Update on Chronic Wasting Disease

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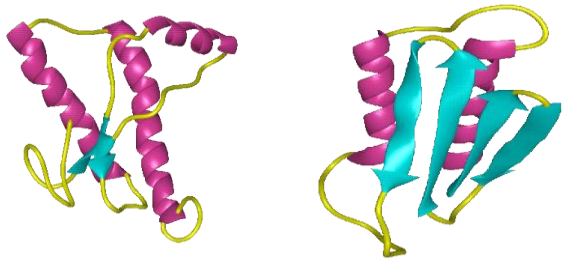
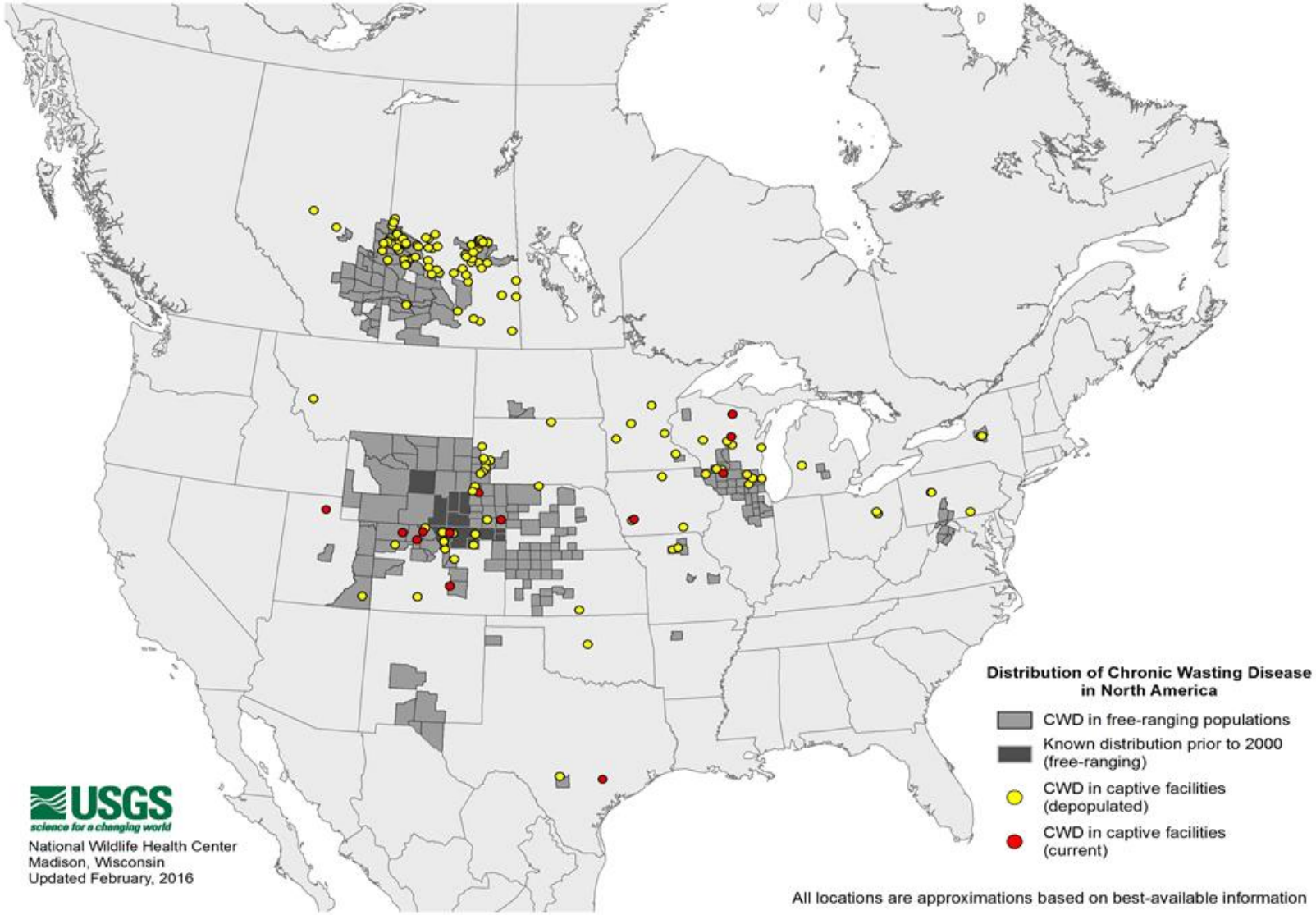
https://cwhl.vet.cornell.edu/

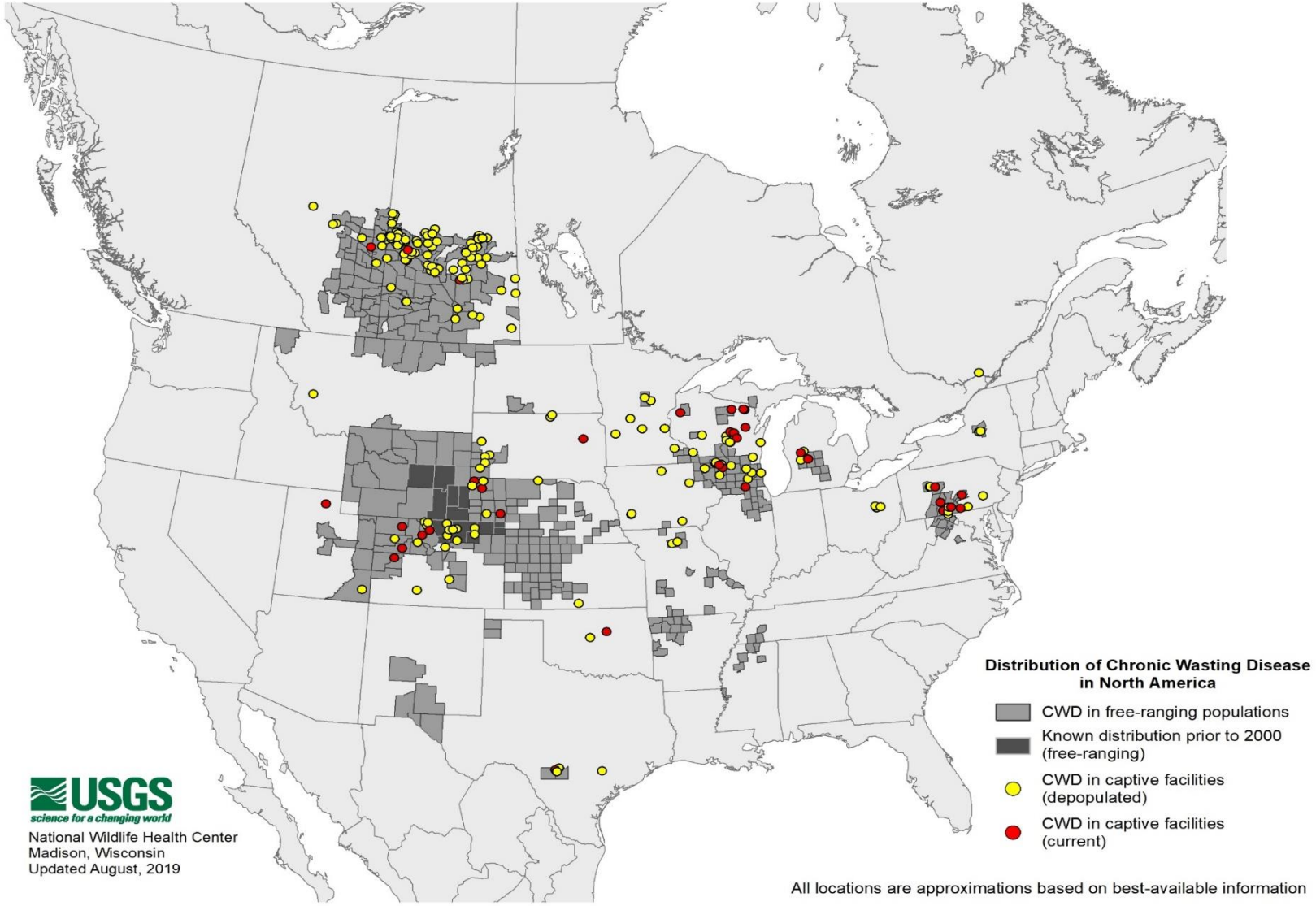
Chronic Wasting Disease (CWD)

- Transmissible spongiform encephalopathy (TSE)
  - Caused by a “prion” or infectious protein particle



- Fatal – no treatment, no vaccine, no resistance
- Deer, elk, moose, & reindeer are affected
  - Older age-class moose may have spontaneously generating CWD (Scandinavian countries)


Distribution of Chronic Wasting Disease in North America
CWD in free-ranging populations
Known distribution prior to 2000 (free-ranging)
CWD in captive facilities (depopulated)
CWD in captive facilities (current)
All locations are approximations based on best-available information
USGS
science for a changing world
National Wildlife Health Center
Madison, Wisconsin
Updated February, 2016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science for a changing world
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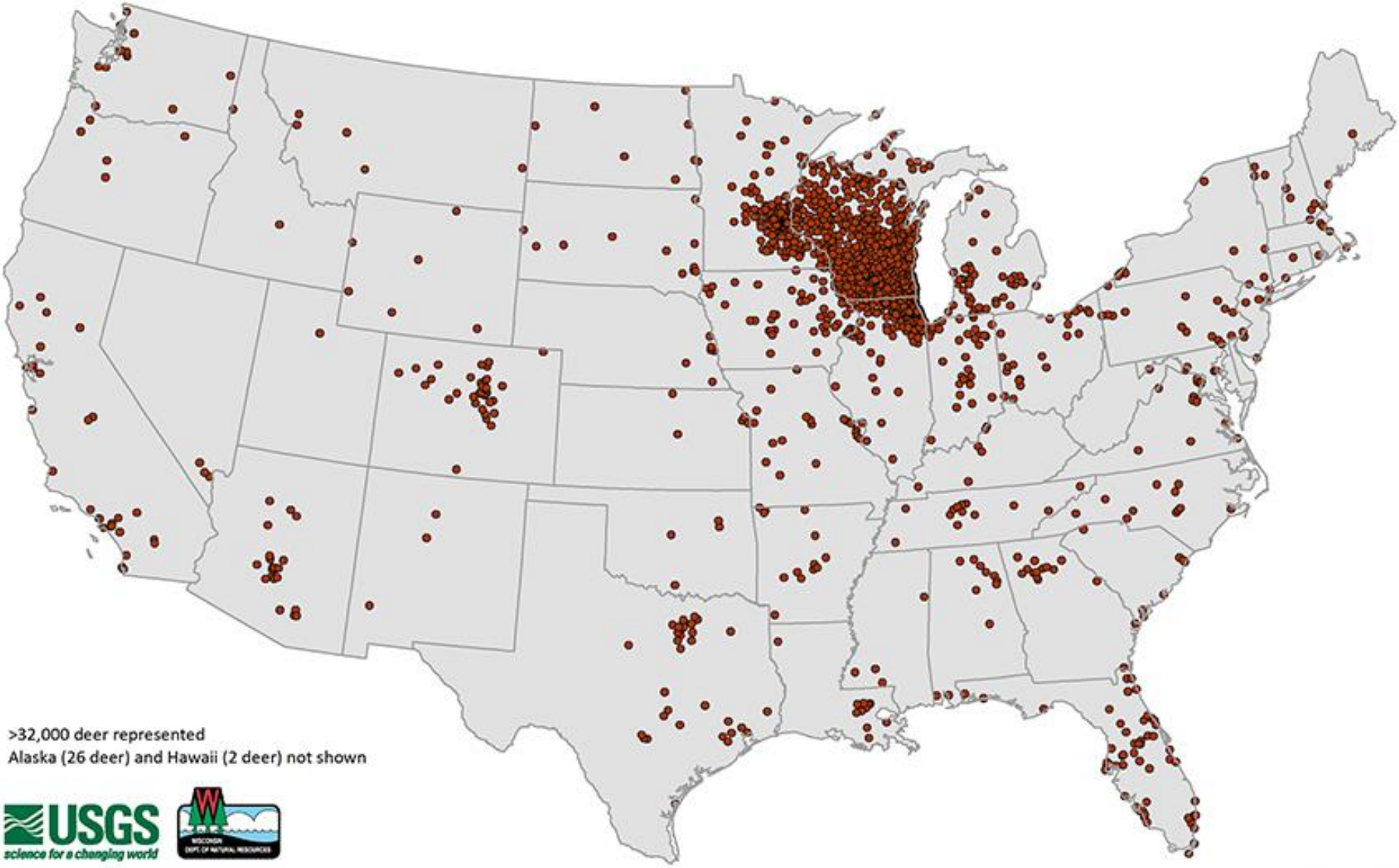
Madison, Wisconsin
Updated August, 2019

CWD Progression

Home Zip Codes of hunters harvesting deer in Dane, Iowa, Richland and Sauk Counties, Wisconsin, 2016-2017

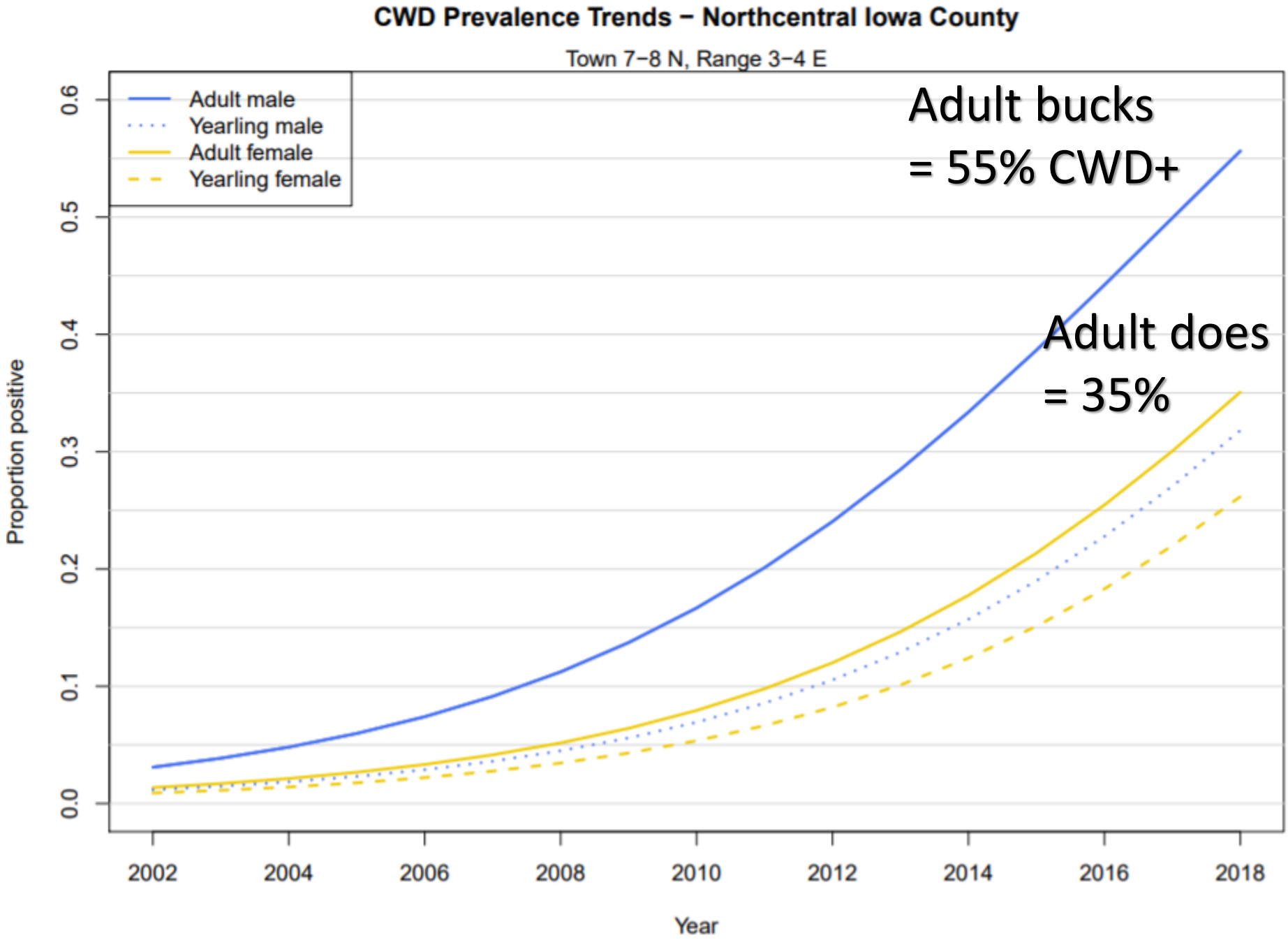
Data: Wisconsin Department of Natural Resources



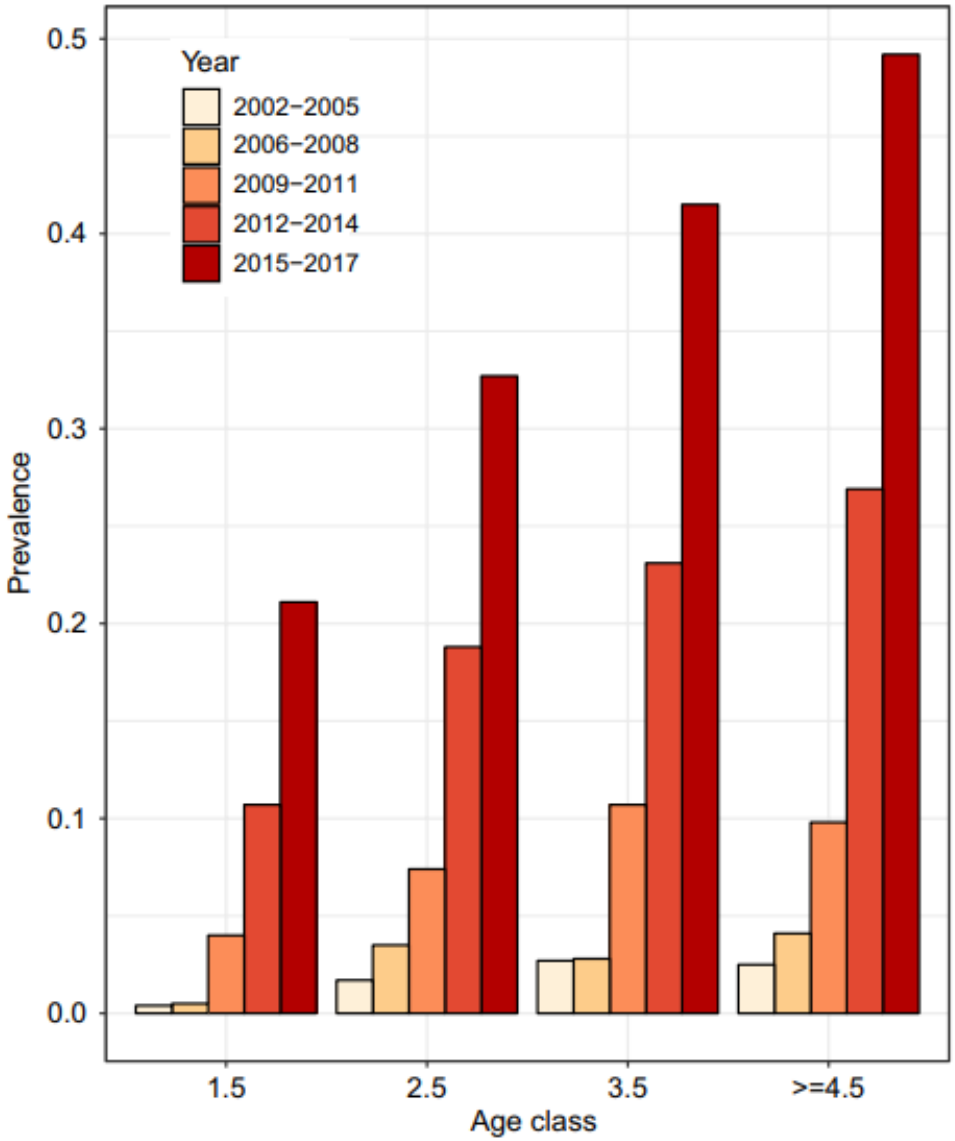
>32,000 deer represented
Alaska (26 deer) and Hawaii (2 deer) not shown

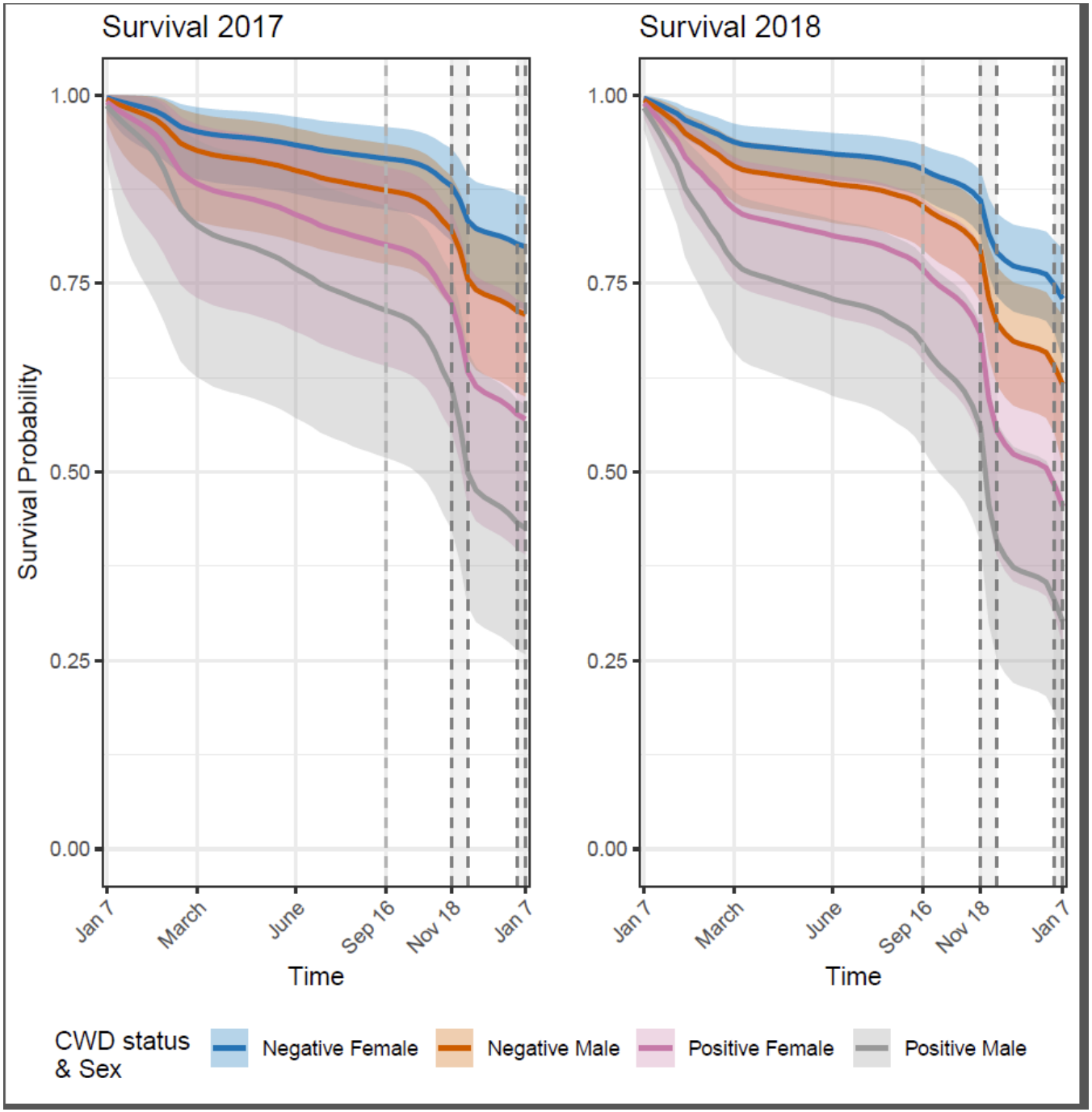
USGS science for a changing world

WISCONSIN DEPT. OF NATURAL RESOURCES


CWD Prevalence Trends – Northcentral Iowa County
Town 7–8 N, Range 3–4 E
Adult male
Yearling male
Adult female
Yearling female
Adult bucks
= 55% CWD+
Adult does
= 35%
Proportion positive
0.0
0.1
0.2
0.3
0.4
0.5
0.6
2002
2004
2006
2008
2010
2012
2014
2016
2018
Year

CWD Prevalence: Male WTD in WI




Survival 2017
Survival 2018
Survival Probability
1.00
0.75
0.50
0.25
0.00
Jan 7
March
June
Sep 16
Nov 18
Jan 7
Time
CWD status & Sex
Negative Female
Negative Male
Positive Female
Positive Male

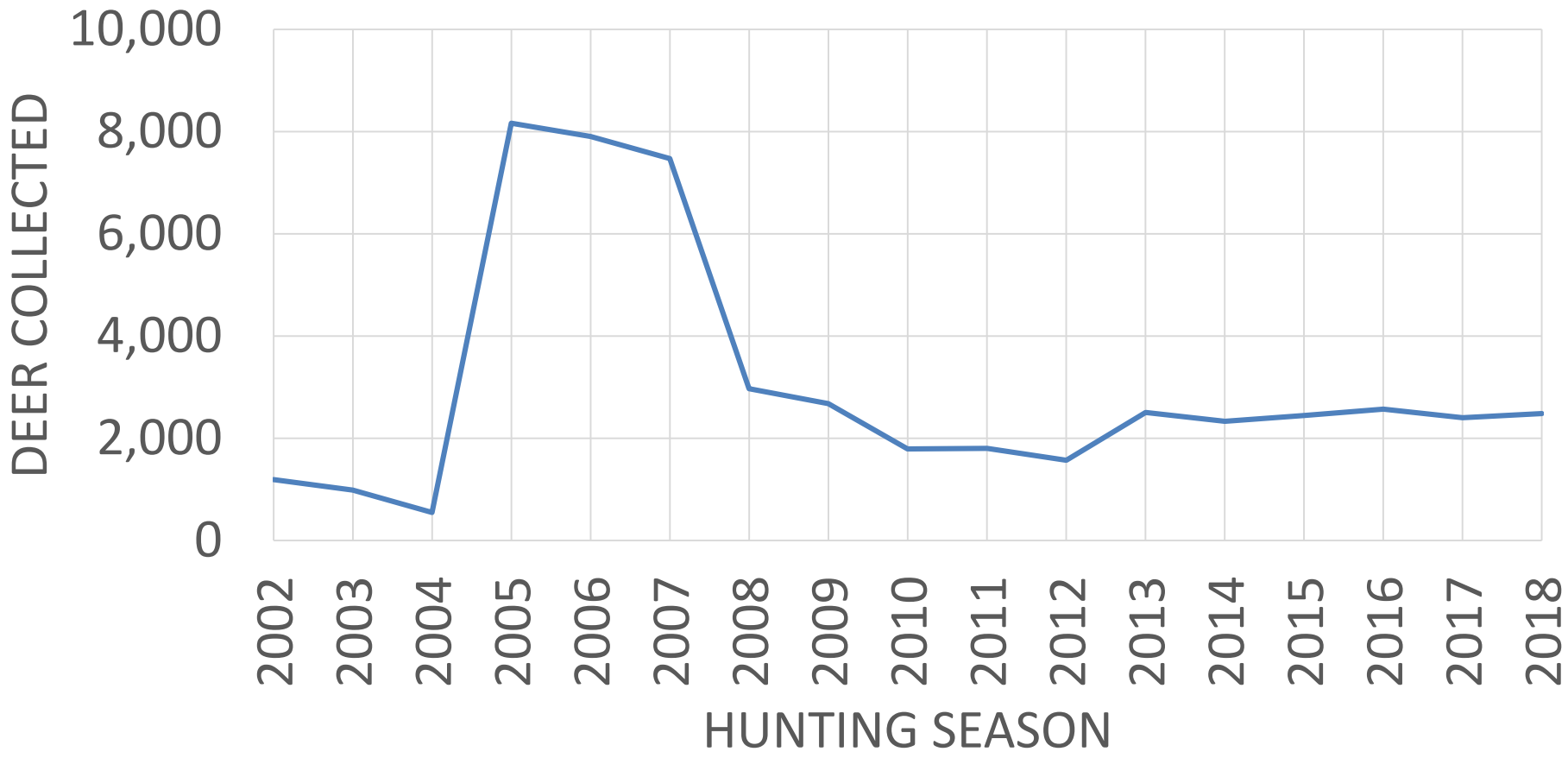
NYS Interagency CWD Program

- Multi-year effort by NYS DEC, DAM & Cornell

1. Surveillance - Detect earliest intrusion of CWD into NYS by focusing on highest risks
2. Response - Prevent disease from becoming established
3. Risk Minimization
   a. Keep infectious material and animals out of New York
   b. Prevent exposure to wild deer
   c. Provide public education to increase awareness and understanding of CWD risks

https://www.dec.ny.gov/animals/7191.html

NYS Wild Deer CWD Surveillance



http://www.dec.ny.gov/docs/wildlife_pdf/cwdsurplan13web.pdf

Annual Cost of CWD Surveillance

- Testing – paid by the state agencies
  - 2016 Wild deer – 2447 (DEC = $67,300)
    - Samples from meat processors & taxidermists = $17,000
  - 2016 Captive deer – 749 (Ag & Markets = $20,600)
- Estimate for 2016 Surveillance - $308,000
- Disease Outbreak Response – 2005 cost >$1M

Taxidermy Partnership Program

- Trained taxidermists to collect RPLN via DVD
- Increased payments

CWD: tissue sampling instructions for taxidermists

NYSDEC

Subscribed

114 views

29 participating taxidermists submitted 636 deer

<5% of samples collected by taxidermists are unsuitable

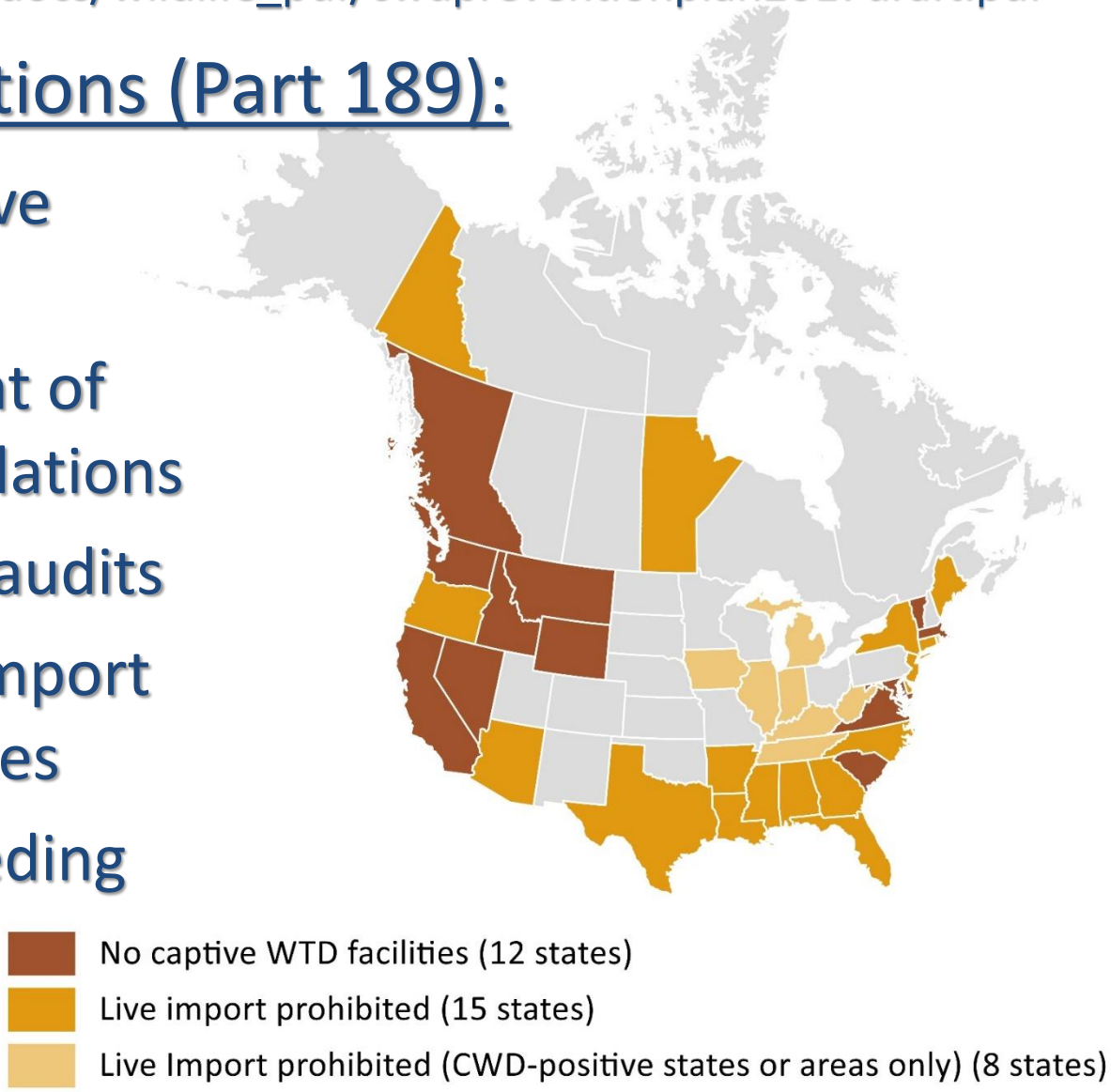
NYSDEC CWD COOPERATOR

Interagency Risk Minimization Plan

http://www.dec.ny.gov/docs/wildlife_pdf/cwdpreventionplan2017draft.pdf

Actions & Regulations (Part 189):

- ✓ Banned live captive imports (2013)
1. DEC enforcement of Agriculture regulations
- ✓ Joint site visits & audits
2. Whole carcass import ban from all states
3. Separate out feeding regulation



Can humans get CWD?

No known cases of CWD in humans

- how many people are tested? Would it be recognized?
- CDC recommends no consumption of CWD+ venison

Is the species barrier complete? Pigs can be “silent carriers.”

- prion strain adaptation
- serial passage

Macaque study:

-1 orally infected via brain material

-2 orally infected via consumption of venison

Local farmers head to Kansas with truckloads of hay to help wildfire recovery

By: Chris Gothner

Posted: Apr 06, 2017 09:23 PM CDT Updated: Apr 06, 2017 09:23 PM CDT

TOWN OF CROSS PLAINS, Wis. - A group of farmers from across southwest Wisconsin piled hay on top of their trucks and headed off to Kansas Thursday night to help fellow farmers affected by devastating wildfires in the southern portion of the Sunflower State.

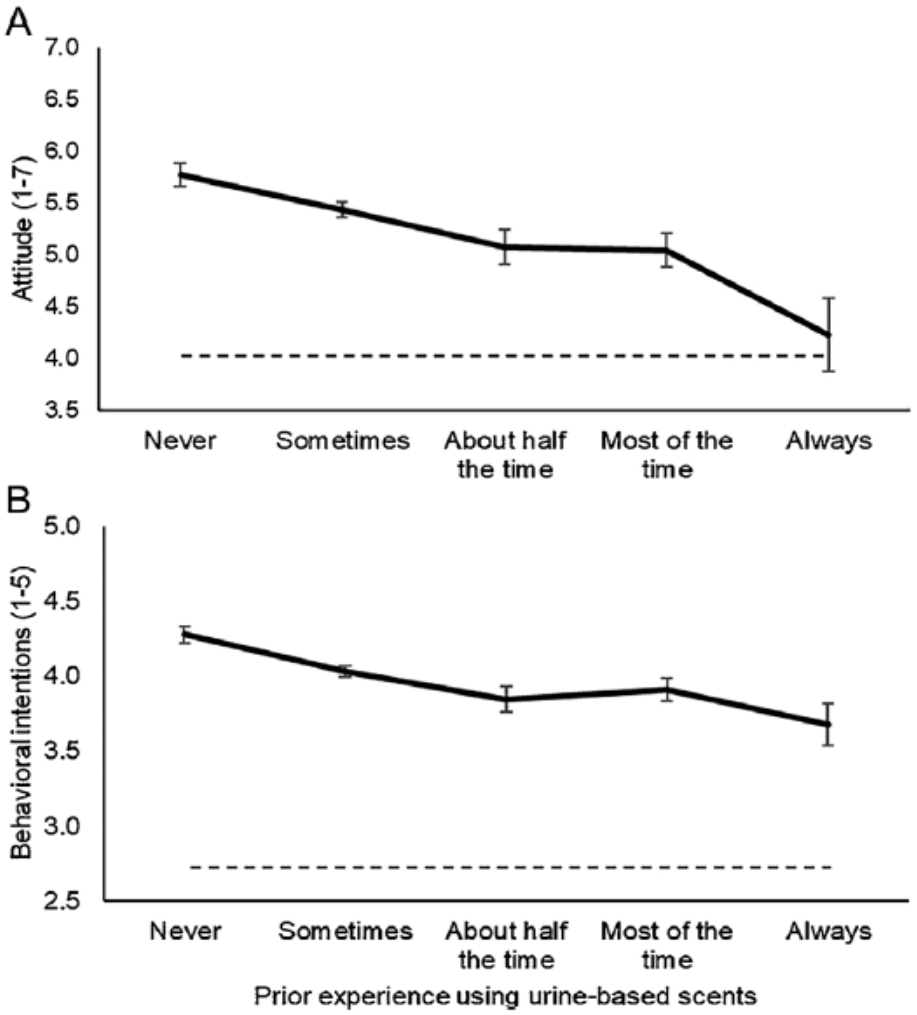
CHANNEL3000.com
WISC-TV • NEWS 3 • MADISON

Jurisdictions that Prohibit the Sale and/or Use of Cervid Urine-based Products

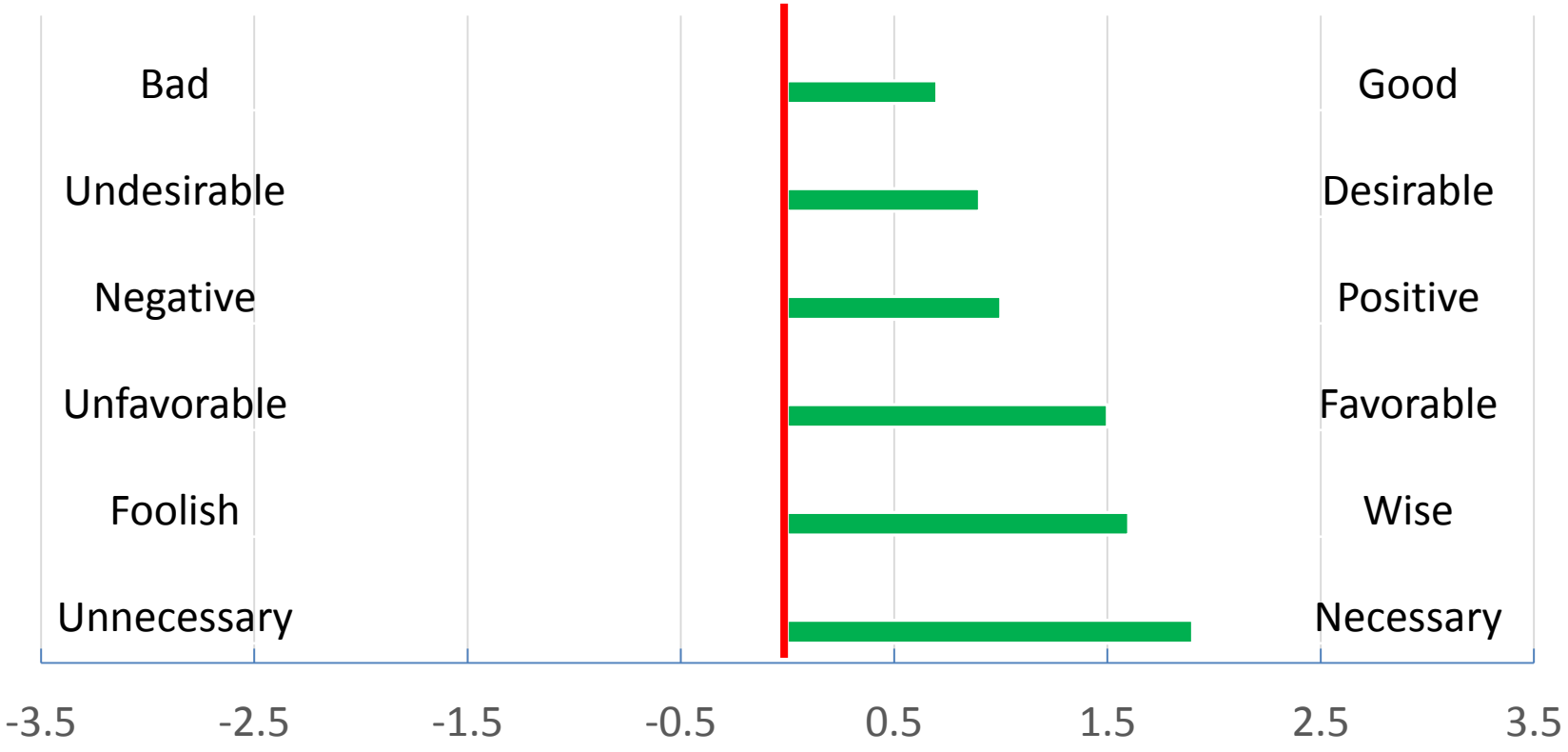
1. Alabama – effective 2019
2. Alaska – effective 2012
3. Arizona – effective 2013
4. Arkansas – effective 2017
5. Idaho – effective 2018
6. Louisiana* – effective 2018
7. Manitoba – effective 2002
8. Michigan* – effective 2018
9. Minnesota (southeastern region) – effective 2018
10. Montana* - effective 2018
11. New Mexico – date unknown
12. North Dakota (disease management area) - 2019
13. Nova Scotia – effective 2007
14. Ontario – effective 2010
15. Oregon – effective 2020
16. Pennsylvania (disease management areas) - 2013
17. Rhode Island – effective 2018
18. South Carolina – effective 2019
19. Tennessee – effective 2019
20. Virginia – effective 2015
21. Vermont – effective 2015
22. Yukon Territory – date unknown

* allow use of products from companies enrolled in the ATA Deer Protection Program

- Hunters are supportive of a urine ban
- Hunter intend to comply with a urine ban



NE Hunters have Supportive Attitudes For A Urine Ban



We’re all in this boat together….

