

Elodea on the Kenai Peninsula: Why it's a big deal and what we're doing about it

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'iwua (Cook Inlet Aquaculture Association, Kenai)
Rebecca Zulueta (Kenai Watershed Forum, Soldotna)
Janice Chumley (UAF Cooperative Extension Service, Soldotna)
Michele Ariniqui (Kenai Peninsula Borough Mayor's Office, Soldotna)
Cecil Rich (USFWS Regional Office, Anchorage)

In consultation with:

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



Cooperative Weed
Management Area



Kenai Watershed Forum



Elodea was recognized early as bad...

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



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

By

Tobias Schwoerer, M.S.

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

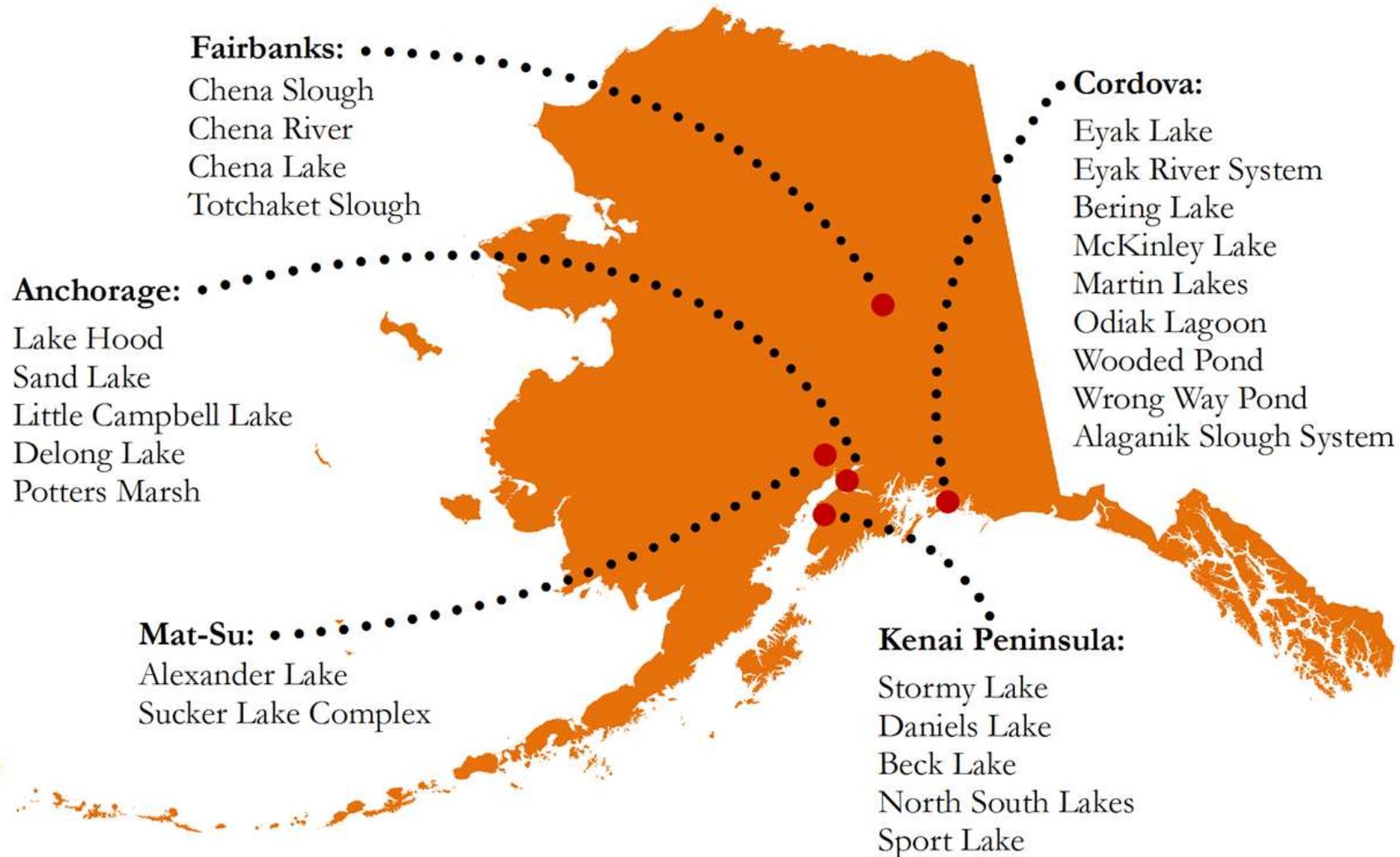
APPROVED:

