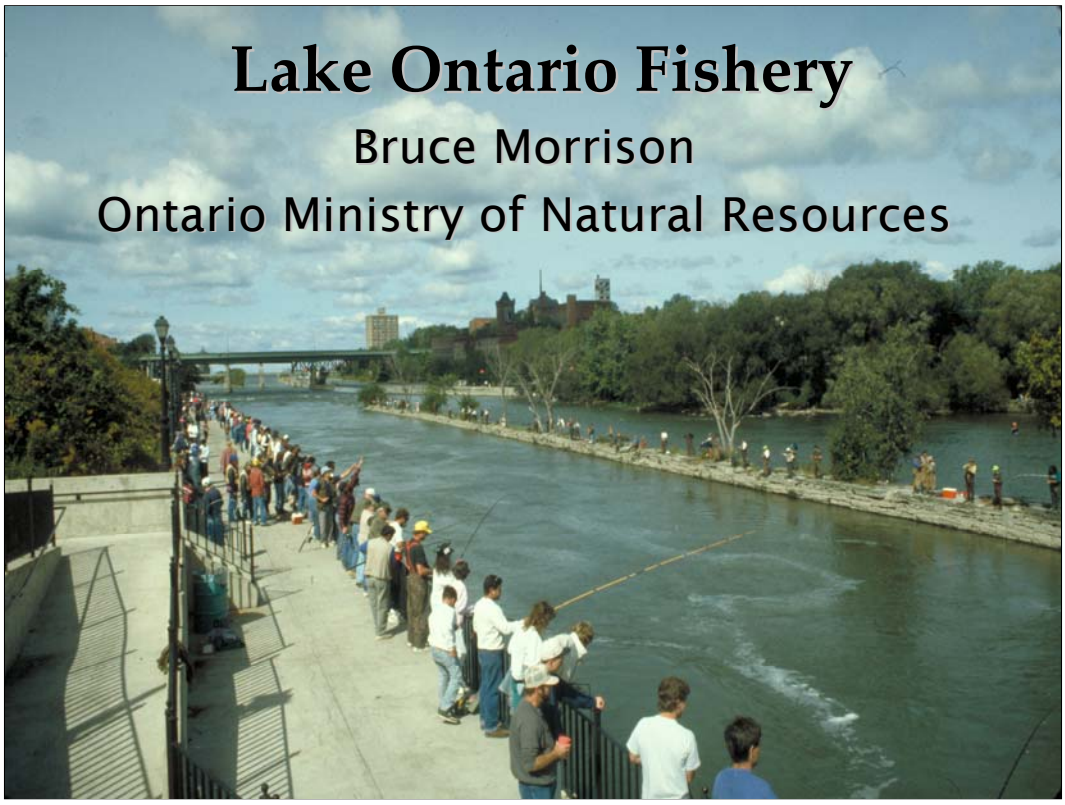


Good morning,

Today I am presenting to you about the state of Lake Ontarios fisheries.

Overview

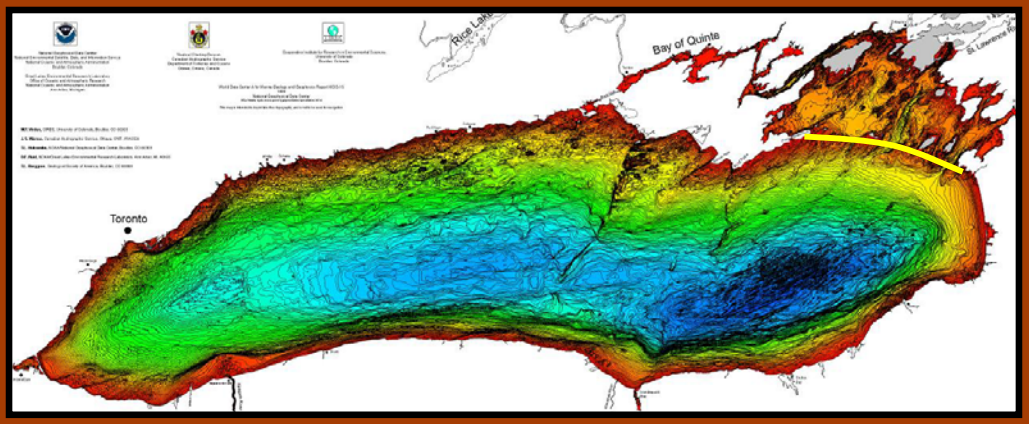
- Indicators and habitat
- Benthos
- Status of species driving fishery trends
  - Nearshore – walleye
  - Offshore – lake trout, other salmonids
  - Prey fishes and sea lamprey status
- Fishery trends

I plan to use a bottom up approach to build for you a picture of what the Lake Ontario ecosystem is like today.

Most of the information you will see comes from our State of the Lake Conference held in March 2003 and some data have been updated to reflect the recent status of Lake Ontario biota.

I hope this 15 minute expose provides you with a well rounded story of Lake Ontario ecosystem. I can not update you on every species and there is much more to tell especially about non-native invertebrates echinogammarus, cercopagis and native off shore prey fishes such as sculpins, herring and sticklebacks.

