

REPORT TO THE MARINERS' WORKSHOP

Great Lakes and Seaway

January 29, 2020

Overview

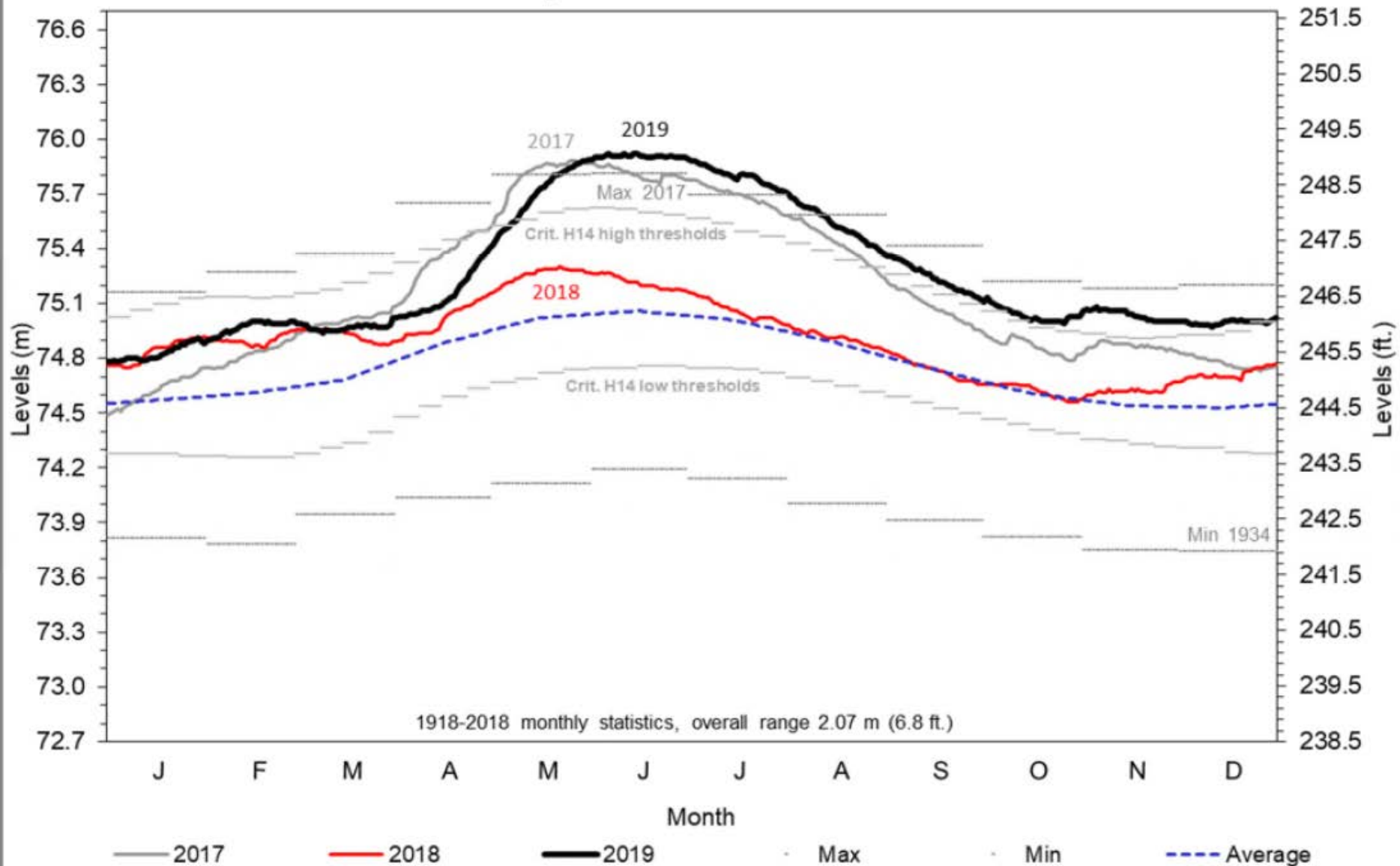
- High Water Levels.
- Seaway Related Technologies.
- Virtual and Synthetic AtoNs.
- Great Lakes vessel projects related to automated navigation assistance.

