



Fish Movement in the St. Marys River: Potential Pathways for Invasive Species

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ICAIS April 10-14, 2016



Background

- Asian carp are the next potential invasive species of concern for the Great Lakes
 - Potential introduction methods include intentional live fish release
 - Breach of the Chicago electrical barriers into Lake Michigan
- Once in the Great Lakes, they will have access to sufficient food supplies and habitat in all lakes to successfully complete their life-cycle

Available Great Lakes Habitat

Models for Asian carp growth and survival have been developed (e.g. Kocovsky et al 2012):

- River length
- Temperature
- Velocity
- Wetland area for juvenile rearing

Modelling of Canadian Streams for Optimal Habitats include:

North shore L. Huron

St. Marys River

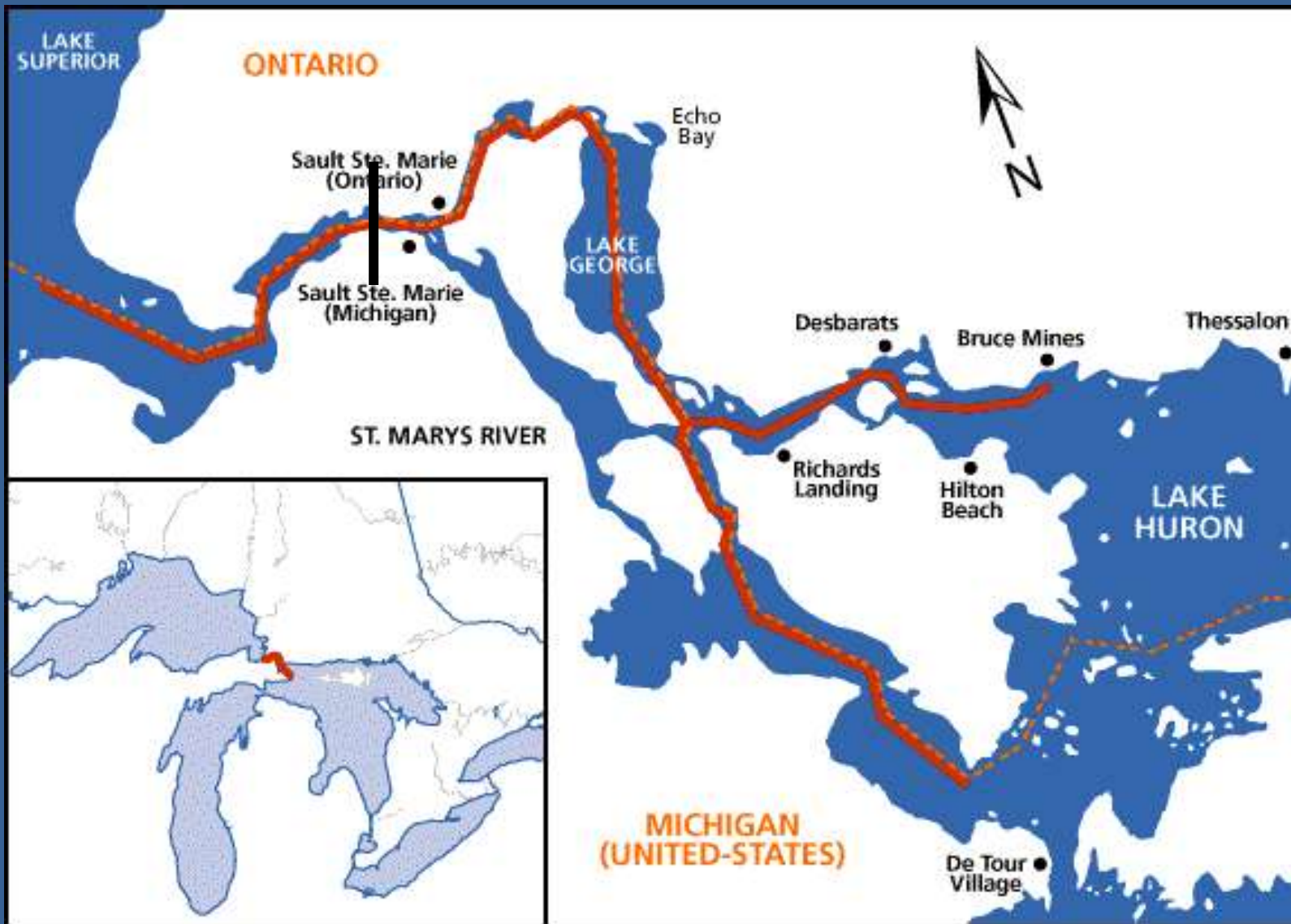
Lake Superior streams



Potential In Lake Movements

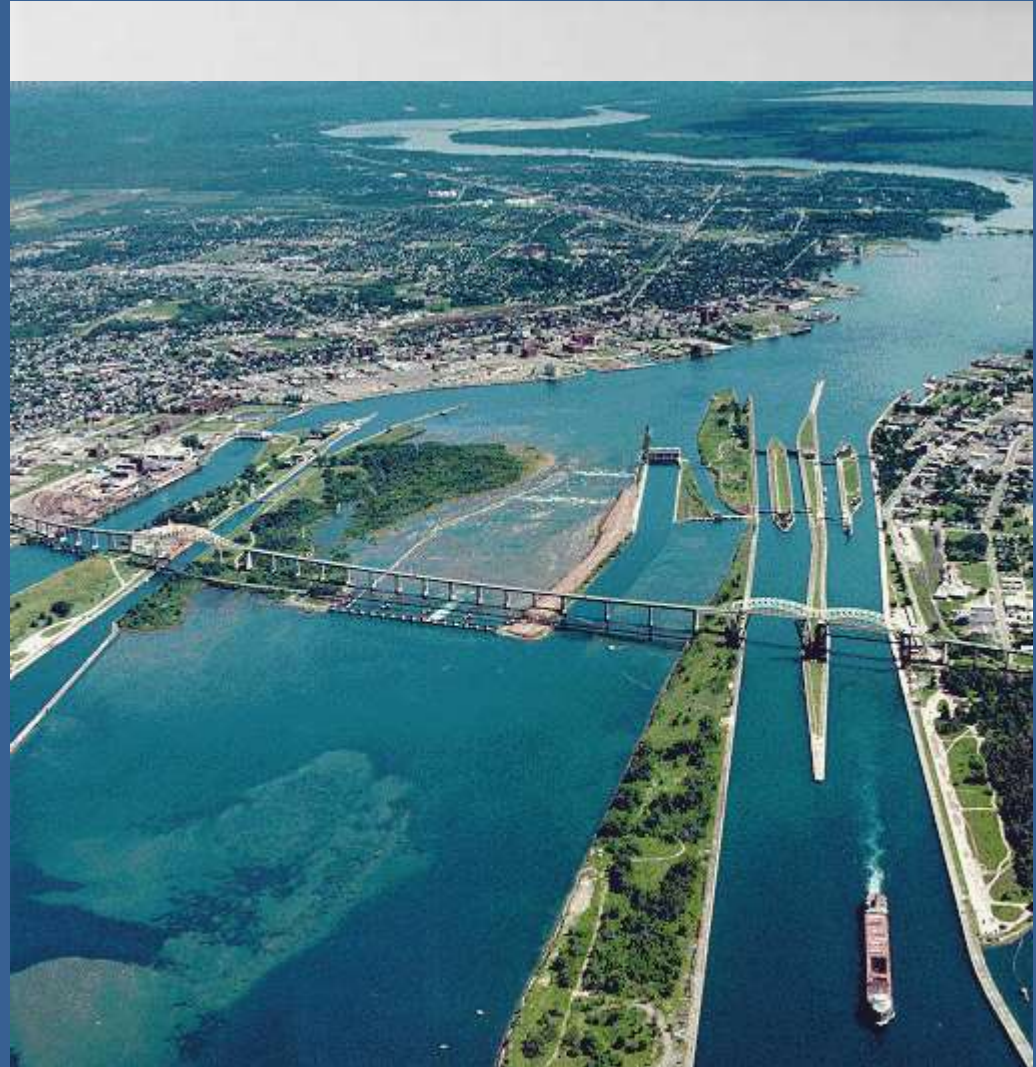


St Marys River

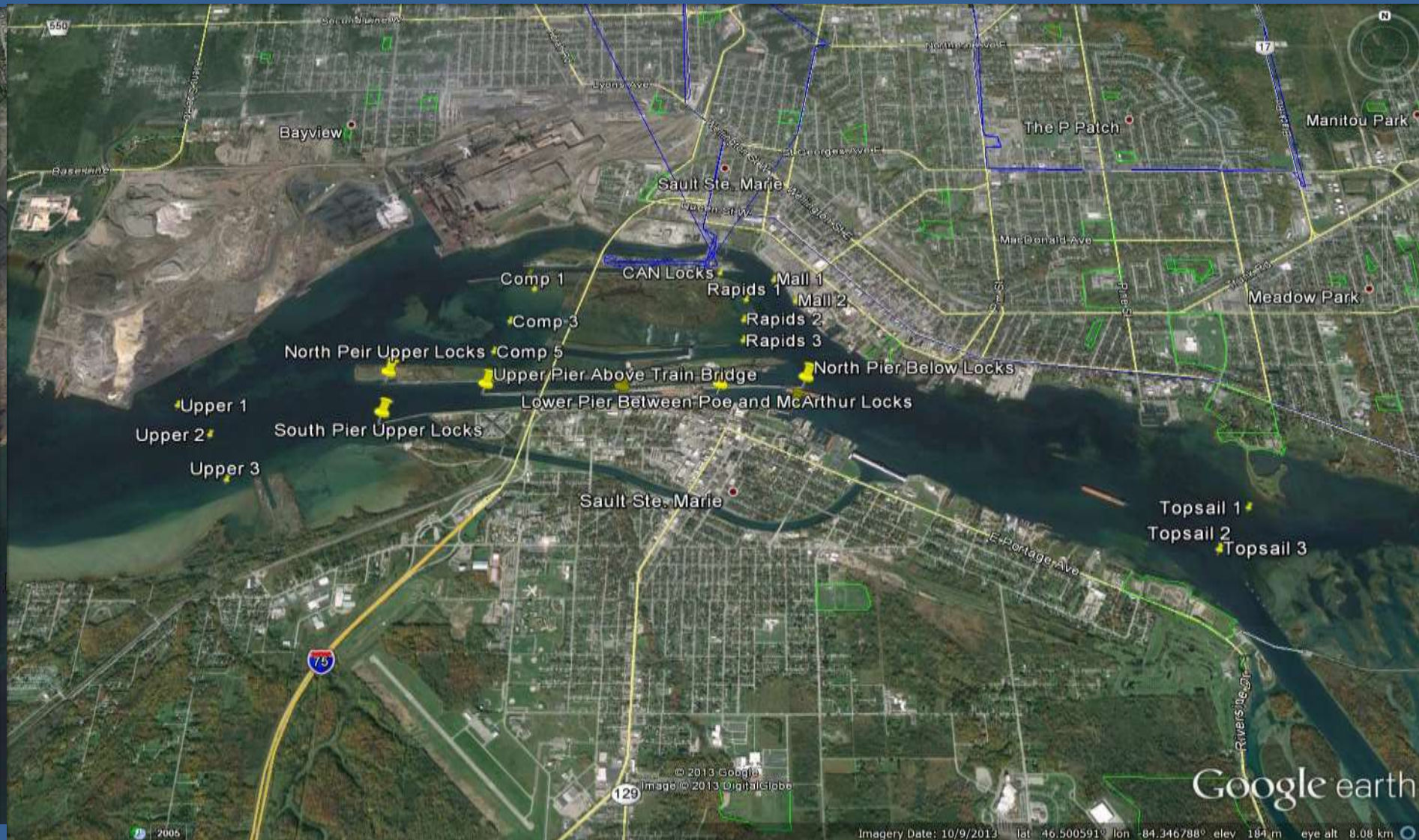


The St. Marys River

- Historically the river was a free flowing rapids
- Currently the river is divided by shipping locks, power dams, and a compensating works



How Do Fish Move Between the Lower and Upper St. Marys River?



St. Marys River Array

- VEMCO Hydrophone array
 - 2013: 28 VR2W receivers
 - 2014: 27 VR2W receivers
- Receivers set:
 - 2013: May 27-30
 - 2014: April 25 – June 23
- Receivers retrieved:
 - 2013: October 22-25 and November 8 and 15th
 - 2014: November 4-10 and December 10-17





Fish Tagging: V9 Tags



| Species | 2013 | 2014 |
|-----------------|------------|-----------|
| White Sucker | 62 | 3 |
| Northern Pike | 9 | |
| Smallmouth Bass | 3 | |
| Brown Bulhead | 1 | |
| Sea Lamprey | 25 | |
| Atlantic Salmon | 15 | 18 |
| Silver Redhorse | 7 | 1 |
| Freshwater Drum | 2 | 2 |
| Chinook Salmon | 2 | |
| Pink Salmon | 1 | |
| Walleye | 2 | |
| Total | 128 | 24 |

