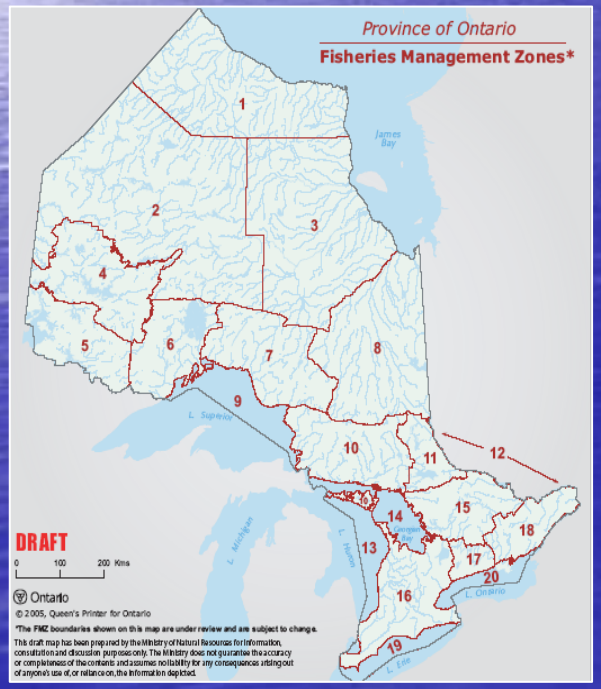
Broad-Scale Monitoring
of Ontario's Inland Lakes

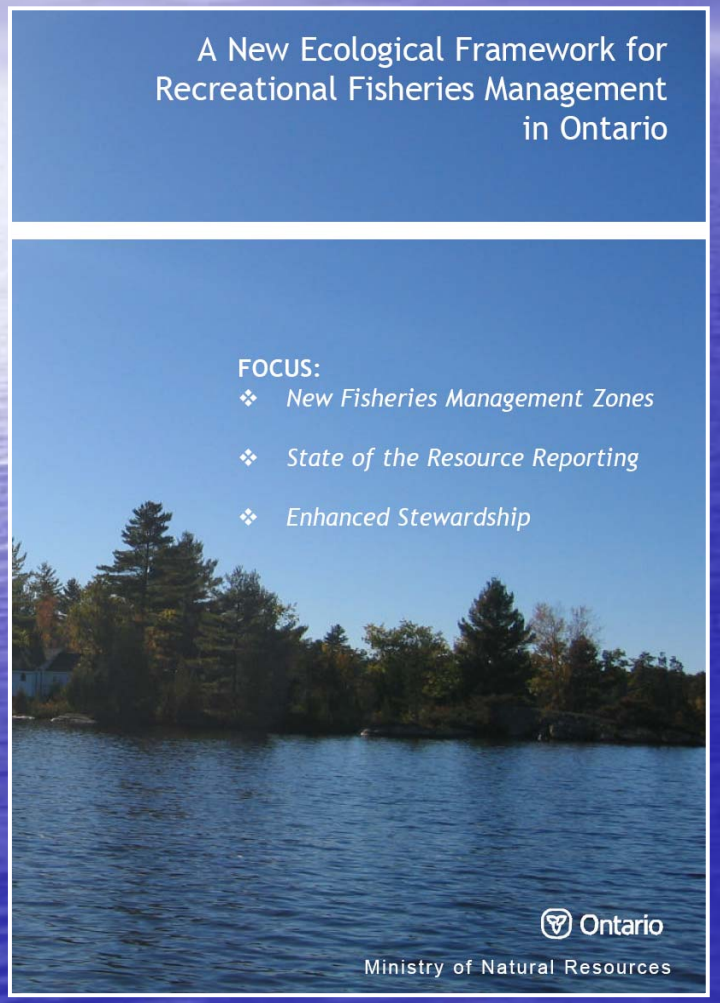
Anne Bendig
Management Biologist, Kemptville District
Lake Links Workshop
October 24, 2009



Talk Outline

- Background to the Broad-Scale Monitoring Program
- Field Implementation
- Reporting
- A Few Results
- Questions

Background

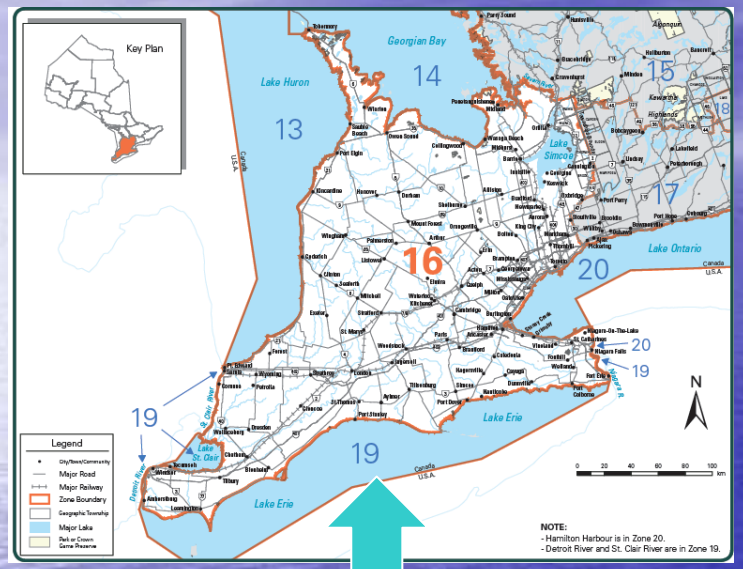


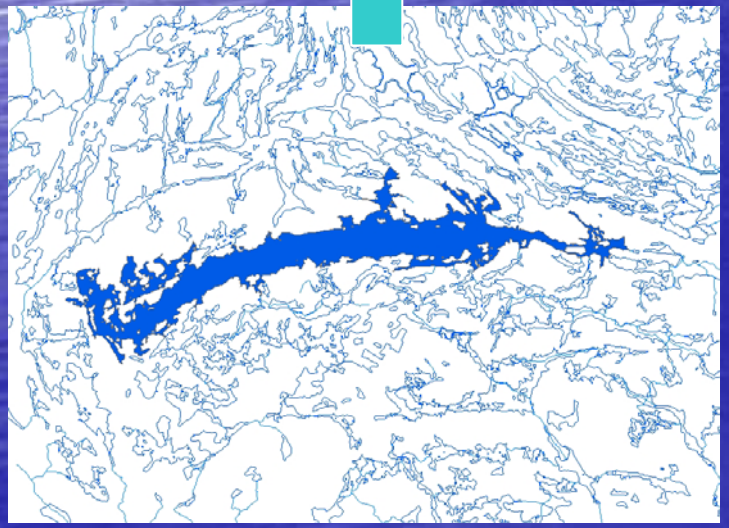
- Broad-scale monitoring:
  - a key component of the Ecological Framework for Fisheries Management in Ontario
  - implementation begins May 2008
  - province wide: Northwest, Northeast and Southern Regions

What is Ecological Framework for Fisheries Management?

