ISSN 1072-8244

News from....

Hudsonia

Bard College Field Station
Annandale, N.Y. USA 12504
Telephone: (914) 758-1881

Volume 10, Number 2, June 1994

MARINE MAMMALS IN THE HUDSON RIVER ESTUARY

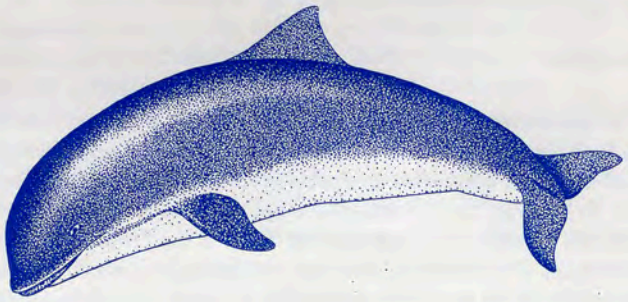
by Erik Kiviat and Tanessa Hartwig

Off in the haze and muddy waters of the tidal Hudson River are large, rare animals that have intrigued people for three and a half centuries. "Marine mammals" include the cetaceans (great whales, dolphins, porpoises) and the pinnipeds (seals) of oceans, bays, and estuaries. Several species have been reported in the Hudson, including the harbor seal, harbor porpoise, bottlenose dolphin, common dolphin, humpback whale, and fin whale.

Nearshore and estuarine waters worldwide are subject to intense pollution and disturbance from human activities. Many species that use these habitats are endangered or declining, in some cases due to chemical contaminants, disturbance by or collisions with boats, by-catch in fishing nets, harvest for food, or shooting.

The Hudson River estuary and neighboring waters are polluted by PCBs, petroleum, metals, nutrients, pesticides, organic matter, and suspended sediment. The estuary supports heavy commercial and recreational boat traffic and has been physically altered by dredging and the disposal of dredged material, railroad and road causeways, bridges, the Troy dam, the regulation of freshwater discharge by reservoir releases, and accelerated siltation. Larger predators of the estuary have undergone declines (sometimes followed by recoveries) or are less abundant than expected. These include the striped bass, black-crowned night-heron, peregrine falcon, osprey, bald eagle, river otter, and mink as well as the marine mammals. How has the Hudson's marine mammal community been affected by human activities, what do these changes tell us about the viability of the estuary and the animals themselves, and are there opportunities for restoration?

In our review of Hudson River data, we accepted 36 records of cetaceans and seals from the Battery (southern tip of Manhattan) north to the Capital District (Fig. 1). It is not possible to directly "sample" such a low-density biological



Harbor porpoise

community. (Kiviat has spent considerable time on the Hudson since 1971 and has never seen a marine mammal or found the remains of one.) We therefore collected secondary data from history and natural history books, newspaper and magazine articles, scientific publications, museum specimen collections and databases, and verbal reports from people who boat, fish, hunt, bird, trap, and study the river. A press release elicited additional reports. When possible, we screened data for apparent accuracy on the basis of the context (e.g. the availability of detail, the distinctiveness of the species, and the experience of the observer). Identification to species was often uncertain, and large gaps in the historical record may be due to absence or rarity of animals, lack of potential observers, historic commonness of certain species discouraging the recording of sightings, or the general loss of information over time.

Harbor Seal

The harbor seal (ca 1.5 m long) was reported in the Hudson in the late 1800s by naturalists such as A.K. Fisher, Edgar Mearns, C. Hart Merriam, and John Burroughs. We found only two records between ca 1890 and 1970, with an increase in the frequency of reports since. Recent records (Fig. 1) are from fishers, boaters, and other river users, who

ALSO IN THIS ISSUE: Sample Habitat Profile from Biodiversity Manual p. 6; Hudsonia Courses, Errata, Project Notes p. 7; Sponsor List p. 8

have a real chance of seeing a seal. Many of the seals reported in the Hudson cannot be identified to species, but we assume on the basis of geography and habitat that most or all were harbor seals. A few gray seals frequent the eastern end of Long Island[21] and this species could occasionally visit the Hudson.

