

Responding rapidly to Elodea – the first freshwater invasive plant in Alaska



John Morton, Matt Bowser & Todd Eskelin
Kenai National Wildlife Refuge



Elodea was recognized early as bad...

- ✓ It's prolific!
- ✓ Reproduces vegetatively
- ✓ Spreads easily
- ✓ Grows under the ice
- ✓ Impedes boat traffic
- ✓ Reduces property values
- ✓ Anoxic conditions in extreme cases
- ✓ Severely impairs fish habitat



Invasive elodea threatens remote
ecosystem services in Alaska:
A spatially-explicit bioeconomic risk analysis

By

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A Dissertation Submitted in Partial Fulfillment of the Requirements

for the Degree of

Doctor of Philosophy

in

Interdisciplinary Sciences: Socio-bioeconomics

University of Alaska Fairbanks

May 2017

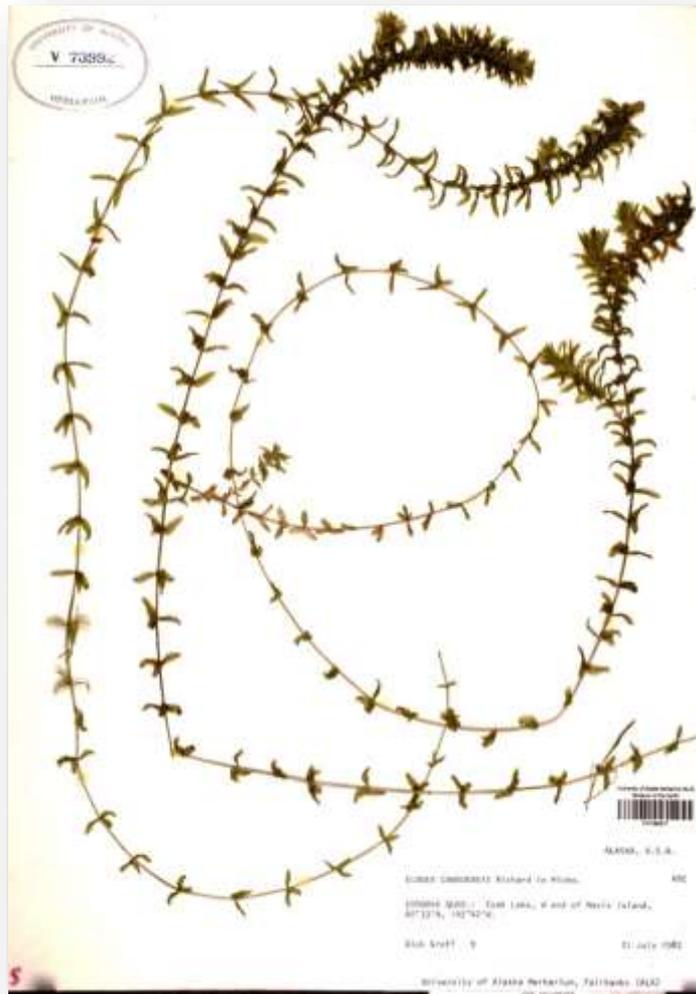
APPROVED:

Dr. Joseph Little, Committee Chair
Dr. Milo Adkison, Committee Member
Dr. Jungho Baek, Committee Member
Dr. Greg Hayward, Committee Member
Dr. John Morton, Committee Member
Dr. Joseph Little, Chair
Department of Economics
Dr. Mark Herrmann, Dean
School of Management
Dr. Michael Castellini, Dean
Graduate School

Salmon habitat
degradation will likely cost
statewide commercial
sockeye industry ~\$100
million annually



Eyak Lake, Cordova



1982



2015







05.15.2007









10195727



Community Elodea Information Meeting

Nikiski Community Recreation Center
Mile 23.4 Kenai Spur Highway

Tuesday February 19th, 2013
6 - 8:30PM

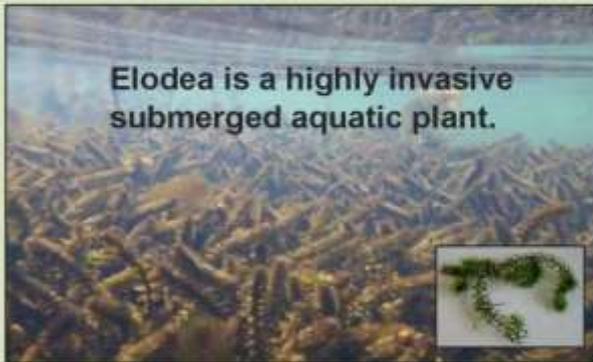


Please join us for a community meeting to discuss what to do about the discovery of Elodea in Stormy & Daniels Lakes.

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

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



INTEGRATED PEST MANAGEMENT PLAN FOR ERADICATING ELODEA FROM THE KENAI PENINSULA

April 2014

Prepared by

Elodea Subcommittee of the Kenai Peninsula Cooperative Weed Management Area

John M. Morton (USFWS Kenai National Wildlife Refuge, Soldotna)
Brianna N. Blackburn (AK Department of Natural Resources, Palmer)
Elizabeth Bella (USFWS Kenai National Wildlife Refuge, Soldotna)
Matt Steffy (Homer Soil & Water Conservation District, Homer)
Cheryl Anderson (USFWS Kenai Fish & Wildlife Field Office, Soldotna)
Rob Massengill (Alaska Department of Fish and Game, Soldotna)
Jack Blackwell (AK State Parks, Soldotna)
Lisa Ka'aihue (Cook Inlet Aquaculture Association, Kenai)
Rebecca Zulueta (Kenai Watershed Forum, Soldotna)
Janice Chumley (UAF Cooperative Extension Service, Soldotna)
Michele Aranquiz (Kenai Peninsula Borough Mayor's Office, Soldotna)
Cecil Rich (USFWS Regional Office, Anchorage)

In consultation with:

Lars Anderson (Waterweed Solutions, Davis)
Donald H. Les (University of Connecticut, Storrs)
Scott Schuler (SePRO Corporation, Carmel, IN)
Andrew Skibo (SePRO Corporation, Fort Collins, CO)