- Three parts to EFFM:
  - Regulation streamlining
    - Consultation since 2005
    - Implemented Jan 2008
  - Fisheries Management Zone Councils
    - Three pilot Councils across Province with lead Districts
    - NWR (FMZ 6), NER (FMZ 10) & SR (FMZ 17)
    - Produce Zone Fisheries Management Plans/Strategies
  - Broad scale Monitoring
    - Produce State of the Resource reporting
    - Support Zone Council decision making process

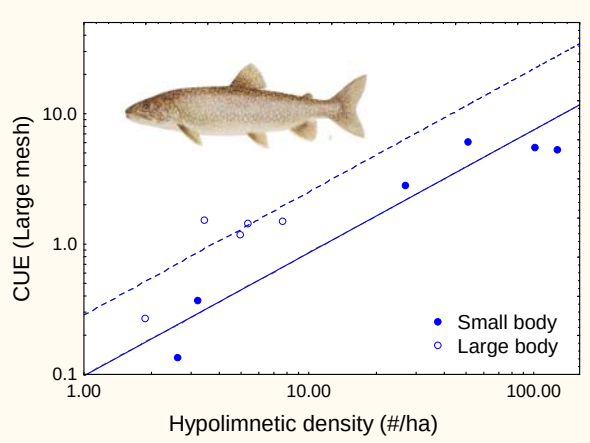
Background





- Broad-scale monitoring approach:
  - basic information on a large number of lakes
  - across a large geographic area
  - over a short period of time.
- The large geographic areas are the new fisheries management zones across Ontario.
- Moving from “individual lake” management to managing and monitoring fisheries resources on a “broad scale”

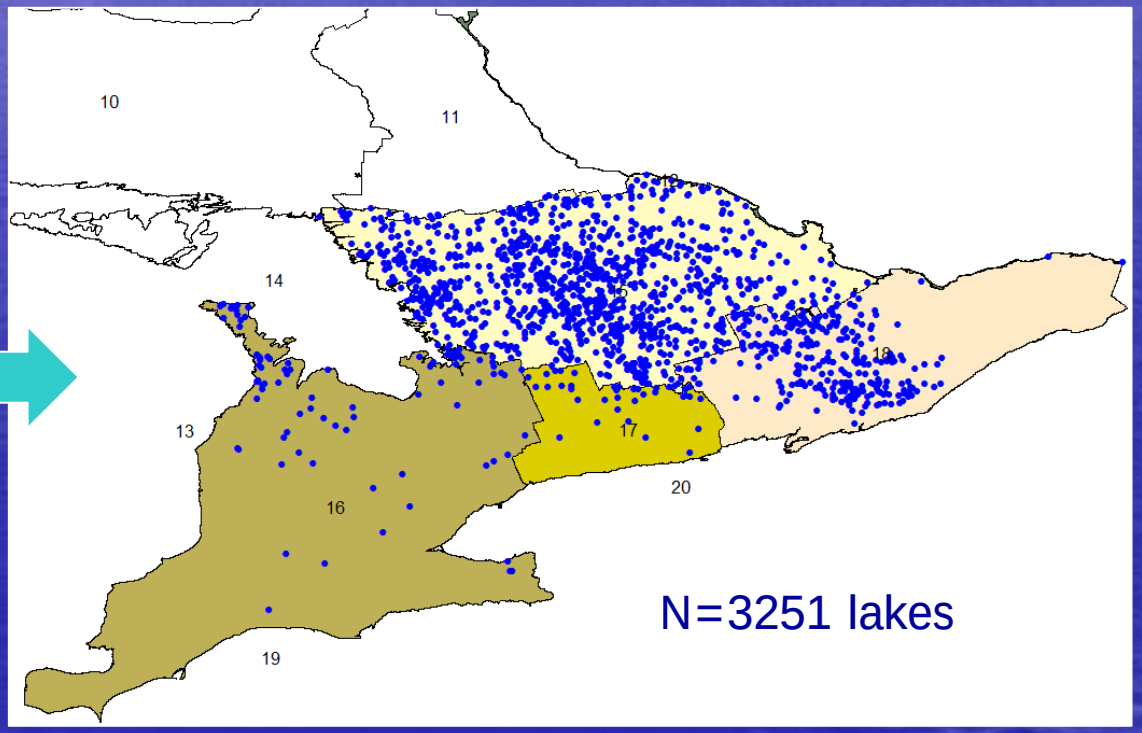
Background



- This monitoring approach will:
  - provide a effective way to supply fisheries information to managers
  - report with statistical confidence on the state of the resource
- In consultation with the fisheries management zone councils, MNR will use this information to assist with setting
  - objectives
  - strategies
  - actions

