corrective measures, and 2) provide adequate funds to correct identified problems. Ohio DNR's Columbus office has been very supportive of Sandusky's efforts to correct construction mistakes. Sandusky staff gave high marks for their agency's support of their vessel program in Lake Erie. The coming field year will be crucial in establishing if the EXPLORER is safe to operate and how well suited it is for typical survey needs in western Lake Erie.

VESSEL PROGRAM SUMMARY

NAME: **MUSKY II**
OPERATOR: United States Geological Survey – Biological Resources Division
Great Lakes Science Center (GLSC)
LOCATION: Lake Erie
HOME PORT: Sandusky, Ohio
CAPTAIN: Mike McCann
STATION ADMINISTRATOR: Mike Bur

VESSEL DESCRIPTION: The MUSKY II is a 45' x 14.5' x 6', 27 ton steel-hulled fisheries research vessel operated on Lake Erie by the GLSC Lake Erie Biological Station (LOBS) in Sandusky, OH. The MUSKY II was built in 1960 by Hans Hansen shipyard in Toledo, Ohio. The MUSKY II is fitted with a single Detroit Diesel 6V-71, and an 8 kW 120v AC auxiliary generator. Deck equipment includes: a Crossley 12- inch gillnet lifter, KEM 4420 MS net reel, Belkin D-40 split main winches with 600 ft of 3/8-inch cable, a HIAB-200 articulating deck crane, and a limnological boom and winch. Wheelhouse electronics and navigational aids include: Roberton autopilot (inoperable), Raytheon 41X radar, Raytheon V-860 color sounder, Garmin and Northstar GPSs, and two marine radios.

VESSEL OPERATION and MAINTENANCE: Since the last complete overhaul of the main engine in 1986, the MUSKY II has accumulated 7,500 hrs. There was not sufficient information to determine seasonal use patterns, but in 2000 the MUSKY II operated a total of 31 days, which probably represents 200-250 hours. Other similarly sized and powered vessels (e.g., KEENOSAY) typically burn about 4.5 g/h. Therefore, total fuel usage by the MUSKY II was probably near 1,000 gallons per season at a cost of approximately $1,000.

The crew of the MUSKY II does most of the routine maintenance required to keep it operational. Each winter the MUSKY II is hauled out of the water and the bottom and some of the topside are painted the following spring. In 1999, the reduction gear was overhauled at a cost of $8,000, and in 2000, hull plates along the entire length of the keel were replaced at a cost $15,000. The main engine is 43 years old and has had two complete and one partial overhauls; the last was in 1993. The GLSC Vessel Manager believes the engine in the MUSKY II is operable but further repair is not cost-effective and a new engine is planned to be installed in 2001. New equipment installed in the last three years includes a differential GPS for $1,500. The annualized cost for repairs and new equipment was about $9,000, but this figure does not include expenses for regular maintenance and haul-out costs. Hence, a minimum estimate of operation and maintenance costs are roughly $10,000 per year.

VESSEL STAFFING: The normal crew complement aboard the MUSKY II is four people – a captain, engineer, biotechnician, and biologist. Currently there is no permanent captain assigned to the MUSKY II, the position responsibilities are shared by two captains assigned to other USGS vessels. This strategy was initiated because the USGS can draw from a number of qualified captains operating their other vessels and because the field program for the MUSKY II is relatively modest (i.e., only 31 days). A temporary (seasonal) engineer who has maintenance responsibilities entered on duty on 05/27/01. The GLSC hopes to reinstate a permanent engineer for the MUSKY II at some point in the future when the budget permits. Captain and engineer salaries can be approximated using the simulation from the LOBS (i.e., $396 per operating day). Assuming a 31-day program for Lake Erie (last field season), the captain and engineer costs would be $12,276 per season. Combining the estimate for fuel use, the partial estimate for maintenance, and staffing costs results in a minimal estimate of operating the MUSKY II of $22,276, or $718 per operating day.

SAFETY, SURVEYS and INSPECTIONS: The MUSKY II is fitted with a single, six-man life raft, four exposure suits, two life rings, and six PFDs. There are no survival suits, fire fighting suits, portable pumps, or

emergency breathing apparatus. There is a CO2 flooding system for the engine room and three ABC portable extinguishers. No stability assessment has been done on the MUSKY II. There are no watertight bulkheads, and the crew must rely on pumps to keep the MUSKY II afloat if there is flooding. There is a 12-volt 600- g/h bilge pump and an old-32 volt electric bilge pump. USGS vessel staff are required to have annual updates for CPR and a 3-year renewal of First Aid training. There is no record of a marine survey or comprehensive inspection of the MUSKY II. However, after the GLSC Vessel Manager identified plate wastage in April 2000, the hull was audio gauged (with ultrasound) by a licensed commercial shipyard in May 2000 and repairs were made.

PROGRAM DESCRIPTION: The 2001 field program for the MUSKY II consists of a near shore fish assessment survey in June (5 days), July (5 days) and September (5 days); a young-of-year survey in July (5 days) and October (5 days); an EPA-funded water quality survey in late-August (5 days); and a lake trout assessment survey in August (13 days). There are a total of 43 scheduled days in the 2001 program, although experience suggests that actual operational days will be less (31 days in 2000). The young-of-year and lake trout assessments are the station's two long-term monitoring programs, extending 40 and 9 years, respectively. These two activities represent 53 percent of scheduled effort. The lake trout survey is done in cooperation with NYDEC, PFBC and OMNR in the eastern basin of Lake Erie. The near-shore fish assessment is a short-term study (3 years) of a 5-year data series that was discontinued in 1990 and reestablished at the request of Ohio Department of Natural Resources to fill an important data need. The water quality assessment represents 12 percent of total effort. Bottom trawls are used for the near-shore and young-of-year surveys (58 percent of effort) and gill nets are used for the lake trout survey (30 percent).

In the 1970s, the MUSKY II operated about 90 to100 days per year. At that time, there was a rainbow smelt assessment program, walleye tagging work, and a more intensive young-of-year assessment program. In the late 1980s, the Sandusky station increased its efforts in the central basin of Lake Erie to include near shore fish assessment and EPA-funded water quality work. Recent work emphasizes collecting fish, plankton, and benthos and requires more laboratory processing of the catch and samples than the older approach, which maximized the sampling potential of the MUSKY II with a "catch, count, and toss approach". In addition, there has been increased vessel capability by the states and OMNR – currently seven other fisheries vessels are operating on Lake Erie.

The LEBS program has two principal sources of funds–base funding from USGS and soft money from grants and contracts. The GLSC expects all staff to supplement base funding with soft money from grants and contracts. Using grant monies to supplement base funding is potentially problematic because these sources of funding are usually not available on a regular basis. LEBS staff must exercise discretion in selecting compatible contract activities and be careful to ensure that the LEBS program is addressing the principal interests and priorities of GLSC and its partners and is not unduly influenced by what soft-money funds are currently available in the marketplace.

Considering that the LEBS needs one additional biologist, that the MUSKY II is 43 years old and in need of constant care and attention, and that base funding is sometimes inadequate, it is perhaps not surprising that station staff feel that their vessel and long-term monitoring programs are not fully appreciated. There have been instances where cruises were cut and where no new work was initiated due to funding constraints. There is a conflicting view among GLSC staff regarding the role of grant and contract money. Administration staff indicate that staff salaries and long-term, core assessment activities are not funded with grant and contract dollars, but lake program chiefs are aware of situations where grant and contract money sometimes is needed to augment their core program operations.

FUTURE PROGRAM: LEBS staff are uncertain about their future. Most of this uncertainty stems from not knowing how their administration views their role – they believe their program is the lowest priority among GLSC field stations. This view is supported by the following observations, which in some instances extend back to the 1980s:

1. scientific staff was reduced from 4 to 2 biologists;

2. the permanent vessel crew was eliminated and a captain and engineer were borrowed from other field stations when needed;
3. the MUSKY II is the least fit of the five GLSC vessels;
4. the maintenance strategy seems to be to provide "just enough" support to get by until the MUSKY II is replaced;
5. little hard money is provided for the LEBS small, core program;
6. and under the USFWS, a plan was considered that would have eliminated the LEBS in what was then a very tough fiscal environment.