2013: Tagging in spring, summer and fall (trap net, sea lamprey trap, boat electrofishing); 2014: Tagging in fall only (boat electrofishing)

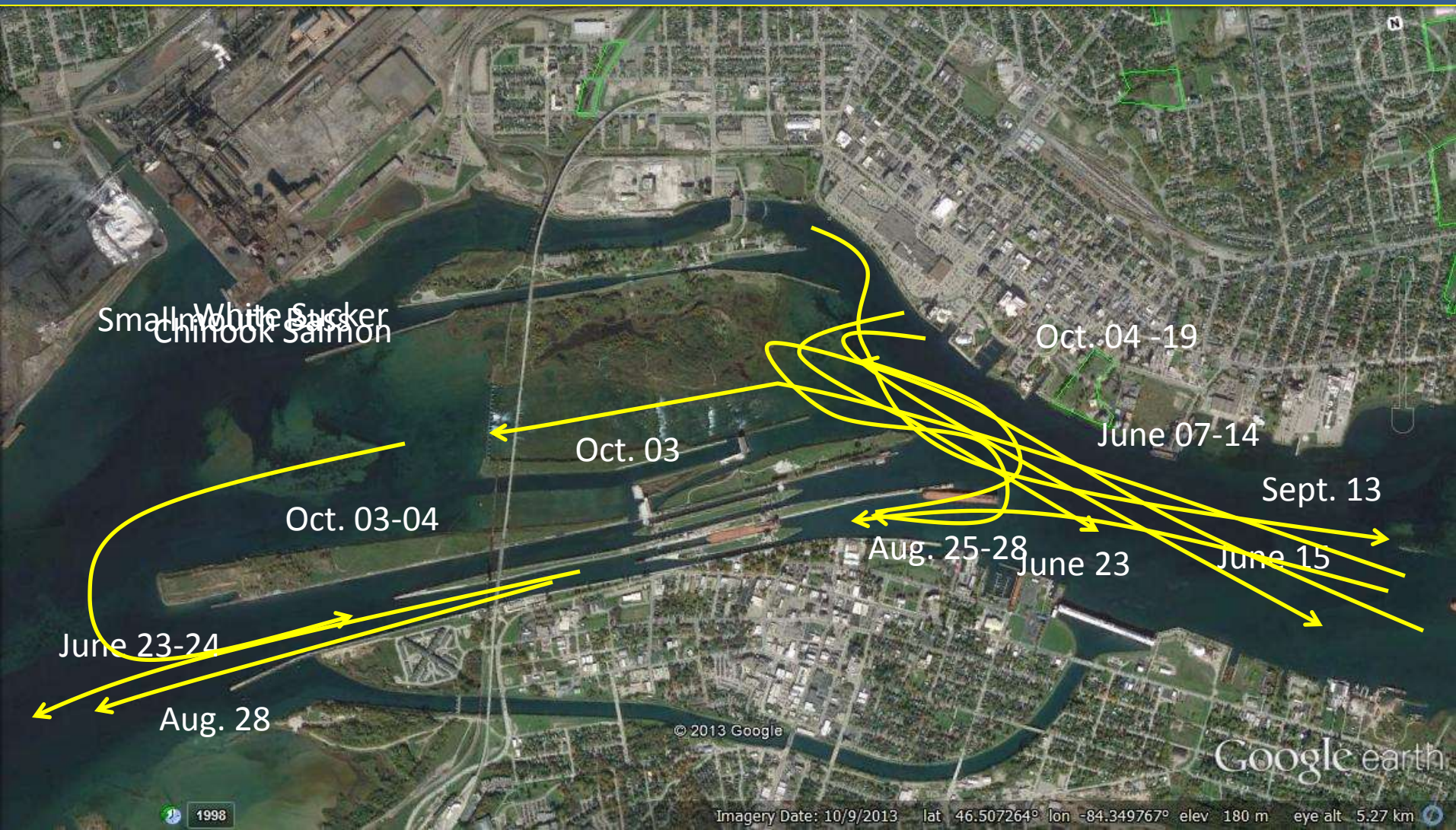
Fish Movement Results: 2013

- Total of 128 fish tagged, 11 species – all recorded on at least 1 receiver
- 5 fish were recorded moving from the lower to upper river
 - White sucker (2) – 1 CAN locks, 1 US locks
 - Smallmouth bass – US locks
 - Chinook salmon - through the Comp. Works
 - Atlantic salmon – through Whitefish channel?

