

Investigation of Threats to Species at Risk Fishes in Grand Bend, Ontario

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Introduction:

The Grand Bend area in southwestern Ontario supports three species at risk (SAR) fishes: Pugnose Shiner (Endangered - END), Lake Chubsucker (END), and Grass Pickerel (Special Concern - SC) (Figure 1). Monitoring by Fisheries and Oceans Canada (DFO) and the Ausable Bayfield Conservation Authority (ABCA) has found SAR fishes in the Old Ausable Channel (OAC), L Lake, and Old Mouth Lake (OML) (Figure 2). These water bodies have still, clear water with abundant aquatic vegetation (Figure 3).

The OAC is a pond-like ecosystem that runs parallel to the Lake Huron shoreline (Figure 2). Most of the OAC lies within the boundaries of the Pinery Provincial Park, but a small northern portion is bordered by residential properties. L Lake (bordered by conservation lands) and Old Mouth Lake (surrounded by cottages) are oxbow wetlands located near the village of Port Franks, Ontario, just southwest of Grand Bend (Figure 2).

Potential threats to SAR fishes in the Old Ausable Channel include:

- Nutrient inputs to the OAC may cause increased aquatic plant growth that may result in winter fish kills from depleted oxygen concentrations and over the longer-term a more rapid transition to a terrestrial ecosystem.
- Management of water level structures that may not regard fish habitat.

Project Objective:

To test the hypothesis that SAR fish habitat in the OAC may be more vulnerable to threats than habitat in L Lake and OML by investigating the presence of SAR fishes in the three systems and relating this information to aquatic macrophyte vegetation, and water quality.

