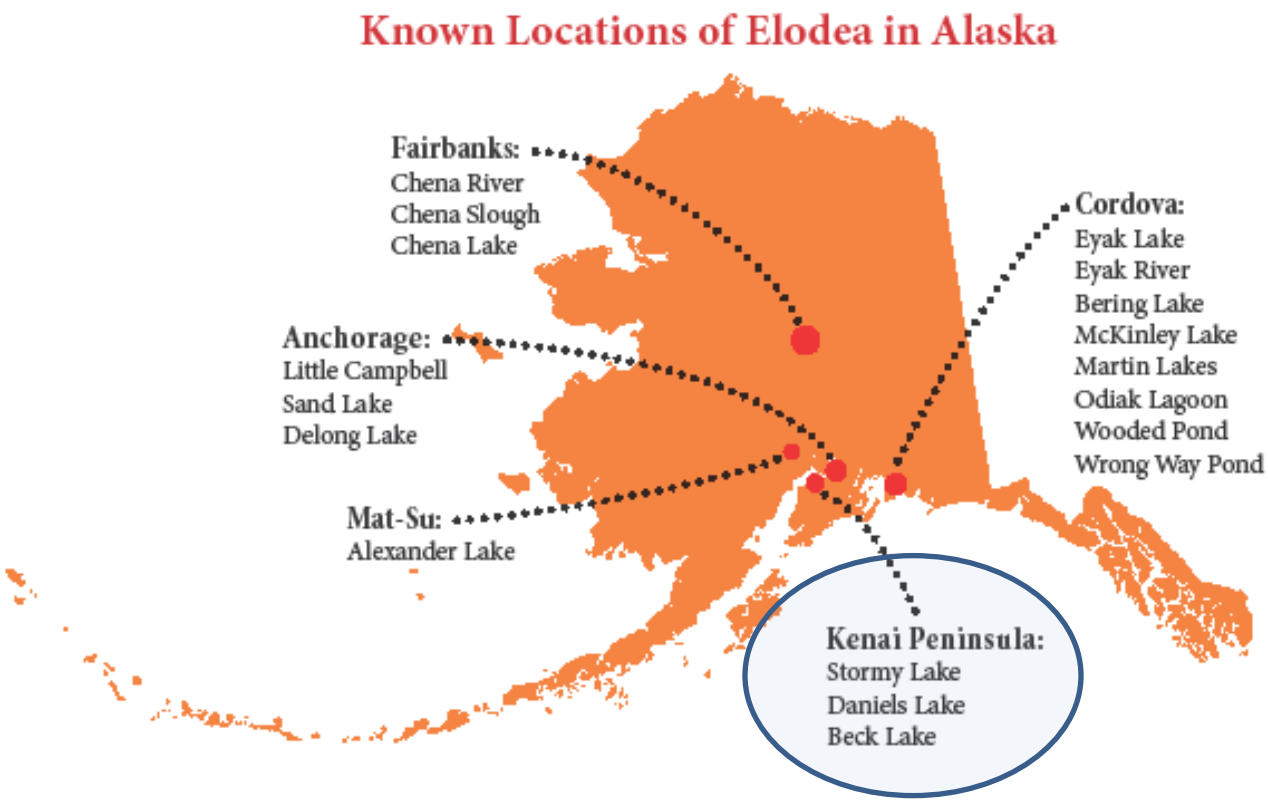
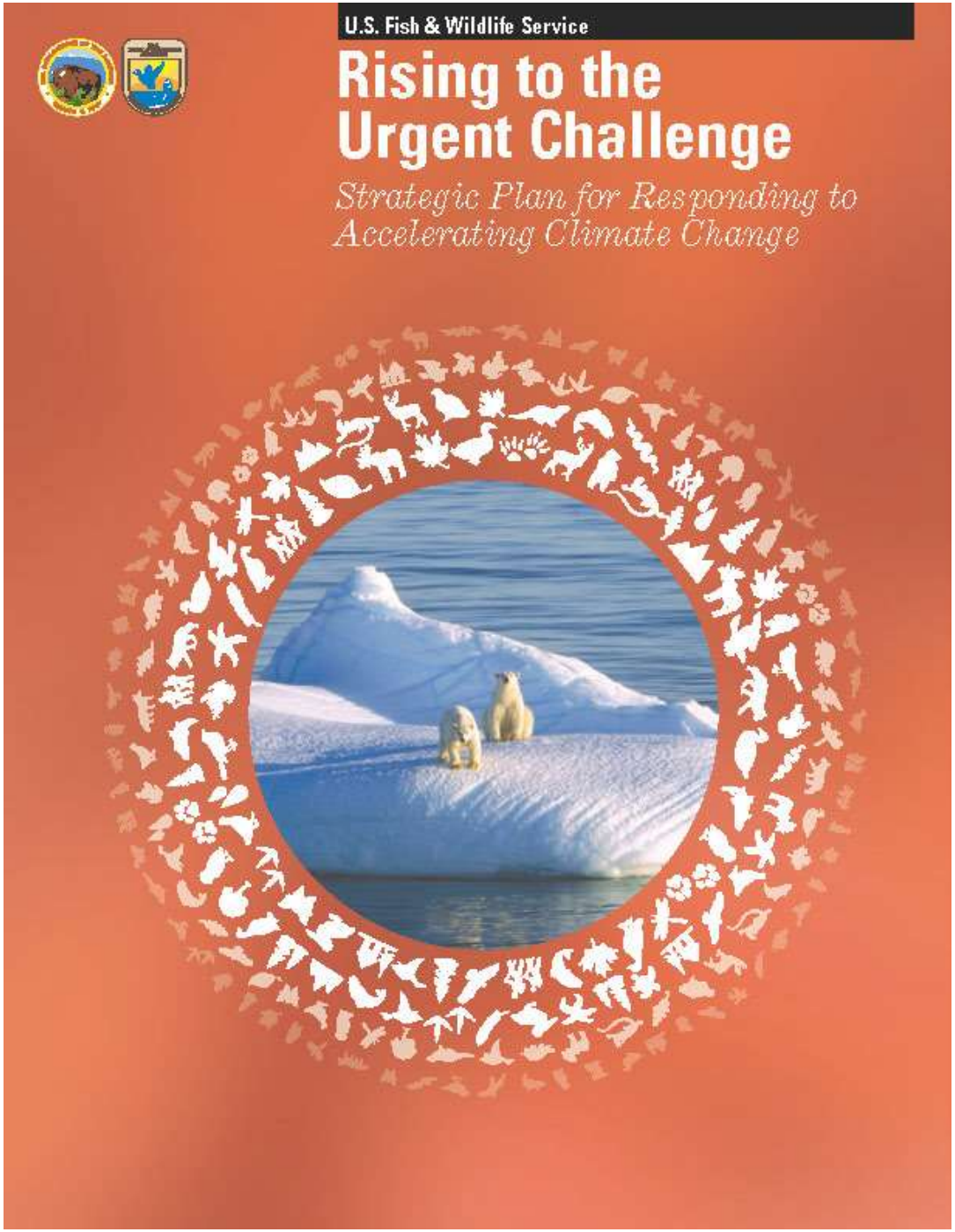
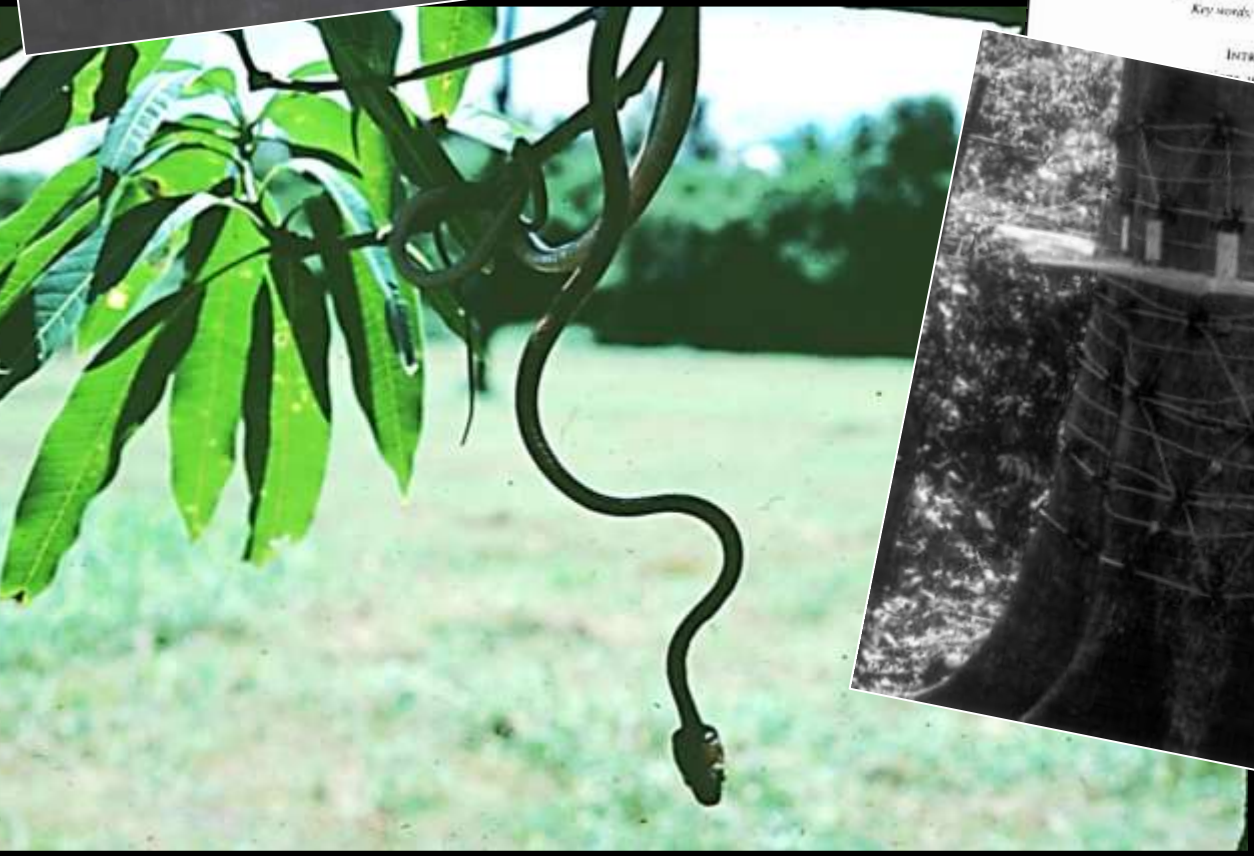
Responding to Elodea: What are the lessons learned?