Resolving these issues will require a renewed dedication to a more viable LEBS program and a commitment to provide the necessary resources to improve staffing and vessel capability. If that were to occur, there are some specific activities that staff believe should be part of their future program. The young-of-year trawling and lake trout gillnet monitoring programs will undoubtedly continue, because they represent important core activities. Hydro-acoustic assessments of the fish community may also be a component of future work, especially considering the pace of new technological developments and the continued demands by managers for better quantification of the fish community. There will probably be more interest in keying fisheries and invertebrate sampling to habitat-types using geographic information system technology. In addition, station staff will probably need to continue assessing the impacts of the next new exotic species that makes their way into the Great Lakes. If positive changes occur for the LEBS, their future program may be more flexible, diverse, and responsive to change than other GLSC lake programs, a greater portion of whose base funding is committed to maintaining long-term data sets.

VESSEL SUITABILITY and FITNESS: The MUSKY II had two major repairs completed within the last two years – one to repair a damaged marine gear and the other to replace deteriorated hull plates. The main engine has been rebuilt several times and a new replacement is planned in 2001. There are some other minor items that need attention as well (e.g., inoperative autopilot). Aside from issues related to mechanical fitness, the design itself does not meet the current mission, nor does it provide much flexibility for the future. The gill net lifter is situated too far aft, deck space is seriously limited, there are no wet or dry labs, and the crew accommodation is insufficient for extended surveys. The Great Lakes Science Center recognizes the need to replace the MUSKY II, but no formal plan to do so yet exists. In the short-term, the GLSC will maintain and use the MUSKY II until a replacement can be obtained. When the STURGEON refit is completed, and that vessel goes into use on Lake Michigan, the SISCOWET , which has better capabilities than the MUSKY II, may be dedicated for use in Lake Erie.

VESSEL PROGRAM SUMMARY

VESSEL NAME: **CHANNEL CAT**
OPERATOR: Mt. Clemens Fisheries Research Station, Michigan Department of Natural Resources, Mt. Clemens, Michigan
LAKE: Erie, St. Clair, Lake Huron
HOME PORT: Mt. Clemens
CAPTAIN: Jack Hodge
STATION ADMINISTRATOR: Robert Haas

STATION PROGRAM DESCRIPTION: The Channel Cat is used for walleye and fish community studies in Lake Erie, habitat assessment, fish community, and lake sturgeon studies in Lake St. Clair, and yellow perch and fish community studies in Saginaw Bay of Lake Huron. Work in Lake Erie starts the first week of April and includes walleye tagging as part of an interagency tagging effort. The GLFC Lake Erie Committee uses the results of walleye tagging for a lake-wide management program. Following work in Lake Erie and until mid-June, the Channel Cat is back in Lake St. Clair for habitat mapping using side-scan sonar and capturing lake sturgeon using setlines. These two projects go to mid-June. The Channel Cat then goes to Saginaw Bay and trawls for yellow perch and other associated species in the fish community. By mid-summer the Channel Cat is back in Lake St. Clair trawling for lake sturgeon, habitat mapping, and doing fish community assessment with large- and small-mesh trawls. In September, the Channel Cat returns to Saginaw Bay and trawls for yellow perch and associated species then goes back to Lake Erie for fall index gill netting for yearling walleye until mid-October. Most of the program is similar to the one done 10-20 years ago but vessel operation days have been increased about 40 days largely due to addition of the habitat and lake sturgeon work. The walleye/yellow perch/fish community assessments, mostly by trawling, make up 85% of the Channel Cat program. Habitat and lake sturgeon make up the remainder except that about 1-2% of the vessel time is used for assisting Michigan Department of Natural Resources (MIDNR) Law Division. The Channel Cat operates about 70-80% of the available time during April-October and could operate as early as the last week of March and as late as the first week of December. The Mt. Clemens Fisheries Research Station does cooperative work with other agencies, but does not do contract work for money or contract out any of its work to government or private entities. There are few commercial fishers available in the area that would be able to do the work. The station has thought about contracting some of the remote sensing habitat work but believe they would have to go out of the area, such as the East Coast, to find someone to do the work.

VESSEL DESCRIPTION: The Channel Cat is 46-foot long steel Lake Erie trap-net design boat that was designed and built for the Mt. Clemens Fisheries Research Station by Harlan Maybee of Toledo, Ohio in 1968. The Channel Cat beam is 16.5 feet, displacement is 26 tons, and draft is 4 feet. Workspace is restricted to the aft deck, which is about 260 feet^2. The Channel Cat is powered by two 215 hp Detroit Diesel engines (6V53) and has a cruising speed of 10 knots and a top speed of 13 knots. Total engine hours are 8,575 with 2,200 since the last overhaul. Deck machinery includes a 12-ton Tulsa (TP1-15UB) winch with a capacity of 600 feet of 3/8-inch cable, and a Crossley gill-net lifter. Pilothouse electronics consist of a Cetrek ProPilot 725 autopilot installed in 1999, Furuno 1830 radar installed in 1999, Raytheon Raychart 630 WAAS-DGPS installed in 2001, Raytheon RayNav 570 loran installed in 1986, Datamarine Sandpiper II depth sounder installed in 1975, Furuno FCV292 depth sounder installed in 2000, a Standard Titan marine radio installed in 1988, and a Raytheon Ray53 DSC VHF radio installed in 2001.

VESSEL STAFFING: The crew of the Channel Cat consists of full-time boat captain, full-time assistant boat captain, and a 9-month fisheries assistant. Previous crews have been two full-time positions including a boat

captain and either an assistant boat captain or full-time boat aide. The boat captain has worked on the boat for 23 years and has been the captain for the past 4 years. The assistant boat captain has been on the boat for 4 years and has been assistant captain for 2 years. The fisheries assistant has a season and a half experience on the Channel Cat. The captain and assistant captain must have a Coast Guard license rated equal to or greater than the tonnage of the vessel. The fisheries assistant must have a high school diploma. A biologist and fisheries technician is on board nearly 100% of the time during vessel operation. This scientific staff and vessel crew share jobs during the various fish and habitat assessments. The boat captain is the first-line supervisor of the assistant boat captain and fisheries assistant. The assistant boat captain supervises the deck operations (setting and retrieval of fishing gear). The station administrator supervises the boat captain and is responsible for filling vacant vessel positions. The vessel crew receives annual safety training, has access to training afforded to all state employees (i.e. computer training), and on-the-job training pertaining to the Mt. Clemens Fisheries Research Station vessel program. Channel Cat crew members spend about 25% of their time during year doing non-vessel related work such as station maintenance, lab work, fish aging, and data summarization and entry.

VESSEL OPERATION AND MAINTENANCE COSTS: The Channel Cat operated an average of 121 days in recent years. Main engine hours averaged 360 during 1998-2000 and ranged from 349 in 2000 to 369 in 1999. Fuel use during this period averaged 2,933 gallons and 8.1 gallons per hour. Fuel expense averaged $3,954 and ranged from $3,598 in 1999 to $4,192 in 2000. Fuel costs per engine hour and operation day were about $11 and $33, respectively. Maintenance costs during 1998-00 averaged $3,928 and ranged from $3,260 in 2000 to $4,964 in 1998. Total fuel and maintenance costs per engine hour and operation day were $22 and $65, respectively. The Channel Cat is hauled out annually and dry-docked for the non-operational season at a cost of $1,500 per year. New equipment installed in 1998-2000 includes a radar and an autopilot in 1999 and a depth sounder in 2000. Hull sandblasting is scheduled for 2001 and was last done in 1990. Engines were overhauled in 1995. Maintenance is done as needed except that engine overhauls are based on engine hours recommended by the manufacturer. The crew does day-to-day maintenance such as patch painting and oil changes. Other maintenance is contracted out. The boat captain is responsible for scheduling and seeing that maintenance projects are completed. The frequency of unforeseen repairs has increased in recent years but have not caused significant down time nor compromised the vessel program. However, regular repairs in the shipyard have sometimes delayed start of the operational season. A couple of repair facilities that can work on steel boats are available at Mt. Clemens. There used to be more but many facilities have switched to fiberglass boat construction and repair. The station administrator is responsible for the Channel Cat operation and maintenance budget, but much of the work in budget preparation is done by the boat captain and station administrative assistant. The Channel Cat's operation and maintenance budget has been flat the past 10 years but has not impacted the vessel program yet.

