



PARRY SOUND AREA LAKE SUMMARIES



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Gord Pollock, Broker

Century 21 Granite Properties Ltd Brokerage
33 James Street, Parry Sound, Ontario P2A 1T6

Business: 705-746-2158 , Fax: 705-746-4746

Residence: 705-746-4816 , Cell: 705-774-0955

Website: www.gordpollock.com Email: gord@gordpollock.com

Six Mile Lake

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Location:

MNR District:..... Parry Sound
Geographic Township: Baxter & Gibson
Municipal Township: Georgian Bay
Watershed: Severn River
Angling Division: 15

Basin and Terrain Characteristics:

Lake Survey Year: 1968
Surface Area:..... 1,475 ha
Maximum Depth: 48.8 m
Mean Depth: 7.8 m
Perimeter: 84.8 km
Island shoreline: not available
Littoral Zone: 49% (of lake area has light penetration to bottom)
Thermal Regime: Cold to Cool to Warm
Shoreline Development: 750 cottages and residences (1973), undoubtedly much higher today; Six Mile Provincial Park
Access Points: Public
Water Level: Regulated; 4 outlet dams, 2 inlet dams
Crown Land: 20% of Shoreline

Water Quality:

(Parameters pertain to fisheries habitat only. For information on potability of water or contaminants, contact Min. of Health and Min. of Environment.)

Secchi reading: 4-5 m
Colour: (not recorded; but probably blue-green of Severn River)
Dissolved Oxygen: Hypolimnetic anoxic conditions do occur in some basins
Alkalinity: 50 – 100 mg/l; Moderate Buffering Capacity
pH: 7.5 – 8.0 (slightly basic)
Total Phosphorus: 11 – 13 ug/l

See “**Guide to Eating Ontario Sport Fish**”.

Consumption restrictions recommended for Walleye, Smallmouth Bass, Largemouth Bass, northern pike, Yellow Perch, Black Crappie.

Fisheries:

Game Fish Species: Walleye, Smallmouth Bass, Largemouth Bass, Northern Pike, Muskellunge, Lake Whitefish, Burbot, Channel Catfish, Smelt, Black Crappie.

Lake Trout (extinct; inconclusive if there was a native population in this lake or if they were present only by virtue of Ministry plantings).

Other species present: White Sucker, Pumpkinseed, Mottled Sculpin, Mimic Shiner, Iowa Darter, Rock Bass, Yellow Perch, Longnose Gar, Cisco, Northern Redhorse(1978), Bluntnose Minnow(1973), Flathead Minnow(1973), Brassy Minnow(1973), Johnny Darter(1973), Greenside Darter, Logperch(1973), Blacknose Shiner(1973), Blackchin Shiner(1973), Spottail Shiner(1973), Common Shiner(1973), Golden Shiner(1973), Longear Sunfish(1973), Ninespin Stickleback(1973), Bowfin(1973), Banded Killifish(1978), Grass Pickerel(1978).

Exotic Species: Zebra Mussels (first recorded 1996)

Stress Type: Over-fishing, Shoreline Development, Water Manipulation,

Use Type: Recreation, Angling

Stocking Record: (1969 is the last year fish plantings occurred.)

Stocking Year	Species	Number	Size / Stage
1969	Lake trout	2,280	yearling
1968	Lake trout	5,000	Yearling
1967	Lake trout Smallmouth bass	2,500 2,000	Juvenile Fry
1966	Lake trout Lake trout	5,900 20,000	Yearling Fingerling
1965	Rainbow trout Smallmouth bass Lake trout	4,000 2,000 20,000	Yearling Yearling Fingerling
1964	Lake trout	5,000	Yearling

	Smallmouth bass	2,000	Fingerling
1963	Smallmouth bass	2,000	Fingerling
1961	Lake trout	10,000	Fingerling
	Muskellunge	2,000	Fingerling
1960	Lake trout	10,000	Yearling
1959	Lake trout	16,800	Yearling
	Smallmouth bass	3,000	N/R
	Muskellunge	21,000	N/R
Additional, older stocking records available upon request. There are records of walleye fry plantings in 1954, 1953, 1950 and 1946. Largemouth plantings in 1954, 1952, and 1950. Whitefish were planted in 1953 only.			

