





**Determination of Home Range and Dispersal Patterns of Lake Sturgeon (*Acipenser fulvescens*) in the Upper Tennessee River System Using Acoustic Telemetry**



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**Roadmap**



- Background
- Research Objectives
- Methods
- Preliminary Results
- Future Research Plans



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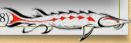
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**Background: Lake Sturgeon (*Acipenser fulvescens*)**

- Adult Size: Usually 4-6 feet, can reach over 8ft in length. Typically weigh 50-100 pounds but they can reach over 300 pounds.
- Typical Foods: Benthic feeder primarily mussels and snails but will eat a range of invertebrates, some fish, and some plant material.
- Range: Temperate freshwater fish ranging from Hudson By through Mississippi River drainage.
- Long Lived: "Living Fossils" approx. 140 million years old
- Age at Sexual Maturity: Males 8-14 years & Females 20-30 years
- Spawning: April to June in shallow areas with hard clean cobble to boulder sized substrate in swift current.



(U.S. Fish and Wildlife 2008)



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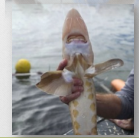
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### Background: Lake Sturgeon (*Acipenser fulvescens*)

- Cartilaginous skeleton
- Shark-like heterocercal tail
- 5 rows of scutes (2 belly, 1 dorsal, 2 on either side)
- Protractile sucker mouth with thick lips
- 4 barbels (whiskers) in front of mouth
- Coloration varies: Young: gray or brown with dark dorsal and lateral blotches. Adults: gray to yellowish green dorsally and white ventrally.




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### Background: The Decline

- Overfished
- Meat and Roe
- Environmental issues
- The 20th century drastic decline
- Threatened or endangered in 19 of the 20 states within the fish's original home range
- Slow sexual maturation + Overfishing and habitat loss=



Extirpation




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### Background: Upper Tennessee Lake Sturgeon Restoration Program

- The lake sturgeon reintroduction program is an interagency cooperative project initiated in 2000
- First sturgeon (embryos) acquired in 1998 from Wisconsin DNR from wild brood stock
- Since 2000, released 140,000+ into TN waters
- So what now?




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## Research Objectives

- Identify movement patterns and home ranges
- Classify vital habitat
  - Spawning sites
  - Summer refugia
  - Feeding grounds
- Identify barriers to migration



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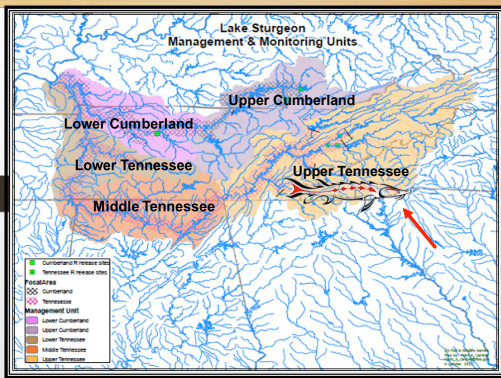
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## Methods

### Step 1: Putting out Vemco Receivers

- 21 Vemco VR2W 69 khz frequency Receivers cabled throughout upper Tennessee River System
- Lithium D Battery with approx. 15 month life

<http://vemco.com>



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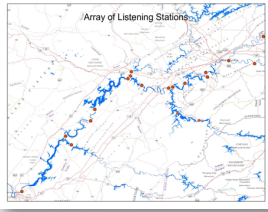
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### Vemco Acoustic Listening Array in the Upper Tennessee River System



VEMCO VR2W

- Locks/Dams
- Large tributaries



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### Methods

#### Step 2: Catch some fish...

- Fall Sample
  - Standard Trotline
    - 50 hooks
      - 300-400 ft. #48
      - Baited with cut buffalo
      - Anchor, floats



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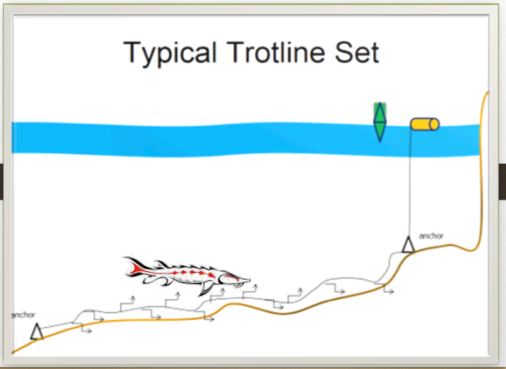
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### Typical Trotline Set



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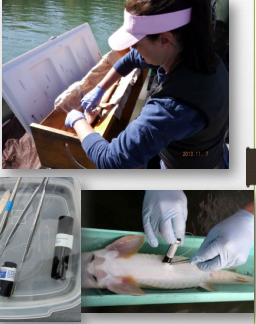
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**Methods**  
**Step 3: Surgically Implant Transmitters**

Implanted 42 transmitters  
Nov/Dec

- 3 transmitter sizes
  - 9 small V13-1X 11.0g.
  - 13 medium V16-4X 24.4g.
  - 16 large V16-6X 34.2g.
- Determine sexual maturity and gender



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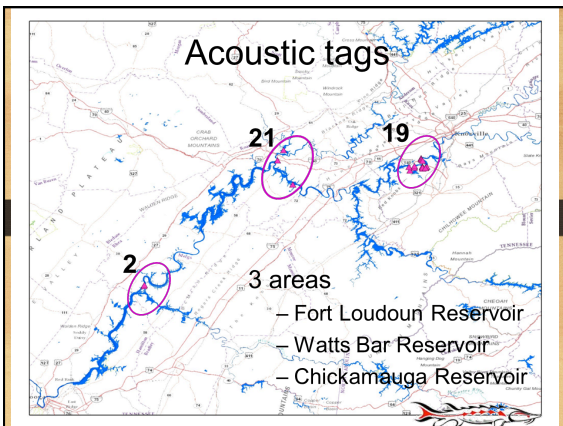
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### Preliminary Results