VESSEL INSPECTIONS and SAFETY: The Channel Cat receives a Condition and Value inspection every five years with the last one done in 2000. This is done in part as a requirement of the vessel insurance policy. No stability test has been done on the vessel but the length of the hull has been increased 10 feet since its original construction. Annual safety training for the Channel Cat crew includes CPR training and a day of in-the-water survival suit and man overboard training. First Aid training is also provided every three years. The Channel Cat carries a Plastimo 6-man Coastal life raft which is serviced and/or inspected every five years. Other safety equipment onboard includes an ACR406 (RLB27) EPIRB, six Sterns survival suits, and assorted life jackets. Fire suppression equipment is six hand-held fire extinguishers. The Channel Cat has one Lovett bilge pump.

FUTURE VESSEL PROGRAM: The Mt. Clemens Fisheries Research Station staff is fairly certain that the station will have a vessel program 20 years from now and that the Channel Cat will be a part of it. They believe that support for their program is strong within the Research Section and fairly strong within Fisheries Division. They believe the recent switch by Fisheries Division to lake basin management teams with strengthen that support. Certain surveys that make up the Mt. Clemens Fisheries Station program will be continued over the next 20 years in order to maintain long-term data sets. Station staff believes that they will be doing more remote sensing projects with technology that may ultimately replace some of their current netting programs.

VESSEL FITNESS and FUTURE: According to Mt. Clemens Fisheries Research Station staff, the Channel Cat is economical to operate and a flexible work platform with the necessary draft for working in the very shallow Lake

Erie, Lake St. Clair, and Saginaw Bay environments. However, she is slow, has some weak spots in the hull, needs to be rewired, and could be larger to accommodate more gear. The Channel Cat is one of three vessels being considered for replacement by an ad hoc committee of MIDNR boat captains. However, station staff believes that a retrofit of the Channel Cat may be an acceptable alternative to replacement. They are leery about going through the process of vessel replacement because of recent bad experiences by other agencies, who in the opinion Mt. Clemens station staff, found that their replacement vessels were inadequate to perform all their program tasks. Other factors contributing to the concern of Mt. Clemens station staff are that the MIDNR does not yet have a workable process in place for vessel replacement, and while they know of a shipyard at Mt. Clemens that could do a retrofit, they do not know of a shipyard that could build a replacement vessel.

VESSEL PROGRAM SUMMARY

VESSEL NAME: **CHINOOK**
OPERATOR: Michigan Department of Natural Resources, Alpena Fisheries Research Station
Alpena, Michigan
LAKE: Huron, including St. Marys River and Saginaw Bay
HOME PORT: Alpena
CAPTAIN: Clarence Cross
STATION ADMINISTRATOR: James Johnson

STATION PROGRAM DESCRIPTION: The Alpena Fisheries Research Station vessel program using the Chinook begins with a lake trout assessment using graded-mesh gill nets during May and most of June. This assessment starts in southern Lake Huron at Harbor Beach and samples 12 stations north to the Straits of Mackinaw. Some exploratory netting is done on offshore reefs during mid-July into August and two weeks of trawling is done in August for young-of-the-year lake trout and lake whitefish. September into October is spent in Saginaw Bay assessing walleye and yellow perch with small-mesh graded-mesh gill nets. The Chinook is used for assessment of spawning lake trout populations from mid-October into early November. Gill netting makes up 90% of the work done with the Chinook, trawling makes up 9%, and cooperative work with Michigan Department of Natural Resources (MIDNR) Law Division inventorying shipwrecks makes up the remaining 1%. A 20-foot aluminum boat is also used by the station to do shallow near-shore assessment of brown trout and lake trout with gill nets, and for assessing plankton and shallow-water fish communities in the St. Marys River, les Cheneaux Islands, and Saginaw Bay. Station personnel also collect data from commercial fish catches. The Alpena Fisheries Research Station does not do contract work with the Chinook and does not contract out for any of its vessel work. The station administrator believes that contract money earned by the Chinook likely would not go back to the station vessel program, and contracting out work would be expensive and can be done cheaper with the Chinook.

VESSEL DESCRIPTION: The Chinook was designed and built in 1947 by Marinette Marine in Marinette, Wisconsin. The Chinook was initially used for law enforcement by the MIDNR Law Division. The Chinook was acquired by Fisheries Division in 1968, used briefly for trolling to catch salmon then went to the MIDNR Gaylord Repair Shop in winter of 1970 where eight feet was added to bring it to 50 feet long. She was used for trolling and gill netting during the next three years and has been used for gill netting and trawling since then. The Chinook is a $3/16^{th}$-inch steel hulled boat, 50 feet long, 11.5 feet wide, draws 4 feet 8 inches, and displaces 26 tons. Workspace is the 250 ft^2 aft deck, the forward part of which is covered by a canopy to protect the crew from sun and rain. Below deck there is a 30-ft^2 galley area and a 25-ft^2 bunk area with a commode. The Chinook is powered by one General Motors 671 diesel engine that generates 250 hp with a cruising speed of 9.7 and a maximum speed of 11 knots. Onboard electrical power is provided by an Onan diesel-powered 7,500-watt generator. Deck machinery includes a hydraulic single-warp side trawling winch with 3,000 lb lifting capacity and a cable capacity of 950 feet of 0.5-inch steel cable, a hydraulic capstan mounted mid-deck, a Tulsa electric winch and boom with 1,000 lb lifting capacity, a hydraulic gurney for deploying bathythermographs and other sampling gear, and a 24-inch Crossley gill-net lifter. Pilothouse electronics includes a Wood Freeman Model 11 autopilot installed in 1969, a Raytheon GPS Chartplotter 630 installed in 2001, a Raytheon R21XX radar installed in 1996, a Datamarine Chartlink II GPS installed in 1994, a Furuno LC-90 Mark II loran installed in 1992, a Calvin Hughes depth sounder installed in 1966, a Sitex HE-705 depth sounder installed in 1987, a MIDNR radio installed in 1980, and a President-Uniden LTD-715 marine radio installed in 1996.

VESSEL STAFFING: The Chinook crew is a full-time boat captain, assistant boat captain, fisheries technician, and a 9-month fisheries assistant. A biologist is usually onboard during lake trout assessment and the survey work

in Saginaw Bay. The captain has been on the boat for 29 years with 6 years as captain, the assistant boat captain has been onboard for 11 years with 3 years as assistant captain, the technician has worked on the boat for 7 years, and the fisheries assistant has 3 years experience. This crew composition is similar to what it was 20 years ago except the part-time unclassified contract worker position has been replaced with a longer-term part-time fisheries assistant position that has Civil Service status. The vessel crew and scientific staff share jobs and work well together. The crew receives annual safety training with work-related training being mostly on-the-job. The Chinook crew spends 15-20% of its time on non-vessel related work such as sampling commercial fishers, station maintenance, walleye tagging, and inland stream fish community sampling.

