

BIOLOGICAL DIVING SERVICES

Woodlot Alternatives, Inc. has more than 15 years of experience providing scientific diving services for a wide variety of clients. We have completed scores of habitat assessments and sampling programs in fresh water and marine environments in all seasons. Our underwater biological team includes marine biologists and wildlife biologists who are skilled in evaluating underwater habitats as well as characterizing fish and invertebrate communities.

Instead of relying on non-scientist contract divers to gather natural resource data, Woodlot has five professional biologists on staff who are certified SCUBA divers. This has proven to be a very cost-effective approach to projects requiring rapid assessments and flexibility in execution. Our divers hold a variety of certifications including AAUS Scientific Research Diver and NAUI Open Water, and are trained in safety, dive first aid and CPROX oxygen administration. We have expertise in preparing dive safety plans, and experience performing dives in riverine habitats with fast currents and low visibility.

Woodlot has all the necessary equipment to perform on-site aquatic ecological characterizations, substrate and biota sampling, habitat assessments, restoration, and Essential Fish Habitat evaluations in any season. Woodlot maintains three work boats, including two docked in Casco Bay, has ready access to larger platform fishing vessels, and can mobilize boats and equipment to any location in the northeast on short notice.



Woodlot maintains a full line of equipment to support our scientific diving services, including SCUBA gear for any season, sampling devices, underwater cameras, and a variety of boats to fit a project's specific requirements.



Woodlot's scientific divers have prepared dive safety plans approved by the U.S. Army Corps of Engineers, and required by OSHA.

Woodlot's Biological Diving services include:

- SCUBA and Snorkel Surveys
- Lake and River Surveys and Sampling
- Intertidal and Subtidal Marine Characterizations
- Sediment/Substrate Sampling and Characterization
- Rare, Threatened and Endangered Species Surveys
- Benthic Invertebrate Surveys and Sampling
- Lobster Population Dive Surveys
- Fish Sampling and Taxonomic Studies
- Mussel Surveys and Relocation Projects
- Eelgrass Surveys and Restoration Projects

These services are provided in support of:

- Corridor Planning and Transportation Projects
- Aquaculture and Marine Facility Permitting
- Dredge Planning and Permit Preparation
- Estuarine, Tidal Flat, and Salt Marsh Restoration
- Natural Resource Damage Assessments
- NEPA studies and documentation
- Marine Ecological Risk Analysis
- Essential Fish Habitat Evaluations

FRESH WATER DIVING

Many of Woodlot's recent scientific dive surveys in fresh water have focused on aquatic habitat assessments and rare species surveys for mussels. Selected examples include the following projects:

- **Connecticut River Dive Surveys and Mussel Sampling** – for Roy F. Weston, Inc. and USEPA. A study of contaminant effects on mussels for the Housatonic River CERCLA project required a large sample of *Elliptio complanato* to be placed into the Housatonic and monitored throughout the season. A pilot study was designed to test the procedures, and spring-season dive surveys were conducted by Woodlot biologists in the Connecticut River to locate and collect reference samples of *Elliptio*. Woodlot assembled a dive plan approved by the US Army Corps of Engineers, and provided logistical arrangements including boats, boat operators and safety divers. Sampling protocols were developed in consultation with USEPA and Weston scientific staff, and all mussel samples were successfully transferred to monitoring tanks 100 miles from the sample site. This project presented Woodlot biologists with physically challenging dive conditions during peak spring runoff in the Connecticut River.
- **Rare Mussel Surveys, Connecticut River, Vermont** – US Gen New England, Inc. As part of license compliance work for the USGen's Fifteen Mile Falls Project, Woodlot conducted snorkeling and SCUBA surveys along 22 miles of the Connecticut River in southern New Hampshire and Vermont. Surveys were stratified according to habitat requirements of the rare species and resulted in the discovery of a new population of the Federally-Endangered dwarf wedge mussel (*Alasmidonta heterodon*, a small freshwater mussel that rarely exceeds 1.5 inches in length.) The results of the survey were presented at the First Annual Freshwater Mussel Symposium in Nashville, Tennessee in 1999.
- **Ecological Site Assessments and Freshwater Mussel Surveys** – Madison Paper Company. As part of a preliminary relicensing planning effort, Woodlot conducted mussel surveys in a 2000-foot reach of river affected by a 1.5-foot headpond elevation increase. Methods included shoreline surveys and snorkeling.
- **St. Lawrence River Dive Surveys** - New York Power Authority. As part of the FERC relicensing process, Woodlot conducted underwater mussel surveys along sections of the St. Lawrence River in New York state. These surveys involved diving in riverine currents adjacent to the hydropower site, using in-mask dive communicators.
- **Kennebec River PCB and Dioxin Water Quality Survey** - Woodlot assisted Friends of Merrymeeting Bay, Maine Department of Inland Fisheries & Wildlife, and Maine Department of Environmental Protection staff in identifying potential mussel collection sites for PCB and dioxin water quality studies in the Kennebec River, and assisted in collecting over 2,500 individual *Elliptio complanata* specimens for use in the survey.



