

FISH COMMUNITY STUDIES

The Pelagic Small Fish Surveys of Lake Winnipeg (2002 and 2003)

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OBJECTIVES

- To determine the distribution and abundance of forage fish species in Lake Winnipeg.
- To determine inter-annual variability in the small fish community structure of Lake Winnipeg.

METHODS

The open waters of Lake Winnipeg were sampled for forage fish with a 3 m square beam trawl with small mesh net. The net was deployed over the side of CCGS *Namao* randomly at surface, mid-depth and near the bottom at or near the water quality/benthic stations monitored in Lake Winnipeg.

Lake Winnipeg Trawl Summary 2002 and 2003					
Trawl Type	Year	South	Channel	North	Total
Surface	2002	37	13	44	94
	2003	43	7	37	87
Mid-depth	2002	18	8	17	43
	2003	29	8	34	71
Bottom	2002	1	0	9	10
	2003	9	6	20	35
Total in basin	2002	56	21	70	147
	2003	81	21	91	193

The table above provides data on numbers of trawls by basin and depth for 2002 and 2003 seasons. These data include multiple tows that were done to better understand variance of trawl catches in the same general water mass.

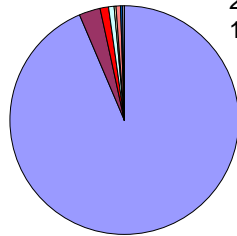
RESULTS

Fish Community Results

The figure below shows the differences in fish catches in 2002 and 2003 in terms of total numbers of fish caught over the whole lake. It is noteworthy that about three to four times as many fish were caught in total and per trawl in 2003 as in 2002.



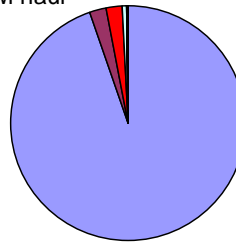
Differences in Fish Catches (2002 & 2003)



2002 Fish Numbers: Total
156,437; 1,064 / trawl haul

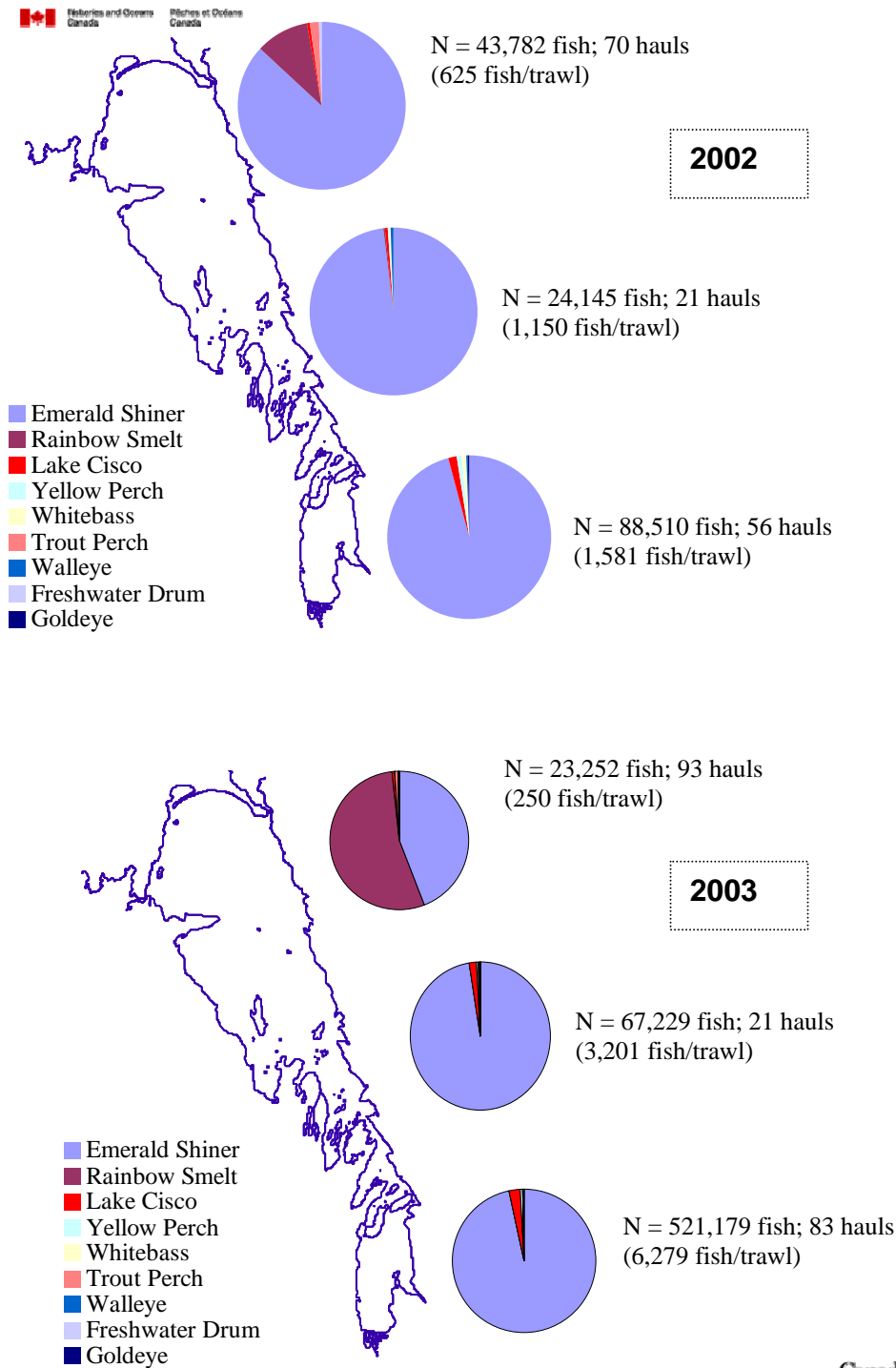
- Emerald Shiner
- Rainbow Smelt
- Lake Cisco
- Yellow Perch
- Whitebass
- Trout Perch
- Walleye
- Freshwater Drum
- Goldeye