VESSEL OPERATION AND MAINTENANCE COSTS: The Chinook operated an average of 61 days with a range of 58 to 64 during 1998-2000. Main engine hours averaged 204. Fuel use averaged 1,098 gallons and increased from 1,044 gallons in 1998 to 1,159 in 2000, and fuel cost averaged $1,574 and increased from $1,315 in 1998 to $1,901 in 2000. Average fuel use and cost per operation day and engine hour were 18 gallons and $26 and 5.4 gallons and $8, respectively. Maintenance costs averaged $3,174 and ranged from $2,807 in 2000 to $3,500 in 1998. The Chinook is hauled out, power washed, shrink-wrapped, stored, and put back in the water annually at an average cost of $1,675. Prior to being put back in the water, the Chinook is painted at a cost of $1,500 annually. Vessel overtime pay for the crew came to about $3,400 a year and travel expenses averaged $10,210 for 1998-2000. The boat captain schedules major and minor maintenance projects based on his evaluation, marine surveys, and manufacturer's recommendations. The station administrator secures budget support and provides project oversight. The crew chips paint, changes oil, and does minor engine repairs. Special maintenance projects are done as judged necessary by the boat captain and station administrator. The hull was sandblasted and painted in 2000 with the previous sandblasting done 20 years ago. The engine is tuned and overhauled as needed. Unforeseen repairs are handled with a minimum of down time and have not resulted in cancellation of any part of a survey. The Chinook has ready access to parts suppliers and a hoist at Alpena, and diesel repair facilities at Alpena and at the MIDNR Gaylord Repair Shop about 75 miles away. Although the Chinook's operation budget has been flat the past 10 years, maintenance money to keep the Chinook operational has been adequate. However, overtime money, which is necessary for the vessel program, has usually been less than requested. Vessel maintenance has not constrained the Alpena Station's ability to implement its Lake Huron program.

VESSEL INSPECTIONS, and SAFETY: The Chinook receives a Condition and Value survey every five years with the last one done in 1996. The hull was sandblasted and was tested with ultrasound in 2000. It is not known if a stability test was ever done but an old file indicated a "listability" of 45 degrees. The crew receives CPR and on-the-job training for safety and fire fighting annually and first aid training every three years. The captain and assistant captain have had life raft training from the Coast Guard, and the captain has been to radar school. Safety gear onboard the Chinook includes a Revere 6-person coastal life raft, an ACR-Satellite 406 EPIRB, five adult exposure suits, and 10 life jackets. Fire suppression equipment includes a Halon system in the engine compartment and three hand-held extinguishers. The Chinook has two Lovett automatic bilge pumps and one SABSCO bilge pump.

FUTURE VESSEL PROGRAM: The Alpena Fisheries Research Station staff believes that support for their vessel program within MIDNR is good and that the station will have a vessel program 20 years from now. The future vessel program at the Alpena Fisheries Research Station depends upon progress in the recovery of lake trout and walleye in Lake Huron. Until populations of these species show signs of recovery, the current assessments will continue. Some additional lake trout sampling stations were added to comply with the August 2000 Consent Decree agreed upon by the state, federal, and tribal agencies. Other modifications to these assessments might be more non-lethal sampling and more tagging. This could mean a shift from gill nets to trap nets requiring some modifications to the Chinook. A shift from lake trout and walleye assessment to other work such as habitat assessment will depend upon the focus established by the Lake Huron Committee. The station would like to do more lake trout tagging with thermal and depth tags, and do some studies on lake trout hooking mortality since size limits are being increased. Although the vessel and vessel staff could take on additional work, especially in July and August, the station lacks sufficient scientific staff to oversee this work and process the additional data.

VESSEL FITNESS and FUTURE: The Chinook is a seaworthy vessel that is economical to run and its size and shallow draft permits access to many harbors. Alpena station staff believes that she has a serviceable life of at least 20-25 years providing that major and minor maintenance problems are taken care of. The Chinook is old and is experiencing some electronics and steering system problems. Some hull plates will have to be replaced in the next 10 years and the hydraulic system will have to be rebuilt or replaced. The station staff would like the Chinook to be about 5 feet wider to accommodate more deck gear and minimize rolling, and would like it to have a thicker hull to do some operating in ice. A major retrofit would be required to accomplish the above. Consequently, the Alpena Fisheries Research Station is considering replacement of the Chinook. Specifications being considered for a replacement vessel include a beam at least five feet wider than the current Chinook, twin engines to increase speed to 12-13 knots and enhance safety and maneuverability, a dry lab, freeboard low enough for efficient gill netting, and a deck plan that allows all fish handling to be on one deck. The Alpena staff is working with the ad hoc committee of mainly MIDNR boat captains to develop design, cost estimates, and a process for obtaining approval and funding for replacement of the Chinook and one or two other agency vessels. The Alpena Fisheries Research Station staff believes that the current and foreseeable fiscal environment within MIDNR is not suitable for obtaining either desirable staffing levels or a replacement for the Chinook.

VESSEL PROGRAM SUMMARY

NAME:	**ATIGAMAYG and WONDA GOLDIE**
OPERATOR:	Ontario Ministry of Natural Resources (OMNR)
LOCATION:	Lake Huron
HOME PORT:	Owen Sound, Ontario
CAPTAINS:	John Brookham and Jim Hastie
LAB DIRECTORS:	David McLeish (Assessment) and Brian Henderson (Research)

VESSEL DESCRIPTION: OMNR's Owen Sound Fisheries Station is organized somewhat differently from the other OMNR facilities on the Great Lakes. From the operational standpoint, most of the other stations have research and assessment unit functions that are implemented by a common, integrated vessel operation group. In contrast, the Owen Sound research and assessment units each have a separate vessel and captain, and in addition, each of the units has a separate funding source to maintain and operate their vessels.

The ATIGAMAYG is a 57 x 21 x 6 ft., steel 75-ton Lake Erie style gillnet tug that is operated by OMNR's fisheries research unit at Owen Sound. The boat was built in 1954 by Matheson Boatworks and had an extensive refit by Hike Metal, Wheatley, Ontario in 1990 and other work in 1997. The main engine is a turbocharged Detroit Diesel 6V-71 (~300 hp) that was rebuilt in 2000 -- currently there are 3,308 hours on the main engine. The ATIGAMAYG is fitted with a 12.5 kW Westerbeke auxiliary and a gillnet lifter – there are no trawl winches, net drum or crane. Navigational aids include: Furuno 24-mile radar, Lowrance LMS 350 GPS and depth sounder combination, Furuno FE-4300 color sounder, and two marine radios. There are live-aboard accommodations, extensive deck space (350 sq. ft.), but no wet or dry labs.

The WONDA GOLDIE is a 50 x 12 x 4.5 ft., 35-ton steel fisheries vessel operated by the assessment unit at OMNR's Owen Sound fisheries facility. The Russell Brother's Shipyard built the vessel in Owen Sound in 1950. The WONDA GOLDIE was re-powered in 1994 with a Caterpillar 3116 main engine, and since has accumulated 2,418 hours. Deck machinery is outfitted for gillnetting, with the addition of a new Crossley 24 in. lifter in 2000. There is no equipment for trawling. Wheelhouse electronics include: Comnav 1001 autopilot, Furuno 1831 radar, Furuno GP 50 GPS, Furuno color sounder and a Raytheon 90 marine radio.

VESSEL OPERATION and MAINTENANCE: In 2000, the ATIGAMAYG operated 384 hours and burned 3,086 gallons of diesel fuel at a cost of $5,960[10]. Over the last three years, the vessel program has ranged from 40-60 operational days and consists almost entirely of fisheries collections using gillnets. The WONDA GOLDIE also operated exclusively as a gillnetter and operated an average of 321 hours in 1999-2000, consumed an average of

[10] All subsequent cost figures are expressed as US dollars by assuming $1 US buys $1.43 Canadian. Because of fuel quality issues, fuel for the ATIGAMAYG was purchased at a local marina at a substantially higher cost than contract fuel used in the WONDA GOLDIE.

2,228 gallons, which cost $2,777. The rate of fuel consumption was 8.0 and 6.9 gph for the ATIGAMAYG and the WONDA GOLDIE, respectively.