Woodlot biologists recently discovered a rare Dwarf wedge mussel population (*Alasmidonta heterodon*) in the Connecticut River (photo by National Wildlife Federation)

FRESH WATER DIVING (CONTINUED)

- **Pipeline Crossing Mussel Surveys** – Maritimes & Northeast Pipeline. Woodlot conducted mussel surveys at a number of pipeline crossing sites. Sites ranged in size from large streams (30' wide) to large rivers (1200'). Methods employed included shoreline surveys, viewing buckets in shallow water, snorkeling, and SCUBA diving, although most sites employed SCUBA. Species richness at sites ranged up to seven species.
- **Belknap County Freshwater Mussel Survey** – United States Fish and Wildlife Service. Woodlot conducted extensive surveys for freshwater mussels throughout Belknap County, in southern New Hampshire.



MARINE DIVING

Because of our convenient location on the coast of Maine, Woodlot staff have easy access to study and work in one of the richest and most productive marine environments in North America. As a result, we offer our clients a unique and cost-effective blend of scientific expertise and project experience in complex coastal environments from Nova Scotia to the mid-Atlantic states.

Woodlot's biological divers have extensive experience evaluating coastal habitats, as well as fish and invertebrate communities in estuarine, nearshore, and subtidal and intertidal zones. Our scientists have expertise in assessing marine and island ecosystems; providing state and federal permit support for coastal and nearshore facilities and dredge projects; designing and managing estuarine and salt marsh restoration projects; and designing and executing marine sampling programs. Some examples of Woodlot's recent marine scientific dive projects include the following:



Woodlot's scientific divers are experts at conducting intertidal and subtidal zone characterization and sampling programs in support of dredging projects.

- **Belfast Harbor Project** – MBNA New England. Woodlot was retained to assess feasibility and site location of a corporate waterfront docking facility along 800 feet of Belfast Bay. Woodlot evaluated the ecological resources found in the project area, including wetlands, and assessed anticipated environmental impacts of the proposed pier system. Intertidal and subtidal field surveys were conducted to describe the substrate, hydrology, plant communities, and animal communities found within the project area. Woodlot SCUBA divers conducted winter dive surveys in swift tidal currents, to collect benthic fauna and flora samples and take still and video photographs to support final site assessments and recommendations.

MARINE DIVING (CONTINUED)

- **Bowdoin College Coastal Studies Center** – Bowdoin College. Woodlot was retained to lead a detailed site assessment of a large coastal property in Harpswell for development of a Coastal Studies Center. Woodlot provided Bowdoin with a detailed resource inventory, maps, GIS data, and recommended paths forward for siting including permitting constraints. In the marine environment, Woodlot biologists conducted underwater dive surveys to evaluate sub- and inter-tidal habitats, map eel grass beds, and survey benthic macro-invertebrates and macrofauna.