2003 Fish Numbers: Total
611,660; 3,169 / trawl haul



This next figure shows the distribution of fish catches by number in the different basins of Lake Winnipeg in 2002 (top) and 2003 (bottom). Noteworthy here is about a 3X drop in fish catches in the North basin but large increases in the Channel and South basin.

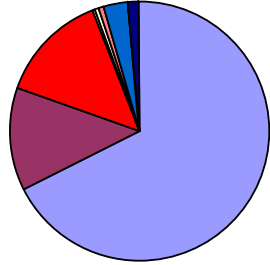
Distribution of Fish Catches by Number (2002 & 2003)



Again it is noteworthy that in 2003, about 2.5 times more fish biomass was collected per trawl than in 2002. In terms of total biomass, the difference is slightly greater yet at about 3.25X more fish in 2003.

Fish Catches by Biomass (2002 & 2003)

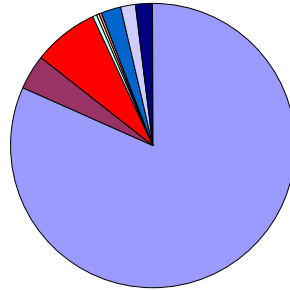
 Fisheries and Oceans Canada / Pêches et Océans Canada



2002 Fish Biomass: 212.4 kg
1.44 kg / trawl haul

- Emerald Shiner
- Rainbow Smelt
- Lake Cisco
- Yellow Perch
- Whitebass
- Trout Perch
- Walleye
- Freshwater Drum
- Goldeye

