

Mustang PFDs, 10 Mustang exposure suits, and an EPIRB. There is a CO₂ flooding system for the engine room, two fire pumps (one electric, one belt driven), and 3 smoke detectors. There is no fireman's outfit or emergency breathing devices. The crew has had fire fighting; CPR and First-Aid training and biologists and technician have had CPR and First-Aid training. There are annual updates on CPR and First-Aid. The captain received fire-fighting training once, and the engineer had extensive fire fighting and damage control training in the Navy. In-pool training with PFDs and life rafts is conducted periodically in Ann Arbor, most recently in April 2001.

The KAHO'S crew believes that vessel crews operating on the Great Lakes could spend more time addressing safety issues and training and that safety training should be and required for all persons who work on the vessel. They see heightened accident risks with some personnel who come aboard with little, if any, vessel safety training or experience. This increased risk is particularly true in bad weather when unstable footing and seasickness are likely. The KAHO's crew also cautions that using 2-person crews on non-fishing, transit days is risky because they could not handle some emergency situations that might occur. The crew believes falling overboard may be one of the major risks facing vessel crews working on the Great Lakes and that more attention needs to be given to man-overboard drills.

PROGRAM DESCRIPTION: From 1998-2000, the KAHO averaged 86 operating days per year on fish stock assessment activities. The 2000 vessel program for the KAHO was composed of seven cruises (mostly 12 days duration) beginning on April 24 and continuing through November 3. All of these cruises were directed toward fish stock assessment activities using bottom trawls (73% of scheduled effort) and gill nets (27% of effort). In addition, plankton samples were collected throughout the season during most of these surveys.

The current biological program is aimed mainly at prey fish assessment and lake trout rehabilitation. The seasonal timing sequence for each of the prey fish surveys is designed to optimize catches. Alewives were surveyed in April-May, smelt in June, and sculpins in October. Two other surveys provide information to support the lake trout rehabilitation program in Lake Ontario. A bottom trawl survey of juvenile lake trout was completed each July-August, and adult lake trout were collected each September. These surveys were initiated soon after USFWS established the LOBS in 1978. All of these activities, excepting sculpin assessment, are done in conjunction with NYDEC's Cape Vincent Fisheries Station staff and their vessel the SETH GREEN. This cooperative approach has been ongoing since these surveys began and it includes planning, sampling, data sharing and co-authored annual reports. Furthermore, the cooperation has extended to assisting each other at times when staffing or vessel problems made it difficult for one of the agencies to meet their sampling responsibilities.

The cruise schedule for 2000 is remarkably similar to the KAHO's schedule 20 years ago. The only major change was the absence of a cruise focused on reproductive success of yellow perch in the northeastern basin; that cruise was dropped in 1998 due to staff shortages and lack of operating funds. Based on the 2000 schedule, 92 percent of survey effort focused on maintaining long-term data series. A deepwater prey fish assessment survey and lake trout thiamine study are shorter-term activities that constituted 8 percent of the 2000 program. In addition to these scheduled program activities, the LOBS supported numerous "piggy-back" research and collaborative activities.

The LOBS also performed contract work, which usually had a strong link to program interests (e.g., *Diporeia* study), but some was done solely to earn operating dollars (e.g., military debris retrieval). In the final years under the USFWS, and under NBS and now USGS, leaders of the lake programs were encouraged to seek outside funding to help support the base-funded studies that generate their long-term fisheries data sets. Most of the money (less overhead) earned through contract work by the KAHO has accrued to the LOBS to help support the field program.

The LOBS staff indicate that in the final years with USFWS, with NBS, and in the initial years with USGS, base funding of their core, long-term program elements have not been adequate. However, GLSC staff add that it is now improving. They believe that operating budgets and staffing are insufficient to fully implement their current program and characterize their budgets over the last ten years as "erratic." They report situations in the past where there was not enough money to operate the KAHO, and where (in 1994) station staff accepted funding

from a citizen group for fuel, per diem, and dockage to conduct a cruise and had to solicit funding from outside sources for fuel. Staff reductions also reduced the station's productive capacity 3 years ago, when they lost one of three biologists. The current feeling is that the KAHO's potential is not fully realized because there is insufficient analytical capacity (scientists) to process the information that is currently being collected.

FUTURE PROGRAM: LOBS staff hope they will soon return to staffing levels they had in the 1980s, but they are not optimistic. They believe the station's program in 20-25 years will probably change very little and that the databases will be 40 years in length and even more valuable. However, they caution that if future staffing and funding do not improve, most of the program resources will be committed to maintaining the long-term data sets, at the expense of program flexibility, thus preventing new program expansion. If funding and staffing improve, they hope to schedule more vessel time for the KAHO, spend less time soliciting funds and writing funding proposals, employ better technology, expend more lake-wide effort on lake trout, and resume yellow perch work that was discontinued after 1997.

Over the next 20-25 years, the cooperative GLSC-NYDEC prey fish assessment program in Lake Ontario should continue to yield improved understanding of the fish community. Station scientists also expect that "piggy-back" research and collaborative work will continue to grow, particularly by integrating lower trophic level studies into the fisheries surveys. However, station scientists also caution that doing more collaborative work may have limits, especially if the time needed to work on associated projects diminishes what they see as their main responsibility – preyfish and lake trout research.

VESSEL SUITABILITY and FITNESS: During 40 years of operating on the Great Lakes, the KAHO has proven to be an extremely capable fisheries research vessel. The vessel's strengths include flexibility and comfortable crew accommodations. Lack of wet or dry labs and too much exposed work deck space are deficiencies the crew would like to see changed. Currently the KAHO is meeting program needs in Lake Ontario. Whether it meets future needs will depend primarily on how much base funding is provided for vessel maintenance and operations. The captain and engineer believe the KAHO is in "good shape", although the hull and electrical system need some work and all of the recommendations provided by a marine surveyor in 1997 have yet to be completely addressed. Station staff do not think the KAHO can be safely operated for another 20-25 years without a major refit sometime in the next 15 years. LOBS staff are unaware of any formal discussion by GLSC management about whether the KAHO will be replaced or refitted and they doubt they will be involved in the decision. Vessel management actions have been aimed at keeping the KAHO operating safely and on schedule to maintain long-term data sets. In several respects the KAHO would be a good candidate for a major refit. It is seaworthy, comfortable, and has an extremely flexible design; engines, reduction gears and generators are relatively new with low operating hours; all deck equipment has been replaced within the last 5 years; and hydraulic, steering, and autopilot systems were recently replaced. Furthermore, needed wet and dry lab workspace could be created with minimal restructuring.

VESSEL PROGRAM SUMMARY

NAME:	ARGO
OPERATOR:	New York State Department of Environmental Conservation (NYSDEC)
LOCATION:	Lake Erie
HOME PORT:	Dunkirk, New York
CAPTAIN:	Doug Zeller
LAB DIRECTOR:	Bill Culligan

VESSEL DESCRIPTION: The ARGO is a 42x16x5 ft., 36 ton steel fisheries research vessel designed by the Napier Co., Arbroath, Scotland. It was built by Goudy and Stevens in East Booth Bay Harbor, Maine in 1986. The ARGO is a stern trawler design propelled by a single Lugger 6466A diesel, which also powers the hydraulic system. The ARGO is fitted with 2 main winches (800 ft., 5/16" cable) mounted overhead on the covered deck, a Crossley 12 in. gill net hauler, and a 4ft.x 4ft. net drum for the trawl. Wheelhouse electronics include: Wood-Freeman autopilot, Furuno radar, Northstar GPS and Loran, Sitex and Eagle sounders, and ICOM and Unidex marine radios. Available spaces (sq. ft.) include: deck 225, wet lab/enclosed deck 120, and galley/crew quarters 129.



VESSEL OPERATION and MAINTENANCE: From 1998-2000, The ARGO averaged 71 operational days per year, and averaged 544 hours per year on the main engine, or 7.7 hours. per day. Total annual fuel use averaged 2,251 gallons for 1998-2000 field seasons, which represents a 4.1-gallon per hr. average. The three-year average fuel cost was \$1,537 per year.