Summary of Fisheries Studies / Reports:

McIntyre, E. 2003. **Pretty Channel walleye spawning site observation report, Six-Mile Lake – Township of Georgian Bay, Baxter Ward; Spring 2003.**

- Documents the sighting of 5-8 walleye and location; makes reference to preferred walleye spawning sites.
- Recommends regulated flows down Pretty Channel to optimize walleye spawning conditions be reduced to 20 cms for spawning and 15 cms for incubation.

McIntyre, E. 2002 **Walleye Spawners Index Survey Report At Pretty Channel, Six-Mile Lake, Spring of 2001**

- From three night of fishing effort using an 8'-trapnet, only 8 walleye were captured. We speculate that the ineffectiveness of our netting locations may have contributed significantly to our lack of success at capturing walleye.
- We are unsure to what degree our poor walleye catch is reflective of the size of the walleye spawning population in the vicinity.
- All of the eight walleye captured were small adults or juveniles, suggesting there is some recent recruitment to the spawning population.

McIntyre, E. 2000 **1999 Synoptic Trapnet Survey Report**

- The purpose of this project was to more conclusively assess the status of the near-shore fish community and in particular the walleye component. Concerns related to chronic walleye reproductive failure have recently been raised by Ontario Hydro in relation to it's Big Chute Hydro Generating Redevelopment Environmental Effects Monitoring Program.
- The fish community of Six-Mile Lake is characterized by very high productivity (23.2 kg. of fish caught / trapnet set) levels and exceptionally diverse species composition. In terms of biomass (fish weight), the catch was dominated by coarse fish that comprised 56.1% of the catch. Game fish comprised 40.7% and pan fish 3.1%. We acknowledge that due to 'species selectivity' of the gear – the catch is not representative of community composition. Nonetheless, the dominance of coarse fish in our catch is a 'persuasive indicator' that these species are very prominent in Six-Mile Lake.
- The walleye catch-per-unit-effort (C.U.E) by number was 0.6 ± 0.3 ($P > .05$) fish per net set. Relative to similar surveys previously conducted in the Parry Sound Area, this value is among the lowest. Size class distribution of walleye indicates poor levels of reproduction and/or recruitment. We speculate that a highly predatory and competitive fish community, intense historic angling pressure and limited 'optimal walleye habitat' are likely factors that contributed to the decline of walleye in Six-Mile Lake.

- For smallmouth bass, the observed C.U.E of 5.9 ± 1.4 ($P < 0.05$) is 'above average' relative to similar surveys previously conducted on Parry Sound Area lakes. Size class distribution indicates 'very good' levels of reproduction and recruitment and satisfactory and sustainable levels of mortality.
- Black crappie abundance looks 'very good' (C.U.E. of 4.7 ± 2.8 ; $P < .05$) – although we have no reference data for comparison. Reproduction and recruitment are excellent and mortality levels sustainable. Although less conclusive due to sampling biases, it would appear that largemouth bass in particular and northern pike populations are doing 'well' with no apparent threat to sustainability should current levels of reproduction, growth, recruitment and total mortality remain unchanged.

Pope, G.F. 1997 Big Chutes GS Redevelopment Operational Effects Monitoring Program 1996 and 1997

- Water quality observations were consistent with past years of study and fall within the environmental objectives as set in the Environmental Assessment.
- In 1997 walleye were not observed spawning at Pretty Channel or White Falls thus it is considered that a flow of 100 cms limits access to these sites.
- A visual reassessment was made at the Pretty channel site and it was concluded a flow of 30 cms would be more conducive to spawning than 50 cms.
- Netting yielded no captures of walleye in 1997.
- A relationship between spawning success at Pretty Channel and overall year class strength can not be determined from the collected data thus far.
- Rock bass and northern pike are the dominant catch in the index netting.
- Black crappie abundance in the netting has not increased since 1993.

Bell, G. 1997 Big Chute GS Redevelopment Study Water Level and Flow Monitoring – 1996

- Water flow data collected for 1996.
- Dam leakage: flows were not measured due to high flows and frequent spilling.
- Flows in Pretty Channel were approximately 44 cms to 93 cms during walleye spawning and 20 cms to 30 cms for the incubation period.