High Water Levels

- Impacted all five (5) Great Lakes – record highs.
- Navigational challenges.
- Shoreline damage and to system infrastructure.
- Continuation into 2020.

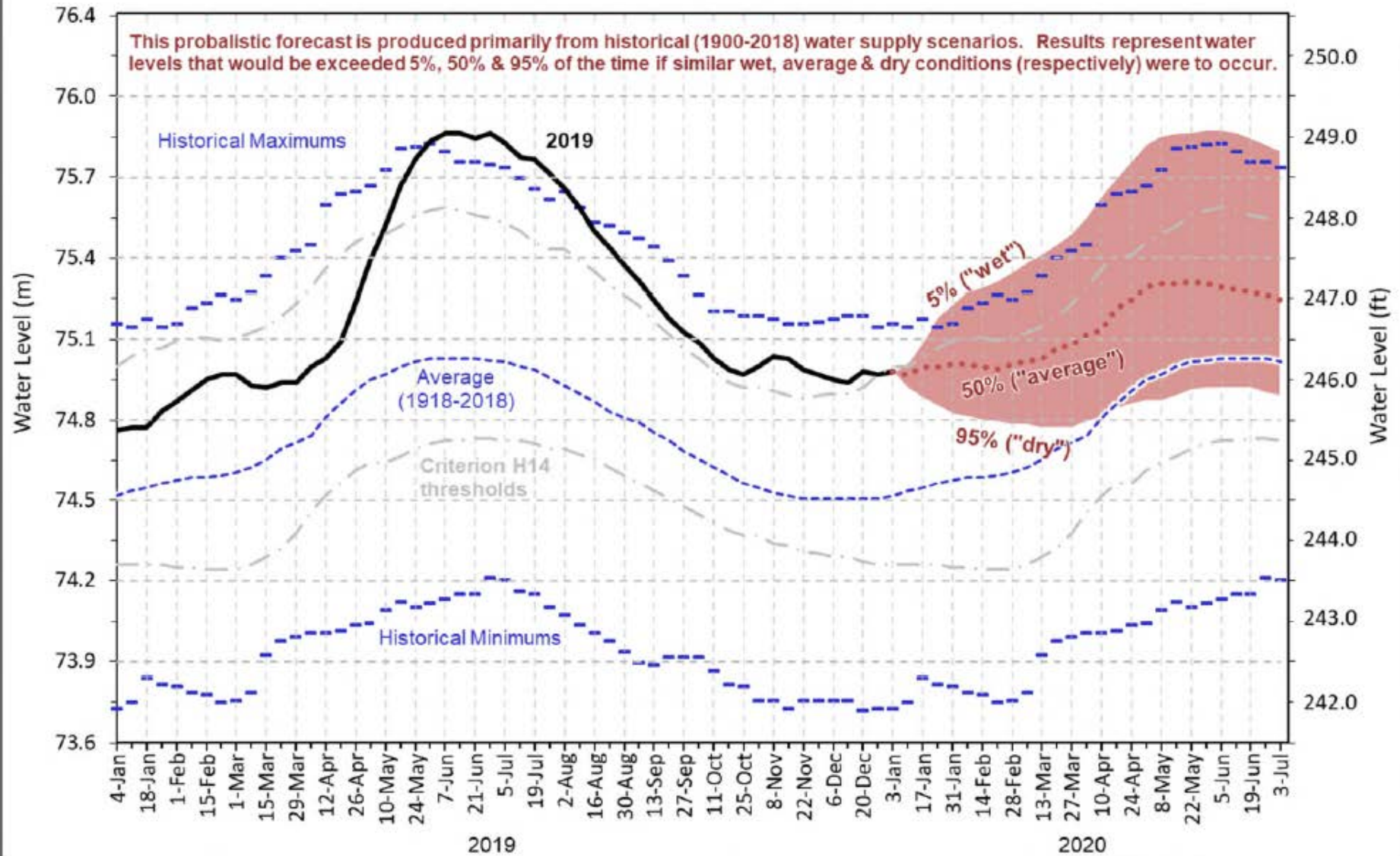