Hudson River seal records span the year and the river. There is a peak in winter and spring. The main range of the western North Atlantic harbor seals stretches north from Cape Cod with a small population on eastern Long Island, but some seals move south in winter. Seals have been observed hauled out on rocky islands and docks in the Hudson.

Harbor Porpoise

The harbor porpoise is also about 1.5 m long. Our records of porpoises are from the late 1800s in the lower (brackish) third of the estuary in the Westchester-Rockland county area, in June and July. It is likely that the harbor porpoise was once a regular seasonal visitor to the Hudson. Unfortunately, many records of small cetaceans in the Hudson are too vague to permit identification as porpoises or dolphins.

Dolphins

The bottlenose dolphin is 2.4-3.7 m long, the common dolphin 1.8-2.4 m long, and both have a distinct "beak" that the harbor porpoise lacks. The common dolphin is an open-ocean species that occasionally enters the river. With the exception of a specimen at the American Museum of Natural History collected October 1911 in the Hudson River in the New York City area (exact locality not available), all records apparently date from the 1930s and we believe they all result from a single incursion of common dolphins into the Hudson River in October 1936.[25] A number of museum specimens, newspaper accounts, photographs, and oral reports resulted. Ernest Agnew,[1] who provided a photograph of a dead dolphin taken by his mother at Poughkeepsie, said that when dolphins were sighted in the river people shot at them with rifles, believing they were sharks.

The bottlenose dolphin is fairly common along the South Shore of Long Island[21] and southward along the coast. Surprisingly, we found a single unambiguous Hudson River record. A bottlenose dolphin entered the Hudson in June 1989 and eventually died near Garrison. Some of the older dolphin records could have been bottlenose rather than common dolphins. This species is the marine mammal best-known to Americans through public exhibit, television, and research.

Great Whales

Oft-cited reports of unidentified whales at Albany or Cohoes Falls in 1646-47 (Fig. 1) can be traced to Antony de Hooges[17] and Adriaen van der Donck.[27] Another whale was reported in the New York City area in 1679, followed by a long hiatus and 3 whales off Manhattan in the 1980s. Humpback whale and fin whale have been confirmed in the Hudson, and other species such as the sperm whale have been identified near the river mouth. Great whale records cluster in spring and early summer. We assume that whales entering a narrow, shallow, low salinity estuary are either unhealthy or are young individuals that are lost or dispersing. It is not clear why the records are limited to early and late years.