Pope, G.F. 1996 Big Chutes GS Redevelopment Operational Effects Monitoring Program 1994 and 1995

- The comparatively drier years of 1994 and 1995 favour the detection of any environmental response of the trophic or acidification of the lake due to reduced flushing but the resultant water quality parameters were similar to pre-operational conditions and were well within the environmental objectives of the Environmental Assessment.
- Cold water species were detected in the two deep basins, as in the past, but smaller numbers of fish were also detected in the other 3 basins for the first time.
- Spawning was observed in Pretty Channel in 1995. Observations of spawning are believed to be too late in 1994 thus only 3 or 4 walleye were observed.
- The lower flows of 1995 appeared to be more favourable to walleye spawning and confirm the ability of walleye to pass the rapids in Pretty Channel. Flows of 20 to 35 cms appear to allow walleye passage over those rapids. Flows at this range may be more beneficial than the present agreed to discharge level of 50 cms during walleye spawning.
- The 1993 discharge of 64 to 95 cms at Pretty Dam has a corresponding low walleye recruitment in the 2+ class as surveyed in 1995. Lower spill flow may be beneficial considering the index data and spawning

observations.

- Author determines the index netting is most efficient at catching year class 2+ walleye.
- Age of catch indicates that successful walleye spawning has resulted from 1992 to 1994.
- Two muskellunge were taken in the netting for the first time since monitoring had commenced in 1987.
- Rock Bass and northern pike continue to be the dominant species in the sampling.

Bell, G. 1996 Big Chute GS Redevelopment Study Water Level and Flow Monitoring – 1995

- Water flow data collected for 1995.
- Dam leakage: Pretty Channel – 3.6 cms, Six Mile – Not Measurable, Whites Fall – 1.2 cms and Crooked Bay - 0.15 cms
- Flow was approximately 30 cms during spawning and 20 cms for incubation.

Carson R.K. 1995 Big Chute GS Redevelopment Study Water Level and Flow Monitoring – 1994

- Water flow data collected for 1994.
- Dam leakage: Pretty Channel – 1.8 cms, Six Mile - 0.7 cms, Whites Fall – 1.0 cms and Crooked Bay - 0.04 cms
- Data indicates first year of utilizing the “Walleye Spawning Priority”.
- Flow was maintained at approximately 50 cms during spawning and 20 cms for incubation.

Pope, G.F. 1994 Big Chute GS Redevelopment Pre-Operational Environmental Effects Monitoring Program 1993 Addendum

- Report summaries the pre-operational water quality and fisheries information collected.
- Report specifies the objectives of the operational monitoring program, which are to verify predictions of operation phase effects, identify unpredicted effects of operation, assess the effectiveness of protection and mitigation measures, demonstrate compliance with commitments and identify the need for additional mitigative or compensatory actions.
- Walleye spawning habitat was developed at Big Chute, Little Chute and Whites Falls.

Beak Consultants 1993 Big Chute GS Redevelopment Pre-Operational Environmental Effects Monitoring Program 1993

- Despite increased flushing rates due to the shutdown of the generating station deoxygenation patterns remained the same as past years.
- Sonar confirms coldwater species are (cisco, whitefish) are widely distributed in spring and concentrate in the two deep basins (below 5 meters) by late summer.
- Black Crappie C.U.E. has increased rapidly since 1989.
- Juvenile walleye were collected in low numbers at each sampling station.
- Sampling indicates juvenile walleye are evenly and broadly distributed in suitable littoral zone habitats.
- The two index netting sampling sites, with four consecutive years of comparable sampling effort, show a decline in walleye catches.
- Sampling indicates weak walleye recruitment for year classes 1989, 90 & 91 and stronger for 1987 and 1988.
- Rock Bass and northern pike continue to be the dominant catch in the sampling.

- Due to high flow rates walleye were unable to reach the spawning gravels above Pretty Channel rapids but flows were high enough to allow the use of the north side of the Lost Channel narrows for spawning.

Williams, R.G. 1992 Big Chute GS Redevelopment Study Water Level and Flow Monitoring – 1992

- Flow monitoring data for Big Chute turbines, sluiceway and Pretty channel dam for 1992.
- Leakage flow was not measured at Pretty Dam, Six Mile Channel, White's Falls and Crooked Bay due to spill conditions.