- **Wyman Station Habitat Assessments** – CMP. To evaluate the potential effects of operation of a licensed ash lagoon discharge on the near shore environment, Woodlot performed dive and snorkel surveys to identify and map coastal wetland communities and to evaluate fish and macro-invertebrate communities. Underwater plots were surveyed for species presence and population, with the organisms being identified to the lowest practicable taxa.
- **Little John Island Habitat Surveys** – Town of Cumberland. Woodlot assessed the permitting viability of relocating a ferry wharf serving Chebeague Island in Casco Bay. The potential site lay in shallower water than the existing wharf, in an area of eelgrass and shellfish beds. Reconnaissance-level SCUBA surveys were conducted by our biologists to evaluate sub- and intertidal habitats, map eelgrass beds, and survey macrofauna and benthic macroinvertebrates. The location of eelgrass beds, salt marsh, and approximate normal high water line were determined using GPS equipment. In addition, a matrix of marine animal, algae, and plant species observed by our divers was developed for use by the town and review agency.
- **Vinalhaven Sanitation Project** – Town of Vinalhaven, Woodard & Curran Engineers. To assist in planning and NPDES permitting for a new sewer system in this remote island community, Woodlot conducted natural resource investigations in intertidal and subtidal zones near proposed sewer outfalls. In addition to evaluating coastal wetland impacts, the work included SCUBA dive surveys in late winter to characterize marine habitats and assess potential impacts of the outfall discharges in the marine environment.
- **Mack Point Expansion** – Pierce Atwood. In areas near a proposed cargo port, Woodlot performed dive surveys of the nearshore environment to identify extent of mussel beds, eel grass beds, and soft and hard bottom. Underwater photos were collected to document the characteristics of each community. Fish and macroinvertebrate surveys were also performed.
- **UMaine Coldwater Aquaculture Facility** – Woodard & Curran and USDA. Woodlot is currently providing assistance for the planning and permitting of a proposed coldwater research facility in Maine. This project involves terrestrial and aquatic habitat mapping, rare species evaluations, wetland assessments, and characterizations of both the intertidal and subtidal environments. Tasks include dive surveys to characterize subtidal habitats in the vicinity of proposed intake and discharge pipes in the bay, in relation to NPDES permitting requirements and Essential Fish Habitat regulations.

Woodlot biologists recently mobilized and conducted winter SCUBA diving surveys around the island of Vinalhaven, a fishing community located 16 miles off the coast of Maine.

CONNECTICUT RIVER MUSSEL DIVE SURVEYS AND SAMPLING: MASSACHUSETTS

Client: Roy F. Weston, Inc. and U.S. Environmental Protection Agency

SPRING-SEASON DIVE SURVEYS were conducted by Woodlot biologists in the Connecticut River as part of an assessment of the Housatonic River Superfund site in Massachusetts to collect reference samples of mussels. A study of contaminant effects on mussels in the Housatonic River required a large sample of *Elliptio complanato* to be placed into the Housatonic and monitored throughout the season.

Woodlot had initially conducted mussel surveys in the Housatonic River tributaries to characterize invertebrate populations, which included species such as *Pyganodon cataracta* and *Elliptio complanato*.

Based on the size of the Housatonic tributaries and the substrates, and incorporating data obtained from spot checks in the water and a snorkeling survey, Woodlot biologists determined that an alternate source of mussel population would need to be located to meet the goal of deploying approximately 500–700 *Elliptio complanato* into the Housatonic in early spring.

Woodlot's research identified the Connecticut River as a likely source population, but because there is substantial difference in the pH levels in the two rivers, a short-term pilot deployment study was implemented.



Woodlot's initial site surveys identified a number of invertebrate species in the Housatonic ecosystem, including *Pyganodon cataracta* (shown above).