John Morton
U.S. Fish and Wildlife Service

What's your world view?





Ecology, 68(2), 1987, pp. 493–498
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EXTINCTION OF AN ISLAND FOREST AVIFAUNA BY AN INTRODUCED SNAKE[1]

JULIE A. SAVIDGE
Division of Aquatic and Wildlife Resources, P.O. Box 2950, Agana, Guam 96910, and Department of Ecology, Ethology, and Evolution, University of Illinois, Champaign, Illinois 61820 USA

Abstract. The island of Guam has experienced a precipitous decline of its native forest birds, and several lines of evidence implicate the introduced brown tree snake (*Boiga irregularis*) as the cause of the range reductions and extinctions. The range expansion of *B. irregularis* correlated well with the range contraction of the forest avifauna. Exceptionally high predation by snakes on bird-baited funnel traps occurred in areas where bird populations had declined. Little or no snake predation occurred in areas with stable bird populations. Several factors have contributed to *Boiga*'s success in decimating the avifauna on Guam. Although most common in forests, *B. irregularis* has occupied a variety of habitats on Guam, and few effective barriers to its dispersal exist. Prey refuges are present only in urban areas, on concrete or metal structures, and in the savanna. *Boiga*'s nocturnal and arboreal habits and an apparent keen ability to locate prey, make roosting and nesting birds, eggs, and nestlings vulnerable. Besides birds, *B. irregularis* feeds on small mammals and lizards. By including the abundant small reptiles as a major component in its diet, *Boiga* has maintained high densities in forest and second-growth habitats while exterminating its more vulnerable prey. This is the first time a snake has been implicated as an agent of extinction.

Key words: *Boiga irregularis; endangered species; extinction; Guam; island avifauna; predation.*

INTRODUCTION

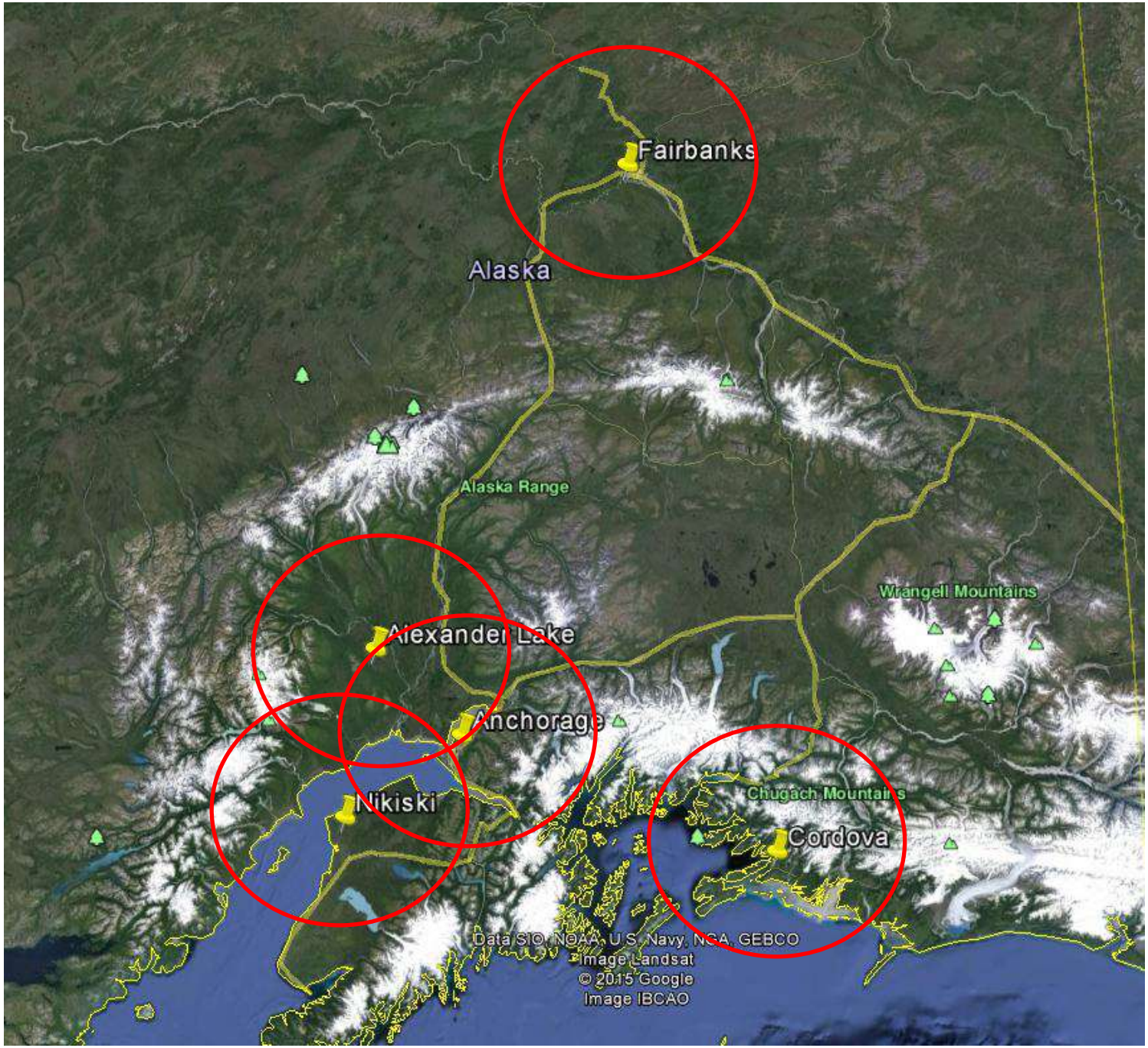
usually following introductions driven

2.5 km south of Guam. The western half of the island is dominated by mixed forest and strand vegetation, whereas the eastern half is a tourist development. Be- the recent declines and extinctions, the resident of 18 native birds: 12 land and a

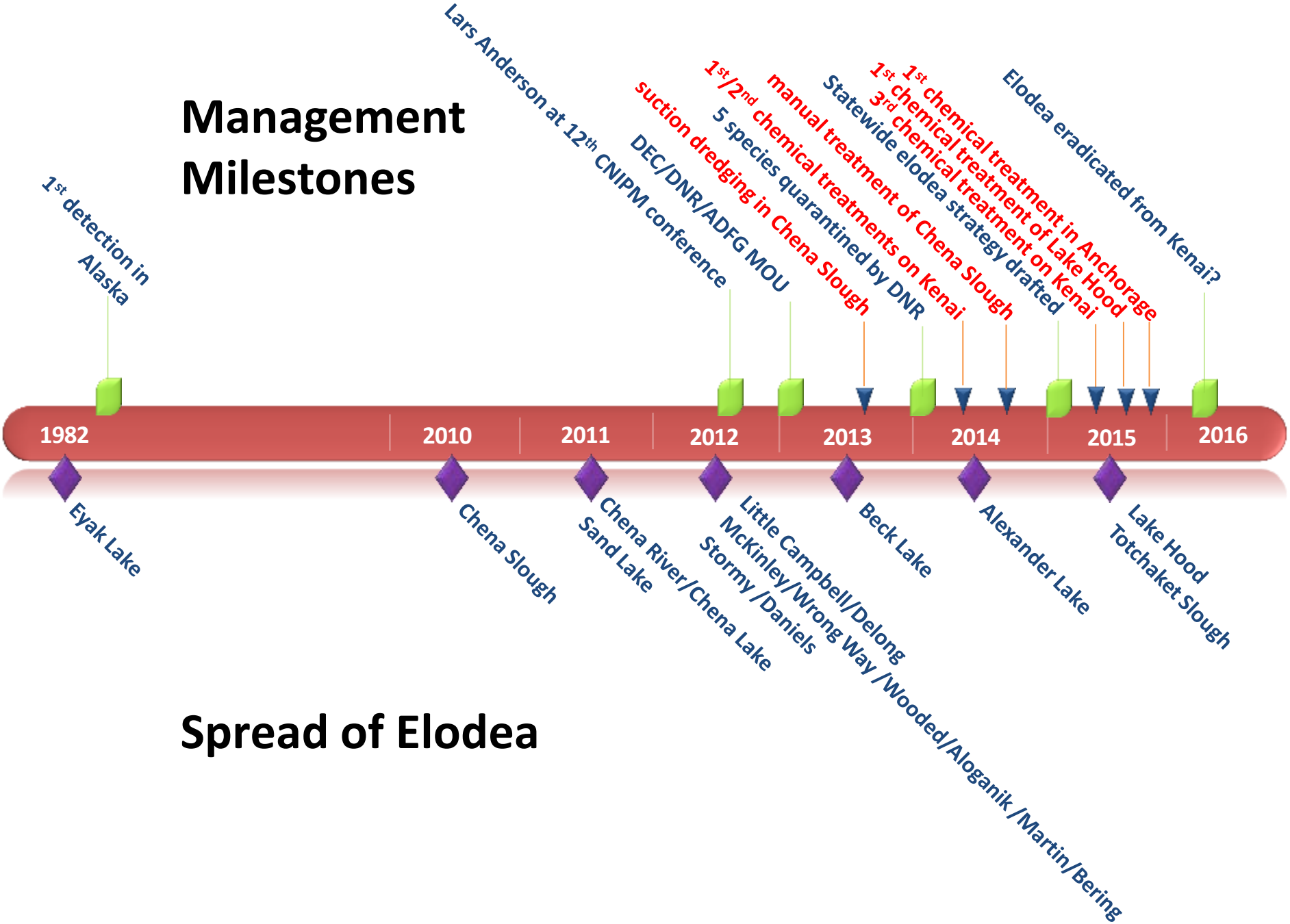
Elodea was singularly recognized as bad…

- ✓ 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

Vectors change as elodea becomes established…..

