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)
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
Adult bucks = 55% CWD+

Adult does = 35%
CWD Prevalence: Male WTD in WI
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

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

29 participating taxidermists submitted 636 deer
<5% of samples collected by taxidermists are unsuitable
Interagency Risk Minimization Plan


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

- No captive WTD facilities (12 states)
- Live import prohibited (15 states)
- Live Import prohibited (CWD-positive states or areas only) (8 states)
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.
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
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
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

-3.5 -2.5 -1.5 -0.5 0.5 1.5 2.5 3.5

Bad
Undesirable
Negative
Unfavorable
Foolish
Unnecessary

Good
Desirable
Positive
Favorable
Wise
Necessary
We’re all in this boat together....
Deer urine-based lures have limited effectiveness.
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

<table>
<thead>
<tr>
<th></th>
<th>WILD DEER (2011)</th>
<th>CAPTIVE CERVIDS (2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct sales:</td>
<td>$30.2M</td>
<td>$5.1M</td>
</tr>
<tr>
<td>Indirect Sales:</td>
<td>$1,475.6M</td>
<td>$8.4M</td>
</tr>
<tr>
<td>Total:</td>
<td>$1.5B</td>
<td>$13.5M</td>
</tr>
</tbody>
</table>
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

Functionally extirpated (by mid-1900s)
Brief history of otter in NY State

Northern zone: harvested
Southern zone: harvested
Recovery zone: closed to harvest
Regions 1 & 2: closed to harvest

- 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
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%)

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)

Probability of otter occurrence

Road density (km/5 km²)
Model predictions

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

Habitat suitability

- Low
- Intermediate
- High

Camera traps

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

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

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:
  \[ \hat{p} = \frac{5}{8} = 0.63 \]

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

<table>
<thead>
<tr>
<th>Site #</th>
<th>Survey 1</th>
<th>Survey 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>X</td>
<td></td>
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<tr>
<td>5</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td></td>
<td>X</td>
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<tr>
<td>8</td>
<td>X</td>
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<td>9</td>
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</tr>
<tr>
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</tr>
<tr>
<td>14</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Habitat Occupancy

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

**Naïve** estimate of occupancy probability: \( \frac{8}{15} = 0.53 \) (53.3%)  

**Corrected** estimate of occupancy probability = \( \frac{8}{0.63} / 15 = 12.7 / 15 = 0.84 \) (84%)
Region 9 Surveys

- 159 sites
- 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

Survey Period

<table>
<thead>
<tr>
<th>Year Range</th>
<th>Sites with otter sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002 - 2005</td>
<td>1</td>
</tr>
<tr>
<td>2006 - 2010</td>
<td>2</td>
</tr>
<tr>
<td>2011 - 2015</td>
<td>3</td>
</tr>
</tbody>
</table>

Solution

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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Naïve occupancy</td>
<td>0.06</td>
<td>0.14</td>
<td>0.25</td>
</tr>
<tr>
<td>Corrected mean (95% CI)</td>
<td>(0.04-0.61)</td>
<td>(0.02-0.26)</td>
<td>(0.21-0.45)</td>
</tr>
</tbody>
</table>

Photo credit: NYS DEC
Sites with otter sign

2002 – 2005
2006 – 2010
2011 - 2015

Survey

Naïve occupancy
Corrected mean (95% CI)

Road density
low
high

Shoreline density
low
high

Predicted probability of use
Low
High
(<0.10)
(>0.50)
Sites with otter sign

Probability of site colonization

<table>
<thead>
<tr>
<th></th>
<th>Probability</th>
<th>Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002 – 2005</td>
<td>0.05</td>
<td>(0.00-0.20)</td>
</tr>
<tr>
<td>2006 – 2010</td>
<td>0.23</td>
<td>(0.12-0.34)</td>
</tr>
<tr>
<td>2011 – 2015</td>
<td>0.66</td>
<td>(0.04-0.61)</td>
</tr>
<tr>
<td>2016 – 2015</td>
<td>0.05</td>
<td>(0.02-0.26)</td>
</tr>
</tbody>
</table>

Probability of site extinction

- 2002 – 2005: 0.05 (0.00-0.20)
- 2006 – 2010: 0.23 (0.12-0.34)
- 2011 – 2015: 0.66 (0.04-0.61)
- 2016 – 2015: 0.05 (0.02-0.26)

Survey

Photo credit: Elaina Burns
<table>
<thead>
<tr>
<th>Survey</th>
<th>Newly colonized sites</th>
<th>Previously used sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002 – 2005</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>2006 – 2010</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>2011 - 2015</td>
<td>30</td>
<td>10</td>
</tr>
</tbody>
</table>

**Probability of site colonization**
- 0.05 (0.00-0.20)
- 0.66 (0.04-0.61)

**Probability of site extinction**
- 0.23 (0.12-0.34)
- 0.05 (0.02-0.26)
Mean $\lambda$

(Occupancy-derived estimate of population growth)

0.66
(-0.92-2.24)