Deer urine-based lures have limited effectiveness.

=

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Economic Impacts – NY Wild Deer

Value of wild deer herd

- Hunters afield 2012: 552,800
- Direct revenue of Big Game Licenses: $30.2M
- Indirect economic input of deer hunting in New York: $1.47 Billion

  $777.2M in retail sales ($804.2M total - $30.2M license sales)

  $458.1M in salaries & wages

  $123.8M in state & local taxes

  $ 116.5M in federal taxes

  = $1,475,600,000 indirect economic input

$30.2M+$1,475.6M = $1.5B for the value of the NY Wild Deer Herd per Year

Additional Benefits: Food and Recreation

- 10.2M lbs of venison for NY households x $6/lb for ground venison = $61M in table fare/yr
- 10,459,000 days hunting deer x $40/day recreational value = $418.3M/year in recreational value

Economic Impacts – NY Captives

Value of Captive Industry:

Direct sales: $5.1M, (deer only)

Indirect sales: $8.4M (includes other game)

= $13.5M in estimated economic output

Estimated number of farms: <564

Employment: Direct full time: 267, Direct part-time: 228; Indirect full-time: 117 = Indirect part-time: 100 = $425,000 for labor

Deer and Elk farm inventory by value: $4.7M

COMPARISON OF ECONOMIC VALUE

WILD DEER (2011)		**CAPTIVE CERVIDS** (2008)
Direct sales:	$30.2M	$5.1M
Indirect Sales:	$1,475.6M	$8.4M
Total:	$1.5B	$13.5M

Tracking recovery of NY river otter

using sign surveys and occupancy models

Jacqueline L. Frair, SUNY ESF Roosevelt Wild Life Station

Acknowledgements

NYS DEC

Field surveys: Regional biologists & technicians … too many to list here!

Photo reviews: Andrew MacDuff, Scott Smith, Mike Clarke

Research oversight: Furbearer Management Team
(Team leaders: Jennifer Petit and Mike Clarke)

SUNY ESF

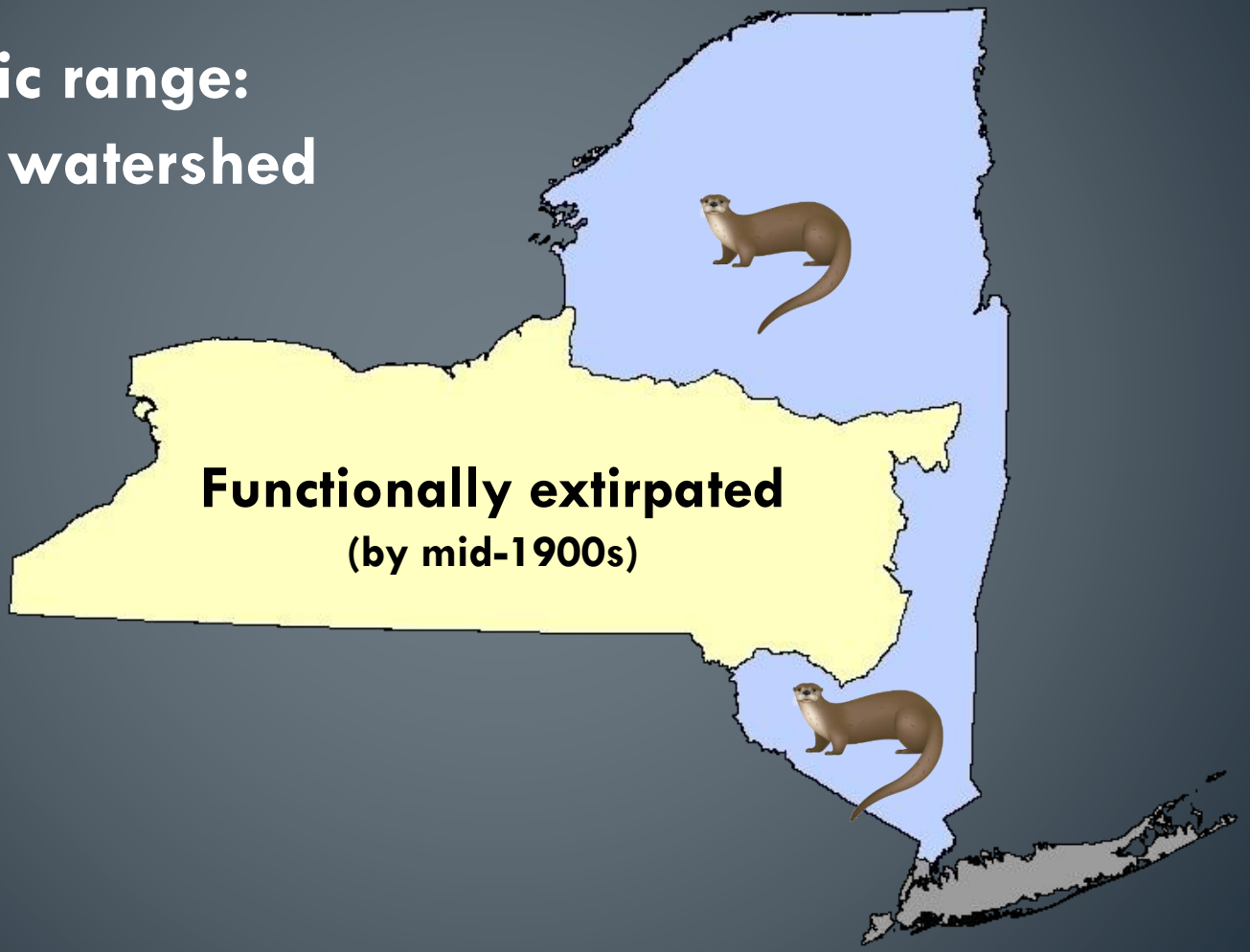
Hierarchical occupancy models: Michelle Stantial, Jonathan Cohen

Seasonal occupancy models: Allison Devlin, Jonathan Cohen

Habitat suitability models: Kelly Powers, Brian Underwood

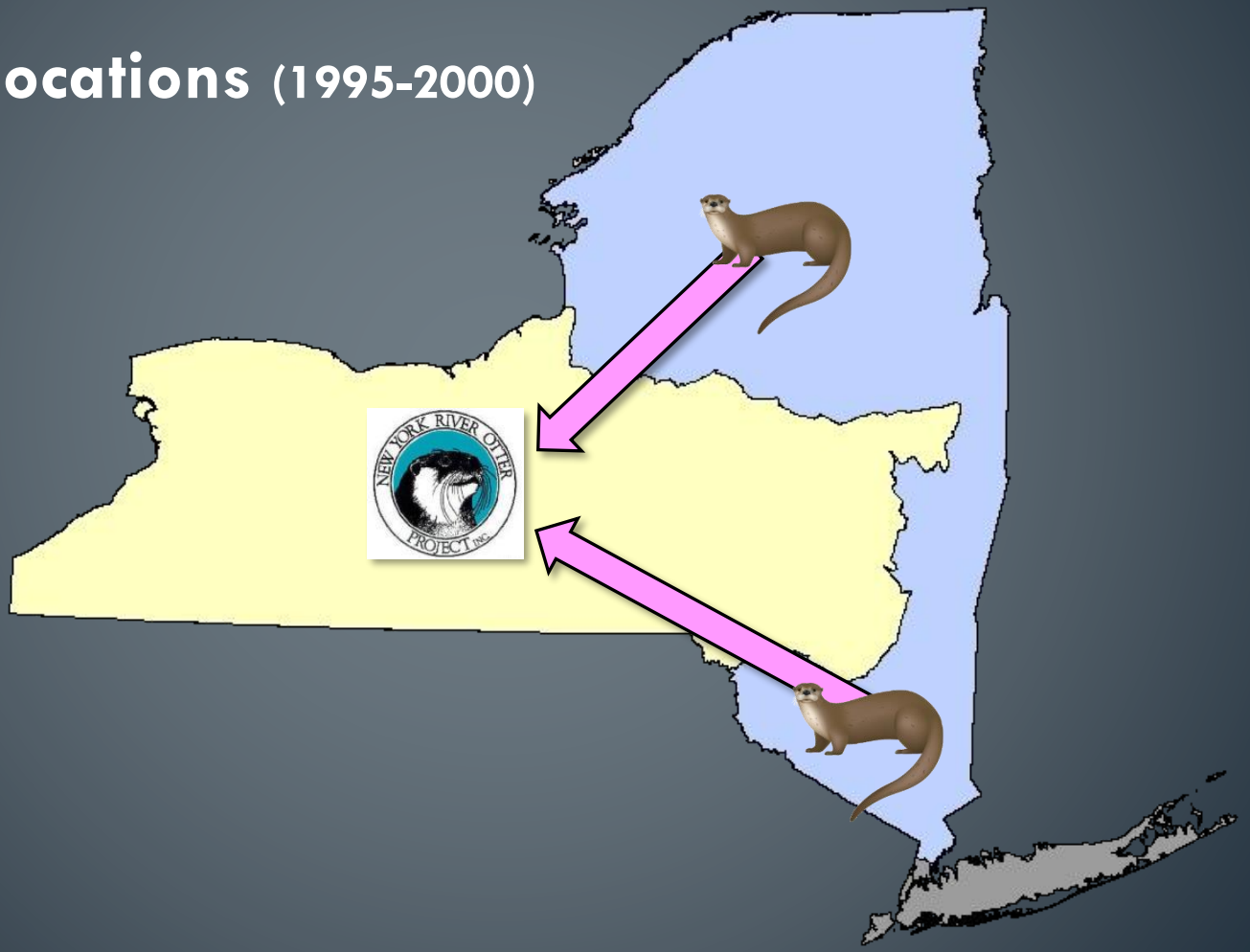
Brief history of otter in NY State

- **Historic range: every watershed**

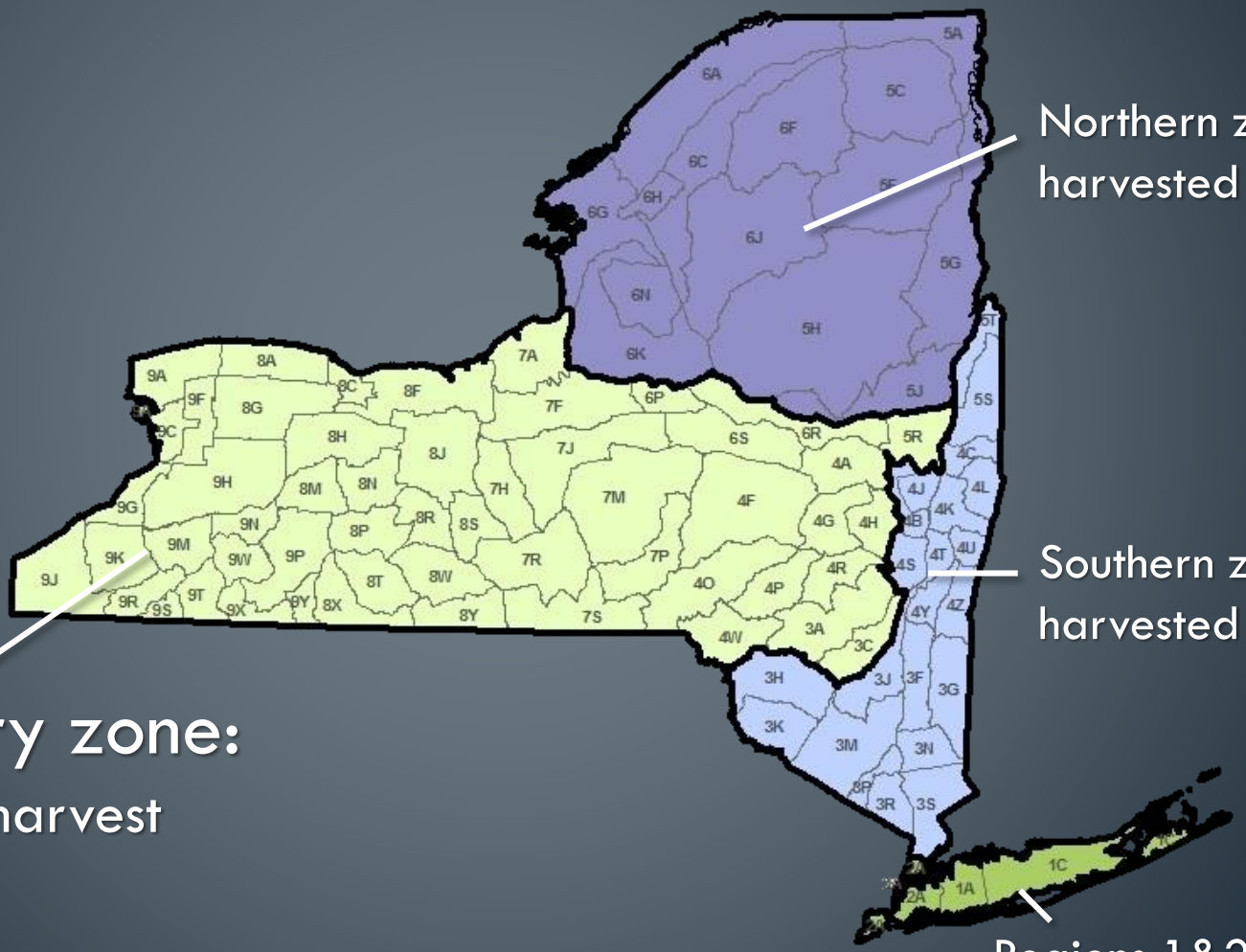


Brief history of otter in NY State

- **Translocations** (1995-2000)



Brief history of otter in NY State



Monitoring otter recovery (1998 – 2015)

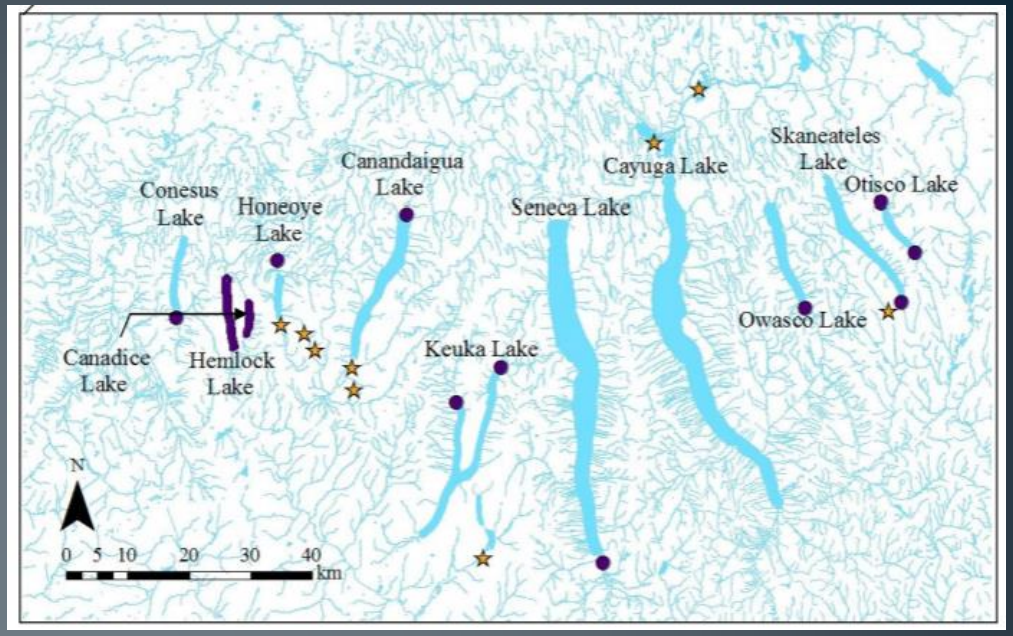
- Incidental observations
  (by-catch, road kills, sightings)
- Bridge-based sign surveys

search 100 m

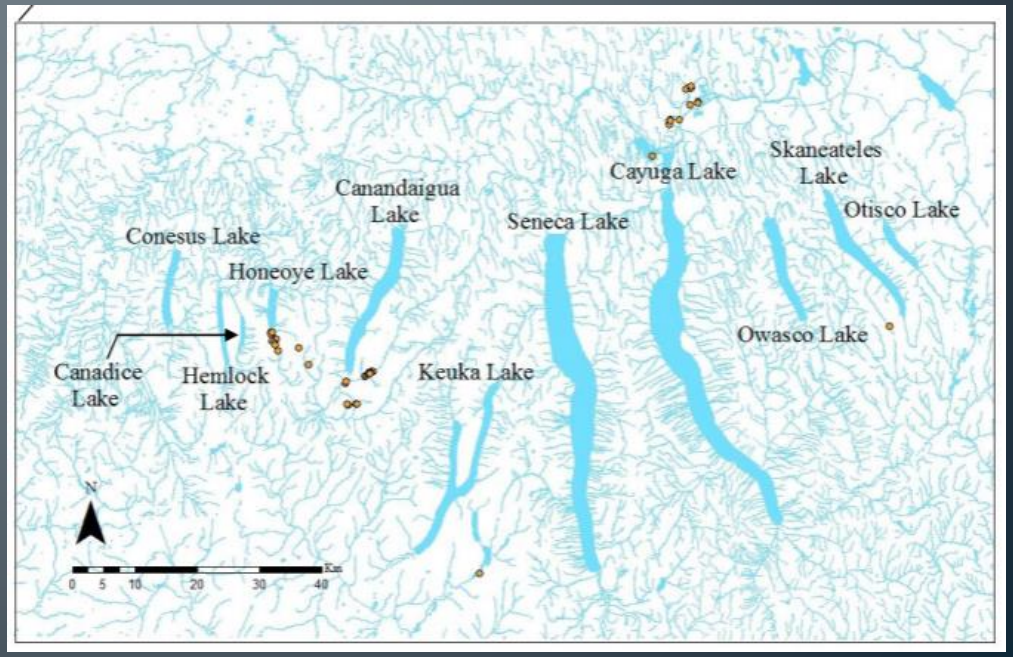
Elaina Burns

M.S. 2014

- **Non-invasive estimate of abundance: genotyping spraints/jelly at latrine sites**
- **Activity patterns at latrine sites: camera trap study**



Otter detected Not detected Latrine



Study Objectives

1. Document otter population trend within the recovery zone
2. Design efficient and non-harvest based method for monitoring otter populations
3. Assess the status of otter populations statewide

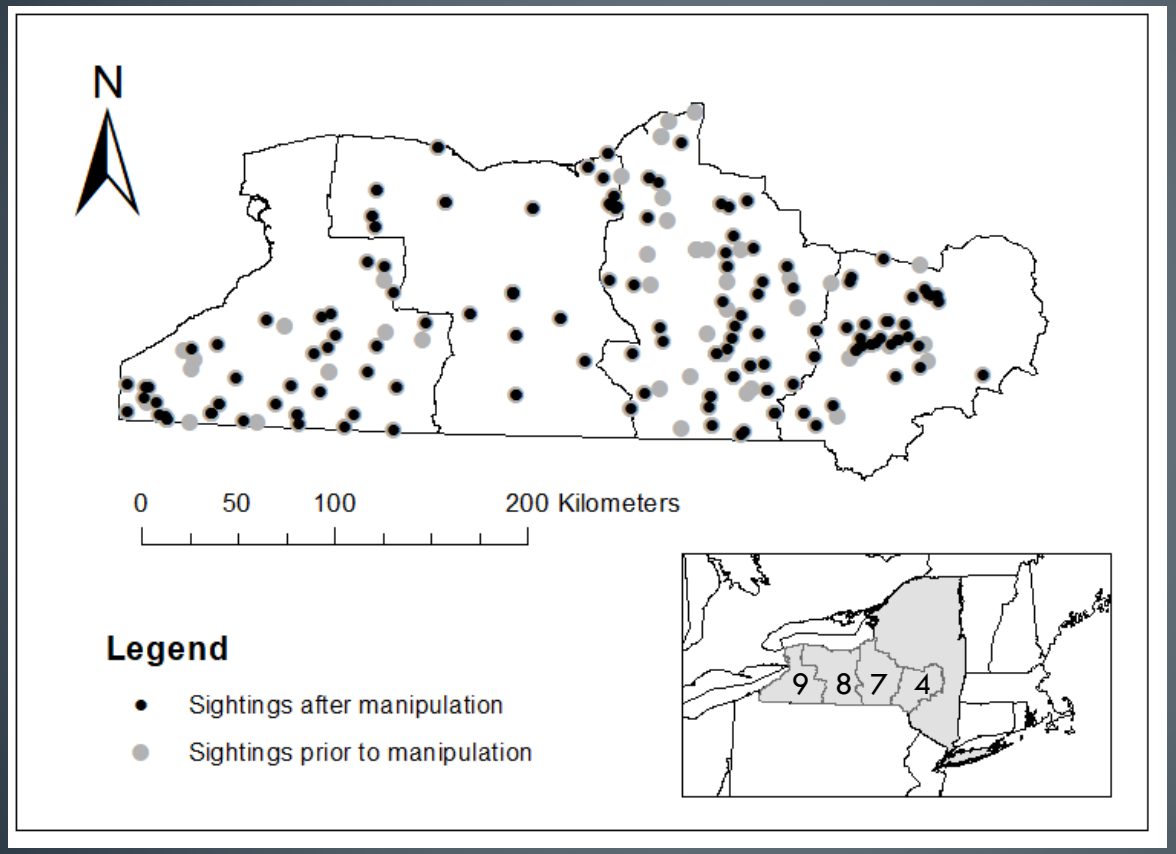
Alternative means to monitor otter

1. Incidental sightings → habitat suitability map
2. Camera traps → site occupancy

Kelly Powers, ESF ‘18

Verified otter sightings

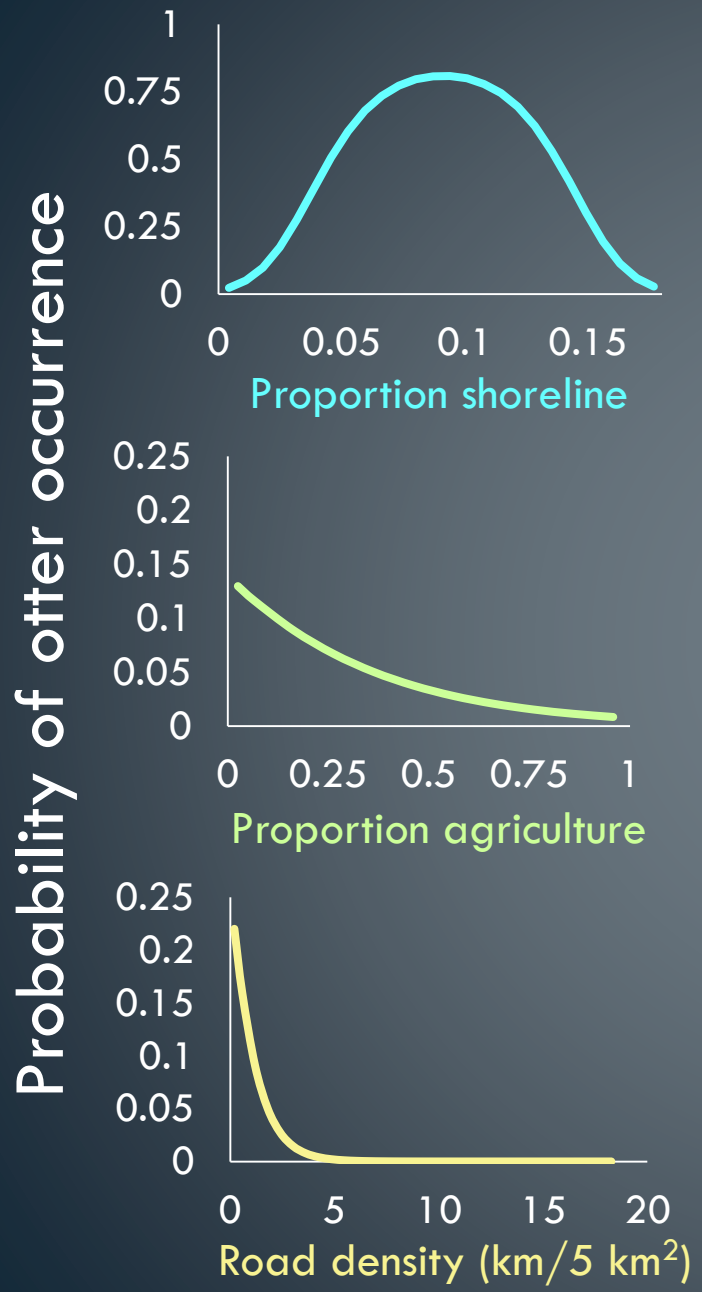
Recorded 2001-2012



Data sources varied by region

- Sign surveys (4-98%)
- Opportunistic sightings (0-58%)
- Incidental harvest (0-30%)
- Mortalities (0-8%)

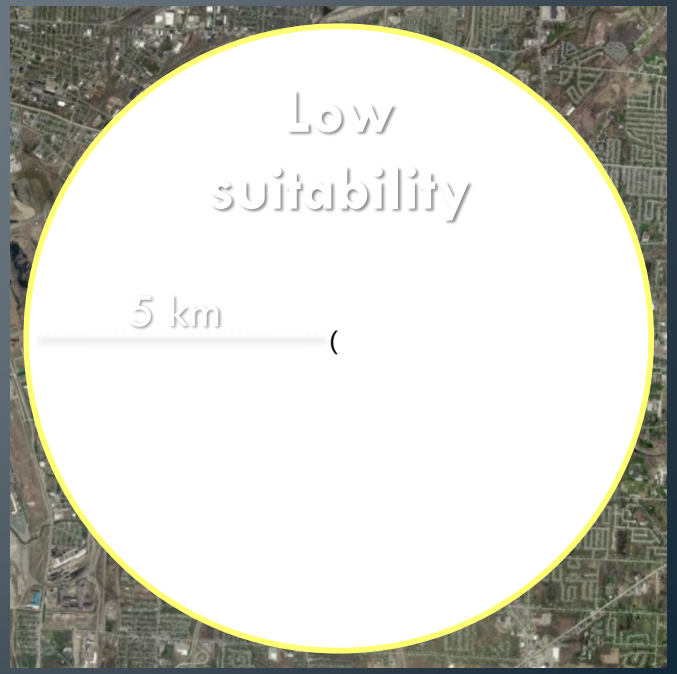
K. Powers, M.S. thesis (2018)



Shoreline (≤10 m from shore) within surrounding area (1-km radius)

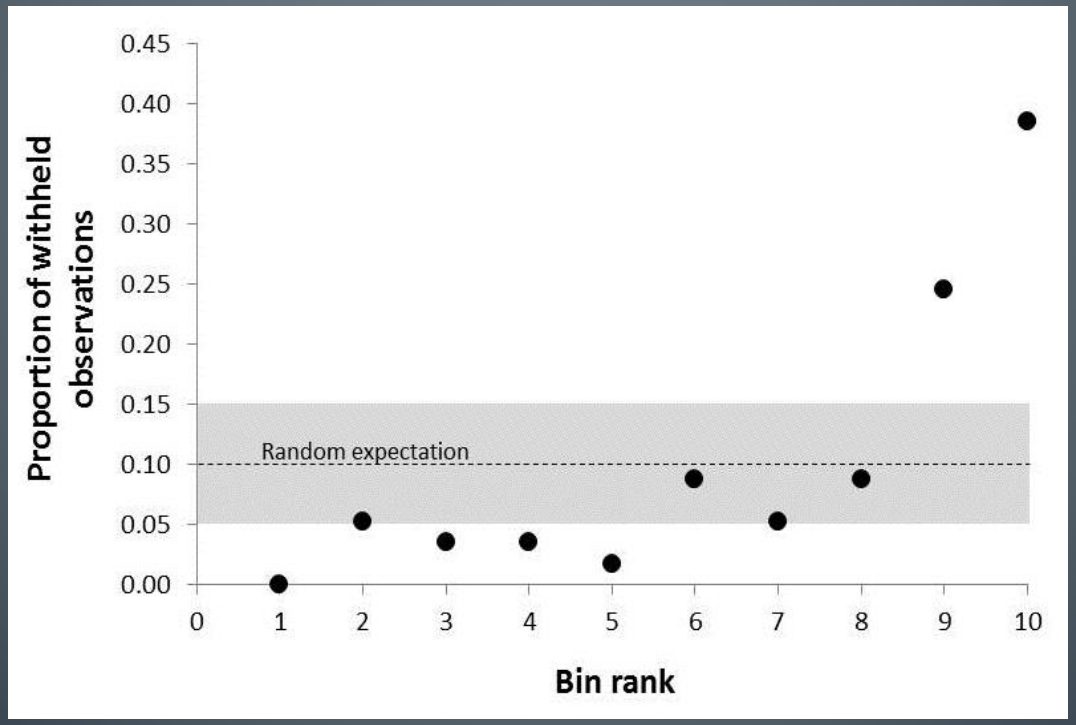
Agricultural lands within surrounding area (5-km radius)

Linear km of roads within surrounding area (5-km radius)



Model predictions

Strong correspondence to independent set of surveys (N = 57 otter locations; $R^2 = 0.90$)



K. Powers, M.S. thesis (2018)

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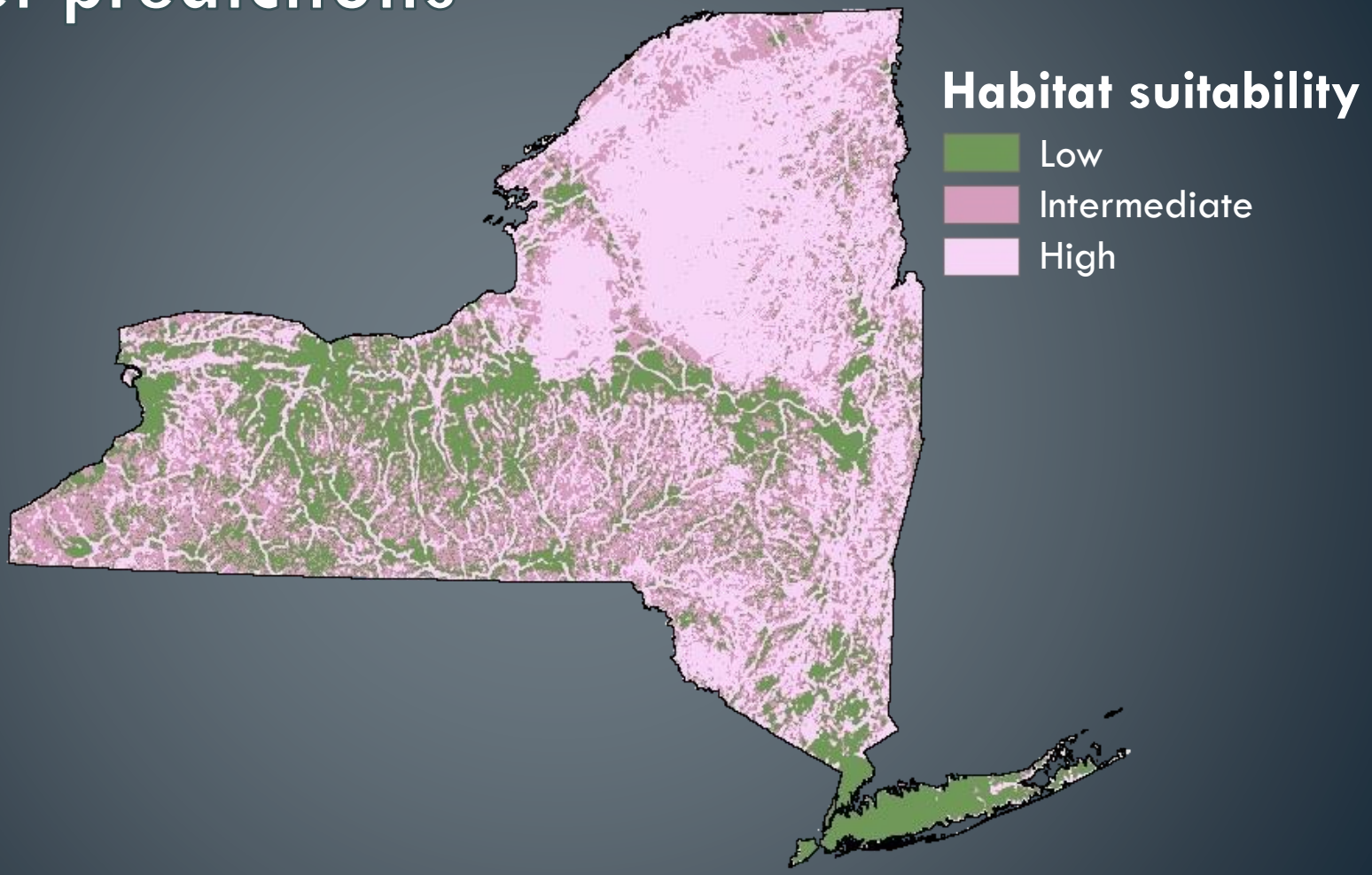
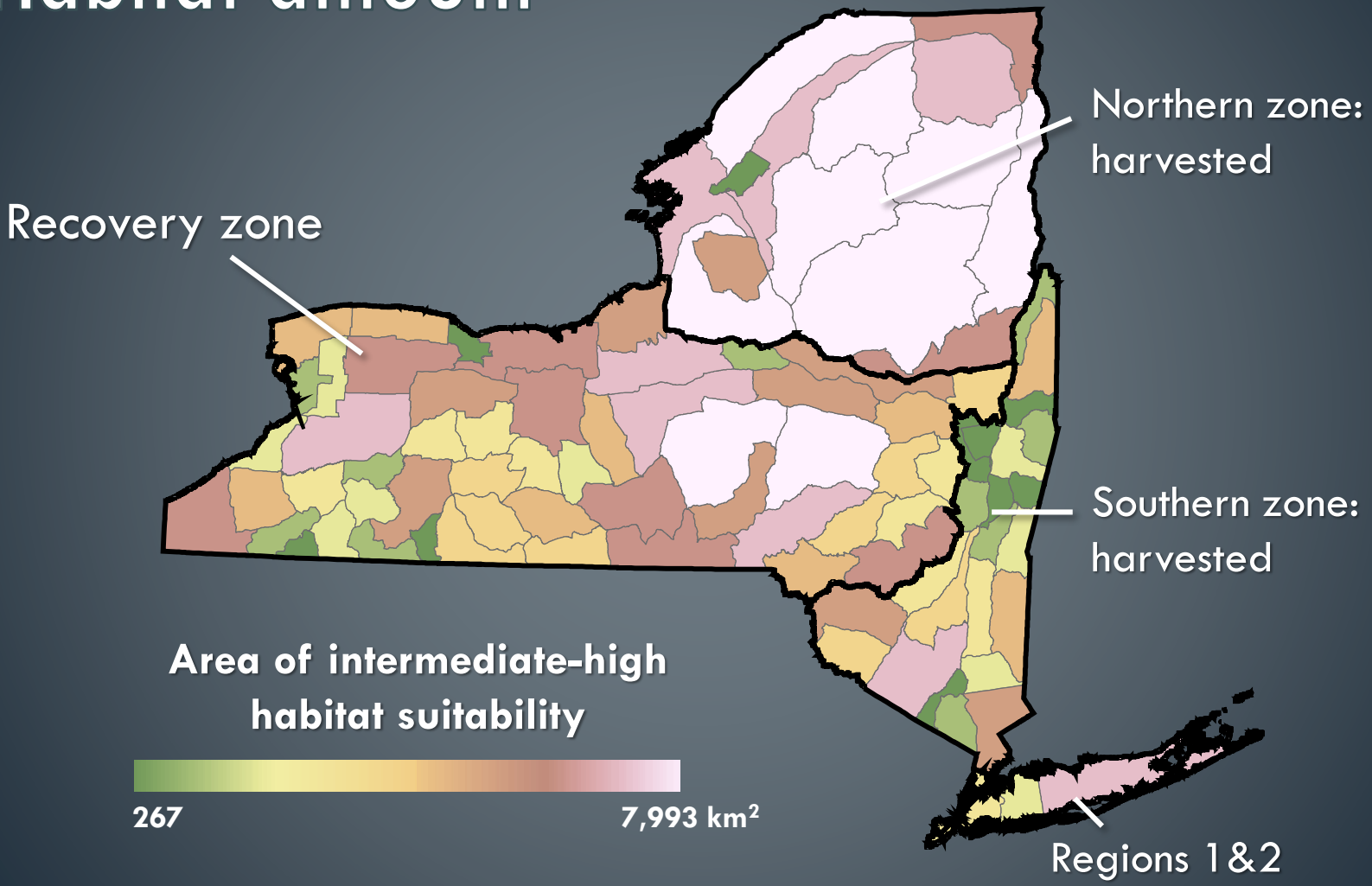


K. Powers, M.S. thesis (2018)

Habitat amount

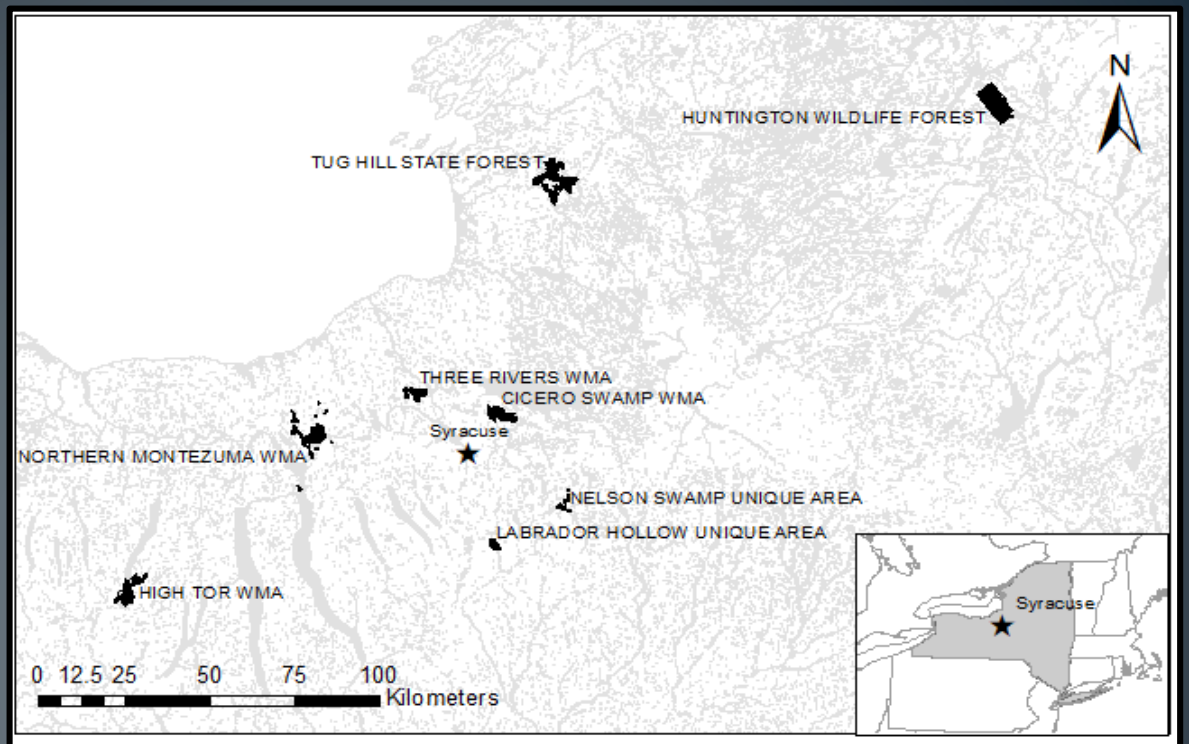


Based on K. Powers, M.S. thesis (2018)

Camera traps

Summer-fall 2016
(4 sites, 29 stations, 62-145 days/site)

Spring 2017
(5 sites, 36 stations; 52-95 days/site)



K. Powers, M.S. thesis (2018)

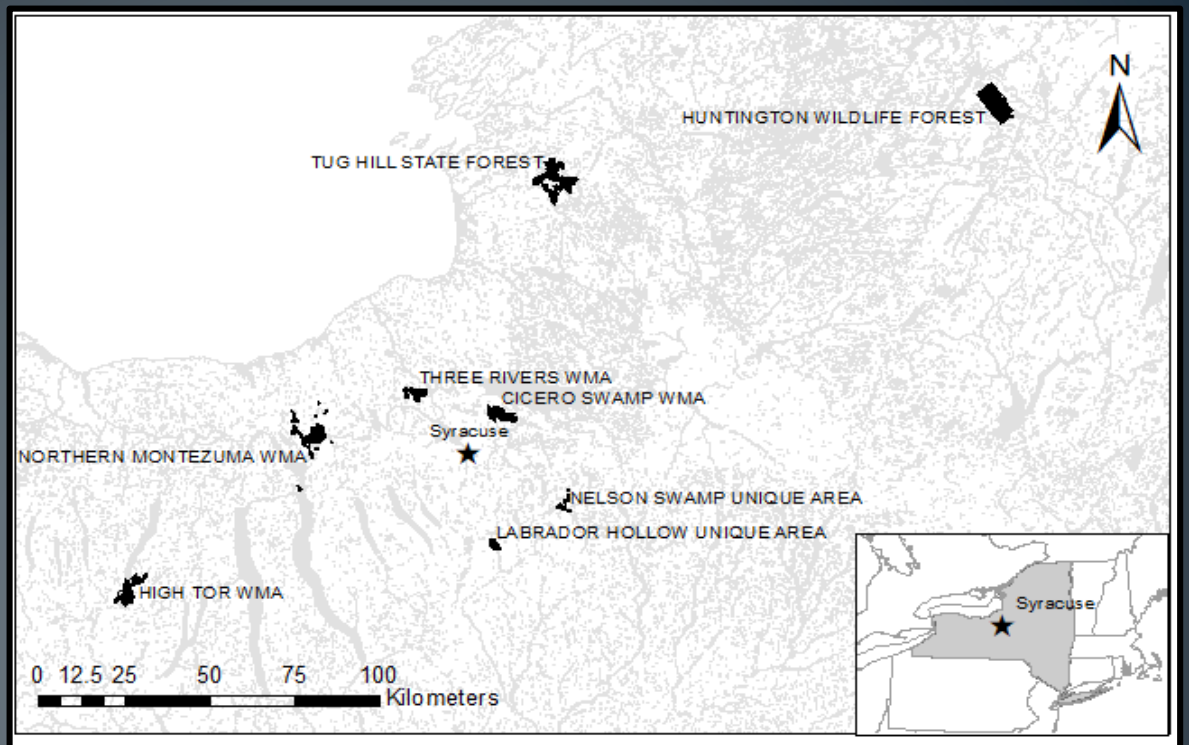
Camera traps

Summer-fall 2016
(4 sites, 29 stations, 62-145 days/site)

Spring 2017
(5 sites, 36 stations; 52-95 days/site)

2017 data

- 503,078 photos
- 29,975 (6%) contained animals
- 4 were river otter



Otter detected at only one site in each season!