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

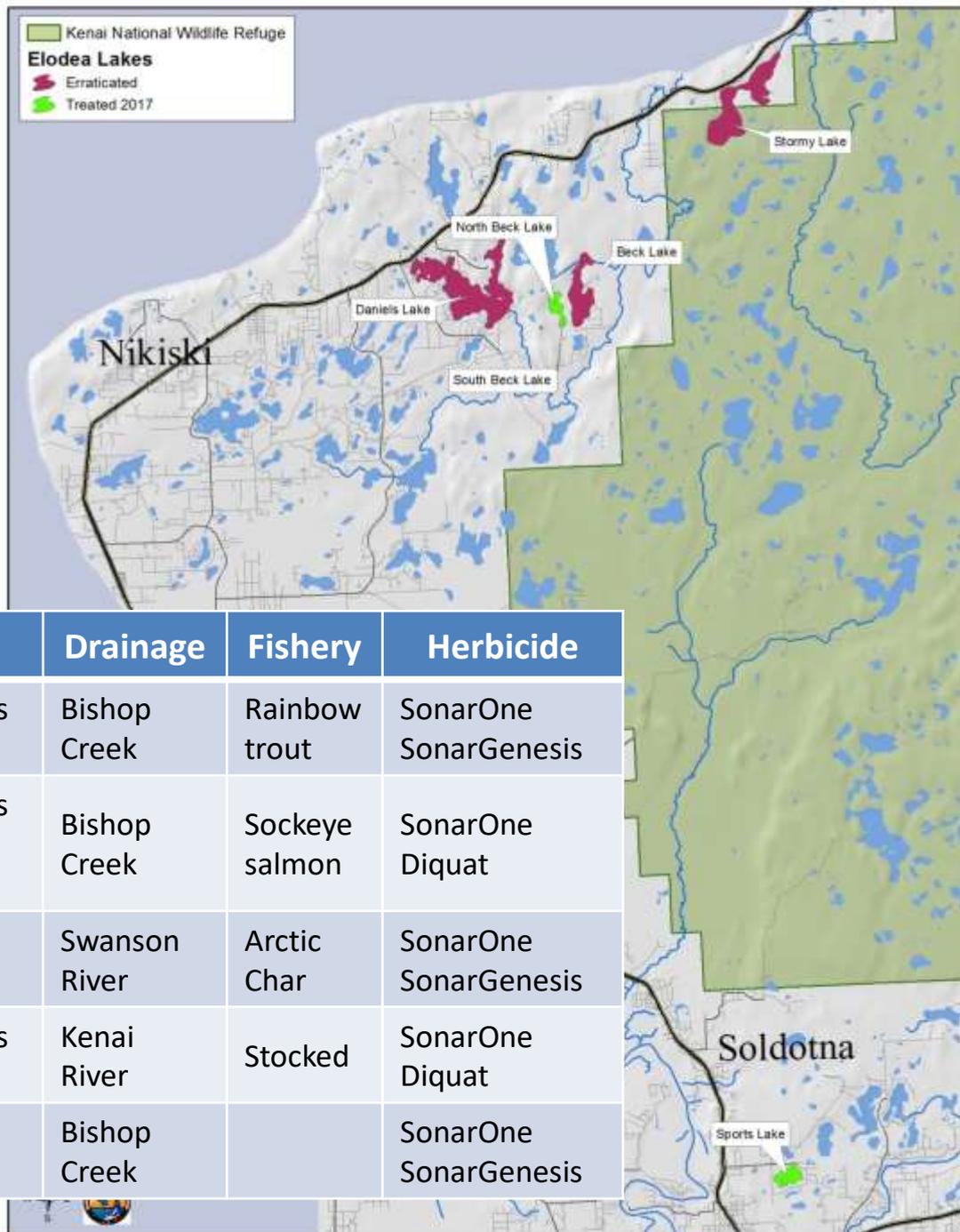
**Salmon habitat
degradation will likely
cost statewide
commercial sockeye
industry ~\$100 million
annually**

**Worst case scenario:
~\$500 million lost
annually**

Known Locations of Elodea in Alaska



Elodea-infested lakes on the Kenai Peninsula



	Acres	Risks	Drainage	Fishery	Herbicide
Beck	200	Private landowners floatplanes	Bishop Creek	Rainbow trout	SonarOne SonarGenesis
Daniels	620	Private landowners floatplanes community launch	Bishop Creek	Sockeye salmon	SonarOne Diquat
Stormy	400	Public launch Floatplanes	Swanson River	Arctic Char	SonarOne SonarGenesis
Sports	70	Private landowners public launch	Kenai River	Stocked	SonarOne Diquat
North/South	55		Bishop Creek		SonarOne SonarGenesis