An initial dive survey to identify and locate potential *Elliptio* populations was performed by Woodlot in the Connecticut River. A test sample of *Elliptio* were subsequently collected by Woodlot divers from the Connecticut River and the effects of habitat change, specifically a drastic change in water quality, were meticulously monitored. The pilot deployment study proved successful, and Weston staff subsequently conducted the full deployment as scheduled.

As part of this project, Woodlot assembled a dive plan approved by the U.S. Army Corps of Engineers (Corps), and provided logistical arrangements including boats, boat operators and safety divers.

Sampling protocols were developed in consultation with the U.S. Environmental Protection Agency (USEPA) and Roy F. Weston scientific staff, and all mussel samples were successfully transferred from substrate to boat, then to monitoring tanks in Pittsfield, Massachusetts, 100 miles from the sample site, for the pilot study.

This project involved coordination of several teams of scientists and divers, and presented Woodlot biologists with physically challenging dive conditions during peak spring runoff in the Connecticut River.

LITTLE JOHN AND COUSINS ISLANDS HABITAT SURVEYS: YARMOUTH, MAINE

Client: Town of Cumberland

AN OPINION WAS SOUGHT by the Town of Cumberland regarding the permitting viability of relocating the wharf for a ferry serving Chebeague Island in Casco Bay, Maine. The potential site lay in shallower water than the existing wharf, in an area of eelgrass and shellfish beds.

Both the existing and the potential wharf sites are located in the Town of Yarmouth (Cumberland has no Town-owned deep water access), but the ferry serves Cumberland, so the entire wharf area and relocation topic were the focus of intense public scrutiny and political debate. As a result, field evaluations had to be done carefully and within sight of a busy marine thoroughfare and summer cottage area.

The most important permit requirements to be considered included NRPA 38 MRSA Sec. 480, Clean Water Act Sec. 404, particularly in relation to the



Endangered Species Act and the Marine Sanctuaries Act.

Reconnaissance-level SCUBA surveys were conducted by our biologists to evaluate sub- and inter-tidal habitats, map eelgrass beds, and survey macrofauna and benthic macroinvertebrates. The

location of eelgrass beds, salt marsh, and approximate normal high water line were determined using GPS equipment. In addition, a matrix of the marine animal, algae, and plant species observed by our divers was produced.

Woodlot reviewed available published information on natural resources, performed a field survey of the site, and contacted the U.S. Army Corps of Engineers to verify issues likely to be considered when evaluating applications for new wharfs.

The client was presented with a brief narrative report detailing work performed, outlining potential permitting issues, and stating our opinion regarding the permit hurdles for the proposed wharf. Woodlot performed all the field studies within two weeks of initial conversation with the client, and completed the work under budget.



CASCO BAY HABITAT STUDIES, WYMAN STATION: YARMOUTH, MAINE

Client: Central Maine Power Company

WOODLOT PROVIDED EXPERT WETLAND FIELD SERVICES and regulatory interpretation services to evaluate the potential effects of operation of a licensed ash lagoon discharge on the near shore environment. Initial evaluation included historical research into the creation of the ash lagoon. After completing the field work, Woodlot prepared a technical memo outlining the jurisdictional aspects of the lagoon.

To gather field data, our SCUBA divers performed dive and snorkel surveys to identify and map coastal wetland communities and to evaluate macroinvertebrate and fish communities along the length of the bermed ash lagoon. The underwater plots were surveyed for species presence and population, with the organisms being identified to the lowest practicable taxa.

Sediment samples were collected at regular horizontal intervals at



the base of the berm and from immediately below the discharge point in the weir. Samples were also collected from a reference location. Each sample location and the general location of relevant intertidal habitats (i.e., eel grassbeds) were subsequently located with a Trimble™ Pro XR

Geographic Positioning System (GPS). Resultant geochemical analyses of ash lagoon sediment samples were evaluated with respect to background levels and reference samples.

This project required rapid mobilization and field assessment, a clear understanding of the regulatory issues, as well as flexibility with regard to schedules and project scope. Woodlot staff carried out field studies and sampling programs within the client's timeframe and budget constraints.