K. Powers, M.S. thesis (2018)

eDNA

- **Isolated DNA signature from otter tissue**
- **Optimized collection and filtration methods**
- **Validation using 'contrived' samples**
  (where otter known to occur)

  → Unable to detect in standing water column
  → Better able to detect them in soil sediment in heavy use areas (e.g., at latrine sites)

- **Snow track eDNA more fruitful**

Dr. Hyatt Green, SUNY ESF

Snow track surveys

Snow track surveys

- Detection / non-detection data
- What fraction of available habitat is occupied by the species?
- Probability of site occupancy ≈ Proportion of area occupied

Snow track surveys

- Detection / non-detection data
- Probability site used by otter at least once during survey period
- Challenge: detection of animals or their sign varies over time and space

Habitat Occupancy

- **15 sites**
- **8 occupied** (certain)
- **Detected otter at 5 in any given survey:**
  $\hat{p} = 5/8 = 0.63$

1 – 0.63 = 0.37 (37%)
chance of failing to detect otter at a site during a given survey

0.37 x 0.37 = 0.14 (14%)
chance of failing to detect otter after 2 surveys

Site #	Survey 1	Survey 2
1	X	X
2		
3		X
4	X	
5	X	X
6		
7		X
8	X	
9		
11		
12	X	
13		
14		X
15		

Habitat Occupancy

- **15 sites**
- **8 occupied** (certain)
- **Detected otter at 5 in any given survey:**
  $\hat{p} = 5/8 = 0.63$

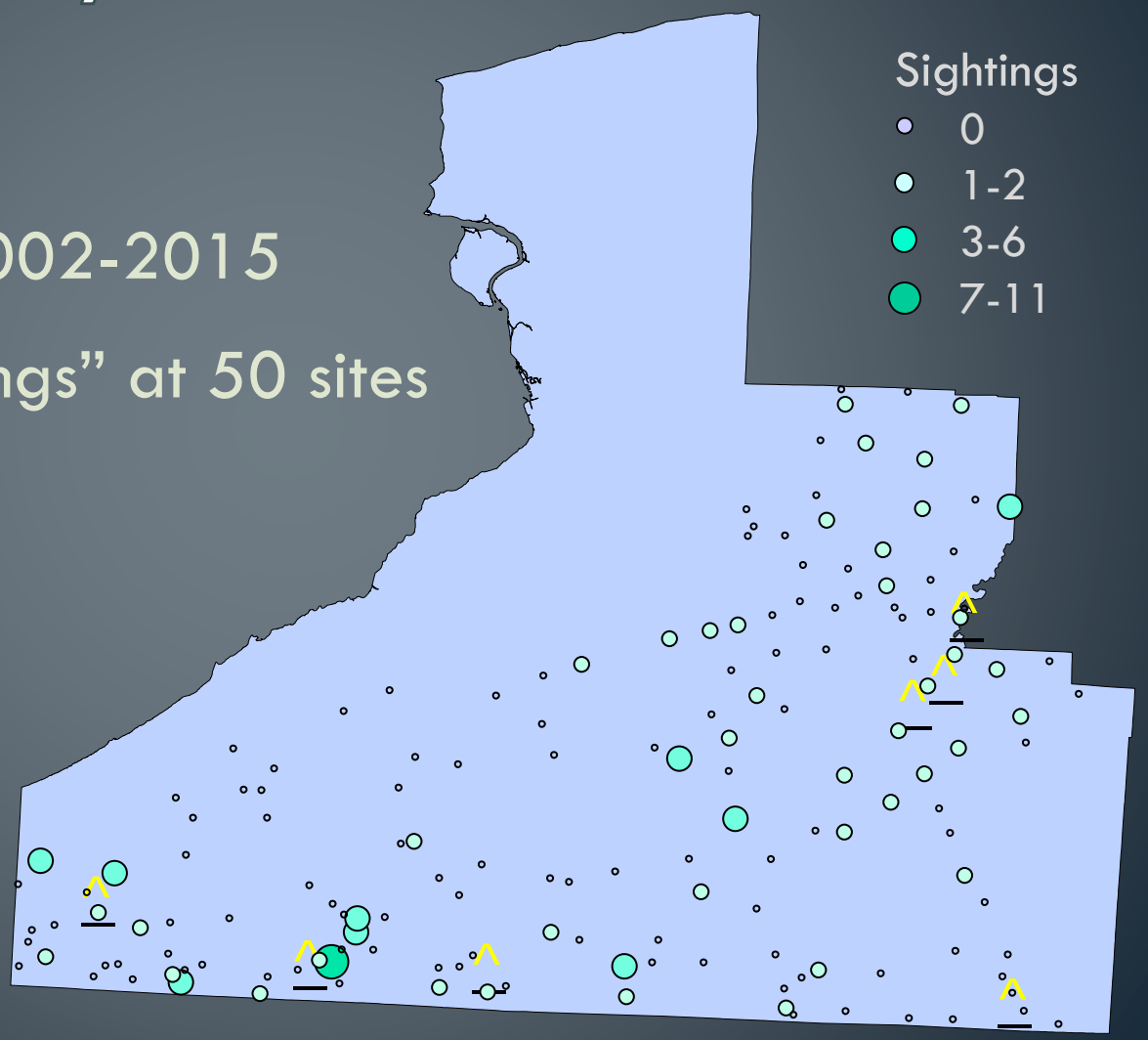
Naïve estimate of occupancy probability: 8/15 = 0.53 (53.3%)

Corrected estimate of occupancy probability = (8/0.63) / 15
= 12.7 / 15 = 0.84 (84%)

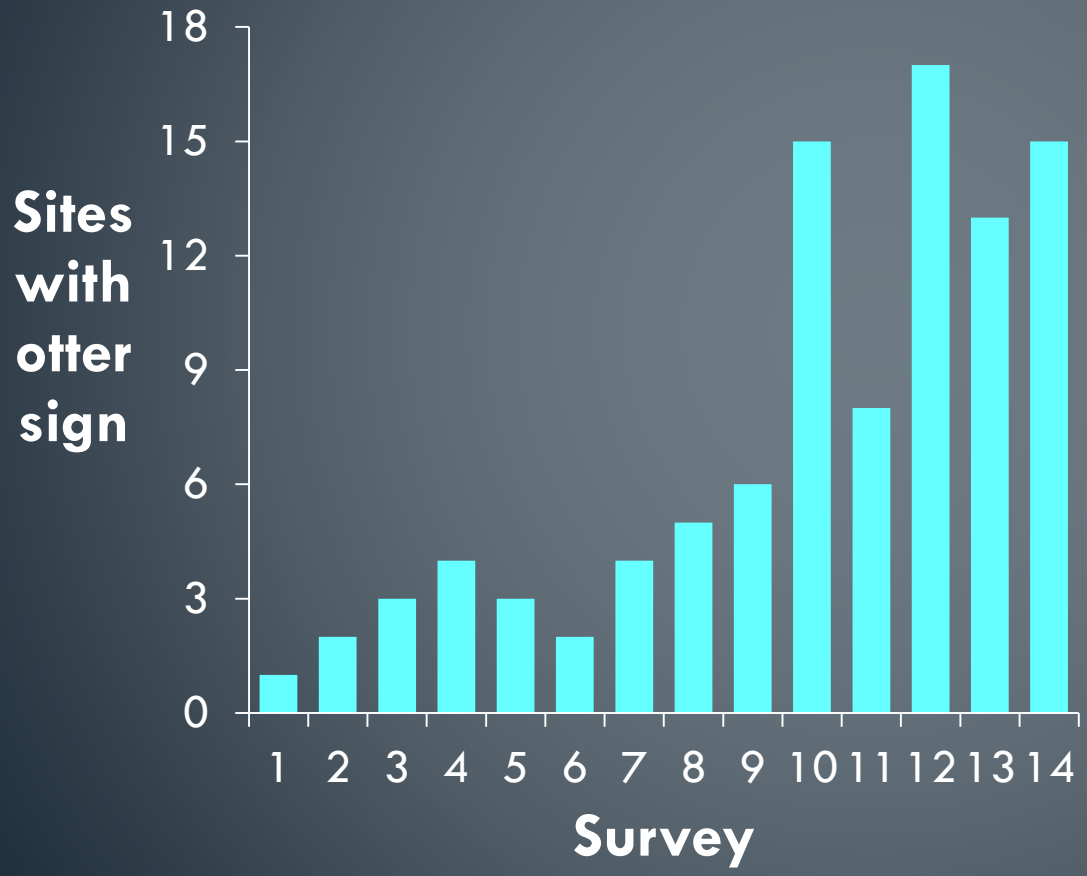
Site #	Survey 1	Survey 2
1	X	X
2		
3		X
4	X	
5	X	X
6		
7		X
8	X	
9		
11		
12	X	
13		
14		X
15		

Region 9 Surveys

- 159 sites
- 1997-1999, 2002-2015
- 98 total “sightings” at 50 sites
  (2-11 sightings/site)



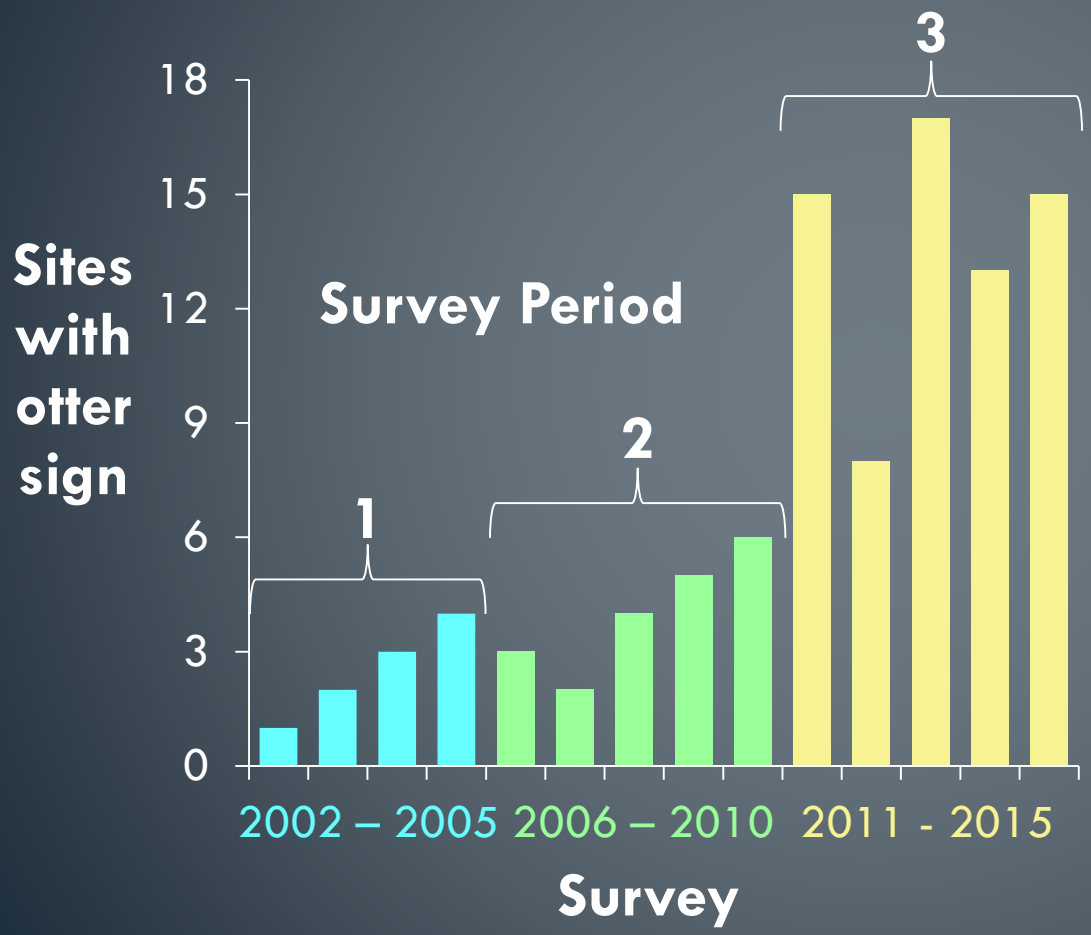
Region 9 Surveys



Problems

- False absences not accounted for
- Single visit, short distance, no covariates

Region 9 Surveys



Solution

- **Year as replicate visit at each site**
  - Probability that otter used a given site at least once during survey period

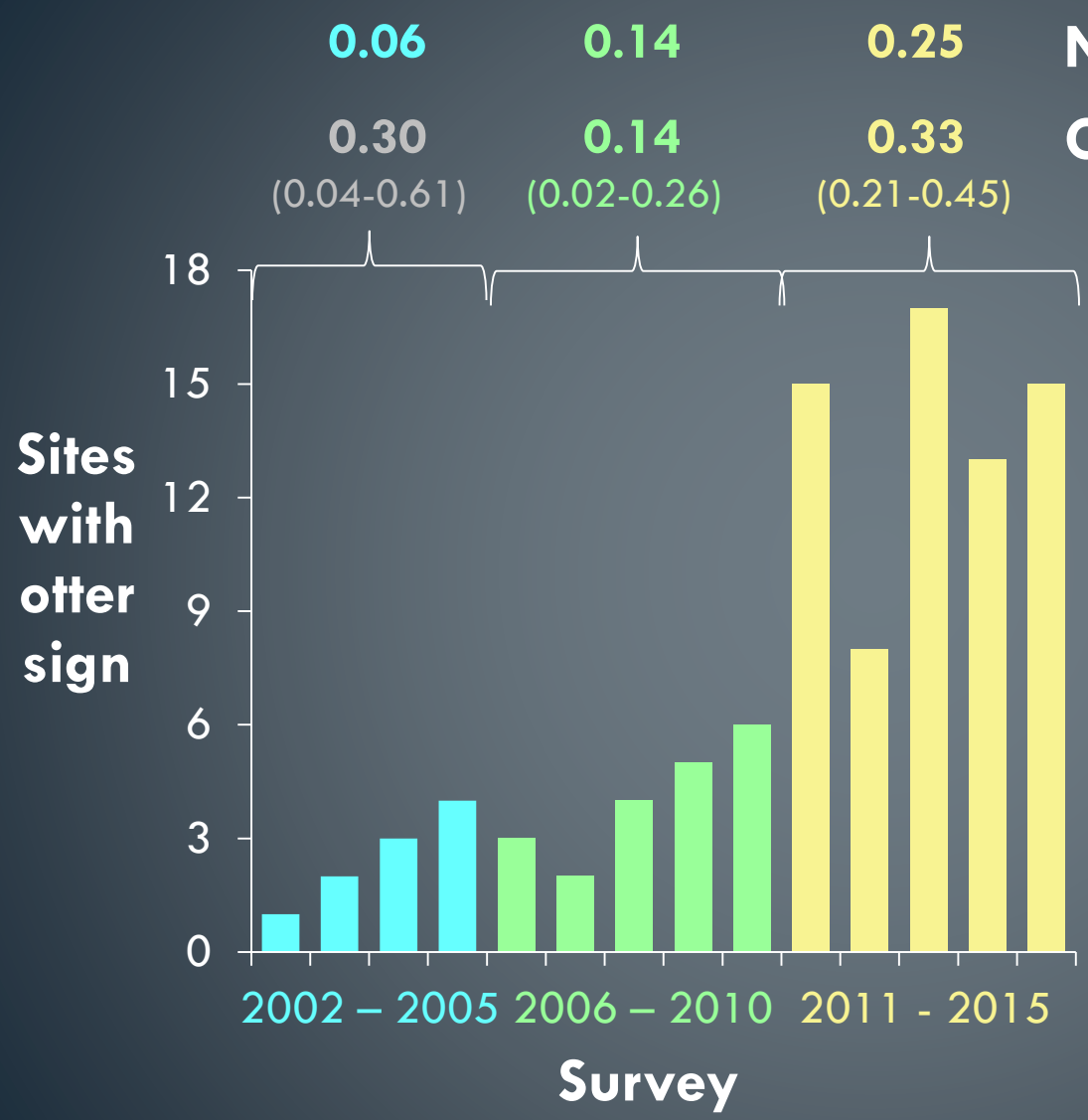
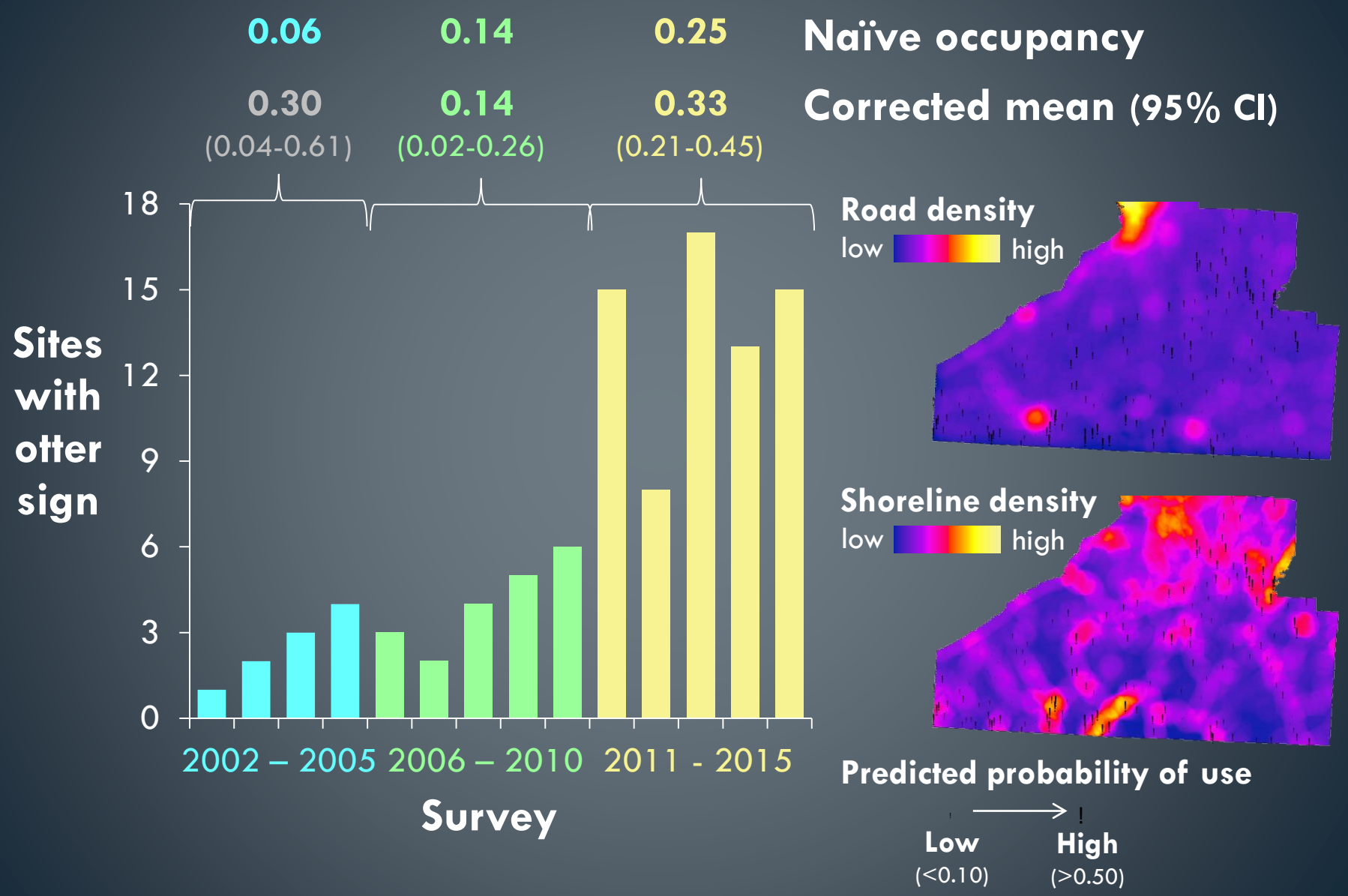


Photo credit: NYS DEC


0.06
0.14
0.25
Naïve occupancy
0.30
(0.04-0.61)
0.14
(0.02-0.26)
0.33
(0.21-0.45)
Corrected mean (95% CI)
Sites with otter sign
18
15
12
9
6
3
0
2002 – 2005
2006 – 2010
2011 - 2015
Survey
Road density
low
high
Shoreline density
low
high
Predicted probability of use
Low
(<0.10)
High
(>0.50)

0.05 (0.00-0.20)	0.23 (0.12-0.34)	Probability of site colonization
0.66 (0.04-0.61)	0.05 (0.02-0.26)	Probability of site extinction

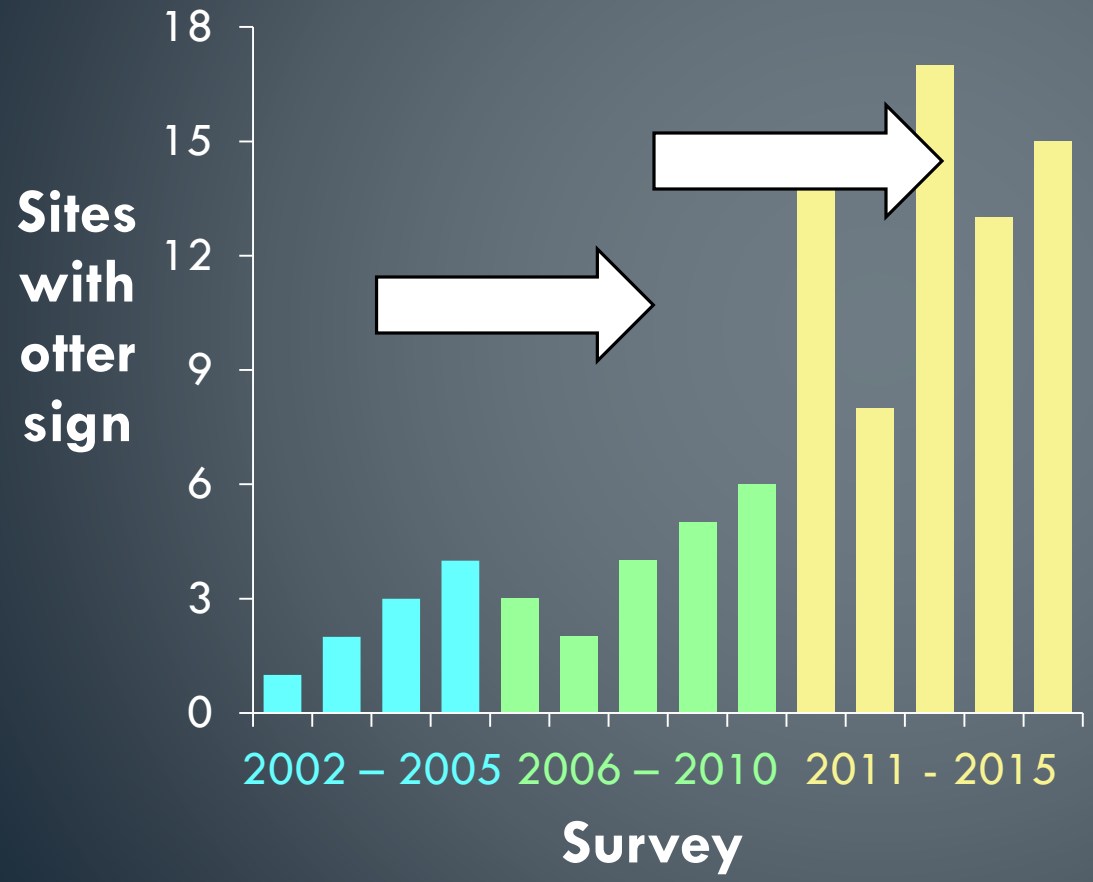
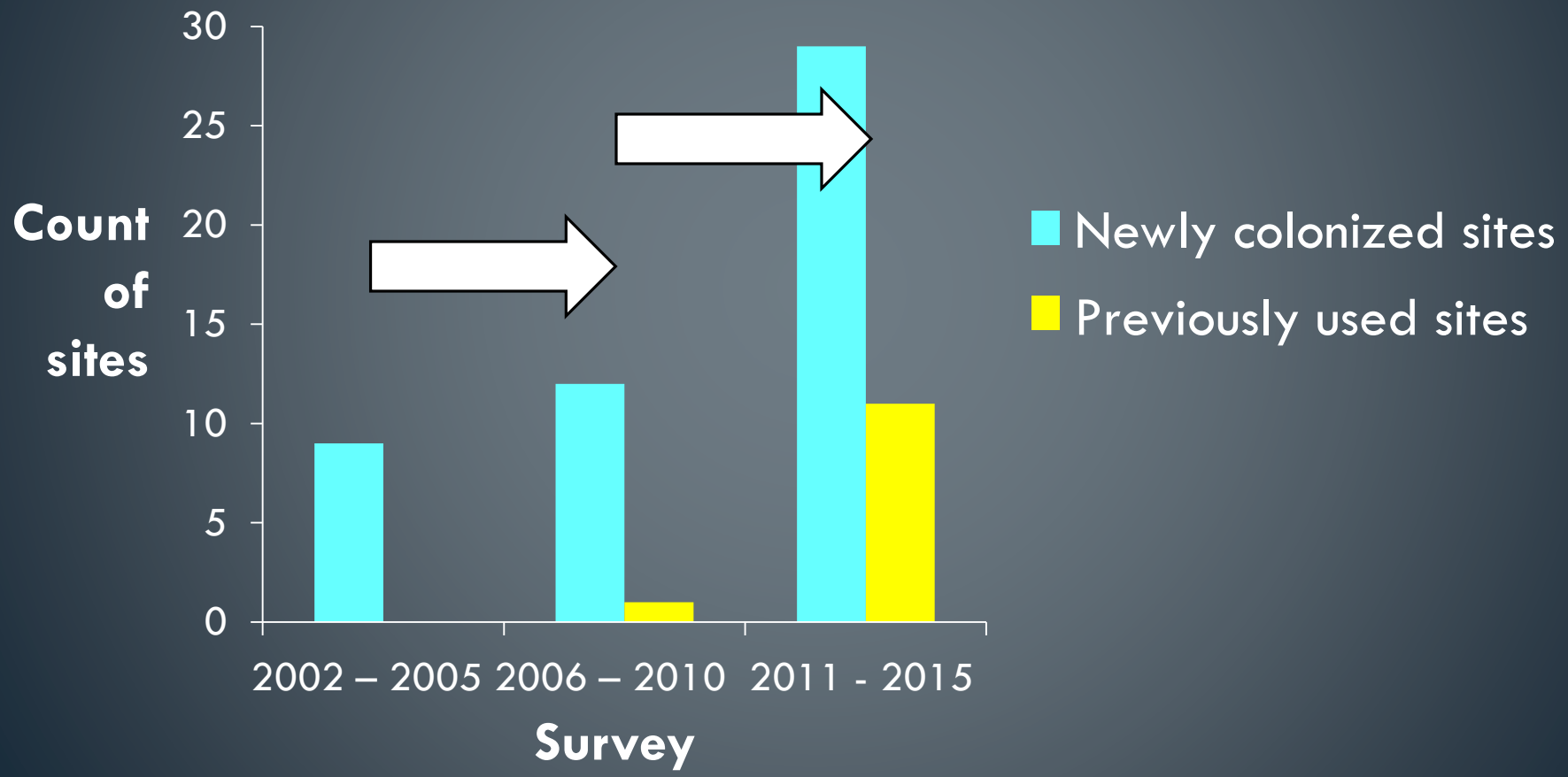


Photo credit: Elaina Burns

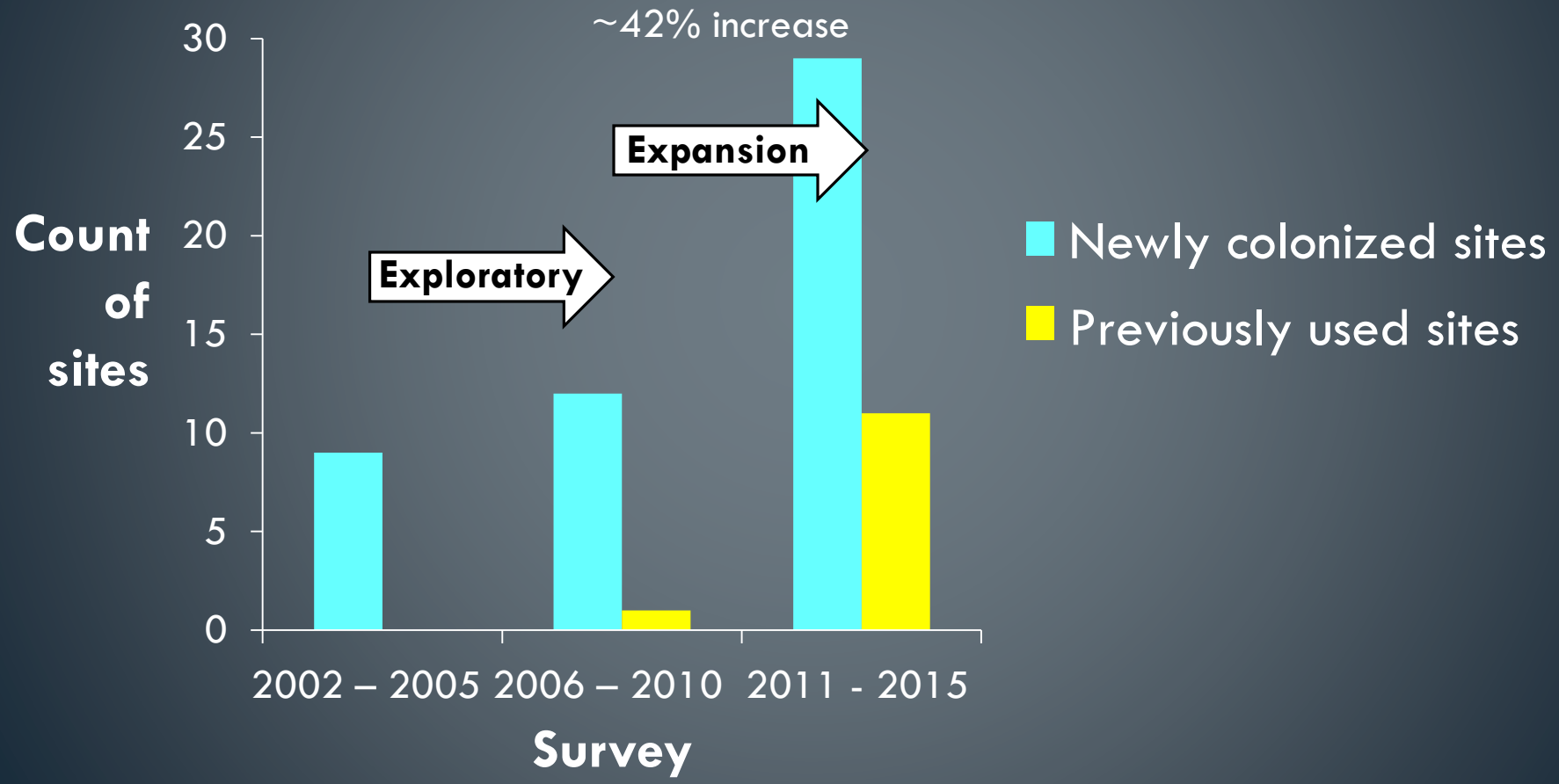
0.05 (0.00-0.20)	0.23 (0.12-0.34)	Probability of site colonization
0.66 (0.04-0.61)	0.05 (0.02-0.26)	Probability of site extinction



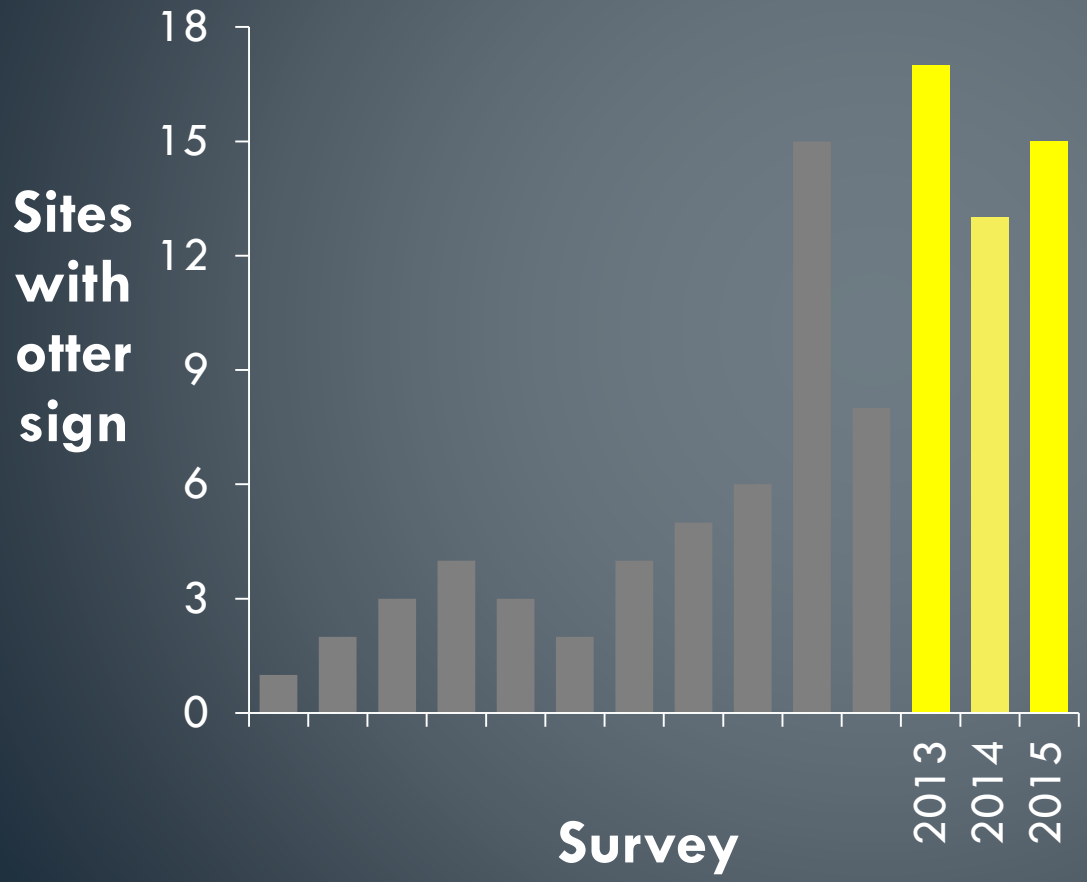
0.66 (-0.92-2.24)

2.65 (0.28-5.03)

Mean λ (Occupancy-derived estimate of population growth)