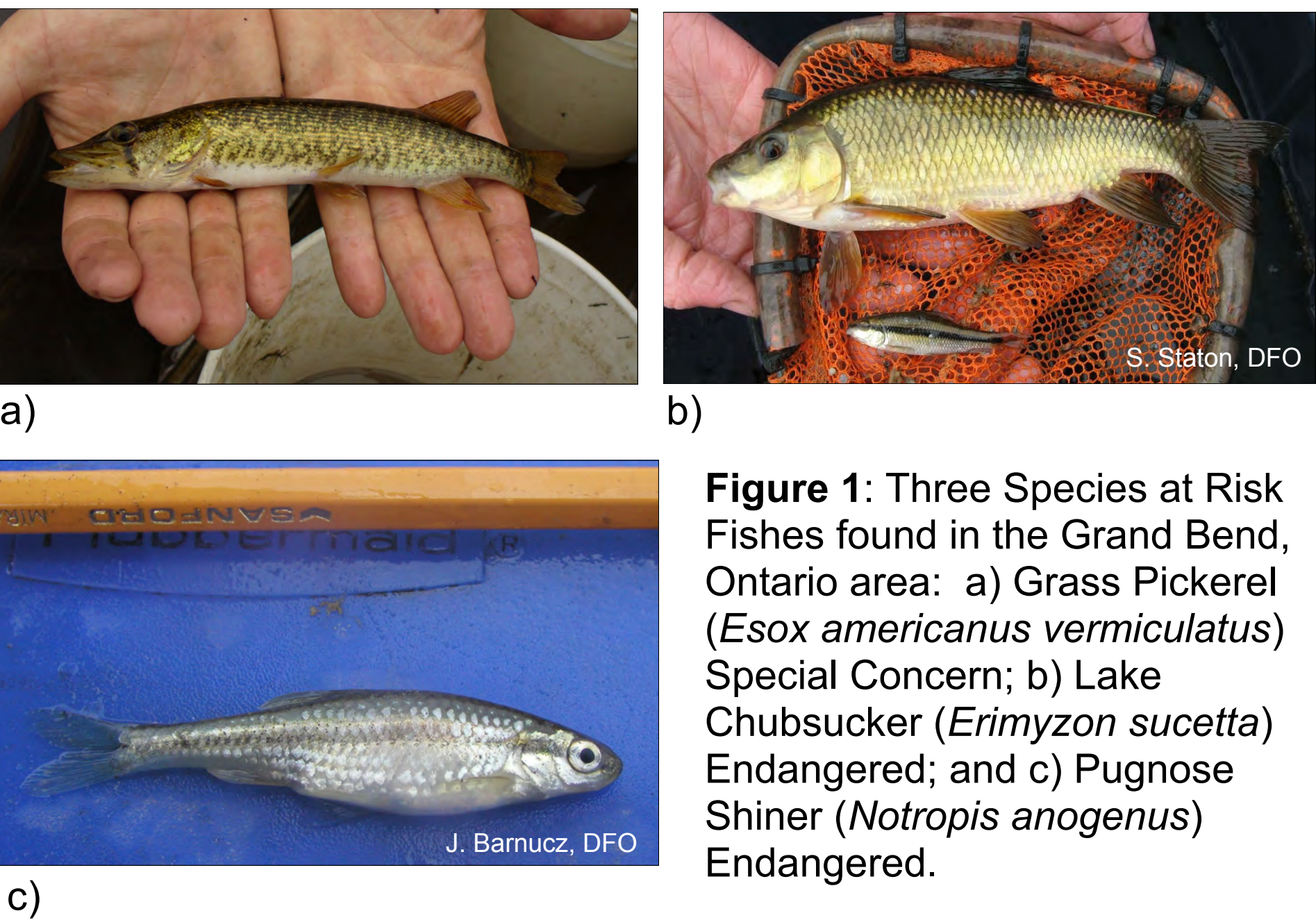


Figure 1: Three Species at Risk Fishes found in the Grand Bend, Ontario area: a) Grass Pickerel (*Esox americanus vermiculatus*) Special Concern; b) Lake Chubsucker (*Erimyzon sucetta*) Endangered; and c) Pugnose Shiner (*Notropis anogenus*) Endangered.

Methods:

Water quality was monitored and fish and aquatic vegetation were surveyed at seven sites - five sites in the OAC, and one site each in L Lake and OML (Figure 2).

Water quality was monitored twice per month between June and September 2012. A YSI 600 QS collected instantaneous measures of temperature, conductivity, total dissolved solids, dissolved oxygen, and pH. Water samples were collected and analyzed for concentrations of total phosphorus, soluble reactive phosphorus, ammonia, nitrate, nitrite, total Kjeldahl nitrogen, and total suspended solids.

Aquatic macrophyte relative abundance was surveyed along one or two transects per site by Johan Wiklund, University of Waterloo. Five hauls using a seine net were completed at each site as per fish depletion sampling methods developed by Fisheries and Oceans Canada.

Two biological indices for the Great Lakes, the Wetland Macrophyte Index (WMI) (Croft and Chow-Fraser 2007) and the Wetland Fish Index (WFI) (Seilheimer and Chow-Fraser 2006 and 2007) were used to explore relationships between fish species presence, aquatic macrophyte species presence and water quality indicator concentrations. The WMI and WFI scores for a site can range from 1 to 5, with 1 being indicative of the most degraded conditions and 5 being the more pristine.