2.65
(0.28-5.03)

~42% increase

Newly colonized sites
Previously used sites

Survey

Count of sites

Alternative approach

Sites with otter sign

Survey

2013 2014 2015

Space-for-time substitution
Alternative approach

Solution

- Sites as replicate surveys within a block
- 1-8 reps/block
- Averaged covariates across sites within a block
## Best model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of Occupancy</td>
<td>Shoreline density (+)</td>
</tr>
<tr>
<td></td>
<td>Road density (-)</td>
</tr>
<tr>
<td>Probability of Colonization</td>
<td>0.00 (0.00-0.00)</td>
</tr>
<tr>
<td>Probability of Extinction</td>
<td>0.02 (0.00-0.26)</td>
</tr>
<tr>
<td>Estimated growth ($\lambda$)</td>
<td>0.98 (0.74-1.22)</td>
</tr>
</tbody>
</table>

**Habitat saturation**
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

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

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of assigned survey blocks</th>
<th>Percent of blocks surveyed at least once (# blocks)</th>
<th>Percent of blocks with ≥4 replicate surveys (# blocks)</th>
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<tr>
<td>9</td>
<td>59</td>
<td>92% (54)</td>
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<td>61</td>
<td>100% (61)</td>
<td>84% (51)</td>
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<td>10% (5)</td>
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<tr>
<td>4</td>
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<td>45</td>
<td>80% (36)</td>
<td>17% (6)</td>
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<tr>
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<td>20</td>
<td>90% (18)</td>
<td>89% (16)</td>
</tr>
<tr>
<td>Totals</td>
<td>323</td>
<td>90% (290)</td>
<td>48% (138)</td>
</tr>
</tbody>
</table>

*Spread too thin*
How might we scale back?

Cumulative proportion of blocks where otter detected

Target 4 surveys / block

Percentage of otter detections

Keep 400-m search

Number of surveys / block

Segment searched

Cumulative proportion of blocks where otter detected

Target 4 surveys / block

Percentage of otter detections

Keep 400-m search
## Survey design and effort

### Winter 2016-17 surveys

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### Winter 2017-18 surveys

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</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>37</td>
<td>100% (37)</td>
<td>100% (37)</td>
</tr>
<tr>
<td>8</td>
<td>41</td>
<td>102% (42)</td>
<td>93% (38)</td>
</tr>
<tr>
<td>7</td>
<td>38</td>
<td>102% (39)</td>
<td>102% (39)</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>89% (8)</td>
<td>88% (7)</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
<td>100% (11)</td>
<td>100% (11)</td>
</tr>
<tr>
<td>4</td>
<td>36</td>
<td>100% (36)</td>
<td>97% (35)</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>78% (21)</td>
<td>5% (1)</td>
</tr>
<tr>
<td>1-2</td>
<td>15</td>
<td>100% (15)</td>
<td>100% (15)</td>
</tr>
<tr>
<td>Totals</td>
<td>214</td>
<td>98% (209)</td>
<td>86% (183)</td>
</tr>
</tbody>
</table>

Percent change over previous year:
- Winter 2016-17: -34%
- Winter 2017-18: +9% +79%
2017-18 Survey Returns

- Survey location
- Otter sign detected
Detecting otter with certainty

Independent photo validation

<table>
<thead>
<tr>
<th>Field crew call regarding otter sign</th>
<th>Photo review call</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Otter – yes</td>
</tr>
<tr>
<td>Certain</td>
<td>88.6</td>
</tr>
<tr>
<td>More certain than not</td>
<td>59.5</td>
</tr>
<tr>
<td>Doubtful</td>
<td>37.5</td>
</tr>
<tr>
<td>No</td>
<td>16.4</td>
</tr>
</tbody>
</table>
Detecting otter with certainty

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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Otter – yes</td>
<td>Otter – no</td>
<td>Collapsed categories</td>
<td>Overall percent agreement</td>
</tr>
<tr>
<td>Certain</td>
<td>88.6</td>
<td>11.4</td>
<td>Otter detection</td>
<td>78.5</td>
</tr>
<tr>
<td>More certain than not</td>
<td>59.5</td>
<td>40.5</td>
<td>No detection</td>
<td>77.6</td>
</tr>
<tr>
<td>Doubtful</td>
<td>37.5</td>
<td>62.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>16.4</td>
<td>83.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Time (distance)-to-detection model