2003 Fish Biomass: 700.9 kg
3.63 kg / trawl haul

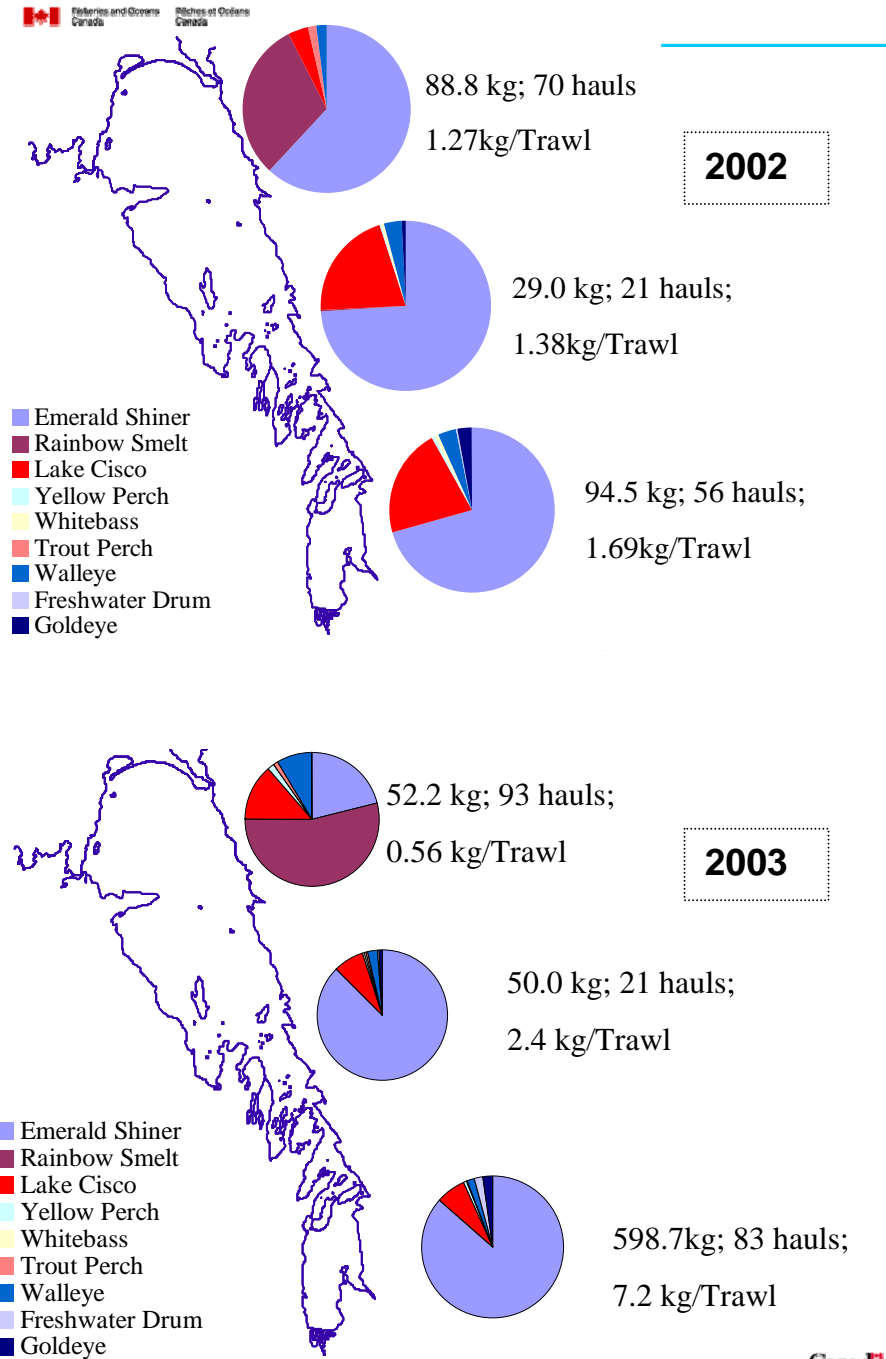


 Canada

The North basin, as seen in numbers, saw a considerable drop in catch biomass while the Channel and South basin had increases.

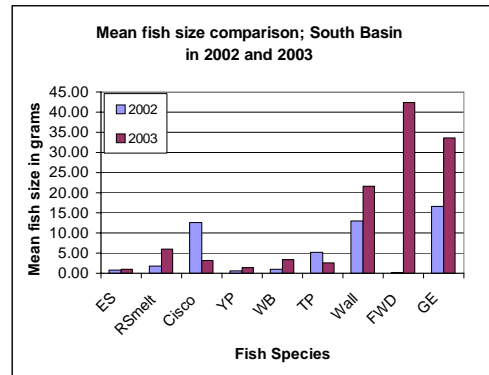
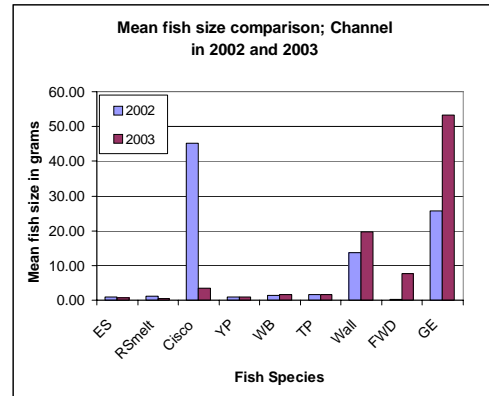
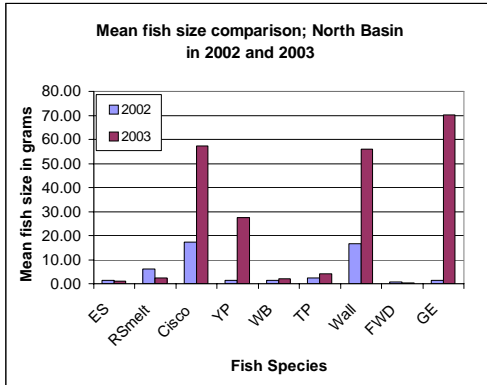
In both fish numbers per trawl and biomass per trawl, the Channel and South basin produced more fish in 2003 than in 2002 while the North basin catches fell by about half.

Distribution of Fish Catches by Biomass (2002 & 2003)



The figures below illustrate the reasons for some of these differences but in reality there is little in the data so far analyzed that would explain the fish catch results. Analyses of water quality, temperature and climate factors among seasons and between years will be required to provide explanations for the observed differences between 2002 and 2003.

Comparison in Differences in Mean Fish Weights (2002 & 2003)



Fish of most species (except cisco) averaged greater in weight in 2003 catches over those of 2002. These data are raw division of biomass by number and so do not illustrate the great variation in sizes of fish caught.

Trawl catch variance is part of the analyses being done to determine if in fact there really are trends in the fish catch data between the years. Repeated trawls in the same general area of the lake provided an indication of the kind of effort required to provide reliable indices of real fish abundance. Ten replicate trawls were required to get variances in the range of 50% of mean fish catches for some species.

FUTURE RESEARCH

- Complete whatever trawling we are able to do in 2004
- Complete all analyses of fish length:weight relationships
- Complete detailed comparisons of fish distributions by depth and station, basin and years
- Begin development of our understanding of fish distributions in relation to water chemistry, season and temperature, phytoplankton and zooplankton
- Fit the fish data into the bigger picture of the Lake Winnipeg ecosystem