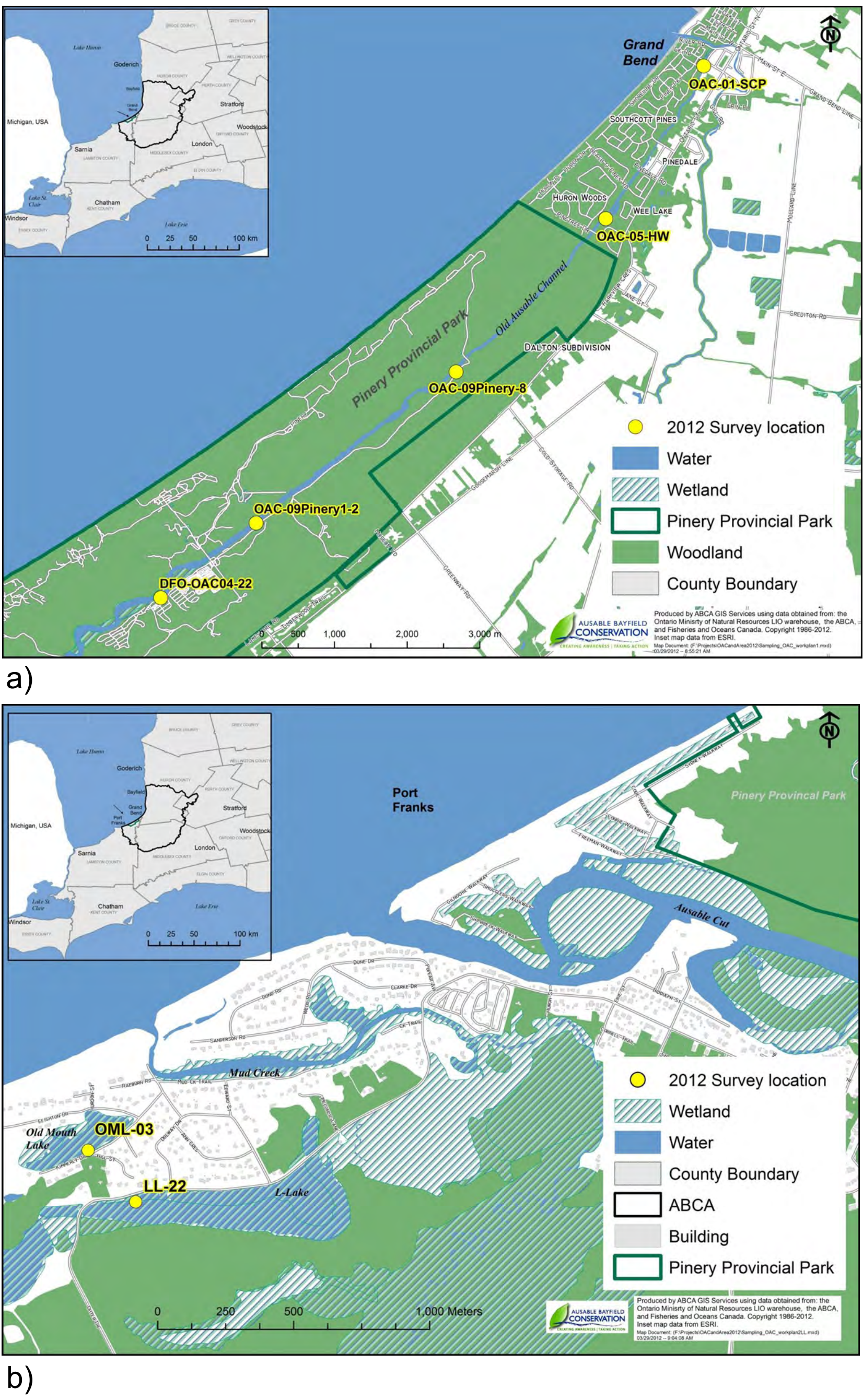
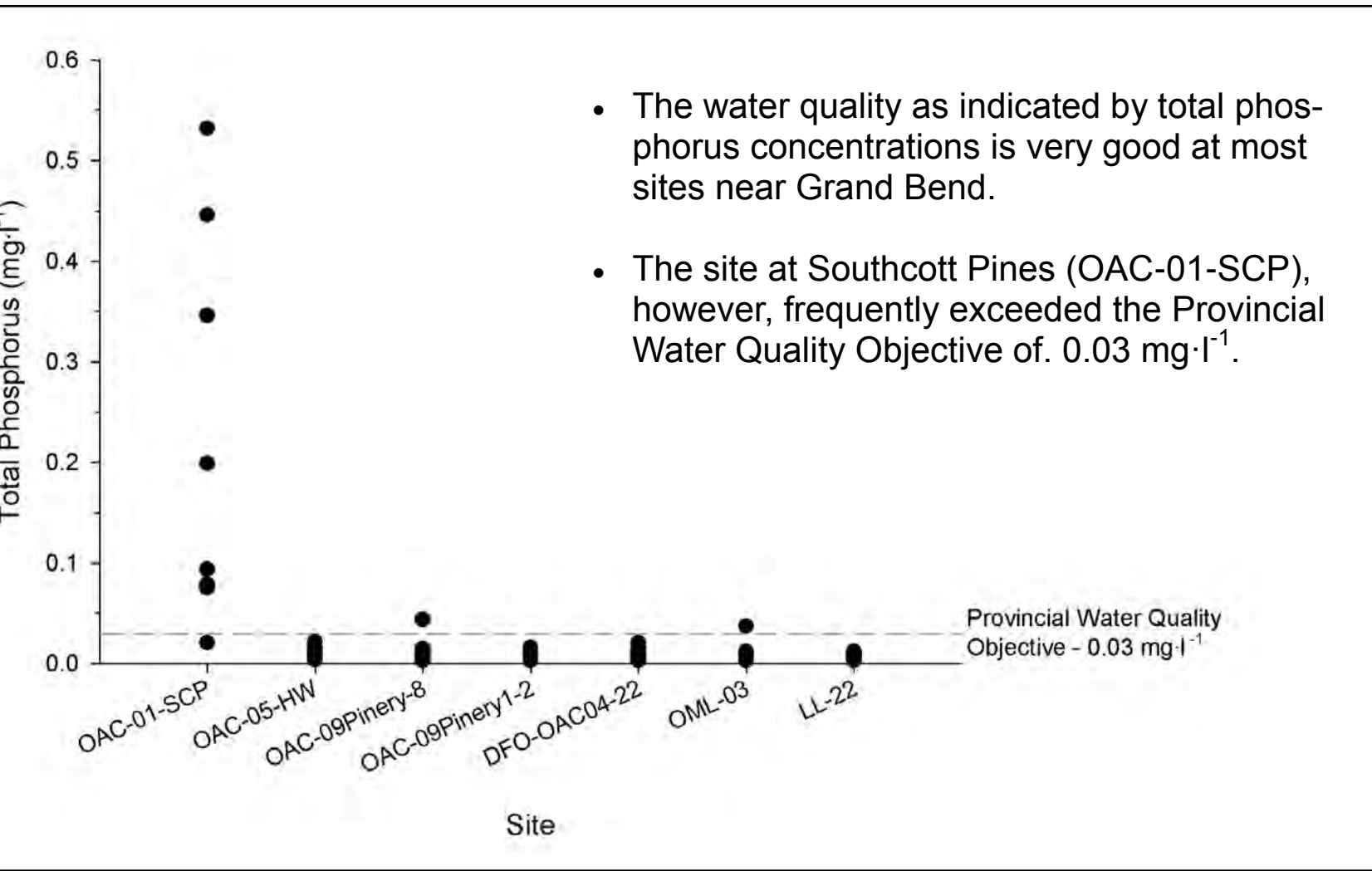