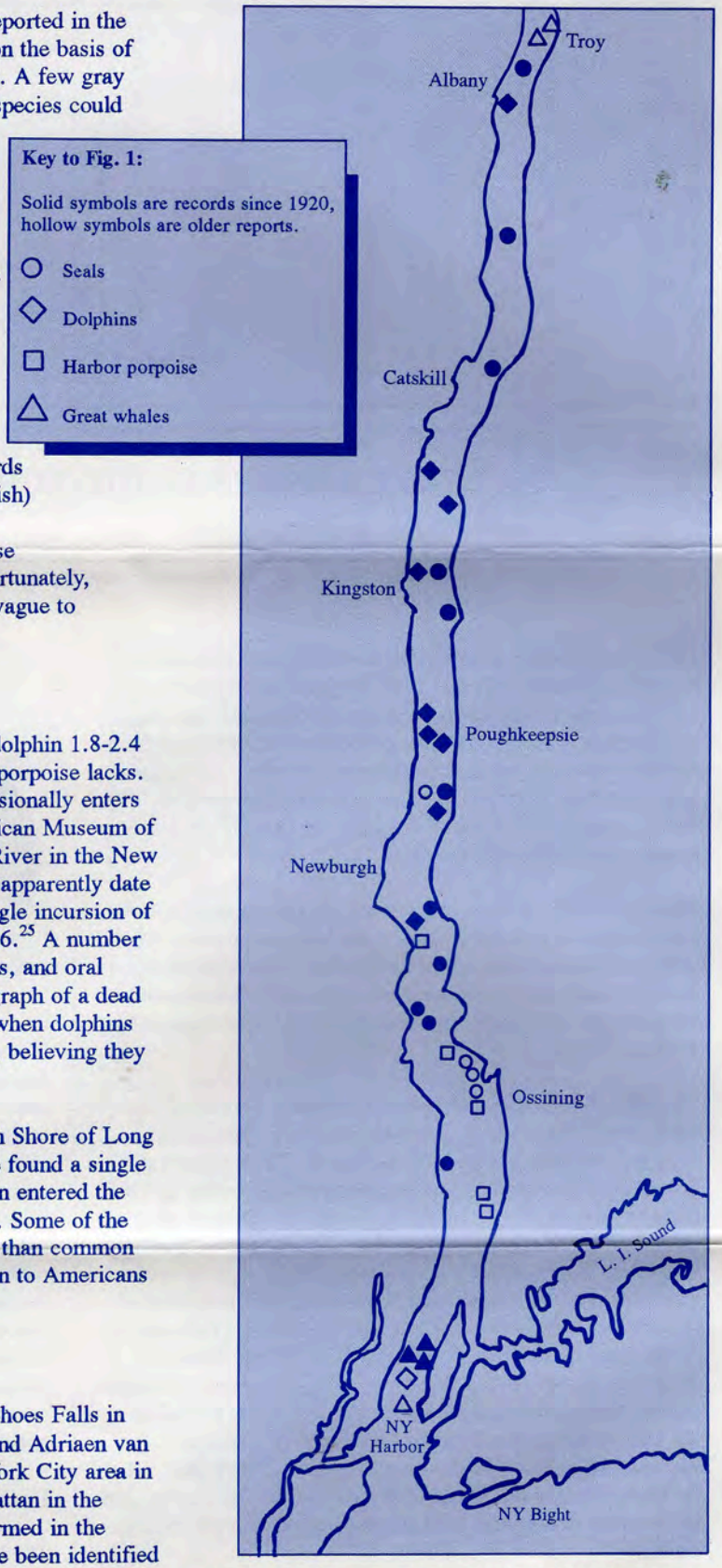


Fig. 1. Marine mammal records in the tidal Hudson River (east-west dimension exaggerated). In a few cases, different dots may represent multiple sightings of a single individual. Some records shown are still being verified. The data and source citations may be requested from Hudsonia in a Lotus 123 v. 3.1 diskfile or in paper copy.

The Hudson River Environment

What factors of history, the habitat, or geography have contributed to the patterns of marine mammal occurrence? The mouth of the Hudson River lies in the southern end of the ranges of harbor porpoise and harbor seal, and in the northern end of the range of bottlenose dolphin.[3,9,14] The numbers of individuals of these species potentially available to enter the river may be smaller than at estuaries to the north and south. The harbor porpoise population in the western North Atlantic has apparently declined,[8] and the Canadian Maritime population of harbor seals declined during the early and mid-1900s.[3] These extrinsic changes may have contributed to the apparent absence of the harbor porpoise from the Hudson during the current century, and the lack of harbor seal records for the first two-thirds of the century.

Marine mammals, like marine fishes and birds, intrude variable distances into estuaries, according to the tolerance by individual species for low salinities and their ability to feed on estuarine and freshwater organisms.[15] The harbor seal is tolerant of freshwater,[3] commonly entering estuaries, rivers, and lakes, and the harbor porpoise and bottlenose dolphin can tolerate reduced salinity in estuaries at least briefly.[8,22] Most of the numerous species of marine mammals that frequent the New York Bight[21] would not normally be expected to enter the Hudson River due to low salinity, shallow depth, and confined space. Harbor seal, harbor porpoise, and bottlenose dolphin are of normal occurrence in confined estuaries, whereas common dolphin and the great whales are not. Salinity decreases from the Harbor upriver, but is higher during the dry weather of summer and fall. Historical changes in salinity patterns have occurred due to variable precipitation,[26] regulation by water releases from reservoirs in the Adirondack and Mohawk River regions,[10] dredging and filling in the Harbor and lower estuary, and the gradually rising relative sea level. Salinity patterns may help explain the predominance of harbor porpoise records in summer and common dolphin in fall when the river is more brackish, and the disappearance of the porpoise after the late 1800s when reservoir releases began. Dry decades ca 1865-1885 and ca 1915-1940 could account for greater frequency of porpoise, seal, and dolphin records, although the worst drought was in the mid-1960s and we have not found a concentration of records during that period. Denser, more saline bottom water moves up the Hudson Canyon from the New York Bight towards New York Bay;[12] common dolphins concentrate around the canyon[21] and could at times follow this saline water into the bay and then swim up the Hudson River.