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



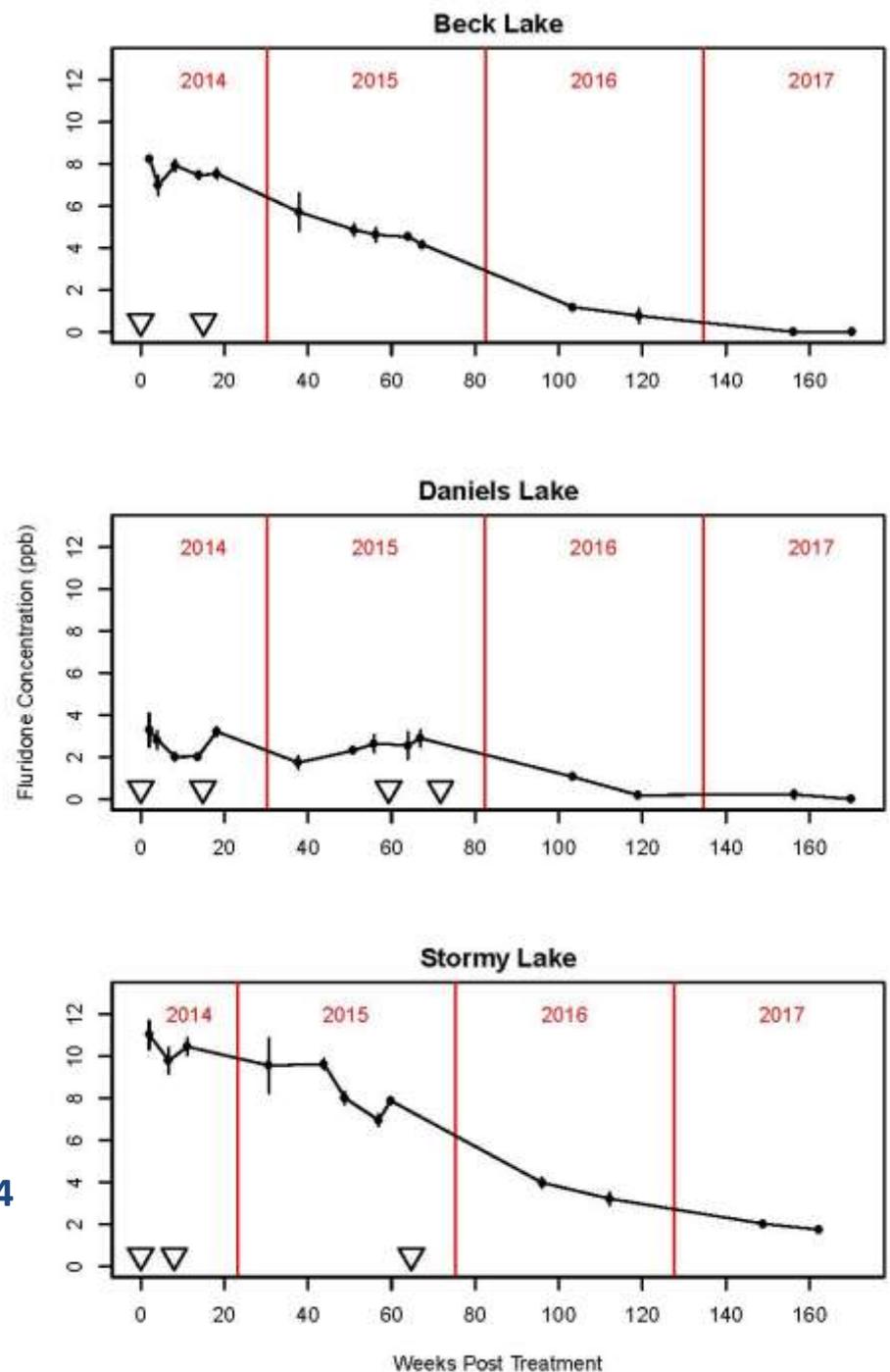
Pump for Sonar Genesis, Diquat



Is it working?



- 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



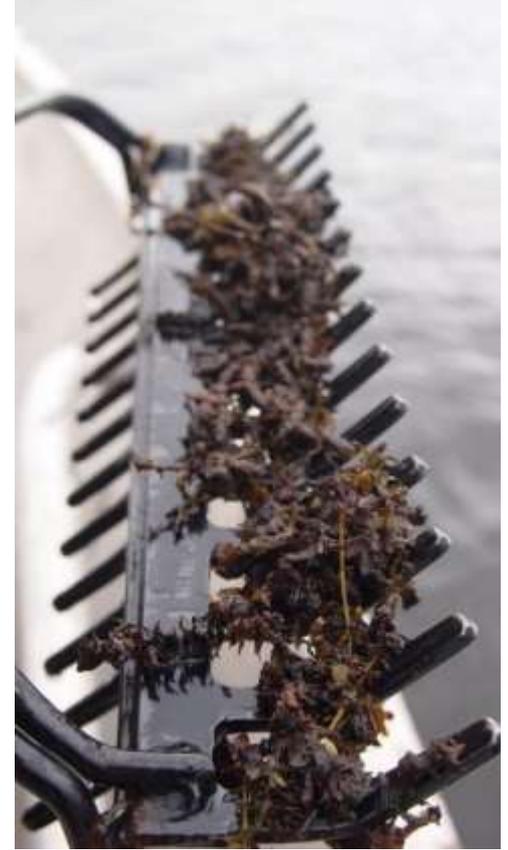
Is it working?