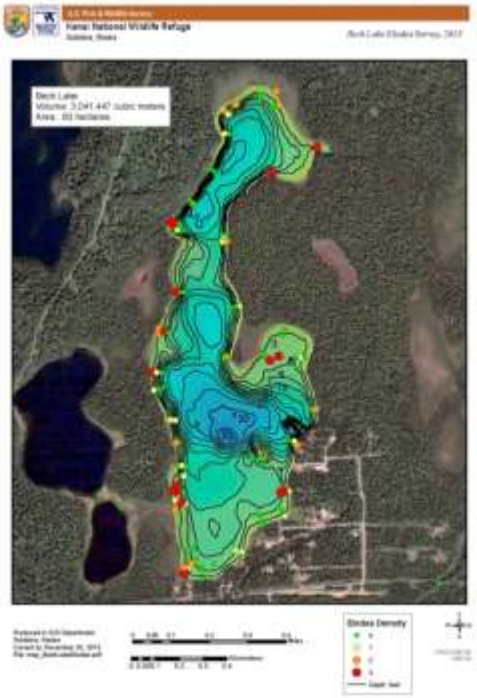

Fairbanks
Alaska
Alaska Range
Wrangell Mountains
Alexander Lake
Anchorage
Nikiski
Chugach Mountains
Cordova
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
© 2015 Google
Image IBCAO

Management Milestones



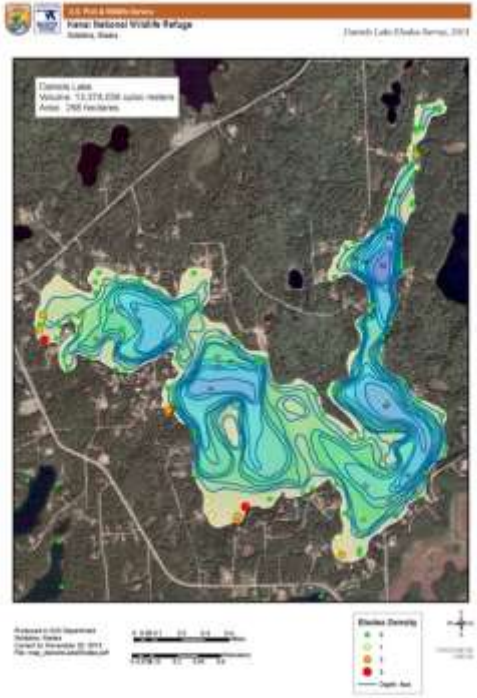
Spread of Elodea

Beck Lake (200 ac) whole treatment



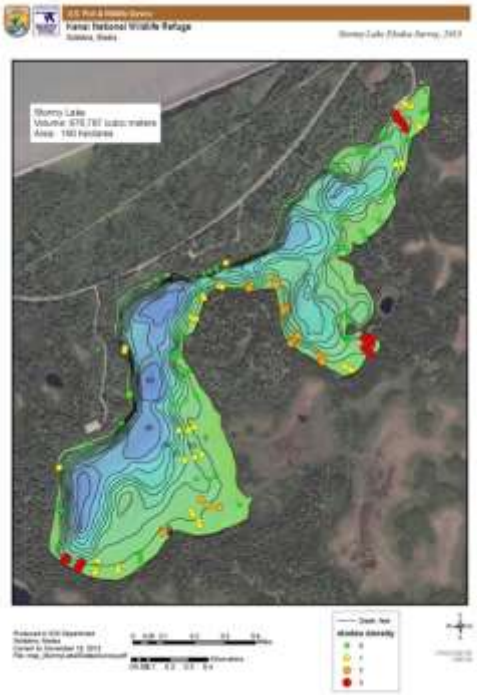
- Some private landowners
- Floatplanes
- NO public access
- Flows into Bishop Creek
- Rainbow trout

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

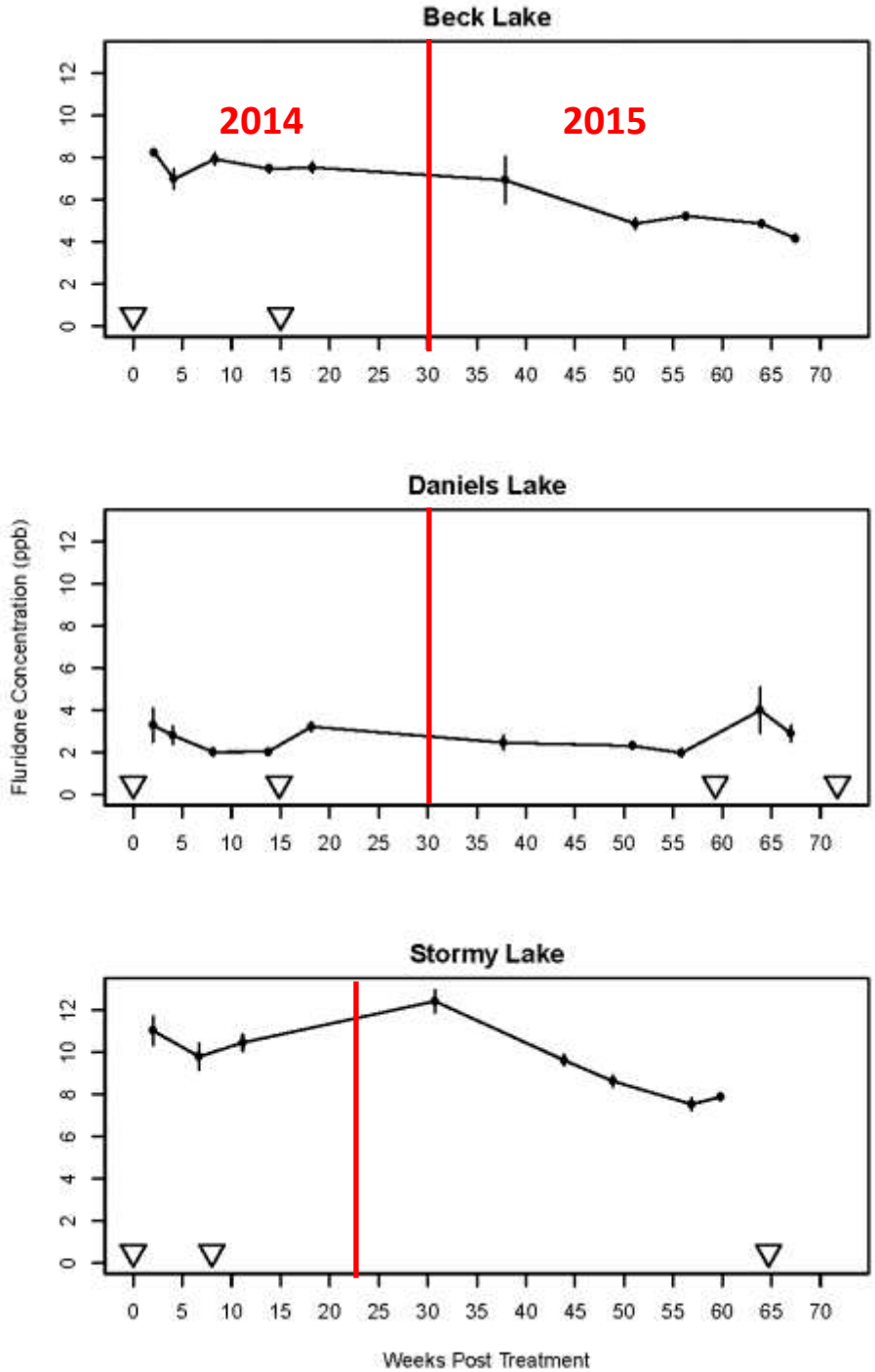


- State Parks/KENWR
- 1 public boat launch
- Flows into Swanson River
- Arctic char

Fluridone kills elodea systemically and selectively with few nontarget effects

- ✓ Absorbed through roots and shoots (systemic)
- ✓ Inhibits carotenoid synthesis (photosynthesis) and elodea is particularly sensitive (selective)
- ✓ Applied as liquid or slow-release pellets
- ✓ Degrades by photolysis, adsorption, absorption
- ✓ <u>No</u> restrictions on swimming, drinking or fishing
- ✓ Minimal irrigation precautions
- ✓ Needs to be in water column for 45 – 90 days

Is it working?