Figure 2: Study site locations in the Grand Bend, Ontario area: a) the Old Ausable Channel; and b) Lake L and Old Mouth Lake.

Results:



Wetland Macrophyte Index (Croft and Chow-Fraser 2007)			
Site		Value	
OAC-01-SCP	Southcott Pines	1.41	1.0 Poor 5.0 Excellent
OAC-04-22	Pinery - Riverside	2.06	
OAC09-Pinery8	Pinery - North	2.31	
OAC-05-HW	Huron Woods	2.32	
OAC09-Pinery1-2	Pinery - Dam	2.54	
OML-03	Old Mouth Lake	3.44	
LL-22	L Lake	3.58	

- Southcott Pines is in poor condition.
- OACPP-04-22 (below Pinery Park Dam) is in moderate to moderately poor condition.
- Remaining OAC sites are in moderate to moderately good condition.
- Port Franks oxbow lakes are in excellent condition.

Wetland Fish Index (Seilheimer and Chow-Fraser 2007)			
Site		Value	
OAC-01-SCP	Southcott Pines	3.53	1.0 Poor 5.0 Excellent
OML-03	Old Mouth Lake	3.58	
OAC09-Pinery8	Pinery - North	3.68	
OAC-05-HW	Huron Woods	3.74	
OAC09-Pinery1-2	Pinery - Dam	3.86	
LL- 22	L Lake	3.86	
OAC-04-22	Pinery - Riverside	3.93	

- Southcott Pines is at poorest end of conditions – however all sites are moderately good to excellent with respect to the fish communities.

Fish family dominance, total abundance, species richness, species diversity and presence of species at risk at seven study sites near Grand Bend, Ontario					
Site	Dominant Family Relative Abundance %	Total Abundance	Species Richness	Diversity Shannon-Weiner	Species at Risk Fishes
OAC-01-SCP Southcott Pines	Centrarchidae 92%	118	11	1.77	absent
OAC-05-HW Huron Woods	Centrarchidae 24% Ictaluridae 24%	86	14	3.21	present
OAC-Pinery8 Pinery - North	Cyprinidae 39%	148	14	3.13	present
OAC-Pinery1-2 Pinery - Dam	Cyprinidae 79%	178	13	1.43	present
OAC-Pinery22 Pinery - Riverside	Cyprinidae 41%	180	16	3.19	present
LL-22 L Lake	Cyprinidae 61%	62	11	2.83	present
OML-03 Old Mouth Lake	Cyprinidae 49%	70	9	2.51	absent
Species at risk fish not found in Old Mouth Lake (limited habitat) and Southcott Pines (poor habitat)					

Conclusions:

Based on results from this study, the aquatic ecosystems in the Grand Bend area have moderately good to excellent conditions. However, all of our indicators (water quality, aquatic macrophyte community and fish community) at our seven study locations show that conditions are degraded in the northern OAC (Southcott Pines neighborhood, OAC-01-SCP) and are generally better outside of the OAC in L Lake and Old Mouth Lake. Threats to SAR fishes are more apparent in the northern OAC compared with other sites.

The Wetland Fish Index (WFI) shows that the sites where no SAR fishes were captured (OAC-01-SCP and OML-03) have the most degraded conditions as determined by the relationship between fish community and water quality.