2 weeks (Stormy)

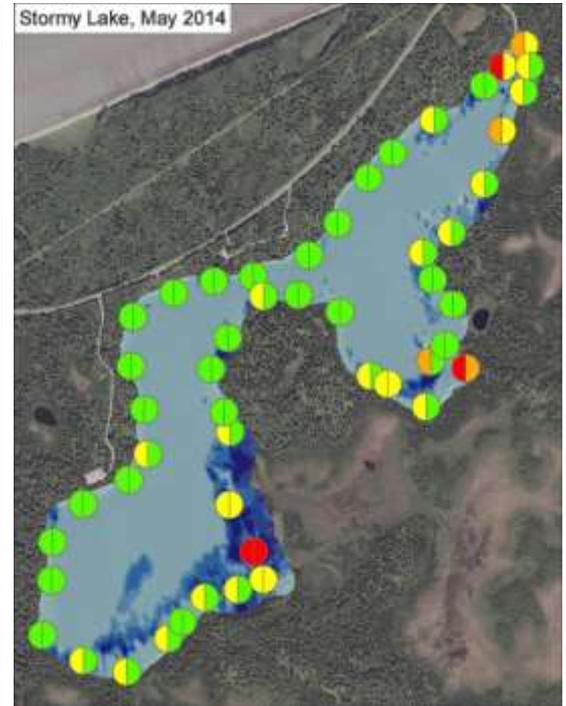
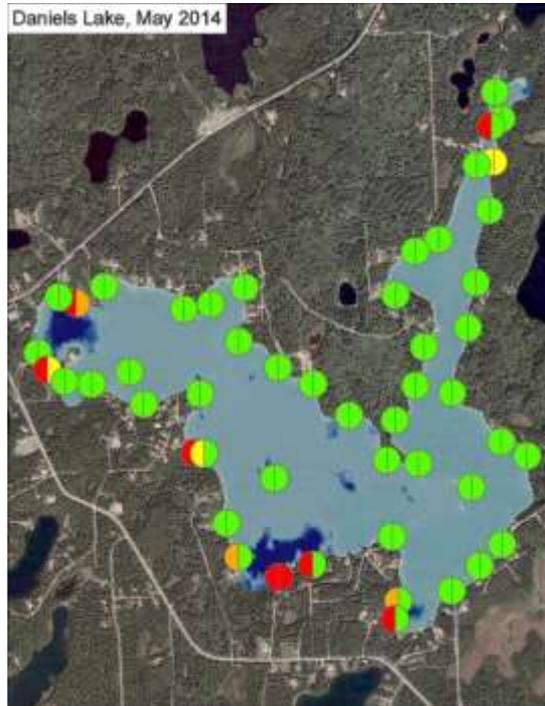


8 weeks (Beck)



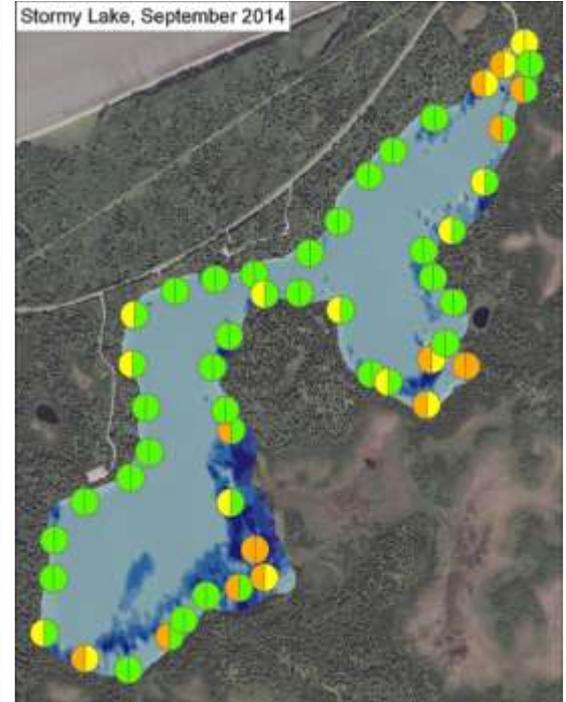
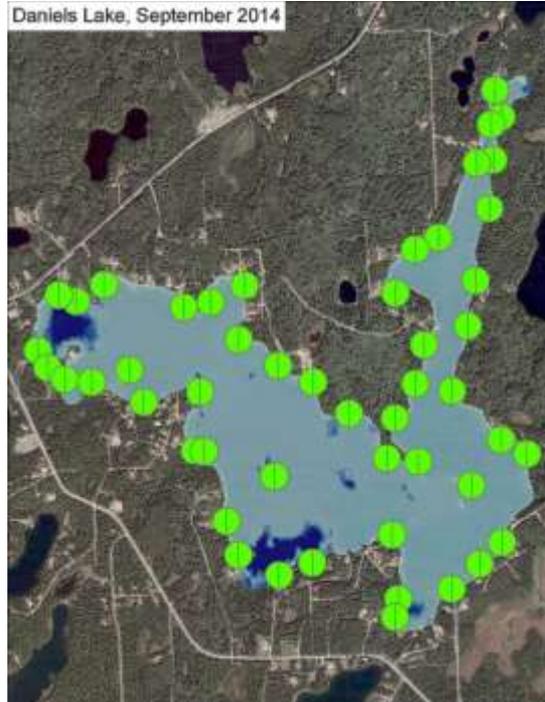
14 weeks (Beck)

Is it working?