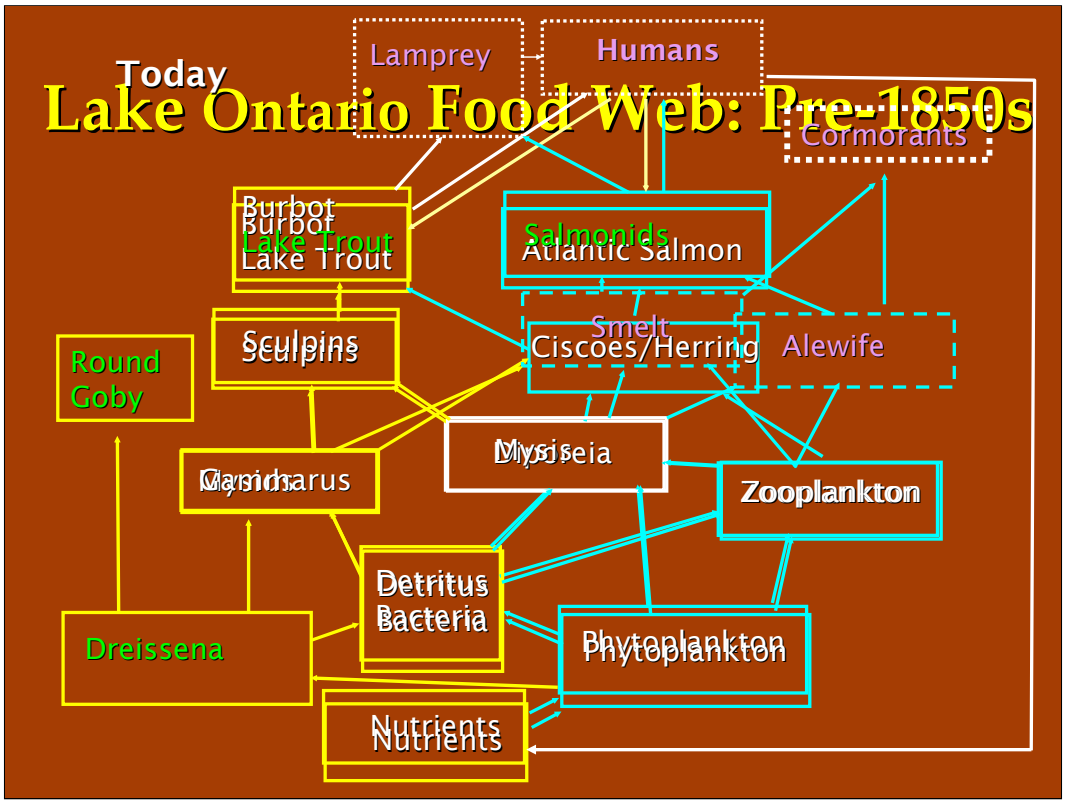
Great Lakes indicators and fisheries



- Organized by habitat
  - Mesotrophic shallow near shore areas (red)
  - Oligotrophic and very deep off shore areas

The best way for me to talk about the Lake Ontario fisheries and at the same time provide a connection with SOLEC indicators is to divide the lake into two broad habitat categories, the mesotrophic area in red and the oligotrophic areas everywhere else (meso meaning moderate nutrients and oligo meaning few nutrients).

Throughout the presentation, I will try to remind you about these two areas and I will frequently refer to the lake as main basin and eastern or Kingston basin which are separated by the ridge extending from the southeast end of Quinte's Isle or Prince Edward County and extends over to New York.



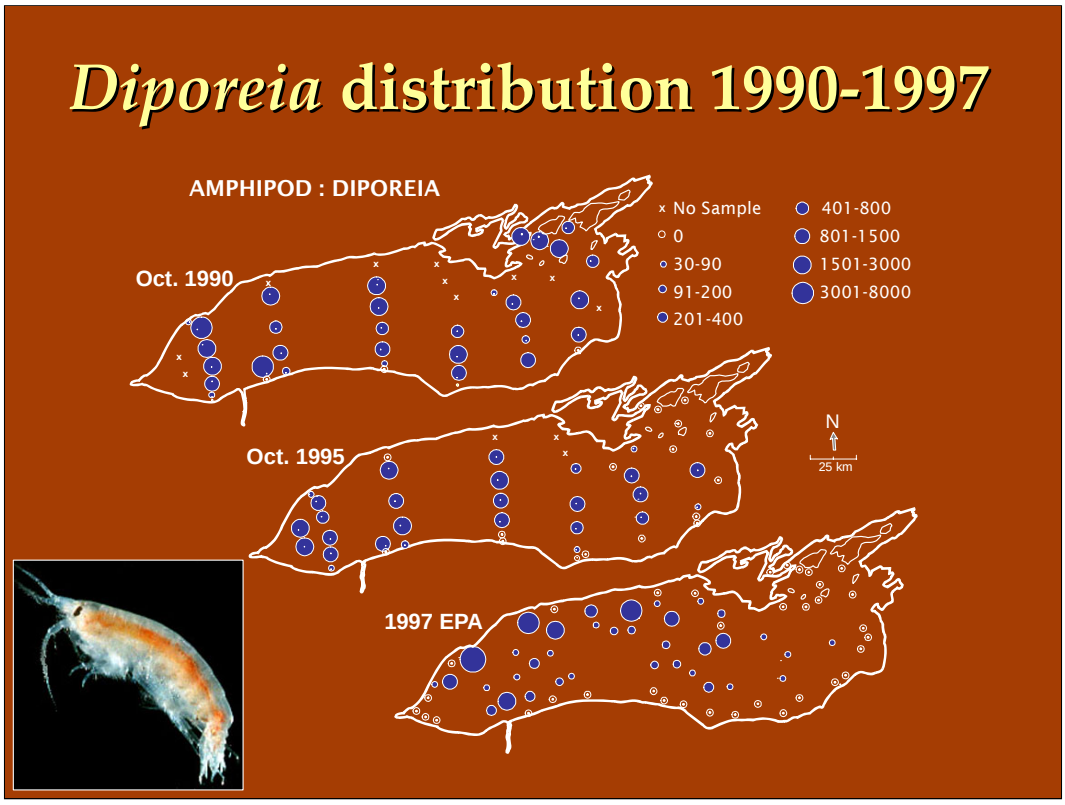
As an introduction to fisheries in Lake Ontario it is important to understand the history of the ecosystem. As an example, I will show you some simple depictions of the off shore food web.

Prior to 1850, there are only native species and the system quite simple and balanced with respect to benthic (yellow boxes) and pelagic (blue boxes) components.