Maintenance and repair costs were \$9,329, \$3,979 and \$16,145 for 1998-00, respectively. These costs included haul-outs reflected in 1998 and 2000 expenses. Haul-outs are normally scheduled on a two-year cycle. The three-year average for combined maintenance and annualized haul-out costs was \$9,818. New equipment purchased and installed during the last three years included: global positioning system (\$1,000), computer (\$2,500) and a sounder (\$200). Total annual cost for fuel, maintenance plus haul-out and new equipment (annualized) was \$12,588. These operational costs averaged \$177 per operating day, assuming a 71 operating day average for the ARGO during the 1998-2000 field seasons.

SAFETY: A stability test (inclining experiment) of the ARGO was completed at the time of commissioning in 1986 by the vessels designer Maurice Napier. No modifications or added weight have occurred since then that would alter the findings from the initial stability test. For fire fighting, the ARGO is outfitted with a Halon system in the engine room, two-1 ½ in. fire pumps (one off the main engine and the other operated electrically), and various alarms. There was no portable pump for fire fighting or de-watering, no fireman's outfits (SCBA), no emergency escape breathing devices and no USCG fire fighting training for the crew. The ARGO had a complete complement of approved PFDs with lights, life raft, EPIRBS and survival suits. Safety training for the ARGO's crew includes in-water survival suit familiarization drills, CPR and first-aid training and aquatic safety training sponsored by NYSDEC, Cornell University and the New York Chapter of the American Fisheries Society. Safety-at-Sea tapes are also available for crew review.

SURVEYS and INSPECTIONS: There have been no formal USCG safety inspections nor have there been any hull or vessel surveys, aside from an annual inspection of the main engine by a factory trained mechanic. During haul-outs the captain and shipyard staff do a visual inspection of hull plating and welds; no problems have noted to date. The ARGO is in excellent condition, and to date, there has been no loss of survey time due to mechanical failure.

VESSEL STAFFING: Normal staffing of the ARGO consists of a 4-5 member crew: the captain, a biologist, two permanent technicians, and on gillnet surveys, a seasonal technician. The biologist and technicians are involved in all aspects of gear use and data processing. Technicians also assist the captain running the boat, maintenance and operating fishing gear. They also assist the biologist in data processing.

The current requirements for a research vessel captain for the New York State Department of Environmental Conservation (NYSDEC) are at least 1 year experience operating a fishing trawler or fisheries research vessel and an USCG tonnage license. The recruitment protocol for vessel captain involves advertising for the position (usually the National Fisherman), evaluating experience and references, conducting an interview, and then choosing the best candidate. The ARGO's captain has ten years experience in the position and currently holds a 50-ton license. The starting and final salaries for a NYSDEC captain are \$32,076 and \$39,860, per year respectively. There is no formal career ladder for NYSDEC vessel captains, other than a series of in-grade longevity increases. From 1998-2000, the ARGO's captain averaged 77 hours overtime per year and earned another \$2,300 in overtime pay. Nearly all of the work done by the ARGO and its crew is on a day-trip basis, consequently, travel costs are minimal, and overtime costs are restricted primarily to long day trips.

Both permanent technicians have nearly ten years experience, and one is a licensed operator. Technicians need at least a two-year associate's degree in environmental science and they are hired off a list developed from a competitive test of knowledge and skills. Their annual starting and final salaries are \$25,451 and \$32,134. Each technician averaged an additional 60 hours overtime/year earning another \$1,450 per year. Travel expenses for each of the vessel crew averaged \$150 per year. A simulation of the total vessel crew annual operating expense, assuming median salaries for captain and technicians is \$64,611 or \$249 per day, assuming 260-day work year. For the 71-day vessel season, crew salaries would be \$17,679. These figures do not include the expense for biologists or for a seasonal technician who joins the crew during gillnet surveys. Combining operating, maintenance and staff costs yields a total expense of \$30,267 or \$426 per operating day.

PROGRAM DESCRIPTION: In 2000, the scheduled field season (not actual operational days) consisted of six surveys: May-October limnological surveys (15 days), May lake trout stocking (5 days), July hydroacoustics survey (13 days), August lake trout assessment survey (22 days), September warmwater fish stock assessment survey (22 days) and October young-of-year trawling (6 days). Of these 83 scheduled days, 76% were fisheries assessments, 18% were limnological surveys and 6% of the program effort was used for fish stocking activities. For the scheduled fisheries activities, 70% of effort utilized gillnets and 30% used trawls (21% midwater and 9% bottom trawls). Most of the long-term surveys have changed little since their inception. Eastern Basin smelt assessment, however, evolved from an initial bottom trawling survey to the current cooperative acoustic/midwater trawl assessment.

Most of the ARGO's fisheries investigations are directed toward maintaining long-term data series, which for NYSDEC's Lake Erie program began near the time of delivery of the ARGO in 1986. Eighty-one percent of the scheduled effort in 2000 were programs that began in 1986. Although the intent of these monitoring programs is to maintain a consistent sampling approach, there have been some modifications and adjustments to account for changes in Lake Erie's biological and physical conditions. NYSDEC staff cooperate with Pennsylvania Fish Commission, USGS – Sandusky and OMNR – Port Dover on nearly all of their survey programs. They also contribute data and expertise to several of the Lake Erie task group activities coordinated through the GLFC.

If 100-120 operating days represents the maximum potential use of a fisheries research vessel on the Great Lakes, then the 71 day average operating use of the ARGO represents 30-40% unused capacity. The crew of the ARGO, however, contributes another 35% of their field effort using smaller boats to do walleye tagging, fry sampling, limnological sampling and other activities. Staff felt the ARGO's program was not constrained by vessel capability, vessel funding or scientific staffing. They noted, however, that given additional monies and staff the ARGO could provide more information. Dunkirk staff feel the ARGO has more potential to generate data than staff have the ability to process.

The Dunkirk station just completed a 2-year, limnological research contract project for Cornell University. Relative to the prospects of conducting on-going contract work, the Dunkirk staff are not actively soliciting researchers for additional work. It is not necessary to use the ARGO and crew to generate operating or program funds for the Lake Erie project because they receive excellent funding support from NYSDEC. Further, there is little incentive to sell ship time, since there is not an easy or effective protocol for outside funds to flow directly to the Dunkirk station. Station staff are, however, receptive to any cooperative arrangements with other agencies or institutions that have similar programmatic interests.

FUTURE PROGRAM: NYSDEC's Lake Erie program in 20-25 years will probably look very similar to the current program. Staff believe the long-term monitoring perspectives provide the best approach to understanding of the Lake Erie fish community, hence their core program will continue to maintain those data sets. They also suggest that habitat and lower trophic studies may become a bigger component of future work, and they also believe work in the next two decades will emphasize even more collaboration with scientific staff outside their agency. If future budgets increased, they could see better utilization of the ARGO's survey potential by increasing analytical staff. They also envision one potential caution regarding future operations -- animal rights groups could restrict or eliminate traditional gillnet and trawl collection techniques that kill large numbers of fish. Prospects for additional personnel in 20-25 years are unlikely and staffing will probably remain unchanged from current levels.

VESSEL SUITABILITY and FITNESS: The ARGO currently meets the programmatic needs of the Dunkirk scientific staff, and it is expected to meet any program needs in the next 20-25 years. The ARGO is in excellent mechanical condition, and with continued good care, will provide excellent service in the future. Vessel strengths include a sturdy, safe, reliable and flexible sampling platform, which is also very inexpensive to operate. Major complaints are that it could have been longer to accommodate visiting scientific crew (women's quarters too), and that the boat is too slow (the most common complaint of all Great Lakes fishery vessels). In summary, the ARGO is a very good design for NYSDEC's Lake Erie program needs, it is in excellent shape, vessel crew staffing is adequate to meet current and future needs, and NYSDEC funding and support are excellent.

VESSEL PROGRAM SUMMARY

NAME: **ERIE EXPLORER**
OPERATOR: Ontario Ministry of Natural Resources
LOCATION: Lake Erie
HOME PORT: Port Dover, Ontario
CAPTAIN: Gord Ives
LAB DIRECTORS: Phil Ryan (Assessment) and Brian Shuter (Research)

VESSEL DESCRIPTION: The ERIE EXPLORER is a 62 x 20 x 6 ft, 64 ton steel fish tug that is outfitted for gillnetting and trawling in the eastern basin of Lake Erie. The vessel was designed and built by G. Hopper in 1982 for commercial fishing on Lake Huron. OMNR purchased the boat for the Port Dover fisheries station in 1995. The ERIE EXPLORER is powered by a Detroit Diesel 8V-92 Turbo (~400 BHP) that was rebuilt in 1998. Other equipment includes a Westerbeke 8kW generator, Hathaway split main winch, 30 in. Crossley gillnet puller, and HIAB articulating hydraulic crane. The navigational aid system consists of a Sperry Autopilot, Raytheon R-20X 24-mile radar, Furuno FCV 251 color sounder, Raytheon L750 sounder, Furuno GP-70 and GP-35 GPS's, NAVAD 7000A chart plotter, and Raytheon RAY82 marine radio.