1st application (Beck, Daniels) 3-4 Jun 14
1st application (Stormy) 23 Jul 14
2nd application (Beck, Daniels, Stormy) 16-17 Sep 14
3rd application (Daniels) 24 Jul 15
4th application (Daniels) 19 Oct 15

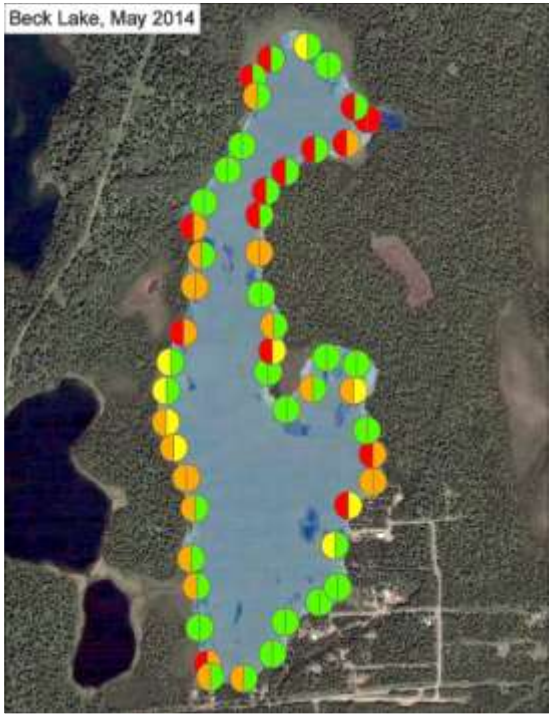
Is it working?

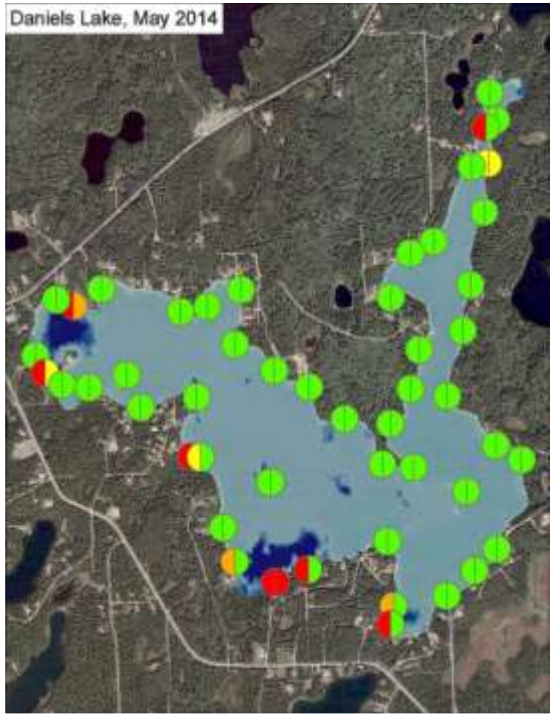
2 weeks (Stormy)

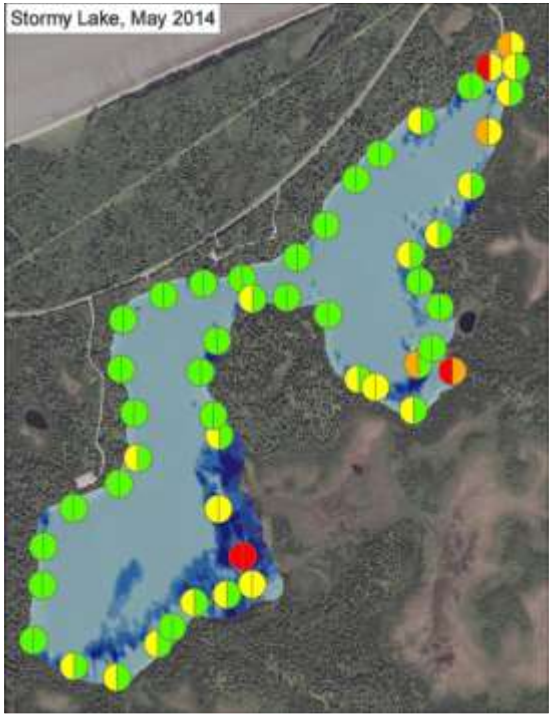
8 weeks (Beck)

14 weeks (Beck)

Is it working?

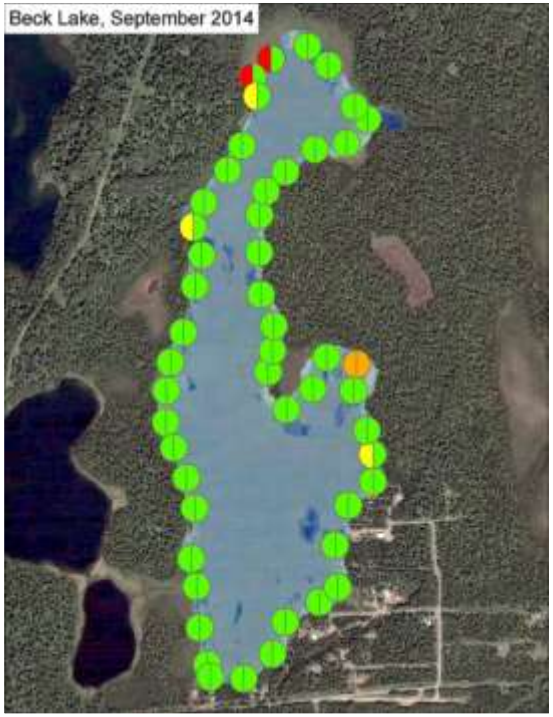


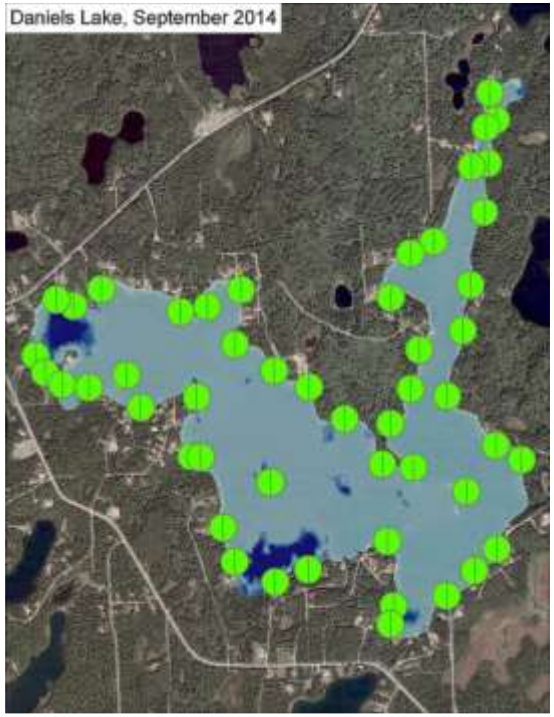


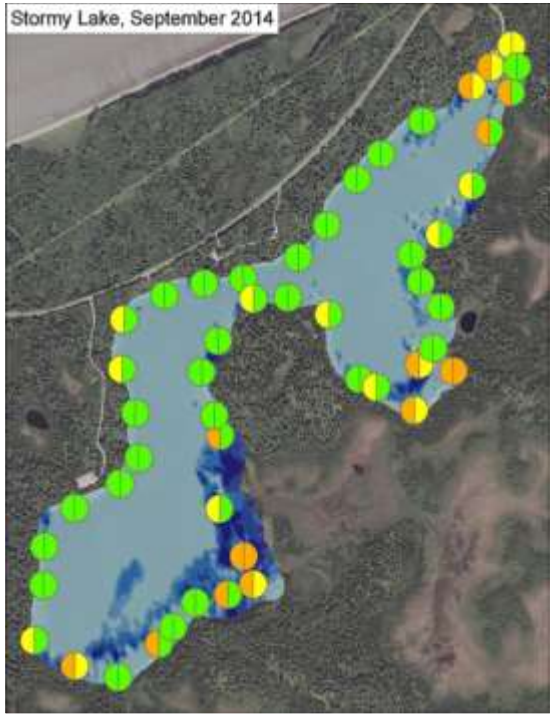


SURVEY	LAKE		
	Beck	Daniels	Stormy
May 2014 (pre-trmt)	**70**	**22**	**50**

Is it working?