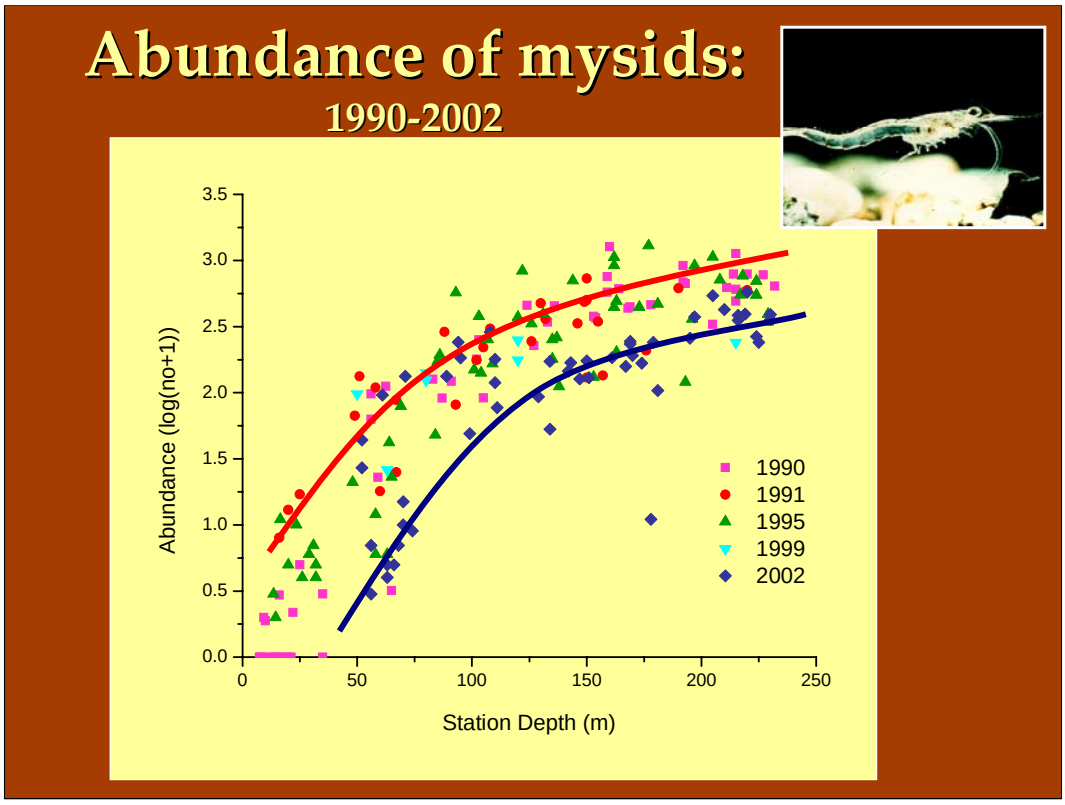
Lake trout and burbot were the predominant benthic top predators, Atlantic salmon were the pelagic top predators and a wide variety of deep and mid water ciscoes were present. Diporeia and ciscoes made up a major component of the diet. Over the next 100 years, this ecosystem changed drastically. *<click mouse>*

Today, there is a large number of non-native species some of which have arrived by accident and some intentionally and others have expanded naturally.

The diversity of invertebrates has changed, favouring non-native species. For example, Dreissena (zebra and quagga mussels), have permanently anchored energy to the benthos (Yellow side of the food web) in an unprecedented fashion. Native amphipods like Diporeia have all but disappeared and Mysis have been left to fill the menu. Alewife is the most important prey fish now. The biomass of non-native top predators exceeds that of native top predators (most of which are there due to stocking too) and even though they occupy different habitats in the lake they all compete for the same food at least as adult fish. The resulting off shore ecosystem is complex and far more artificial too.



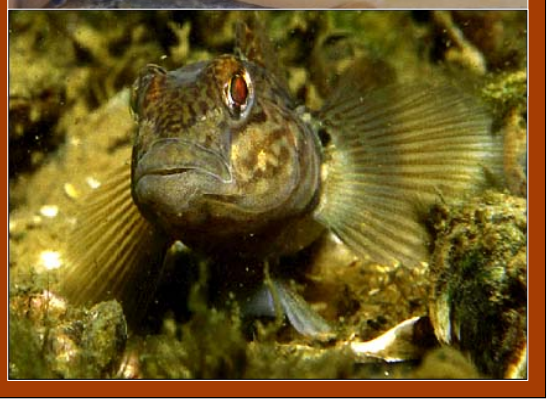
These plots of *Diporeia* densities show rapid declines over a 7 year period. The trend was from east to west and shallow to deep. Since 1997, the decline has continued. In fact, at depths of <120m *Diporeia* densities have been zero at all USGS sites (Dittman, pers.comm). This morning you heard Rimi Kalinauskis describe changes in habitat due to the colonization and expansion of Dreissena. As you can see the amphipod *Diporeia*, did not fair too well after the colonizing of Lake Ontario by Dreissena. *Diporeia* were an important high lipid content food item for many fish species.



Recent surveys on Mysids, suggested a declining trend was occurring, note the 1991 observations (red line) and that from 2002 (blue line). Sampling in 2003 suggested this decline did not continue. As you saw in the depictions of the food web in 2004 this native species is an important food item for young lake trout, sculpins and will be very important for deep water ciscoes.