VESSEL OPERATION and MAINTENANCE: During the 2000 season, the ERIE EXPLORER completed nearly 99 operational days conducting gillnet and trawl surveys in eastern Lake Erie. Over the last three seasons, the captain believes that annual engine use was approximately 750 hours per season. This represents a daily average of 7.6 hours, assuming 99-day operating seasons. Average fuel use over the last three years was approximately 6,400 gallons per year at an average cost of \$7,100⁷ per year. This represents an hourly fuel use of 8.5 gallons and daily fuel costs of \$72 per day.

The captain completes all of the routine maintenance on the ERIE EXPLORER. This includes: changing oil and filters, replacing belts, adjusting and cleaning injectors, gear box maintenance, top-side painting or any mechanical repairs that are not too complicated. If required, factory-trained professionals or skilled shipyard personnel do any major engine or equipment work. The captain schedules any necessary repairs. Maintenance schedules are based on manufacturer's recommendations and specifications, and the captain's experience with the equipment.

Haul-outs are scheduled on a five-year cycle, the last one occurring in 1996. The next haul-out is planned for September 2001, which will include the dry-dock, inspections, new shaft bearings, hull sandblasting and bottom painting at a cost of \$4,340. New equipment purchased and installed during the last three years included: backup sounder (\$1,400), SoftStart generator upgrade (\$2,800), and new bunks (\$1,050). Annualized costs for haul-outs and new equipment were \$2,618. Annual operational costs, not including regular maintenance, was \$9,718 per year. These costs averaged \$98 per operating day, assuming a 99 operating day average. Again, these estimates do not include any information on the past history of regular maintenance for the ERIE EXPLORER.

To date, the ERIE EXPLORER has provided relatively trouble-free operation. Little time has been lost to unforeseen mechanical breakdowns and there has not been a trend toward more frequent breakdowns in recent years. In the event of unexpected problems, there are excellent shipyard resources either in or close by Port Dover.

SAFETY: There has never been a stability test of the ERIE EXPLORER, nor is any test planned for the immediate future. There is a full complement of required safety gear including inflatable life raft, life rings, survival suits, personal flotation devices (PFD), flares, portable extinguishers and EPIRBs. There is no engine room extinguishing system, no fireman's outfit (SCBA), no emergency breathing devices, no portable pump, but there are electric and hydraulic fire pumps. Fire fighting training is included in a Marine Emergency Duty (MED)

⁷ This cost, and subsequent cost estimates, are in U.S. dollars where \$1.00 US buys \$1.43 CAN. Fuel cost was based on \$0.42 per liter.

training given to each new ministry employee and First-Aid and CPR training are provided on a regular basis.

SURVEYS and INSPECTIONS: The Canadian Coast Guard inspects all OMNR fisheries research vessels every four years – it is required by law. These surveys are detailed examinations of the hull and all the vessel systems. Also, they are conducted during dry-dock in order to facilitate hull and shaft inspections. If any defects are found during an inspection, a vessel is not permitted to leave dry-dock without making necessary repairs. The next inspection of the ERIE EXPLORER will occur in September 2001. In the past, OMNR has provided excellent support of their vessels for maintenance, repair and operation. The captain expects OMNR will provide whatever is needed if there are any repairs or adjustments needed to maintain compliance with CCG regulations.

VESSEL STAFFING: The usual crew for the ERIE EXPLORER is 3-5 persons, depending on the type of sampling required. At least three crewmembers are needed for trawling, but usually there are four. An additional crewmember is generally aboard for gillnetting surveys. The qualifications for captain are a CCG tonnage license, mechanical expertise and some commercial fishing experience. The primary responsibility of the captain is to maintain and operate the ERIE EXPLORER. The remainder of the crew is composed of fish technicians. These technicians are not dedicated specifically to the ERIE EXPLORER, but are used throughout the fisheries program wherever they may be needed. On the ERIE EXPLORER their responsibilities are to not only help with the operation of the boat, but to also ensure the proper collection of the data.

The starting and final salary for an OMNR vessel captain at Port Dover is \$28,430 and \$30,726⁸, respectively. There is no provision for overtime compensation to captains, neither time-and-half pay nor compensatory time off. In addition, there is no career ladder for Ontario's vessel captains. The fish technicians that make up the remainder of the crew have starting and final salaries of \$24,723 to \$27,620. In contrast to the captain, deck hands and technician staff can accrue time-and-half compensatory time off. Since the vessels are only operating on a day-trip status (i.e., no overnight, long-term cruises) travel costs are nil. A simulation of the ERIE EXPLORER vessel crew operating expense was calculated assuming a two-person crew, an average salary of \$29,578 for the captain and \$26,172 for the technician's average salary. This combined crew salary is \$55,749, or \$214 per day, assuming a 260-day work-year. For a 99-day field season, crew cost would be \$21,227. Combining operating, maintenance and staff costs yields the ERIE EXPLORER's total operating expense of \$30,945 or \$313 per operating day (99 day season), but this figure does not include normal maintenance costs.

PROGRAM DESCRIPTION: The ERIE EXPLORER's field program encompasses nearly the entire ice-free time period for eastern Lake Erie. Starting the year, a trawling/limnological index program is scheduled for one day per month in January, February, November and December, and two days per month from May through October (16 days). In March through May, walleyes will be captured with gillnet gear and tagged for an eastern basin rehabilitation program (35 days). A Long Point adult index-gillnetting program is scheduled from June through August (24 days). An interagency hydroacoustic-midwater trawl survey program is conducted in the eastern basin in July (5 days), and in the central basin in August (5 days). Adult lake trout are collected in August (10 days), as part of an interagency lake trout rehabilitation program. Finally, in October there is an outer bay juvenile index-trawling program (4 days). These activities result in a total program effort for the ERIE EXPLORER of 99 days.

The outer bay juvenile trawling and the Long Point adult indexing programs have been underway for more than two decades. These activities can be considered a core program and they represent nearly 30 percent of ERIE EXPLORER's scheduled effort. The hydroacoustic, lake trout netting and limnological indexing surveys were initiated in the 1990s as part of Port Dover's long-term assessment program. They represent 36 percent of the total survey effort. The walleye tagging survey, however, is a short-term, 5-year study -- the program began in 2000 and will terminate in 2005. Much of the information acquired during all these surveys is shared through the task group activities of the Lake Erie Committee of the GLFC. The hydroacoustic and lake trout netting work are cooperative surveys done with New York DEC, and to a lesser extent, the Pennsylvania FBC. Port Dover station has not done any contract work for other agencies, but they have collaborated with other scientists (e.g., U. of Waterloo, U. of Toronto and CCIW) and "piggy-back" studies are a common part of their program. The Port

⁸ Salaries are in US dollars, assuming a \$1.43 conversion.

Dover station is most likely to cooperate with other scientists and/or agencies that have common, compatible interests with OMNR.

The 99-day season that is currently scheduled for the ERIE EXPLORER is considered a near maximum use of vessel crew resources. With a mid-March through December possible field period, the maximum potential operational period is nearly 150 days, assuming 20 workdays per month and 4 days per month for gear and vessel maintenance. Port Dover staff indicate that with only one dedicated crewmember responsible for operation and maintenance of the ERIE EXPLORER their 99-day schedule is near optimum. Increasing survey time above 99 days can only be accomplished with more staff, particularly another vessel operator.

Port Dover station staff rate their agency's support of their vessel operation (e.g., fuel and maintenance) as outstanding – they are very satisfied and very pleased with this aspect of their operation. Staffing is another matter, however. If available, they would use any additional dollar support to improve staffing. Vessel capability and support dollars are very adequate.