Shoreline

400 m

94 m

270 m
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

<table>
<thead>
<tr>
<th>Detection probability</th>
<th>Occupancy probability (use)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Days since last snow</strong></td>
<td><strong>Habitat type</strong></td>
</tr>
<tr>
<td>(&lt;1 day, 1-3 days, ≥3 days)</td>
<td>(lake, pond, marsh, stream, river)</td>
</tr>
<tr>
<td><strong>Tracking conditions</strong></td>
<td><strong>Shoreline habitat</strong></td>
</tr>
<tr>
<td>(poor, fair, excellent)</td>
<td>(1-, 5-, or 10-km radius)</td>
</tr>
<tr>
<td>Bank access</td>
<td><strong>Percent forest</strong></td>
</tr>
<tr>
<td>(&lt;50%, 50-90%, &gt;90%)</td>
<td>(1-, 5-, or 10-km radius)</td>
</tr>
<tr>
<td>Beaver detected</td>
<td><strong>Road density</strong></td>
</tr>
<tr>
<td>Muskrat detected</td>
<td><strong>Beaver detected</strong></td>
</tr>
<tr>
<td>Random effect: DEC Region</td>
<td>Elevation</td>
</tr>
<tr>
<td>(survey team)</td>
<td>Percent slope</td>
</tr>
<tr>
<td>Random effects: Block, WMUA</td>
<td></td>
</tr>
<tr>
<td>(survey design)</td>
<td></td>
</tr>
</tbody>
</table>
Predicted occupancy
Summary by WMU

Mean occupancy prediction

0.04 0.11 0.19 0.25 0.29

Recovery zone
Not different from southern zone
\( t = 1.31, \text{df} = 73, P = 0.09 \)

Northern zone (harvested)

Higher than SZ
\( t = 4.28, \text{df} = 34, P < 0.01 \)

Southern zone (harvested)

Regions 1 & 2
Lower than SZ
\( t = 6.66, \text{df} = 23, P < 0.01 \)
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
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

<table>
<thead>
<tr>
<th>Fund Type</th>
<th>(OPS)</th>
<th>(NPS)</th>
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<tbody>
<tr>
<td>General Fund</td>
<td>$304,100</td>
<td>$247,655</td>
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<tr>
<td>General Fund (DECALS)</td>
<td>$49,200</td>
<td>$3,870,400</td>
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<tr>
<td>Conservation Fund (main)</td>
<td>$1,703,700</td>
<td>$2,892,545</td>
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<tr>
<td>Conservation Fund (RAGTW)</td>
<td>$126,839</td>
<td>$235,156</td>
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<tr>
<td>Conservation Fund (venison donation)</td>
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<td>$4,000</td>
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<tr>
<td>Conservation Fund (migratory bird)</td>
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<td>$35,587</td>
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<tr>
<td>Hazardous Waste Remedial Fund</td>
<td></td>
<td>$10,600</td>
</tr>
</tbody>
</table>
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):**

<table>
<thead>
<tr>
<th>Region</th>
<th>-acre</th>
<th>-%</th>
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</thead>
<tbody>
<tr>
<td>Region 3</td>
<td>3,186</td>
<td>24%</td>
</tr>
<tr>
<td>Region 4</td>
<td>10,818</td>
<td>60%</td>
</tr>
<tr>
<td>Region 5</td>
<td>5,269</td>
<td>90%</td>
</tr>
<tr>
<td>Region 6</td>
<td>43,628</td>
<td>100%</td>
</tr>
<tr>
<td>Region 7</td>
<td>52,497</td>
<td>99%</td>
</tr>
<tr>
<td>Region 8</td>
<td>32,534</td>
<td>68%</td>
</tr>
<tr>
<td>Region 9</td>
<td>7,118</td>
<td>46%</td>
</tr>
</tbody>
</table>

**Total** (155,050) **(78%)**

Seed tree cut – Indian River WMA – R6
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
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
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

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

Commercial + Sport Fishing Costs = 408 Million $ \sim 80\% \text{ of Total}
Asian carp

Bighead carp

Grass carp

Black carp

Silver carp
Bigheaded carp
Hypophthalmichthys molitrix

- 1973 imported
- 1980 found in wild
Rapid growth (300 mm within 1st year)
Early maturation (~ 2 years)
Highly fecund (5 million eggs per year)
silver carp
phytoplankton
zooplankton
Pre-Asian carp

Post-Asian carp
• 1973 imported
• 1980 found in wild
Round goby
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1991

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2013

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2016

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2017

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The numbers show the total non-native and invasive species known to be present in each waterway as of September 2017.
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.
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.

$778 million
4. Hydrologic separation

Re-established natural watershed, expensive, low maintenance, requires facilities for passage
<table>
<thead>
<tr>
<th>Action</th>
<th>Risk Reduction</th>
<th>Cost</th>
<th>Passage</th>
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<tbody>
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<td>none</td>
<td>0</td>
<td>yes</td>
</tr>
<tr>
<td>Non-Structural</td>
<td>minimal</td>
<td>$</td>
<td>yes</td>
</tr>
<tr>
<td>Barrier</td>
<td>&lt;100%</td>
<td>$$</td>
<td>yes</td>
</tr>
<tr>
<td>Hydro Separation</td>
<td>~100%</td>
<td>$$</td>
<td>alternative</td>
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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
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
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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Overview

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

J. Clayton, NYSDEC
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
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
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 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”
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.*)
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)
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)
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

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

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

Nature
Invasive Species
Aquatic Invasive Species in NYS
Invasive Species Regulations
Thank you!

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