Background - Inland lakes broad-scale monitoring

Spatial Framework

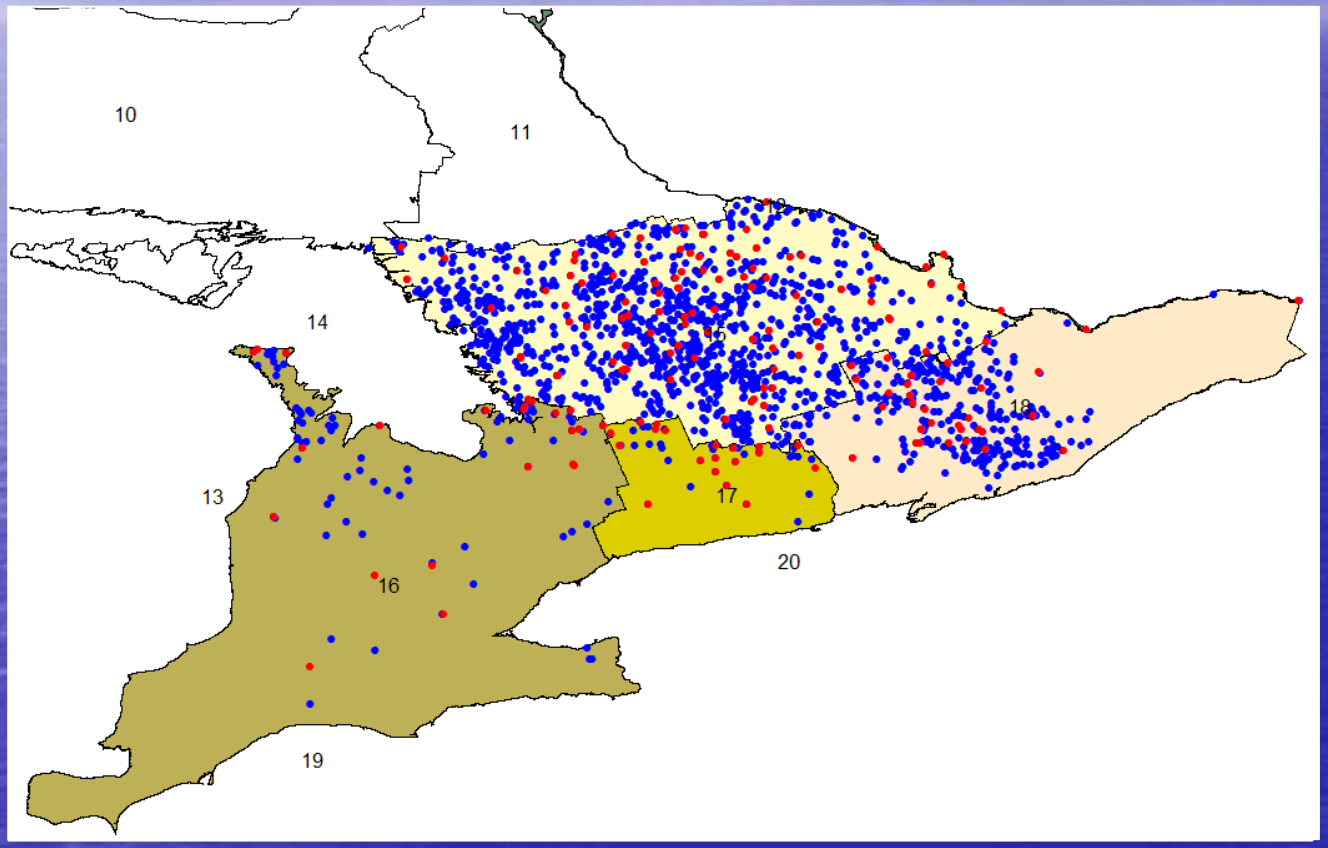


Over the next 5 years in the Southern Region, MNR plans to monitor approximately 255 lakes in Fisheries Management Zones 12, 15, 16, 17 and 18. This is about 5% of all the lakes in Southern Ontario.

Background - Inland lakes broad-scale monitoring

Spatial Framework

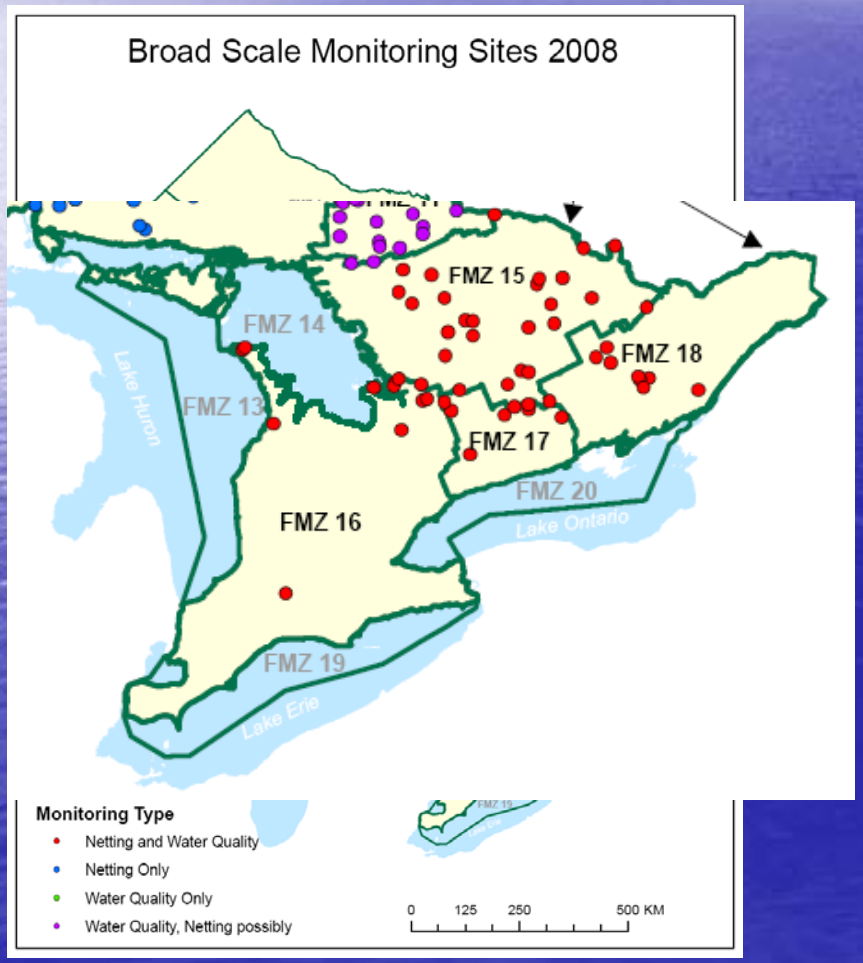
N lakes = 3251
N Fixed = 168
N Variable = 86



All lakes to be monitored will be randomly selected. Half the lakes selected will be monitored once every five years (referred to as fixed sites) and the rest will be reselected during every monitoring cycle (referred to as variable sites). A monitoring cycle is five years.

Background - Inland lakes broad-scale monitoring

Spatial Framework



- Summer of 2008:
  - Planning on sampling 56 Lakes in Southern Region
- Fixed lakes:
  - quicker detection of trends
  - needed for effective fisheries resource management on a landscape basis
- Variable lakes:
  - better information on the overall status of the fisheries resource
  - needed for State of Resource Reporting

Broadscale Assessment Program

- 2008 Lakes (FMZ 18) F=Fixed
  - White (F)
  - Bobs (F)
  - Buckshot (F)
  - Charleston (F)
  - Eagle (F)
  - Kashawakamak (F)
  - Leggat (F)
  - Mazinaw (F)
  - St. Andrews (F)

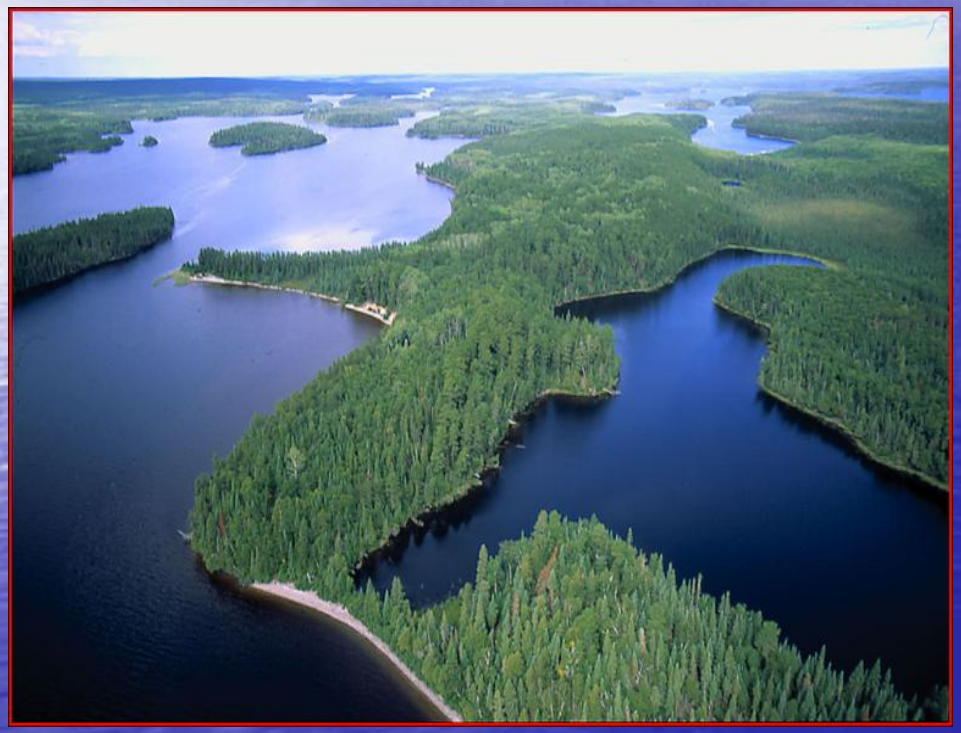
Broadscale Assessment Program

- 2009 Lakes (FMZ 18) F=Fixed
  - Big Rideau (F)
  - Palmerston (F)
  - Weslemkoon (F)
  - Dalhousie (F)
  - Mississippi (F)
  - Govan (F)

