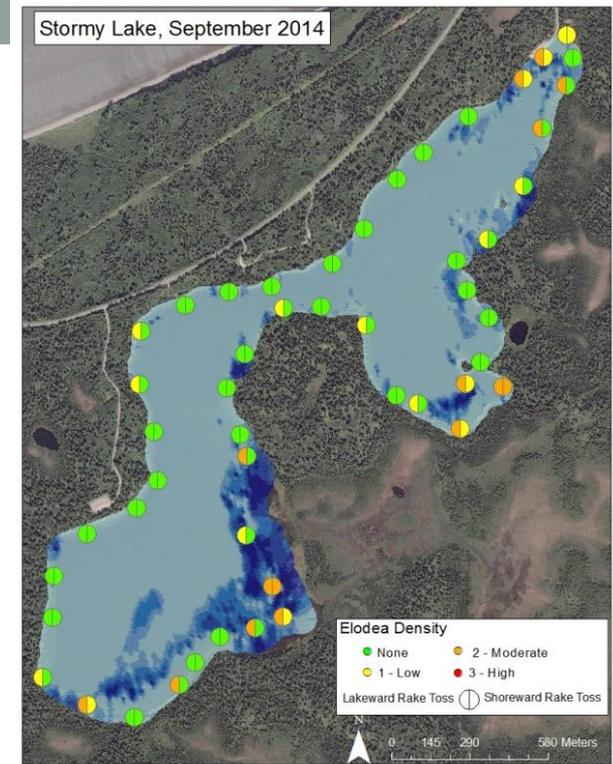
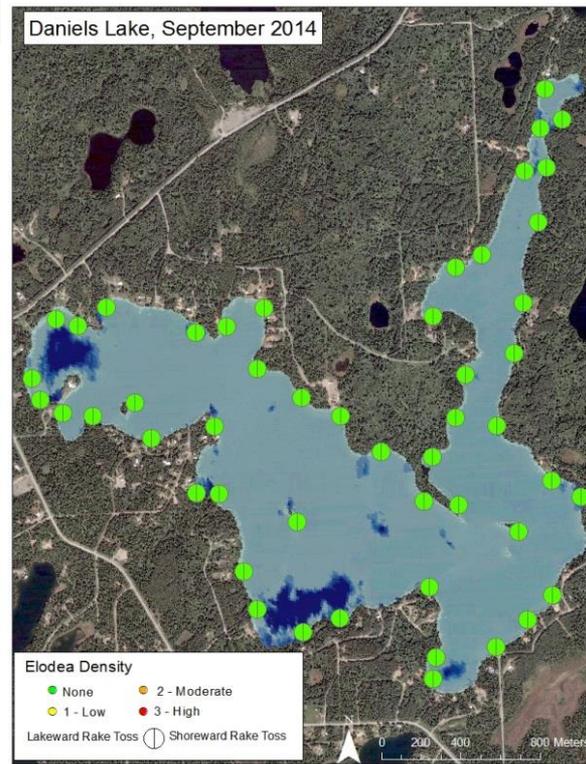
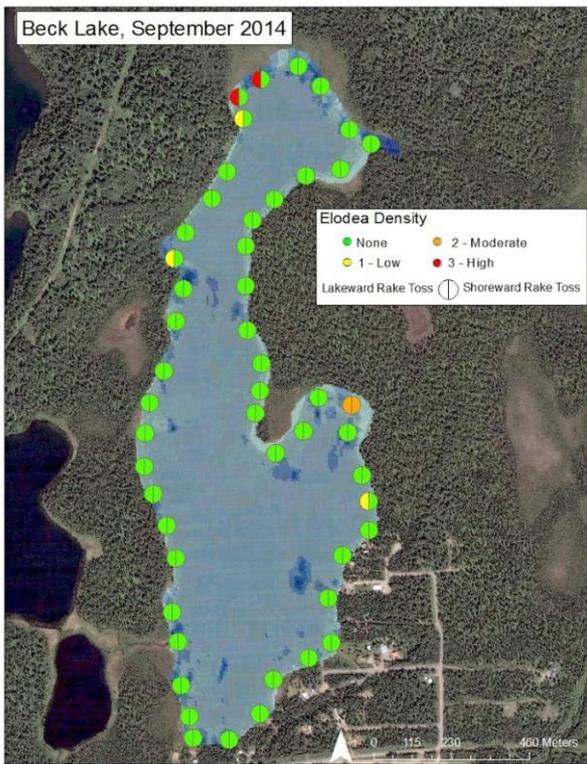
Daniels Lake, May 2014



Stormy Lake, May 2014



LAKE	Beck		Daniels		Stormy	
TREATMENT	PRE	POST	PRE	POST	PRE	POST
% occurrence	70		22		50	
Mean relative abundance	1.49		1.55		0.75	



LAKE	Beck		Daniels		Stormy	
TREATMENT	PRE	POST	PRE	POST	PRE	POST
% occurrence	70	<b>12</b>	22	<b>0</b>	50	<b>46</b>
Mean relative abundance	1.49	<b>0.18</b>	1.55	<b>0</b>	0.75	<b>0.78</b>

# Challenges

- Leveraging funding effectively
- Cross boundary jurisdiction
- Interest level and ability by jurisdiction
- Distribution of statewide infestation
- High reinfestation probability if not systematically treated
- Climate effects known, but not published
- Vectors known, but not published
- Stakeholder buyoff on treatment options



# Lessons Learned

- **Clear management goal**
  - eradicate from Kenai Peninsula
  - understand the problem (no jurisdictional boundaries, no time to waste)
- **Dedicated interagency project team**
  - include private landowners
- **Find the right experts**
  - SePRO, Lars Anderson, Don Les
- **Adaptive IPM plan**
  - don't be discouraged by lack of funds if you have clarity of vision
- **Outreach to generate support**
  - general public, targeted stakeholders, potential funders
- **The hard work is planning, fund raising, NEPA/permit process**
  - easy work is field application



Vegetation from Lake Hood on Refuge Supercub rudder, flying back to Soldotna

# What's Next

- Continue FasTEST monitoring
- Apply treatment after ice-out (pellet SONAR)
- Monitor to evaluate treatment success and effects (elodea presence, native plant presence, plankton, macroinvertebrates, etc.)
- Assist statewide survey and mapping efforts
- Guide other locations in effective treatment, funding, and stakeholder meeting strategies
- Support and develop extended studies – economic analysis, quantified vector/transmission analysis



# Kenai Elodea Team

- USFWS
- ADNR
- ADF&G
- CIAA
- KPCWMA
- SePRO
- Homer SWCD
- CES
- NPS
- USFS
- Friends of Alaska NWR
- Local Citizens

All photos/materials by me/refuge unless otherwise noted