Beak Consultants 1992 Big Chute GS Redevelopment Pre-Operational Environmental Effects Monitoring Program 1992

- Report summarizes water quality parameters collected previous to 1992 and lists the detailed data collected in 1992.
- Report notes water quality trends are consistent throughout the sample years thus far.
- A comprehensive netting program is introduced to provide base line information for comparative use in subsequent years of monitoring.
- The monitoring program's intent is to provide a better understanding of stock/habitat relationships in Six Mile Lake and ensure mitigation efforts are successful.
- A chinook salmon was netted in October of 1992. The salmon most likely migrated up the Macdonald River due to the Crooked Bay dam being open earlier than usual and with higher volumes. It is unknown how many salmon are in the lake or if fall spawning had occurred.
- Fall sampling in 1992 resulted in no juvenile walleye captures.
- For the past five years walleye have spawned with relatively consistent water temperature and at variable flow rates.
- As in 1990 and 91, high water flows prevented access to upper spawning areas of Pretty Channel in 1992. Walleye spawned below Pretty Channel rapids. Relatively low numbers of spawners were observed in 1992 whereas large numbers were observed at Port Severn.

Schiefer K. Beak Consultants 1991 Report on Water Quality and Fisheries Study on Six Mile Lake, 1990

- Coldwater species, predominantly cisco and lake whitefish, can be located in the two deeper basins by lake summer where oxygen levels and temperatures are suitable.
- Electrofishing and index netting yielded few juvenile walleye indicating a low 1989 year class or the fish were not occupying the same habitats as in 1989. A more standardized index netting program would be needed to examine year class strength.
- An additional electrofishing program in spring after ice-out may yield useful index results.
- Discharge was high at 102 to 108 cms during spawning. Observations indicate high discharge may have prevented walleye from reaching the Pretty Channel spawning grounds and instead spawning in Lost Channel.

Schiefer K, Beak Consultants 1990 **Report on Water Quality and Fisheries Study on Six Mile Lake, 1989**

- Water depth and flow velocities were within preferred ranges for walleye spawning (depth 0.3 to 0.8 m, velocity 0.4 to 0.8 m/s) for a discharge of 32 cms.
- Walleye eggs exposed at flows below 15 cms.
- Water temperature ranged from 6 to 9 degrees during spawning.
- Spawning commenced in mid to late April and was completed by the end of April for 1987, 1988 and 1989.
- Report recommends establishing four or five index netting stations annually or biannually in establishing a program to compare index CUE data for juvenile walleye.
- Black Crappies were captured in the netting and represents the first record of this species in Six Mile.

Ontario Hydro 1989 **Big Chute Generating Station Redevelopment Project Environmental Assessment (Draft)**

- Summarizes previous reports and past studies relating to the redevelopment options as above.
- Introduces the “Walleye Spawning Priority” to waterways operations designed to provide a more consistent environment for walleye spawning in Pretty Channel.
- The priority provides for 50 cubic meters per second water flow maintained during spawning and 20 cubic meters per second during incubation. 30 to 50 cubic meters per second is considered optimal for walleye spawning and this corresponds to velocities of 0.7 to 0.9 m/s near the spawning site.
- Based on observation, 10 cubic meters per second of flow appears to be the lower limit of discharge that maintains coverage of spawning beds thus 20 cubic meters per second would be a conservative estimate of flow to maintain water coverage of the spawning beds.
- Walleye spawning period begins when water temperatures reach 6 degrees or on April 15 at the latest and incubation period is between April 30th and May 15th.
- Temperature is considered to be the stimulus for the beginning of spawning rather than velocity or discharge.
- Spawning has been noted at 0.3 to 0.5 m/s in 1987 and 1988. Spawning subsurface site velocities can differ from surface velocities depending on profile and substrate.
- During most years walleye spawning may have been hindered due to high velocities.
- Considering the past unreliable conditions for spawning in Pretty Channel but corresponding strong walleye year classes in the creel surveys, walleye may have alternate spawning locations.
- Spawning and incubation flows will be maintained except when water is not available due to natural conditions.
- Results will be monitored and any potential changes will be discussed with cottage associations and will require MNR and TSW approvals.

Beak Consultants 1989 **Prediction of Big Chute Development on Trophic Status and pH in Six Mile Lake (Draft)**

- The study utilizes computer modeling calibrated to known water quality information to predict changes to Six Mile Lake due to the development of and 8mw or 10 mw station operated to accommodate minimum flow rates over walleye spawning and incubation.
- Flushing of the lake will be significantly slower but will remain faster than the average shield lake.
- Redevelopment is predicted to cause a small decrease in mean total phosphorous levels.