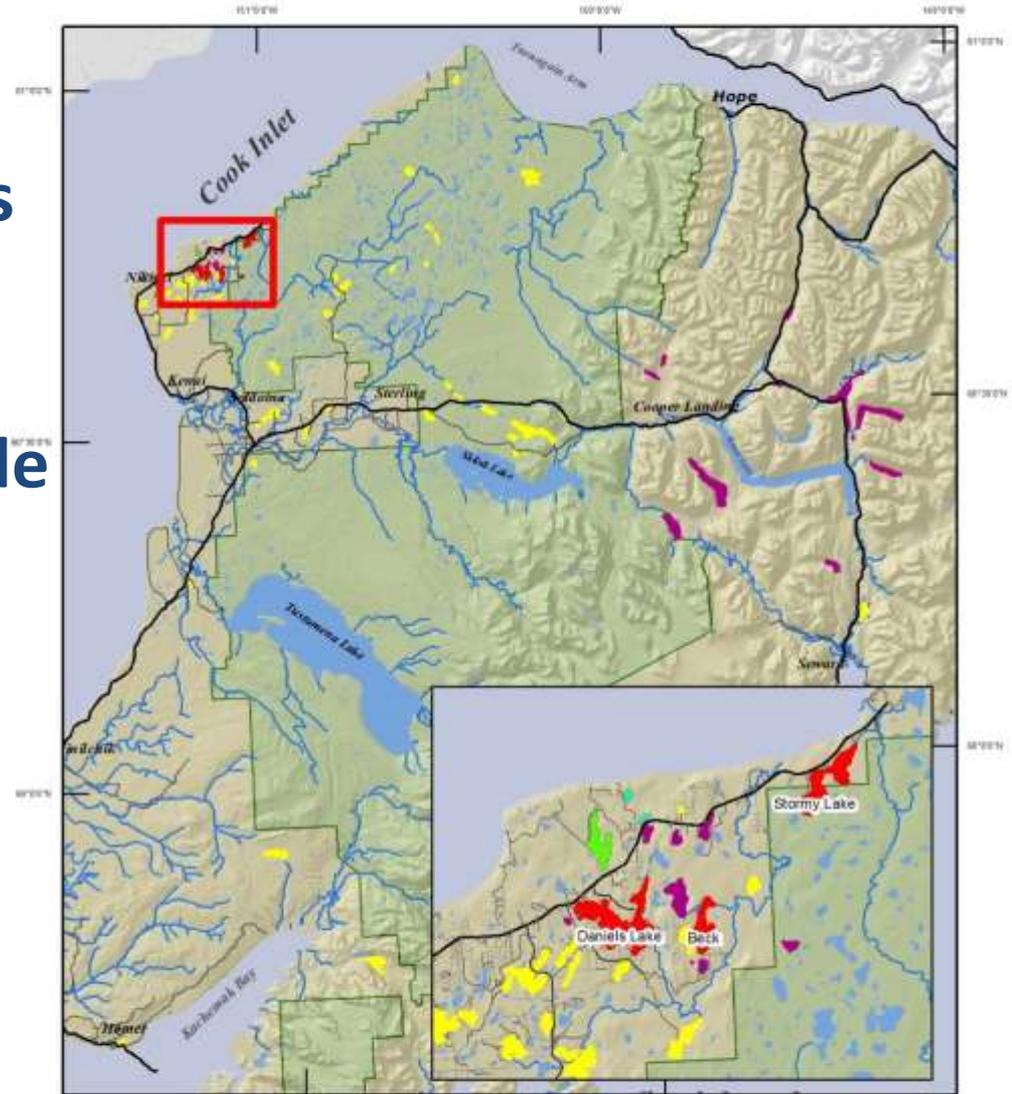


**Cooperative Weed
Management Area**





Surveyed 100+ at-risk lakes before (and during) treatments to assess feasibility of peninsula-wide eradication...

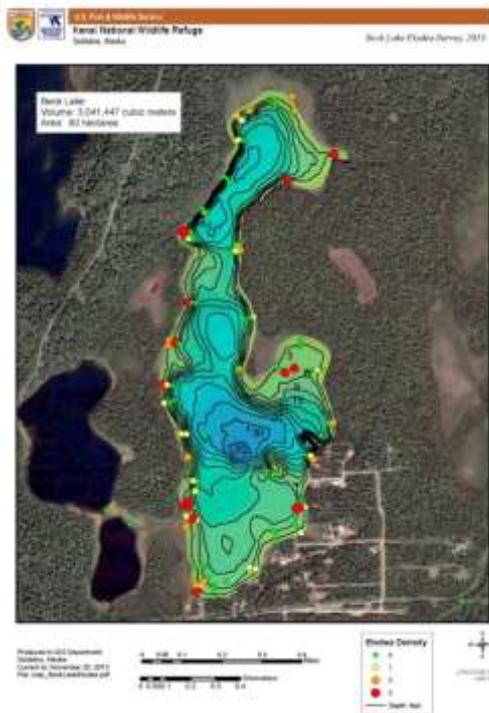


Produced in GIS Department
Soldotna, Alaska
Current to: 08/11/2016

0 5 10 20 Miles

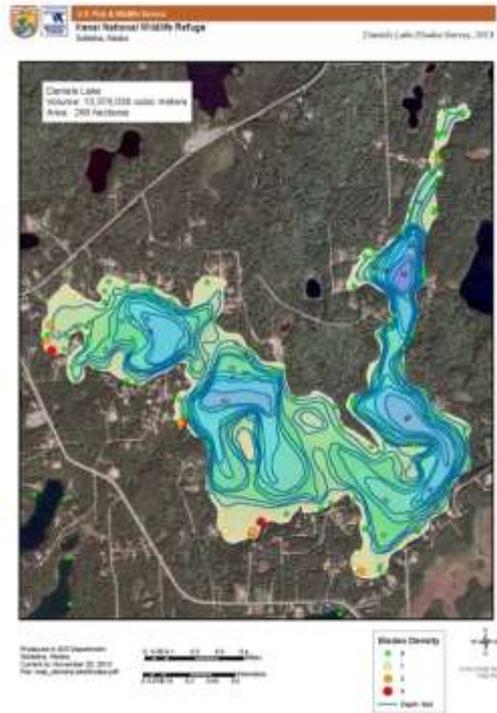


Beck Lake (200 ac) whole treatment



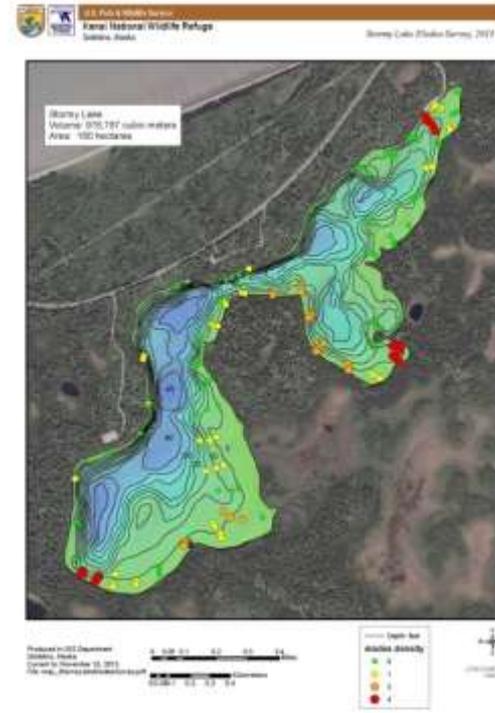
- Some private landowners
- Floatplanes
- NO public access
- Flows into Bishop Creek
- Rainbow trout