Broadscale Assessment Program

- 2010 (FMZ 18) (F=Fixed, V=Variable)
  - Big Clear (F)
  - Big Gull (F)
  - Birch (F)
  - Bull (F)
  - Gull (F)
  - Burridge (F)
  - Fourth Depot (F)
  - Moira (F)
  - Sharbot (F)
  - Shawenegog (F)
  - Sheffield Long (F)
  - Leatheroot (F)
  - Brule (F)
  - Crystal (F)
  - Christie (V)
  - Eagle (F)
  - Effingham (V)
  - Farrell (V)
  - Little John (V)
  - Little Long (V)
  - Sand (V)
  - Skootamatta (F)
  - South (V)
  - Sydenham (V)

Field Implementation



Aerial effort survey

- Water Quality data will be collected shortly after the ice is off the lakes (partnership with OMOE)
- Some habitat data including temperature and oxygen will be collected during the summer index netting
- Fishing effort will be estimated using aerial effort surveys throughout the fishing season, summer and winter

Field Implementation

Large fish netting

Small fish netting

- Information will be collected on:
  - Fish community diversity
  - Sport fish abundance
  - Life history characteristics of key species
  - invasive species (partnership with CAISN)
  - contaminant samples

- The netting will comprise of:
  - large mesh gill nets (large fish)
  - small mesh gill nets (small fish)

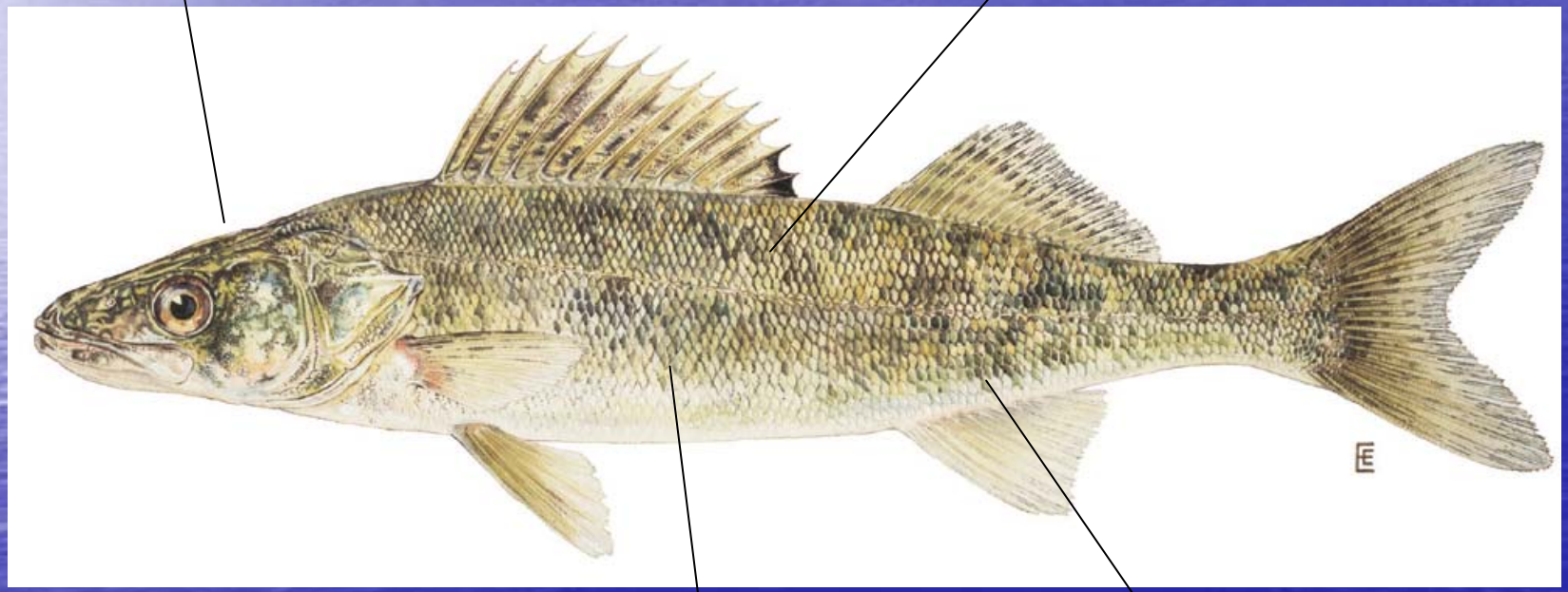
Field Implementation

- Gill nets are our primary tool for monitoring and assessing fish populations:
  - are easy to use, quick, efficient and least costly
- Gill netting is a common scientifically accepted technique
  - NASIN is proposed as a netting standard by the AFS - can compare lakes across North America
- Gill netting allows biologists to collect critical information:
  - size, age, growth, sex, maturity, fecundity, contaminants and stomach contents

Field Implementation

More accurate ageing structures (otoliths)