The captains doe all of the routine maintenance (e.g. oil changes, fuel filter and belt replacements etc.) on their vessels. They decide what needs to be done to maintain their vessels. There are good local factory mechanics to handle any engine problems or extended maintenance, but for any hull or systems repairs they travel to Wheatley, Ontario – there are no local yards that can service either boat.

Maintenance costs for the two vessels were approximated using recent budget allocations along with some actual expense data. For the ATIGAMAYG, $6,300 is budgeted each year to cover the cost of minor repairs, oil, filters and life raft servicing etc., and a winter haul-out. Problems with the main engine in 2000 required an overhaul at an additional cost of $11,200. Maintenance, repairs and winter haul-out expenses for the WONDA GOLDIE averaged $8,855 per annum from 1999-2000. Within the last three years, new $3,500 radar was installed on the ATIGAMAYG, and the WONDA GOLDIE was outfitted with a new life raft, hydraulic system and new gillnet lifter at a total cost of $17,920. Combining fuel cost, maintenance expenses and an annualized estimate of new equipment resulted in a total operational expense of $17,160 for the ATIGAMAYG and $17,605 for the WONDA GOLDIE. Both of these figures, however, were exaggerated by the unusual expenses for big ticket, repair items, e.g., an engine overhaul, new hydraulic system and gillnet lifter.

Both vessels have provided good service, without appreciable loss of survey time. The WONDA GOLDIE is characterized as being dependable and reliable. A week of sampling time was lost in 2000 for a hull repair, but this was considered unusual. The ATIGAMAYG had problems with the main engine and fuel systems and required four weeks for a repair during the 2000 field season. However, the repair was scheduled ahead of time and staff were able to work around ATIGAMAYG's downtime without a loss of program. Station staff indicated that for years they under spent on vessel maintenance, and recently began providing better support. They also suggest that it has taken time for staff to fully appreciate the costs required to keep these boats in good operational condition. Unfortunately, funding for preventive maintenance is not as readily available as it is for emergency repairs during the field season. Owen Station staff are trying to change administrative attitudes toward preventive maintenance.

SAFETY, SURVEYS and INSPECTIONS: The ATIGAMAYG undergoes a Canadian Coast Guard (CCG) vessel inspection every four years, but the WONDA GOLDIE is not inspected because it is under the CCG weight requirement. The CCG inspections conducted on the ATIGAMAYG and other OMNR fisheries research vessels are not as complete and comprehensive as may be needed. These inspections focus principally on hull integrity, as well as life saving equipment and navigational lights. The hull inspections are done with the vessel out of the water where they can check plate wastage and the shaft and rudderpost bearings. Other systems (e.g., mechanical, plumbing, electrical and hydraulic) are not usually examined. The primary purpose of the inspections seems to be to ensure that the vessel will not sink. Although these CCG inspections may not be as comprehensive as needed, they are still valuable and important. For example, the captain of the WONDA GOLDIE during routine maintenance discovered holes in some of the steel plates near the transom. This kind of a problem could have undoubtedly been detected much sooner with a CCG hull inspection.

The WONDA GOLDIE had an inclining experiment done in 1985 to establish if it could be operated safely with fish stocking tanks on the deck. Past maintenance records for the ATIGAMAYG are not complete, nevertheless the captain believes there has never been a stability test. In 1990 the ATIGAMAYG was widened from 15 to 21 ft. and it is frequently used to stock fish (without any problems to date), yet no stability test of any type was completed.

As a result of the CCG inspections every four years, there is a full complement of safety gear aboard the ATIGAMAYG: including a Halon fire extinguishing system for the engine room, six-man inflatable life raft, six immersion suits, PFDs, EPIRB, life rings and flares. In addition to the Halon system, the fire fighting equipment includes: two portable extinguishers, two fire/bilge pumps (one electrical and one mechanical), and a smoke detector (non-operable). There were no fireman's outfits or emergency breathing apparatus. The WONDA

GOLDIE has no engine room fire suppression system, only portable extinguishers. There is a life raft, immersion suits, PFDs and an EPIRB.

Firefighting training is made available through OMNR's MED 1-A training program, which is generally available for new captains, and on occasion, other employees. Also, MED 1-A firefighting training deals primarily with how to handle portable extinguishers[11]. All station staff have annual updates of CPR training and every three years for First-Aid training. Both captains believe more could be done with a safety program, especially one that focuses on situation-based, "what-if" training. Moreover, the captains feel that better training should be made available to all potential crewmembers, and not just the captains. This is particularly important today when most crewmembers are temporary, seasonal employees. With the current arrangement of vessel staffing, the captains want to see some provision for a backup captain, e.g., technician with a boat operator's license, that could run the boat if a captain were incapacitated.

VESSEL STAFFING: Four people are the typical crew complement for the ATIGAMAYG, and a captain and two technicians make up the crew of the WONDA GOLDIE. Twenty years ago the fisheries vessels operated on Lake Huron by OMNR had dedicated crews, e.g., generally a captain and technician whose sole responsibility was vessel operation and maintenance and care and construction of fishing gear. Today this is no longer the staffing strategy for OMNR's fisheries vessels. The captain spends as much, or more, of his time on non-boat related activities. Moreover, technical crew on the vessels today are more likely to be seasonal, temporary employees who also spend most of their time on non-boat activities. These temporary crew are also less likely to come with commercial fishing backgrounds and skills, but are more likely to have some level of formal natural resource training.

The captain of the WONDA GOLDIE has been in that position for 10 years, and the captain of the ATIGAMAYG was a crewmember for 10 years and captain for the last ten years. Current job requirements for these positions are an appropriate tonnage license, two years of education in resource management, and some fisheries and gear experience. The education requirements underscore the dual role of Owen Sound captains. During the winter, they are often involved in other activities that support the overall mission of the fisheries units, such as scale reading, data summaries etc. The captain of the ATIGAMAYG spends approximately one-third of his work on vessel operation and maintenance and two-thirds on other program activities. A similar distribution of work effort for the captain of the WONDA GOLDIE is roughly one-half for vessel operation and one-half for other station activities. One of the concerns station staff have is that finding future captains that have this combination of skills will probably be very difficult. Someone who has good vessel and gear skills may not have a "clue" as to what is required in the lab, while another individual who has a good biology background may not have good vessel operation skills. Owen Sound staff see this as a dilemma, because this current hiring practice may lead to hiring a new captain who does not have the best combination of vessel and gear skills.

The salary and compensation package for the Owen Sound captains is similar to those captains at the other OMNR fisheries stations on Lakes Ontario and Erie. 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; i.e., the difference between start and final salaries is small. 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.

A simulation of the ATIGAMAYG or WONDA GOLDIE vessel crew operating expense was calculated assuming a two-person crew, with an average annual salary for the captain of $30,605 and an annual 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. Assuming a 50-day operating season for the ATIGAMAYG, staff operating cost would be $10,900. For the WONDA GOLDIE, with a 110-day schedule, the staffing cost is $23,980. Combining operating, maintenance and

[11] Other levels of MEDI training get more involved in firefighting.

staff costs yields a total operating expense of $28,060 for the ATIGAMAYG and $41,585 for the WONDA GOLDIE or $561 and $378 per operating day, respectively.

PROGRAM DESCRIPTION: Owen Sound station staff characterized the difference between research and assessment vessel programs as research spends 20 percent of their effort catching fish and 80 percent processing the catch, whereas the assessment unit spends 80 percent of their time catching fish and 20 percent processing. This thumbnail description provides a context to view the field programs for both units. Nearly all the effort for the research unit's ATIGAMAYG is associated with fisheries work: 75, 15 and 10 percent of effort is spent on research, assessment and fish stocking, respectively. The field program begins in May with lake trout stocking in Lake Huron (5 days). From late-May through June, the ATIGAMAYG works in Lake Superior collecting lake trout for research and to assist contract commercial netters working for the Lake Superior management unit (35 days). During August-September, 10 to 14 days will be spent at South Bay, Manitoulin Island, to net sites that have not been visited since 1992. Finally, approximately 18 days will be spent supporting the assessment unit's Offshore Index program. The total field program encompasses approximately 70 days.