Daniels Lake (640 ac) partial treatment



- All private landowners
- Floatplanes
- 1 community boat launch
- Flows into Bishop Creek
- Sockeye salmon

Stormy Lake (400 ac) whole treatment



- State Parks/KENWR
- 1 public boat launch
- Flows into Swanson River
- Arctic char

Fluridone kills elodea systemically and selectively with few nontarget effects

- ✓ Absorbed via roots and shoots (systemic)
- ✓ Inhibits carotenoid synthesis (photosynthesis) and elodea is particularly sensitive (selective)
- ✓ Needs to be in water column (4–10 ppb) 45–90 days
- ✓ Applied as liquid or slow-release pellets
- ✓ Degrades by photolysis, adsorption, absorption
- ✓ No swimming, potable water or fishing restrictions (<150 ppb)



PRESCRIBED: 4 herbicide treatments over 3 years (2014-16) to eradicate elodea

	Beck	Stormy	Daniels	Cost
acres	200	400	660 (100)	
approach	WHOLE	WHOLE	PARTIAL	
June 2014	liquid/pellet fluridone	liquid/pellet fluridone	diquat fluridone	\$360k
Sept 2014	pellet	pellet	pellet	
June 2015	pellet	pellet	pellet	\$144k
June 2016	pellet	pellet	pellet	\$116k
cost	\$113K	\$320K	\$197K	\$620K

ACTUAL: 2+ herbicide treatments over 2 years (2014-15) to eradicate elodea

	Beck	Stormy	Daniels	Cost
acres	200	400	660 (100)	
approach	WHOLE	WHOLE	PARTIAL	
June 2014	liquid/pellet fluridone	liquid/pellet fluridone	diquat fluridone	\$360k
Sept 2014	pellet	pellet	pellet	
June 2015	pellet	pellet*	pellet*	\$144k
June 2016	pellet	pellet	pellet	\$116k

Application equipment



Pellet blower for SonarONE



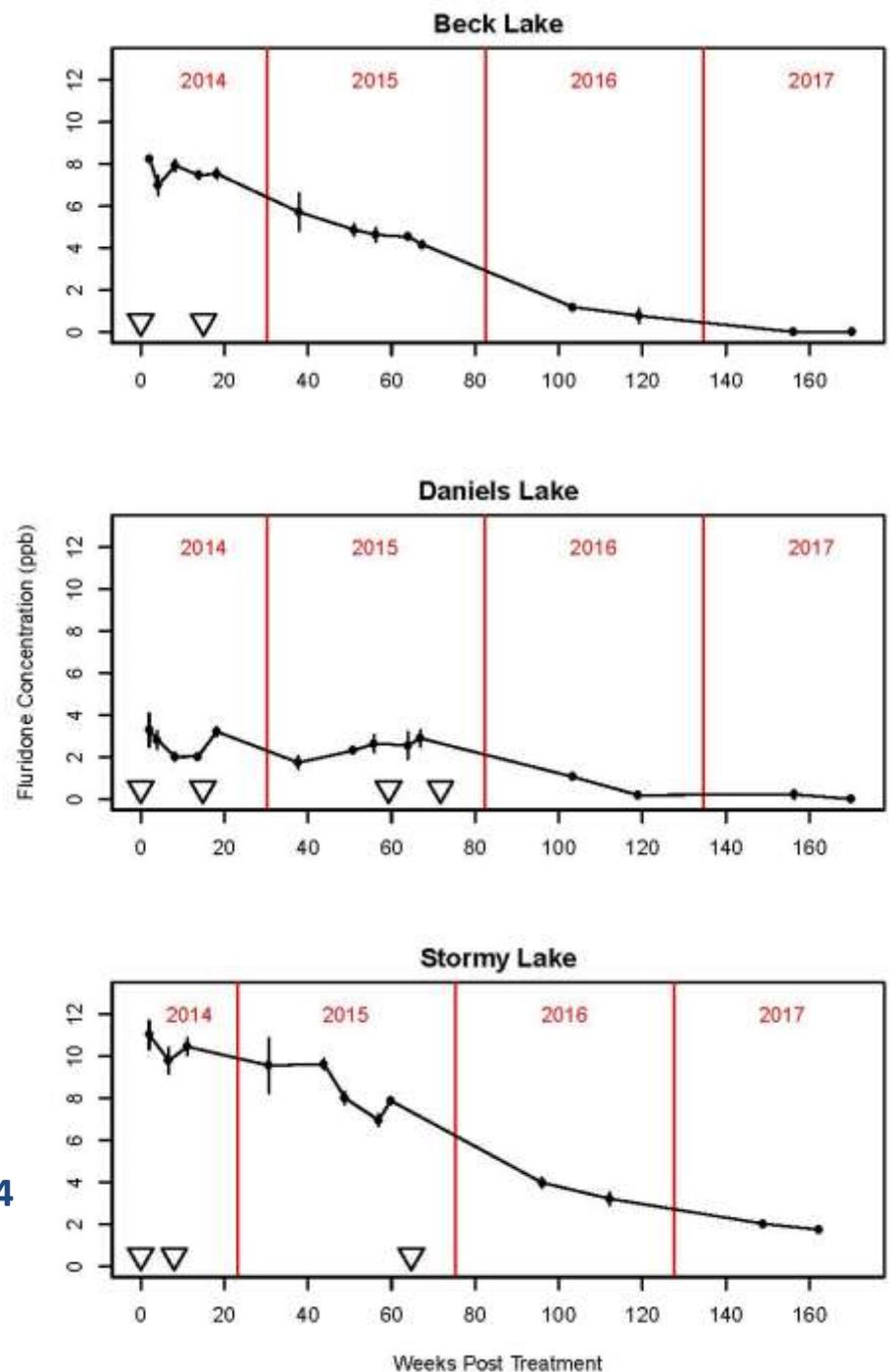
Pump for Sonar Genesis, Diquat



Did it work?