Turbidity (murkiness) is not known to interfere with foraging or navigation by marine mammals; cetaceans sense their physical environment and prey by echolocation, and seals find prey and orient at close range by touch with their whiskers.[14] High turbidity and nutrient levels from soil erosion and sewage discharges, however, may have affected the food supply for marine mammals. At the least, seasonally low dissolved oxygen in New York Harbor and the lower Hudson River in the early and mid-1900s[24] must have greatly reduced fish abundance and created a barrier to fish-eating marine mammals such as harbor seal, harbor porpoise, and common dolphin. Squid- or plankton-eating cetaceans have infrequently entered the river in any case. American eel, American shad, alewife, blueback herring, tomcod, striped bass, white perch, hogchoker, bluefish, and blue crab are common in the Hudson in the size ranges likely to be consumed by harbor porpoise, harbor seal, and dolphins. Intense fishing pressure on many of these species could have reduced the availability of prey for marine mammals.

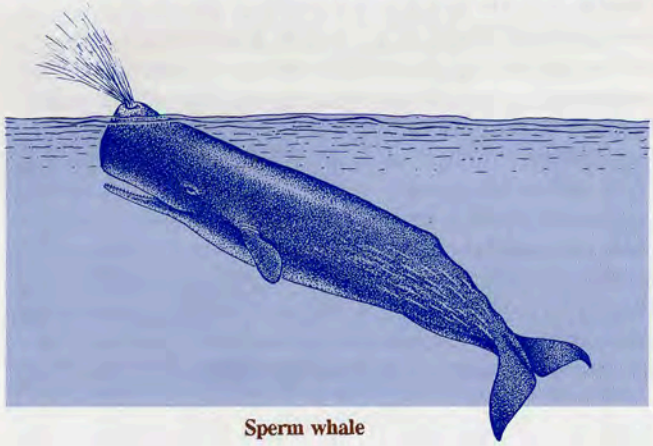
Fishing nets are a major threat to marine mammals, and increases in the numbers of carcasses of harbor porpoises and other marine mammals detected along the Mid-Atlantic Coast in the 1990s may be due to mortality in gillnets.[16] Porpoise mortality in gillnets is severe in the Gulf of Maine.[20] There was a major net-fishing industry in the Hudson for American shad, striped bass, and sturgeons until a few decades ago. We have found no reference to marine mammal entanglement in gillnets in the Hudson, but this could have affected harbor porpoise, bottlenose dolphin, and harbor seal.

The Hudson River lacks nonhuman predators of marine mammals. There are no definite records of large sharks,[23] which may avoid the low salinity. Killer whales are rare in the New York Bight and stay in waters 30 m or more deep.[4,21]

PCBs have caused reproductive pathology in seals in Europe and the Pacific Northwest,[2,18] and may have affected other marine mammals. Heavy metals, prominent pollutants in the greater New York estuarine complex,[13] may also affect cetaceans.[5] Massive dumping of sewage sludge in the New York Bight during the current century may have affected mammals in the New York Harbor area.

People often shoot marine mammals. A beluga whale was shot in Long Island Sound in 1986.[19] Harbor seals were often shot on Long Island in the mid-1900s.[4] The report of shooting at dolphins at Poughkeepsie in 1936[1] suggests a factor limiting marine mammal use of the Hudson River.

