



The R/V *Kaho* - Lake Ontario

The USGS Great Lakes Science Center is dedicated to providing scientific information for restoring, enhancing, managing, and protecting living resources and their habitats in the Great Lakes region. The USGS Great Lakes Science Center is headquartered in Ann Arbor, Michigan, and has biological stations and research vessels located across the Great Lakes Basin.



K A H O	Specifications
	Length: 70 ft.
	Beam: 18 ft.
	Draft: 5.5 ft.
	Cruising speed: 12 kts.



The Fleet

The Great Lakes Science Center (GLSC) operates five large research vessels, ranging in length from 70 to 107 ft, with one vessel stationed on each of the Great Lakes. The vessels are equipped with wet laboratories, gear for fish, limnological, and contaminant sampling, hydroacoustical fish-detection systems, and GPS navigation systems. The GLSC also operates a fleet of small (18-25 ft) research vessels, outfitted with GPS navigation systems and equipment for fishery and limnological research, and has a side-scan sonar and remotely operated vehicle.

The Vessel

The R/V *Kaho*, stationed in Oswego, NY, at the GLSC's Lake Ontario Biological Station (LOBS), is the principal GLSC research vessel on Lake Ontario. Built in 2011, the new *Kaho* replaced the original *Kaho* when maintenance costs, safety considerations, endurance and speed limitations, and partner needs to utilize newer technologies marked the end of its service life. The new vessel is faster, safer, and provides technological capabilities for cutting-edge scientific investigations of

deepwater ecosystems in Lake Ontario. The new *Kaho* can be at sea eight days with sleeping accommodations for six people. There are two heads and a full galley.

The original R/V *Kaho* was the workhorse of the multiagency fisheries research fleet on Lake Ontario for more than three decades. The vessel was built in 1961 and assigned to LOBS in 1977.

The Science

LOBS provides scientific information to support the restoration, enhancement, management, and protection of fishery resources in Lake Ontario. The R/V *Kaho* is the cornerstone of this mission. The vessel has participated in long-term data collections including population studies of important prey fish and studies aimed at evaluating the performance of stocked lake trout used in the bi-national restoration program. Current information on prey fish populations is used by resource agencies to manage stocked predator populations, and long-term data is used by GLSC researchers to build population models to anticipate future changes





in the prey fish community. The fish population research program is closely coordinated with the New York State Department of Environmental Conservation.

The *Kaho* has participated in multiple additional studies related to the Lake Ontario ecosystem, such as: (1) collecting fish and environmental samples for the Great Lakes Fish Contaminants Monitoring Program, in cooperation with the U.S. Environmental Protection Agency; (2) documenting changes in food webs and fish distributions associated with establishment of invasive species; and (3) documenting the spread of zebra and quagga mussels across the lake bottom and the concurrent decline of the burrowing amphipod, *Diporeia*.

The *Kaho* fishes all U.S. waters of Lake Ontario and is often involved in specific research projects near its home port in eastern Lake Ontario. The *Kaho* is also used in Canadian waters of Lake Ontario in collaborative research with Canadian agencies.

On-board Equipment

The *Kaho* has state-of-the-art industrial systems to support the widest possible range of scientific sampling activities. The main winch system allows deployment of multiple towed gears (trawls, sonar devices, gliders, plankton nets, etc.) using centerline or double-warp configurations. Precision fishing at specified depths can be accomplished via an integrated net

mensuration system, line counters, and a tensiometer. An A-frame provides options for stern gear deployment and lifting, and a knuckle crane facilitates the transfer of large loads and specialized sampling needs. The vessel also has a hydraulic gillnet lifter, which is a primary tool used in cooperative surveys across Lake Ontario.

To survey forage fish and zooplankton biomass, the vessel is equipped with a hydroacoustic transducer (120kHz) with a through-hull design that minimizes bubble sweep and background noise. Ship propulsion is also designed for quiet operation. Twin propellers, a bow thruster, and hydraulic anchor winch provide a variety of options for complex maneuvering and stationary sampling. In addition, the scientific instrument winch has slipping capability that facilitates safe deployment of sensor arrays when real-time observation is necessary. Onboard sample processing and storage is supported via a stainless steel work bench in the wet laboratory, motion-compensating balance, chemical storage locker, cold and hot water supply, clean AC power supply, and large freezer capacity. Navigation, weather, and winch operation data are supplied to the dry lab area and can be integrated electronically with data from scientific sensors.

To facilitate communications while underway, the vessel is equipped with a 3G/4G cellular modem and Wi-Fi network that are operational in most U.S. waters on the lake.



R/V Kaho on Lake Ontario