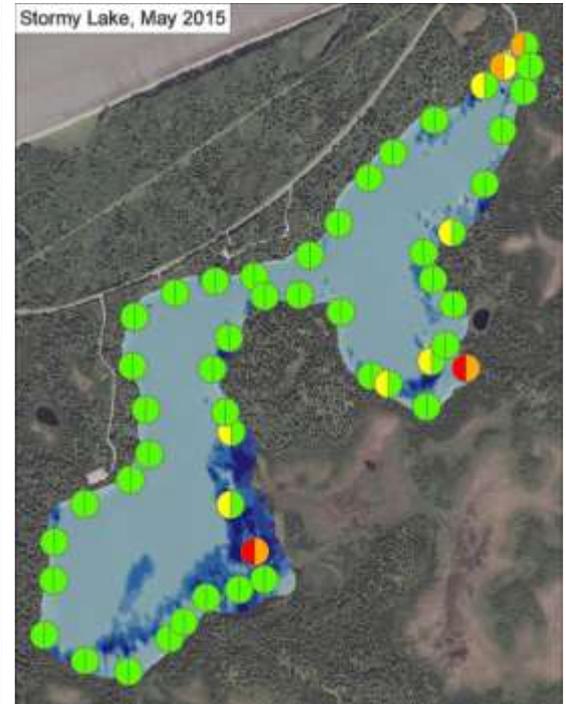
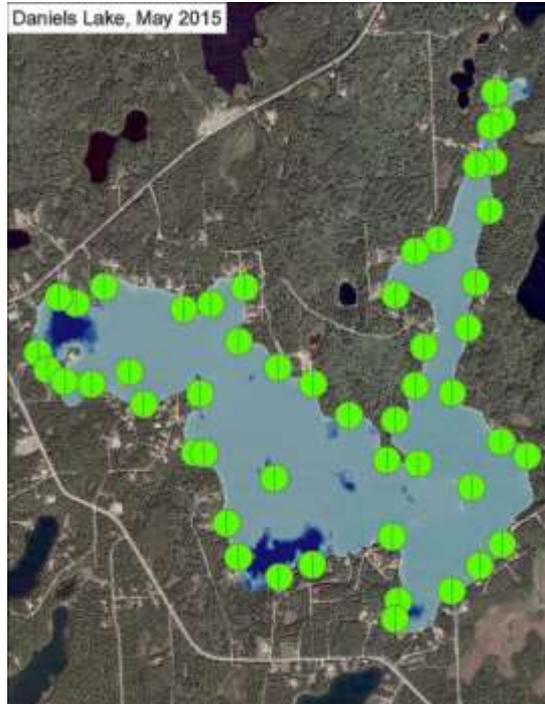
SURVEY	LAKE		
	Beck	Daniels	Stormy
May 2014 (pre-trmt)	70	22	50

Is it working?



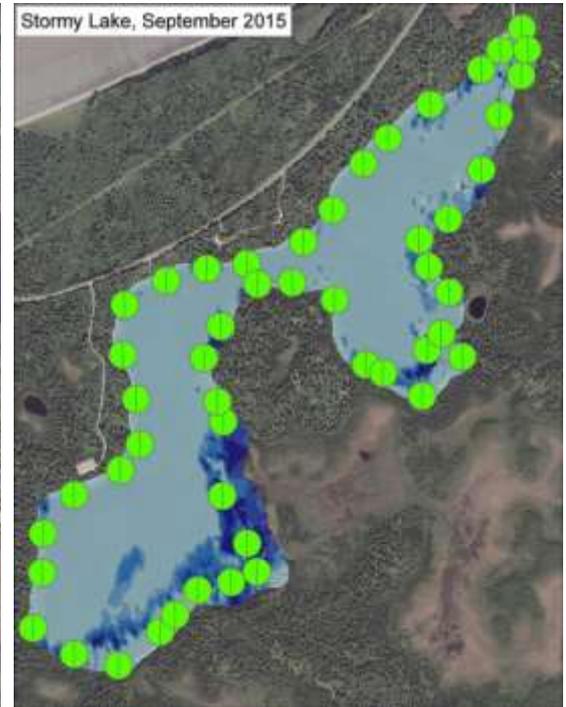
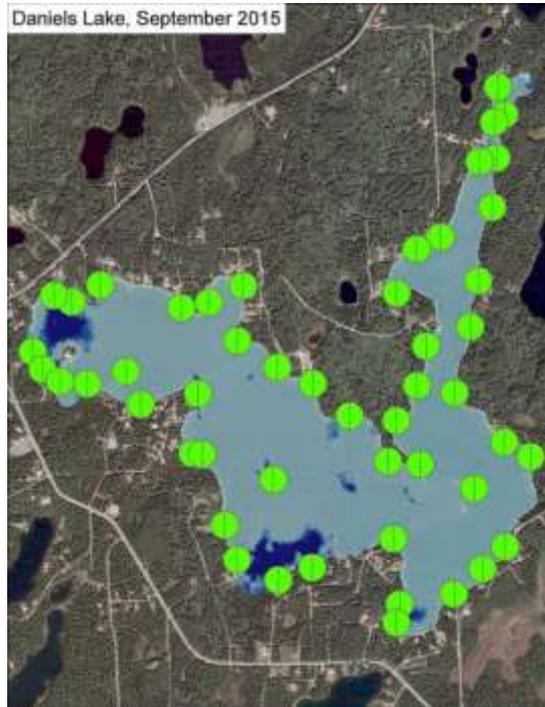
SURVEY	LAKE		
	Beck	Daniels	Stormy
May 2014 (pre-trmt)	70	22	50
Sept 2014 (post)	12	0	46