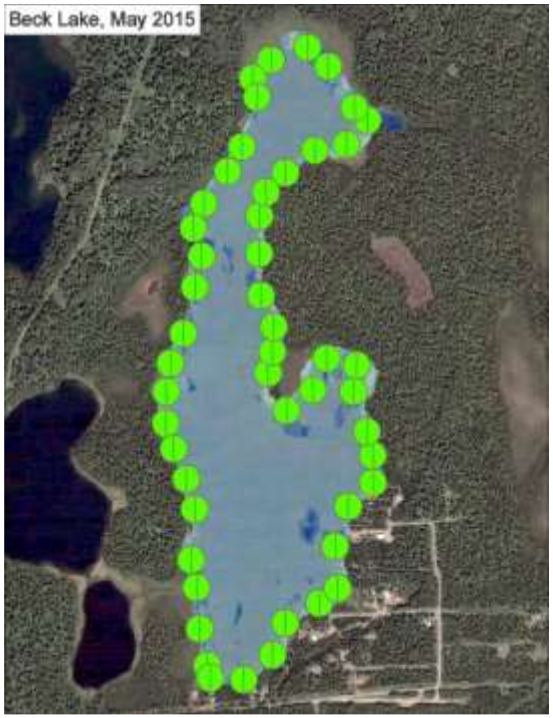


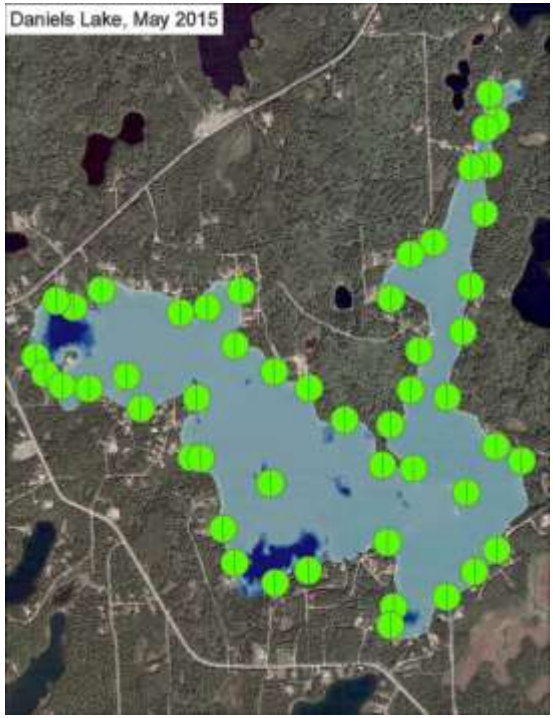


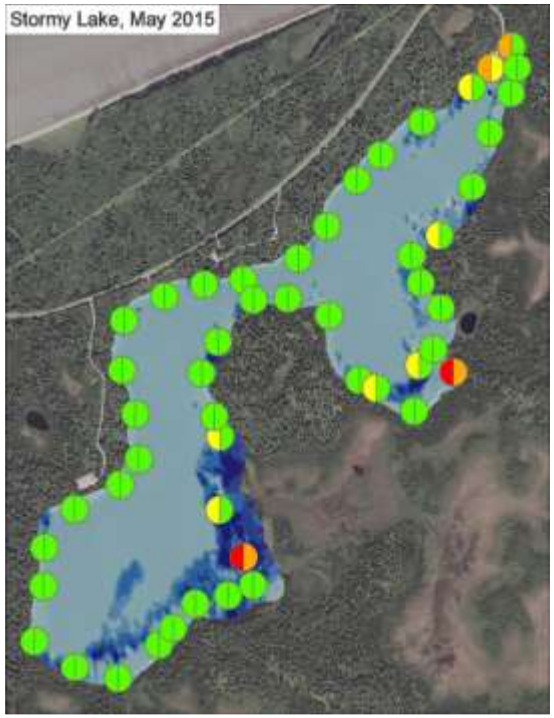


SURVEY	LAKE		
	Beck	Daniels	Stormy
May 2014 (pre-trmt)	70	22	50
Sept 2014 (post)	**12**	**0**	**46**

Is it working?

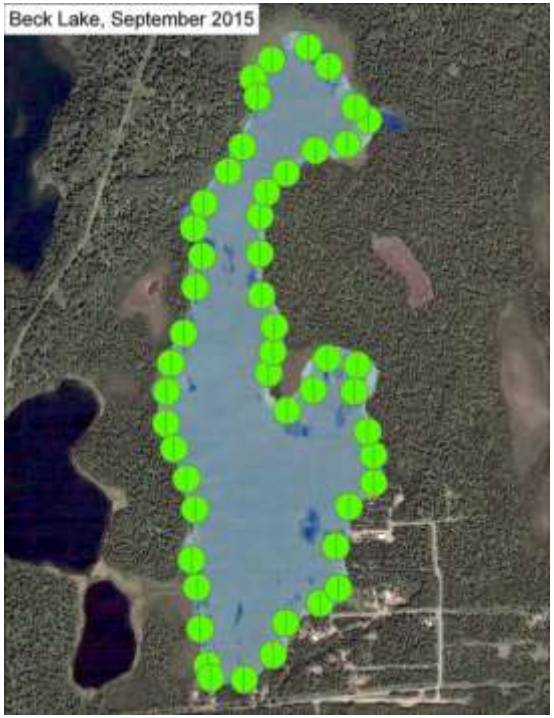


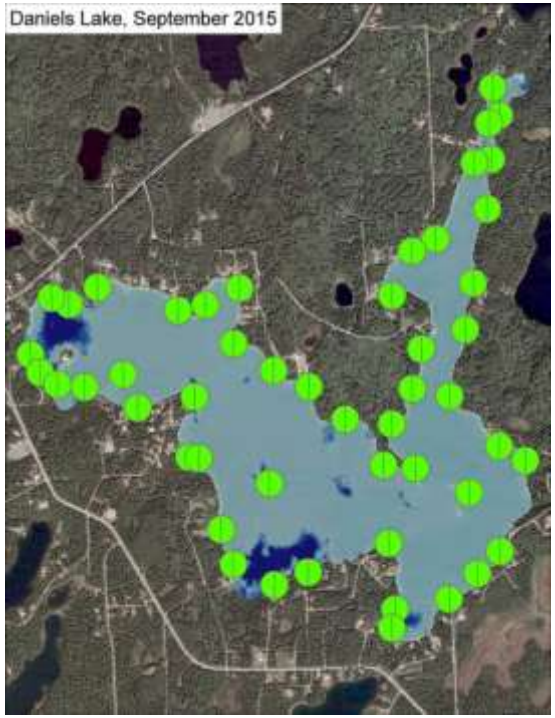


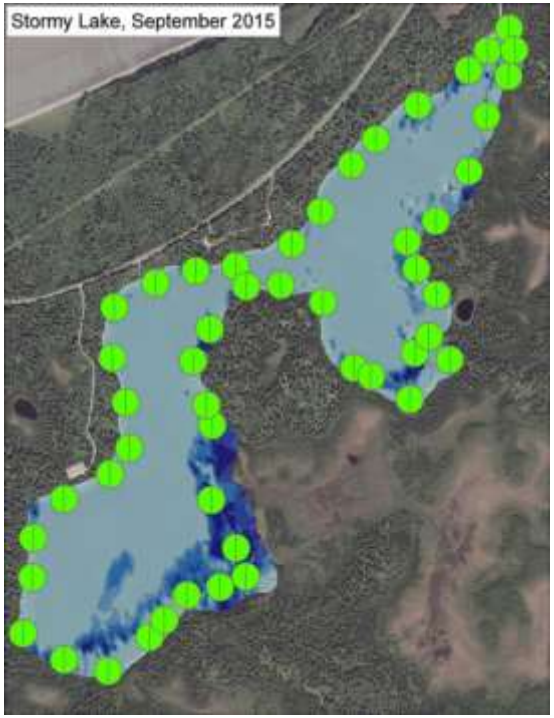


SURVEY	LAKE		
	Beck	Daniels	Stormy
May 2014 (pre-trmt)	70	22	50
Sept 2014 (post)	12	0	46
May 2015 (post)	**0**	**0**	**20**

Is it working?







SURVEY	LAKE		
	Beck	Daniels	Stormy
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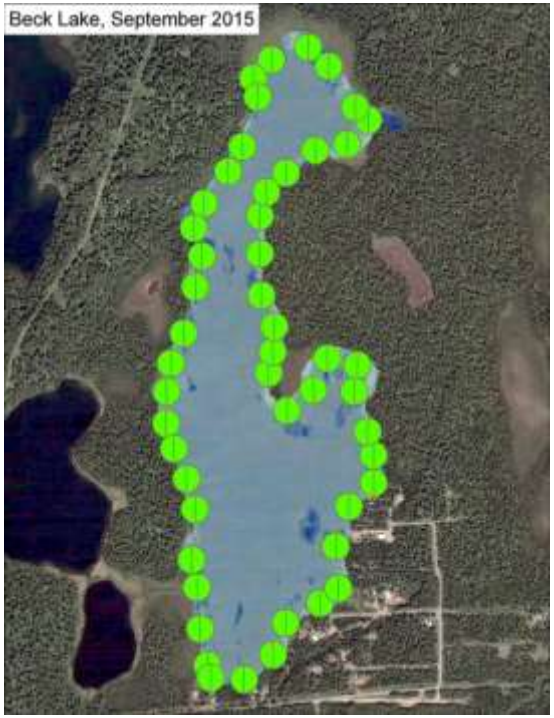
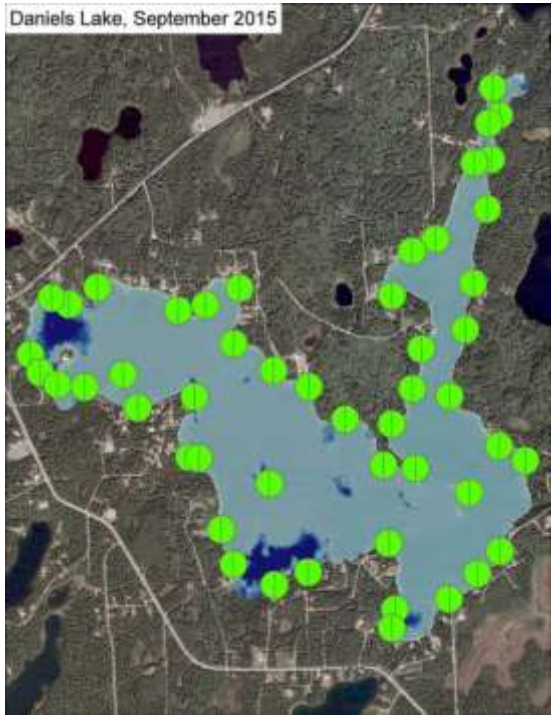
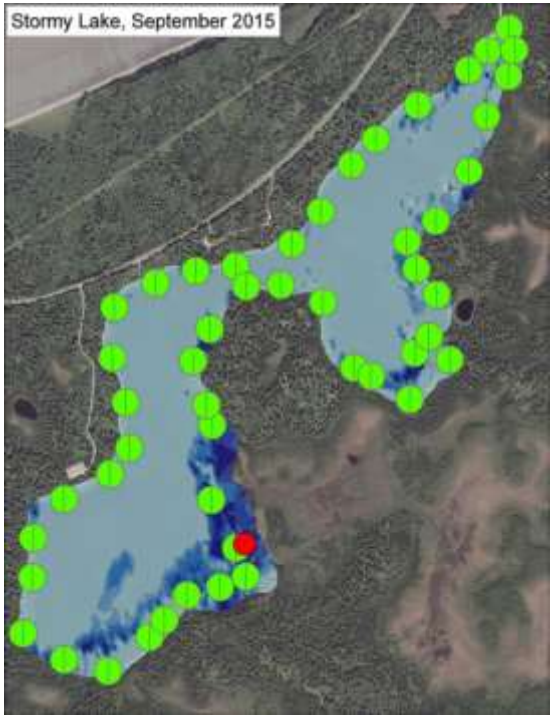
Sept 2014 (post)	12	0	46
May 2015 (post)	0	0	20
Sept 2015 (post)	**0**	**0**	**0***