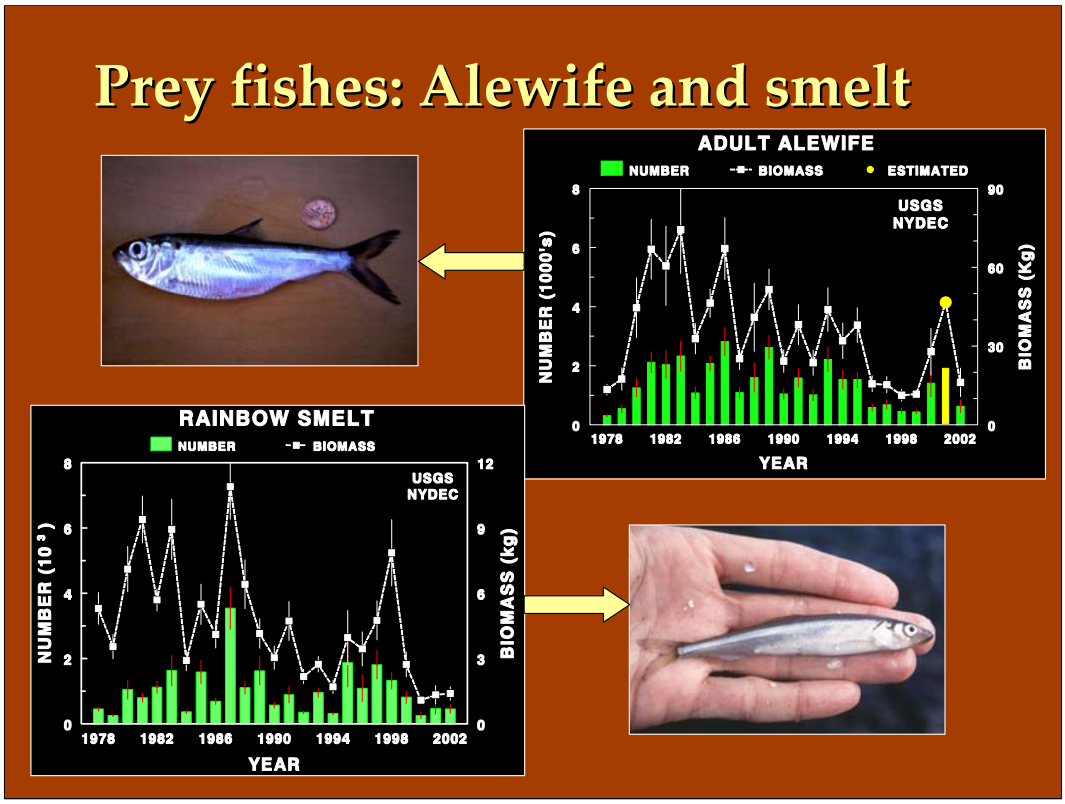
Nearshore prey fishes

- **Very productive nearshore areas support a large number and diversity of prey fishes including the latest arrival, round goby**



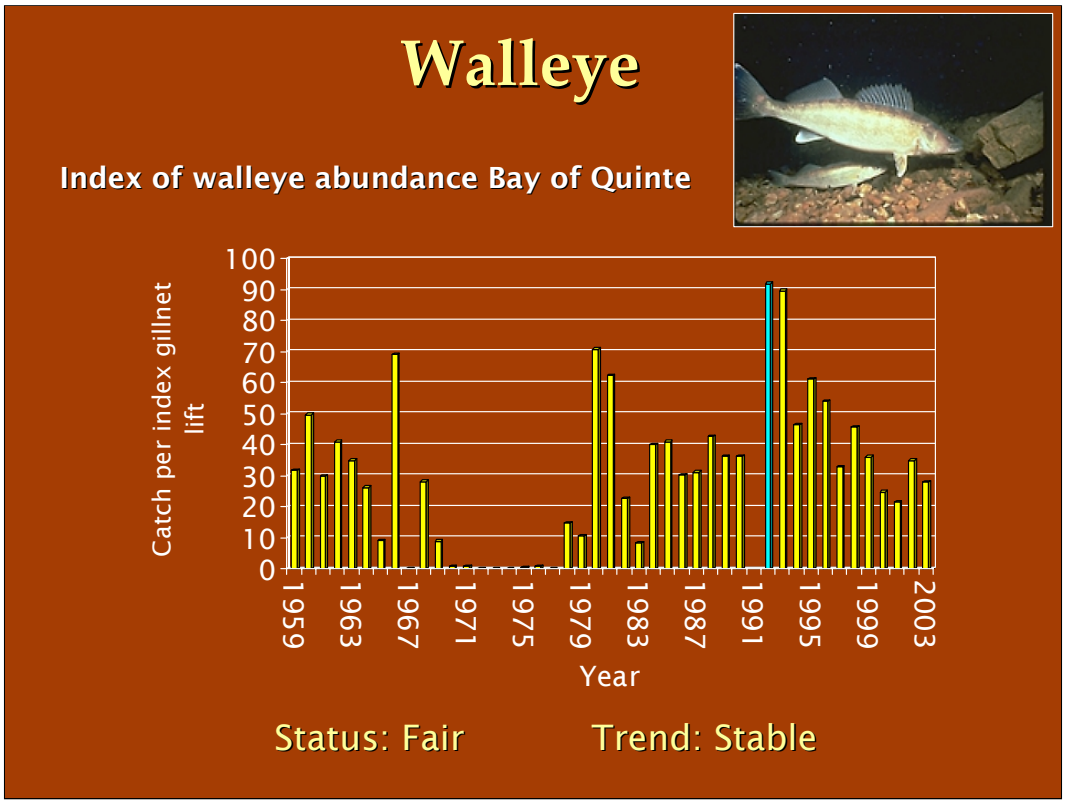
The nutrient rich near shore areas of Lake Ontario support a wide diversity of fish species. In the near shore almost every fish that can fit in another fishes mouth is a prey fish. The main prey fish are young freshwater drum, white perch, yellow perch, suckers and cyprinids.

In recent years, the new fish food on the block is the round goby. It is well established now. Recent work by OMNR Research on Lake Erie indicates this fish to be an important prey item for many fish species. Similar work is occurring on Lake Ontario now.



Alewife and rainbow smelt status are determined based on a variety of indices occurring at various times of the year. The figures shown here are from the USGS and show decreasing and highly variable abundance estimates and less variable biomass estimates occurring from the late 1970 and up to 2002.. This year may show an increase in biomass for both species however, alewife numbers may be reduced from that in 2003. The variation we see in abundance and biomass indices lead us to assign a mixed status and undetermined forecast.