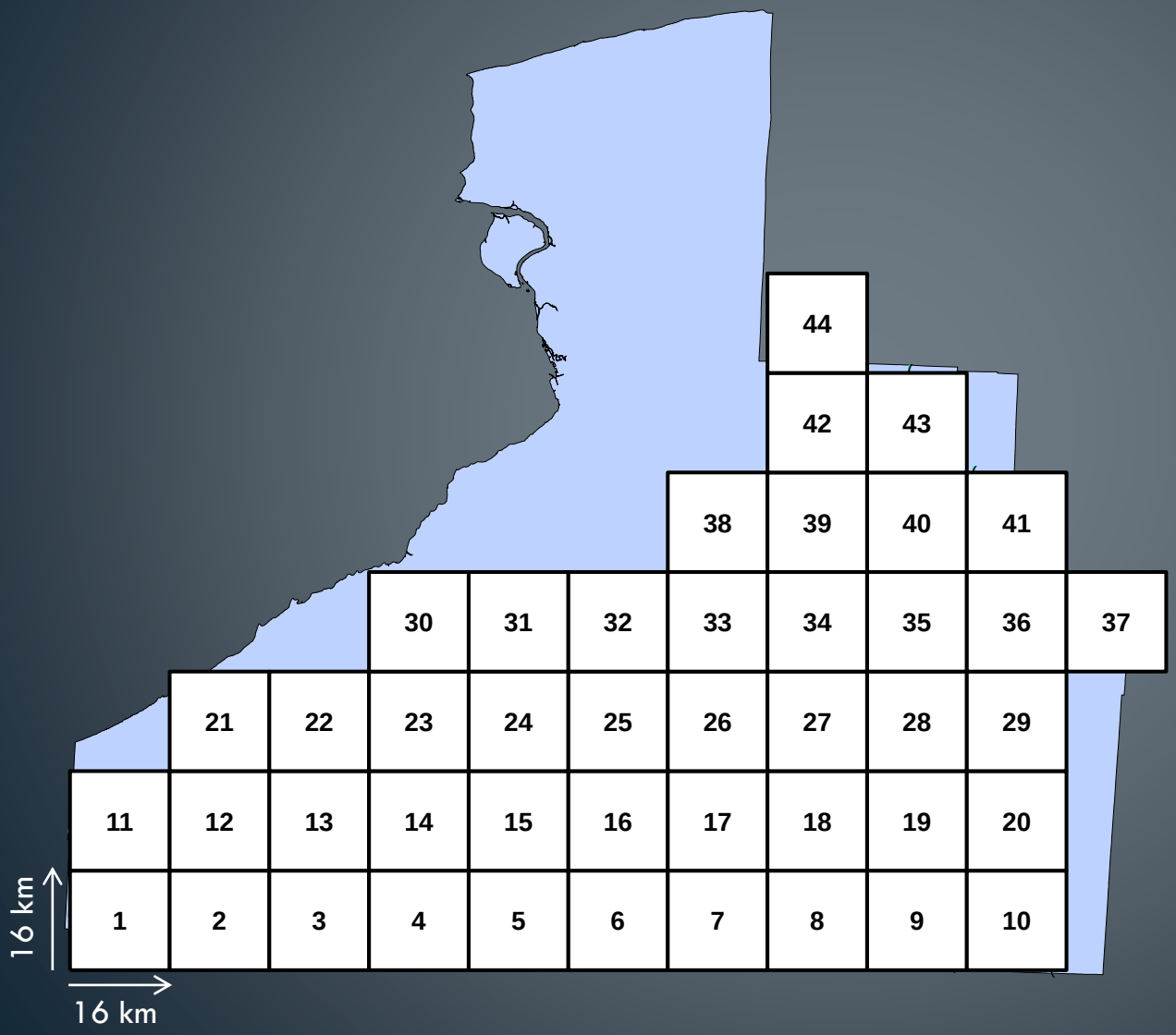


Alternative approach



Space-for-time substitution

Alternative approach



Solution

- Sites as replicate surveys within a block
- 1-8 reps/block
- Averaged covariates across sites w/in block

Best model

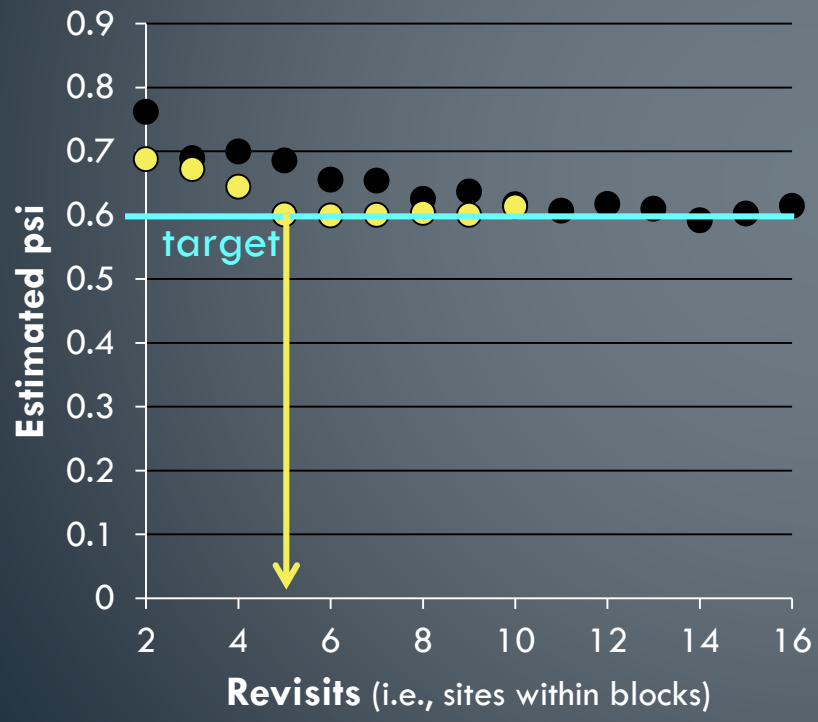
Variable	Estimate
Probability of Occupancy	Shoreline density (+) Road density (-)
Probability of Colonization	0.00 (0.00-0.00)
Probability of Extinction	0.02 (0.00-0.26)
Estimated growth (λ)	0.98 (0.74-1.22)

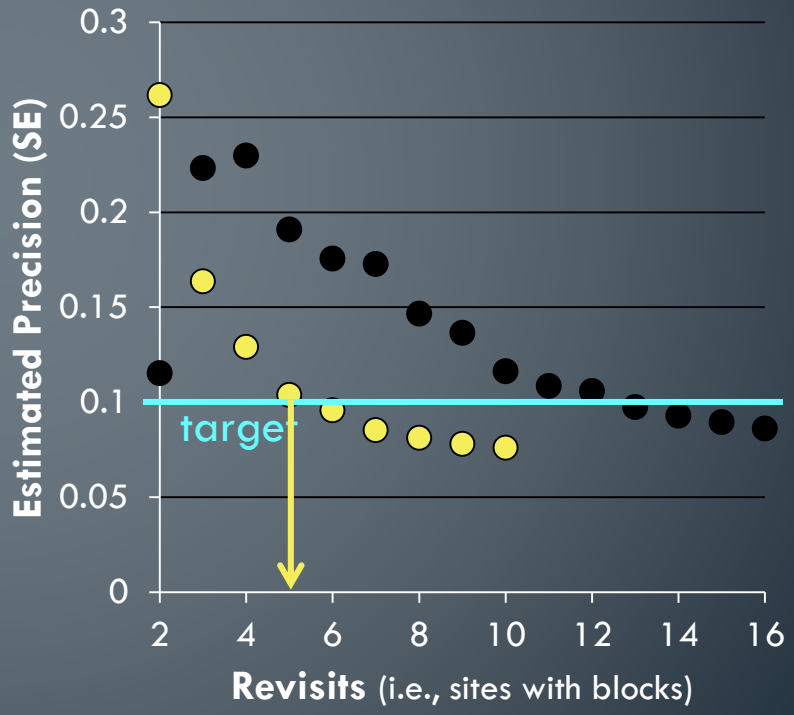
Habitat saturation

Contemporary surveys

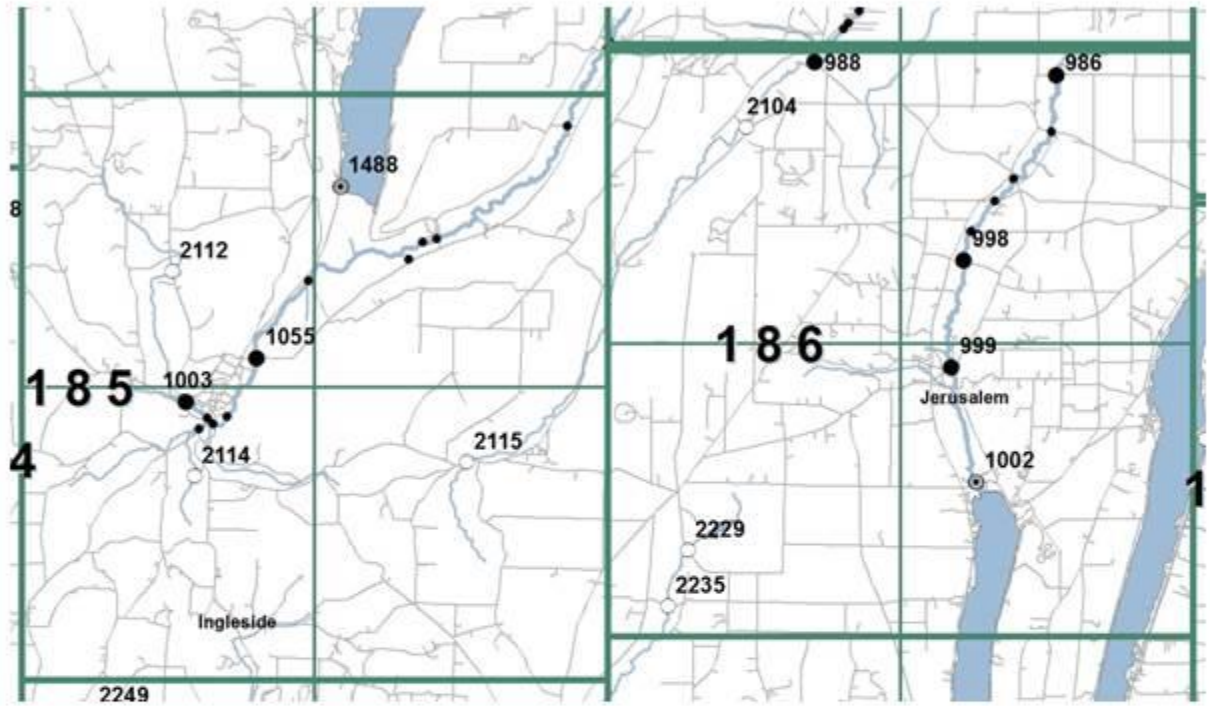
Decrease effort by in increasing detection probability

Increase search distance from 100 to 400 m (Jeffress et al. 2001)





Detailed Map Sheets for Survey Site Selection



Legend

- Block (16 x 16 km)
- Sub-block (8 x 8 km)

Survey sites

- Boat launch (priority)
- 3+ Order Crossing (priority)
- 2nd Order Crossing
- Alternative priority sites

- Road
- Lake
- 3+ order stream
- 2nd order stream

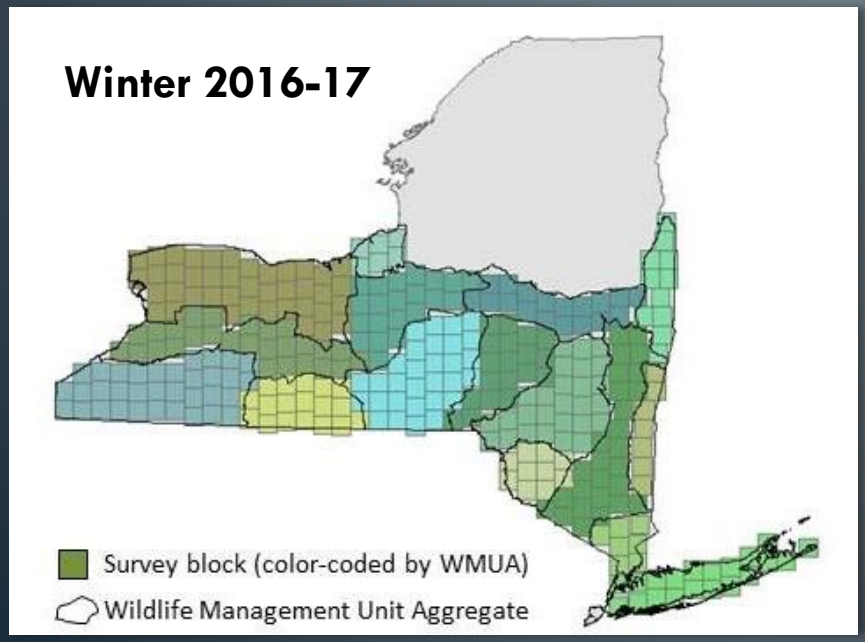
Which sites to sample?

- The goal is to survey 4-8 sites per block, spaced 1-2 sites per sub-block with no more than 1 survey/sub-block/day to insure independence.
- Wherever possible, sites have been pre-selected within each sub-block. Priority sites include boat launches and bridges over 3+ order streams (prime winter habitat). Second order stream crossings should be surveyed when priority sites are not available within the target sub-block.
- Alternative priority sites are shown on the map to help guide you should the pre-selected site not be suitable for surveying. (In this case, label the chosen site with the original site number plus the letter "A" (e.g., 998A) as directed on survey forms).

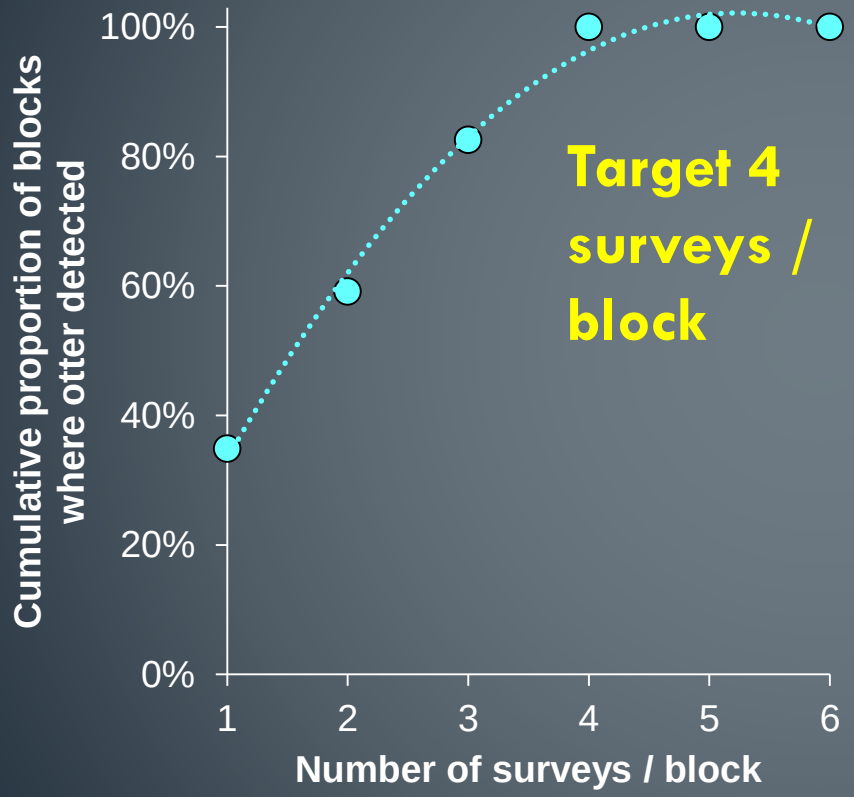
Survey design and effort

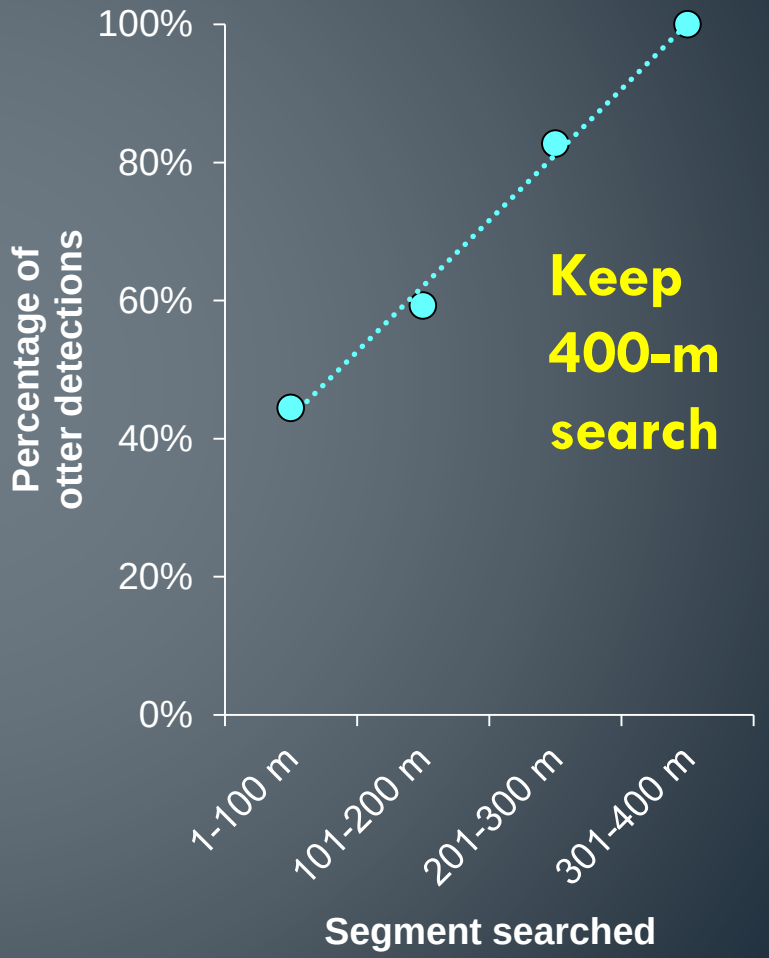
	Winter 2016-17 surveys		
Region	Number of assigned survey blocks	Percent of blocks surveyed at least once (# blocks)	Percent of blocks with ≥4 replicate surveys (# blocks)
9	59	92% (54)	59% (32)
8	61	100% (61)	84% (51)
7	58	88% (51)	10% (5)
6	9	133% (12)	83% (10)
5	11	--	--
4	60	97% (58)	31% (18)
3	45	80% (36)	17% (6)
1-2	20	90% (18)	89% (16)
Totals	323	90% (290)	48% (138)

Spread too thin



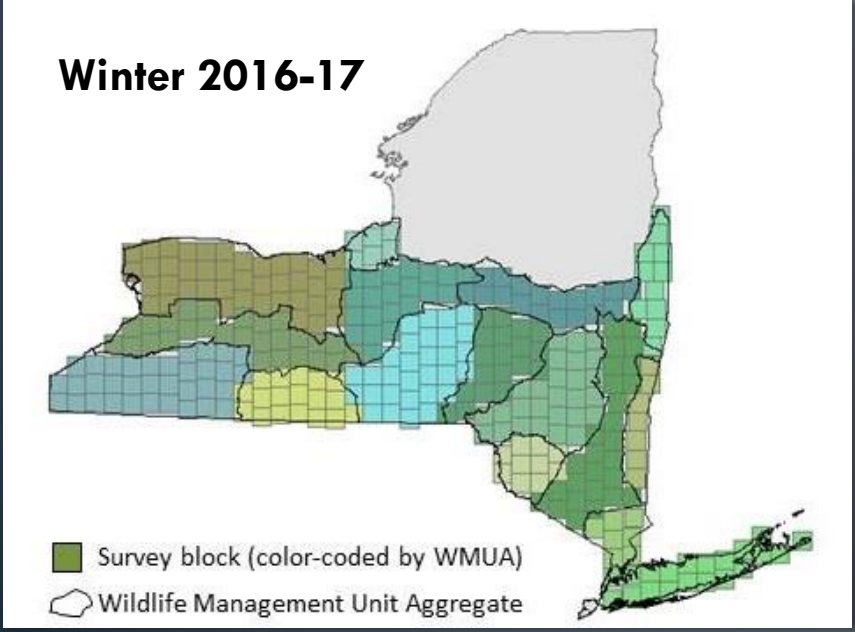
How might we scale back?

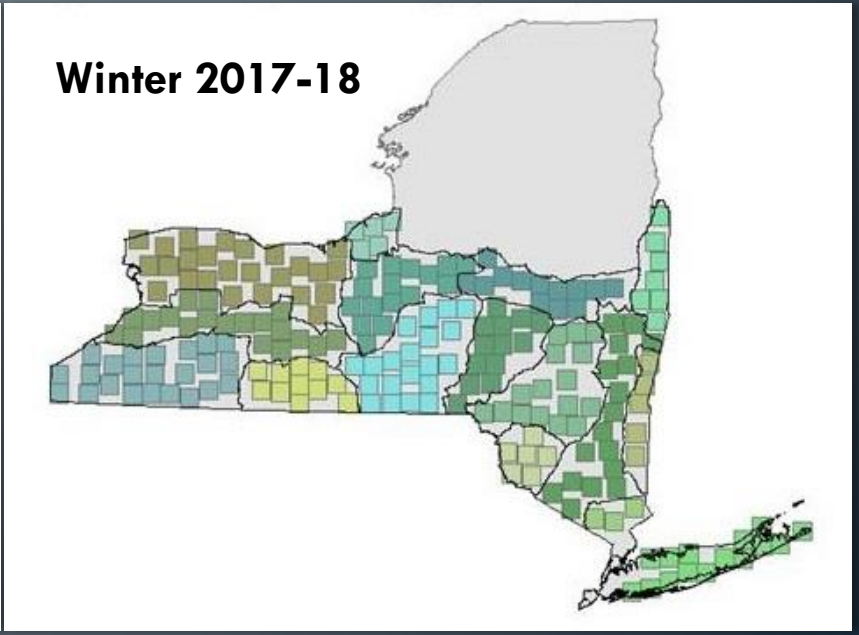




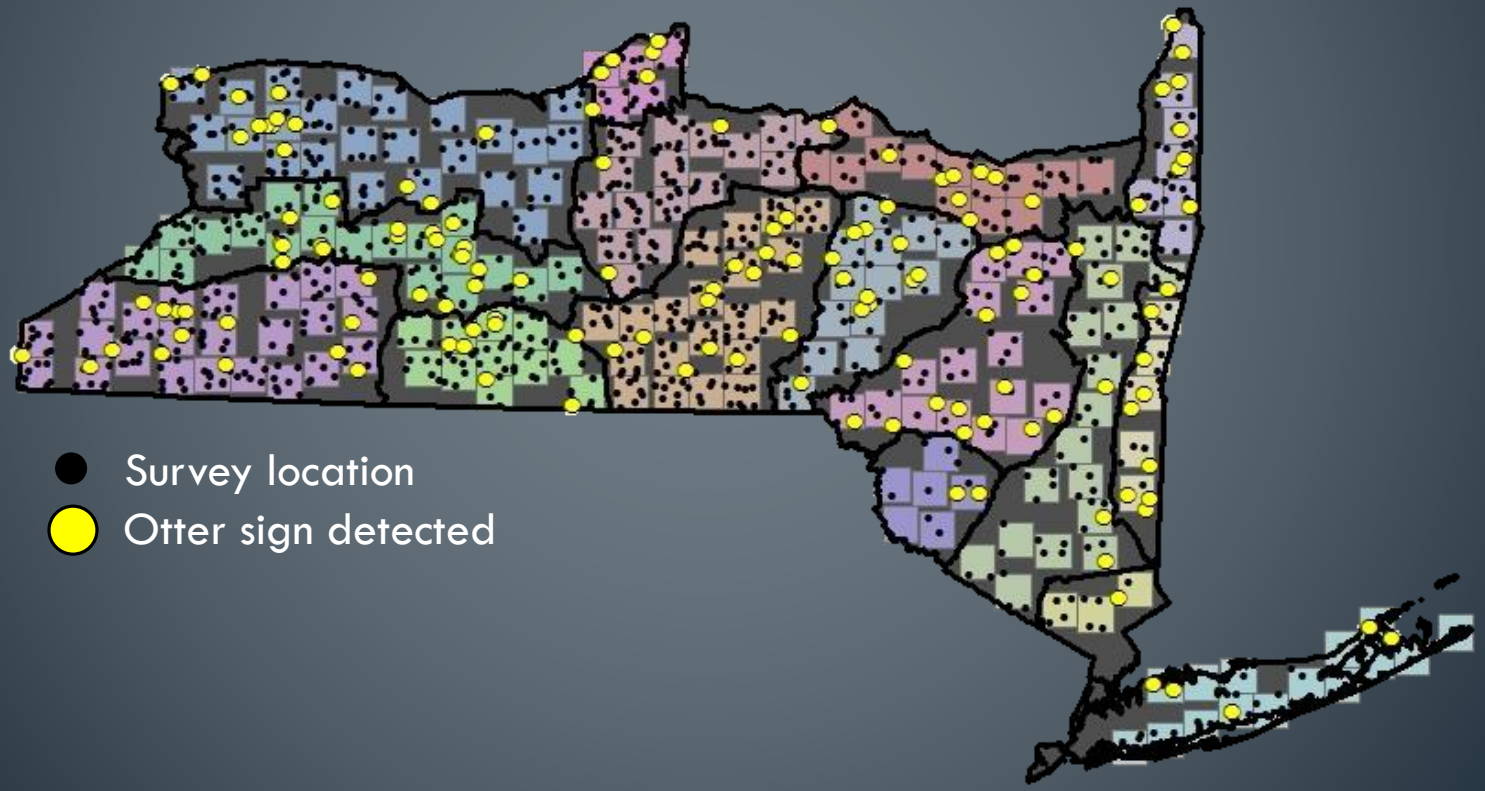
Survey design and effort

	Winter 2016-17 surveys			Winter 2017-18 surveys		
Region	Number of assigned survey blocks	Percent of blocks surveyed at least once (# blocks)	Percent of blocks with ≥4 replicate surveys (# blocks)	Number of assigned survey blocks	Percent of blocks surveyed at least once (# blocks)	Percent of blocks with ≥4 replicate surveys (# blocks)
9	59	92% (54)	59% (32)	37	100% (37)	100% (37)
8	61	100% (61)	84% (51)	41	102% (42)	93% (38)
7	58	88% (51)	10% (5)	38	102% (39)	102% (39)
6	9	133% (12)	83% (10)	9	89% (8)	88% (7)
5	11	--	--	11	100% (11)	100% (11)
4	60	97% (58)	31% (18)	36	100% (36)	97% (35)
3	45	80% (36)	17% (6)	27	78% (21)	5% (1)
1-2	20	90% (18)	89% (16)	15	[illegible]	[illegible]
Totals	323	90% (290)	48% (138)	214	98% (209)	86% (183)
		Percent change over previous year		**–34%**	**+9%**	**+79%**





2017-18 Survey Returns



Detecting otter with certainty

Independent photo validation

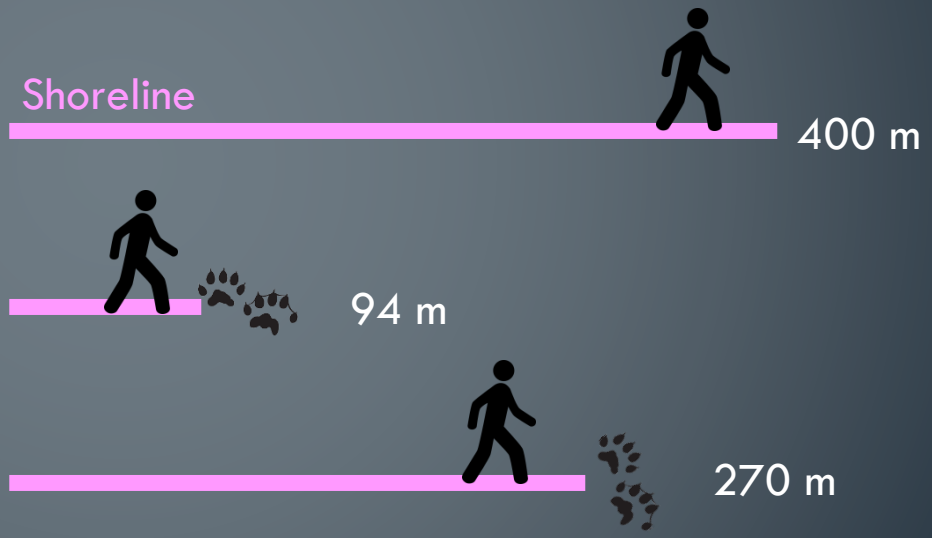
Field crew call regarding otter sign	Photo review call	
	Otter – yes	Otter - no
Certain	88.6	11.4
More certain than not	59.5	40.5
Doubtful	37.5	62.5
No	16.4	83.6

Detecting otter with certainty

Independent photo validation

Field crew call regarding otter sign	Photo review call: Otter – yes	Photo review call: Otter - no	Collapsed categories	Overall percent agreement
Certain	88.6	11.4	Otter detection	78.5
More certain than not	59.5	40.5		
Doubtful	37.5	62.5	No detection	77.6
No	16.4	83.6		

Time (distance)-to-detection model



Time (distance)-to-detection model

Detection probability

Days since last snow
(<1 day, 1-3 days, ≥3 days)

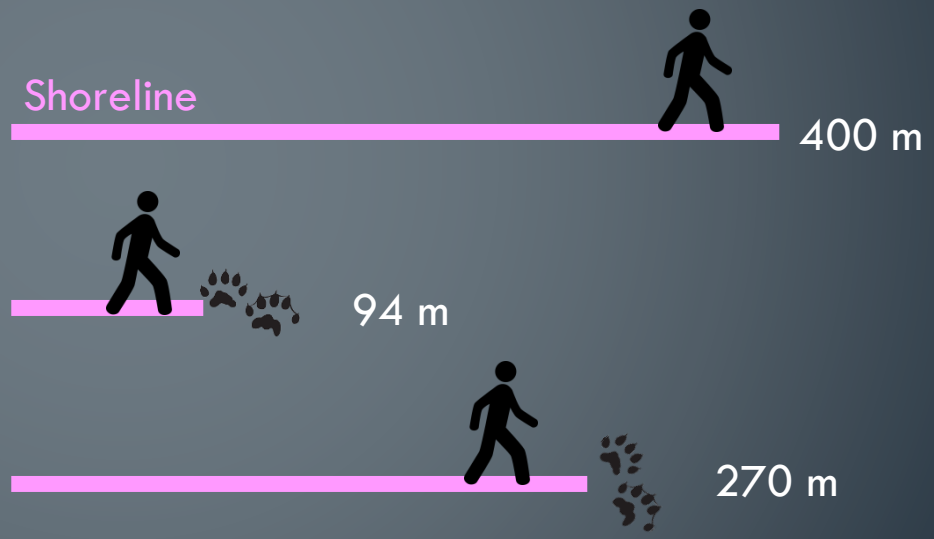
Tracking conditions
(poor, fair, excellent)

Bank access
(<50%, 50-90%, >90%)

Beaver detected

Muskrat detected

Random effect: DEC Region
(survey team)



Time (distance)-to-detection model

Detection probability

Days since last snow
(<1 day, 1-3 days, ≥3 days)

Tracking conditions
(poor, fair, excellent)

Bank access
(<50%, 50-90%, >90%)

Beaver detected

Muskrat detected

Random effect: DEC Region (survey team)

Occupancy probability (use)

Habitat type
(lake, pond, marsh, stream, river)

Shoreline habitat (1-, 5-, or 10-km radius)

Percent forest (1-, 5-, or 10-km radius)

Road density (1-, 5-, or 10-km radius)

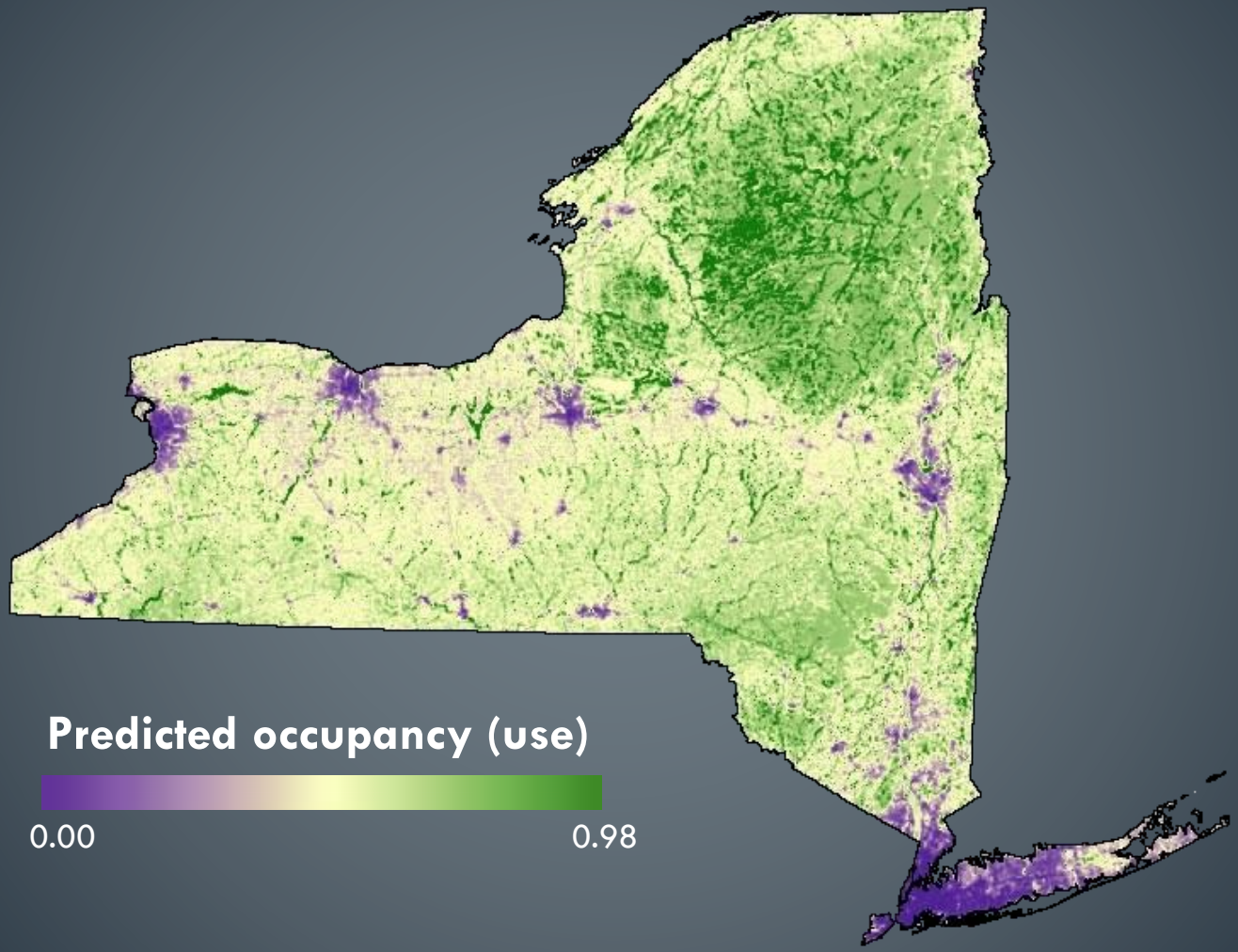
Beaver detected

Elevation

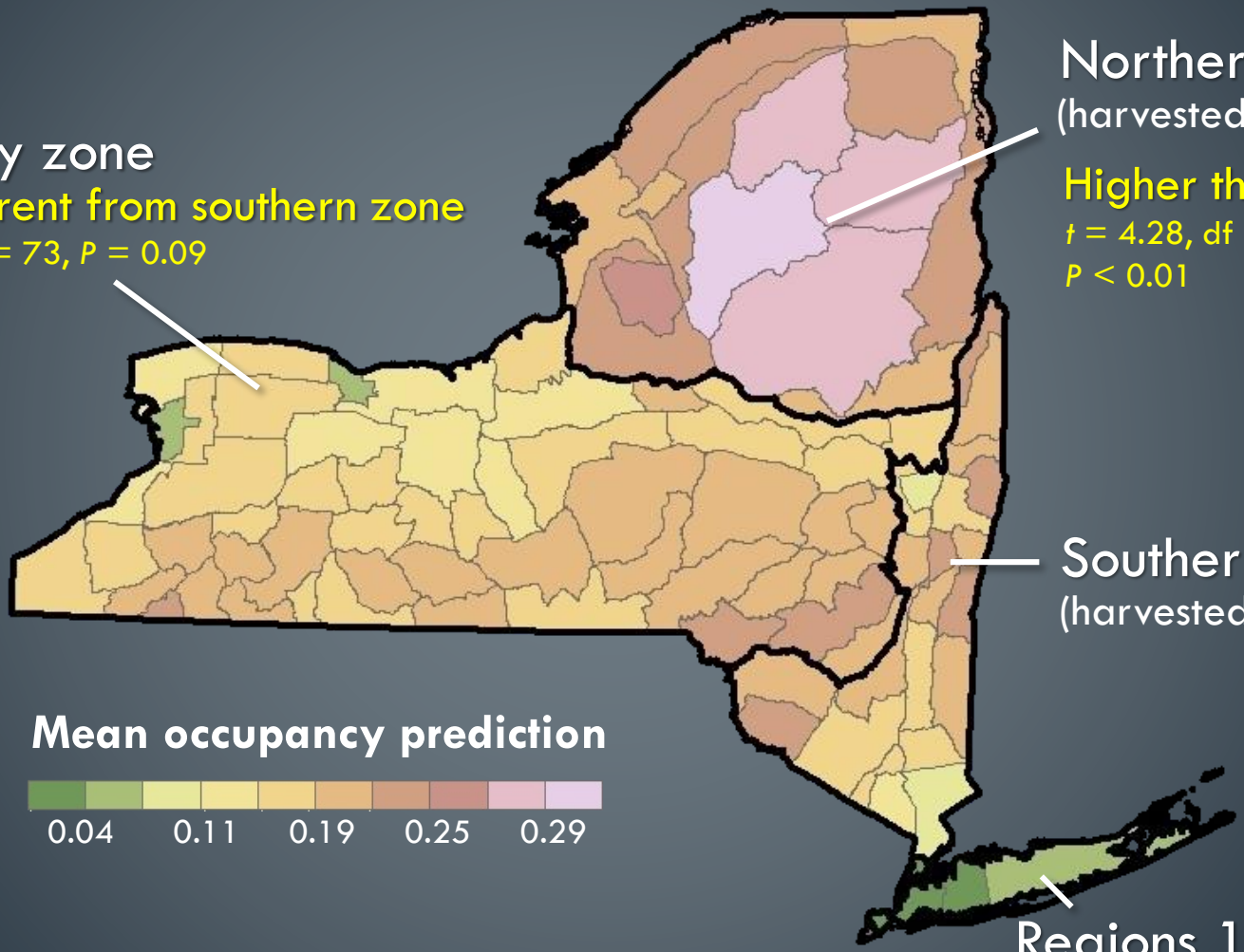
Percent slope

Random effects: Block, WMUA (survey design)

Predicted occupancy



Summary by WMU



Conclusions

Trend and potential

Exploratory through 2010, settled thereafter with evidence of habitat saturation at present. Ample habitat.