Management Recommendations:

- Management options to control nutrients and resultant vegetative growth may need to be considered at the Southcott Pines northern section of the OAC.
- Due to the unique habitat for aquatic (and terrestrial) SAR in the OAC watershed, it is important to continue to monitor water quality, macrophyte and fish abundance and distribution. Monitoring will be particularly important in areas where management activities have potential to alter existing conditions.
- Identification of threats to SAR fishes will be used to direct and target recovery actions for these species.
- Further study is necessary to look at historic and future abundance and distribution of SAR fishes.

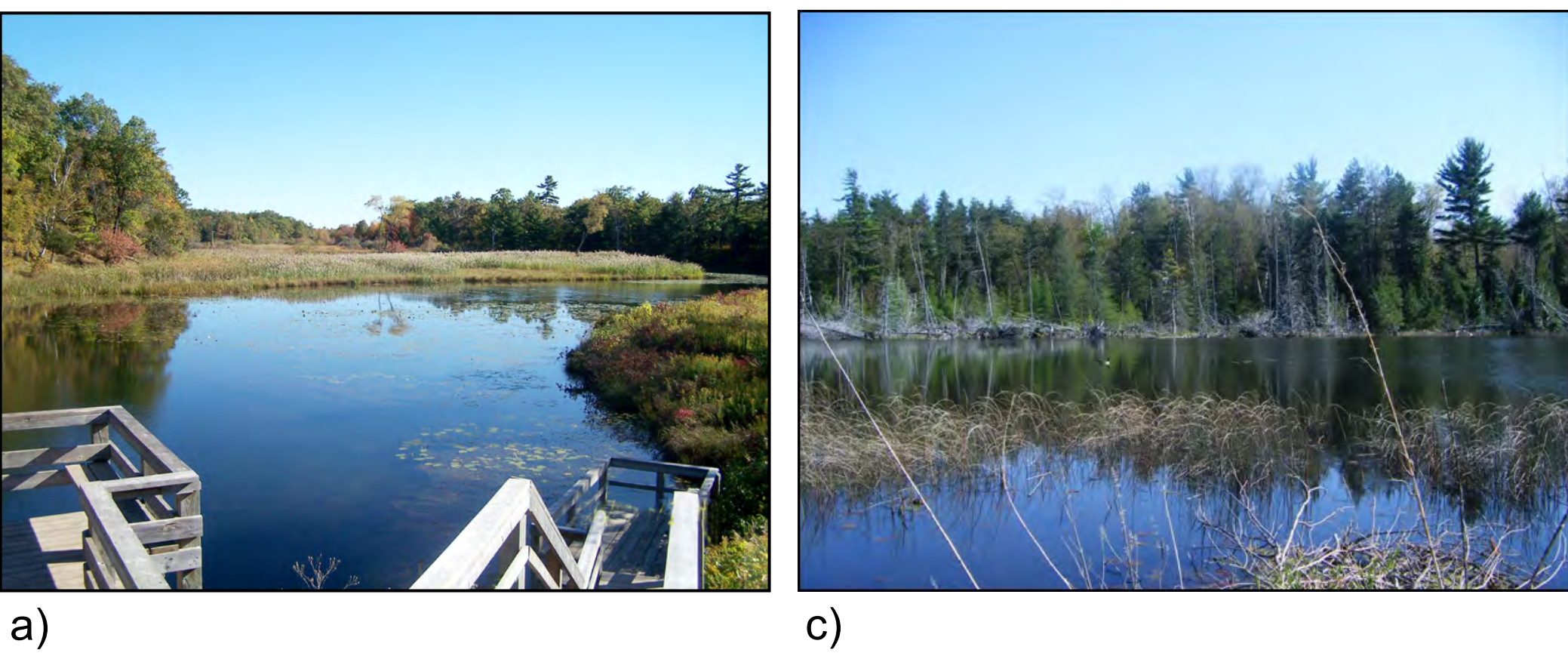


Figure 3: Study sites near Grand Bend Ontario: a) Old Ausable Channel; and b) L Lake.

Literature Cited:

- Croft, M. V. and P. Chow-Fraser. 2007. *Use and Development of the Wetland Macrophyte Index to Detect Water Quality Impairment in Fish Habitat of Great Lakes Coastal Marshes*. J. Great Lakes Res. 33 (Special Issue 3): 172–197.
- Seilheimer, T.S. and P. Chow-Fraser. 2006. *Development and use of the Wetland Fish Index to assess the quality of coastal wetlands in the Laurentian Great Lakes*. Can. J. Fish. Aquat. Sci. 63: 354–366.
- Seilheimer, T.S. and P. Chow-Fraser. 2007. *Application of the Wetland Fish Index to Northern Great Lakes Marshes with Emphasis on Georgian Bay Coastal Wetlands*. J. Great Lakes Res. 33 (Special Issue 3): 154–171.

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