Alewife, a non-native species is the keystone prey species for all salmonids and walleye and cormorants where there habitats coincide. Both species often contain varying levels of thiaminase and are thought to be an important factor for the lack of reproduction for lake trout and Atlantic salmon (Fitzsimon, Honeyfield).



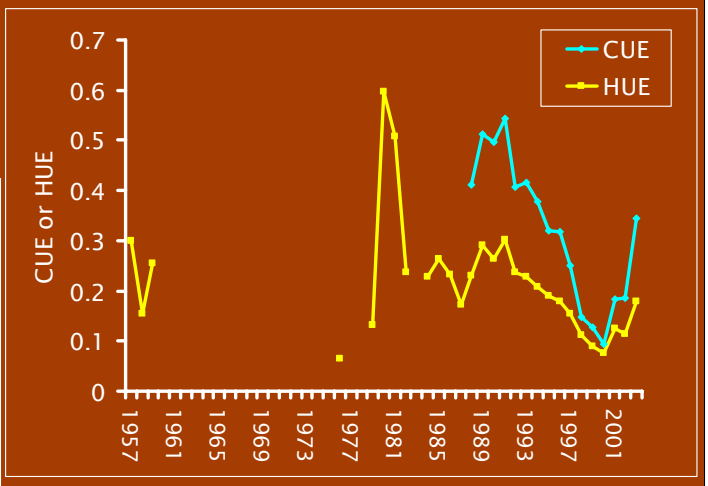
The largest concentration of walleye lives in the eastern end of lake Ontario. This species increased rapidly in abundance after two cold winters in 1977 and 1978 and concurrent die offs of alewife and white perch as shown in this plot of index gillnet surveys from the Bay of Quinte in Eastern Lake Ontario.

Walleye abundance began to decline prior to colonization by Driessena. The Bay of Quinte index shown here, monitors only a portion of the population, and fish less than age 5, generally. Current simulation work suggests that this population is stable now and will remain so but at lower levels of abundance than that observed between 1990 and 1994. Not shown here are the wide range of age classes and relatively good survival of young of the year fish observed in recent years for the entire population.

Note. The blue bar indicates the year when our gear changed and observations have been adjusted for changes in gear efficiency. There were no surveys in 1991.

Walleye: Recreational fishing

- Effort up
- Catch rate up

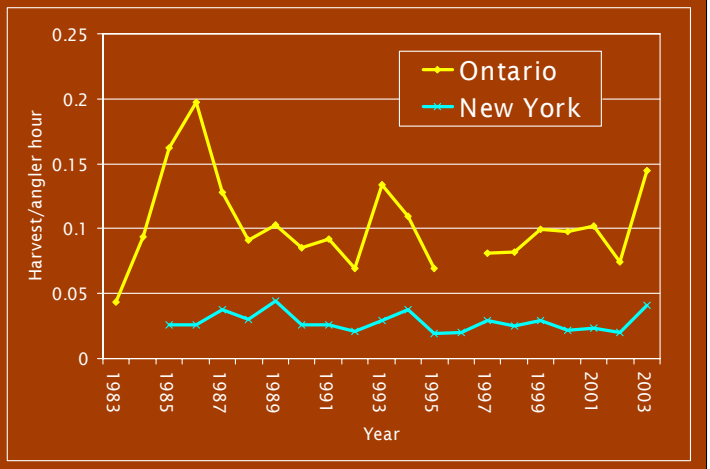


This graph of the recreational fishery for walleye shows a dramatic increase in catch per unit effort (the number of walleye caught in an hour of fishing) and harvest per unit effort (the number of walleye kept in an hour of fish).

Overall effort for walleye fishing has not climbed back to that witnessed in the 1980s. From an economic viewpoint, continued increases in catch per unit effort are important in attracting fishers to the walleye fishery.

Salmon and trout

Harvest rate of Chinook salmon by boat anglers in Lake Ontario



Status: Fair to good

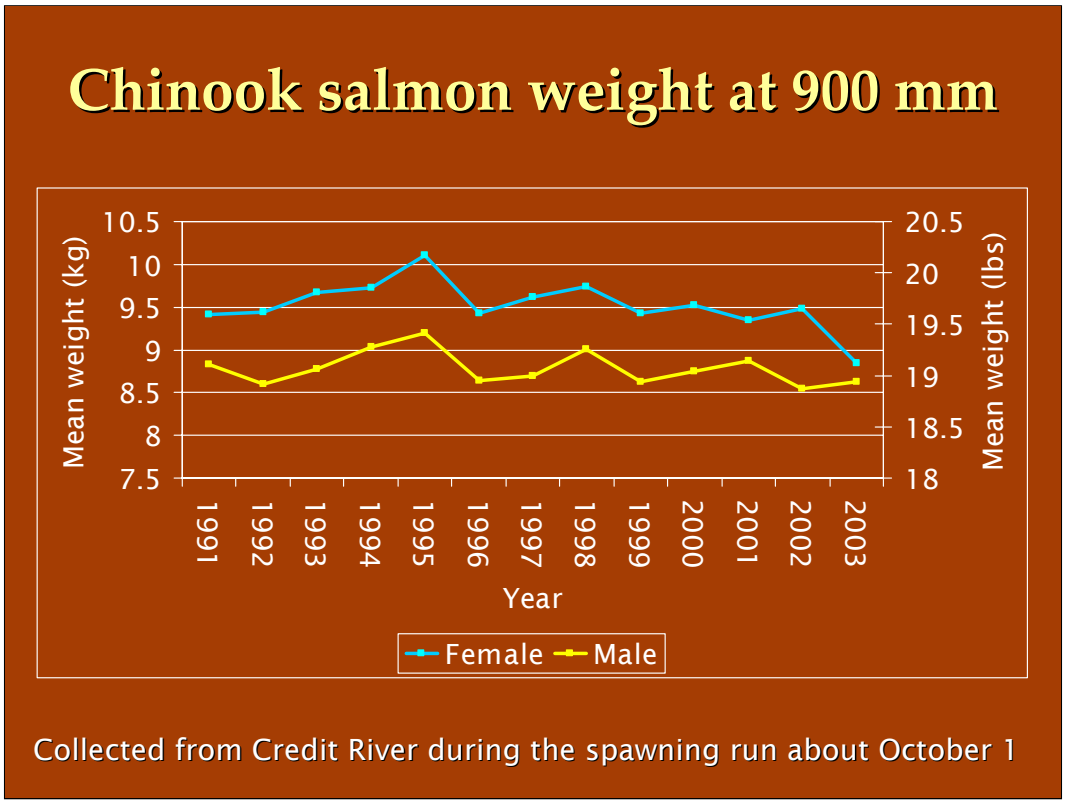
Trend: Undetermined

This SOLEC indicator includes mostly non-native species rainbow trout, chinook, and coho salmon, brown trout and also a small number of re-introduced Atlantic salmon.