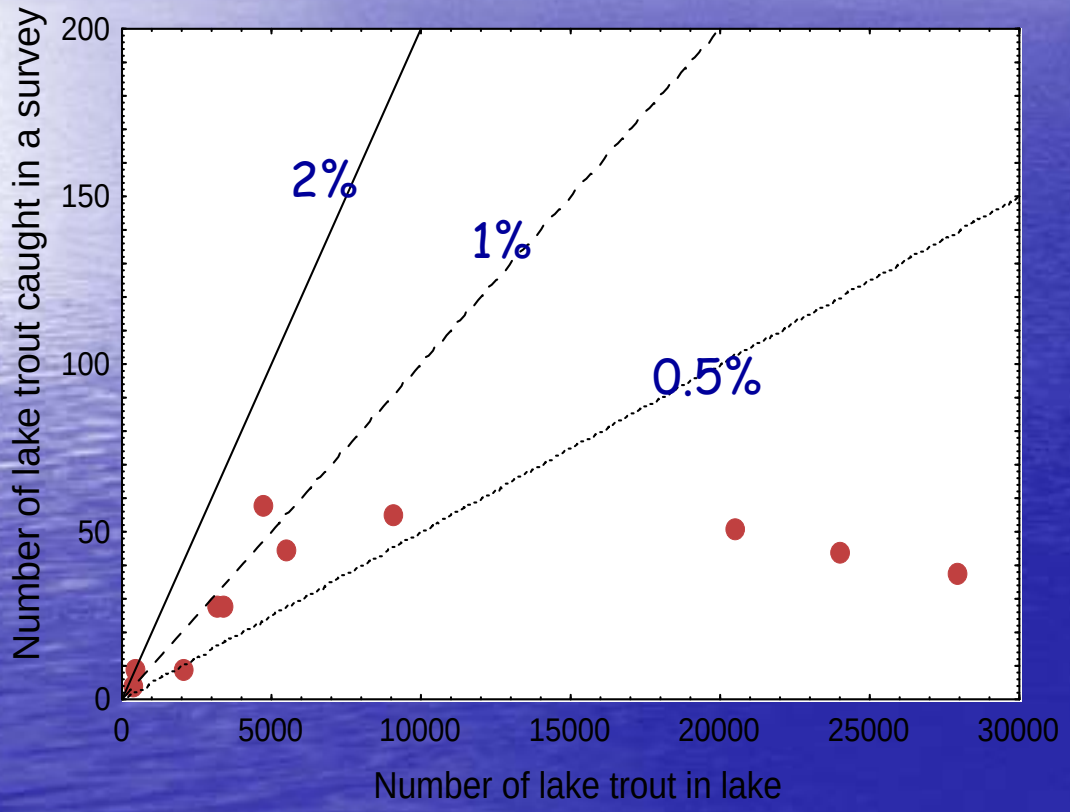
Contaminant samples



Stomach Contents

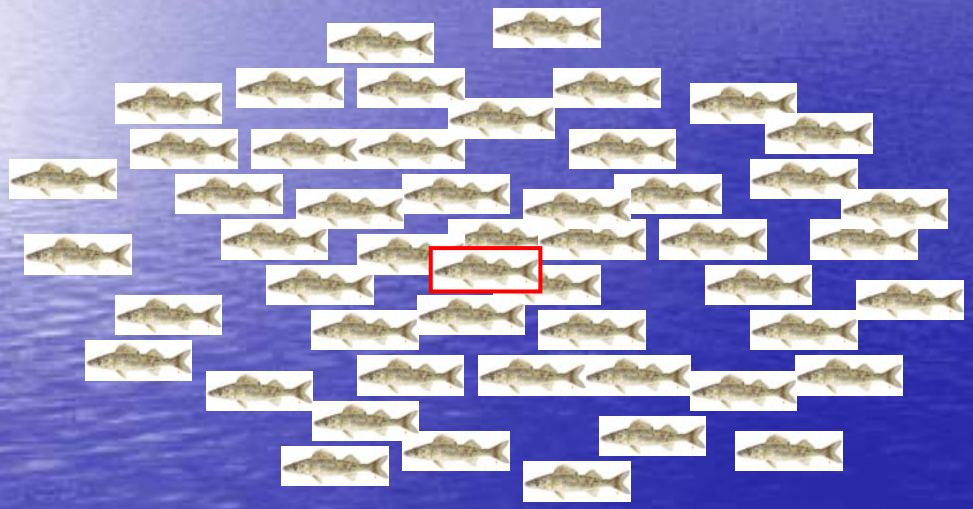
Sex, maturity and number of eggs (fecundity)

What is the sampling impact?



- Large mesh survey
- Lake trout
- Survey catches < 2% of the population
- Of this catch, the number of lake trout live released averaged 50%

What is the sampling impact?



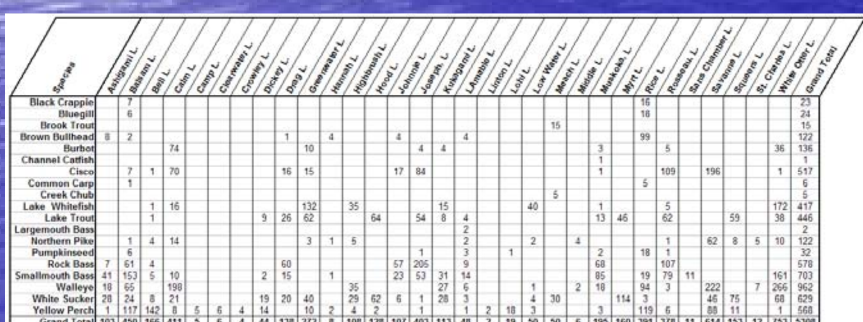
- Starting population (50 individuals)
- Natural mortality rate = 10% to 50% per year (starvation, predation, disease)
- captures < 2% of population 
- Impact is very small (occurs once every five years)

Reporting

Species	Ashigami L.	Balsam L.	Bell L.	Cairn L.	Camp L.	Clearwater L.	Crowley L.	Dickey L.	Drag L.	Greenwater L.	Hannah L.	Highbrush L.	Hood L.	Huron, L.	Johnnie L.	Kukagami L.	L'Amable L.	Linton L.	Loft L.	Low Water L.	Meach L.	Middle L.	Myrt L.	Pigeon L.	Rice L.	Sans Chambre L.	Savanne L.	Simcoe L.	Squirrels L.	St. Charles L.	White Otter L.	Whitefish L.	Grand Total
Alewife														2																			2
Black Crappie		1												2										9	8			11					31
Blacknose Shiner													3	1									28										32
Bluegill		17																						60	20			4					101
Bluntnose Minnow		5	4	1					9	3				17										2				6					47
Brook Silverside																								1									1
Brook Stickleback														1																			1
Brook Trout																					16												16
Brown Bullhead	17	1	1					5	1		1			5	8	2									15			13		1			70
Burbot				1												1															3		5
Chinook Salmon														2																			2
Cisco			10	6						5				3	2												5	4			15		50
Common Shiner									1					2														2					5
Creek Chub																					34												34
Emerald Shiner														18														52					70
Fallfish								8																									8
Freshwater Drum														1																			1
Golden Shiner	1	7						4	2				1				5				3			6									29
Iowa Darter					1																												1
Johnny Darter														2																			2
Lake Whitefish				1						1		1		6		9				1											11		30
Lake Chub													22	9									26								1		58
Lake Trout								7	4	1			16										1						5				34
Largemouth Bass		3							1					1			2							7	3			2					19
Logperch												2		2										1									5
Longnose Gar														8																			8
Longnose Sucker														4																			4
Mimic Shiner														76														44					120
Ninespine Stickleback														16																			16
Northern Pike			2	2							1	1								2		1					3			2	4	10	28
Northern Redbelly Dace													16										4										20
Pearl Dace										17																							17
Pumpkinseed		9	2			2		10	7					23	1		11		7			4		59	11			24		4			182
Rainbow Smelt														39														17					56
Rainbow Trout														2																			2
Rock Bass	13	40	18					15	109					178	46		19							51	2			138					629
Round Goby														91																			91
Round Whitefish														1																			1
Sculpin																													1				1
Slimy Sculpin																															1		1
Smallmouth Bass	18	34	14	1				37	19					9	24	8	16			1				40	4	7		59			6		297
Spotfin Shiner																								3				1					4
Spottail Shiner				1									1	205											4			4					215
Threespine Stickleback														1																			1
Trout-perch										4				6													3						13
Unknown													3	1														10					14
Walleye	16	11		17								12		9		6	2							8	3		8			1	24	22	139
White Perch														18																			18
White Sucker	4							6	2	6		1	7	58	1	10					24		11						12		5		147
Yellow Perch	38	124	8	42	242	165	213	5	104	111	120	18	108	655	12	100	20	157	190	4		99		326	343	1	268	657	63	63	49	369	4754
Grand Total	107	252	59	72	243	167	213	106	260	148	122	36	177	1475	94	216	75	157	197	8	77	104	70	573	413	8	287	1048	81	71	119	401	7434