Daily Lake Ontario Levels



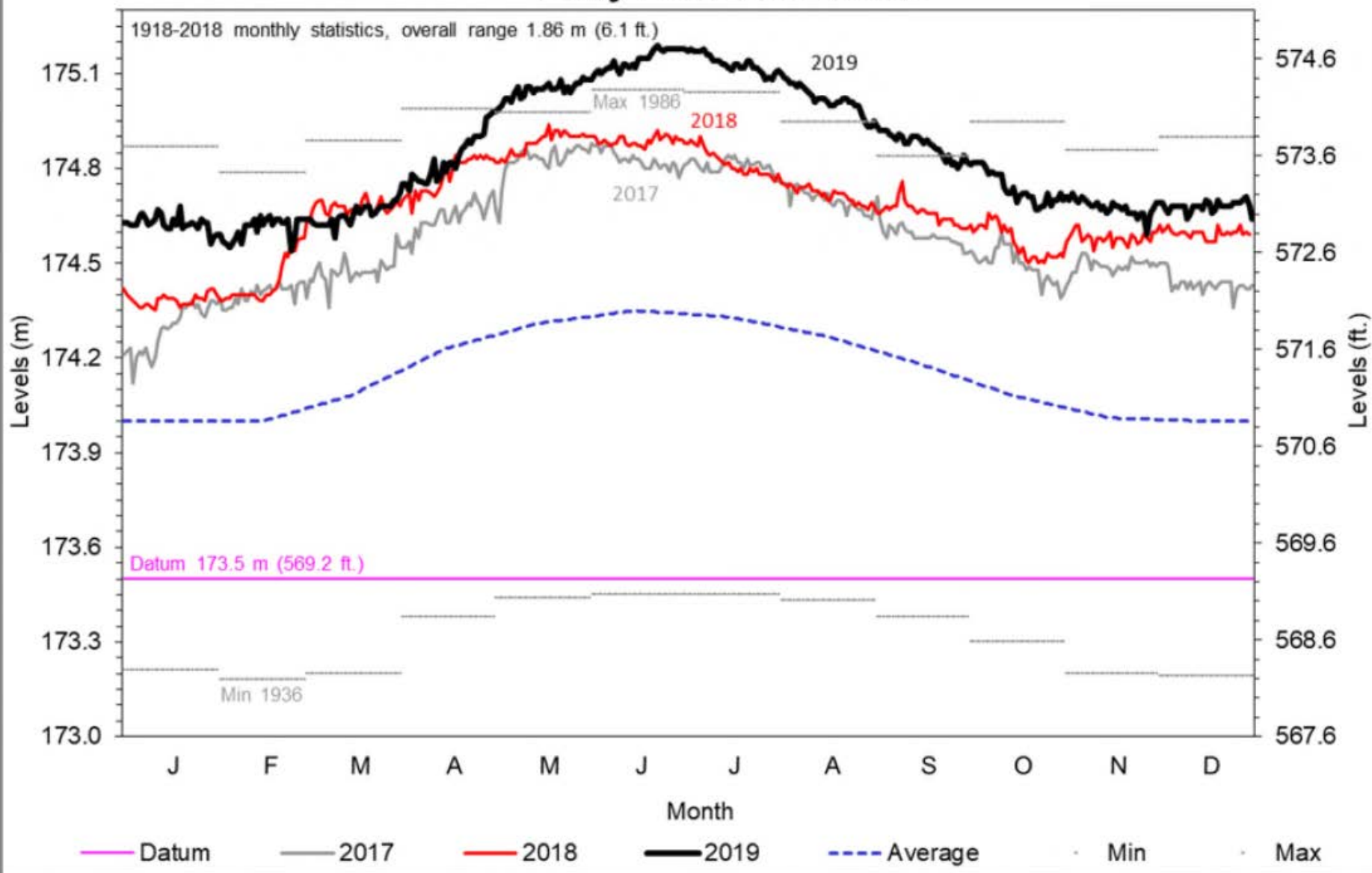
Lake Ontario Water Level Forecast

for the weeks ending 10 January through 3 July 2020 (issued on 03 January)