Is it working?



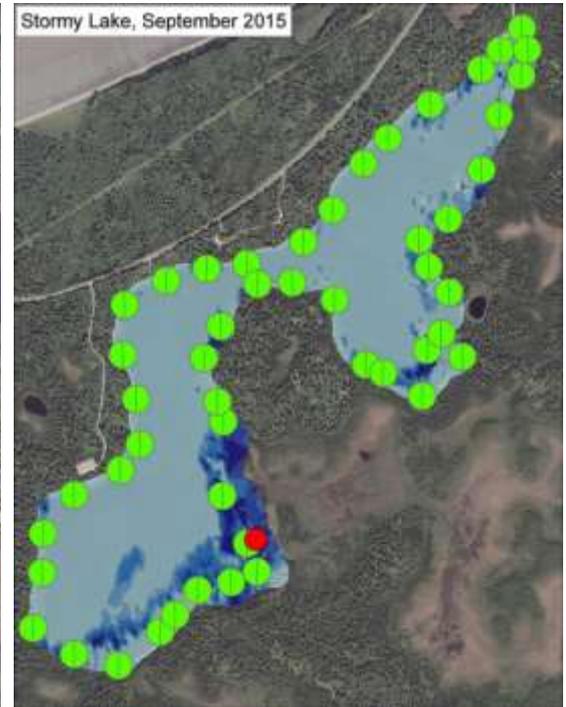
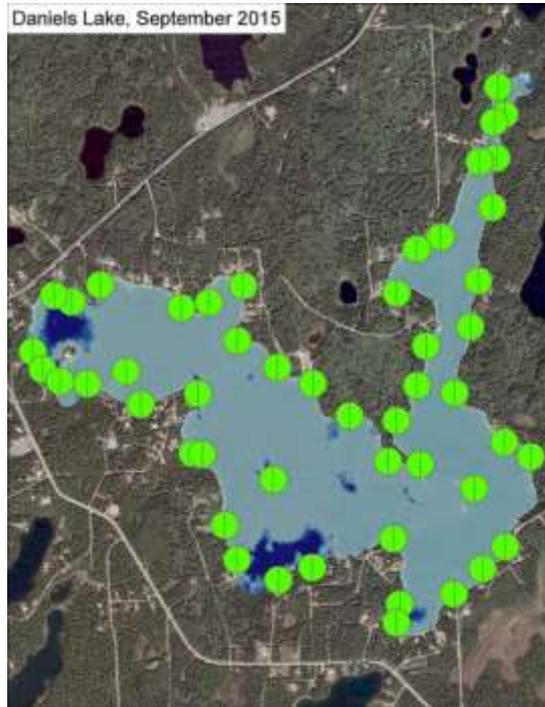
SURVEY	LAKE		
	Beck	Daniels	Stormy
May 2014 (pre-trmt)	70	22	50
Sept 2014 (post)	12	0	46
May 2015 (post)	0	0	20

Is it working?