Status of otter statewide

Widespread across recovery zone, habitat availability and occupancy consistent with SZ harvested units

Non-harvest based monitoring plan

Bridge-based sign surveys with time-to-detection occupancy framework (although multi-scale model being explored)

eDNA might improve speed and certainty of otter detection

… stay tuned for optimal long-term monitoring plan

Otter management plan

(Furbearer Team)

Photo credit: Elaina Burns

Coming soon

NEW YORK
STATE OF
OPPORTUNITY

Department of
Environmental
Conservation

Fish and Wildlife Program Highlights – Fall 2019

Budget and Staffing

Staffing:

Division of Fish and Wildlife

- 340 permanent positions (334 in spring 2019)
- Approval to move forward with 16 permanent positions

Staffing:

Waivers from Hiring Freeze

- Biologist 1 (Aquatic) – CO, Fisheries Information System
- Biologist 1 (Aquatic) – CO, Lake Ontario Unit
- Biologist 1 (Ecology) – CO
- Biologist 2 (Wildlife) – CO, Wildlife Health Unit Leader
- Biologist 1 (Aquatic) – R3
- Biologist 2 (Aquatic) – R5, Regional Fisheries Manager

Staffing:

Waivers from Hiring Freeze

Biologist 1 (Aquatic) – TBD

Fish and Wildlife Technician 2 – R6, Wildlife

Fish and Wildlife Technician 2 – R7, Fisheries

Biologist 2 (Ecology) – R7, Regional Habitat Manager

Biologist 1 (Ecology) – R9

Biologist 2 (Wildlife) – R9, Regional Wildlife Manager

Biologist 1 (Wildlife) – TBD

Staffing:

Waivers from Hiring Freeze

Fish Culturist 1 – Chateauguay Hatchery

Budget: 2019-20

Division of Fish and Wildlife	(OPS)	(NPS)
- General Fund:	$ 304,100	$247,655
- General Fund (DECALS):	$ 49,200	$3,870,400
- Conservation Fund (main):	$1,703,700	$2,892,545
- Conservation Fund (RAGTW):	$126,839	$235,156
- Conservation Fund (venison donation):		$4,000
- Conservation Fund (migratory bird):		$35,587
- Hazardous Waste Remedial Fund:		$10,600

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Budget: 2019-20

Division of Fish and Wildlife

- Environmental Protection Fund – Stewardship (maintenance)

- Wildlife Management Areas (Access)	$350,300
- Wildlife Management Areas (Habitat)	$350,300
- Fishing and Boating Access	$363,800
- Hatcheries	$125,000
- Non-regionalized facilities	$ 45,000

Budget: 2019-20

Division of Fish and Wildlife

- Environmental Protection Fund – Stewardship (projects)
  - Wildlife Management Areas $778,200
    (Tivoli Bay WMA)
  - Regional facilities $419,450
    (walk-in freezers, Cayuga Inlet)
  - Fishing Access / Boating Launch Sites $2,171,800
    (Lake Placid, Otisco, Westport, Fourth Lake, Port Bay)
  - Non-regionalized facilities $51,300
    (Game farm)

Budget: 2019-20

Division of Fish and Wildlife

- Capital (New York Works 8)

Salmon River Hatchery	$5,250,000
Reynolds Game Farm	$200,000
Randolph Hatchery	$2,026,000
Bath Hatchery	$200,000
Wildlife Resources Center	$300,000
Hale Creek Lab	$135,000
Fish Access Sites	$139,000

Budget: 2019-20

Division of Fish and Wildlife

- Federal Aid

  Wildlife Restoration: $22.6 M

  Sport Fish Restoration: $4.5 M (freshwater)

  State Wildlife Grants: $2.2 M

Wildlife Management Area Acquisition

Wildlife Management Area Acquisition

Since emphasis 5 years ago:

- Acquired 48 parcels totaling 3,506 acres
- Added to 12 different WMAs
- Acquired 2 new WMAs
- Funding: EPF and Federal Aid in Wildlife Restoration

Wildlife Management Area Acquisition

Efforts continue (currently in contract process with New York State):

- 57 additional parcels totaling approx. 5,815 acres

[Note: additions to the Capital District WMA in Rensselaer County provides most of the acres (4,195) and parcels (33)]

- Adding to (expanding upon) 3 MWAs
- Acquisition of another new WMA

Habitat and Access Stamp

Promoting Habitat / Access Stamp Sales:

- Goal – 25,000 2019 H / A Stamps (Moose)
- “Stickers” – agents, State Fair
- Pins – State Fair
- Agent Incentives (recognition)
- Banner-ups – State Fair, top retailers
- Posters
- Social Media

Promoting Habitat / Access Stamp Sales:

- Pins were available in 2019 moose at the State Fair

- Three “retro pins” – sturgeon, spotted turtle, and red fox were produced to boost sales in 2019 – purchasers at the Fair could select a pin for each H/A stamp purchased

- Sets of 11 pins were provided purchases of 10 H/A stamps

- H/A stamp purchasers are placed into a drawing for plushy moose

- Holiday promotion planned again for 2019

Promoting Habitat / Access Stamp Sales:

August 1 - September 2:

H/A stamps were up 1,708 (31%) compared to same period in 2018

Promoting Habitat / Access Stamp Sales:

Recognition to License-Issuing Agents

- certificate
- coffee mug
- note out to all LIAs re: top sellers

Young Forest Initiative Update

Young Forest Initiative – Progress continues

47 Approved Habitat Management Plans

7 additional Habitat Management Plans pending approval

15 additional Habitat Management Plans in draft

35 Public meetings held

Young Forest Initiative – Progress continues

Inventories Completed (acres):

Region 3	(3,186)	(24%)
Region 4	(10,818)	(60%)
Region 5	(5,269)	(90%)
Region 6	(43,628)	(100%)
Region 7	(52,497)	(99%)
Region 8	(32,534)	(68%)
Region 9	(7,118)	(46%)
Total	**(155,050)**	**(78%)**

Seed tree cut – Indian River WMA – R6

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Young Forest Initiative – Progress continues

Inventories completed on 75 (82%) of WMAs

Inventories underway 7 additional WMAs (36,558 acres)

Young Forest Initiative – Progress continues

38 projects (1,856 acres) planned but not yet under contract

7 commercial contracts currently out to bid

15 commercial contracts (1,065 acres) in place

15 non-commercial projects (230 acres) under contract or in work plan

Young Forest Initiative - Progress

A young forest demonstration area at Three Rivers WMA in Region 7 before (left), during (middle), and after 6 months of regrowth (right). This project area was cut in January 2019.

Managing Invasive Species

Rich Pendleton
New York State Department
of Environmental Conservation/
Cornell University

Acknowledgements
Gregg Kenney
NYSDEC
Stuart Findlay & Dave Strayer
Cary Institute

Fish and Wildlife Management Board
September 17, 2019

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Non-native & invasive species

Species moved by humans out of their native range

Some may rapidly establish and spread

Some may have large consequences for the ecosystem and/or human use of natural resources

Annual cost > $100 billion (e.g. damage, control, etc)

Table 4. Environmental and economic impacts (damage and control costs) of biological invaders in the New York State Canal and Hudson River systems in millions of dollars

	Functional group							
Stakeholder group	Fish	Algae	Aquatic Plants	Mussels	Other Invertebrates	Birds	Pathogens and parasites	Total
Landowner, agriculture						2[a]	3[b]	5
Public health							40[c]	40
Tourism			4[d]	0.5[e]	10[f]	1[g]	2[h]	17.5
Electric industry				10[i]	10[j]			20
Commercial fishing	200[k]		1[l]	0.5[m]	2[n]		0.5[o]	204
Sport fishing	200[p]		1[q]	1[r]	2[s]		1[t]	206
Boating			2[u]	0.5[v]	0.5[w]			3
Transport								0
Bird/wildlife watchers					1[x]	2[y]	1[z]	4
Total	400		8	12.5	25.5	5	47.5	498.5

Commercial + Sport Fishing Costs = 408 Million $ ~ 80 % of Total

Asian carp

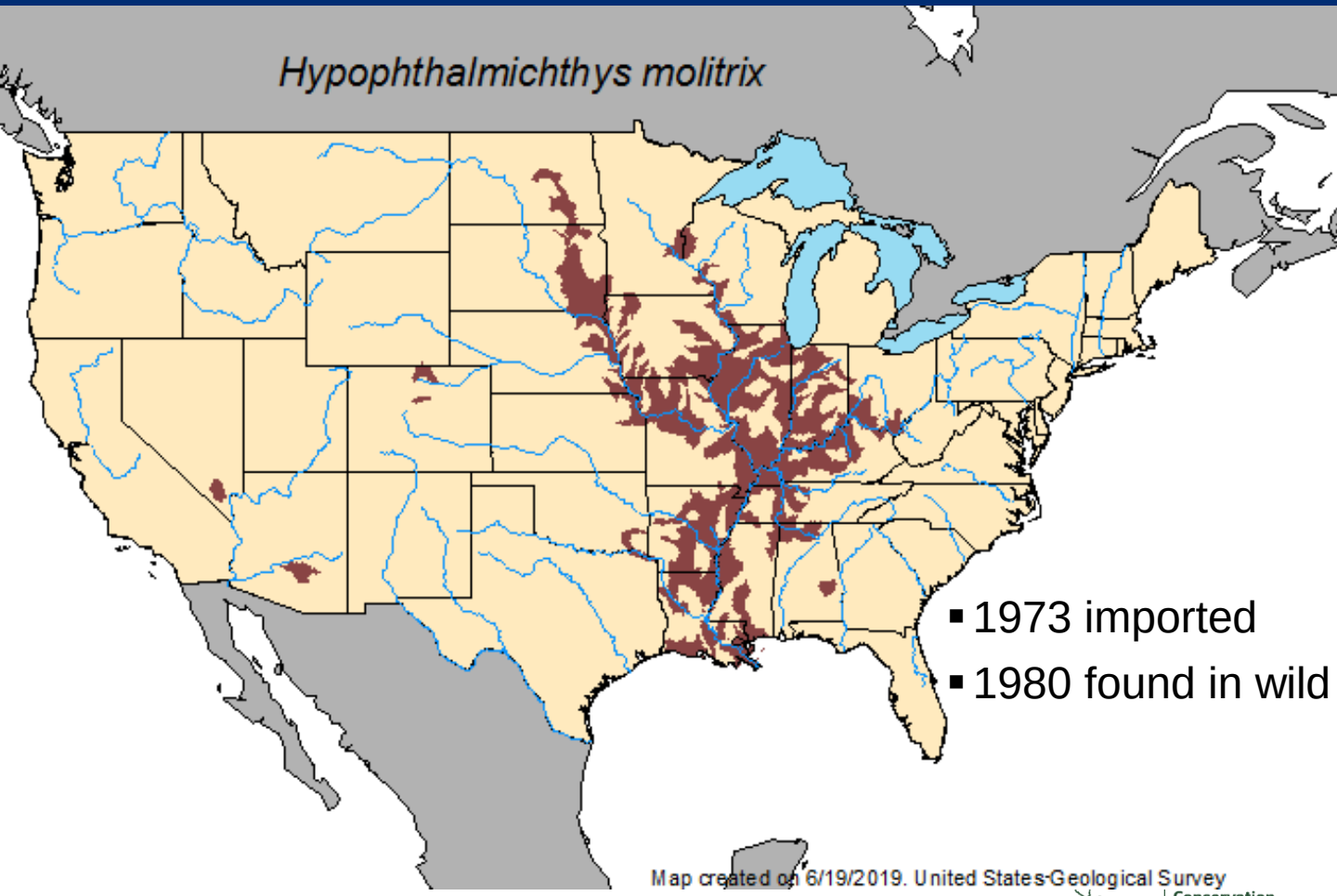
Bighead carp

Grass carp

Black carp

Silver carp

Bigheaded carp

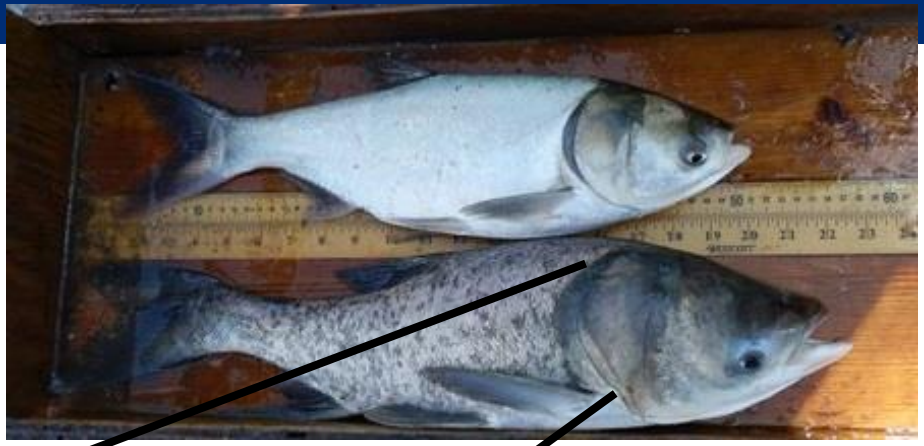


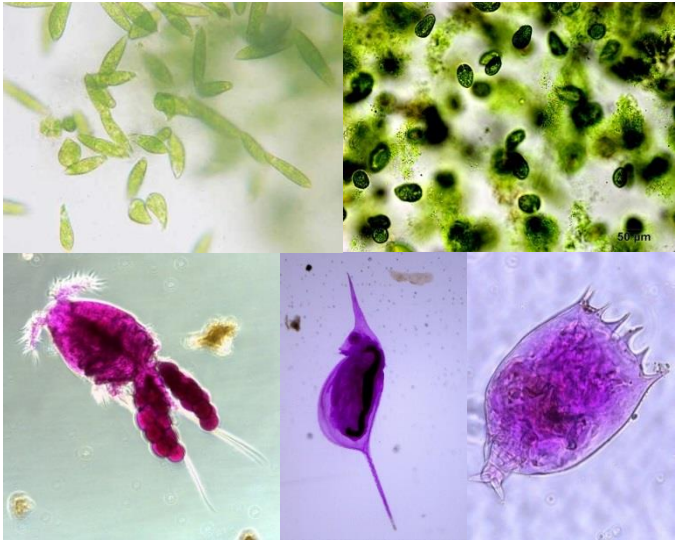
- 1973 imported
- 1980 found in wild

Rapid growth (300 mm within 1st year)

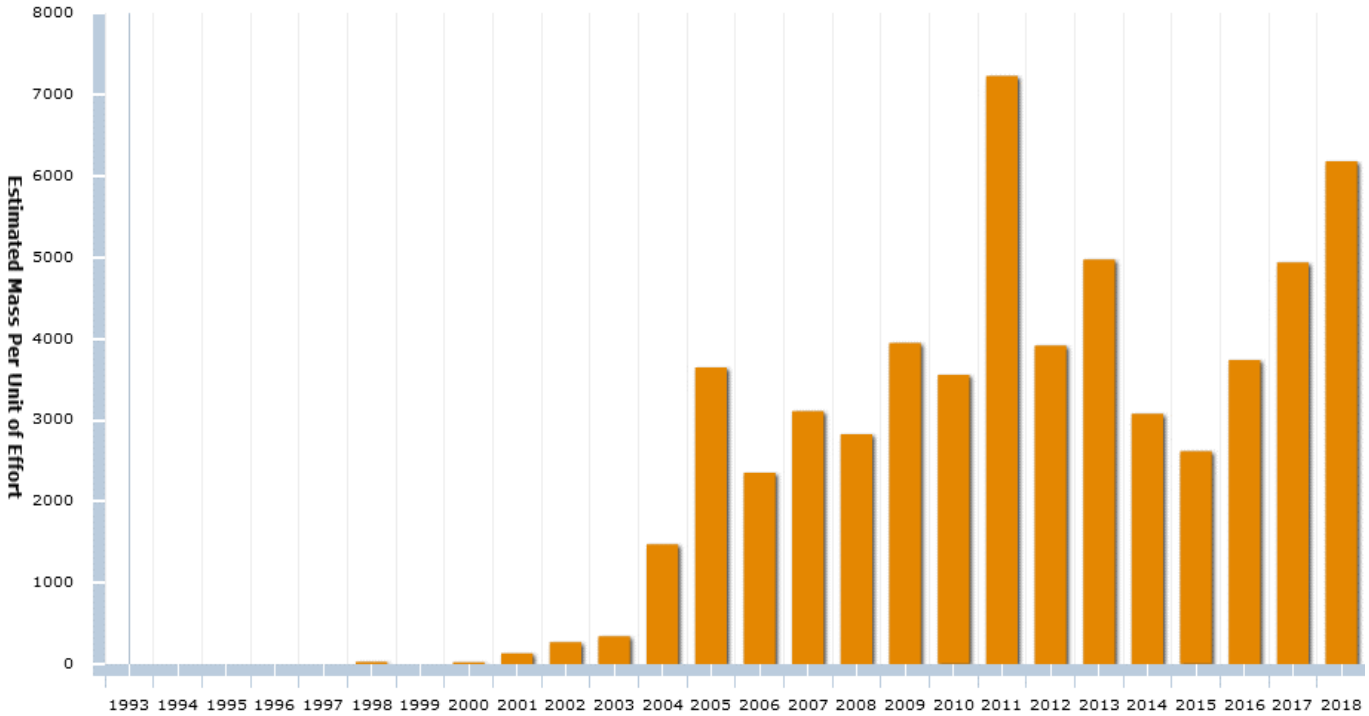
Early maturation (~ 2 years)

Highly fecund (5 million eggs per year)

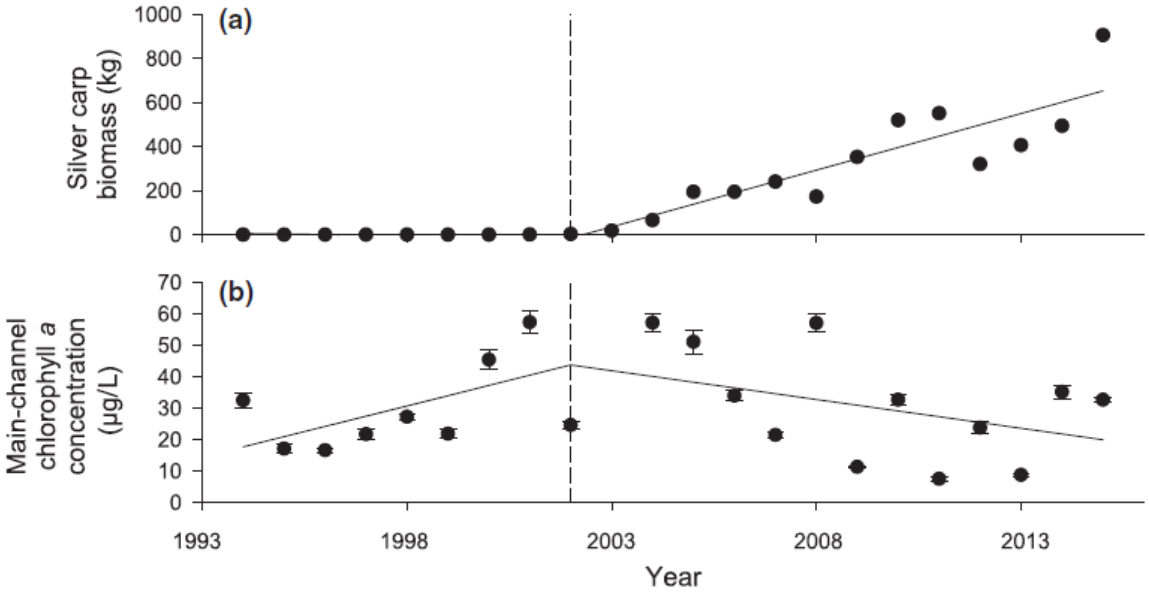



50 µm

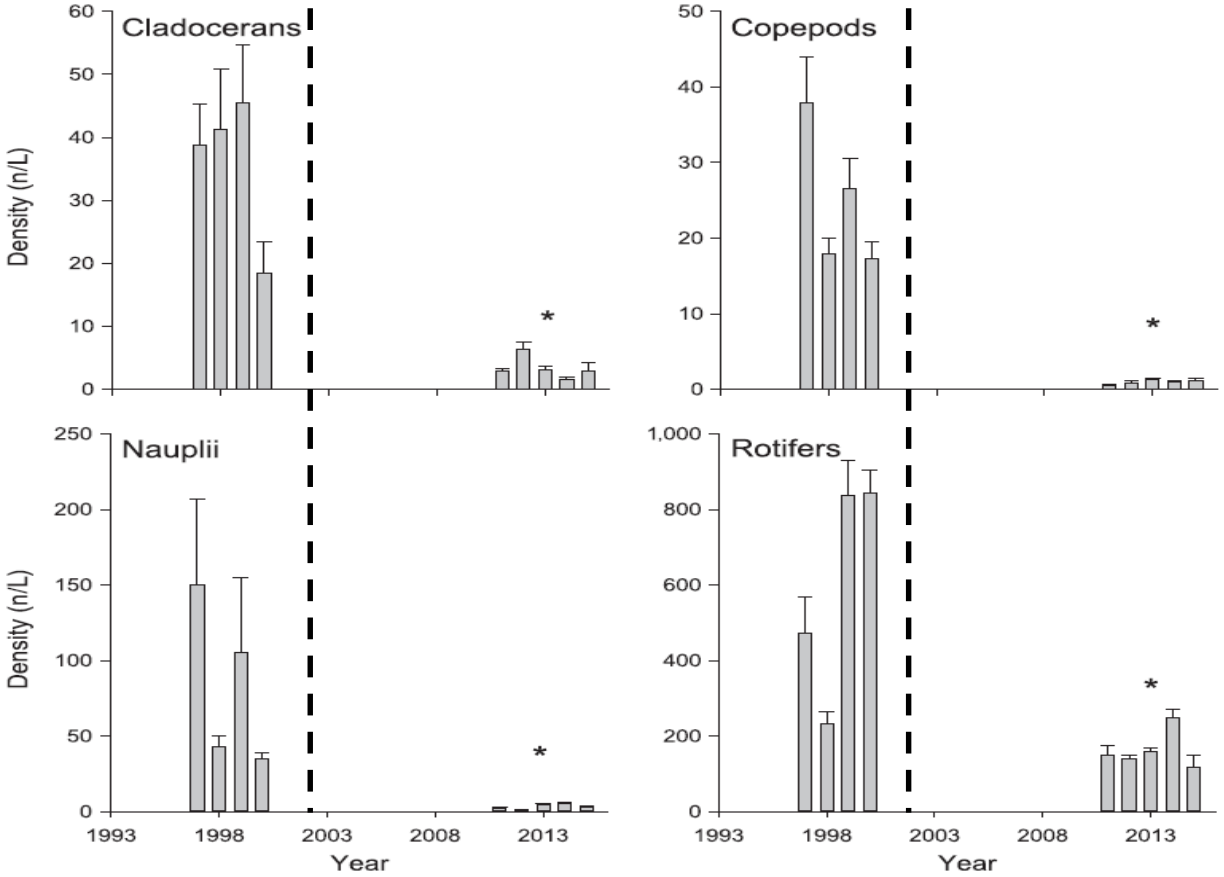
silver carp

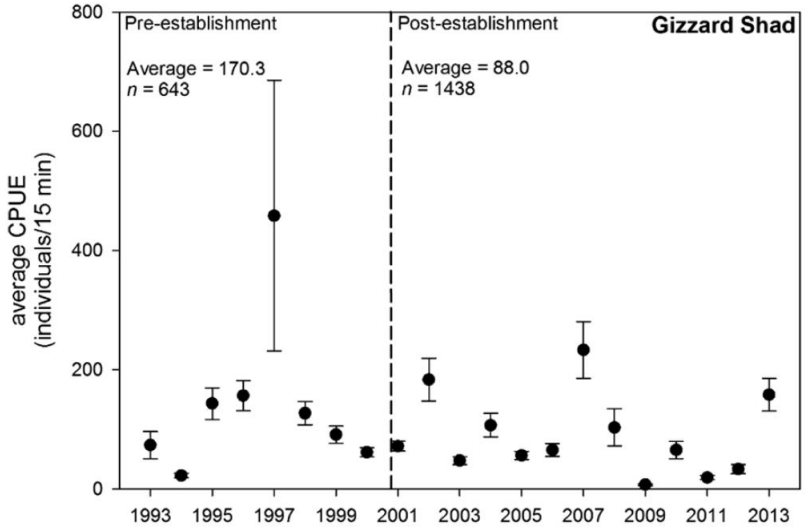

Estimated Mass Per Unit of Effort
8000
7000
6000
5000
4000
3000
2000
1000
0
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018

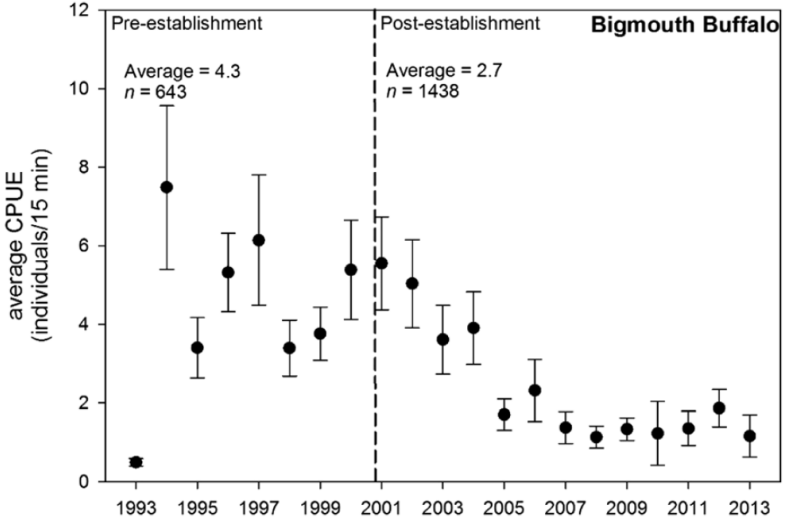
phytoplankton



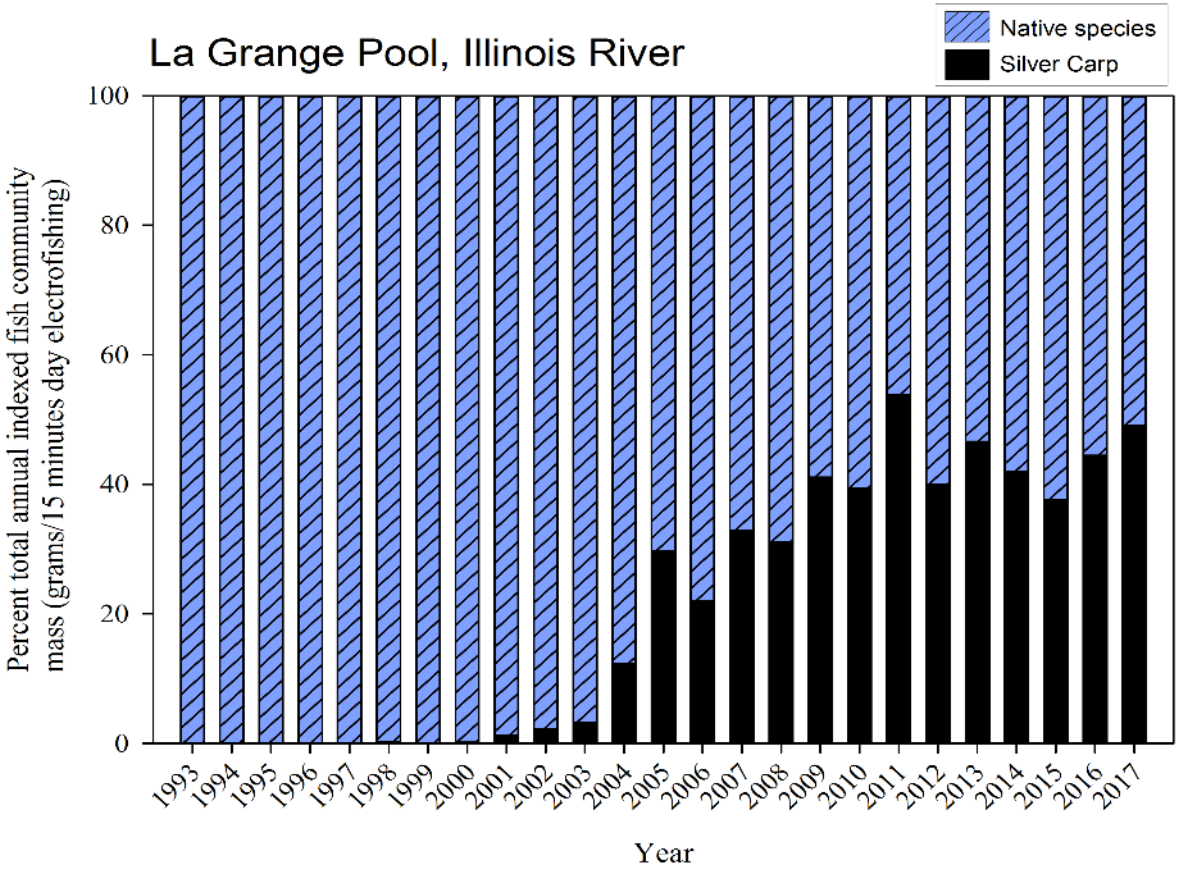
zooplankton




Pre-establishment
Post-establishment
Gizzard Shad
Average = 170.3
n = 643
Average = 88.0
n = 1438
average CPUE
(individuals/15 min)
800
600
400
200
0
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013

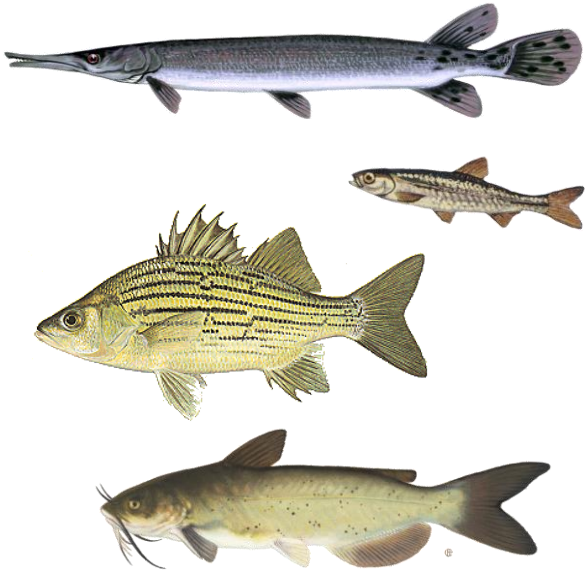

Pre-establishment
Post-establishment
Bigmouth Buffalo
Average = 4.3
n = 643
Average = 2.7
n = 1438
average CPUE
(individuals/15 min)
12
10
8
6
4
2
0
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013


Small fish
ZOOPLANKTON
CARBON DIOXIDE
PHYTOPLANKTO
N
NUTRIENTS
P


La Grange Pool, Illinois River
Native species
Silver Carp
Percent total annual indexed fish community mass (grams/15 minutes day electrofishing)
100
80
60
40
20
0
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
Year

Pre-Asian carp

Post-Asian carp



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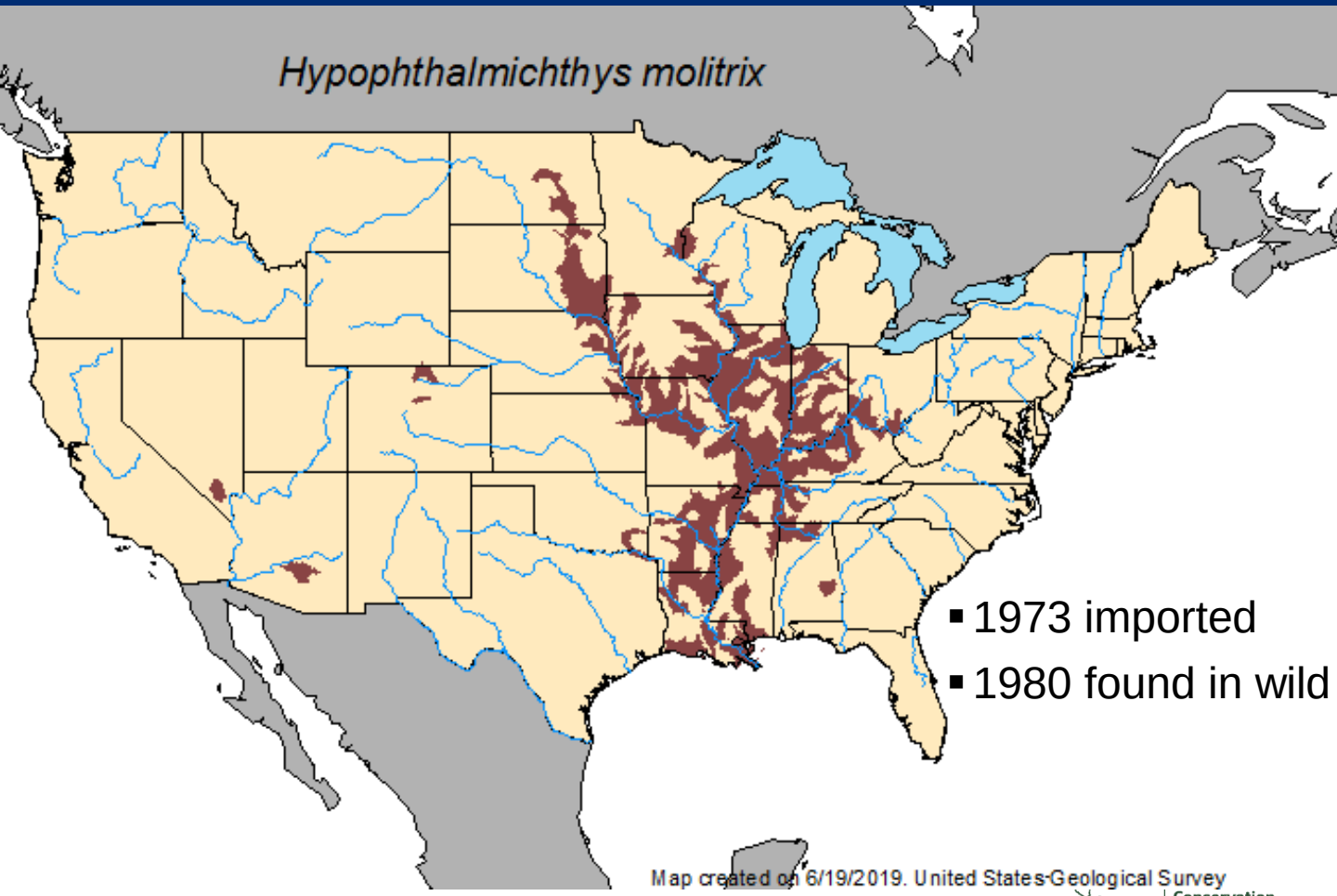
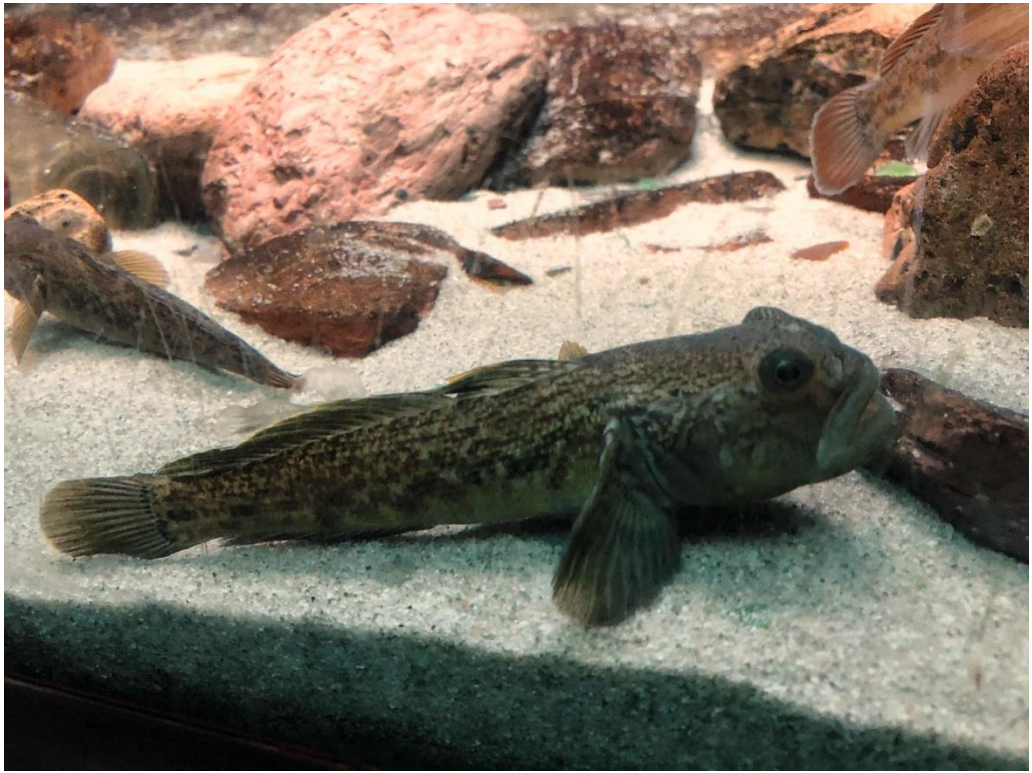
IL 4714 JN
ILLINOIS NATURAL
HISTORY SURVEY



- 1973 imported
- 1980 found in wild


Chicago River Controlling Works
SOUTH BRANCH, CHICAGO RIVER
CHICAGO RIVER
BUBBLY CREEK
Racine Ave Pump Station
Stickney WWTP
DES PLAINES RIVER
CHICAGO SANITARY AND SHIP CANAL
CHICAGO
CALUMET RIVER
ILLINOIS INTERNATIONAL PORT DISTRICT
LAKE CALUMET
INDIANA HARBOR
Calumet WWTP
T.J. O'Brien Lock
CAL-SAG CHANNEL
Electric Barriers
INDIANA HARBOR CANAL
BURNS HAR
GRAND CALUMET RIVER
LITTLE CALUMET RIVER
HART DITCH
Lockport Lock and Dam
Brandon Lock and Dam

Round goby



Fishes
Exotic

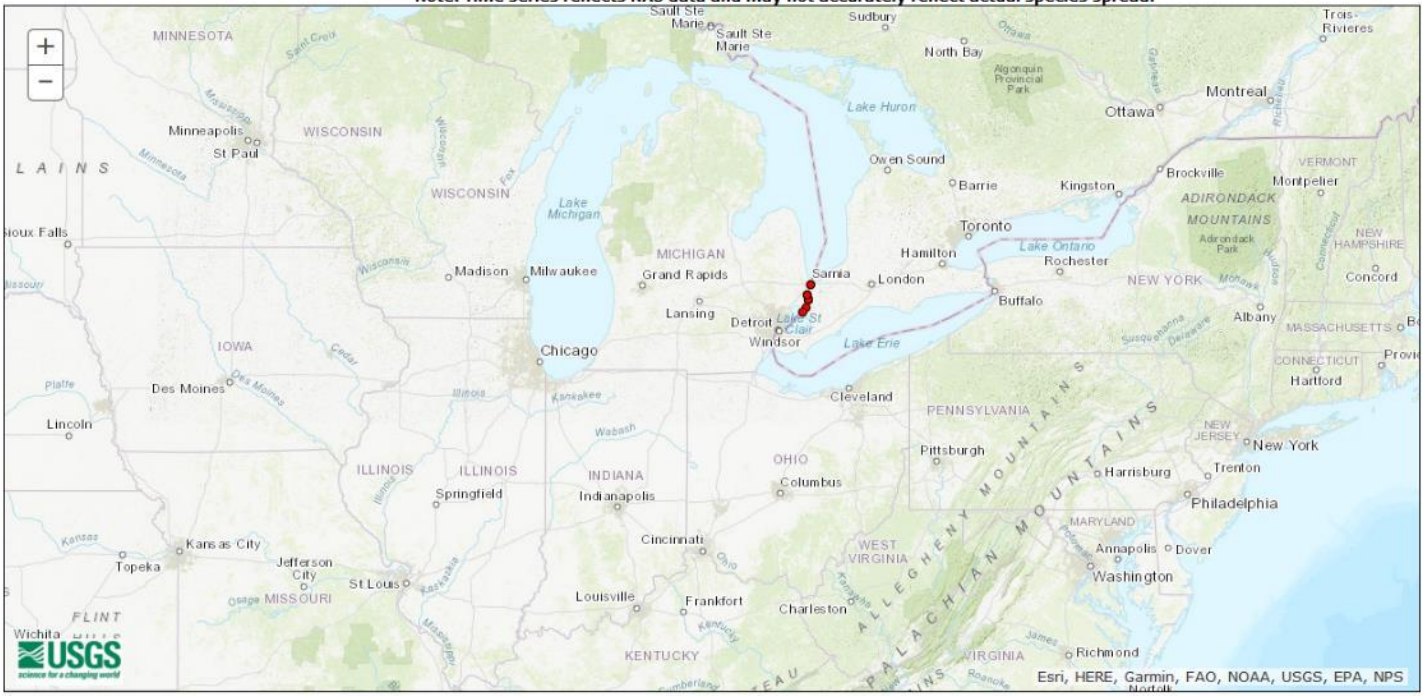
Species Profile
Animated Map

HUC Layers
- HUC 8 / HUC 8 Labels
- HUC 6 / HUC 6 Labels
- HUC 2 / HUC 2 Labels

Cumulative
Skip years with no recorded sightings

1990

Note: Time series reflects NAS data and may not accurately reflect actual species spread.