- Data will be stored in corporate repositories
  - Accessible by MNR, the public and other agencies
- In most cases, analysis of data will be conducted by MNR biologists
  - technical reports
  - public state of the resource reports

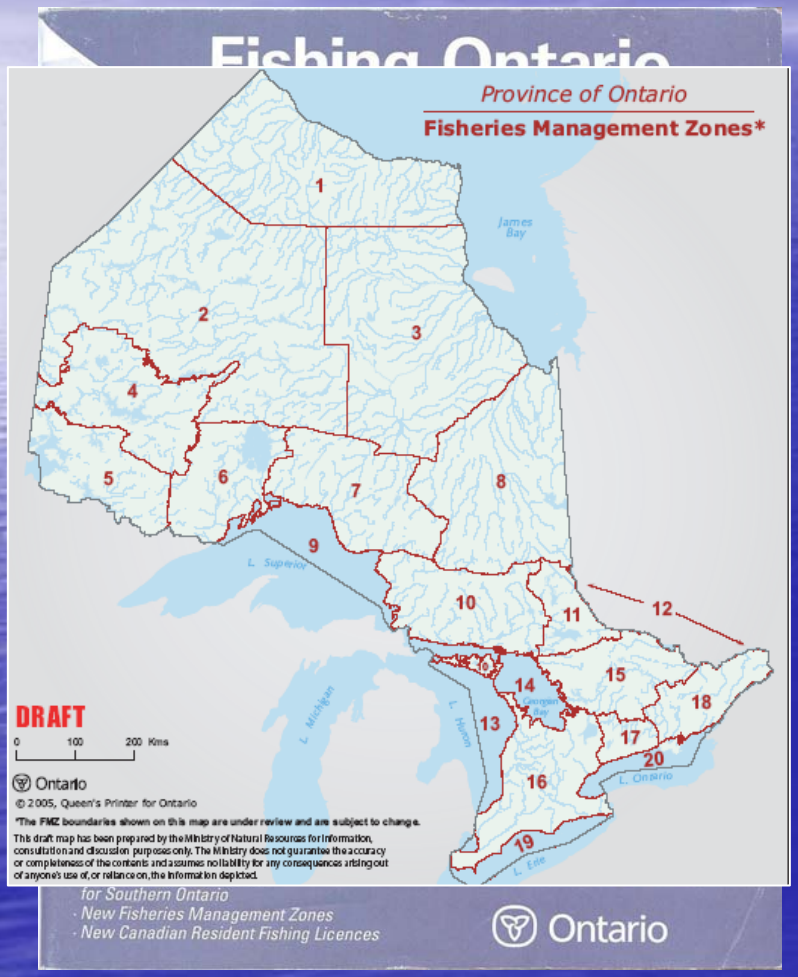
Reporting



Species	Ashigami L.	Balsam L.	Bell L.	Calm L.	Camp L.	Clearwater L.	Crowley L.	Dickey L.	Doig L.	Greenwater L.	Hannah L.	Highbrush L.	Hood L.	Johnnie L.	Joseph. L.	Kukagami L.	L'Amable L.	Linton L.	Lohi L.	Low Water L.	Meech L.	Middle L.	Muskoka. L.	Myrt L.	Rice L.	Rosseau. L.	Sans Chambre L.	Savanne L.	Squeers L.	St. Charles L.	White Otter L.	Grand Total
Black Crappie		7																							16							23
Bluegill		6																							18							24
Brook Trout																					15											15
Brown Bullhead	8	2							1		4			4			4								99							122
Burbot				74						10					4	4							3			5					36	136
Channel Catfish																							1									1
Cisco		7	1	70					16	15				17	84								1			109		196			1	517
Common Carp		1																							5							6
Creek Chub																					5											5
Lake Whitefish			1	16						132		35				15				40			1			5					172	417
Lake Trout			1					9	26	62			64		54	8	4						13	46		62			59		38	446
Largemouth Bass																	2															2
Northern Pike		1	4	14						3	1	5					2			2		4				1		62	8	5	10	122
Pumpkinseed		6													1		3		1				2		18	1						32
Rock Bass	7	61	4						60					57	205		9						68			107						578
Smallmouth Bass	41	153	5	10				2	15		1			23	53	31	14						85		19	79	11				161	703
Walleye	18	65		198								35				27	6			1		2	18		94	3		222		7	266	962
White Sucker	28	24	8	21				19	20	40		29	62	6	1	28	3			4	30			114	3			46	75		68	629
Yellow Perch	1	117	142	8	5	6	4	14		10	2	4	2		1		1	2	18	3			3		119	6		88	11		1	568
Grand Total	103	450	166	411	5	6	4	44	138	272	8	108	128	107	403	113	48	2	19	50	50	6	195	160	391	378	11	614	153	12	753	5308

- Some information such as estimation of fishing effort (aerial effort) and water quality can occur fairly quickly
- Other aspects will take approximately a year or more:
  - aging materials
  - contaminants
  - analyzed and interpreted by qualified staff