Fish Movement Results: 2014

- Anticipated up to 91 fish tagging 2013 may still be alive in 2014.
- 51 were recorded moving on the receivers in 2014
- 24 new fish, 4 species tagged in 2014
- 3 fish were recorded moving from the lower to upper river
 - White sucker (1) – same fish that moved between basins in 2013 – CAN locks for both directions in 2014
 - Atlantic salmon (2) – US locks up for both

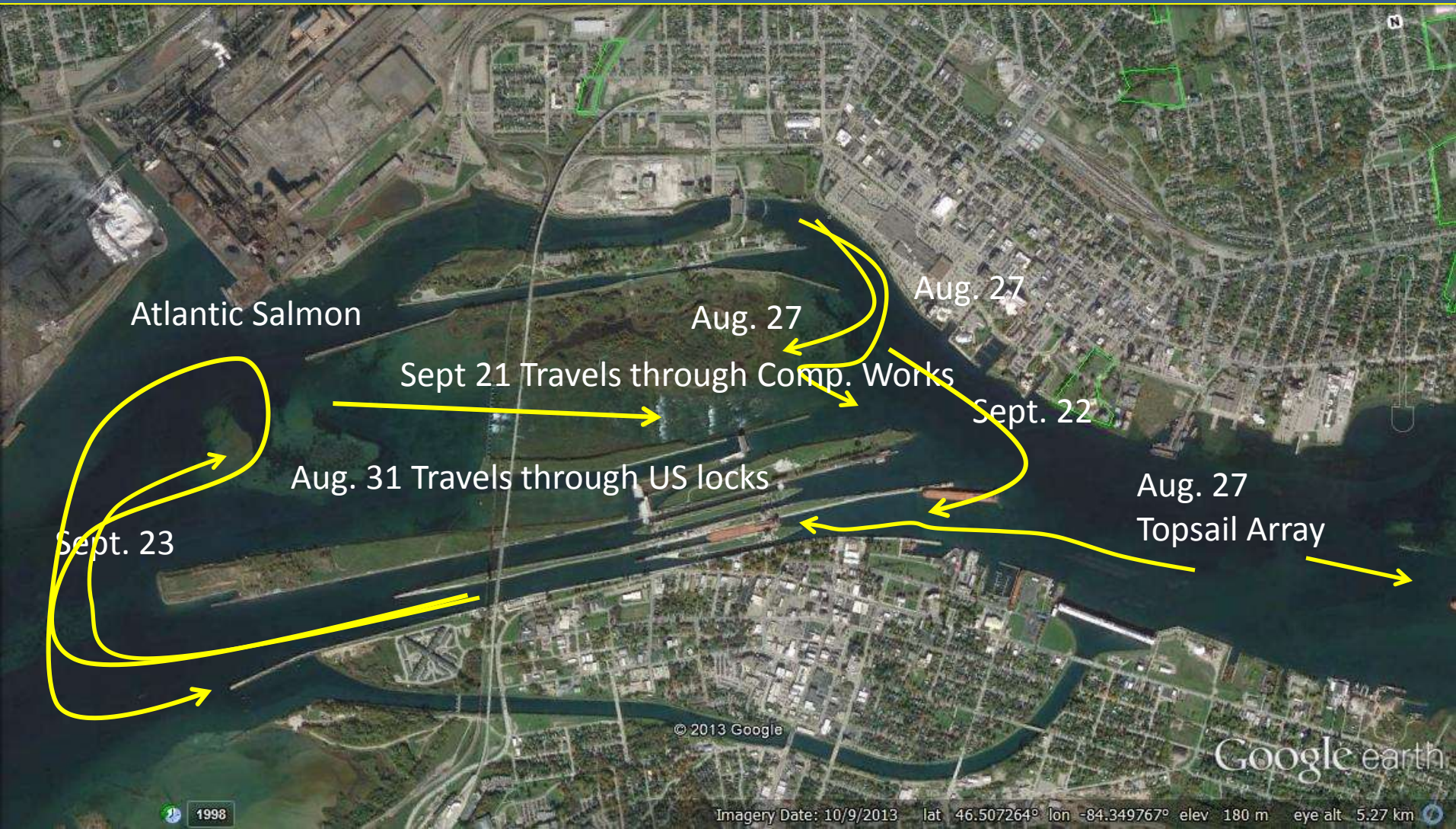
Fish Movements 2013



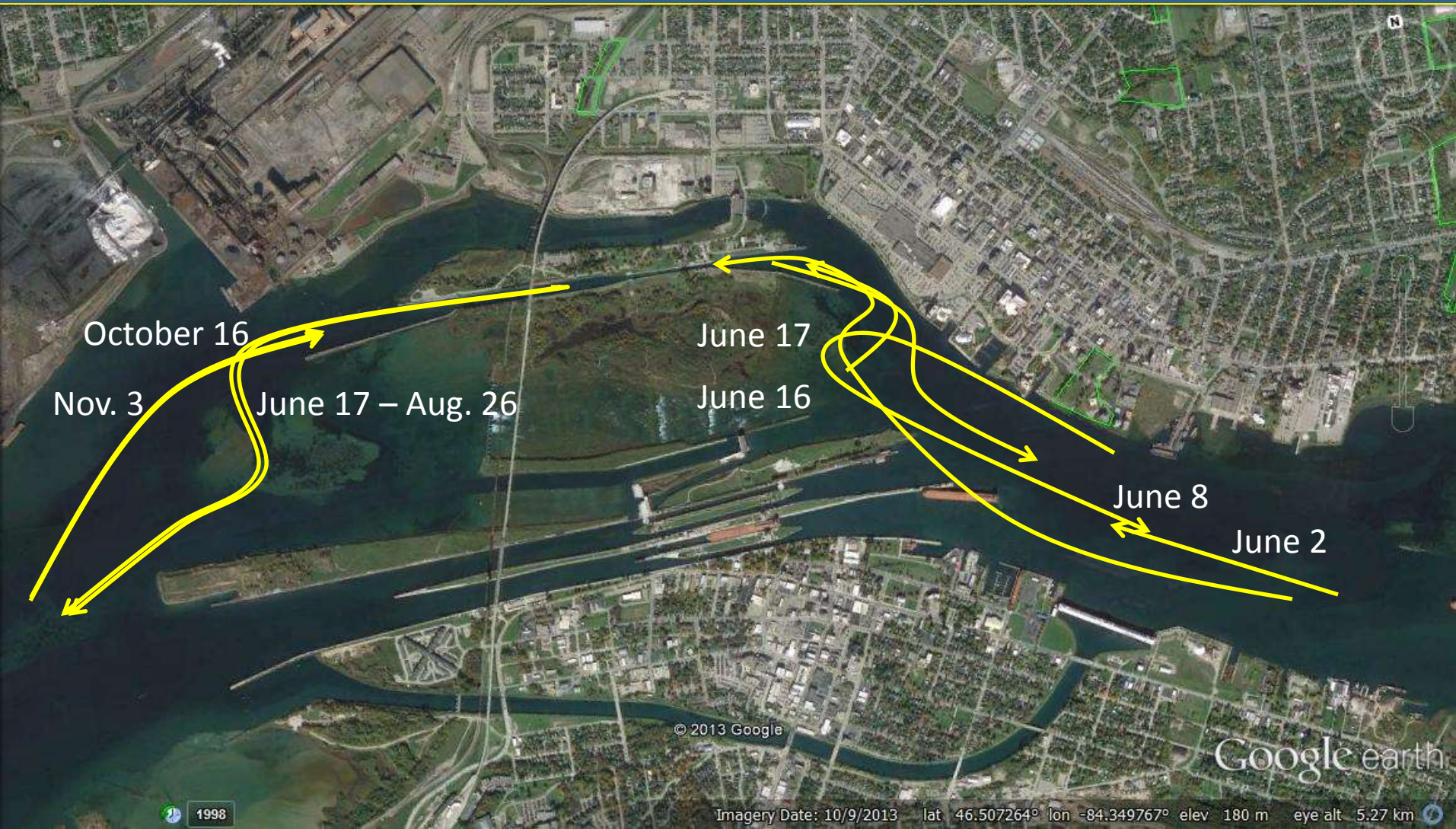
Fish Movements 2013



Fish Movements 2014



White Sucker Movements 2013-2014



Conclusions

- **Fish use many avenues in the St. Marys River to move both up and down river:**
 - US and CAN locks
 - Compensation Works
 - Whitefish Island Channel
- **Multiple fish species will move between basins:**
 - White sucker, smallmouth bass, chinook and Atlantic salmon
- **Given the multiple avenues for movement up and downstream in the St. Marys River, there are limited possible locations for blocking AIS movement**

Questions?