FUTURE PROGRAM: The future foreseen by Port Dover staff is similar to that for many of the other biologists working on the Great Lakes. They hope their station will be active and productive in the next 20-25 years. They anticipate that those activities that were supported over the last 20 years will be an important component of future station activities. They also expect that their efforts will probably continue to broaden into habitat, near shore and lower trophic level studies. Cooperative work will likely expand ("piggy-back" research will grow), but it is unlikely that they could undertake any vessel-for-hire activities, particularly without staffing improvements. As mentioned previously, the main constraint on current program and any future activities is staffing. With current staffing, Port Dover is "just" meeting needs. Any future demands for new research and study, without additional technical and biological staff increases, will require cutting existing program to meet these new needs.

VESSEL SUITABILITY and FITNESS: The Port Dover station is very satisfied with the ERIE EXPLORER. It meets all the current needs of Port Dover's research and assessment biologists. Positive features of the boat are that it is safe, dependable, comfortable, and has lots of space and power. The only feature that could be improved would be better crew accommodations, but this is a lower priority considering that nearly all the work of the ERIE EXPLORER is done on a "day-trip" basis. Biologists and crew cannot see any future needs that could not be met with the vessel's current configuration. One of the advantages of a vessel made of steel and with extensive deck space is flexibility. Any future demands for new sampling gear or new deck equipment could be easily incorporated into the ERIE EXPLORER with a quick trip to a shipyard. The vessel has been well maintained, it has had comprehensive inspections by Canadian Coast Guard on a regular basis, and there are only 2,800 hours on the main engine since it was rebuilt. The agency has also had a proven record of providing excellent vessel support. This should ensure continued future success of Port Dover's vessel operations.

VESSEL PROGRAM SUMMARY

NAME:	PERCA
OPERATOR:	Pennsylvania Fish & Boat Commission (PFBC)
LOCATION:	Lake Erie
HOME PORT:	Erie, Pennsylvania
CAPTAIN:	Paul Atkinson
LAB DIRECTOR:	Roger Kenyon



VESSEL DESCRIPTION: The PERCA was designed and built as a law enforcement vessel by Paasch Boatyard, Erie, Pennsylvania in 1959. It was acquired by PFBC Division of Fisheries in 1969 and refitted by Paasch in 1969 and again in 1975. The PERCA's dimensions are 50 x 12 x 4 ft. and it displaces 20 tons. The hull is constructed of steel with aluminum topsides. It is fitted with a Detroit 6V-71 developing 235 hp (original engine) and there is no auxiliary. Deck machinery consists of a gasoline pony engine powered 12 inch Crossley gillnet lifter and a removable, two-drum Stroudsberg winch (600 ft of 3/8 in cable) powered by an 18 hp gas engine. There is neither a net drum nor a crane -- the 42 ft bottom trawl is pulled over the stern by hand, assisted, when required, by block and fall attached to a stern gallows. Wheelhouse electronics include: Furuno 16 mile radar, Furuno GPS, Furuno Loran C, Furuno color sounder and a Kenwood marine radio.

VESSEL OPERATION and MAINTENANCE COSTS: During the last three years, the PERCA typically completed 30 operational days per season and accumulated about 200 hours on the main engine each season. The PERCA burns 600 gallons of fuel per season at a cost of approximately \$775. Estimated rate of fuel use is 7-9 gallons per hour when cruising.

Maintenance costs from 1998 through 2000 were \$500, \$1100 and \$900, respectively, with \$833 as a 3-year average maintenance expense. The main engine was rebuilt in 1993 after a major failure, but only has 5,000 hours since 1974. The PERCA is dry-docked each winter at a cost of \$1,400. The bottom is painted each spring and every five years the hull is sandblasted to bright metal and repainted. Within the last three years new radar was installed at a cost of \$2,900. Annual maintenance cost, including an annualized new equipment expense, was \$3,200. The total annual cost for both maintenance and fuel is \$3,975.

The captain is responsible for all the routine maintenance on the PERCA, which includes painting, engine service, filter and belt replacements, as well as somewhat more involved service, e.g., replacing injectors, setting injectors and valves. The captain also determines what maintenance and repairs are needed based on his experience and manufacturer's recommendations. More involved engine service or repairs are made by factory or other skilled mechanics. There is good access in Erie for parts, service and boat yard facilities. Station staff characterize their agency's support for maintenance and repairs as very good. They never have a problem getting the funding they need to adequately maintain the PERCA. The Erie Station lost survey time in the spring 1993 when the PERCA's main engine failed. In recent years, there has been a higher frequency of unforeseen repairs, and more care and attention are needed to maintain the boat.

VESSEL STAFFING: Normal staffing for the PERCA is three crewmembers during trawling and four during gillnetting. The captain is aided by two permanent biologists and one seasonal technician. One of the crew biologists is also the captain's supervisor, but this has not resulted in any conflicts because the captain's authority has not been questioned on issues related to vessel operation and on-board safety. The captain began working aboard the PERCA in 1978 and assumed the captain's position in 1983. Current requirements for the job are a United States Coast Guard (USCC) master's license, fishing and trawl gear experience, and good mechanical skills. Starting and final salaries are \$27,900 and \$42,093 based on a 20-step pay scale. The captain also qualifies

for time-and-half overtime, and accrued approximately 70 hours per year, mostly from acoustic surveys. This added another \$2,000 per year to the captain's annual pay. The small amount of shoreline and good cruise speed (12 kts) of the PERCA mean the furthest sampling site is only a 1.5 hrs steam. Consequently, all of the work is done on a day-trip basis without much overtime or travel expenses. A simulation of a PFBC captain's expense, assuming a median salary, would be \$34,997 per year or \$135 per day and a seasonal boat technician salary is another \$63 per day. The total crew cost to run the PERCA for a 30-day season is \$5,950 or \$198 per operating day. Adding fuel, maintenance and annualized new equipment costs results in a total operational cost of \$9,925 or \$331 per operational day.

The major change in the vessel program in recent years was the loss of a dedicated vessel technician who assisted the captain with vessel and gear maintenance. The loss of this permanent position was compensated by hiring a seasonal technician each year. The purpose of this change was the cost savings realized by paying a boat technician at a seasonal rate rather than a permanent, higher rate with added benefits. In addition, savings were incurred by not having a technician employed during the winter season. This staffing arrangement is only effective if the skills and experience of the seasonal and permanent crew are similar, but in nearly all cases they are not. A permanent vessel technician is preferred because their experience and vessel familiarity enable the captain to pay more attention to the safe operation of their boat and less attention to directing and overseeing an inexperienced crewmember. This is even more evident during bad weather or an emergency situation. Furthermore, at a time when the commercial fishing industry is declining, it is increasingly difficult to find temporary workers who have appropriate vessel and gear skills.

SAFETY, SURVEYS and INSPECTIONS: Other than annual, in-house inspections by the captain, who is an USCG veteran, there have been no formal inspections of the PERCA. There has never been a stability test nor is any test planned in the immediate future. At the same time, the captain describes the PERCA as being uncomfortable in a beam sea. There is a hesitancy by station staff to have the vessel surveyed because the PERCA is scheduled to be replaced in the near future. The PERCA is fitted with an inflatable life raft, three survival suits, 15 type I PFDs. There is no EPIRB, no engine room flooding system, no smoke detectors, and no fireman's outfit. The captain and crew receive CPR and first aid training annually, and the captain had some fire fighting training during his service time with the Coast Guard. Captain and crewmembers receive mandatory, agency boating safety instruction or training updates every three years.

PROGRAM DESCRIPTION: The field season for the Erie Station begins in May with a limnological sampling program done 2 days per month through November. Most of this work is done with a smaller skiff, but 4-5 days are scheduled for the PERCA. In mid-May there is a Spring Assessment of percids using gillnet and trawl at several index sites (15 days). In July, there is a Hydroacoustic Survey of the eastern basin of Lake Erie directed at smelt and pelagic prey fish (2 nights). In August, there is a Coldwater Sampling program for lake trout and burbot (10-12 days). From September through early-November there is a Fall Assessment using gillnets and trawls at the same index sites sampled during the spring (18 days). The main interest in the fall is collecting young-of-year percids, but there is also "piggy back" collections of benthos and other limnological sampling. This field season represents a scheduled 45-52 day program for the PERCA. Nearly all the information collected by the PERCA is contributed to Lake Erie task group technical sessions. Furthermore, the lake trout and acoustic work are both cooperative surveys done with NYSDEC and OMNR.