The status of the whole salmon and trout fishery is stable. This is due consistent long term results from a variety of assessment programs, continued observations of natural reproduction and currently good tributary quality. However, we put an undetermined prognosis on this fishery as many of the fish species are dependent on stocking and alewife are their main diet item..

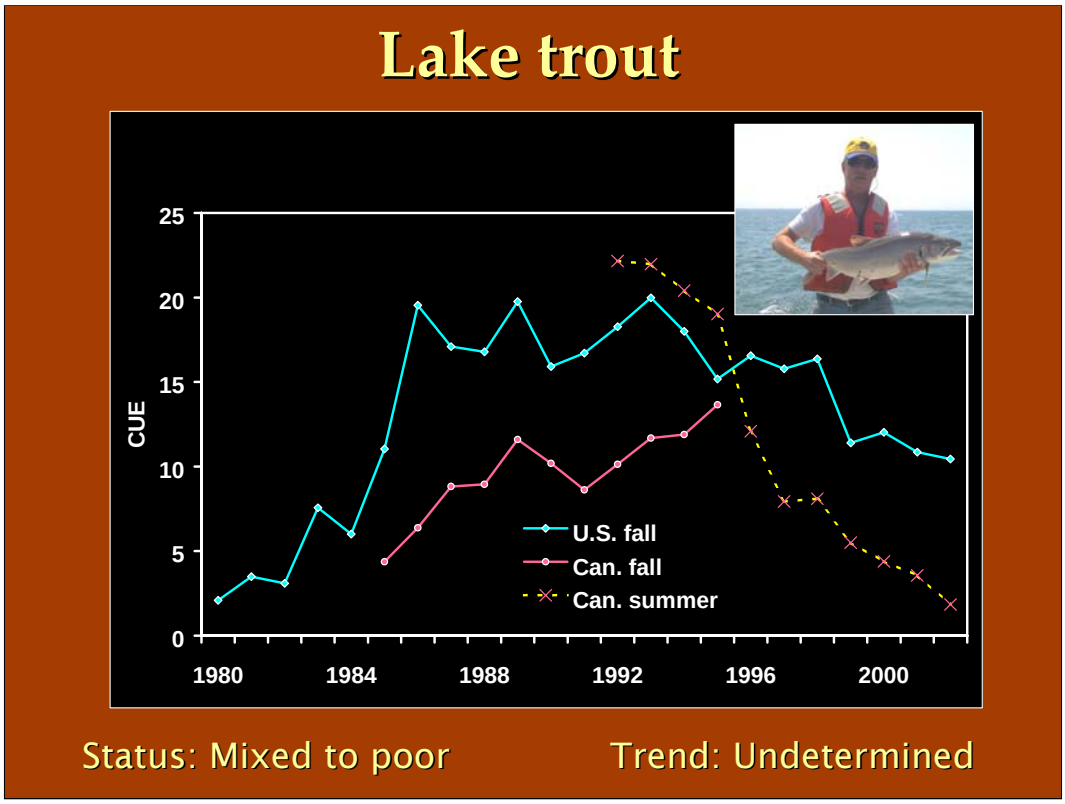
From a fishery perspective, things couldn't be better this year or last. Both NY (in blue) and Ont (in yellow) fisheries showed recent increases in the numbers of fish harvested in angler hour. Although overall effort has not returned to that of the late 80s, the fishery is doing well

.



Although natural reproduction is a good indicator of stream health, it adds to the uncertain estimates of predator abundance

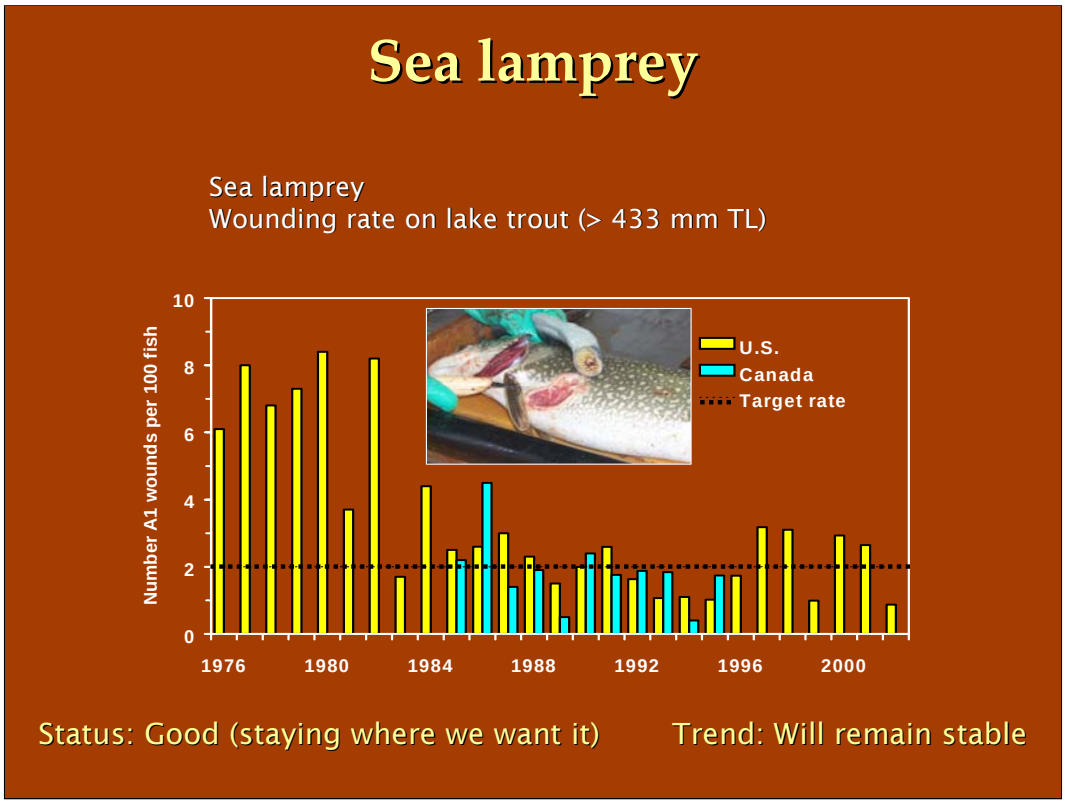
The evidence that the offshore ecosystem could have too many predators is shown in this plot of Chinook salmon weight at length of 900 mm or 35.5 inches. Kg are on the left and pounds on the right. This dramatic decrease in weight at age continues in 2004.