Fishes
Exotic

Species Profile
Animated Map

HUC Layers
- HUC 8
- HUC 8 Labels
- HUC 6
- HUC 6 Labels
- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

1991

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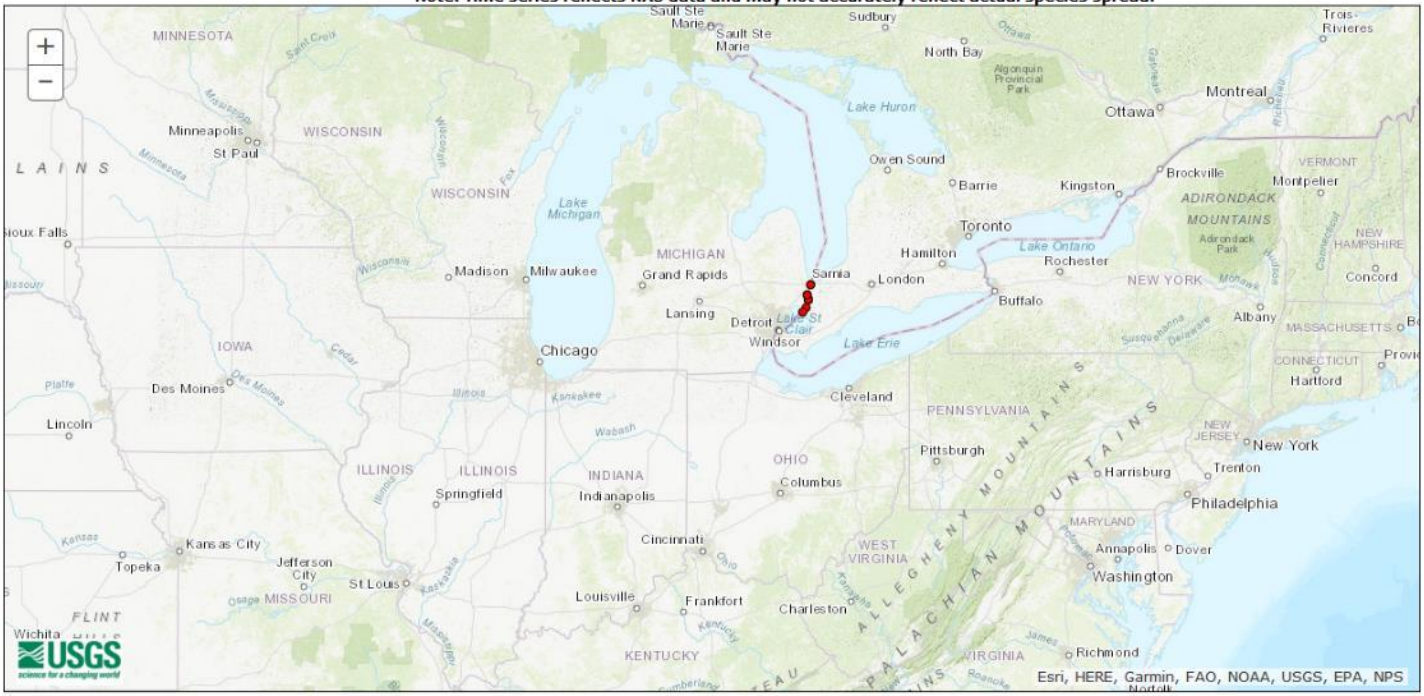

Fishes
Exotic

Species Profile
Animated Map

HUC Layers
HUC 8 HUC 8 Labels
HUC 6 HUC 6 Labels
HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

1992

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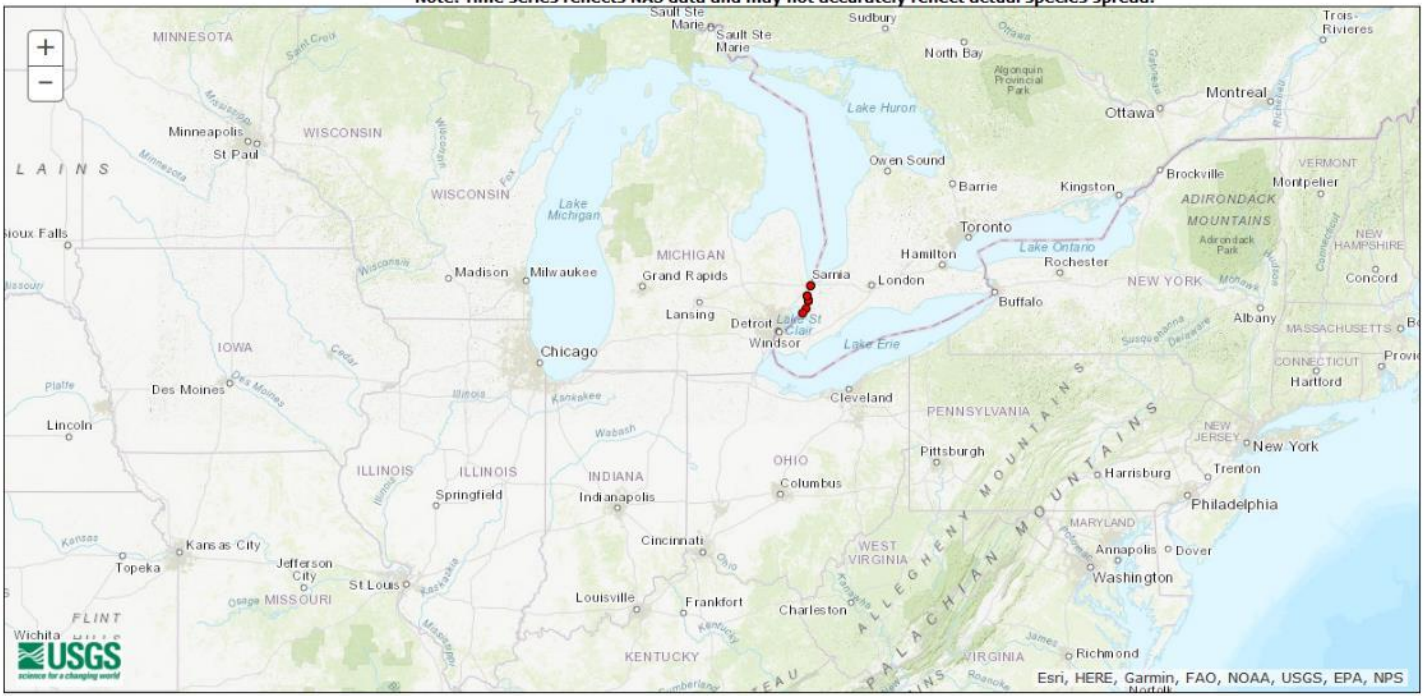

Fishes
Exotic

Species Profile
Animated Map

HUC Layers
- HUC 8
- HUC 8 Labels
- HUC 6
- HUC 6 Labels
- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

1993

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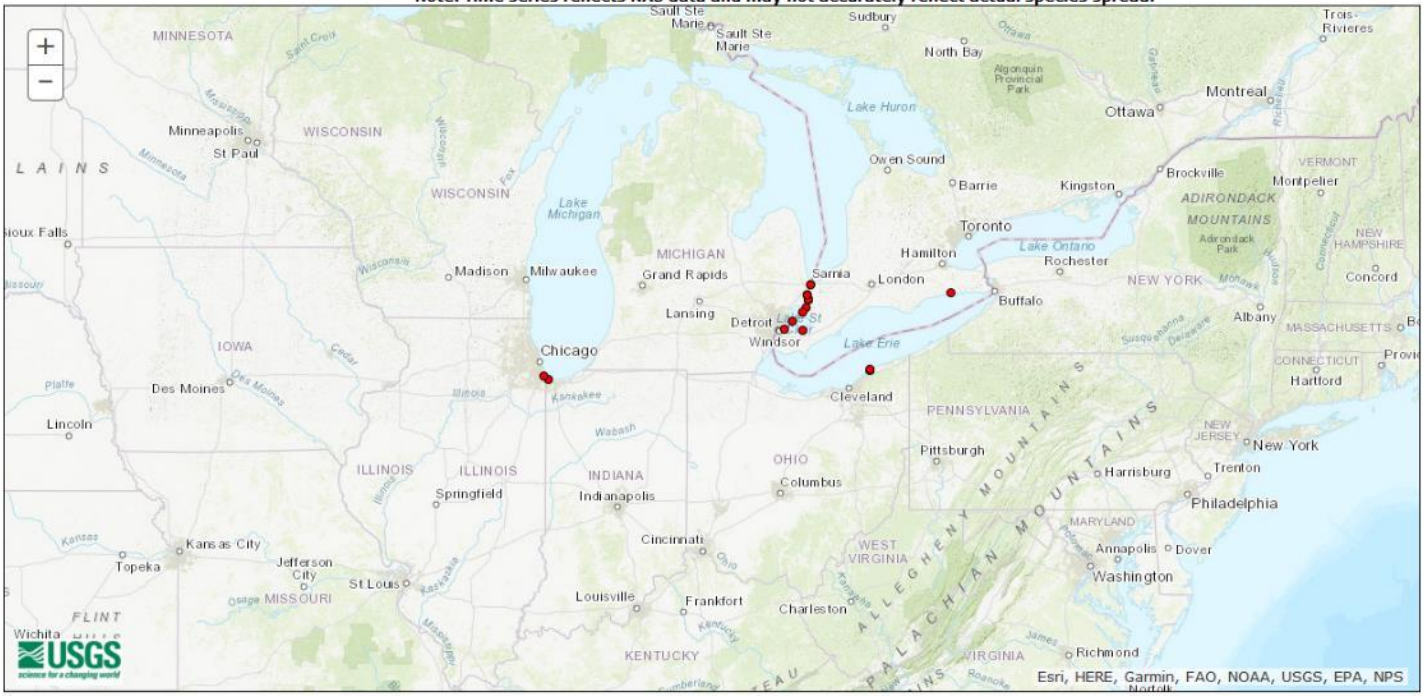

Fishes
Exotic

Species Profile
Animated Map

HUC Layers
- HUC 8
- HUC 8 Labels
- HUC 6
- HUC 6 Labels
- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

1994

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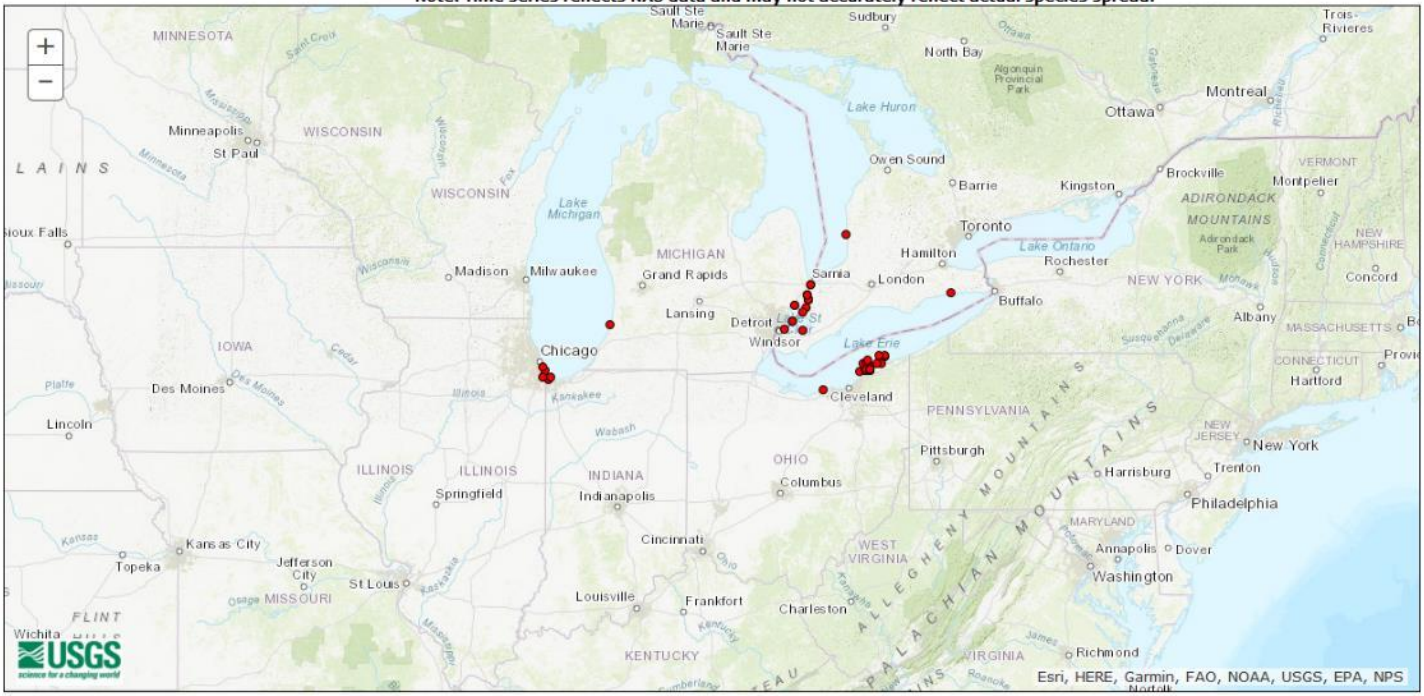

Fishes
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Species Profile
Animated Map

HUC Layers
HUC 8 HUC 8 Labels
HUC 6 HUC 6 Labels
HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

1995

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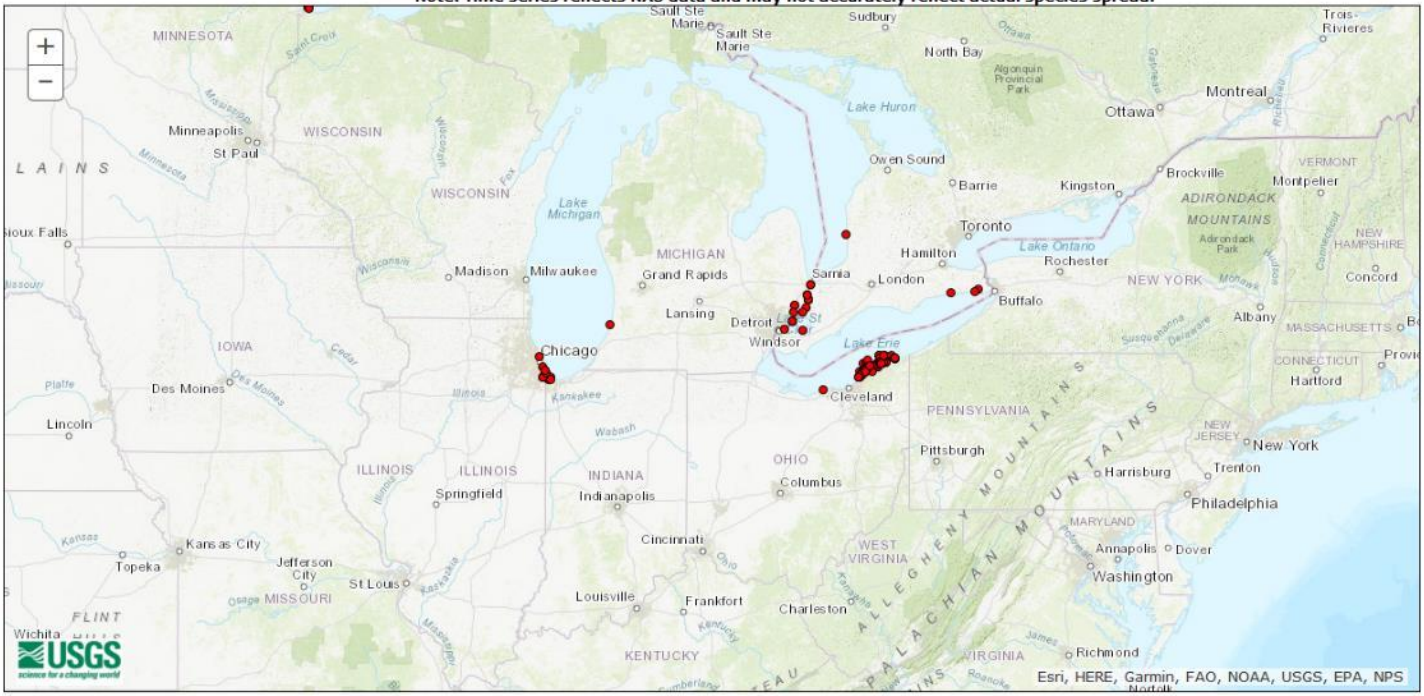

Fishes
Exotic

Species Profile
Animated Map

HUC Layers
HUC 8 HUC 8 Labels
HUC 6 HUC 6 Labels
HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

1996

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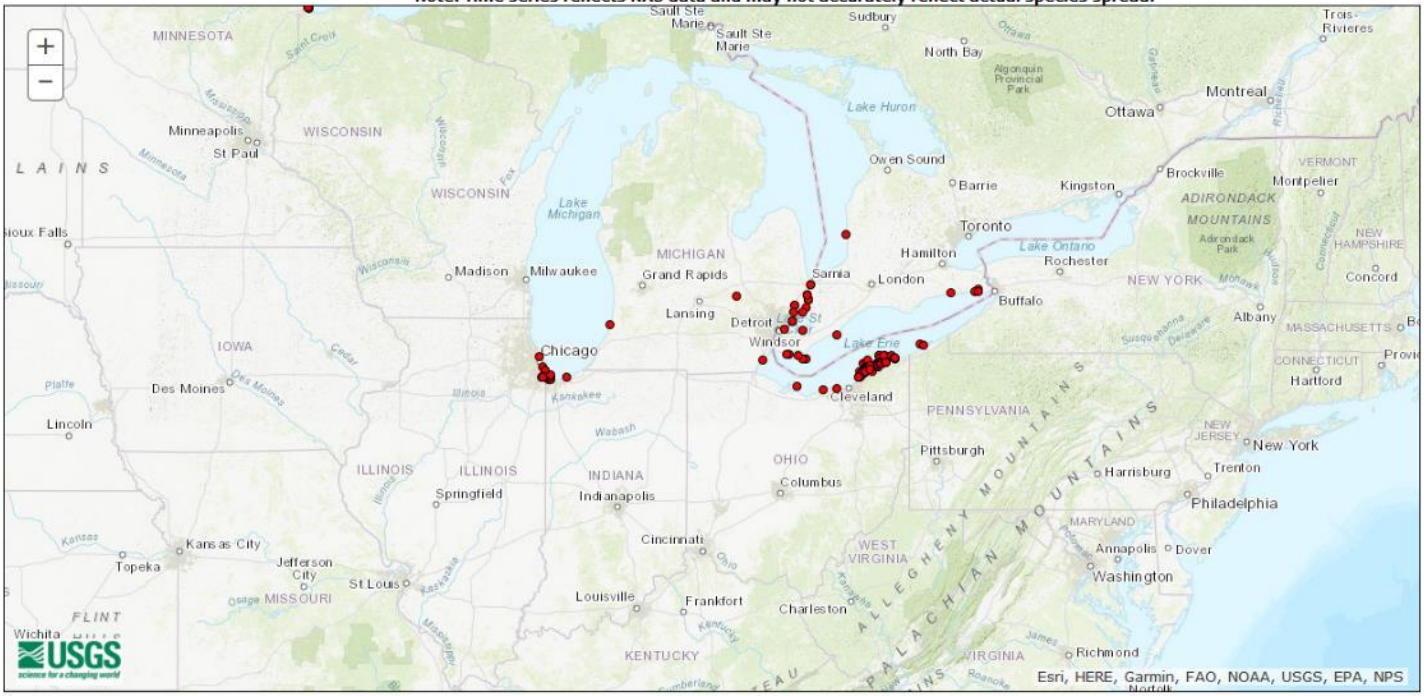

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Fishes
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HUC 6 HUC 6 Labels
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Skip years with no recorded sightings

1997

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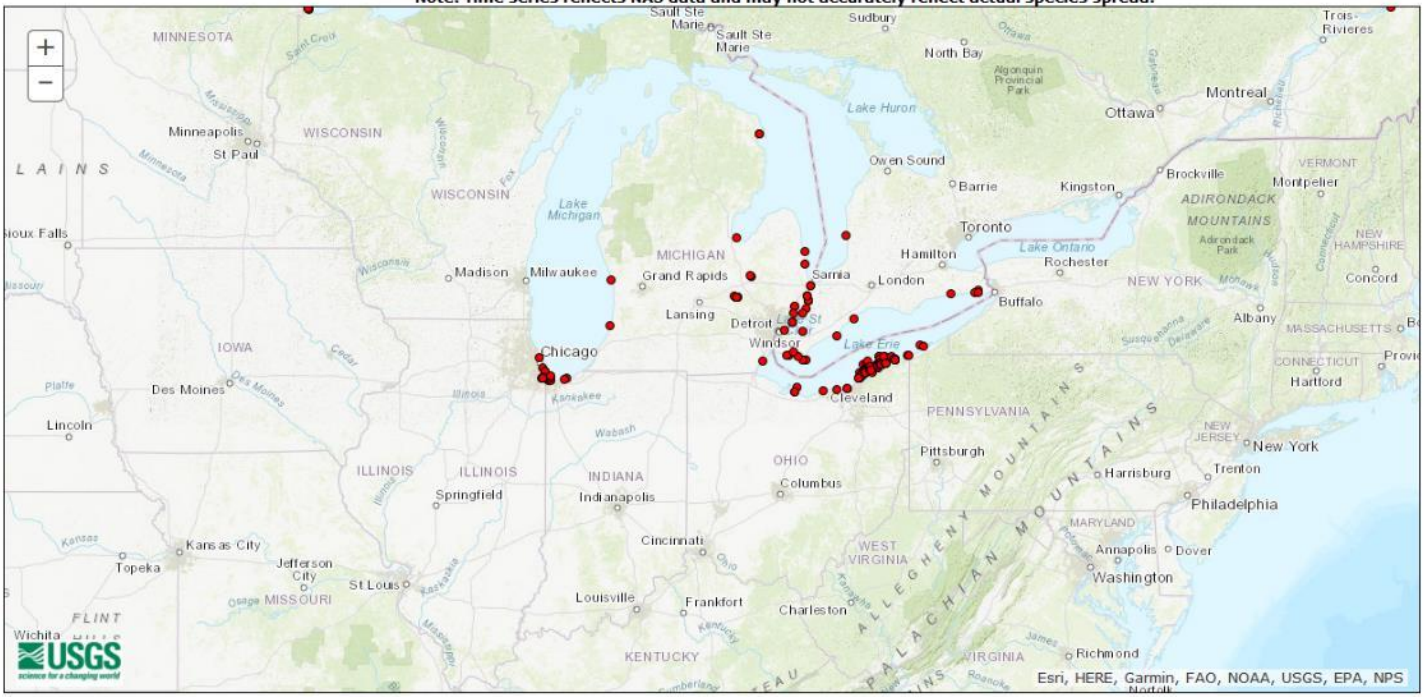

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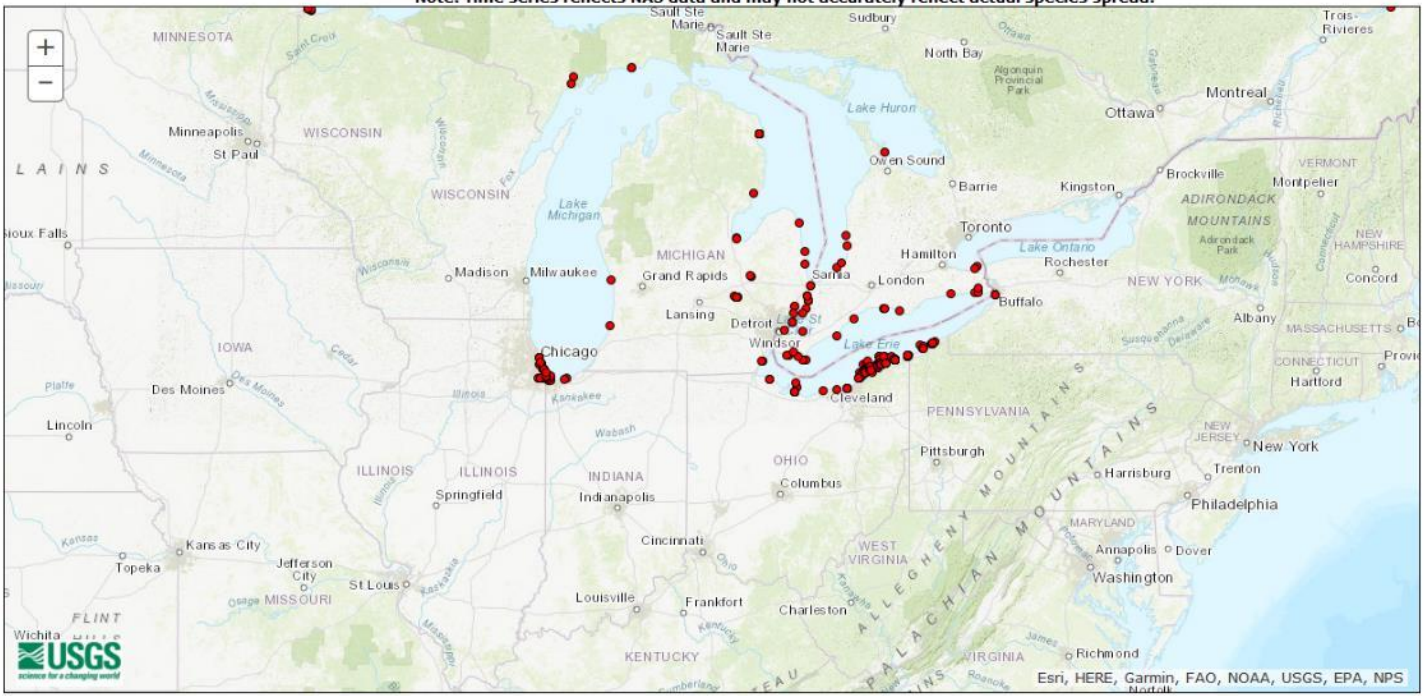

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HUC 8 HUC 8 Labels
HUC 6 HUC 6 Labels
HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

1999

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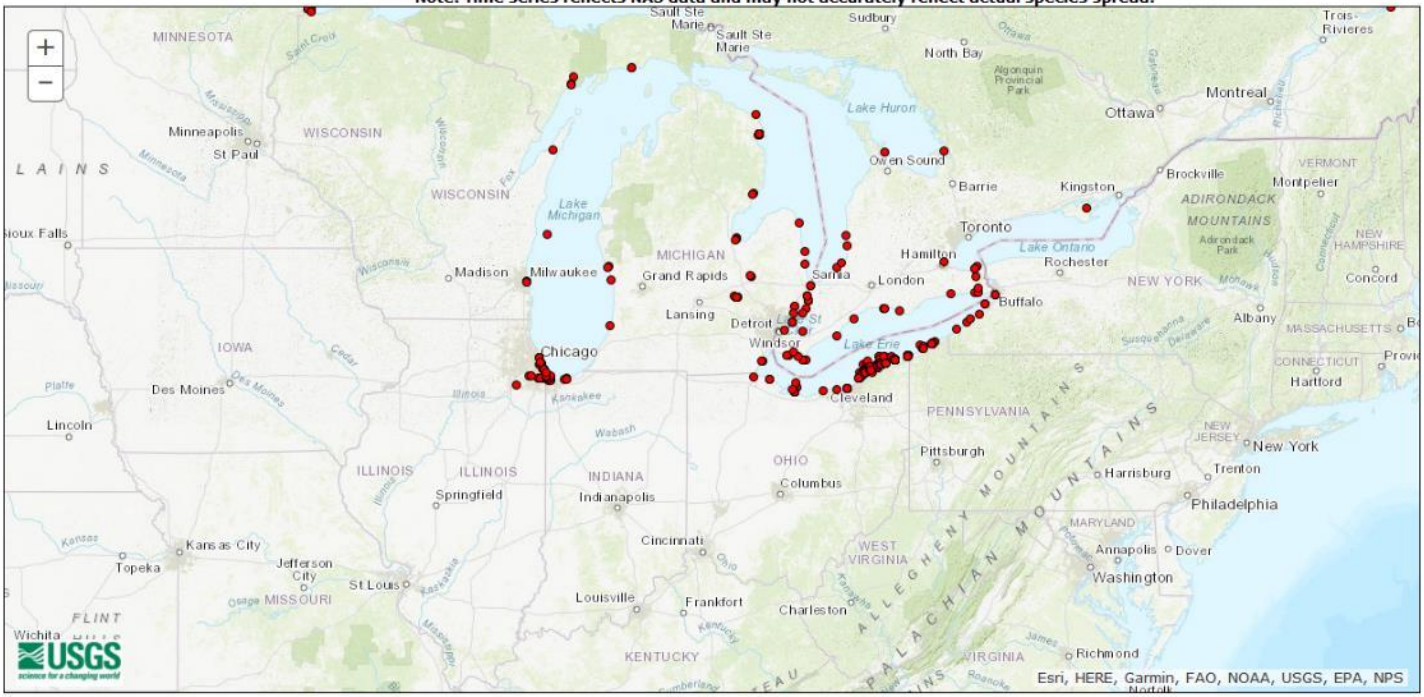

Fishes
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Animated Map

HUC Layers
- HUC 8
- HUC 8 Labels
- HUC 6
- HUC 6 Labels
- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2000

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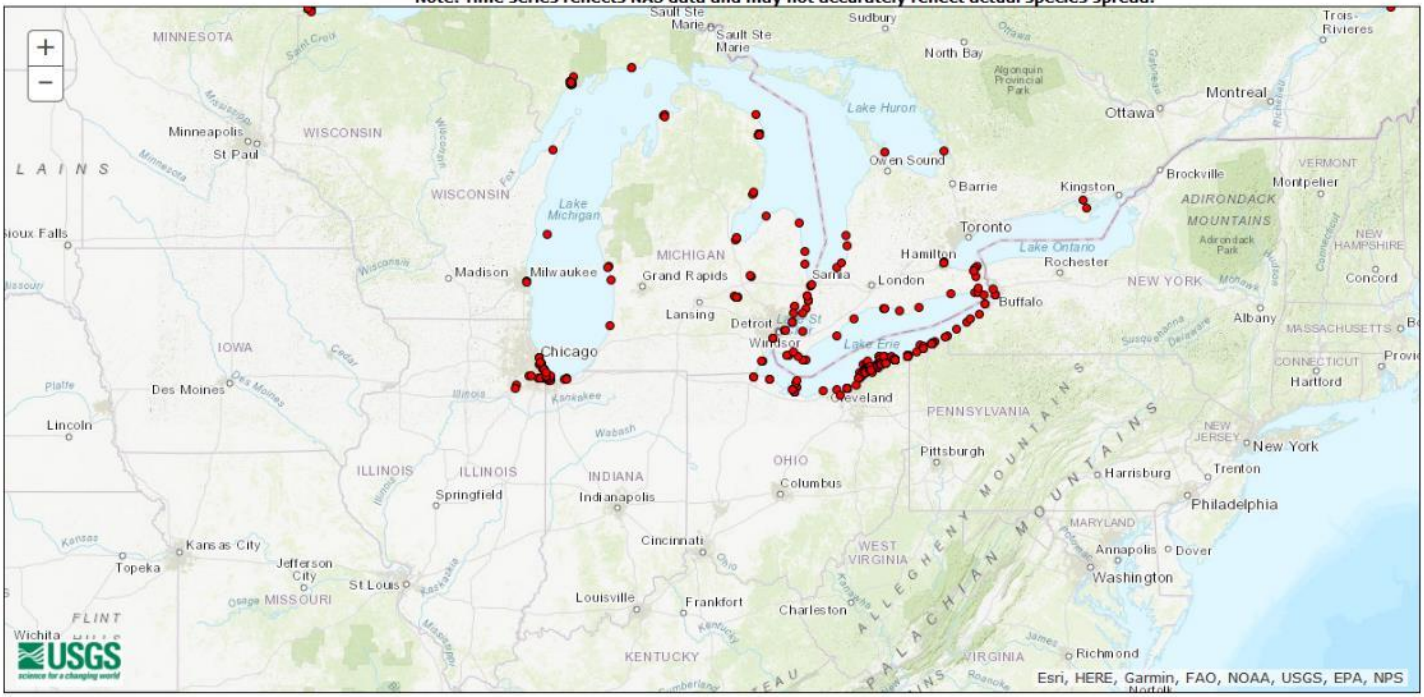

Fishes
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Animated Map

HUC Layers
HUC 8 HUC 8 Labels
HUC 6 HUC 6 Labels
HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2001

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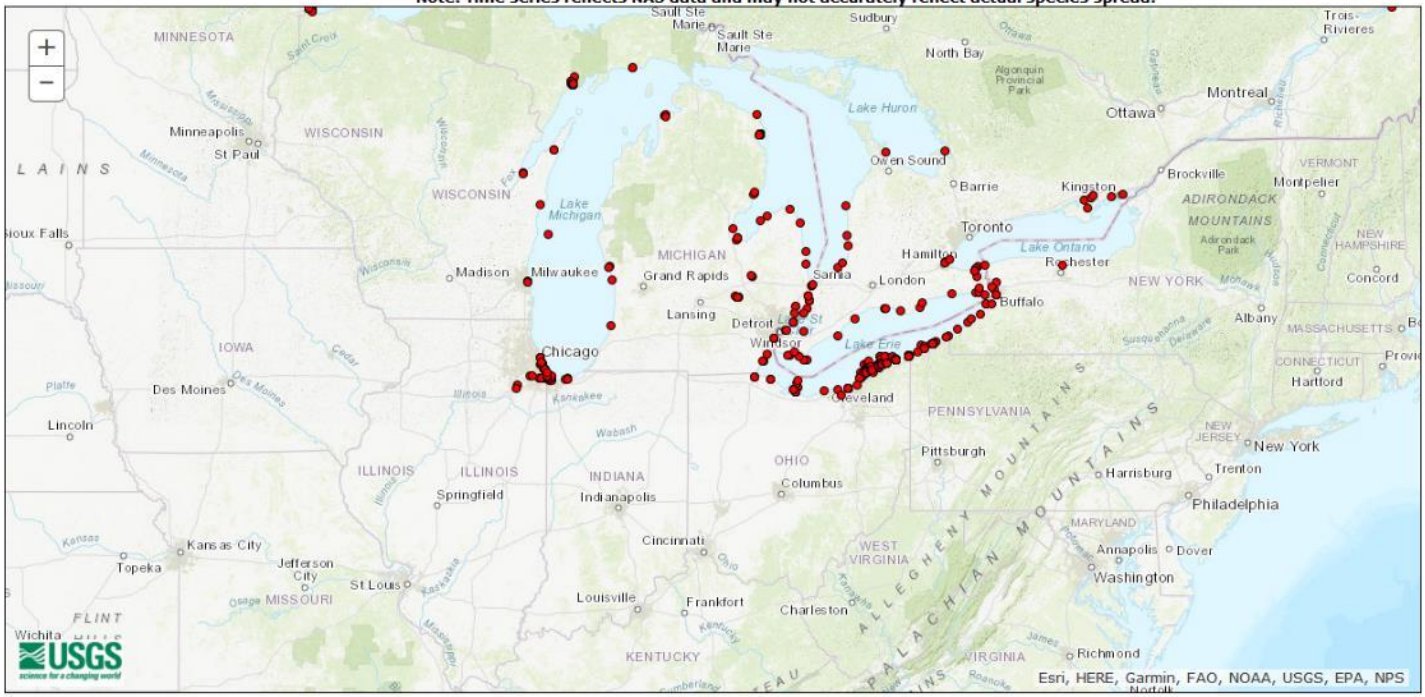

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HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2002

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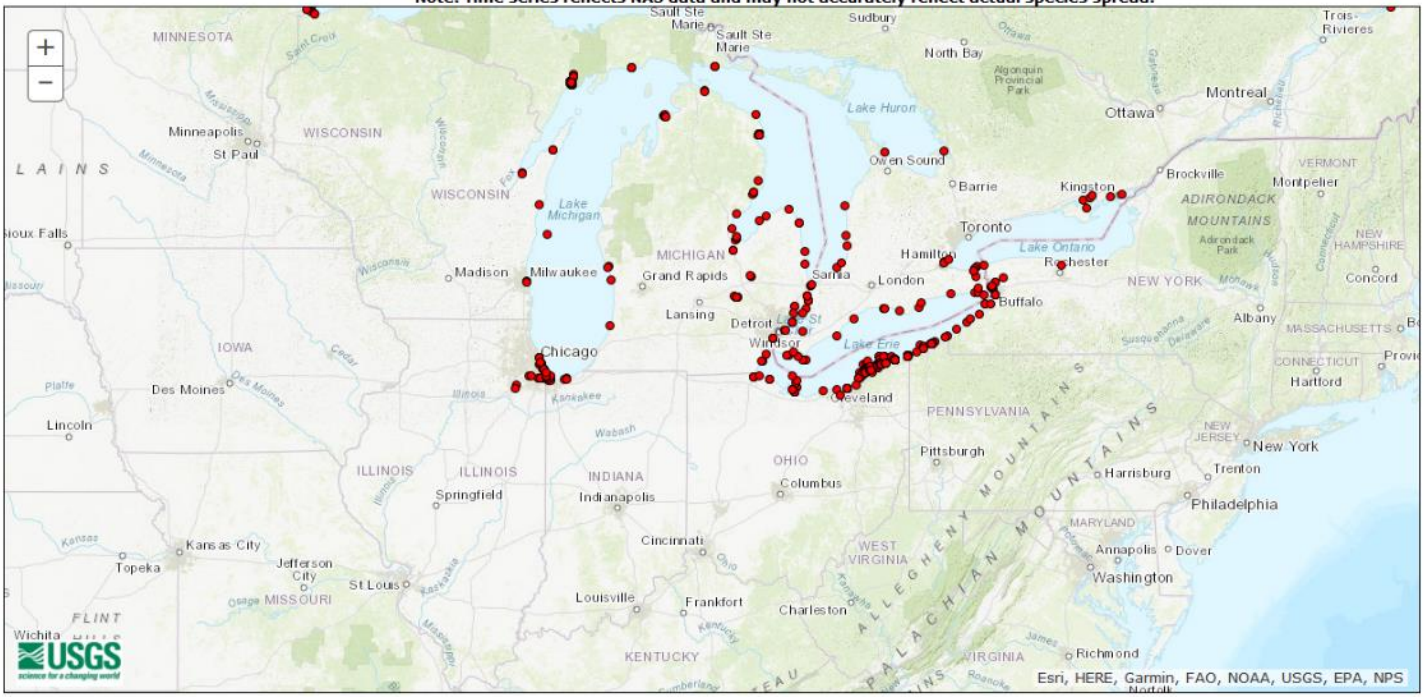

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HUC Layers
HUC 8 HUC 8 Labels
HUC 6 HUC 6 Labels
HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2003