- Oxygen depletion rates in the hypolimnion are predicted to remain at present conditions.
- Potential fish yield is expected to remain at present levels due to negligible change in phosphorous and no addition loss of habitat due to deoxygenation.
- Alkalinity is predicted to remain unchanged but uncertainty exists for Long Lake basin. This basin is less alkaline than the rest of the lake but did eventually mix with the rest of the lake. The uncertainty is derived from the potential variability in exchange rates with the rest of the lake.
- Water quality is predicted to be the same as predevelopment under either redevelopment options.

Pope, G.F. 1988 **Big Chute HGS Redevelopment Water Quality of the Severn River/Six Mile Lake Spill Diversion System**

- Shallow areas (i.e. Crooked Bay) are suitable for warm-water fish production because they do not stratify and suffer no deoxygenation.
- Main and Deep basins stratify but oxygen levels are greater than 5mg/l thus the basin is suitable for cold and warm-water fish production.
- Long Lake basin stratifies and suffers deoxygenation in summer therefor fish production in the hypolimnion is suspect although the basin is suitable for warm-water fish production.
- Metalimnetic oxygen sag occurs in all stratified basins for about 5 meters, which could act as a fish barrier.
- Moderately deep basins (i.e. Transcanada Bay) where the thermocline is just above the bottom will have both hypolimnetic oxygen sag and metalimnetic sag producing a wide band of cool deoxygenated water thus these areas are suitable for warm-water fish production only.
- Oxygen remains within one or two meters of the sediment/water interface and the hypolimnetic water is not totally anoxic.
- Trace metal contaminants were found to be below detection limits.
- Surface water quality tends to reflect the water quality of the Severn River during the most recent spill event.
- Basins close to Pretty Channel respond rapidly to spill events and more slowly to leakage.
- In dry years the summer water quality remains similar to spring water quality of the Severn River due to the lack of spill events.
- Remote basins may not flush during spill events although wind effect may eventually produce a constant water quality in the epilimnion and the thermal turnovers will mix water from surface to bottom.
- The Severn River may not influence Long Basin thus conductivity response would primarily be from the direct watershed drainage basin.
- Severn River may be the source of much of the nitrate entering Six Mile Lake.
- Sediment phosphorous release rates are relatively low.
- Due to sediment and metalimnetic deoxygenation only two deep basins provide oxygenated habitat for cold water species.

Kristmanson, J.D. 1988 **Six Mile Lake Summer Creel Survey 1987**

- Walleye most sought species at 34%; northern pike 24%; smallmouth bass 19%; largemouth bass 17%; no preference 32%
- Walleye creel observed catch per unit effort was .048 fish/angler hour
- Smallmouth Bass creel observed catch per unit effort was .186 fish/angler hour
- Northern Pike creel observed catch per unit effort was .067 fish/angler hour
- Yield 2.89 kg/ha/year: 1978 - 0.28; 1973 - 1.91

Craig, R., Borecky R. & Edmonds, P 1978 **Six Mile Lake Fish Habitat and Harvest Report**

- Walleye is the most preferred target species followed by smallmouth bass
- Walleye creel observed catch per unit effort was .042 fish/angler hour
- Smallmouth Bass creel observed catch per unit effort was .063 fish/angler hour
- Northern Pike creel observed catch per unit effort was .013 fish/angler hour
- No lake trout were observed
- Deep areas on the lake have dissolved oxygen below the acceptable limit for fish to survive and depletion problems exist in some shallow near-shore weedy areas
- Oxygen levels favour a near-shore warm water bass and walleye fishery
- Lack of forage fish does not appear to be a limiting factor
- Stocking with coldwater fish (lake trout) has failed

Eckersley, M.J. & Graham, R.T. 1973 **Six Mile Lake Intensive Lake Survey Report**

- Spawning grounds for northern pike, muskellunge, largemouth bass, cisco and whitefish are excellent
- Spawning grounds for walleye and smallmouth bass are good
- Spawning grounds for lake trout are not common due to lack of proper substrate and water depth limitations
- Walleye is the most sought after species at 49.8% of people surveyed : northern pike 28.2%: smallmouth bass 25.9%; largemouth bass 8.1%; no preference 23.8%
- Walleye creel observed catch per unit effort was .045 fish/angler hour
- Northern Pike creel observed catch per unit effort was .026 fish/angler hour
- Smallmouth Bass creel observed catch per unit effort was .034 fish/angler hour
- Eutrophication is a problem – cottages, boaters and Lake Simcoe water source contributes
- Shoreline development consists of 750 cottages and 5 commercial establishments

Management Prescription:

Manage as a natural, self-sustaining warm and cool-water fishery.