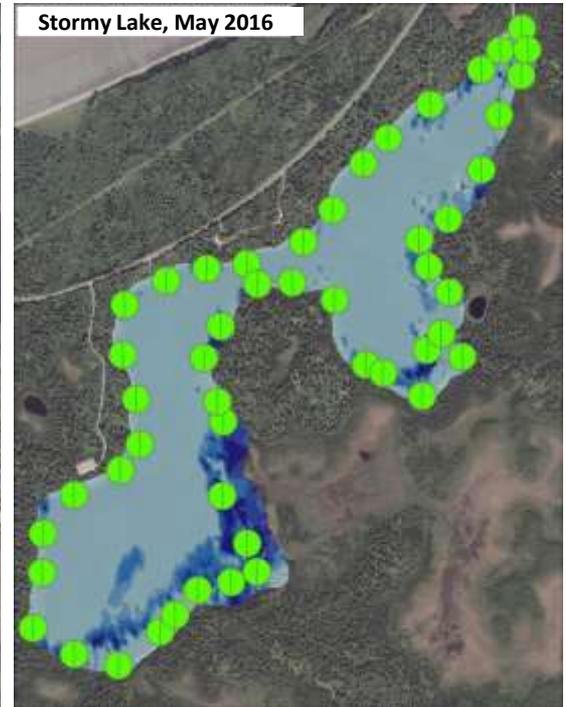
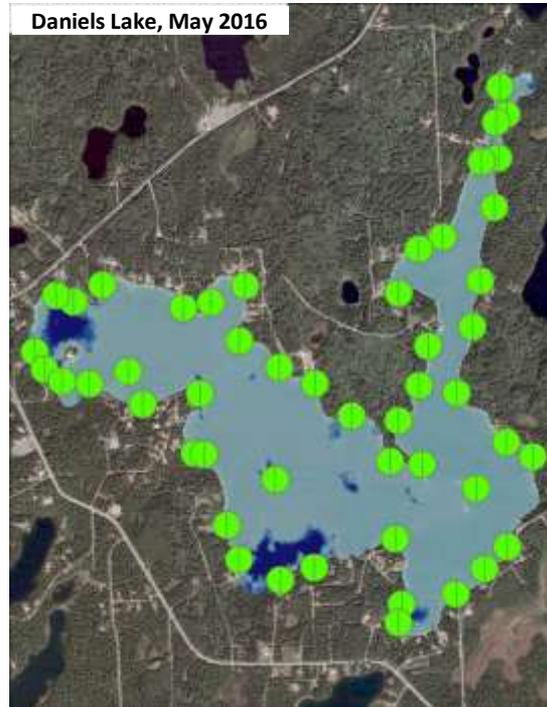
SURVEY	LAKE		
	Beck	Daniels	Stormy
May 2014 (pre-trmt)	70	22	50
Sept 2014 (post)	12	0	46
May 2015 (post)	0	0	20
Sept 2015 (post)	0	0	0*

Is it working?



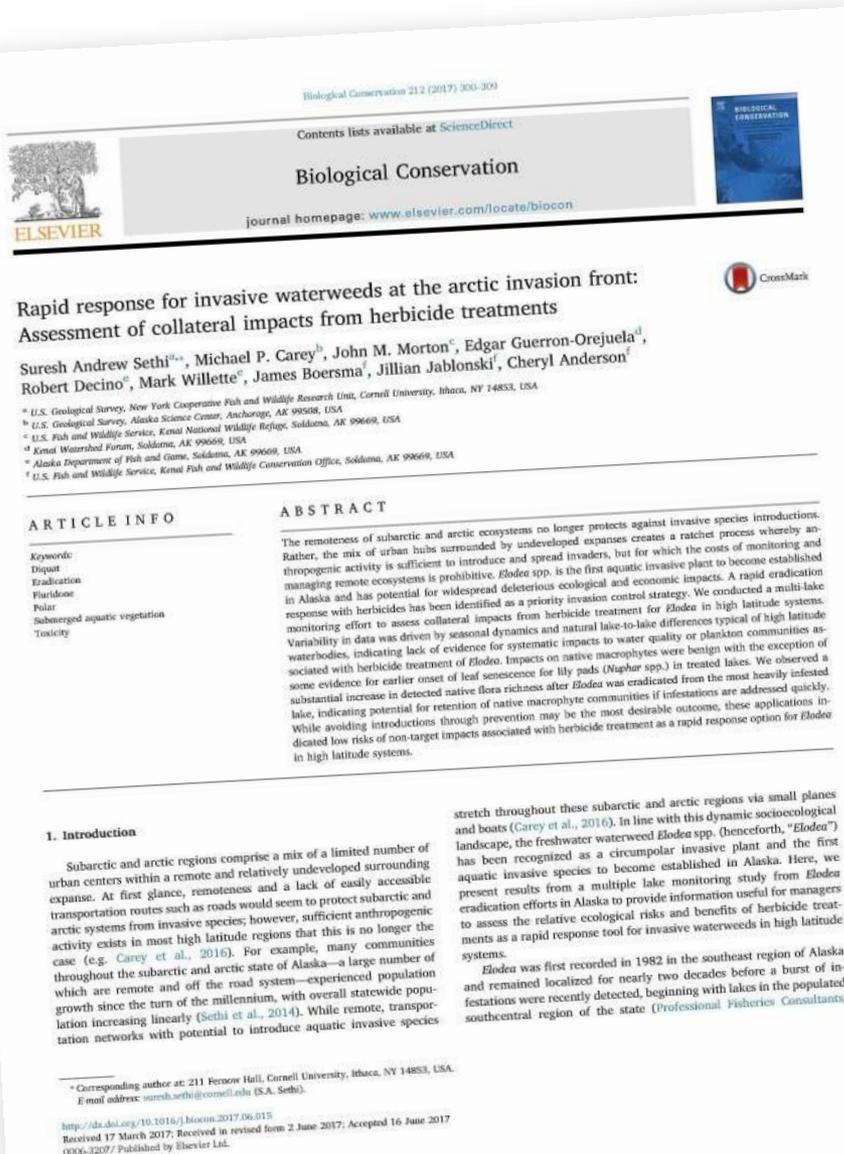
SURVEY	LAKE		
	Beck	Daniels	Stormy
May 2014 (pre-trmt)	70	22	50
Sept 2014 (post)	12	0	46
May 2015 (post)	0	0	20
Sept 2015 (post)	0	0	0*

Is it working?