Is it working?







SURVEY	LAKE		
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Sept 2014 (post)	12	0	46
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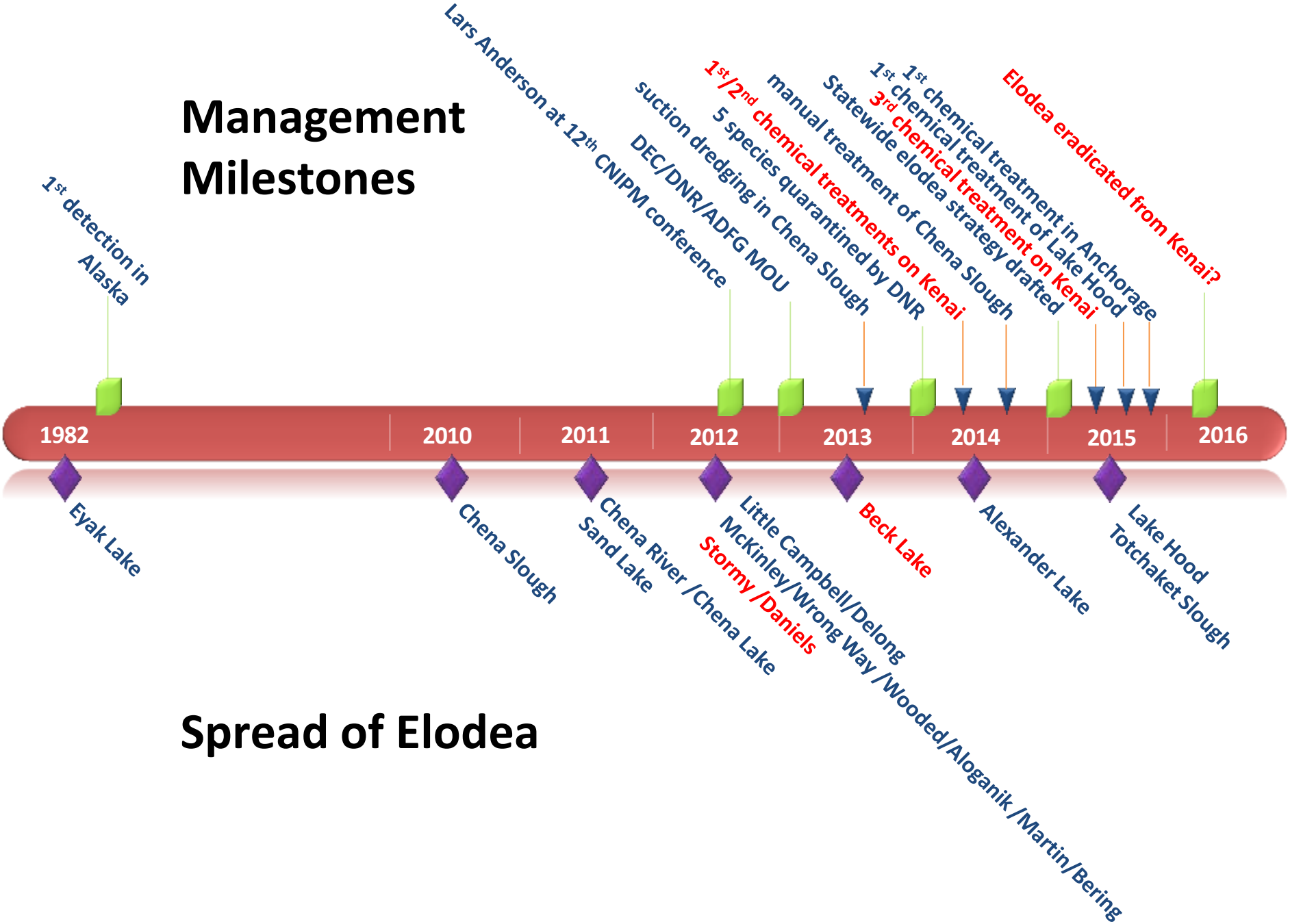
Sept 2015 (post)	**0**	**0**	**0***

Management Milestones



Spread of Elodea

Aggressively pursued information on elodea infestation…

Pursued public outreach and input quickly and consistently…

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.

Elodea is a highly invasive submerged aquatic plant.

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

Safety: fouls float plane rudders and boat propellers

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

Ecological: degrades salmon spawning habitat

Convened committed steering committee to draft IPM quickly…

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)

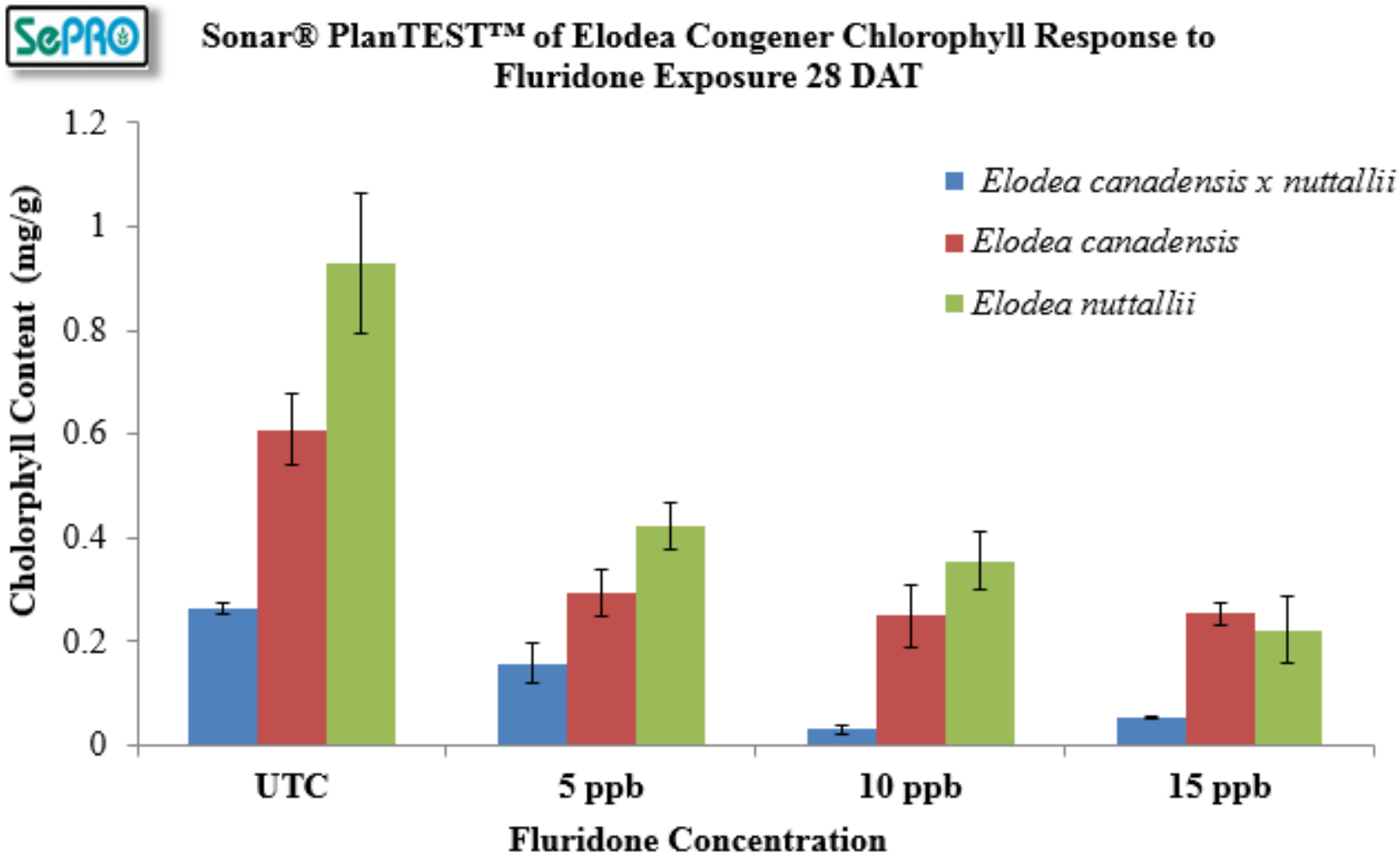
In consultation with:
Lars Anderson (Waterweed Solutions, Davis)
Donald H. Les (University of Connecticut, Storrs)
Scott Schuler (SePRO Corporation, Carmel, IN)
Andrew Skibo (SePRO Corporation, Fort Collins, CO)