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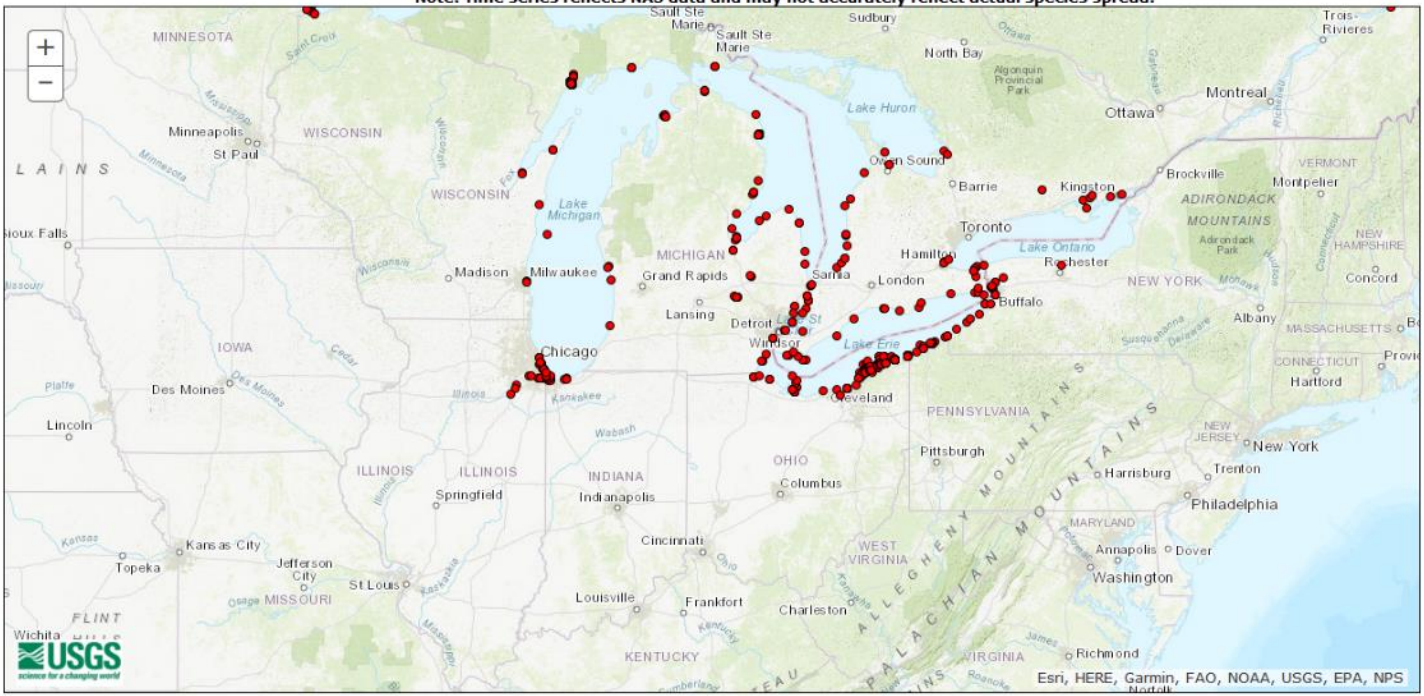

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HUC Layers
HUC 8 HUC 8 Labels
HUC 6 HUC 6 Labels
HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2004

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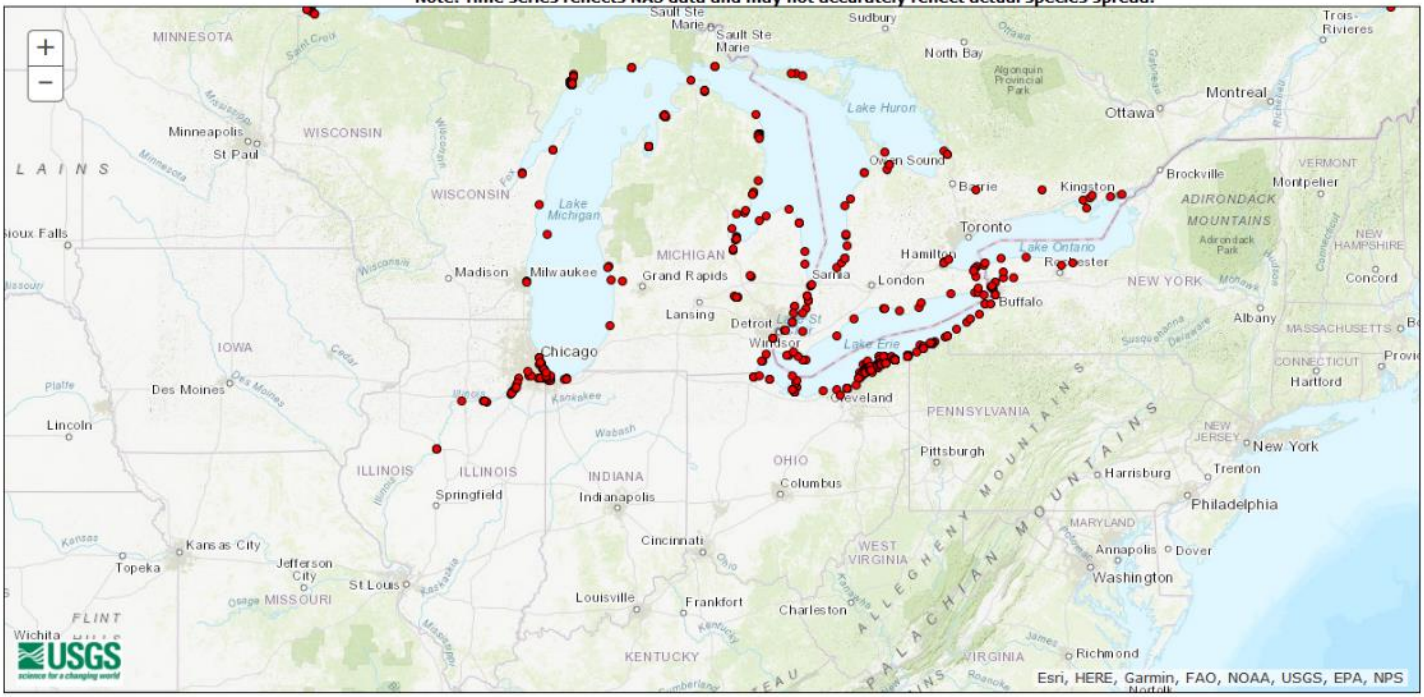

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HUC Layers
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- HUC 8 Labels
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- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2005

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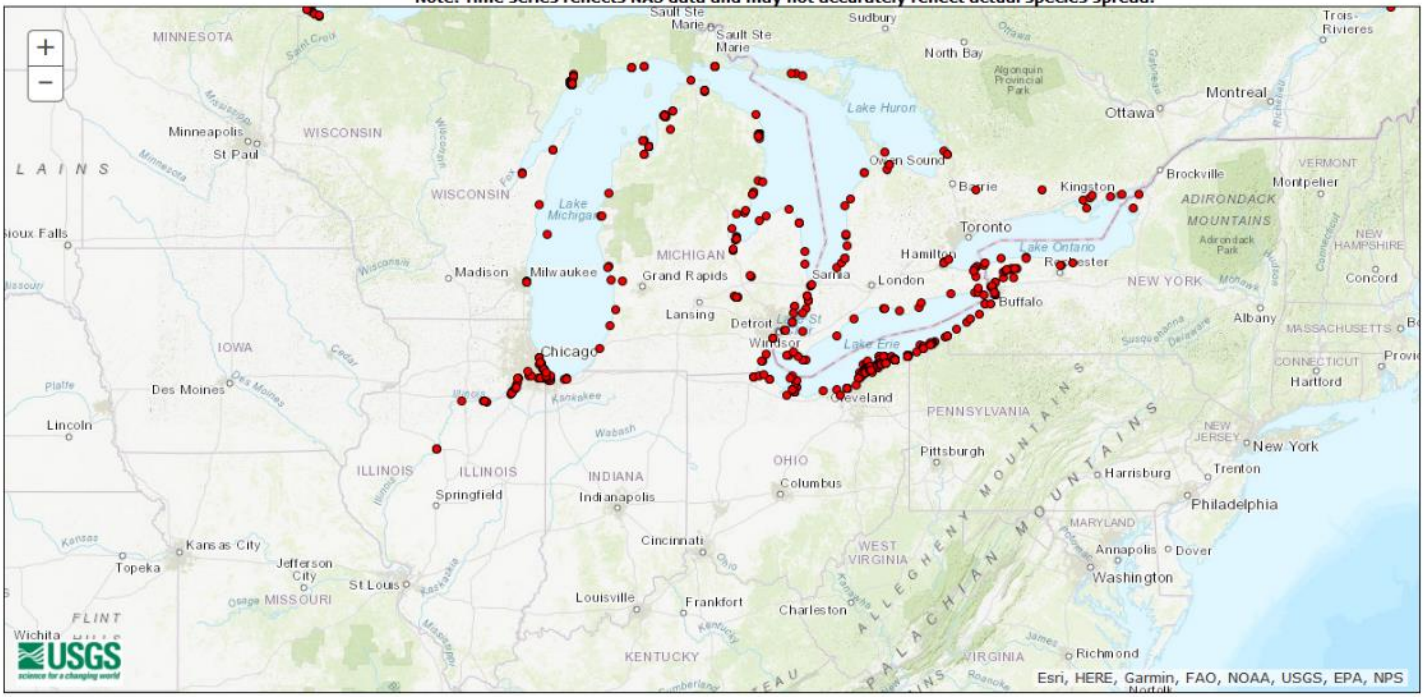

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HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2006

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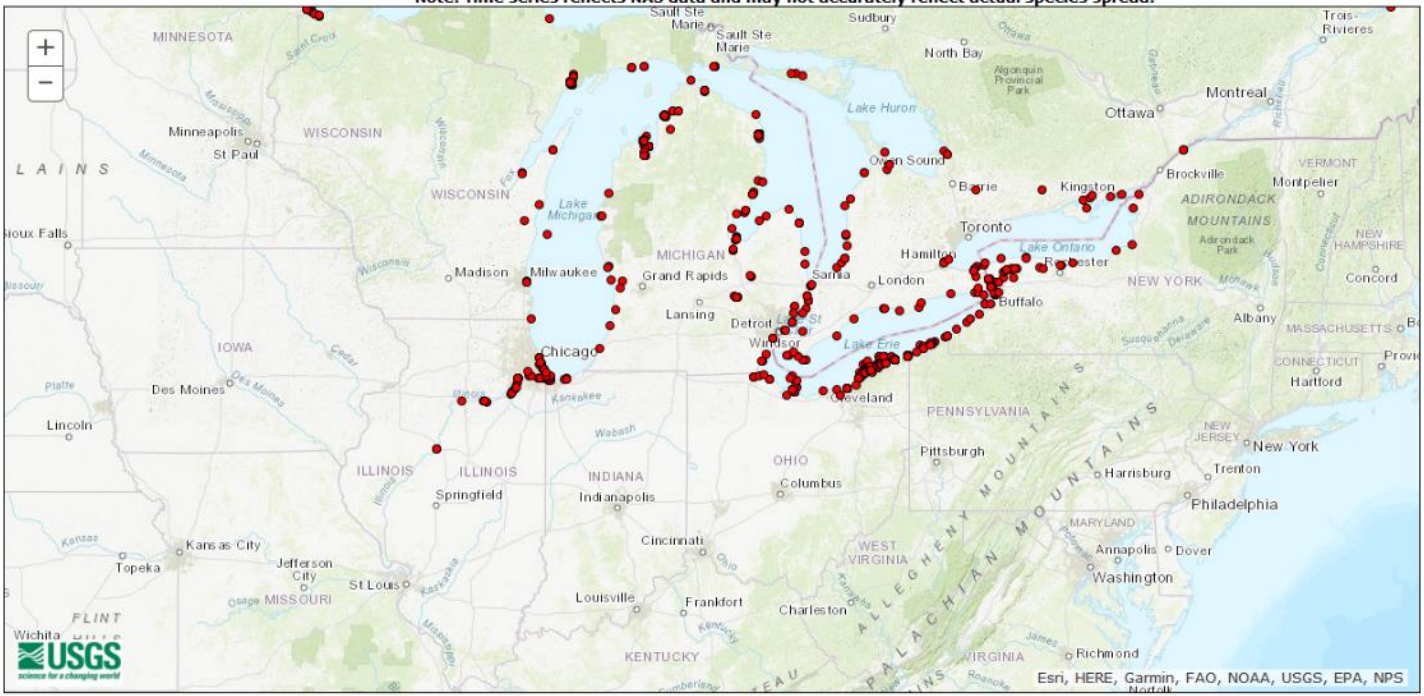

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- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2007

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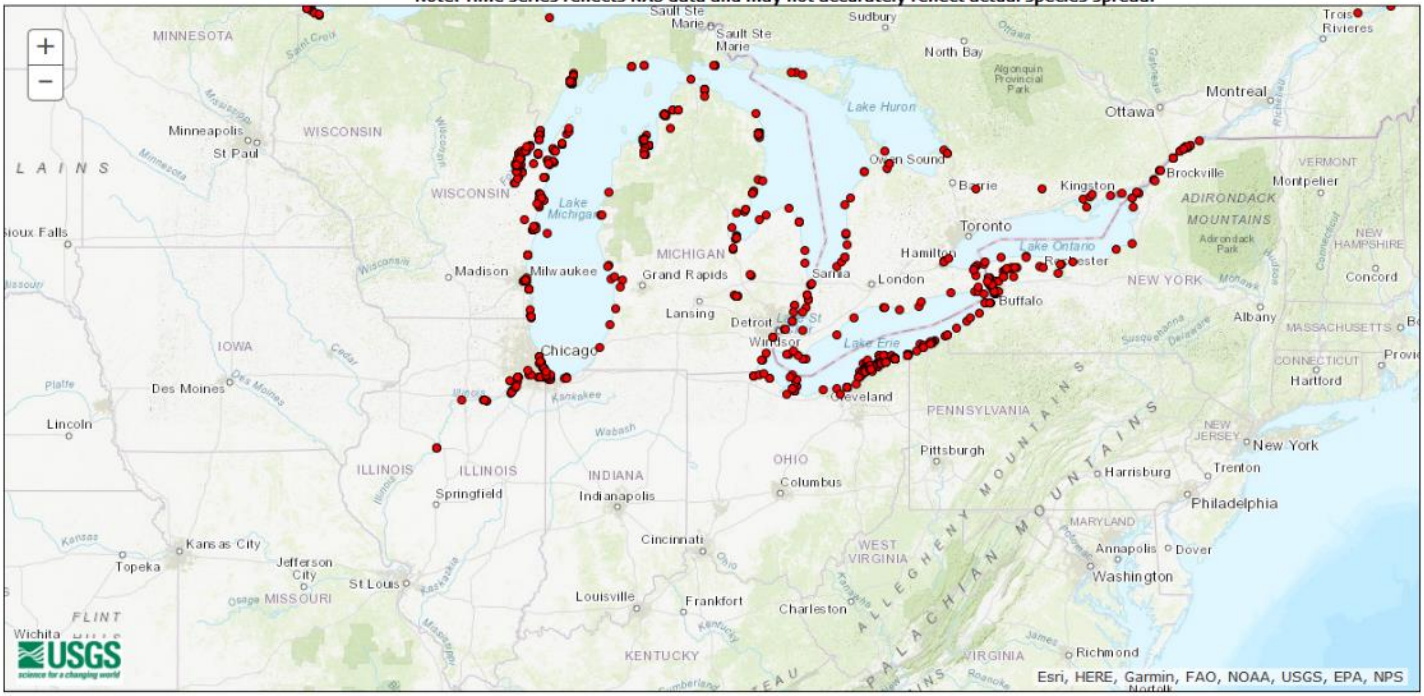

Fishes
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Species Profile
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HUC Layers
- HUC 8
- HUC 8 Labels
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- HUC 6 Labels
- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2008

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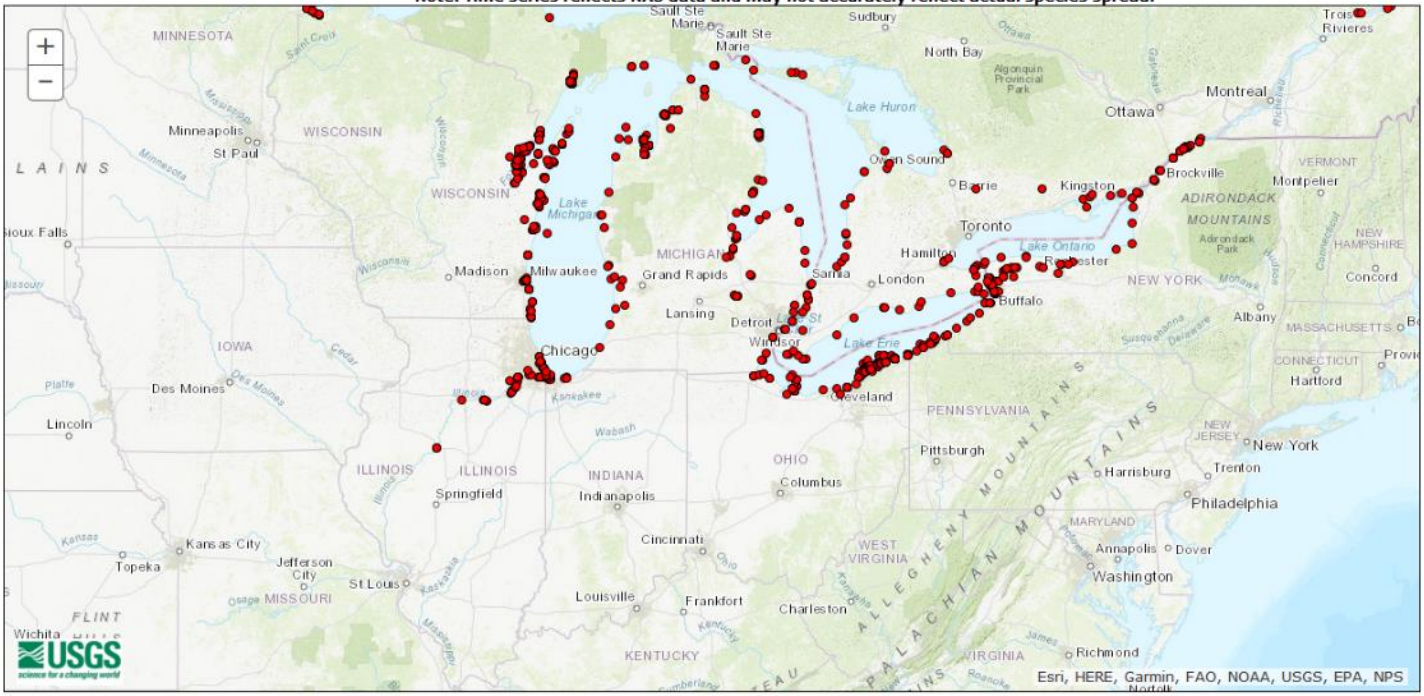

Fishes
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Species Profile
Animated Map

HUC Layers
HUC 8 HUC 8 Labels
HUC 6 HUC 6 Labels
HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2009

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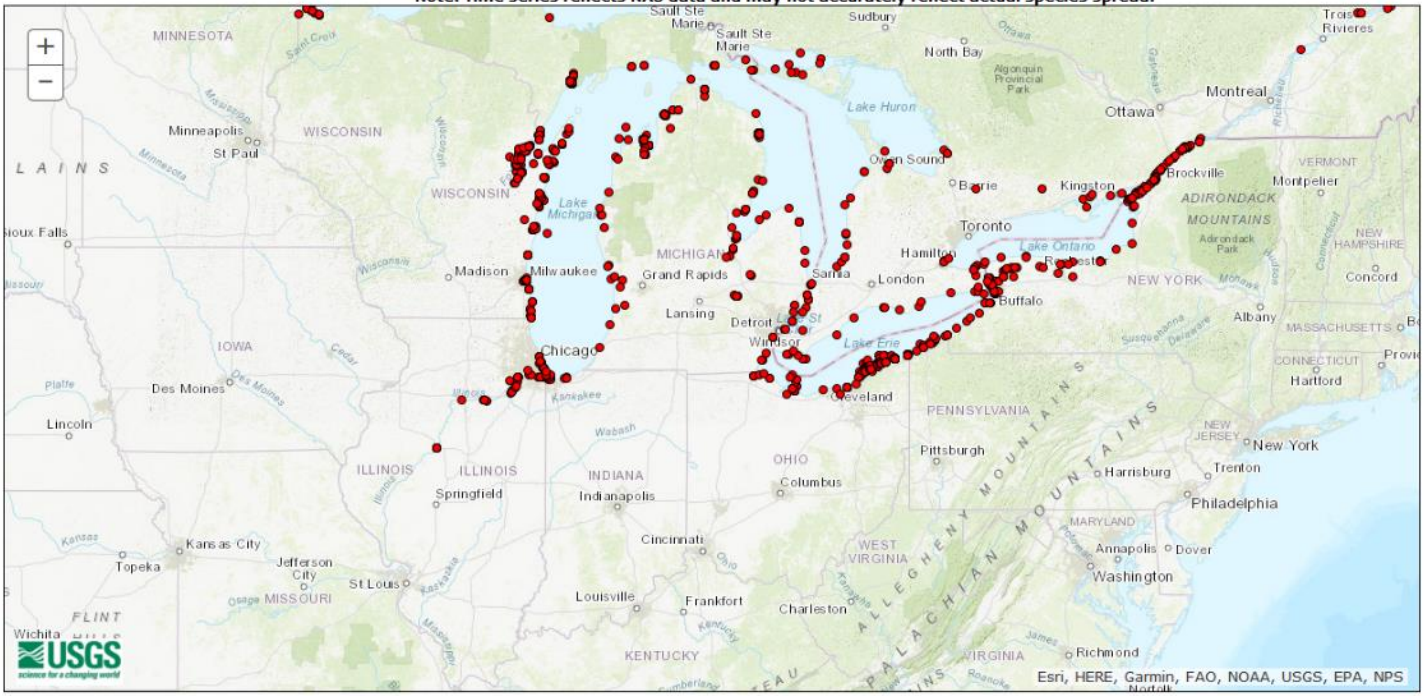

Fishes
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Species Profile
Animated Map

HUC Layers
HUC 8 HUC 8 Labels
HUC 6 HUC 6 Labels
HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2010

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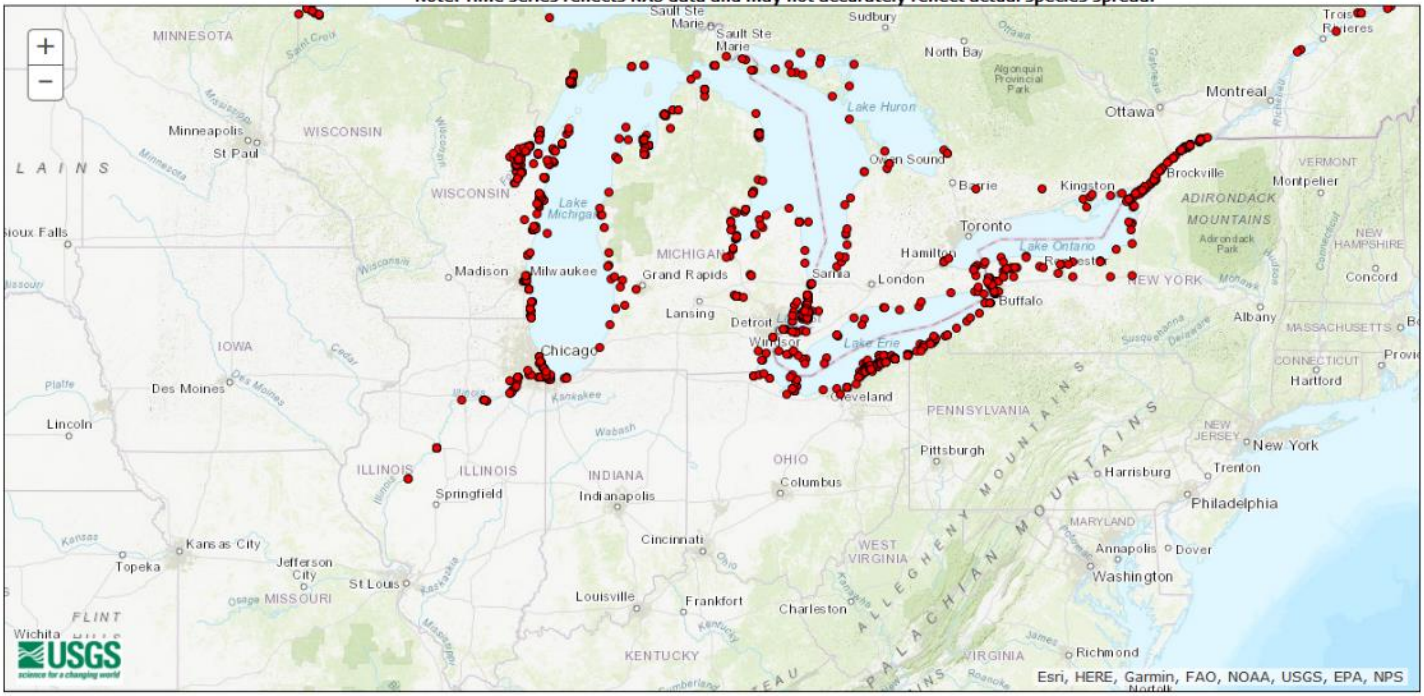

Fishes
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Species Profile
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HUC Layers
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- HUC 8 Labels
- HUC 6
- HUC 6 Labels
- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2011

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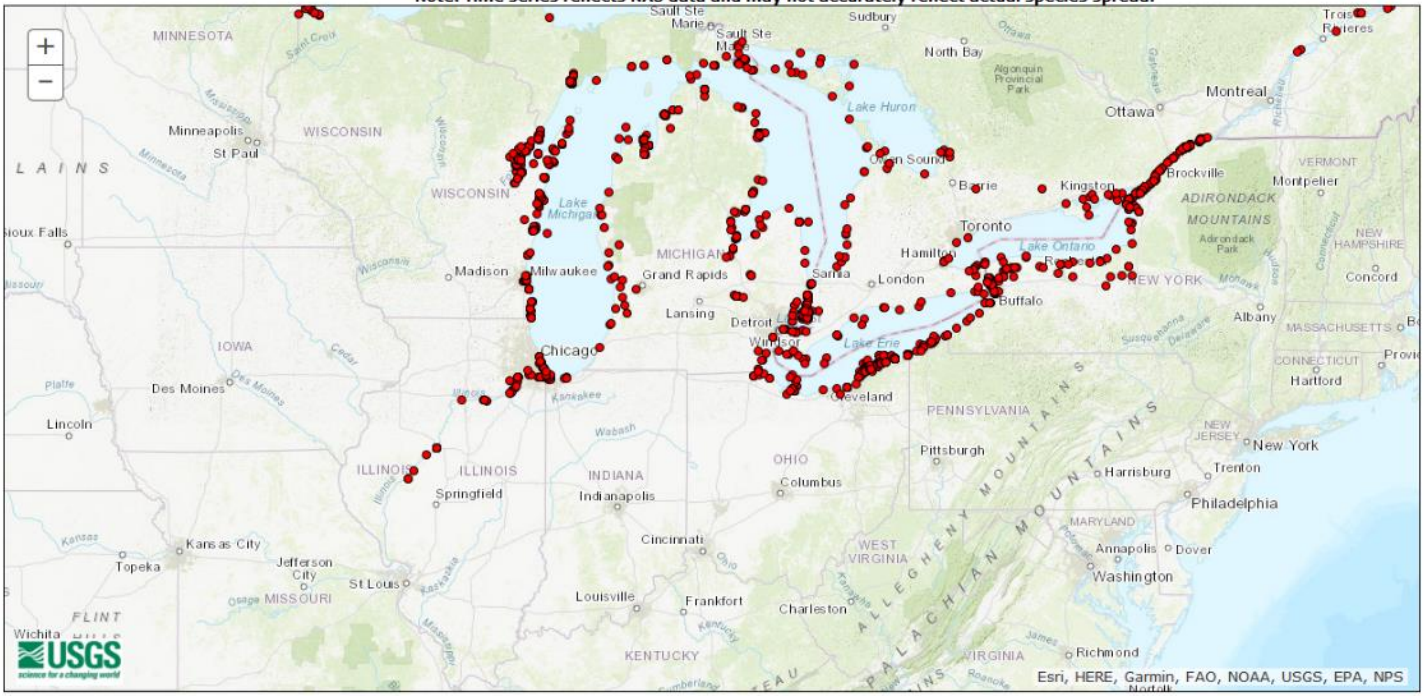

Fishes
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Species Profile
Animated Map

HUC Layers
HUC 8 HUC 8 Labels
HUC 6 HUC 6 Labels
HUC 2 HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2012

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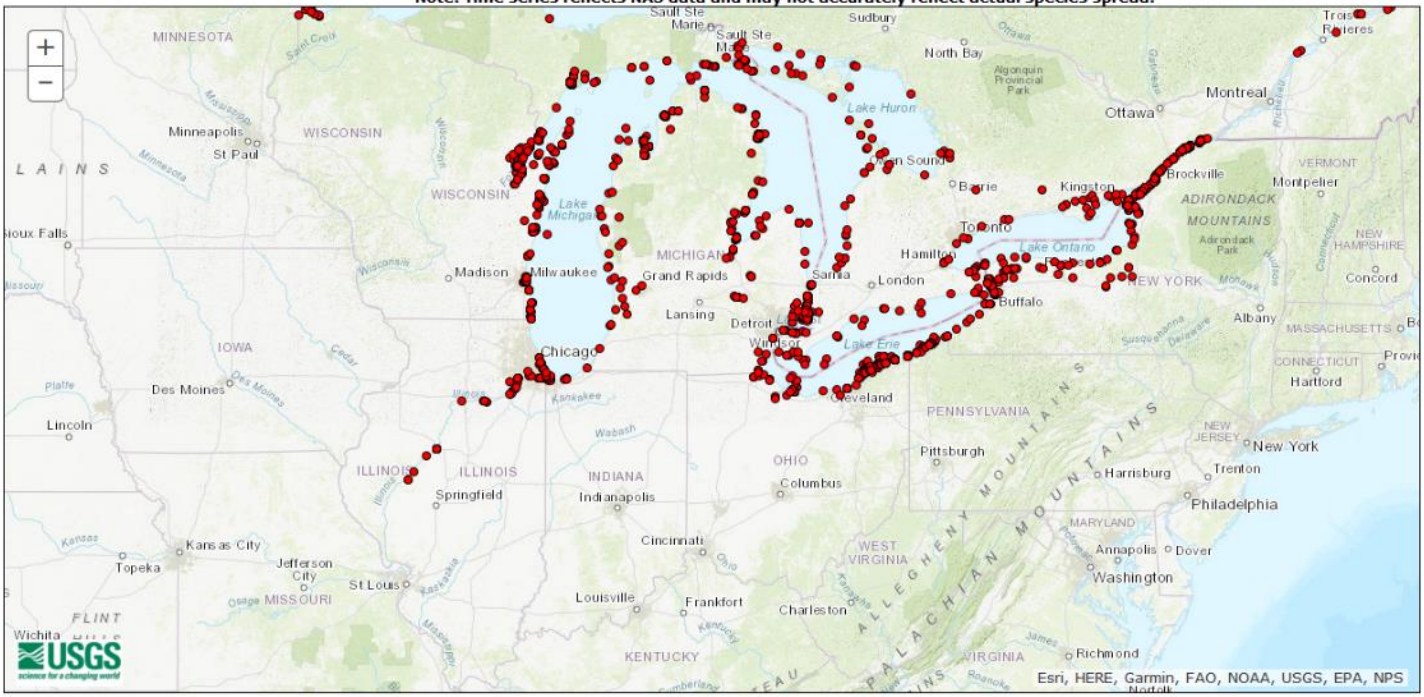

Fishes
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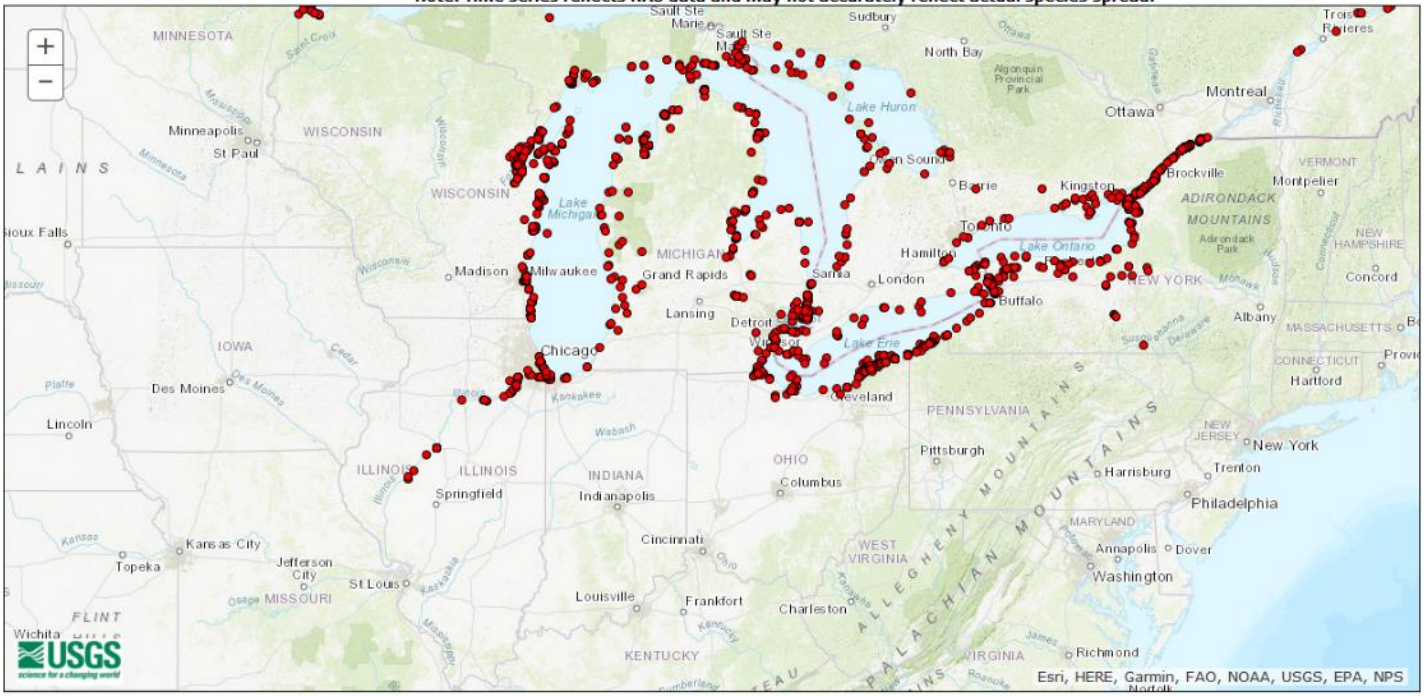
Species Profile
Animated Map

HUC Layers
- HUC 8
- HUC 8 Labels
- HUC 6
- HUC 6 Labels
- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2013

Note: Time series reflects NAS data and may not accurately reflect actual species spread.