The Erie Station's program today is very similar to what they did 20 years ago. The spring and fall index surveys have been ongoing since 1971 and the lake trout sampling since 1980. The acoustic and limnological sampling are the only new additions since then. Twenty years ago the PERCA was operating about 75 days per season, compared to 45-52 days now. Much of the early work was exploring a new resource, because there was little previous work to provide a baseline. Also, earlier emphasis was on very intensive sampling, which subsequent analysis showed was overkill and inefficient. But staffing is probably the main reason why the PERCA is not scheduled more heavily. The PERCA lost a permanent boat technician and boat biologists have more demands on their time today than in previous years. A tight fiscal environment has also created problems with seasonal, temporary staffing. Two years ago the PERCA was tied to the dock because PFBC financial problems lead to layoffs of the Erie Station's temporary workers. Collectively the result is a vessel program that is directed

solely at maintaining long-term data sets, with few staff resources to do much more. When asked how they would rate their agency's support of their vessel program, station staff indicated a 3 1/2 of 5. They are satisfied with the operation and maintenance support, but their major need is better vessel crew staffing.

All of the activities associated with the PERCA are supported with federal aid dollars. Most of these funds are tied to completion of reports and information that will be used in Lake Erie task group activities. Station staff have assisted other agencies and groups, but there is less enthusiasm in partnering and doing contract work. Contract work is perceived to constrain scheduling flexibility for in-house work, put demands on limited staff resources, and increase personal liability risks because of inexperienced workers. There is also a concern that outside scientists may demand more from boat and crew because they have purchased the vessel time. Finally, none of the money earned from contract work would find its way back to the Erie program; hence, there is little incentive to fill-in the PERCA's schedule with outside work.

FUTURE PROGRAM: Station staff could see a future with more, new demands and a program that may be less likely to meet those demands. They see dramatic changes in fish populations, continuing effects from exotics, more new exotics and greater demands for water use by a growing human population. The recent trend in lower fish yields and declining production will probably continue, too. There will undoubtedly be a suite of new problems that can only be imagined at the present time. Practically, Erie Station's program will probably shift somewhat toward more "piggy back" work directed toward habitat and lower trophic level research. However, the field program in 20-25 years will continue to focus on those long-term monitoring activities that represent the current core program. Without additional staff, it is unlikely that future demands can be met. It will be even more difficult for future staff to discontinue those activities that current staff have worked so hard to maintain – the valued 20 to 30 year data sets of today will be the more valued 40 to 50 year data sets of tomorrow.

VESSEL SUITABILITY and FITNESS: Without a replacement or a major refit of the PERCA, Erie Station staff do not see a PFBC vessel program on Lake Erie in 20-25 years. The positive characteristics of the PERCA are its speed and its modest operating costs. However, features that need improvement include: vessel handling characteristics, limited deck space, no fish processing facilities, no dry lab space, inadequate sanitation facilities, no auxiliary, and the lack of a hydraulic system. All these deficiencies also represent features they hope to see in a new vessel. Major fitness concerns are with pitting on hull plating (50% of 5/16 in plate), stuffing box and rudderpost leaks, faulty plumbing and old deck machinery. Some of these repairs would have been accomplished earlier, however, there is a concern that doing too much to update the PERCA may jeopardize support for its replacement.

A major refit of the PERCA is not considered a viable alternative because it lacks some essential design characteristics that are required to meet future needs, e.g., deck space and handling characteristics. With respect to a replacement, there has been recent public interest and support for a new vessel, and there have been suggestions that funds obtained from the buyout of commercial gillnet fishermen in the early 1990s be used to help subsidize new vessel construction. This initiative is not unlike the experience of many other agencies that have successfully built or replaced a new fisheries research vessel on the Great Lakes. Because fisheries research vessels are likely to be the most expensive single pieces of equipment operated by resource agencies, strong public/political support is a crucial component in any procurement process. PFBC central office staff are now trying to move in a positive way toward beginning the replacement process for the PERCA.

VESSEL PROGRAM SUMMARY

NAME: GRANDON
OPERATOR: Ohio Division of Wildlife
LOCATION: Lake Erie
HOME PORT: Fairport Harbor, Ohio
CAPTAIN: Bob Bennett
LAB DIRECTOR: Kevin Kayle



VESSEL DESCRIPTION: The GRANDON is a 47 x 16 x 5.5 ft., 50 ton steel fisheries research vessel designed by the Napier Co., Arbroath, Scotland. It was built by Washburn and Doughty of Booth Bay, Maine in 1991. The GRANDON is stern trawler design propelled by a single Caterpillar 3208 and is fitted with a Wood-Freeman bow thruster, 20kW Northern Lights M854v-20N generator, 2 main winches (800 ft., ¼ in. cable) mounted overhead on the shelter deck, a limnological winch (100 ft., 1/8 in. cable), a Crossley 12 inch gillnet hauler, and a net drum (4 ft. x 4 ft.). Wheelhouse electronics include a Wood-Freeman autopilot, Furuno radar, Northstar GPS, Furuno 5CV561 sounder and an ICOM marine radio. Available spaces (sq. ft.) include: deck 300, wet lab/enclosed deck 300, galley/wheelhouse 120, and bunk area 120 sq. ft.

VESSEL OPERATION and MAINTENANCE: From 1998 to 2000, the GRANDON averaged 39 operating days per season, e.g., 44, 29 and 43 days, respectively. Operational hours on the main engine average approximately 400 hours per year and there are 4,579 hours on the main engine. The GRANDON operates as a day boat throughout the field season, i.e., the crew travels back to Fairport Harbor each night, and therefore, overnight travel is minimal. The GRANDON uses approximately 1,800 gallons of fuel each season or roughly 4.5 gallons per hour. Budgeted fuel cost for 2001 surveys is \$2,100.

The captain does all of the routine maintenance (e.g. oil changes, fuel filter and belt replacements etc.) on the GRANDON and he also schedules more detailed maintenance and repairs. The engine manufacturer's factory mechanic does all the mechanical work on the main engine other than routine maintenance. Aside from some post-delivery mechanical problems, the GRANDON has been relatively trouble free and few days have been lost due to mechanical problems.

Maintenance and repair cost for 1998-2000 averaged approximately \$1,300 per year. If needed, major repair costs would be credited to a central office account. Haul-outs are scheduled every 4-5 years with the last haul-out occurring in 1996 at a cost of \$13,000. Haul-out work included a complete painting of bottom and topsides. The GRANDON is stored in the water without any bubbling system, although the crew would prefer dry dock storage each winter. No new equipment was added to the GRANDON from 1998-2000. Total annual cost for maintenance and haul-out (annualized cost) was \$3,900 per year, and including fuel was \$6,000. These operational costs averaged \$154 per operating day, assuming a 39 operating day average.

SAFETY: A stability test (inclining experiment) of the GRANDON was completed at the time of commissioning in 1991. After delivery of the vessel, cement ballast was added to the hull and the net drum was lowered to the deck, after review with the architect. Training for vessel personnel includes annual updates of CPR and first aid certifications. For fire fighting, the GRANDON is outfitted with a Haylon system in the engine room, two-1 ½ in. fire pumps (one remotely operated), and various smoke and CO₂ alarms. There is also a portable pump for fire fighting or de-watering, but no fireman's outfits (SCBA), no emergency escape breathing devices and no USCG fire fighting training for the crew. The GRANDON has a complete complement of approved PFDs, life raft, EPIRBS and survival suits. An important safety issue highlighted by the GRANDON'S crew is the concern regarding other untrained personnel on-board, especially during fishing operations and foul weather. Crewmembers have to be especially alert to the safety of visiting personnel.

SURVEYS and INSPECTIONS: There have been no safety inspections of the GRANDON by USCG. Requests have been made for inspections, but because of un-inspected vessel status for Great Lakes research vessels the Coast Guard is not obligated to comply with inspection requests. Fire extinguishers and the system in the engine room are inspected each year by a fire inspector. The captain tries to maintain the GRANDON at a level of readiness that would conform to applicable USCG standards.

VESSEL STAFFING: The minimum crew of the GRANDON includes the captain and two biologists. The dual role of biologists as scientists and crewmembers has resulted in very good relations between the captain and scientific staff. During summer, an additional seasonal technician or two may be added to surveys, depending on the workload. Four crewmembers are probably the average complement of crew. The captain is beginning his fifth season and the two biologists have 6-11 years experience. Nearly all the GRANDON'S crew time is spent doing activities related to vessel projects. Job qualifications for the captain's position require a 100-ton USCG marine license with mechanical aptitude and some commercial fishing experience. The captain was recruited by advertising the position, reviewing candidate's qualifications and references, and completing a job interview. In 1996 Ohio DNR reclassified their captain's position so that salary was comparable to a biologist and prior to this time it was difficult to hire and retain a qualified captain.