- 1st application (Beck, Daniels) 3-4 Jun 2014
- 1st application (Stormy) 23 Jul 2014
- 2nd application (Beck, Daniels, Stormy) 16-17 Sep 2014
- 3rd application (Daniels) 24 Jul 2015
- 4th application (Daniels) 19 Oct 2015



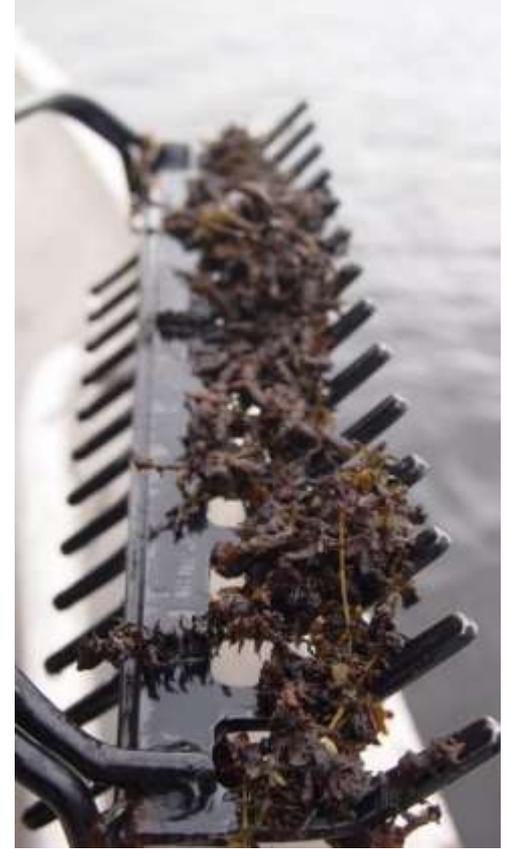
Did it work?



2 weeks (Stormy)

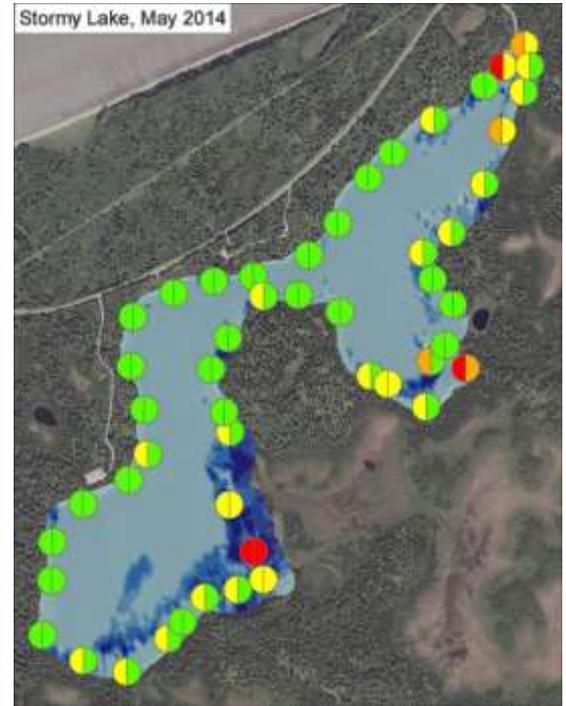
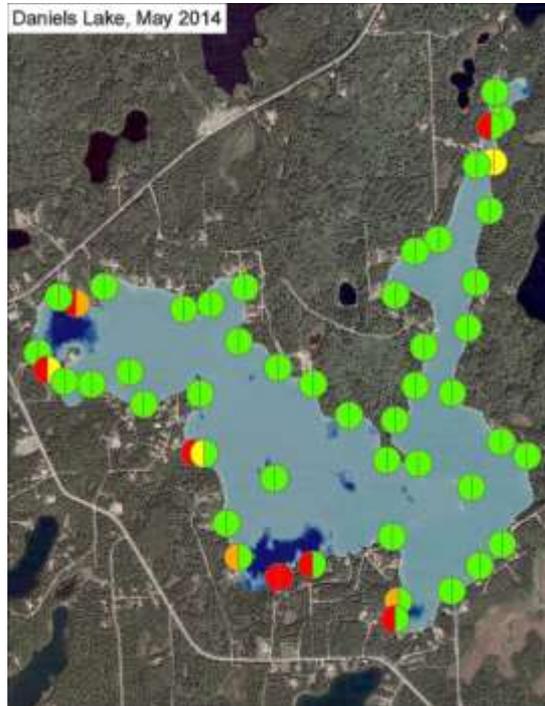
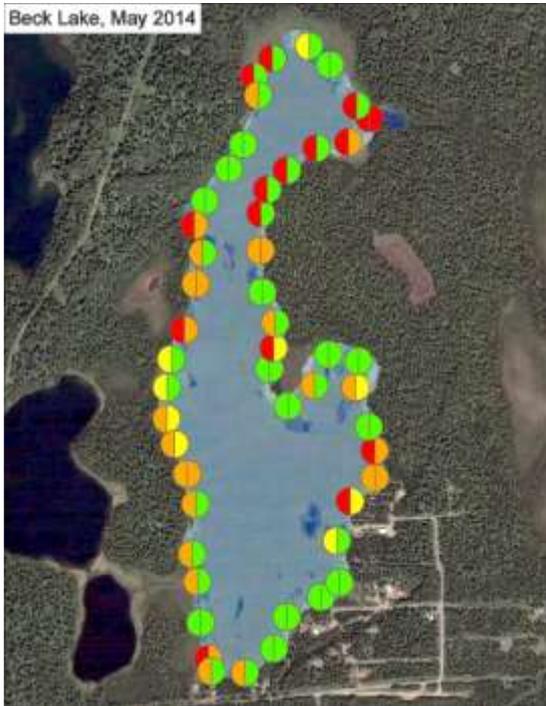


8 weeks (Beck)