Daily Lake Erie Levels

1918-2018 monthly statistics, overall range 1.86 m (6.1 ft.)



Navigational Safety Measures

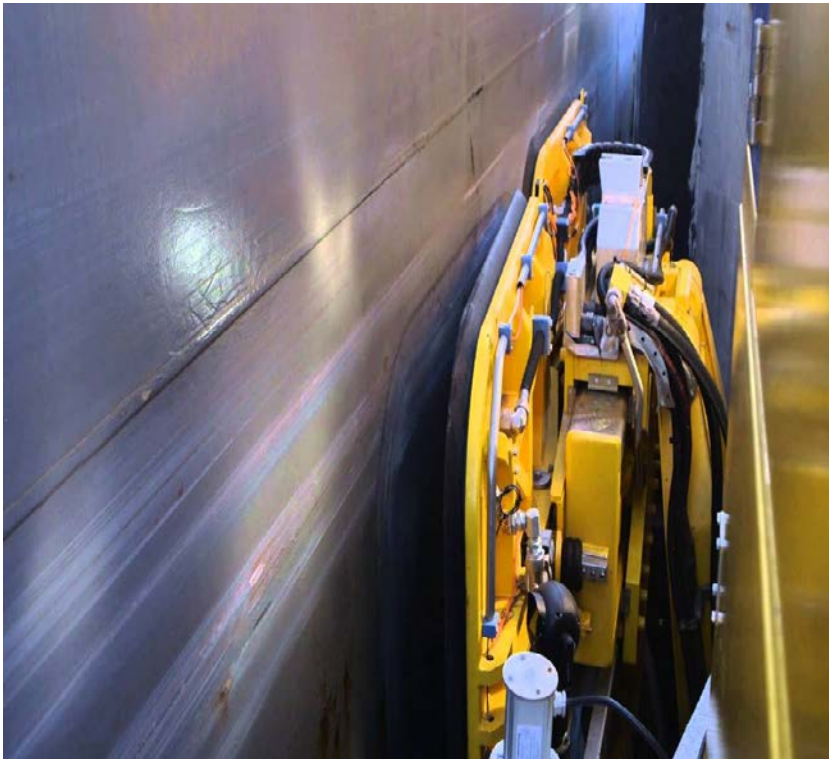
- Speed restrictions.
- Added additional No Meet areas.
- Tugs assistance in Seaway areas.
- Vessel type restrictions.
- Seaway draft restrictions.



2020 Great Lakes Season

- Excepted continuation of near/record high water levels in the Great Lakes Basin.
- Seaway navigation pressures at high outflows.
- Moses Saunders Dam is the most critical water control centre.
- Need for additional navigational safety measures to be place i.e. current measure gauges in the Seaway.
- Development of both short term and long term adaptive management strategies.

Seaway Related Technologies



- Completion of the Hands Free Mooring installation on all deep locks.
- Trial by the ocean fleet of DIS.
- Better understanding vessel surging the while entering the lock.
- Determine if there is a requirement to change the traditional order of turn for vessel lockages

AIS AtoN – Great Lakes and Seaway

- Gradual adoption by both Coast Guards.
- Virtual AIS AtoN– to be in place at the Mackinac Bridge.
- Synthetic AIS AtoN– areas include St. Mary's River, Lake St. Clair, Detroit River, Lake Erie and lower Seaway.
- Real AIS AtoN – found in the entrances to in the system's major waterway, more prevalent in US waters.