The lake trout is present in Lake Ontario due to a persistent restoration initiative, enforcement of regulations and the efficiency of the sea lamprey control program.

Its current status is uncertain mainly due to spatial differences among fishery independent field programs. In the east basin lake trout are at very low numbers. In the west, where there is food, there are lake trout.

The main objective for lake trout has been to have a self sustaining population and that has not been achieved..



One of the main reasons the lake trout restoration program has been able to meet some of its objectives is the efficiency and success of the sea lamprey control program.

This graph shows you the number of A1 marks (picture inset) observed on adult sea lamprey from USGS lake trout surveys and Canadian index surveys. In recent years the marking rate has hovered around the target rate, hence the good status. The rate should remain at this level while control programs exist.

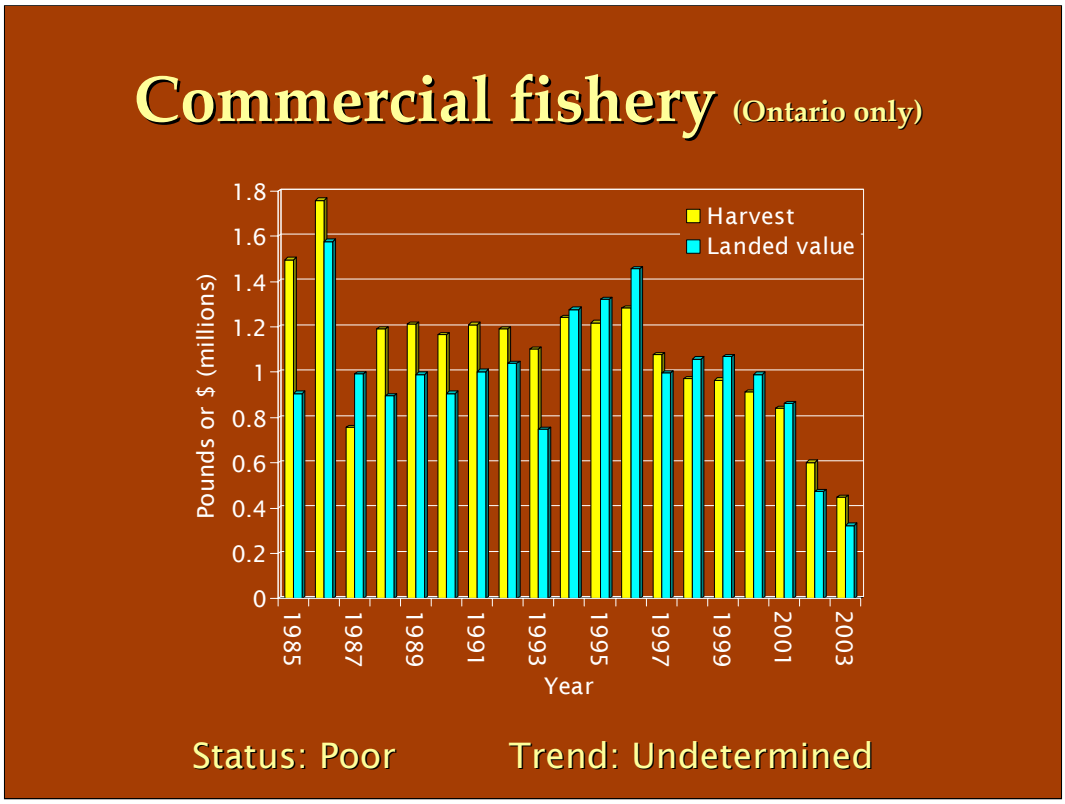
Other species

American eel	Trend: Critical
Sturgeon	Trend: Uncertain but improving

Unfortunately, there are several other native species in Lake Ontario that did not make the SOLEC indicator list but are rather important to commercial fisheries and the Lake Ontario ecosystem.