- Lengths ranged from 485-1245 mm
- Weights ranged from 0.5 - 8.4 kg
- Year classes 1999-2012 represented
- Tissue used for genetic analysis
- Distributed across >200 miles of river
- 21,3307 detections since November 2013
- Since November we have detected 34 of the 42 tagged fish

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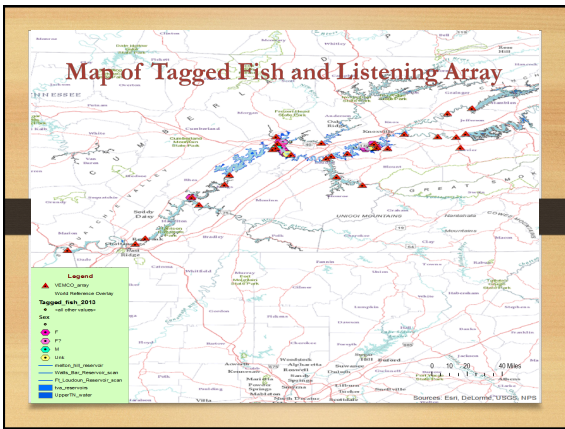
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The screenshot shows a software interface with a table of detections. The table has columns for Date, Time, Cahn Space ID, Transmitter, Station, and Date. The data rows show various detection events with specific dates and times.

Date	Time	Cahn Space ID	Transmitter	Station	Date
2014-05-12	19:32:14	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:34:25	489-9001	Maik_210m004	R0750	
2014-05-12	19:35:55	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:35:55	489-9001	Maik_210m004	R0750	
2014-05-12	19:36:47	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:37:40	489-9001	Maik_210m004	R0750	
2014-05-12	19:38:31	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:38:55	489-9001	Maik_210m004	R0750	
2014-05-12	19:40:39	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:41:49	489-9001	Maik_210m004	R0750	
2014-05-12	19:42:39	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:44:23	489-9001	Maik_210m004	R0750	
2014-05-12	19:44:23	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:44:56	489-9001	Maik_210m004	R0750	
2014-05-12	19:45:49	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:46:39	489-9001	Maik_210m004	R0750	
2014-05-12	19:50:14	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:51:39	489-9001	Maik_210m004	R0750	
2014-05-12	19:51:44	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:52:02	489-9001	Maik_210m004	R0750	
2014-05-12	19:52:57	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:53:07	489-9001	Maik_210m004	R0750	
2014-05-12	19:53:30	489-9001	Ferriak_210m004	R0750	
2014-05-12	19:58:43	489-9001	Maik_210m004	R0750	
2014-05-12	20:00:05	489-9001	Ferriak_210m004	R0750	

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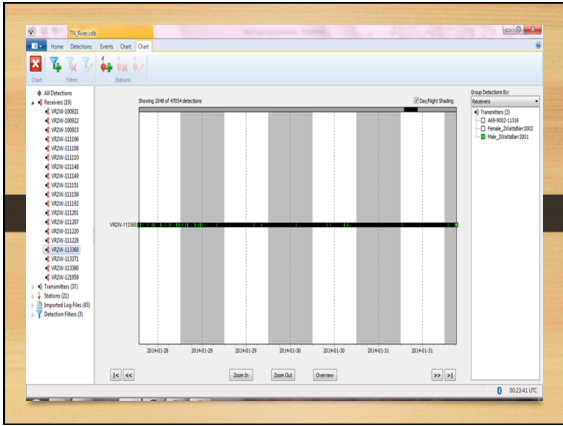
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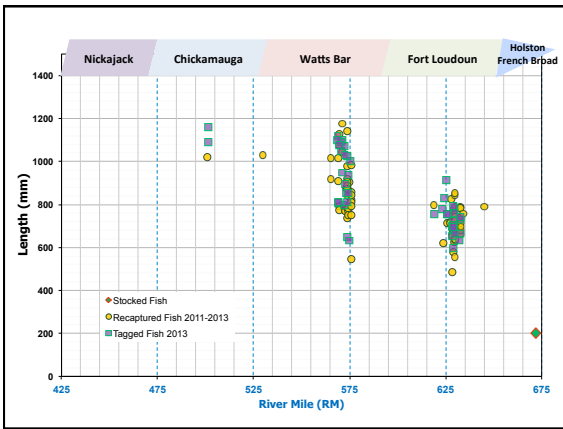
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### Future Research Plans

- Deploy more receivers in the listening array.
- Continue to collect monthly data from the receivers in the winter and fall seasons and then in the spring and summer collect bimonthly data to determine movement patterns and home range.
- After several months of data have been collected a habitat study will begin to determine habitat suitability
- Locate potential spawning grounds and monitor for Spring migration

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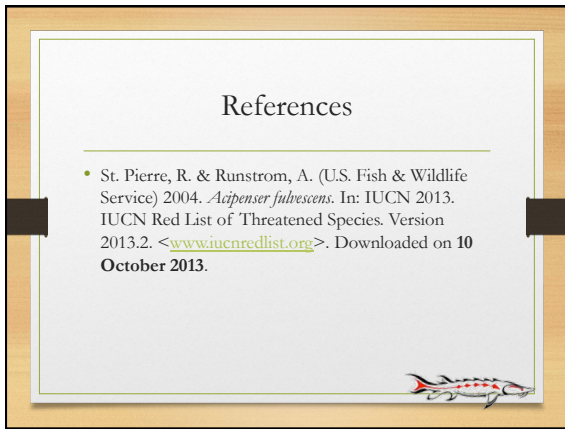
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