The assessment unit's program also begins in May stocking lake trout (20 days). The remaining time between June and October is directed at their core assessment activity, the Offshore Indexing Program. This is a gillnet index program that began in the late-1970s that was initially targeted at chubs, whitefish, lake trout and perch, but is also used to monitor other components of Lake Huron's offshore fish community. Four sites are visited annually for approximately 10 days of effort at each site (40 days), and two sites are netted biannually, 10 days per visit (40 days). Another 10 days of effort is planned for various other activities. More integrated, "piggy back" work is being done today than previously. Water quality, phytoplankton and benthic samples are collected along with gillnet samples, and much of this work is done collaborating with other scientists or agencies. Collectively these surveys total 110 operational days for the WONDA GOLDIE.

In spite of the ambitious core Offshore Indexing program (98 days total), assessment unit staff feel the schedule represents a bare-bones program. The principal concerns are that there is not adequate geographic coverage and that the bottom set gillnets do not adequately reflect the species assemblage in the fish community. To address the problem of insufficient sampling of the offshore-pelagia, assessment and research staff are considering the use of pelagic gillnets, albeit this approach is less efficient and more labor intensive than bottom set gear. With limited staff resources and survey coverage, this approach is unlikely to resolve all their concerns. For vessel program expansion, there is no available time for increasing the use of the WONDA GOLDIE. On the other hand, the ATIGAMAYG has some unused capacity (e.g., 70 days vs. 110 days) that could conceivably be used to expand the Offshore Index program. However, the captain's time is limited by other non-vessel activities and it constrains making better use of the ATIGAMAYG. Both units indicate that current funding is inadequate and it has inhibited formulating a good, base program that considers the spatial and bathymetric distribution of the fish community.

There is a difference in funding for both of these vessels, and the difference has to do with two different administrative units. The assessment unit indicates they get good support for operation and maintenance of the WONDA GOLDIE. Base funding provides money for day-to-day maintenance, repairs and winter haul-out, and capital funding is used to replace equipment, take care of major unforeseen emergency repairs etc. The ATIGAMAYG has the same two sources of funding, but does not have the same access to capital funding as the assessment unit. Consequently, money for new equipment and repairs is less available than that for the WONDA GOLDIE. This point is underscored by the fact the ATIGAMAYG has some maintenance issues, noted during previous inspections that are still unresolved and are considered a "work in progress."

FUTURE PROGRAM: Owen Sound's hope for future programming is tied directly to unmet current needs. Both units would like to see an increase in the spatial scope of their Offshore Indexing program to include northern Lake Huron. They also need a vessel with bottom and midwater trawling capability to help monitor and quantify prey fish distribution and abundance. Connected with the trawling and prey fish assessment, they also want to augment their sampling capability with the addition of hydroacoustic gear.

All of the additional activities that Owen Sound Station staff would like to see in the future are bound to a requirement for additional staff. Yet, the units are not optimistic about future increases in personnel. They hope that they will not have to experience any more cuts in staff than they have already faced, but they do not rule out the possibility that further cuts may lie ahead. This gloomy assessment of future staffing levels is not compatible with their hope for future programming. It suggests that it may be more realistic to think that in 20-25 years the Owen Sound program will look much like the one today. In the meantime, however, better integration of research and assessment unit staff and fiscal resources may improve efficiency, and better use of technology (e.g., hydroacoustic gear) could improve productivity and effectiveness. Regardless, without additional funding or the ability to adapt, it will be difficult to address what is currently considered "unmet needs."

VESSEL SUITABILITY and FITNESS: The WONDA GOLDIE is considered to be in good shape. The main engine was replaced in 1994 and has 2400 hours of use since then – it will be many years before a normal overhaul is required. The gillnet lifter and hydraulic system were replaced in 2000 along with the autopilot and GPS. Although the boat has been well maintained, it is 50 years old and showing signs of structural deterioration. The perforated hull plating discovered and repaired in 2000 is an example of this kind of deterioration. In the future, the WONDA GOLDIE will require constant attention to the structural integrity of the hull, and it is unlikely that it can provide safe service for another 20-25 years without a major refit. The design and sampling capabilities of the WONDA GOLDIE are limited now and they would provide a serious constraint on assessment programming in the future – "the WONDA is not the boat we want to have for the future." The vessel is narrow, deck space is limited, and handling characteristics are poor compared to the ATIGAMAYG. A new vessel is the only way that the assessment unit can consider bottom trawling, midwater trawling and hydroacoustic sampling. Moreover, expanding their geographic range to include index sampling in northern Lake Huron will require a survey vessel with good handling qualities and adequate live-aboard accommodations for the crew.

The ATIGAMAYG went through a major refit in 1990 and had a new wheelhouse and galley installed in 1997. With care it should provide very adequate service for another 20-25 years. The vessel's strengths are its deck space and sea kindliness, while improvements are needed with better electronic navigational aids, better crew accommodations for long surveys, adding some safety equipment (e.g., life sling and boarding ladder), and adding a HIAB crane. The current state of fitness is considered adequate, but it will better when a number of maintenance issues are finally resolved, i.e., replacing electronics and several inspection issues. Getting the ATIGAMAYG into better shape, more quickly could be accelerated with better funding or a change in funding sources. The lack of trawling and hydroacoustic capabilities was noted as an important research need now and in the future. Aside from another refit of the ATIGAMAYG, another approach to providing this capability for the research unit is to develop a more integrated vessel management plan for the Owen Sound station. If and when the WONDA GOLDIE is replaced with a more functional and capable fisheries vessel, research unit staff could schedule any trawling and hydroacoustic work with the new vessel, while the ATIGAMAYG could be used to a far greater extent supporting the Offshore Index program. Considering that research and assessment staff all consider funding and staffing inadequate, it would seem reasonable to make the most efficient use of current resources, i.e., both boats could be shared and funded under a common operational group, similar to the approach used at Glenora, Port Dover and Wheatley stations.

VESSEL PROGRAM SUMMARY

VESSEL NAME: **TOGUE**
OPERATOR: U.S. Fish and Wildlife Service, Jordan River National Fish Hatchery, Elmira, Michigan
LAKE: Superior, Huron, Michigan
HOME PORT: Cheboygan, Michigan
CAPTAIN: Mike Perry
MARINE ENGINEER: Bob Bergstrom
STATION ADMINISTRATOR: Rick Westerhof

PROGRAM DESCRIPTION: The primary mission of the Jordan River National Fish Hatchery is restoration of lake trout populations in the Great Lakes. The primary use of the TOGUE is to transport and stock lake trout on historical offshore spawning reefs. Lake trout stocking by the TOGUE is done during April, May, and June. The boat cannot be used for anything else during that period because it must be on call 24 hours a day for stocking. In October, the TOGUE is used for assessment of spawning lake trout populations with graded-mesh gill nets on offshore reefs (Six-Fathom Bank/Yankee Reef complex). Lake trout stocking is cooperative work with other state, federal, and tribal agencies in their respective lakes, and the spawning lake trout assessment is done in cooperation with member agencies of the GLFC Lake Huron Technical Committee. The TOGUE operated an average of 91 days in 1998-2000 with lake trout stocking and lake trout assessment netting making up 85% and 15% of those days, respectively. The TOGUE has not been used for contract work, but Jordan River staff estimates the cost of contracting the TOGUE would run $1,500-$2,000.