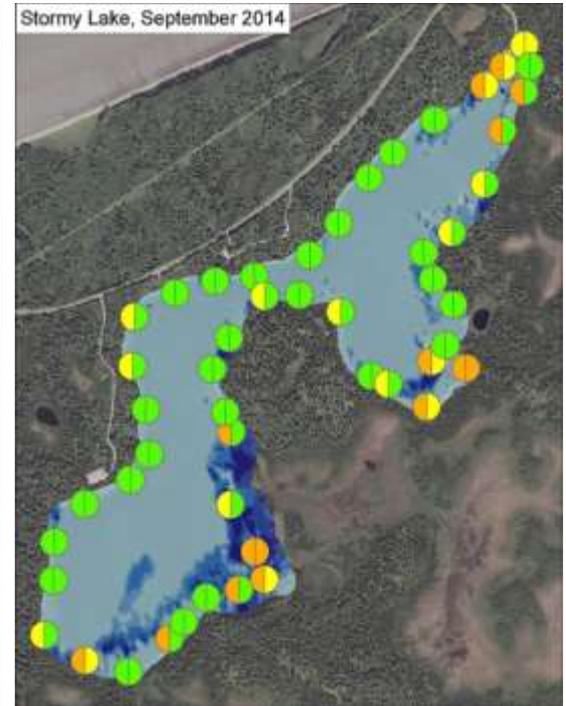
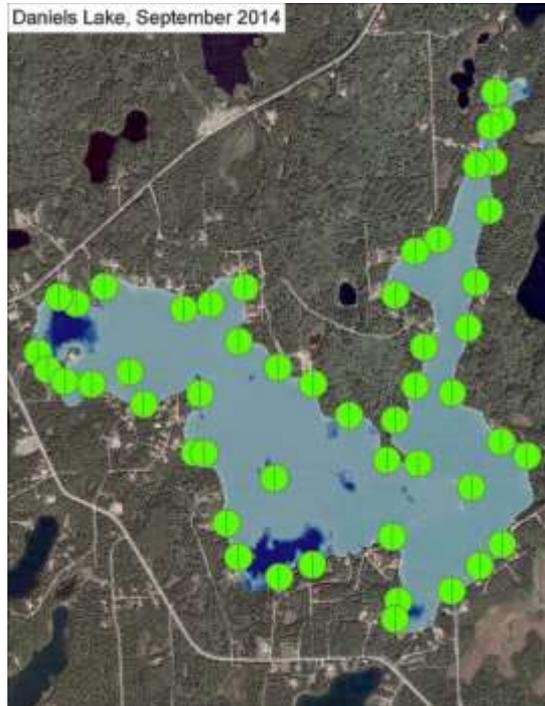
14 weeks (Beck)

Did it work?



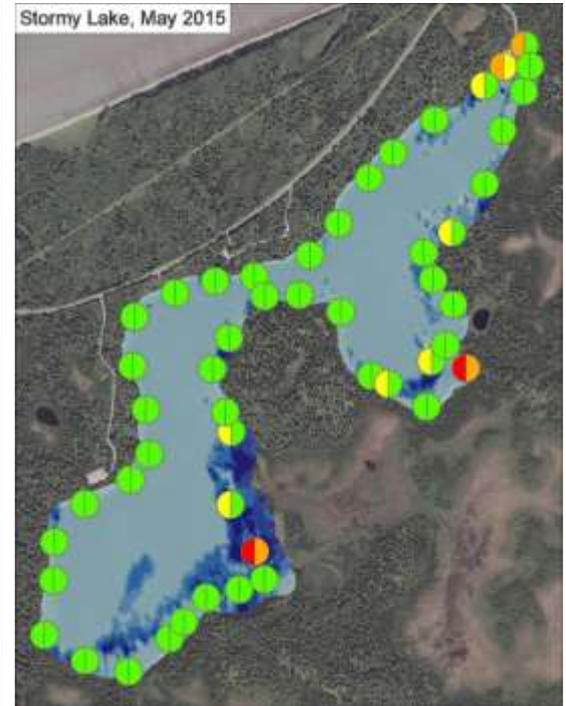
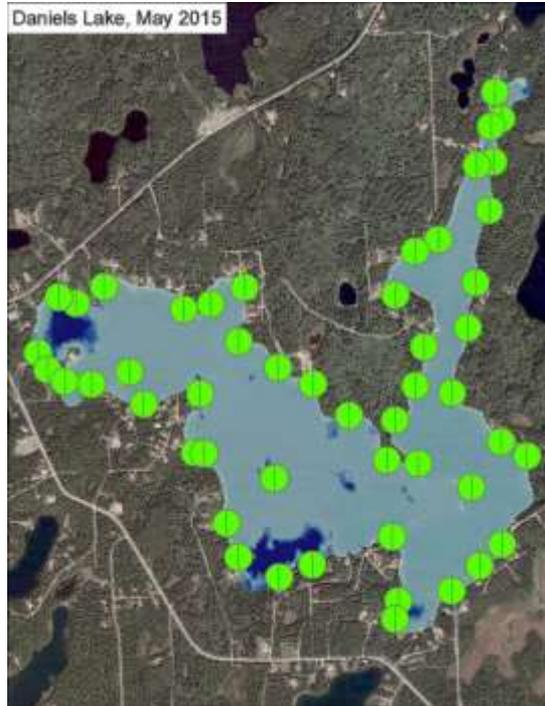
SURVEY	LAKE		
	Beck	Daniels	Stormy
May 2014 (pre-trmt)	70	22	50

Did it work?