The starting and final salary for an Ohio DNR vessel captain is \$33,488, and \$47,632, respectively. The captain may also receive time-and-a-half overtime compensation for up to 160 hours per year, which can be taken as pay or accumulated and used as time off. Because the crew returns to Fairport Harbor each night, travel costs associated with implementing their vessel program are minimal. A simulation of the total vessel crew operating expense was calculated assuming an average salary for the captain (\$40,560) and also including one of the biologist's average salary (\$40,560) to reflect their companion role as vessel crew. This combined crew salary is \$81,112, or \$312 per day, assuming a 260-day work year. For a 39-day vessel season, crew salaries would total \$12,168. Combining operating, maintenance and staff costs yields a total operating expense of \$18,168 or \$466 per operating day.

PROGRAM DESCRIPTION: The GRANDON's survey program has scheduled about 55 days per year, but has averaged 39 operating days per year from 1998 to 2000. Nearly all this effort is directed toward a juvenile fish stock assessment program using bottom trawls, although some fall gillnetting and summer hydroacoustic sampling is also scheduled. Trawl index sites are visited each month (5-6 days sampling) from May to October, with more widespread sampling done in May August and October (10-12 days sampling). The database for these sites began in 1969, prior to the operation of the Fairport Harbor station; consequently, the majority of this assessment program is geared toward maintaining long-term data sets-- less attention is focused on short-term projects. Before 1988, these sites were sampled by vessels and staff from the Ohio DNR station at Sandusky, but were assigned to Fairport Harbor with the delivery of the GRANDON. In addition to the fishery surveys, there are some "piggy back" activities, lower trophic studies with phytoplankton, zooplankton, and water chemistry done in conjunction with trawling and gill netting activities. All of the assessment activities are part of a multi-agency cooperative effort under the cooperative umbrella of the GLFC. Results from these surveys are used in various Lake Erie Task Force assessments of fish stock health.

Currently, there is more than sufficient vessel time to implement Ohio's fishery survey programs in Lake Erie. The maximum length of the field season is 100-120 days. Therefore, the current program is scheduling approximately 50% of the GRANDON's potential survey effort. In addition to the vessel program there are a number of other activities that station support, e.g., tagging studies, creel surveys, commercial catch assessments etc. This level of current vessel work is considered to be the most efficient use of the biologist's time, providing a good balance between data collection and analysis/reporting. The GRANDON has done limited contract work in the past. There is not a procedure whereby monies collected from contract work can go to the GRANDON's program.

The current funding for the GRANDON's program on Lake Erie is all federal aid dollars. The lab director and captain indicate their program has not been constrained by operating funds. Although they don't always receive what they request, their funding is sufficient to continue their program. They rate the level of

support their agency provides as outstanding and the GRANDON more than meets their current program needs.

FUTURE PROGRAM: In the next 20-25 years Ohio DNR will likely provide less concentration on single species management and implement a broader, ecosystem approach to their assessment activities on Lake Erie. The next two decades will also see an increase in cooperative efforts among resource agencies with common interests and probably more integrated research. Although the future is likely to bring some system changes, Ohio DNR staff still see a core program centered on maintaining valuable, long-term data sets. Any future changes or modifications of program will more likely impact assessment techniques and technology and less likely affect vessel operations. The GLFC's purchase of hydro acoustic gear for Lake Erie fisheries research is an example of how partnerships promote more efficient and productive fisheries assessments. This kind of assistance in the future will help cash strapped agencies meet future technological needs. If future budgets were expanded, additional fiscal resources would be used to buy people and technology (not vessel capacity), and if their budgets declined their highest priority would be to maintain August and October bottom trawl surveys.

VESSEL SUITABILITY and FITNESS: Both vessel crew and scientific personnel agree the GRANDON meets current program needs and they are confident it will meet any future needs as well. Positive characteristics of the GRANDON include: a strong, safe, dependable, hull that is inexpensive to operate. The major draw back is its slow speed. Nevertheless, speed is probably less of an issue for vessel programs, such as Ohio DNR's, that have little steam time, operate on a "day trip" basis, and have minimal overtime and travel expense. The GRANDON is relatively new and has been well maintained. There are approximately 4,600 hours on the main and auxiliary engines; hence it should be years before overhauls are required. On balance, the GRANDON has proved to be an excellent fisheries survey vessel and should provide more than adequate service for the next 20-25 years.

VESSEL PROGRAM SUMMARY

NAME: KEENOSAY and K.H. LOFTUS
OPERATOR: Ontario Ministry of Natural Resources
LOCATION: Lake Erie
HOME PORT: Wheatley, Ontario
CAPTAIN: Al Matthews
LAB DIRECTORS: Andy Cook (Assessment) and Tim Johnson (Research)

VESSEL DESCRIPTION: The KEENOSAY is a 58 x 20.5 x 4.5 ft., 68 ton steel fisheries research vessel originally built by D.B. Powell Shipyard Ltd. of Dunnville, Ontario, but rebuilt in 1989 at Hike Metal Products Ltd. of Wheatley, Ontario. The mission of the KEENOSAY is to support trawl and gillnet operations in the open waters of western Lake Erie. The KEENOSAY is powered by a single Cummins N855M (215 BHP) main engine and is fitted with 15kW generator, two split Hathaway winches, HIAB deck crane with winch, and Crossley 30 in gillnet puller. The complement of electronics in the wheelhouse include: Furuno FR7100D Radar (72 mile); Furuno GP-50 GPS; DGPS GP35, COMNAV 2001 autopilot; Furuno color video and paper sounders; SiTex Chart Plotter Nav 7000, cell phone and INTERMARINE, UNIDEN and MOCOM marine radios. The KEENOSAY is the principal vessel used for gillnetting and trawling.



The LOFTUS is a 42 x 14 x 4 ft. aluminum survey vessel used mainly for limnological and lower trophic level research. It was built in 1990 by Kanter Yachts Ltd. of St. Thomas, Ontario. The LOFTUS is powered by a single Cummins 6 CTA 8.3 (350 BHP) diesel which enables 15 kt. cruising speeds. It has an 8 kW Westerbeke diesel generator and is fitted with two hydraulic booms with winches. Wheelhouse electronics include: Furuno 1839 (24 mile) radar, Furuno GP 50 GPS, DGPS GP 35, HORIZON/MOCOM marine radios, cell phone, Furuno VC551 video sounder, Lowrance X-15 paper sounder, NAVAD 7000 chart plotter, and a Sitex autopilot



VESSEL OPERATION and MAINTENANCE: During the 2000 field season, the KEENOSAY completed 56 operational days, which is fairly typical of its activities within the last three years. In 2000, fuel use was about 2,100 gallons (US), or 38 gallons per day of operation. On average, the KEENOSAY burns approximately 10 gallons per hour. Total fuel costs for the 2000 season were \$2,450⁹, or \$44 per operational day. The LOFTUS was used for 21 days during 2000 and burned 1,800 gallons of fuel costing \$2,100. Average fuel consumption is 86 gallons per day or approximately 12 gallons per hour.

The captain and crew do all of the routine maintenance (e.g. oil changes, fuel filter and belt replacements etc.) on both the KEENOSAY and the LOFTUS. They have a station maintenance protocol that covers when and what to do for routine maintenance, otherwise, the captain decides what needs to be done to maintain both vessels. More extensive repairs are done by the equipment manufacturer's technicians or in the shipyard. The engine manufacturer's factory mechanic does all the mechanical work on the main engine other than routine maintenance.

⁹ All subsequent cost figures are expressed as US dollars by assuming \$1 US buys \$1.43 Canadian. Cost of fuel was based on \$0.44 per liter.

Maintenance costs for the two vessels were approximated by budget allocations for the 2000 field season. The following list of maintenance costs were budgeted for the KEENOSAY: winter dry-dock \$2,000, inspections \$840, filters and oil \$420, hull repairs \$3,500, fuel gauges \$3,500, and \$1,400 for paint supplies. New equipment installed in the last three years included new radar for \$3,500 and a new GPS for \$840 (US). After annualizing the inspection, painting and new equipment expenses, the total annual maintenance costs were \$11,717 for 2000, or \$209 per operating day. Adding fuel costs to these estimates yields a total operational cost for the KEENOSAY of \$14,167, or \$253 per day.