VESSEL DESCRIPTION: The TOGUE was acquired by the U.S. Fish and Wildlife Service (USFWS) in 1985 for stocking lake trout offshore in the Great Lakes. It was designed and built in Louisiana by Rodregez Brothers shipyard. The TOGUE is a steel boat, 85 feet long, 22-foot beam, 10-foot draft, and a displacement of 175 tons. Work deck area is 384 ft^2 on the aft deck. It has four bunks, a galley, and a head with a shower. The TOGUE is powered by two Detroit Diesel engines that generate 500 hp and cruise the boat at 8.5 knots. There are two generators rated at 75 and 50 kWs. Deck machinery consists of a removable Crossley 12-inch gill-net lifter (Kennebec Marine Co.). Pilothouse electronics include a Robertson autopilot (AP-40) installed in 1985, two Raytheon radars installed in 1988 (R-41) and 2000 (R1210/6XX), two North Star GPSs installed in 1997 (9300) and 1999 (961XD 1705-A), a North Star loran (9000) and North Star control head (9400) installed in 1997, two Raytheon depth sounders installed in 2001 (JFV90) and 1996 (V8010), a Raytheon marine radio (Sea 157) installed in 1988, and a Sea/Datamarine marine radio (SEA 156) installed in 2000.

VESSEL STAFFING: The crew of the TOGUE is supervised by the Hatchery Manager of the Jordan River National Fish Hatchery. The crew consists of a part-time boat captain hired for the months the vessel is operating and a full-time marine engineer. This has been the crew composition since acquired by the USFWS for fish stocking. One or more biologists and technicians from other U.S. Fish and Wild Service offices (Iron River and Pendills Creek NFH and Alpena Fishery Resource Office) are on board when the vessel is stocking lake trout or doing lake trout assessment netting. The boat captain must have a 200-ton Coast Guard Masters License to operate the TOGUE. The marine engineer has a boat engineer's license. The current boat captain has 1 year of experience on the TOGUE, and the current marine engineer has 12 years of experience on the TOGUE. Together they have 70 years of experience on Great Lakes vessels. The captain is contracted so to fill that position would involve advertising or soliciting marine academies for candidates. The boat captain earns $26.71 per hour and approximately $13,889 annually. The marine engineer is a wage-grade position and currently earns$30.42 per hour and annually $63,485. The captain and engineer have rather specific jobs so there is little job sharing

between these positions. The vessel crew and scientific staff share jobs such as fish stocking, setting and lifting gill nets, and deckhand duties. The captain generally does not do non-vessel related work, but the marine engineer spends about 10% of his time on non-vessel related work such as facilities maintenance at the vessel base in Cheboygan, Michigan. The contracted captain and the marine engineer both get annual CPR and first aid training.

VESSEL OPERATION AND MAINTENANCE COSTS: The TOGUE operated an average of 91 days annually during 1998-2000, ranging from 87 days in 2000 to 98 days in 1998. Main engine hours averaged 4,377. Fuel use averaged 7,321 gallons per year during 1998-2000 and fuel cost averaged $6,719. Average fuel use and cost per operation day and engine hour were 80 gallons and $74 and 2 gallons and $2, respectively. Annual maintenance cost for the TOGUE has averaged $ 10,133 during the past three years or about $334 per operating day. Average annual operating and maintenance cost for the TOGUE from 1998-2000 was $128,491 and new equipment purchased during that period came to $27,350. The Jordan River National Fish hatchery manager is responsible for the TOGUE's operation and maintenance budget. The marine engineer determines what is needed in the way of equipment and schedules maintenance projects and the hatchery manager approves and provides oversight for the projects. The marine engineer does most of the maintenance except sandblasting and major engine overhauls. Haul-out is done every five years. The last haul-out was in 1999 and cost $9,000, which included haul out and return to the water, sandblasting, and painting. Otherwise hull and deck painting is done as needed, and engine tune-ups and overhauls are scheduled according to manufacturer's specifications or as needed. The TOGUE is wet-docked and heated during the non-operational season. Dockage is leased from RYBA Marine in Cheboygan, Michigan and the crew has free use of the USGS vessel base located adjacent to the RYBA Marine dockage. Maintenance needs in general and the frequency of unforeseen repairs has increased in recent years but this has not yet affected the TOGUE's operation. Although the amount of money appropriated for operation and maintenance has not increased in recent years, budget shortfalls have been covered by money from the hatchery budget. The hatchery superintendent and engineer work quickly to secure funds and undertake unforeseen repairs and the TOGUE has ready access to parts suppliers and repair facilities.

VESSEL INSPECTIONS, AND SAFETY: The last inspection of the TOGUE by a marine architect was in 1991 and the next one is scheduled for 2001. The hull is inspected during haul-out every five years. A stability test was done in 1989. Some concrete ballast, a generator, and an air compressor have been added since this stability test. The boat captain and marine engineer receive annual USFWS-supported CPR and first-aid training, and has had marine fire-fighting training as part of the requirements for the marine engineer's license. Safety equipment onboard the TOGUE includes a life raft (Model CRG-10-STD MK-2), an EPIRB (Northern Airbore Tech S1510), 6 immersion suits (Parkway Imperial Model 1409 and Mustang suits Model 2175), 19 PFDs (5 Sterns work vests, 10 adult Safeguard Corp., 4 child Safeguard Corp.). Fire suppression equipment onboard includes a Halon system in the engine room, six hand-held fire extinguishers, and a water pump with 2.5-inch hose. The TOGUE has two bilge pumps.

FUTURE VESSEL PROGRAM: The Jordan River National Fish Hatchery has good support from the USFWS for its major vessel program, which is stocking lake trout on historical offshore spawning reefs to enhance lake trout rehabilitation in the Great Lakes. This agency support is evidenced by the 4.3 million dollars budgeted in 2004 for construction of a vessel to replace the TOGUE. The vessel program is also supported by partner state, federal, and tribal agencies. Recent negotiations with Native-American tribes in the upper Great Lakes has reclassified additional areas of northern Lake Michigan and Lake Huron as lake trout rehabilitation areas. Consequently lake trout stocking may increase by two million fish and require more vessel use for offshore fish stocking. Additional vessel time will likely also be needed by partner agencies to do assessment netting to evaluate the results of offshore fish stocking. The Jordan River Hatchery Manager would like to increase the vessel staff by making the contracted boat captain a full-time position and adding a seasonal deck hand. A full-time captain would assist the Hatchery Manager in managing vessel operations, assist the marine engineer in vessel maintenance, and provide stability and experience for the position.

VESSEL FITNESS AND FUTURE: The TOGUE is the only vessel on the Great Lakes specifically modified for lake trout stocking. The vessel has been well maintained, and thus far has not missed a day of operation due to breakdowns. However, the TOGUE has structural integrity problems and is near the end of its serviceable life.

The keel is twisted and deck plates have buckled. The marine engineer estimates a serviceable life of three years to four years. A formal survey is scheduled for 2001 to determine the life of the TOGUE. The process for replacement of the TOGUE is underway with money budgeted to begin construction of a new vessel in 2004 with an estimated completion in 2006. A team will be assembled including the Jordan River Hatchery Manager, boat captain, marine engineer, USFWS Fishery Resource Office personnel, USGS personnel, and perhaps other partner agency personnel. The team will work with the U.S. Corps of Engineers Marine Design Center to design a new vessel. Major specifications would focus on the onboard fish transport and distribution system to optimize survival of stocked fish. Secondary specifications would enhance the fisheries assessment capabilities of the vessel such as improved gill netting and a laboratory to process fish and house sensitive sampling equipment, and provide better crew quarters. A major concern of the Jordan River Hatchery Manager and the marine engineer is that the TOGUE might not last, even with a retrofit, until completion of a new vessel in 2006. The results of the marine survey in 2001 should answer the above question.