KENAI PENINSULA - CWMA
Cooperative Weed Management Area

ALASKA DEPARTMENT OF FISH AND GAME
Homer Soil & Water Conservation District
U.S. FISH & WILDLIFE SERVICE
COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF ALASKA FAIRBANKS
CIAA
ALASKA DEPARTMENT OF NATURAL RESOURCES
KENAI PENINSULA BOROUGH
Kenai Watershed Forum

Found the right expertise…

ID'd species early and determined herbicide efficacy…



Figured out our game plan early on…

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

Aggressively chased funds…

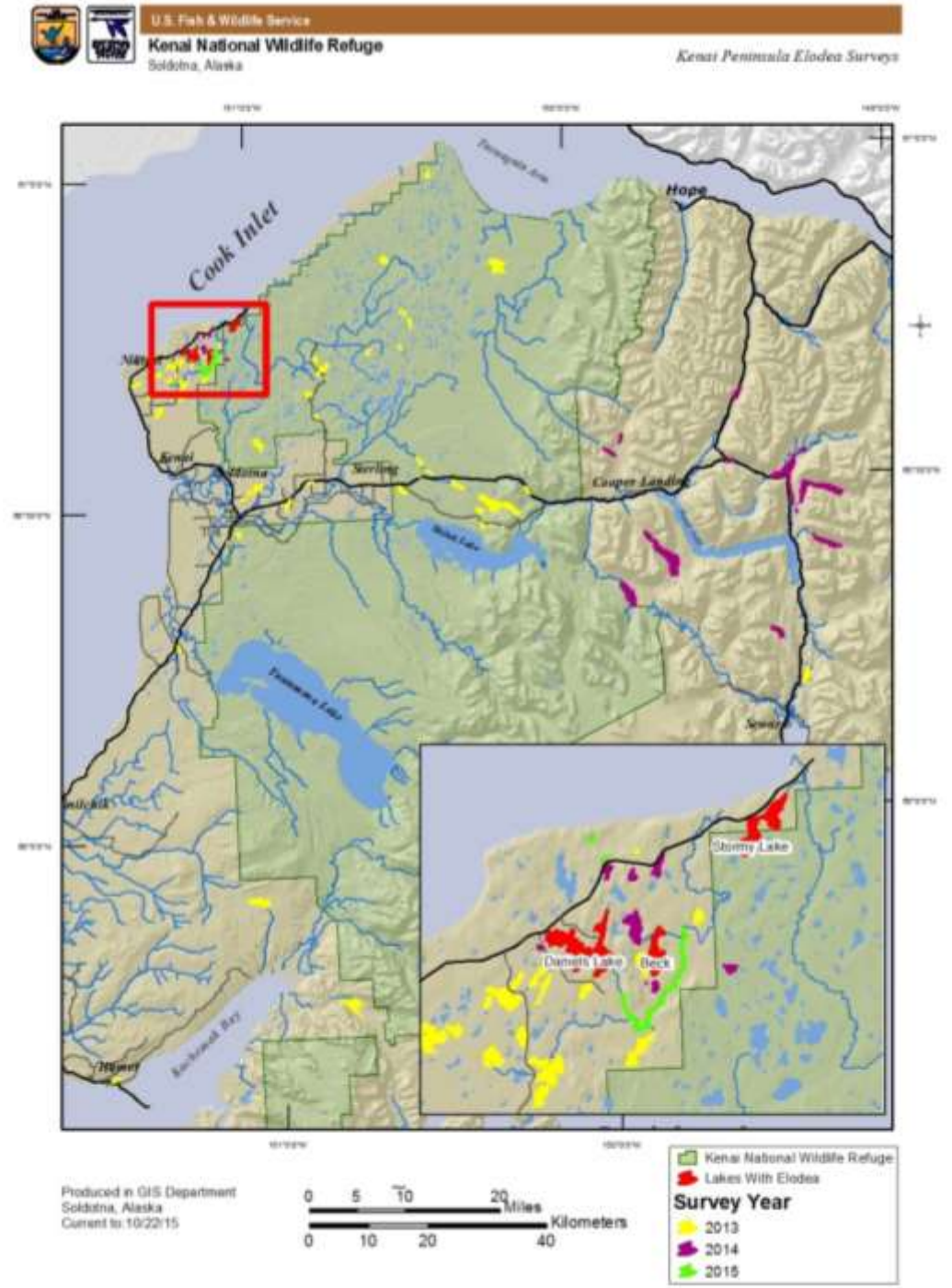
Receiving Office	Funds Rec'd	Funding Source	Purpose
Kenai Fisheries Office (USFWS)	**$28K**	KP Fish Habitat Partnership	Survey peninsula lakes
Kenai NWR (USFWS)	**$20K**	USFWS R7 Invasive Species Management with Volunteers	Survey peninsula lakes
Kenai NWR (USFWS)	**$40K**	Kenai Peninsula Borough	Support treatments
Kenai NWR (USFWS)	**$40K**	National Fish and Wildlife Foundation	Support treatments
Kenai Fisheries Office (USFWS)	**$35K**	USFWS R7 Aquatic Invasive Species Program	Nontarget effects study
Kenai NWR (USFWS)	**$120K**	USFWS R7 Invasive Species Management with Volunteers	Support treatments
Kenai Peninsula Borough	**$400K**	State capital funds appropriation	Support treatments
Kenai Watershed Forum	**$125K**	KP Fish Habitat Partnership	Support treatments
Kenai NWR (USFWS)	**$90K**	USFWS R7 One-time Invasive Species Funds	Support treatments

Figured out equipment needs early on…

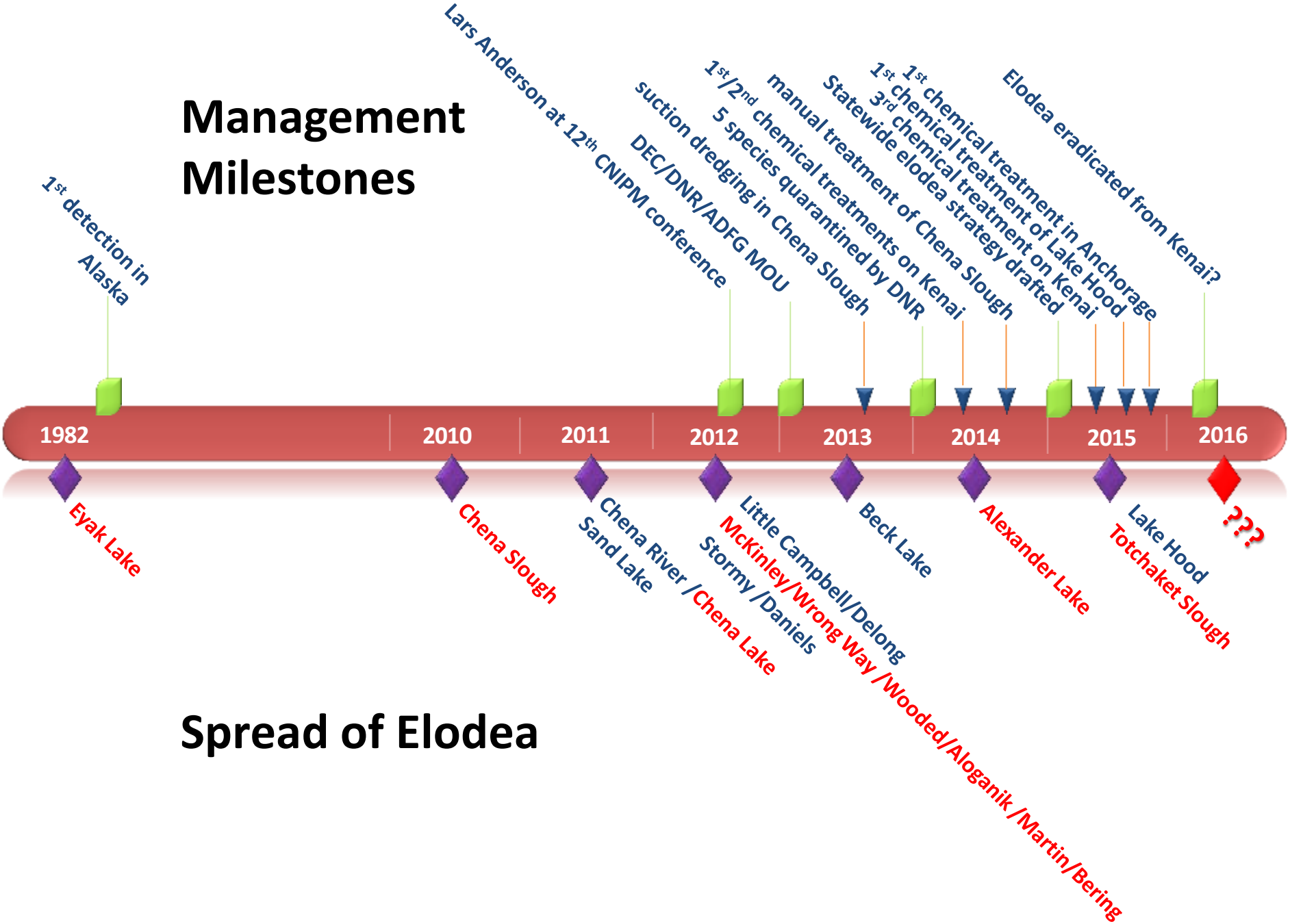
Pellet blower for SonarONE

Pump for Sonar Genesis, Diquat

Surveyed >100 at-risk lakes before (and during) treatment to assess feasibility of peninsula-wide eradication…