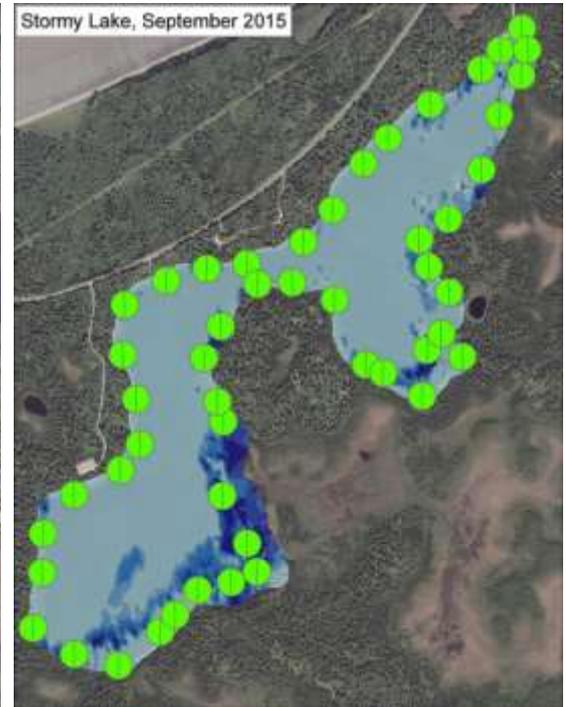
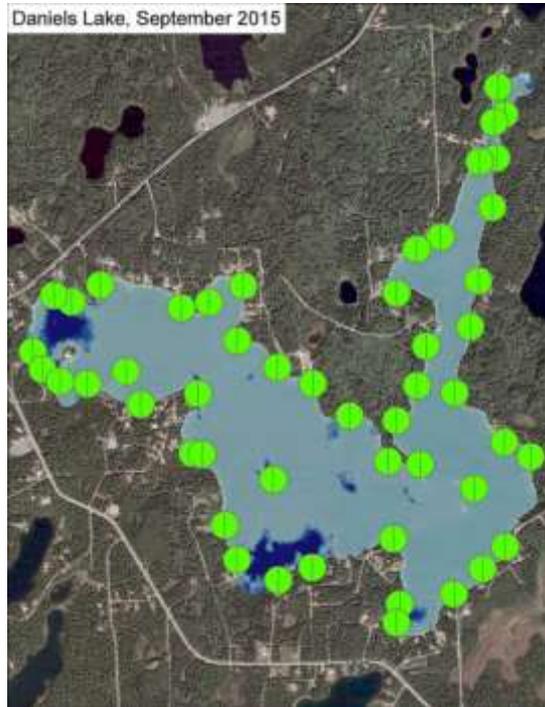
SURVEY	LAKE		
	Beck	Daniels	Stormy
May 2014 (pre-trmt)	70	22	50
Sept 2014 (post)	12	0	46

Did it work?



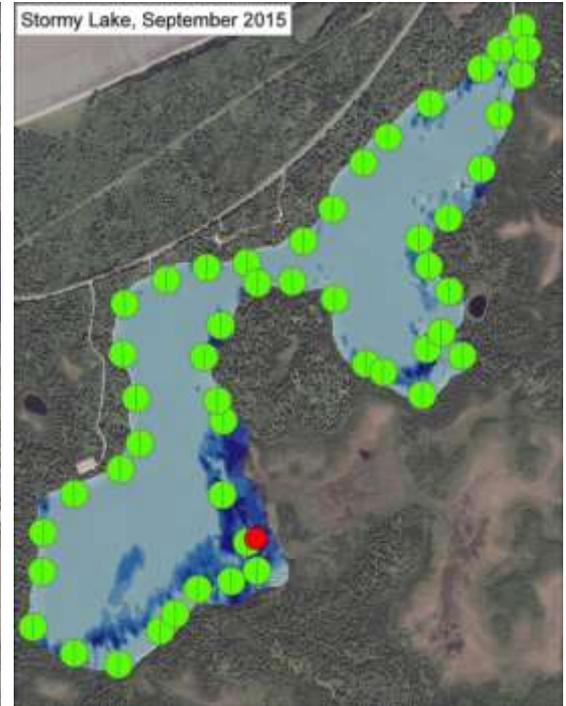
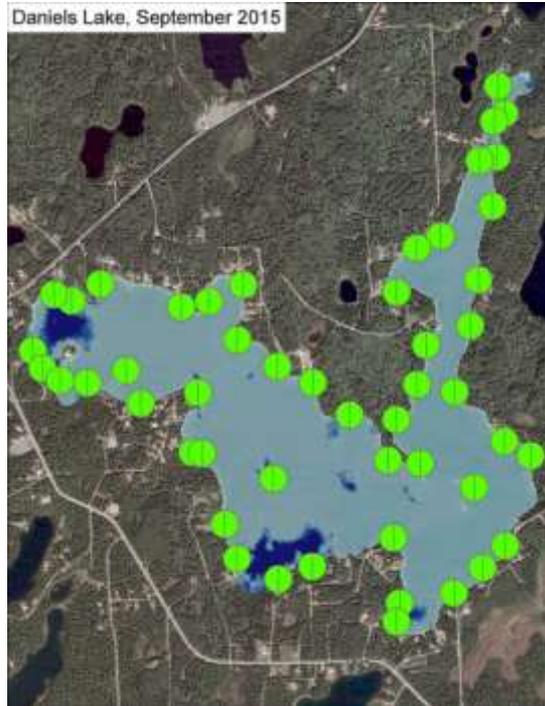
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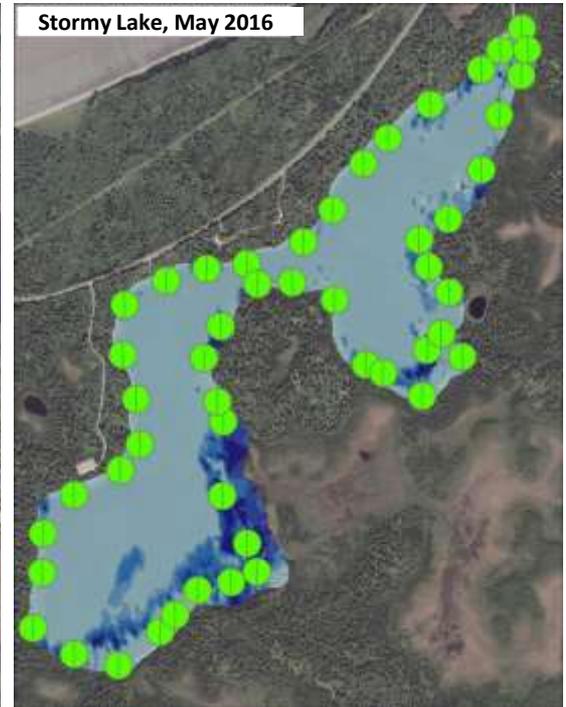
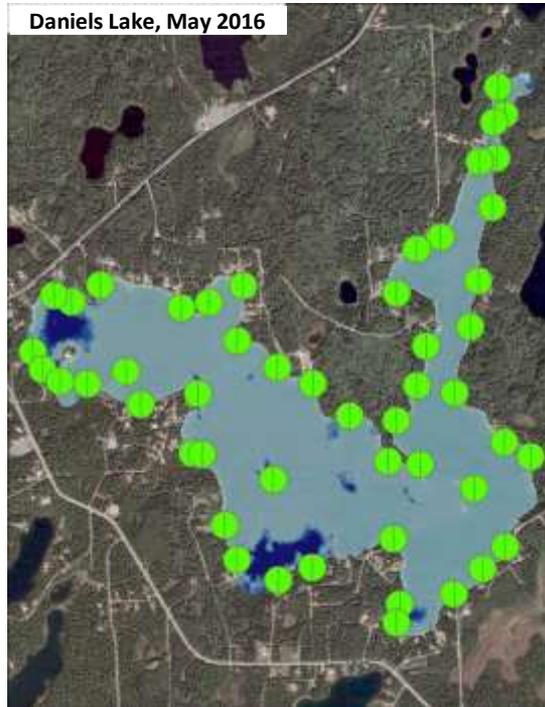
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Did it work?