VESSEL PROGRAM SUMMARY

VESSEL NAME: **GRAYLING**
OPERATOR: U.S. Geological Survey, Great Lakes Science Center
Ann Arbor, Michigan
LAKE: Huron, Michigan
HOME PORT: Cheboygan, MI
CAPTAIN: Edward Perry
CHIEF OF VESSEL MANAGEMENT: Robert Nester
SCIENCE CENTER ADMINISTRATOR: Dr. Nancy Milton, Director

PROGRAM DESCRIPTION: The GRAYLING is used primarily in lakes Huron and Michigan for prey fish population assessment with bottom and mid-water trawls and hydro-acoustic gear, and for lake trout assessment with trawls and gill nets. The GRAYLING operates during April-November and about 85% of its operation is for fish population assessment and the remaining 15% is for fish habitat assessment. All of the work is cooperative with partner agencies through the Great Lakes Fishery Commission's Lake Huron and Lake Michigan committees and Lake Huron and Lake Michigan technical committees. Although personnel from these agencies may or may not be present on the GRAYLING when sampling is done, the data are shared with all partner agencies and used for management of the fish populations. The GRAYLING is currently not being contracted to do work for other agencies, nor is work typically done by the GRAYLING being contracted out. The Great Lakes Science Center occasionally uses the GRAYLING for special projects funded from outside sources, providing these projects do not interfere with prey-fish and lake trout assessment core projects.

VESSEL DESCRIPTION: The GRAYLING was designed and built by Bender Shipyard in Mobile, AL in 1977 and acquired by the Great Lakes Science Center in 1978. It is steel-hulled, 75 feet long, 22 feet wide, has a 10-foot navigational draft, weighs 183 gross tons, and has a full-load displacement of 133.4 tons. It carries 6.5 tons of fixed ballast as steel welded to the keel, cement in the lazarette, and pig iron in the bilge. The GRAYLING has twin screws and rudders and is powered by two 275 hp Cummins diesel engines with a cruising and maximum speed of 9.7 knots. It has a fuel capacity of 4,400 gallons, a cruising range of 1,500 miles, and endurance of 12 days. The GRAYLING has 490 ft^2 of exterior workspace of which 152 ft^2 is taken up by deck equipment. Interior workspace includes 70-ft2 forward and 84 ft^2 aft. There is 43 ft^2 of science storage and a 23-ft^3 freezer. The GRAYLING has accommodations for seven people in five staterooms. There are two heads with showers. The GRAYLING has a 2,500-gallon potable water capacity and a 2,987-gallon sewage capacity. Is has a galley with stove, microwave, refrigerator, sink, water cooler, and hot water dispenser. Recreational facilities include a TV and VCR.

The GRAYLING has two Cummins 855 NH-230-22 diesel 75 Kw generators. Other auxiliary machinery includes a Campbell-Hausfield air compressor, a Wei-Mcaim Ship heater boiler, a Gould J-plus Jet 0.5 hp seawater pump, a Gould Century 10 hp fire and bilge pump, a Crane 5 hp sewage pump, and a Myers 0.5 hp portable ejector pump. Deck machinery includes a Rowe 9-BHH anchor windlass, a HIAB-Dunbar 345 deck crane, a BT winch and boom with 2,000 feet of 3/16th-inch cable, two Rowe 17-H trawl winch with 2,200 feet of 0.5-inch steel cable, a Kem Krd 4420 MS net reel, and a Crossley 30-inch gill net lifter. Pilothouse electronics includes a Simrad autopilot, two radars (Raytheon R4 installed in 1989, Raytheon 1210XX installed in 1997), two depth sounders (Furuno 502L, Wesmar DS 200), a North Star 9000 loran installed in 1995, a North Star 951X differential GPS installed in 1997, a Datamarine Chart Link II plotter installed in 1995, two marine radios (two Sea 156 in 2000), two hand-

held radios acquired in 1996, a Raytheon Ray 400 intercom installed in 1985, a Man Overboard Alert installed in 1997, a Hewlett Packard 700 fax installed in 1997, an Ameritech AC-250 cell phone acquired in 1996, a Simrad net monitor installed in 1994, a Tack II shaft tachometer installed in 1997, a Richie compass installed in 1977, Yokogawa Gyro compass CMZ 250X, and a F420-CWSHROWA anemometer installed in 1977.

VESSEL STAFFING: The current crew of the GRAYLING consists of a boat captain whose official Wage-Board Series classification is a Ship Operator, and an engineer whose official classification is a Marine Machinery Repairer. To meet current Coast Guard manning requirements the vessel also needs a licensed Mate. A 500-ton Coast Guard Masters License is required to operate the GRAYLING and the current captain has a 1,600-ton Coast Guard Masters License. The boat captain is responsible for operational readiness of the vessel, navigation, routine maintenance, and safety. The captain assists the biologist-in-charge on board in planning daily work schedules. An engineer's license is not required by USGS for the Marine Machinery Repair position, but the incumbent must possess knowledge, skills, and abilities consistent with specified acceptable performance for the position including the operation, maintenance, and repair of the vessel's engines, machinery, fishing equipment, and electrical, heating, plumbing, and hydraulic systems. As of 2000, pay ranges were $23.90-$27.93 per hour for Ship Operator and $18.73-$21.87 per hour for Marine Machinery Repairer. In the 1980s, the crew of the GRAYLING also included a cook/seaman. One or more biologists and technicians provide scientific staffing for the core assessments and special projects done by the GRAYLING. The scientific staff assists the crew with various deck duties and the crew assists the scientific staff with processing fish samples. The captain and engineer spend less than 5% of their work time on maintenance of the USGS vessel base facility at Cheboygan, MI.

VESSEL OPERATION AND MAINTENANCE COSTS: The GRAYLING operated 98 days in 2000 and is scheduled to operate 106 days in 2001. Fuel costs for the GRAYLING in 2000 were about $23,000 or $235 per operating day. The captain and engineer work with the vessel manager in scheduling maintenance and they generally do all but major repairs. The frequency of unforeseen repairs has increased in recent years and a recent breakdown of engines on the GRAYLING resulted in some down time and loss of survey days in 2000. Access to parts suppliers and repair facilities for the GRAYLING is good at the vessel's homeport, Cheboygan, MI. Agency support for maintenance of the GRAYLING has been adequate to address repairs and safety concerns necessary to keep the boat operational. However, past budgets have not been sufficient to fund some preventive maintenance, which has resulted in necessary emergency repairs and some loss of survey time.

VESSEL INSPECTIONS, AND SAFETY: The GRAYLING received a condition assessment inspection in 2000 by the Great Lakes Science Center's chief of vessel management. The GRAYLING is hauled out and inspected every 3-5 years for routine maintenance, but the vessel has never had a full-scale formal inspection by a marine surveyor. A stability test done on the GRAYLING in 1976 while it was in the shipyard at Mobile, AL. The crew receives annual CPR training and first aid training every three years. Safety equipment onboard the GRAYLING includes, a man overboard alert system, a 12-foot aluminum boat with a 9.9 hp Johnson outboard, two 10-man life rafts, 10 exposure (survival) suits, 24 life jackets, 4 life rings, and 2 water lights. The Great Lakes Science Center provides the captain and engineer with annual safety training, including CPR and first aid; abandon ship training was conducted in 2001; the crew has also received fire fighting training and that training will be repeated in 2002. Fire fighting equipment includes a fixed CO2 system in the engine room, eight portable fire extinguishers (7 ABC, 1 Haylon) stationed about the vessel, and a Gould Century fire and bilge pump. The Great Lakes Science Center provides support to the crew to update licenses needed to meet Coast Guard requirements.

FUTURE VESSEL PROGRAM: USGS support for operation and maintenance of the GRAYLING has been minimal, but is improving. Great Lakes Science Center administrators and vessel personnel are developing new systematic safety and budget strategies that will more clearly convey to USGS administrators the support needed for the GRAYLING and the Great Lakes vessel program as a whole. These strategies include classifying vessels as facilities, each with its own maintenance budget, and preparing comprehensive vessel management plans that incorporate five-year preventive maintenance schedules based on regular condition assessments performed by the vessel manager and licensed marine surveyors. Great Lakes Science Center personnel believe that their current prey fish, lake trout, and fish habitat assessment core programs will be continued during the next 20 years but that the sampling technology will likely change. They expect to see more assessment done by remote sensing, as this