Automated Navigational Assistance



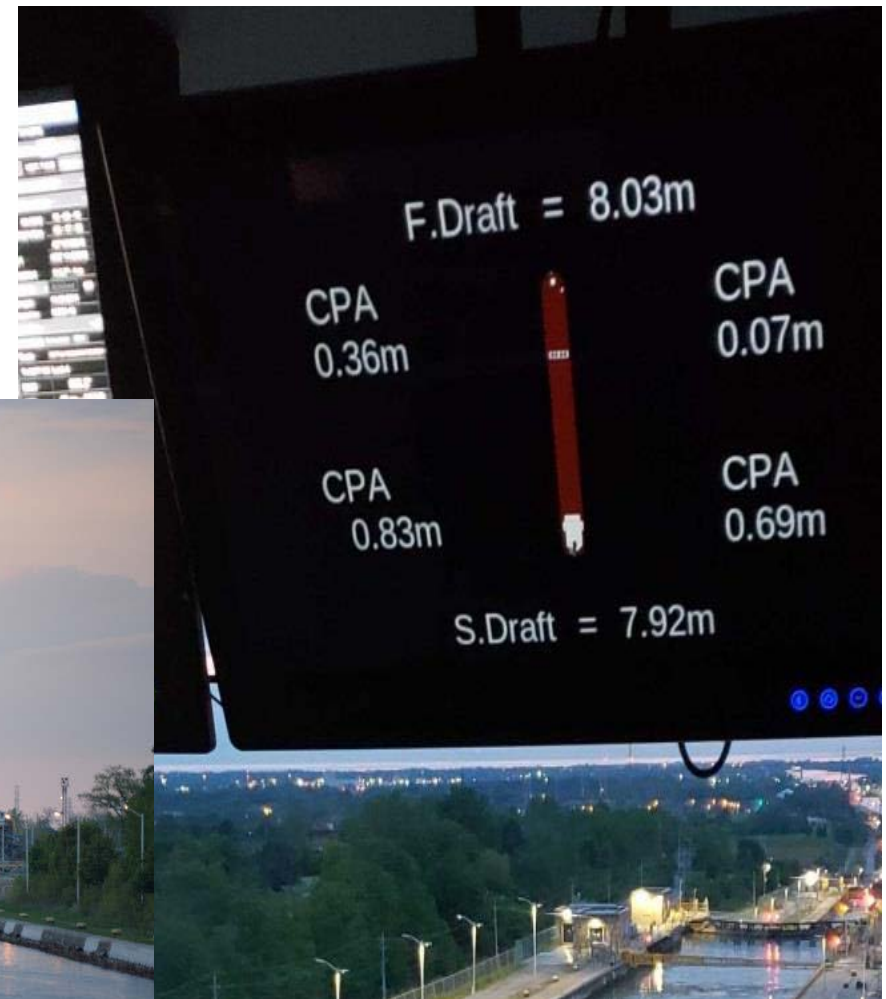
- Certain Canadian and US Great Lakes companies are involved in various projects.
- Limited results to date.
- Validating concepts prior to any initial trials.

Automated Navigational Assistance

- Use of current environmental sensors and information sources.
- Additional sensors – precise GPS, lidar, optical cameras, infrared, shore side sensors.
- Algorithms and Processors – object detection, identification and tracking, navigational control assistance.
- Machine Learning and Big data.
- Tasks not suited – cargo and mooring.

Automated Navigational Assistance

- Object detection.
- Automated spotting.
- Approach guidance.
- Situational Awareness.



Automated Navigational Assistance

The Future:

- Performance Optimization – cargo lift, speed, fuel consumption, alarm integration, machinery status etc.
- Transit Leg analysis – ship efficiencies.
- “Autonomous” (unmanned) vs “Automated” (automated functions on manned ships).
- Issues - Cyber security, cost of big data, regulation, marine infrastructure, training and autonomous vs conventional vessels.