Fishes
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Animated Map

HUC Layers
- HUC 8
- HUC 8 Labels
- HUC 6
- HUC 6 Labels
- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2014

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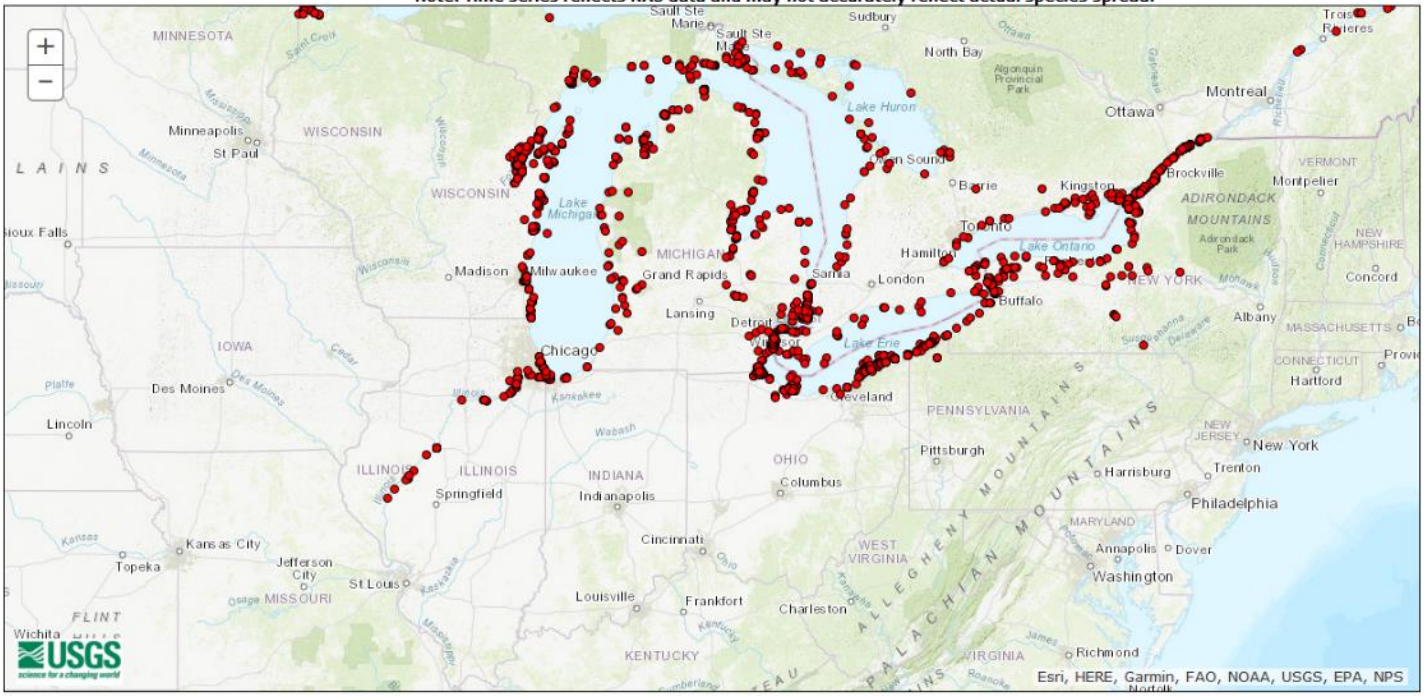

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Fishes
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HUC Layers
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2015

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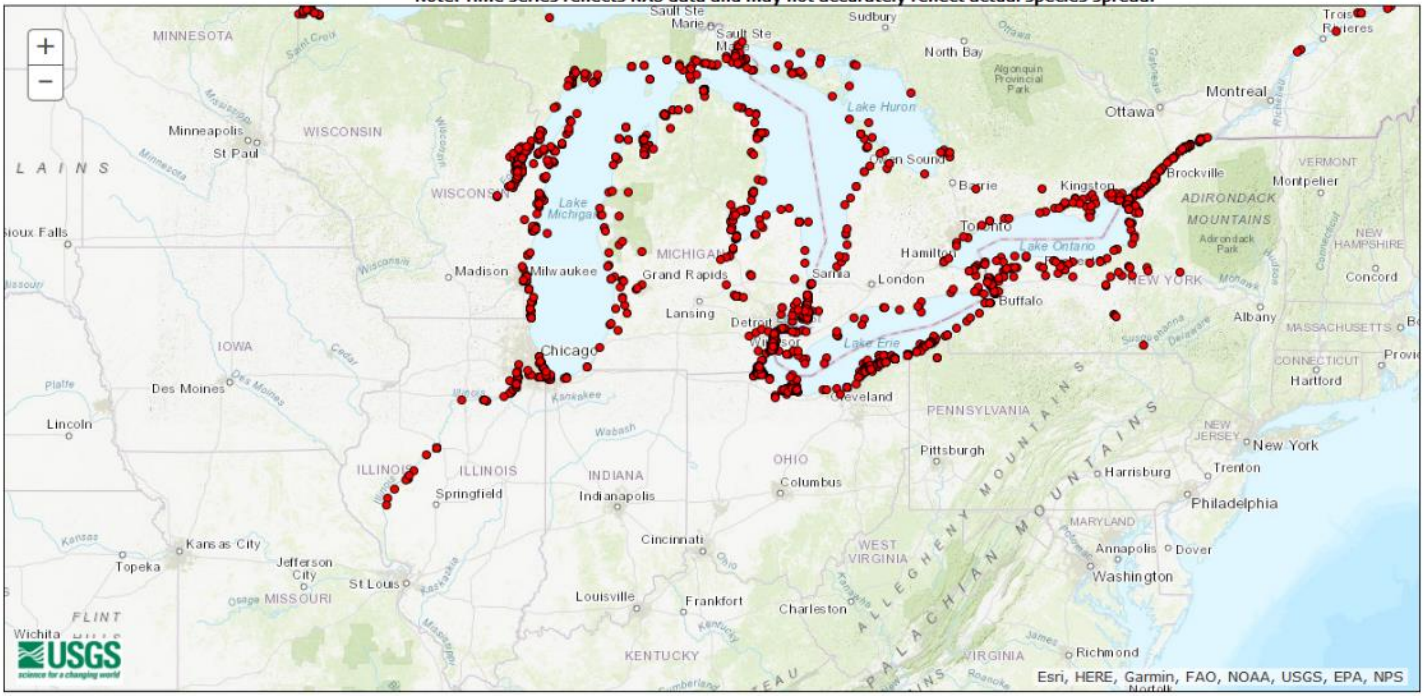

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HUC Layers
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- HUC 8 Labels
- HUC 6
- HUC 6 Labels
- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2016

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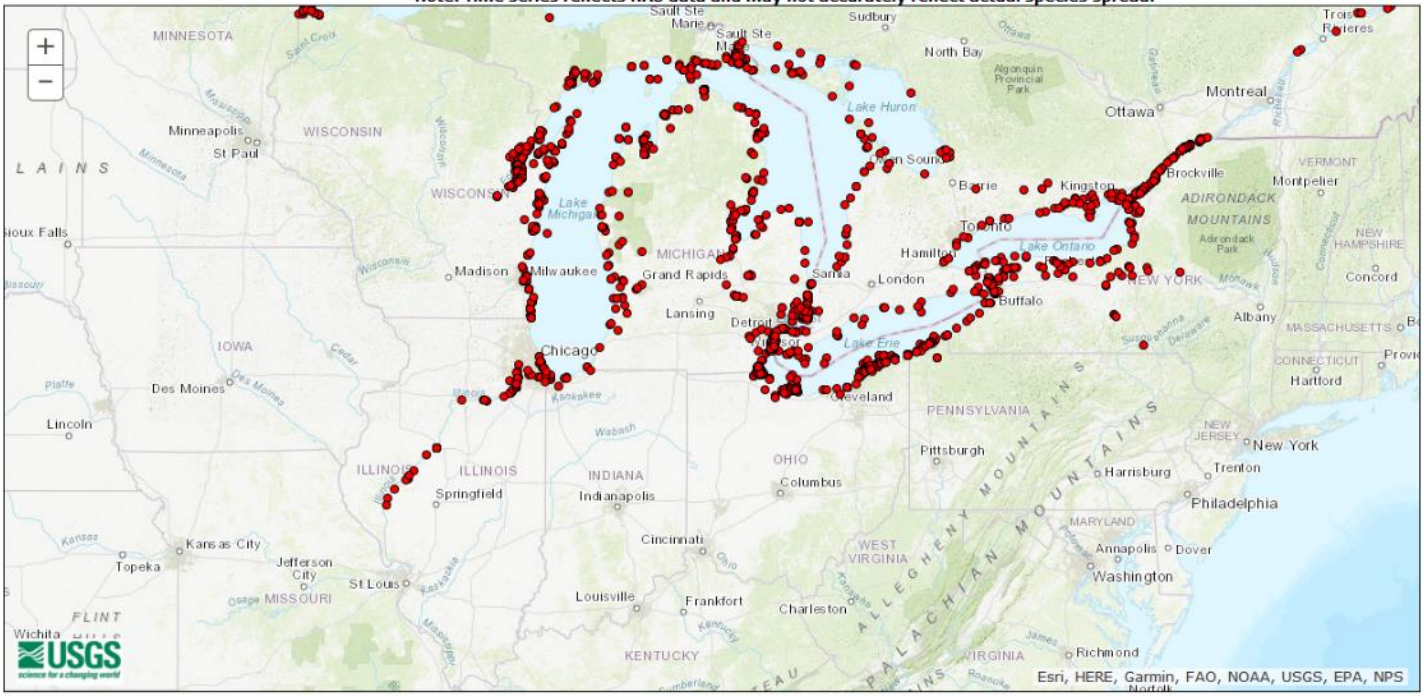

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- HUC 8 Labels
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- HUC 6 Labels
- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2017

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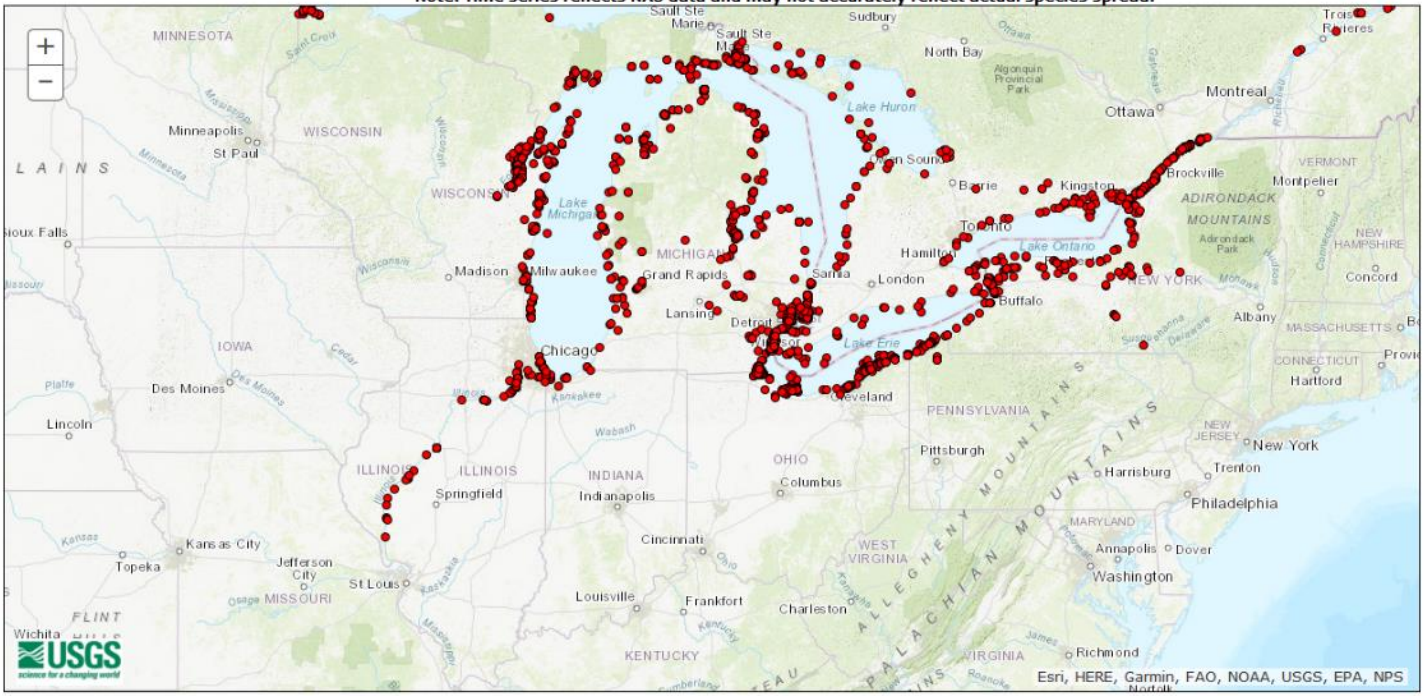

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- HUC 8 Labels
- HUC 6
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- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2018

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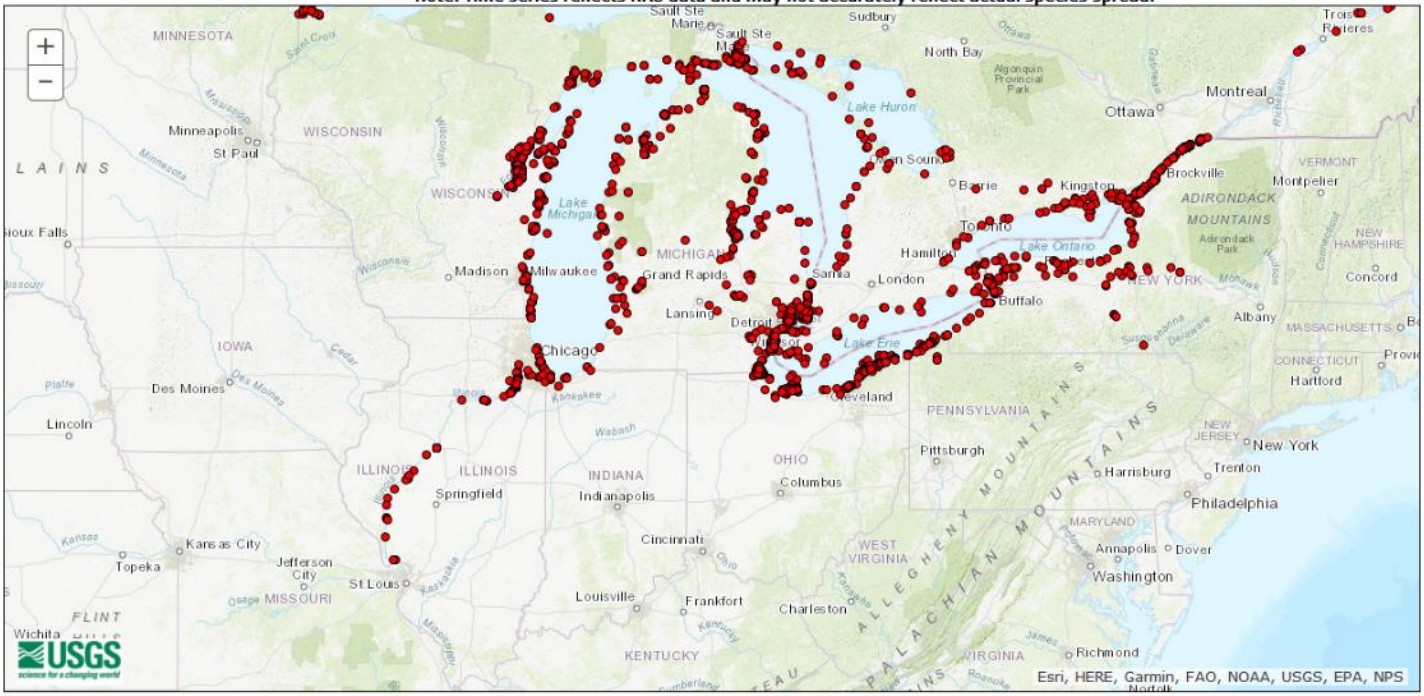

Fishes
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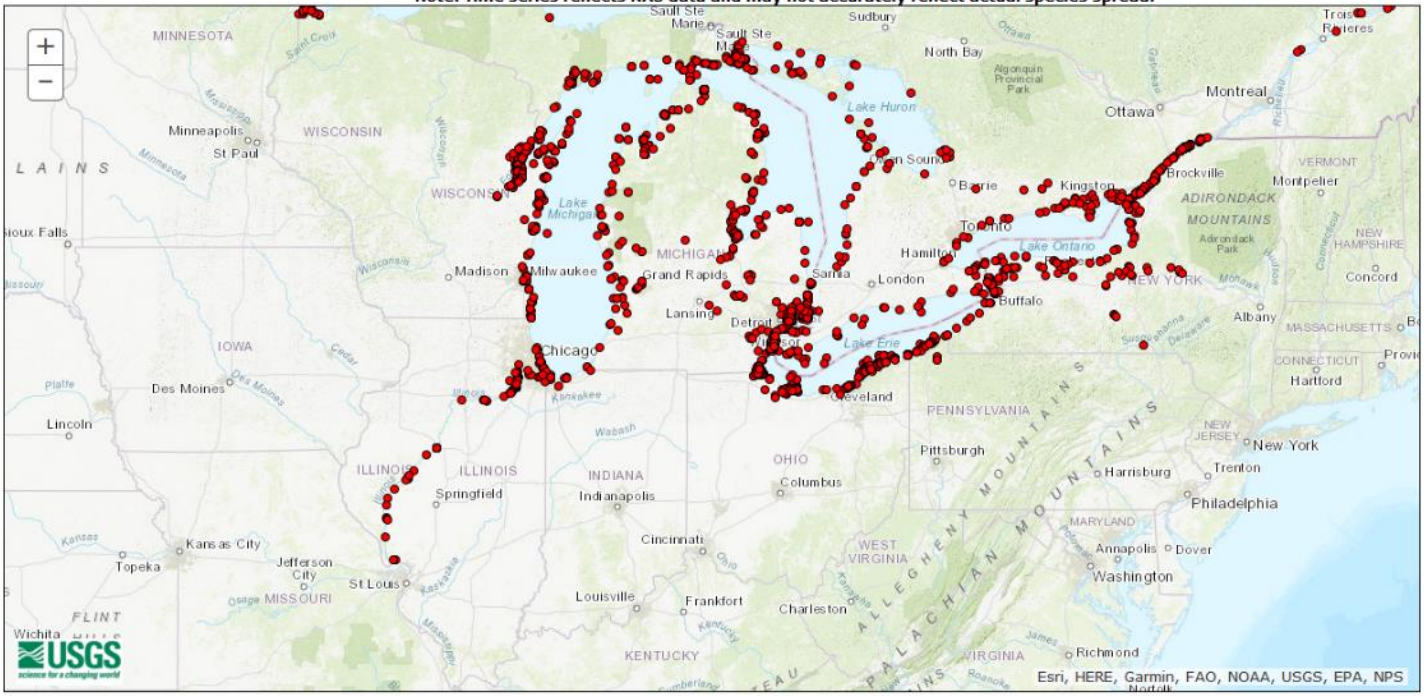
Species Profile
Animated Map

HUC Layers
- HUC 8
- HUC 8 Labels
- HUC 6
- HUC 6 Labels
- HUC 2
- HUC 2 Labels

Cumulative
Skip years with no recorded sightings

2019

Note: Time series reflects NAS data and may not accurately reflect actual species spread.



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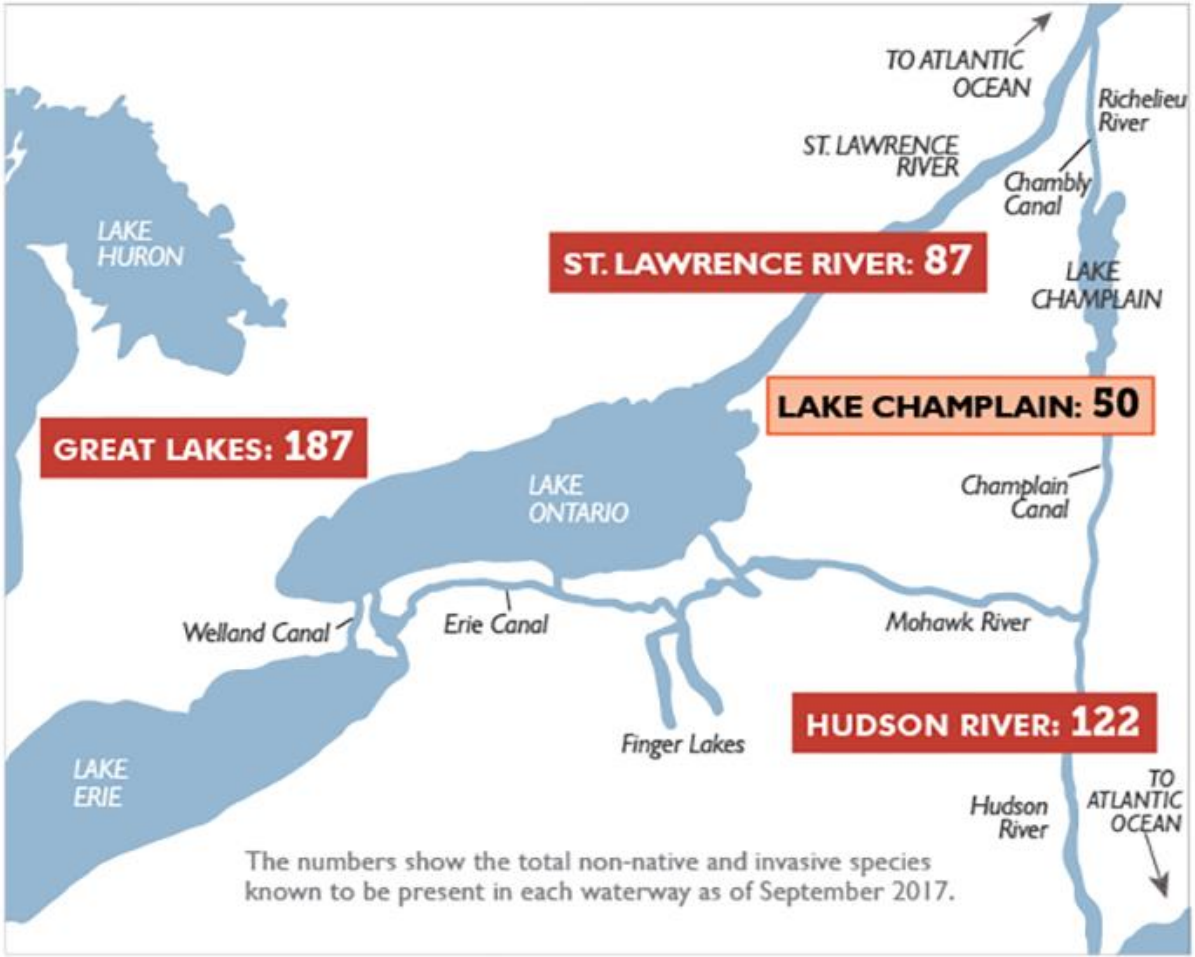
UNLOCK THE LEGEND...NEW YORK STATE CANAL SYSTEM



ıent of
nental
ation

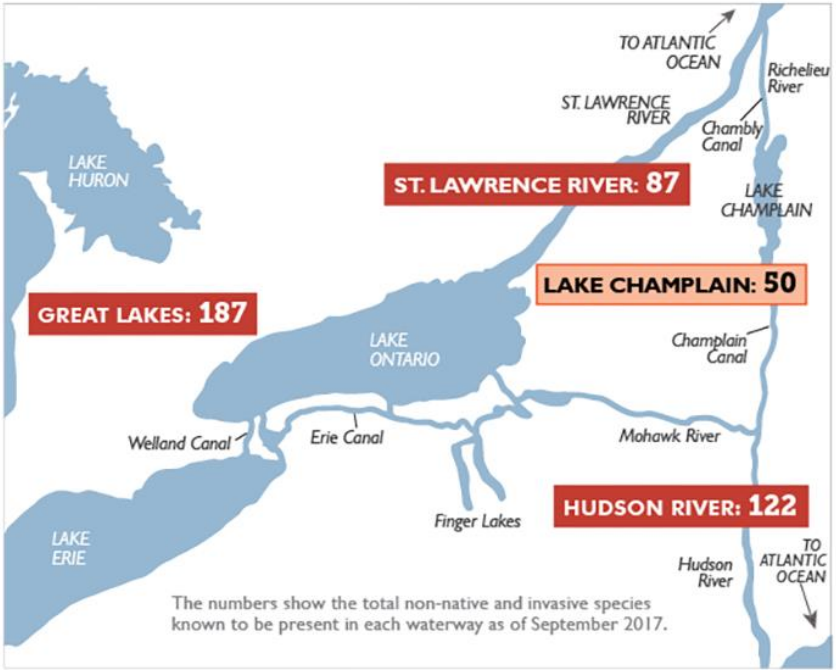
Actions

Get ideas on table before crisis mode. Weigh relative merits. Prepare for pluses and minuses.

1. Take no action
2. Nonstructural control
3. Barriers (e.g. electricity, chemical, sound)
4. Hydrologic separation

1. Take no action

Often driven by competing views, no initiative, no money, no risk reduction



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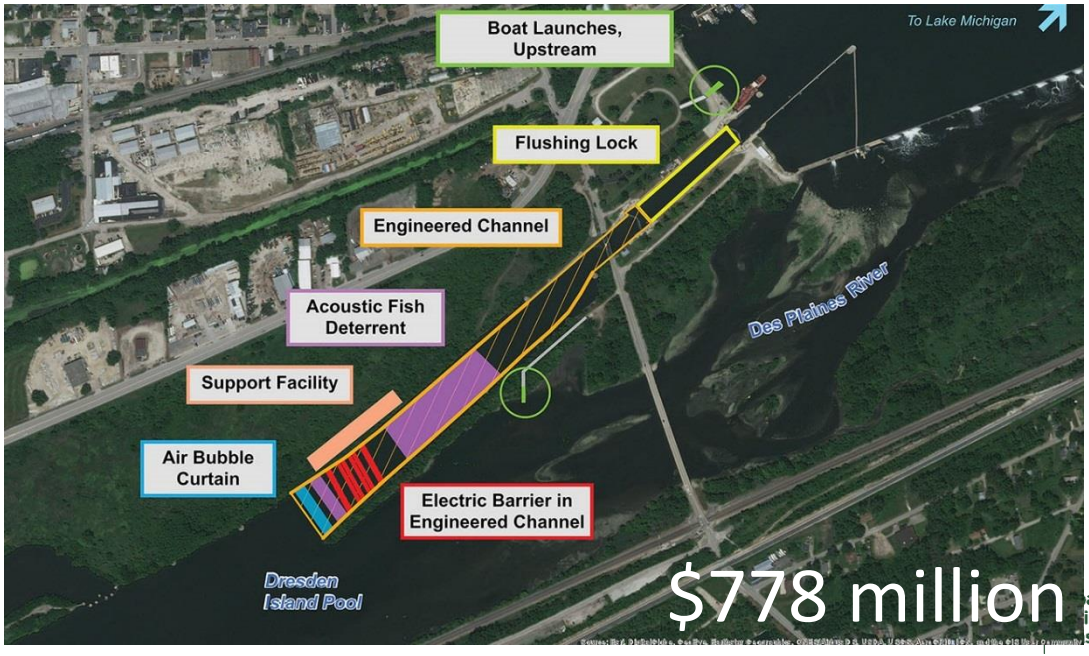
2. Nonstructural control

Monitoring, mechanical removal, pesticides & herbicides, education, allows traffic, limited risk reduction

3. Barriers

Lots of options, expensive, allows traffic, but not 100% effective.



4. Hydrologic separation

Re-established natural watershed, expensive, low maintenance, requires facilities for passage

Action	Risk Reduction	Cost	Passage
No Action	none	0	yes
Non-Structural	minimal	$	yes
Barrier	<100%	$$	yes
Hydro Separation	~100%	$$	alternative

Sportsmen against carp

- American Sportfishing Association
- Anglers of the Au Sable
- Antigo Chapter Trout Unlimited (WI)
- Austin Chapter 10 of the Izaak Walton League of America
- Backcountry Hunters and Anglers
- Bass Anglers Sportsman Society (B.A.S.S.)
- The Bass Federation of Michigan
- Bush Lake Chapter Izaak Walton League of America
- Cass County Chapter of the Minnesota Izaak Walton League of America
- Columbiana County Federation of Conservation Clubs (OH)
- Congressional Sportsmen's Foundation
- Conservation Federation of Missouri
- Ducks Unlimited
- Fly Fishers International
- Fishing League Worldwide
- Great Lakes Council of Fly Fishers International
- Hoosier Coho Club
- Indiana Wildlife Federation
- Iowa Wildlife Federation
- Izaak Walton League of America
- Lake Erie Charter Boat Association
- Marine Retailers of the Americas
- Michigan B.A.S.S. Nation
- Michigan Chapter, Backcountry Hunters and Anglers
- Michigan Steelhead and Salmon Fishermen's Association Federation
- Michigan Trout Unlimited
- Michigan United Conservation Clubs
- Minnesota Chapter, Backcountry Hunters and Anglers
- Minnesota Conservation Federation
- Minnesota Division Izaak Walton League of America
- Minnesota Trout Unlimited
- Montmorency County Conservation Club (MI)
- National Professional Anglers Association
- National Wildlife Federation
- New York Trout Unlimited
- Northwest Indiana Steelheaders
- Northwest Sportfishing Industry Association
- Ohio B.A.S.S. Nation
- Ohio Conservation Federation
- Ohio Council of Trout Unlimited
- Owatana Chapter of Izaak Walton League of American (MN)
- Pennsylvania Council of Trout Unlimited
- Silvertip Productions (Ohio)
- Trout Unlimited
- W.J. McCabe (Duluth) Chapter of the Izaak Walton League of America
- Wabasha Chapter, MN Division, Izaak Walton League of America
- Wild Rivers Chapter, Trout Unlimited (WI)
- Wisconsin Chapter, Backcountry Hunters and Anglers
- Wisconsin Trout Unlimited
- Wisconsin Wildlife

Reimagine the Canals

- Identify potential new uses for the Erie Canal aimed at improving the quality of life for New Yorkers
- Evaluate how the Erie Canal can support and enhance economic development along the canal corridor
- Find new opportunities to enhance recreation and tourism along the Erie Canal
- Assess how the Erie Canal can help mitigate impacts from flooding and ice jams to **improve resiliency and restore ecosystems in canal communities**
- Identify opportunities for using Erie Canal infrastructure to expand irrigation for Western New York farms

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Summary

Invasives have caused significant ecological and economic harm. Some degree of future damage is probably unavoidable.

Asian carp could be a very damaging and expensive problem.

More invaders will appear – some predicted, others as surprises.

Prevention is far cheaper than management once established.

Thank You

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Aquatic Invasive Species in New York State

Fish and Wildlife Management Board Meeting
White Eagle, Hamilton, New York
September 17, 2019

Overview

- IS Comprehensive Management Plan
- AIS Management Plan
  - Prevention
  - Early Detection
  - Control and Management
  - Research
- Regional Efforts
- Resources

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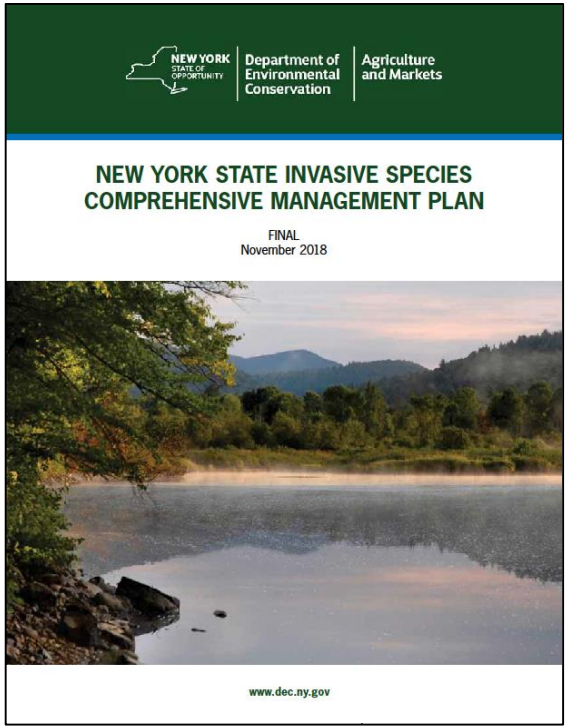
Invasive Species Comprehensive Management Plan

Focal Initiatives

- Continue to build partnerships and capacity
- Commit to a centralized framework
- Set priorities for IS management and advance preparedness
- Engage and inform the public
- Advance prevention and early detection
- Improve response to IS
- Recover Ecosystem Resilience
- Evaluate Success



Aquatic Invasive Species Management Plan: Focus on Prevention

Highest priority

- Expand coverage of boat steward programs and ensure consistency of these programs statewide.

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Watercraft Inspection Steward Program (WISP)

Expanded Coverage in 2019

Coverage at more than 250 locations across NY

- Increased coverage on the Hudson River and Mohawk River (Over 20 new sites)
- Increased coverage in the Catskills (Over 20 new sites)

J. Clayton, NYSDEC

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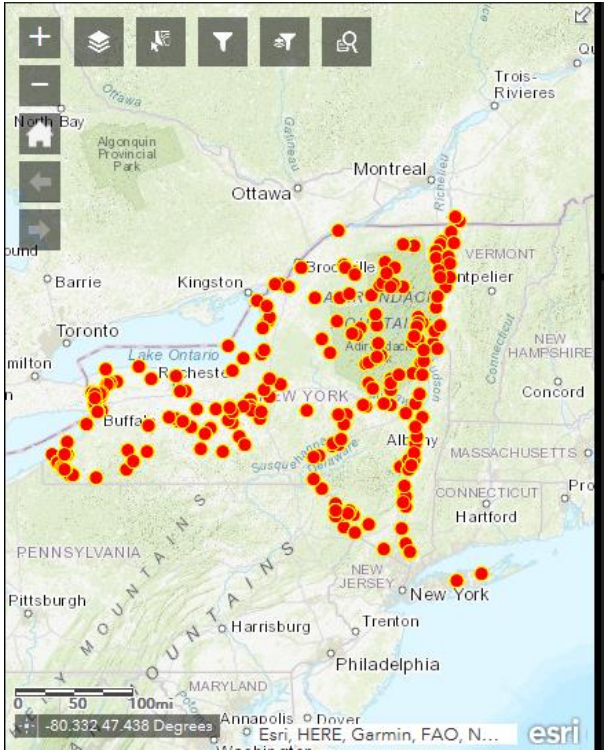
Watercraft Inspection Steward Program (WISP)



- Full scale boat steward programs for Western NY PRISM, St. Lawrence-Eastern Lake Ontario PRISM, and Finger Lakes PRISM
- Expansion of the ADK boat steward program (39 locations+)
- Standardized data collection software and statewide database

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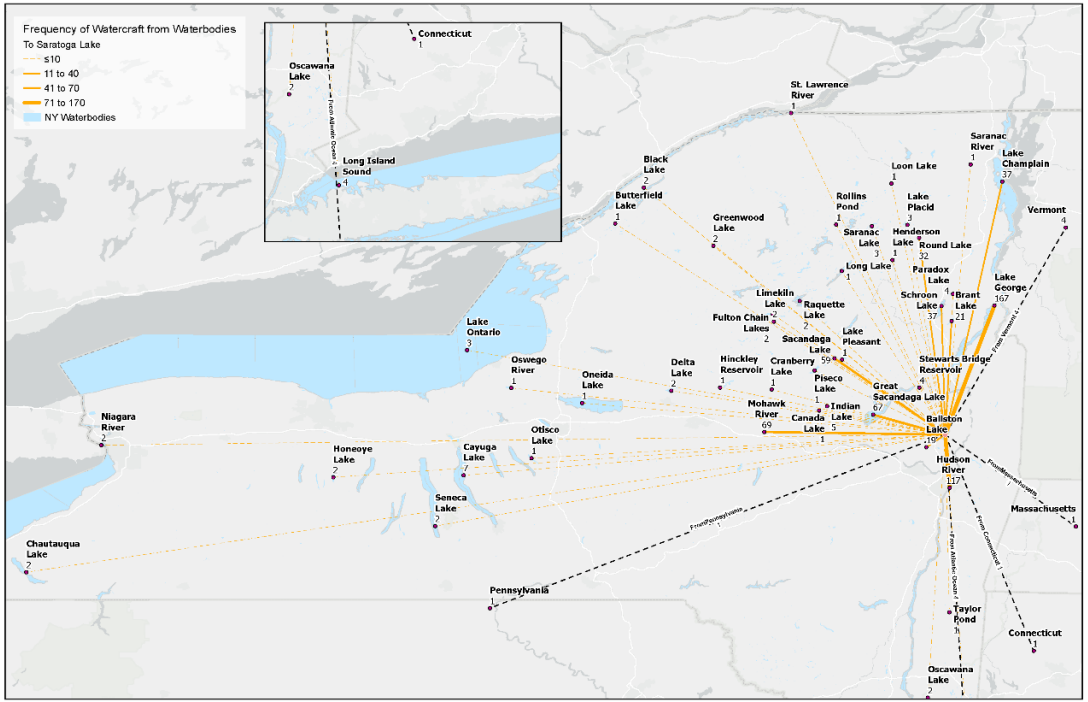
Data standardization and centralized database: Watercraft Inspection Steward Program Application or WISPA

- OPRHP, NYSDEC, and New York Natural Heritage Program (NYNHP) collaboration
- Core of standardized questions asked by stewards across the state

WISPA

WISPA Data Analysis: “Spider” Maps



Visualization of the waterbodies boaters reported as last visiting.

Helps us to understand what lakes are connected and what lakes are most “at risk”

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Detection: WISPA Data Analysis

"Hits" Analysis

- Opportunity to join iMapInvasives data to WISPA data

- Highlights areas in which aquatic invasive species are potentially under-reported in New York State

WISPA Data Results 2019

As of September 6, 2019

- 232,244 records collected
- 11,442 records with organisms detected

- Top species detected
  1. Native eel Grass/Water Celery (*Vallisneria americana*)
  2. Eurasian Watermilfoil (*Myriophyllum spicatum*)
  3. Native pondweed (*Potamogeton* spp.)
  4. Curly Leaf Pondweed (*Potamogeton crispus*)
  5. Native Elodea (*Elodea* spp.)

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Early Detection (sometimes)

- Aquatic plant monitoring:
  - Hudson River (2017-2021)
  - Mohawk River (2020-2022)
  - Finger Lakes (2018-2021)

- Chestnut Chasers
- Hydrilla Hunters
- Chinese mitten crab network (Hudson River/ Smithsonian Environmental Research Center)
- PRISM AIS Programs

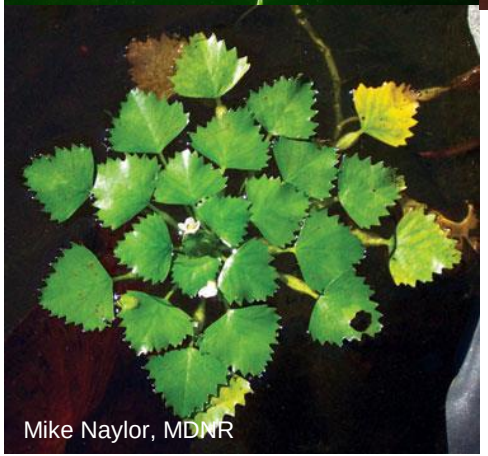
newyorkhistoryblog.org

Early Detection:

- ADK backcountry monitoring
- Citizen Statewide Lake Assessment Program (CSLAP)
- Water Assessments by Volunteer Evaluators (WAVE)


Scott Brown


Emily DeBolt


Mike Naylor, MDNR

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Control and Management

- Case by case basis
- NYSDEC rapid response policy guidelines
- Species and region determine response team
- Resource dependent

Control and Management: Large scale hydrilla infestations

USACE with partners

Cayuga Lake (2011-present): Tompkins County and Cayuga County

Buffalo area (2012-present): Tonawanda Creek/Erie Canal (Niagara and Erie Counties)

DEC with partners

Croton-on-Hudson (2017-present): Croton River and Bay (Westchester County)

Spencer Pond/Little Nanticoke Creek/Kuhlman Pond (2016-present) (Tioga County)

Research

Biocontrol

- Water chestnut

- Phragmites

(Bernd Blossey lab, Cornell University)

Allegan Conservation District

Statewide Invasive Species Grants

2016- AIS Spread Prevention (stewards, wash stations, training) $2.2M

2017- Invasive Species Rapid Response and Control (terrestrial and aquatic species) $1.9M

Statewide Invasive Species Grants

2019- Invasive Species Grants
($2.8M)

- AIS Spread Prevention
- Lake Management Plan
- Control and Management
- Research

www.newsday.com

https://www.dec.ny.gov/animals/115742.html

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Research: NYSDEC eDNA lab

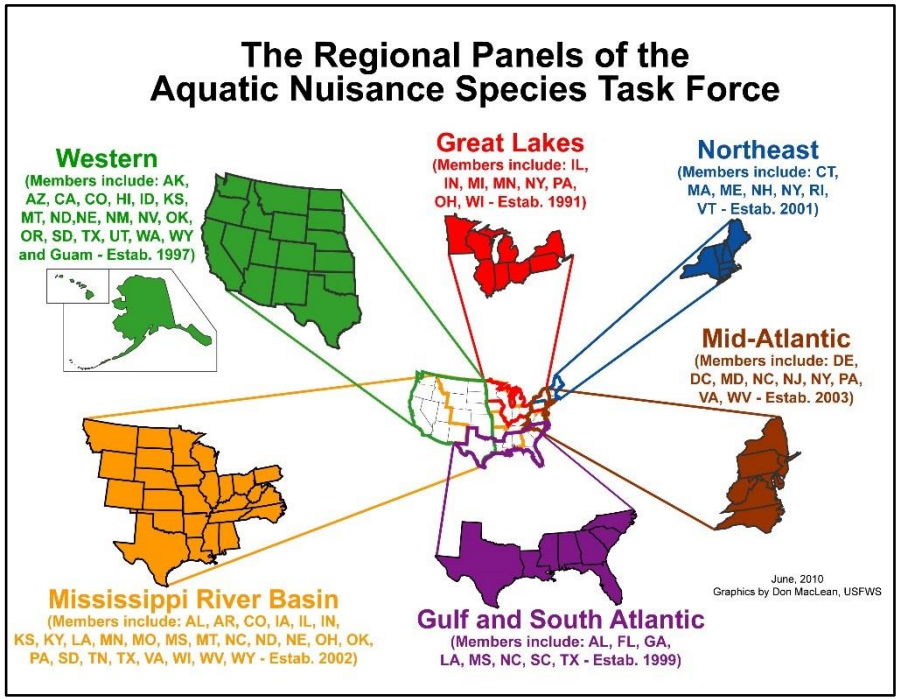
- Research Scientist – Steven Pearson

- Set up and manage lab
  - Single species-focus
  - Early detection potential (guidance for monitoring efforts)

Regional AIS Efforts

Federal Aquatic Nuisance Species Task Force

- **Northeast Aquatic Nuisance Species Panel** (ME, NH, VT, MA, CT, RI, NY)
- **Great Lakes ANS Panel** (MI, IL, IN, MN, WI, NY, OH, Ontario)
- **Mid-Atlantic AIS Panel** (DE, DC, MD, NC, NJ, PA, VA, WV)



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Regional AIS Efforts: NEANS Panel

Hydrilla in the CT River

- Delineation
- Education and outreach
- Genetic testing
- Control?
- **Our spider maps demonstrate a connection to our lakes!**

Regional AIS Efforts: Great Lakes ANS Panel

- Regional Landing Blitz at boat launches week of June 28th

- Early Detection Surveillance at Buffalo Harbor, Irondequoit Bay, and Oswego River

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Resources

NYSDEC website

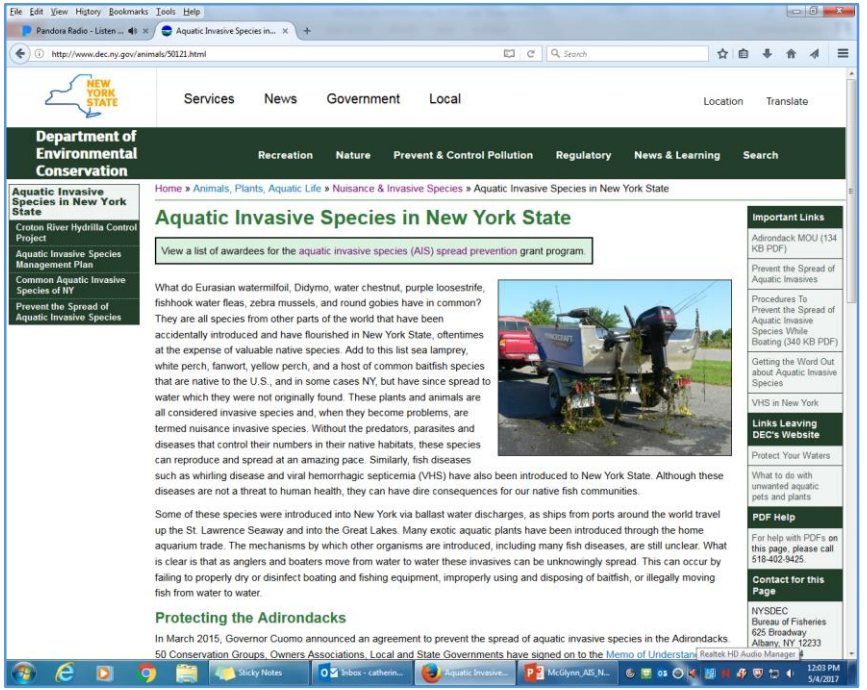
http://www.dec.ny.gov/:

Nature

Invasive Species

Aquatic Invasive Species in NYS

Invasive Species Regulations



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Thank you!


J. Clayton, NYSDEC

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