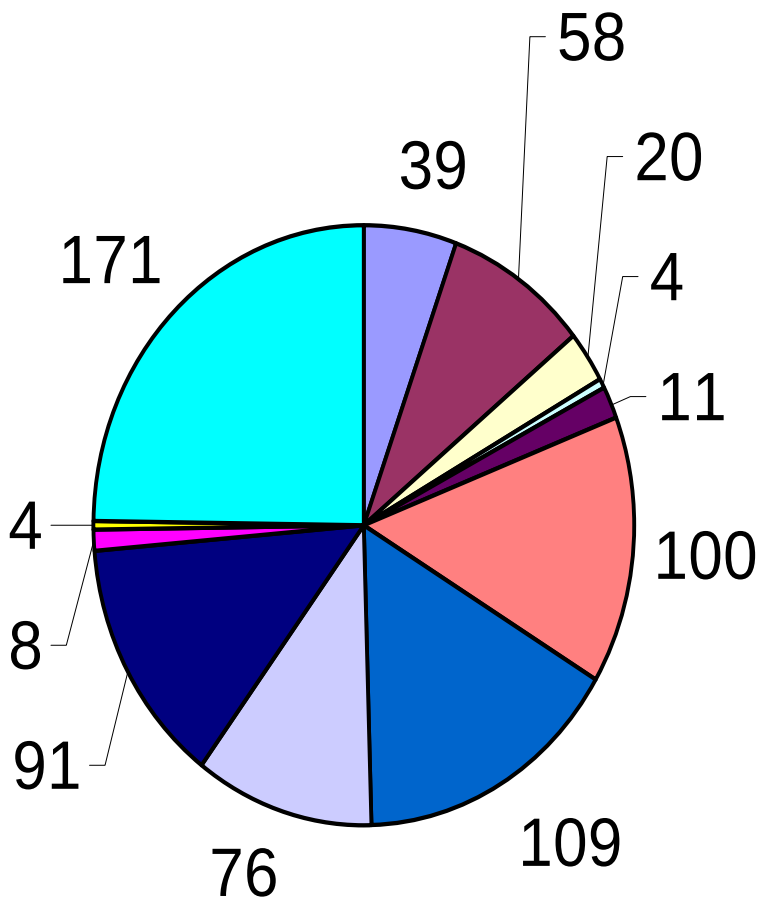
Reporting



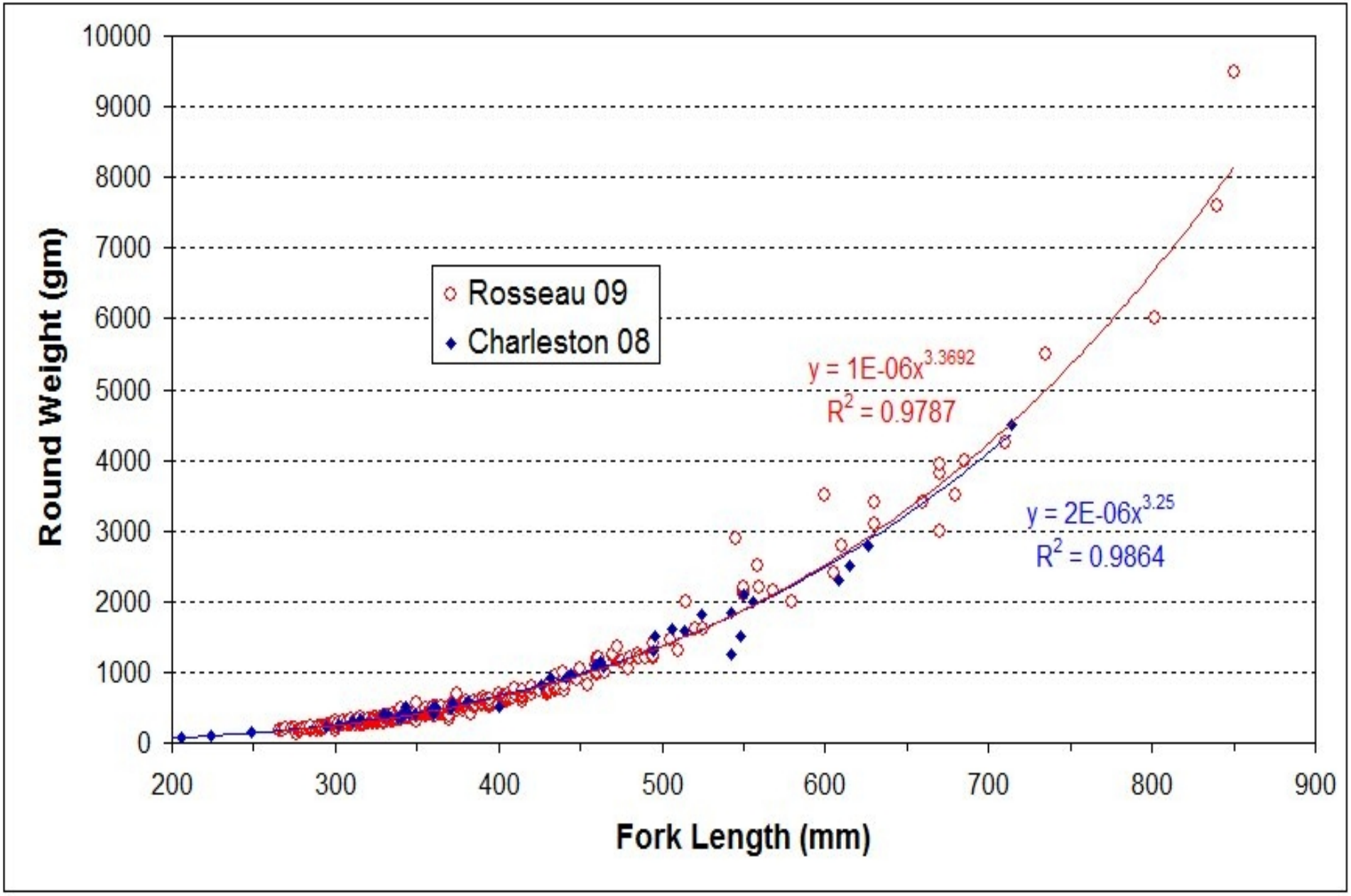
- MNR will use this data in consultation with the FMZ councils (one per FMZ) setting management strategies for the zone
- Management strategies and actions can include regulation changes to achieve specific management objectives

Charleston Lake Broad-scale 2008

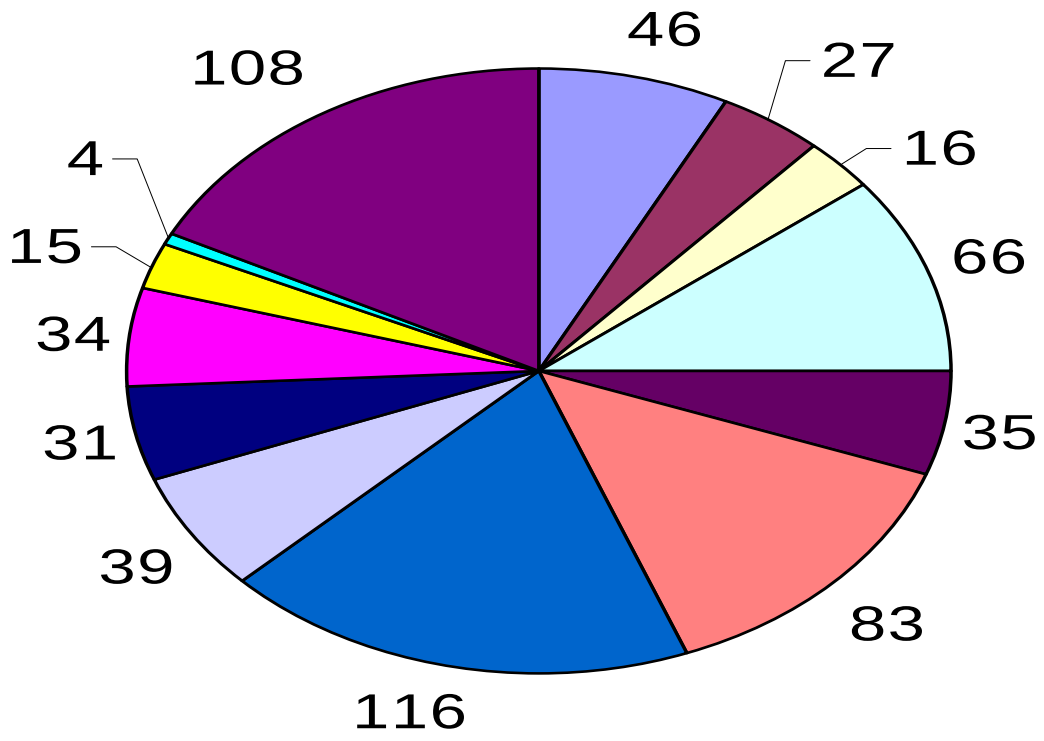
No. Caught In Large Mesh



- Lake trout
- Cisco
- N. Pike
- Y. Bullhead
- B. Bullhead
- Rock Bass
- Pumpkinseed
- Bluegill
- Smallmouth bass
- Largemouth bass
- B. Crappie
- Y. Perch