Management Milestones



Spread of Elodea

Problems shared among elodea management partnerships:

- ✓ inadequate funding
- ✓ inadequate science
- ✓ poor understanding of available management tools
- ✓ inadequate staff
- ✓ lack of clarity on lead organization/agency
- ✓ complex and lengthy state and federal permitting process
- ✓ lack of clarity about the severity of the problem and the management goal

Lessons learned that can be applied to managing any exotic species novel to Alaska:

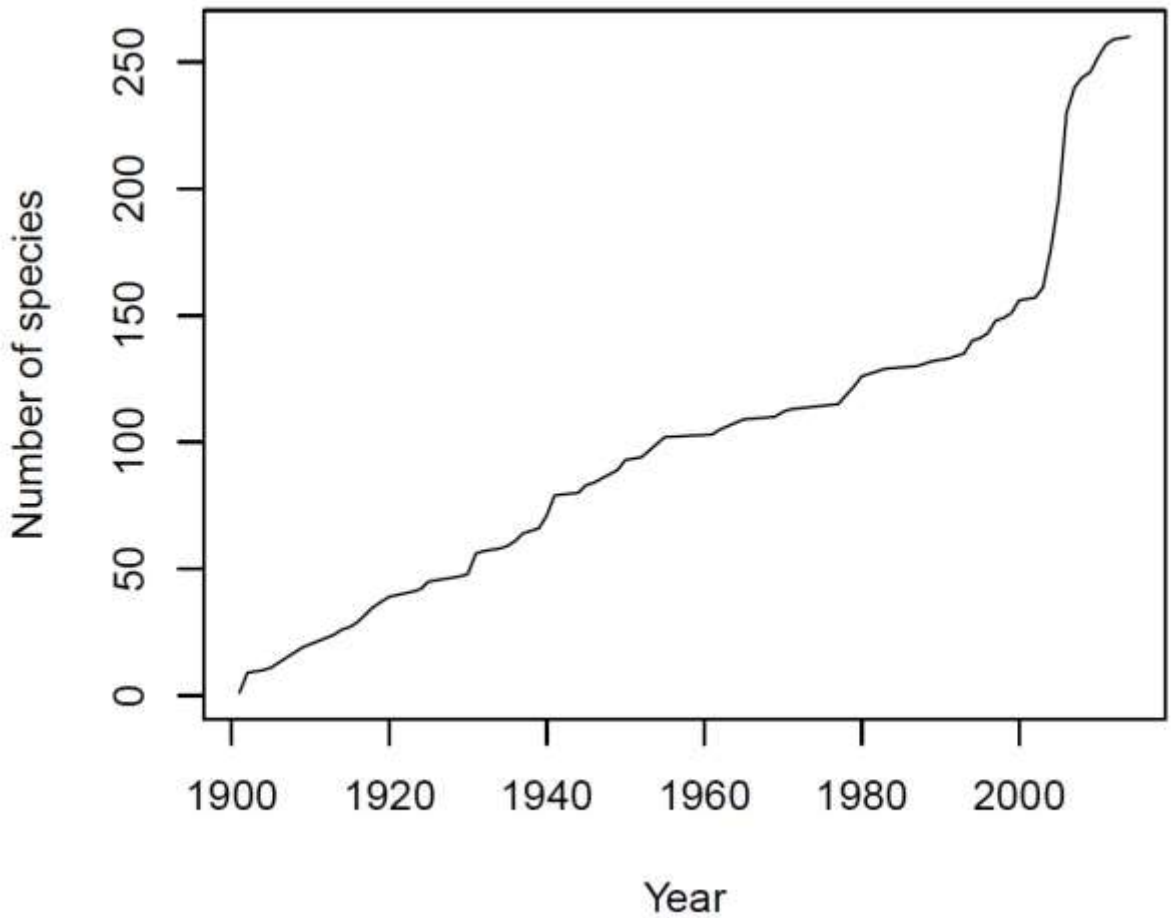
1) Alaska is different only in where our starting point is (and what our end game is), not in how things work (trust the science and management literature!)
2) rapid assessment of threat and management tools
3) coordinated but rapid surveys to determine coarse-grain distribution
4) identification of a lead agency to coordinate statewide efforts
5) articulation of management goal at one or more spatial scales
6) appropriate framing of the problem

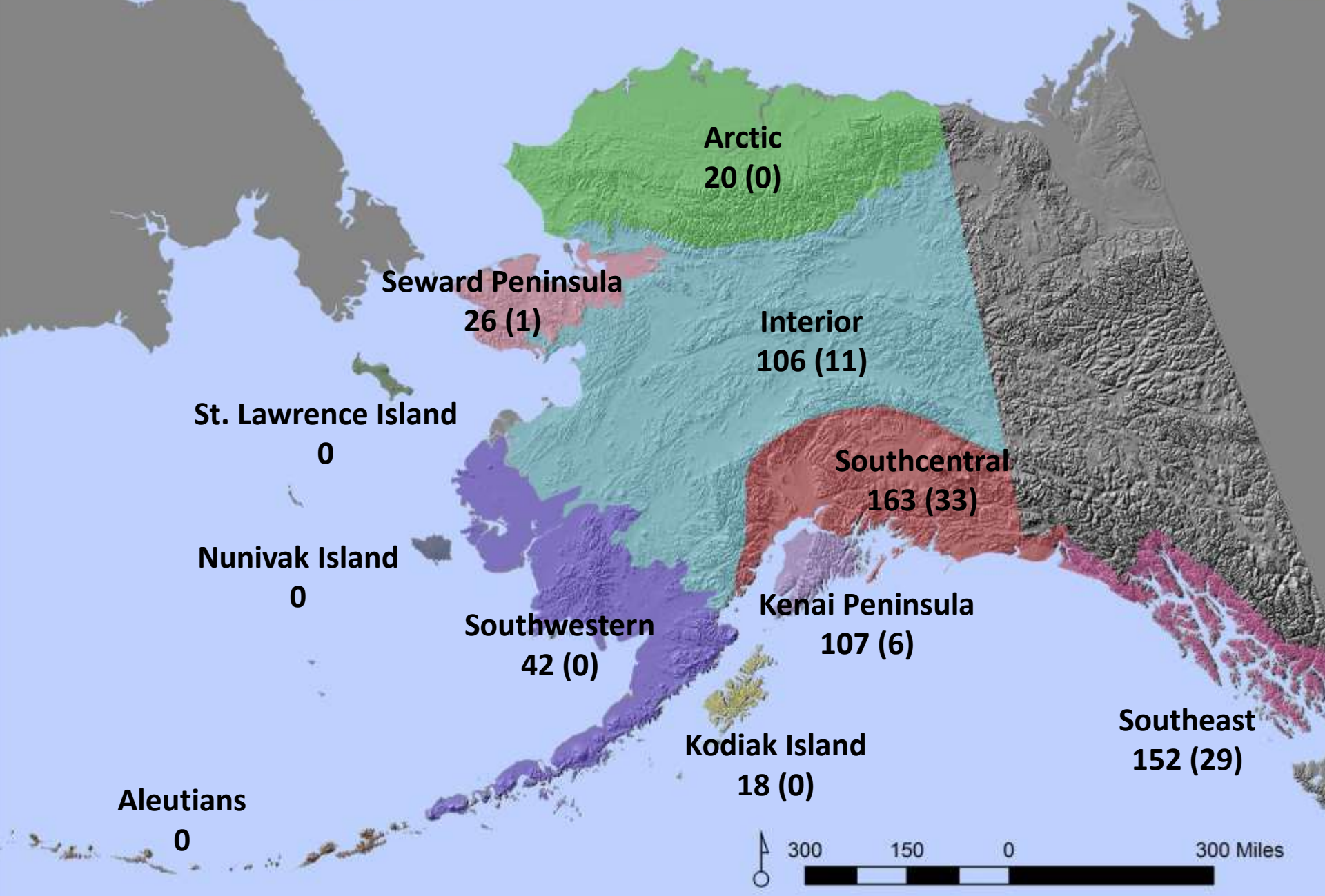
Lessons learned that can be applied to managing any exotic species novel to Alaska:

1) Alaska is different only in where our starting point is (and what our end game is), not in how things work (trust the science and management literature!)
2) rapid assessment of threat and management tools
3) coordinated but rapid surveys to determine coarse-grain distribution
4) identification of a lead agency to coordinate statewide efforts
5) articulation of management goal at one or more spatial scales
6) appropriate framing of the problem
7) aggressive pursuit of funding
8) solid understanding of the public process
9) shared work load so tasks are accomplished concurrently, not sequentially
10) although strategic and coordinated management is advocated, motivated local efforts should not be constrained
11) get ahead of the game (eDNA, Lake Hood)
12) lastly, a “can do” attitude is needed!

We are only at the beginning of the invasion curve for novel species…

4,000 to go?





Regional Species Richness (Unique to Region)

Questions???