A similar breakdown of maintenance costs for the LOFTUS totaled \$1,960 per year. New equipment purchased within the last three years was a GPS at a cost of \$840 and an anchor winch for \$3,500. Therefore, total maintenance and annualized equipment expenses were \$3,407 or \$162 per operating day, assuming a 21-day season. Combined costs for fuel and maintenance costs were \$5,507 or \$262 per day. Operational costs for both vessels were \$19,674, averaging \$256 per day assuming a combined total of 77 operating days.

SAFETY: A stability test (inclining experiment) of the LOFTUS was completed shortly after construction in 1990. Because the KEENOSAY was a refit of an older vessel, there was no requirement for a stability test, and to-date no test has been completed. Canadian Coast Guard inspections ensure that each of the boats has a full complement of required safety gear, e.g., inflatable life raft (inspected annually), flares, alarms, PFDs (personal floatation devices), survival suits etc. They also require a ladder for access to the deck from the water.

The Ministry of Natural Resources requires all its new employees to take Marine Emergency Duty (MED 1-A) training, which covers worker safety afloat, including fire fighter training. There is also an orientation day for new workers and a requirement that all small boat operators have a pleasure boat operator's certificate. In addition, CPR training is updated annually and First-Aid training is renewed every three years.

The KEENOSAY has a Halon system for the engine room with a remote operational switch in the wheelhouse. There are 4 hand held extinguishers -- CO₂ and dry chemical. There are two fire pumps, one a 110 volt electrical and the other a main engine pump; both have two-inch hoses. The LOFTUS has three CO₂ and dry chemical hand held extinguishers. There are two bilge/fire pumps, one operating off the main engine and the other is an electrical pump (110 volt, 1.5inch). The extinguishers on both vessels are inspected annually. There are breathing apparatus or fire suits for either boat.

SURVEYS and INSPECTIONS: Contrary to the un-inspected status of American fisheries research vessels, all Canadian research vessels have to be inspected by the Canadian Coast Guard every four years, at a substantial cost to OMNR. These inspections are very comprehensive and require the boat to be dry-docked to facilitate hull (ultrasound) and shaft inspections. If any problems are detected during the inspection, the vessel is not permitted to be put back in service until defects have been corrected. Having these vessels dry-docked each winter also allows the crews to do visual inspection of the hull prior to each new field season; bottom cleaning and painting are done when needed rather than adhering to any specific schedule.

VESSEL STAFFING: During trawling and gillnetting operations aboard the KEENOSAY there are usually three crewmembers, but for most cases it is more common to have a crew of four. Although, with some labor-intensive surveys, there may be as many as six individuals in the crew. The crew consists of the captain plus another operator who can operate the KEENOSAY if the captain becomes incapacitated. For any new hires, qualifications for the vessel captain include a license (fishing master four), commercial fishing experience, and some level of natural resource training (e.g., community college training). The remainder of the crew generally consists of fish technicians, or depending on a busy schedule of activities, any able-bodied staff who is available. All of the fish technicians require some level of environmental science training. For the operation of the LOFTUS, there are from two to four crewmembers. The operator of the LOFTUS is currently a contract captain (temporary).

The captain of the KEENOSAY has various responsibilities other than boat operation. Perhaps it would be more accurate to describe his role as an operations administrator who also happens to operate the KEENOSAY, or at other times operate the LOFTUS, or do any number of other tasks to assist the scientific staff. At the present

time, there are no staff that are specifically assigned to the KEENOSAY or LOFTUS. This contrasts with the historical operational status of the KEENOSAY prior to 1990, which had a two-person dedicated crew. The lack of dedicated vessel crew is a major concern for Wheatley station staff. They see a potential for problems with excessive movement between vessels and other programs, i.e. things can get overlooked when shared responsibilities result in loss of focus.

The starting and final salary for an OMNR vessel captain is \$28,428 and \$32,782, respectively. This range includes two Resource Technician grades (Senior 1 & 2) with three steps in each grade level. There is no provision for overtime compensation to captains, neither time-and-half pay nor compensatory time off. In addition, there is no career ladder for Ontario's vessel captains; there is not much differential between start and final salaries. The fish technicians that make up the remainder of the crew have starting and final salaries of \$24,723 to \$27,620. In contrast to the captain, fish technicians who work on the vessels can accrue time-and-half compensatory time off. Since the vessels are only operating on a day-trip status, travel costs are nil.

A simulation of the KEENOSAY's vessel crew operating expense was calculated assuming a two-person crew, with an average salary for the captain of \$30,605 and an average salary for a technician of \$26,172. This combined crew salary is \$56,777, or \$218 per day for a 260-day work-year. Staff costs for the KEENOSAY's 56-day season is \$12,229 and \$4,585 for the LOFTUS' 21-day schedule. Combining operating, maintenance and staff costs yields a total operating expense of \$26,396 or \$471 per operating day (56 day season). A similar estimate for the LOFTUS would be \$10,092 or \$481 per day (21 day season). Total cost to operate both boats is \$36,488 or \$474 per day for a combined 77-day season.

PROGRAM DESCRIPTION: The Wheatley station has a 44-day schedule of surveys for both the KEENOSAY and the LOFTUS that represents their core program for the western basin of Lake Erie. It includes walleye tagging for 20 days in March (KEENOSAY), limnological index sampling two days per month (16 days) from April through November (LOFTUS), and an interagency trawl survey for 8 days in late August (KEENOSAY). The walleye-tagging program was initiated in 1990, but will terminate in 2001. The limnological monitoring has been ongoing for 14 years. The summer trawl program was begun in 1982, and in 1987 was incorporated into a cooperative effort with Ohio and Michigan DNRs. Other short-term, non-core program activities include a round goby study (20 days), a walleye stock structure study (4 days), and a juvenile walleye growth study (25 days). All these short-term studies use fish collected with gillnets fished from the KEENOSAY. Other activities that put demands on the boats and their crews involve special collaborative research efforts, assisting enforcement officers (pulling illegal gillnets) and stand-by duty for a gillnet partnership program with commercial fishers.

Collectively the scheduled work for both vessels is nearly 100 vessel days. With a maximum potential season of approximately 120 days, the KEENOSAY has potential for some additional work and the LOFTUS for considerably more. The less than maximum use of these vessels is limited by staff, and not by the vessels themselves. Both boats are in excellent shape, well maintained and could easily be worked harder, if trained staff were available. Staffing issues are a key constraint in making better use of Wheatley's vessels.

Although there is under-utilized vessel capacity at the Wheatley station, only about five days per year are used for outside-the-agency work. OMNR staff are not enthusiastic about promoting outside use of their vessels because they cannot afford the staff time needed to run these vessels for other activities. Again, staff limitations are not only constraining their own program growth, but it limits any possible use by outside scientists or groups. This does not suggest, however, that the Wheatley station does not collaborate with other scientists on special short-term projects. They are willing to coordinate and cooperate, but these studies must be compatible with their agency's mission and their scientists' interests. Nevertheless, even these collaborative studies are ultimately limited by operational staff.

Aside from staff limitations, the vessels themselves are very well supported by OMNR. The boats accommodate their crews' comfort and safety, and the agency provides all the operational funds needed for vessel operation and maintenance. Regarding staff funding, OMNR provides sufficient dollars to fund Wheatley's core

program, albeit scientists have to look for other sources of funding to do any activities beyond their program. This is especially true of the research component of the station.

FUTURE PROGRAM: Wheatley staff were confident that their station will be operative in 20-25 years and will be providing an important function within OMNR. The Great Lakes natural resources are vital to Canada's future. Prominent future issues affecting Lake Erie will probably include sustainable productivity, climatic influences and the affects of other ecological perturbations. Staff are concerned about the continued expansion of people within the Lake Erie watershed, and the effect continued population growth will have on the resources the Wheatley staff are entrusted to help manage. From the station's perspective, staff see continuation of their core program in 20-25 years, but they also perceive more effective use of hydroacoustic techniques in fish stock assessment, multi-trophic approaches to fish community assessments, and spatial GIS views of resources with overlays including habitat, yield and exploitation. These are approaches that will require special skills, which will mean new training for existing staff and/or adding new people with specialized skills.