Round Weight (gm)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
200
300
400
500
600
700
800
900
Fork Length (mm)
Rosseau 09
Charleston 08
y = 1E-06x^3.3692
R^2 = 0.9787
y = 2E-06x^3.25
R^2 = 0.9864

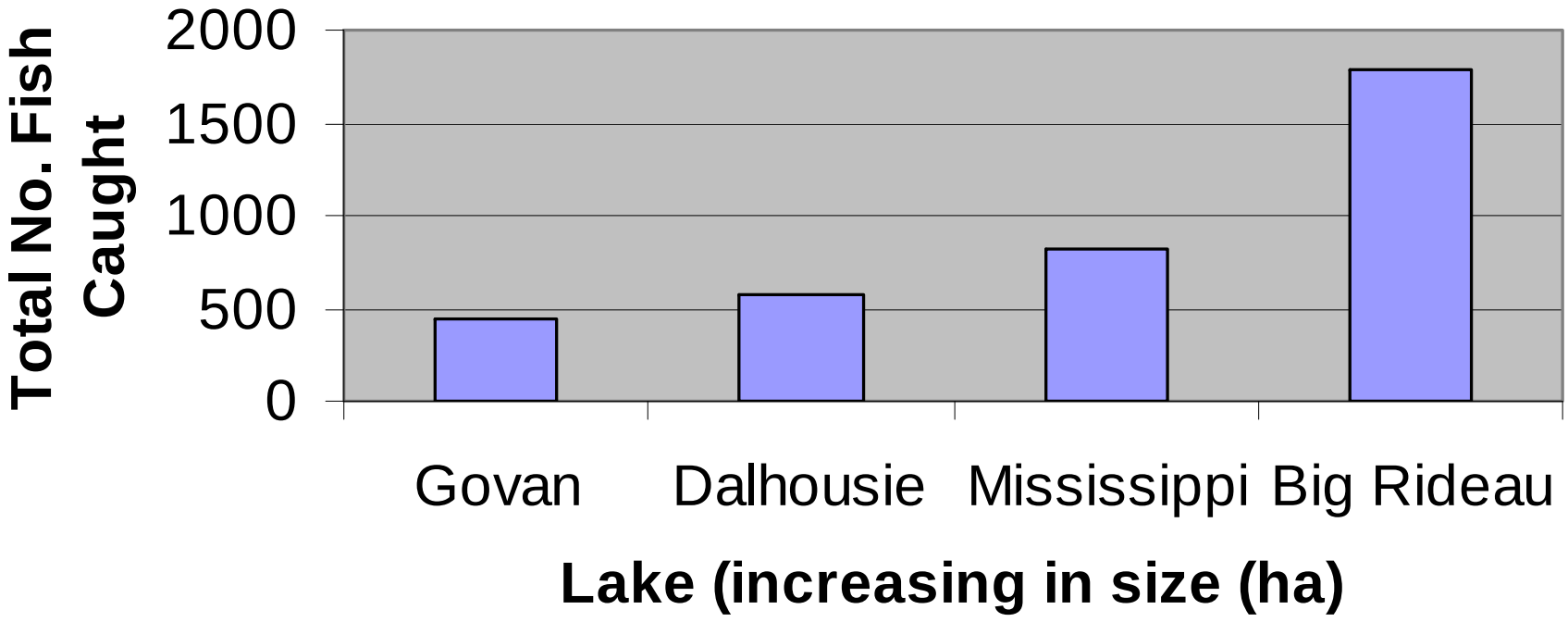
Big Rideau Broad-scale 2009
No. Caught In Large Mesh



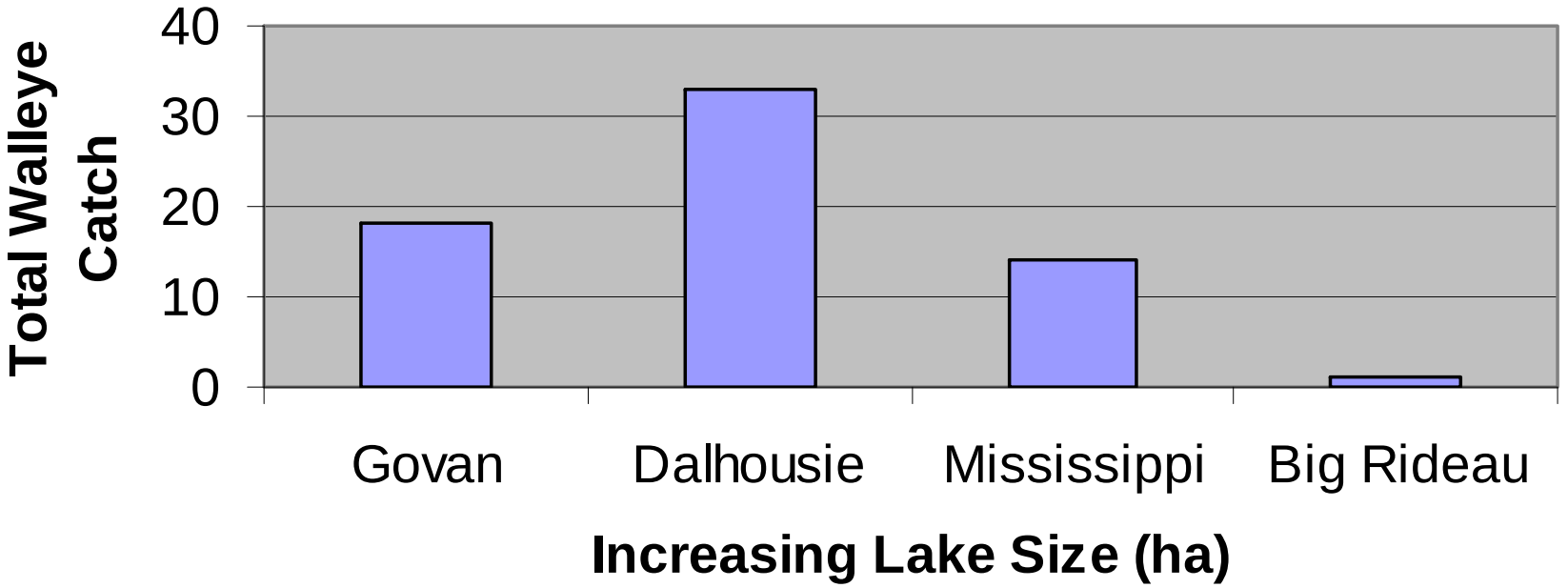
FMZ 18

Total Catch (all species) vs Catch Per Net (large & small mesh)

Broad-Scale Netting 2009 Total Catch (Small & Large Mesh)



Broad-Scale Netting 2009
Total Walleye Catch
(Small & Large Mesh)



Questions?