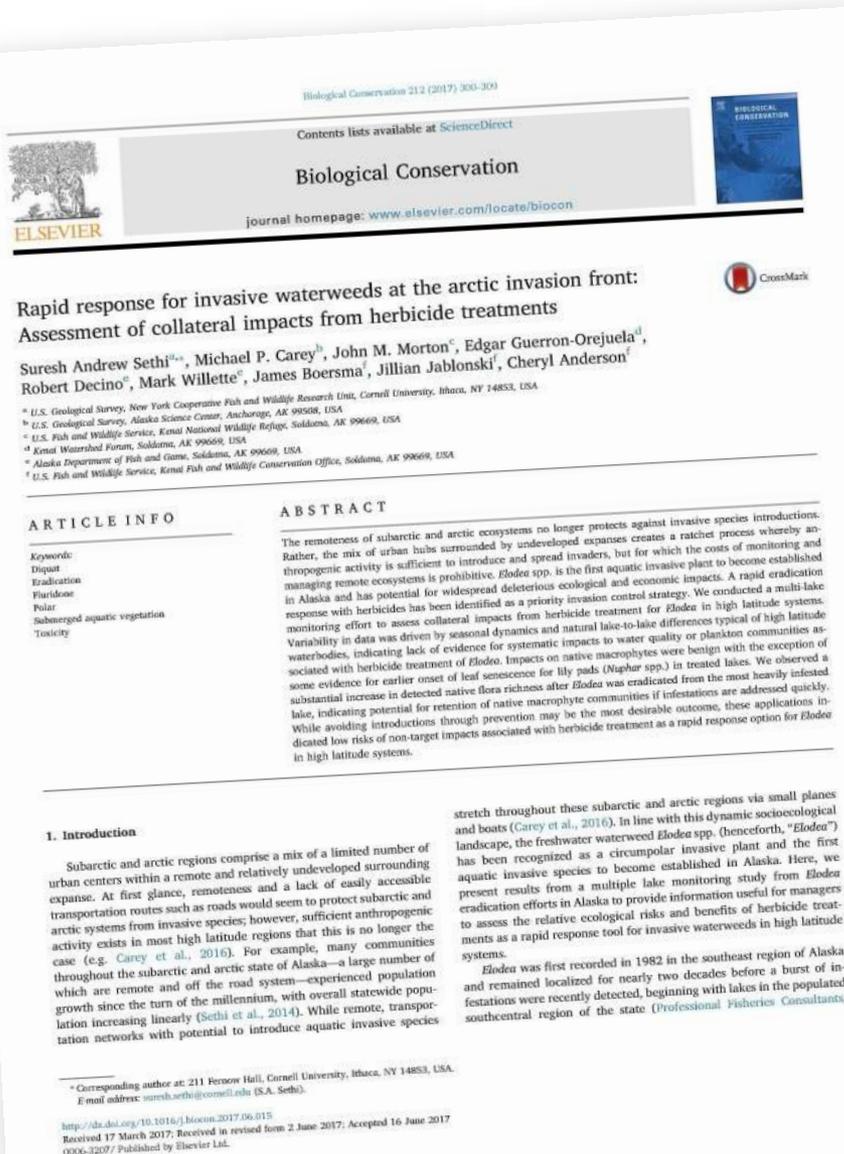
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	Beck	Daniels	Stormy
May 2014 (pre-trmt)	70	22	50
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Sept 2015 (post)	0	0	0*
May 2016 (post)	0	0	0

Secondary effects of fluridone



- No systemic effects on zooplankton
- No systemic effects on water quality
- Some necrosis, loss of non-target plants



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E-mail address: suresh.sethi@cornell.edu (S.A. Sethi).

Why Kenai cares about other parts of Alaska.....