Wheatley station staff believe there will be no further personnel reductions in the future -- they sense they have hit bottom. Moreover, they believe that future staffing can only improve. They also expect that future scientific staff will have a wider scope of skills than current staff. At the same time, there will be a continuing need for highly technical people with the same traditional skills possessed by vessel crews who currently operate the KEENOSAY and LOFTUS.

VESSEL SUITABILITY and FITNESS: The Wheatley station is well positioned for future work on western Lake Erie. They have two large survey vessels that are fairly new, well maintained and with flexible designs. With the current level of use for both the KEENOSAY and LOFTUS, it should be years before any major overhauls are required on any of the engines. The two boats complement one another in performance and capability, and the LOFTUS also has some ability to work as a fisheries vessel, if needed. These vessels have not constrained any of Wheatley's current program activities, and staff believe that their vessels capabilities will more than meet future needs as well. The regular inspections required by the Canadian Coast Guard also plays an important function as a driving force in keeping these vessels safe and in tip-top shape. This is especially true when combined with OMNR's commitment to provide safe fisheries research vessels for their staff working on Lake Erie.

VESSEL PROGRAM SUMMARY

NAME:	EXPLORER
OPERATOR:	Ohio Department of Natural Resources, Division of Wildlife
LOCATION:	Lake Erie
HOME PORT:	Sandusky, Ohio
CAPTAIN:	Joe Baughman
LAB DIRECTOR:	Roger Knight



VESSEL DESCRIPTION: The EXPLORER is a 53 x 16 x 4.5 ft., 53 ton aluminum fisheries research vessel designed for trawling and gillnetting in the western basin of Lake Erie. It was built by T.D. Vinette of Escanaba, Wisconsin and delivered in 2000. The initial specification and basis concept for the EXPLORER was developed by the Napier Co, Arbroath, Scotland (architects for the ARGO, GRANDON and SETH GREEN). The T.D. Vinette shipyard was awarded the contract on a design-and-build basis. They used a lengthened version of one of their pre-existing hull designs. The final design and construction details are the product of Vinette and did not meet the contract specifications. Delivery was three years late and the boat is still not operational. Ohio DNR has since contracted with Deck and Wilson, Co., marine surveyors from Chardin, Ohio, to recommend an approach to correct construction flaws. Extensive and expensive repairs were completed in 2000, but more work is needed to correct all the known problems. Ohio DNR staff hope the EXPLORER can be made operational in 2001.

The EXPLORER is fitted with a Caterpillar 3412 main engine developing approximately 740 bhp, because one of the important performance criteria was to have 15 kt cruising speeds. Other equipment includes: an American bow thruster, Northern Lights 12kW auxiliary, split main winches, 5 x 3 ft. net drum, side boom with winch, and a 12 in. Crossley gillnet hauler. Wheelhouse electronics include: Robertson AP45 autopilot, Raytheon 41XX radar, Garmin 220 and Raytheon 610 chart plotters, Koden sounder and a marine radio.

VESSEL OPERATION and MAINTENANCE: Since the EXPLORER is not yet operational, there is no information regarding operational use and expenditures for a field season. Nevertheless, the proposed 2001 program and past experience suggest the EXPLORER, once it is fully operational, will have a 60-70 day field season. The captain expects to do all of the routine maintenance (e.g. oil changes, fuel filter and belt replacements etc.) on the EXPLORER.

SAFETY: A stability test (inclining experiment) of the EXPLORER was completed by Deck and Wilson after delivery in 2000. Based on this test, some restrictions were noted for safe operation, notably that deck loads should be minimized and there should be no winter operation. The EXPLORER is fitted with a life raft, Bailey survival suits, PFDs, life rings and an EPIRB. Fire fighting equipment is not yet fully functional, but will be this year.

SURVEYS and INSPECTIONS: Typical of all U.S. Great Lakes fisheries research vessels, no inspection is required for the EXPLORER by the U.S. Coast Guard. Deck and Wilson Co. are currently working with Ohio DNR and local shipyards to correct construction and design flaws.

VESSEL STAFFING: The crew complement for the EXPLORER has not yet been finalized. On previous boats operated in the Western Basin of Lake Erie by the Ohio DNR, the typical crew complement consisted of the captain and three other crewmembers, which in most instances were biologists. The starting and final salary for an Ohio DNR vessel operator/captain is \$33,488, and \$47,632, respectively. The captain also receives time-and-a-half overtime compensation amounting to about 100 hours per year at the Sandusky station, which can be taken either as pay or time off. In the past, vessel operations out of Sandusky were largely day trips; consequently, travel costs were negligible. A simulation of the total vessel crew operating expense was calculated assuming an average

salary for the captain (\$40,560) and also including one of the biologists' average salary (\$40,560) to reflect their companion role as vessel crew. This combined crew salary is \$81,112 for a 260-day work-year, or \$312 per day. For a typical 65-day vessel season, the staff costs would be \$20,280.

PROGRAM DESCRIPTION: The Ohio DNR program for western Lake Erie was initially established in the late-1950s, but the modern database begins in 1969. During the last 20 years, the main features of their stock assessment program are still in place, but there have been modifications to compensate for changes in the lake system, and also, to strengthen the sampling program, e.g., more effort and initiation of a stratified random design in lieu of fixed sites. The major component of their current program is an interagency (with OMNR) bottom-trawling program to monitor young-of-year fish in the spring and yearling and older fish in the fall. The trawling program is scheduled for 2 weeks per month from May to the end of September or the beginning of October (50 days). In practice, only one week is usually needed to complete each monthly survey (25 days). A total of 41 sites are visited during each monthly round of sampling. Another core, interagency (MDNR, OMNR, ODNR- Fairport) survey is scheduled during October (20 days) using graded gillnets. It is directed toward sampling adult walleye, yellow perch and other fishes. Two short-term surveys are scheduled for 10 days in September 2001. These surveys include a gillnetting program specifically targeting smallmouth bass and a hydroacoustic survey. Scheduled activities for the EXPLORER total 80 days, but past experience has shown that approximately 60 operational days is a more likely projected use.

All of the effort scheduled for the EXPLORER in 2001 is directed toward fish stock assessment. Trawling and gillnetting represent 60 and 40 percent of scheduled effort, respectively. In recent years, there has been a marked increase in "piggy back" effort directed toward lower trophic level studies, e.g., water chemistry and plankton sampling. With the problems associated with the late delivery of the new EXPLORER, the Sandusky station has had to contract with Ohio State University for vessel time to complete these surveys. Regardless of when the EXPLORER becomes operational, the 2001 surveys will be completed, as they have been in the past. There is a strong commitment by station staff to maintain their historic, long-term databases.

In the past, there has been little contract use of Ohio DNR vessels in western Lake Erie. There has been some discussion, however, in promoting outside-agency use of the EXPLORER to help defer program costs and provide new sources of income. Logistically, external use of the EXPLORER for periods of more than a few days in any week would be impractical under current staffing, since DNR biologists would serve as the vessel's crew.

FUTURE PROGRAM: In 20-25 years the fisheries program on western Lake Erie could be relatively unchanged, or it could be altered substantially. Because so much of current activities are directed toward maintaining long-term databases, in two decades the Ohio DNR program will probably continue with a major trawling effort for juvenile fishes and a gillnet monitoring program for adult warm water fish. Sandusky staff also believe the program could be altered too, in response to changing societal values. In two decades there could be a loss of the commercial fishery, increased emphasis on recreational fisheries, and greater concern for water quality and public health issues. A more likely future program will probably consist of continued support of long-term monitoring efforts, increase use and adoption of technology (e.g., hydroacoustics, satellite imagery etc.), and a greater diversity of staff expertise (e.g., marketing, public relations, geology etc.). Programmatic issues in two decades will probably see continued concern for new exotics and more effort applied to better understanding critical habitat needs for the fish community of the western basin.

Although the future may bring important, substantive changes to Sandusky station operations, staffing will probably remain unchanged. As staff transfer or retire, there will likely be some changes in the roles of replacement staff. One staff reassignment that may be needed is a permanent technician who is dedicated to the EXPLORER. Undoubtedly, future recruitment will be oriented toward meeting future resource needs.

VESSEL SUITABILITY and FITNESS: Ohio DNR at the Sandusky station has a unique and regrettable fisheries research vessel situation – a new vessel with many problems. Station staff are working hard to make the EXPLORER a safe, dependable work platform. Since delivery of the EXPLORER, their approach to solving problems seems reasonable and prudent: 1) employ a capable marine expert to outline problems and suggest