SURVEY	LAKE		
	Beck	Daniels	Stormy
May 2014 (pre-trmt)	70	22	50
Sept 2014 (post)	12	0	46
May 2015 (post)	0	0	20
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



* Corresponding author at: 211 Fessenden Hall, Cornell University, Ithaca, NY 14853, USA.
E-mail address: suresh.sethi@cornell.edu (S.A. Sethi).

Why Kenai cares about other parts of the state.....



PETCO,
Soldotna



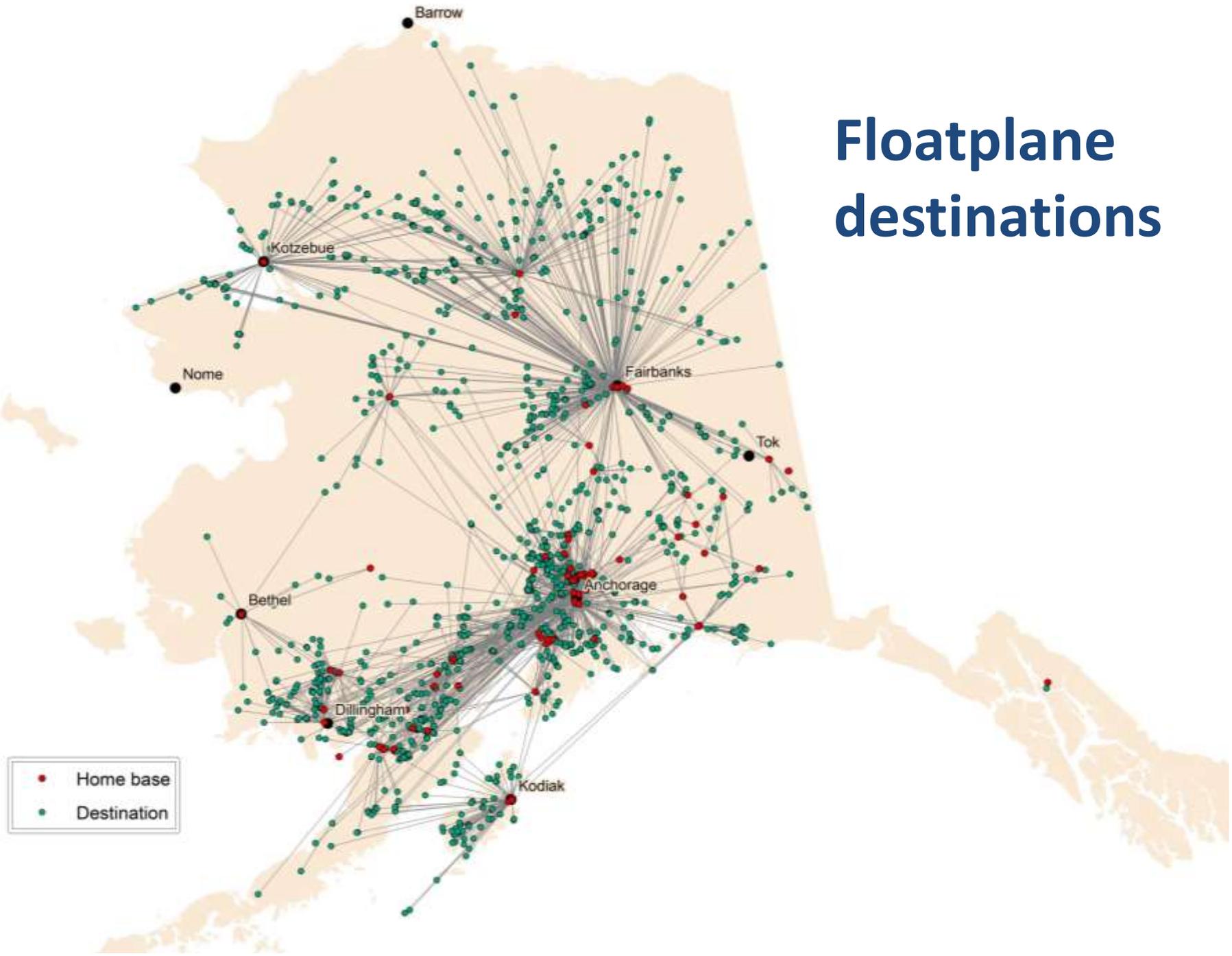
Cordova



Sports
Lake



Floatplane destinations



Sports Lake, Soldotna



North/South Lakes, Nikiski



Next steps in 2018

- ✓ Continue treatment of Sports Lake and North/South Lakes
- ✓ Monitor Beck, Daniels and Stormy Lakes to confirm eradication and assess post-treatment native flora recovery
- ✓ Survey and resurvey other Kenai Peninsula lakes
- ✓ Continue working with other areas in AK





Daniels Lake post-treatment

QUESTIONS??

Elodea on the Kenai Peninsula: Why it's a big deal and what we're doing about it



John Morton
Kenai National Wildlife Refuge