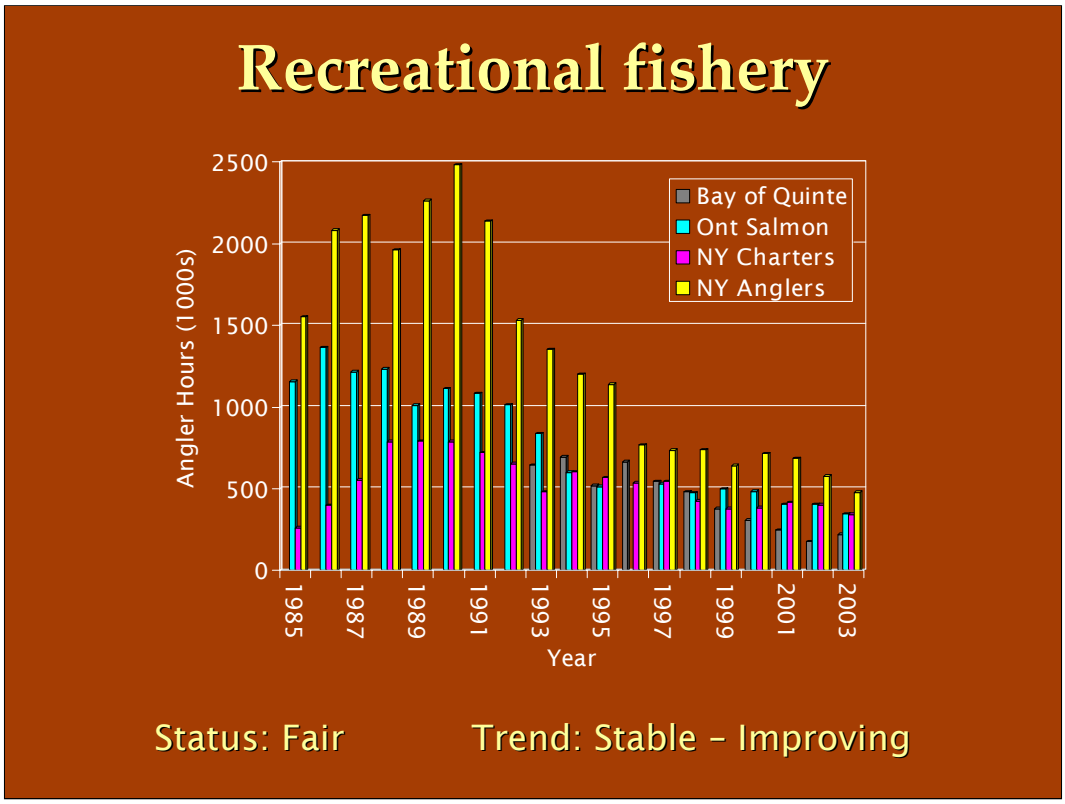
The catadromous American eel is currently under consideration for listing as a species at risk and Ontario closed the eel fishery in 2004. The future of American eel in Lake Ontario is critical and this status extends throughout its range.. There is an international movement afoot to stop the decline in American eels before it is too late.

(click) On a brighter note, the lake sturgeon is caught in our programs every year. Although we have no programs directed at assessing lake sturgeon population health, this finding is promising for a species that is listed in NY. In fact, NYSDEC is still involved in a restoration program for this species.



The commercial fishery has been declining for past 5 years. This is due to a combination of reduced quotas, reduced abundance of two species particularly American eel and lake whitefish. The fishery now depends heavily on panfish including yellow perch, on bullheads and on the remaining adult lake whitefish. In 2003, Ontario closed the American eel commercial fishery as a conservation measure for the species which had declined by 3 orders of magnitude in just over 10 years.

The value of the Ontario fishery declined from 800 K dollars in 2001 to less than 300 K dollars in 2003 and it is expected to continue to decline.



The recreational fishery on the other hand has remained relatively stable for several years following a decline in effort as shown in this graph. The decline occurred concurrently with a decreased stocking, loss of a big salmon derby and the colonization of the lake by *Driessena* spp. The reasons for the decline are not clear.

The fishery is very diverse focusing on salmon and trout offshore in the western basin and catching more than 20 species in the near shore areas with most effort targeted at walleye, smallmouth and largemouth bass and yellow perch.

The prognosis for the recreational fishery is stable to improving as the 2004 catch per angler hour or CUE have gone up for several of the big ticket species. As you heard this morning the number of people living in the Ontario basin is expected to grow by several million people and this population growth will likely cause increased demand on Lake Ontario's fisheries and urban sprawl may degrade tributaries and other near shore areas.

Edibility: Consumption guidelines

- Status: Poor
- Trend: Stable to becoming more complex
  - Given the current list of contaminants and levels in Lake Ontario fish: stable
  - As new contaminants are listed by USFDA and/or Health Canada: likely to worsen

Source and ambient levels of contaminants are down in Lake Ontario. However, many of the large bodied commercial and sport fish species have consumption guidelines on them in both NY and Ontario. The current guidelines have not changed for some time and that accounts for the poor status. However, if the USFood and Drug Administration and Health Canada publish guidelines for 'new' contaminants such as those found in fire retardants, then the guidelines will become more complex.

Concluding remarks

- The Lake Ontario ecosystem is perturbed
- Recently, several non-native species have colonized and permanently altered habitat
- Prevention of new non-natives is key
- The food web has and is still changing
- Native species need continued protection and restoration
- Demands on natural resources will continue to increase

Its very difficult for me to do justice to the Lake Ontario ecosystem in 15 minutes. I hope you leave here with the understanding that the Lake Ontario food web is not what it used to be and a sense that it is not what it should be. Although, it has a wide range of native and non-native species that support economically important fisheries, in the last 10 years, non-native species have permanently altered habitat and 'benthified' the near and off shore food webs of Lake Ontario. These new arrivals are established in Lake Ontario.

A part of the GFLC Lake Ontario Committee's Fish Community Goals and Objectives is the restoration of native species to self sustaining abundances. But as you saw, native species have not done so well, particularly in the offshore. At a time when smelt and alewife are at all time lows, restoration of native species such as Atlantic salmon and ciscoes should be at the top of our restoration efforts.

We need to keep non-native species in check, and new non-native prevented from entering the lake and any of its connected water bodies.

We have to do all this and still provide the people today and the growing number of tomorrow the opportunity to use Lake Ontario and its natural resources.

Thanks,

Acknowledgments

I need to acknowledge the Lake Ontario

LaMP and GLFC and the partnerships they foster

Several partners from state, provincial and federal governments contributed to the collection of this data, its interpretation and this presentation.

Not shown here are the various University partners and Ontario Conservation Authorities who contributed.