**PETCO,
Soldotna**



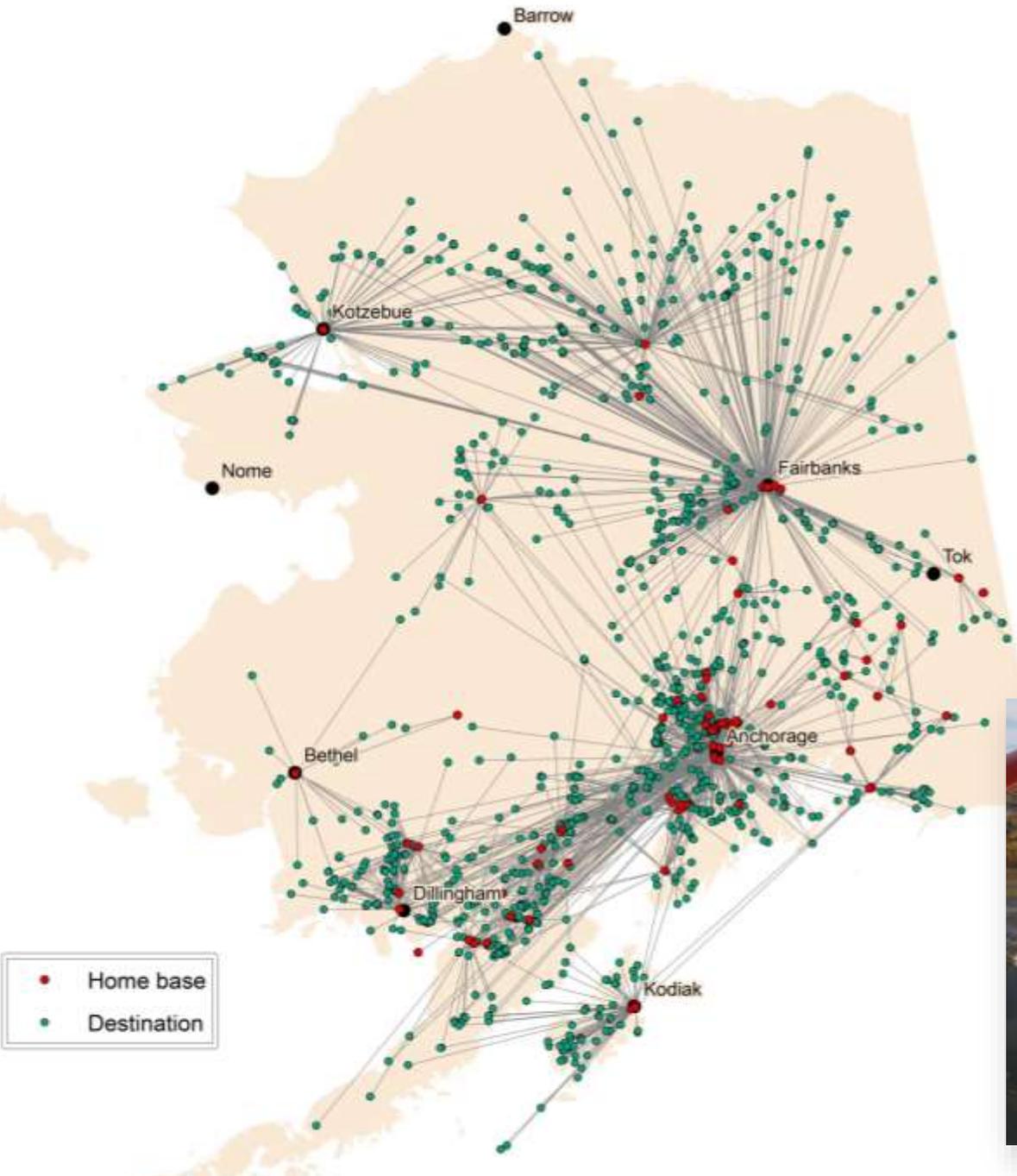
Cordova



**Sports
Lake**



Floatplane destinations





Sports Lake
Feb 2017
E. canadensis

**With permit
exemptions,
2 new infestations
detected in 2017
eradicated by 2018**

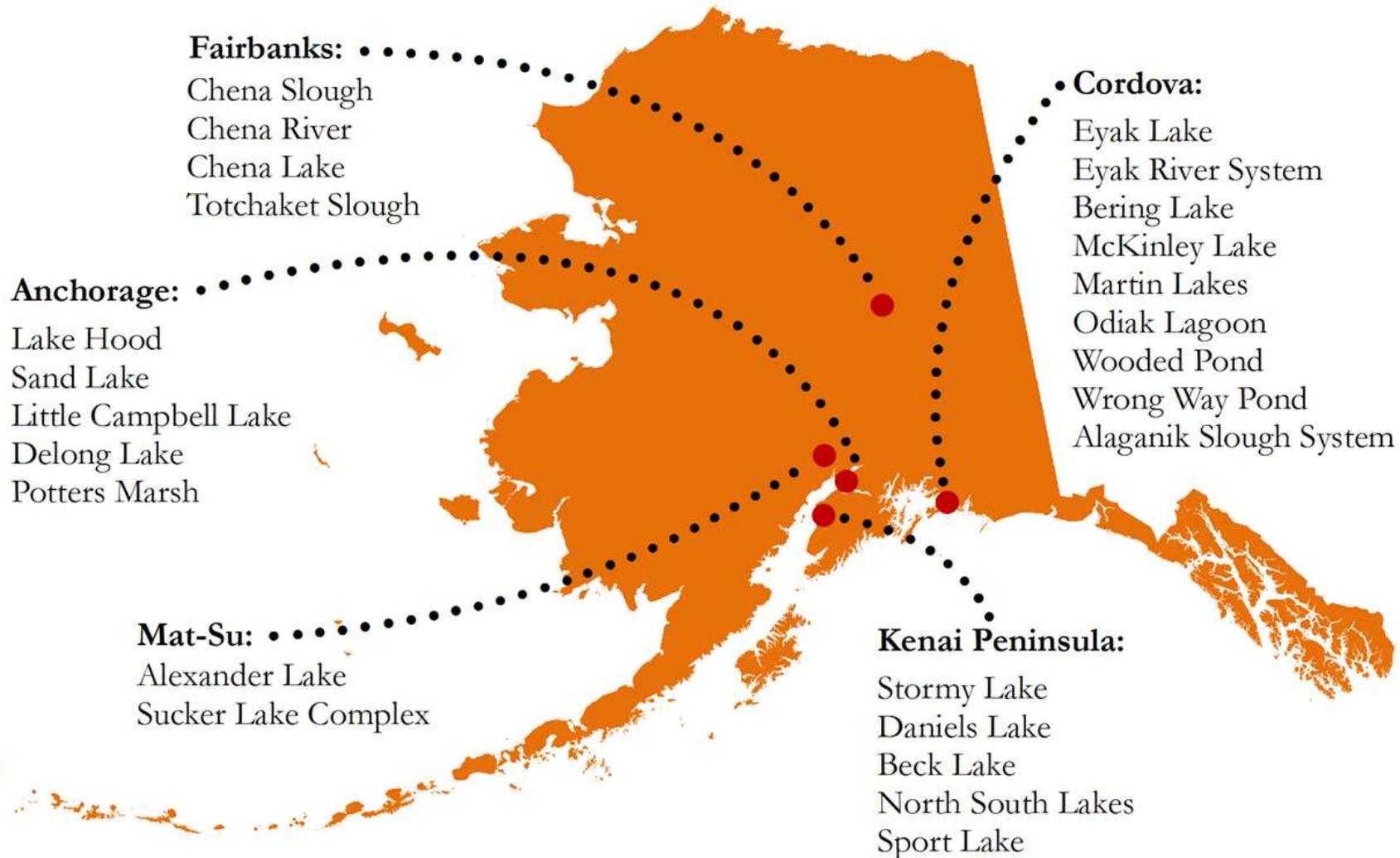
N/S Lakes
Jul 2017
hybrid



Why EDRR is working on the Kenai

- **Clear management goal (eradication)**
- **Dedicated interagency project team (CWMA, landowners) working closely with AK-DNR**
- **Found the right experts (SePRO, Anderson, Les)**
- **Adaptive IPM plan (NEPA, permits, proposals)**
- **Take advantage of life history traits (dioecious, winter growth)**
- **Diquat used 2x (partial lake treatment, reduce risk of spread)**
- **Outreach to sustain support (public meetings, workshops, newspaper articles, radio interviews)**
- **Continuing surveys and resurveys**

Status of other elodea management efforts in Alaska





Daniels Lake post-treatment

QUESTIONS??