Underwater, low frequency noise from boats and ships is known to interfere with cetacean communication in other waters[5,16] and could be a factor in the Hudson where traffic is heavy. At least one Hudson River seal was believed to



Sperm whale

have been injured by a boat propeller. Pleasure boating activities might also disturb seals at their haul-out sites. Boaters should use caution so as not to collide with, or disturb, a seal or other swimming mammal.

Prehistoric or early historic harvest for food could have affected marine mammals in the Hudson as they were and are often harvested for food elsewhere.[2,5] Marine mammal remains, however, have not been found in Hudson Valley archeological sites.[6,7]

Prospect

Can we speculate about the future of the Hudson's seals and cetaceans? We found few marine mammal records preceding 1875; naturalists and the public seemed to take a deeper interest in the Hudson River fauna in the late 1800s. With the exception of the common dolphin strandings of the 1930s, there are few records from the first half of the 20th century. Many environmental, human, and "sampling" factors could have contributed to this lack of records. An increase in seal and whale records in the last two decades may mean that the Hudson has become more suitable for exploration and use by marine mammals (seal reports continue to increase in the 1990s). There have been reductions in pollution by sewage and pesticides, and improvements in dissolved oxygen levels. Any increase in harbor seal and bottlenose dolphin use of the river, and the return of the harbor porpoise, however, will probably depend on substantial reduction of contamination by PCBs and heavy metals. These three species have the potential for regular seasonal use of the river, although other marine mammals appear to be "accidental" visitors to the Hudson.

What constructive action can be taken? Marine mammals mean a great deal to human society: they have served for food, myth, inspiration, and scientific study. Most important now, they are indicators of environmental quality and "charismatic" species that attract positive attention to the management of oceans, coastal waters, and estuaries. We do not think romanticizing nature or culture is environmentally useful, but we hope the seals, porpoises, dolphins, and whales of the Hudson River will become an impetus for better stewardship of the estuary. Environmental restoration is a growing concern, and the U.S. Army Corps of Engineers and the New York State Department of Environmental Conservation are planning restoration of altered Hudson River habitats. It may be possible to improve the quality of hauling out habitats for seals; however, we think that simply maintaining existing rocky islands in an undeveloped condition may be the best step. Any proposed construction or modification of bridges or docks, maintenance or deepening of the navigation channel, increases in boat traffic or speeds, or other activities that affect the Hudson should be scrutinized for potential impacts on marine mammals. The most important action we can take is to improve the quality of the Hudson by reducing artificial inputs of chemical contaminants, nutrients, organic matter, and silt (but not to simply move these pollutants to another environment!).

If you see a large animal in the Hudson River or associated waters, note the shape and color pattern, and if possible its size compared to a familiar object such as a boat, log, or dock. Seals are sometimes confused with river otters or beavers, and large Atlantic sturgeon potentially could be mistaken for dolphins. Also record the date and exact place, and what the animal is doing if it is alive. Photograph or video the animal if you can, but do not disturb live animals. Dead animals or bones should not be touched (they may be sources of microbes infectious to humans) but should be photographed or videotaped. Reports and documentation may be submitted to the Okeanos Ocean Research Foundation (telephone 516-728-4522), the Hudson River National Estuarine Research Reserve (914-758-5193), or Hudsonia. All marine mammals are protected by state and federal laws.

Fig. 2. Hudson River rocky islands: 1. Osprey; 2. Fragrant sum
4. Ninebark (*Physocarpus opulifolius*); 5. Alewive

ac (*Rhus aromatica*); 3. Incubating American black duck; spawning; 6. Map turtle; 7. Harbor seal.

References Cited

1. **Agnew**, Ernest. 1994. Personal communication to E. Kiviat.
2. **Bonner**, W.N. 1982. Seals and man; A study of interactions. Washington Sea Grant, University of Washington Press, Seattle. 170 p.
3. **Boulva**, J. & I.A. McLaren. 1979. Biology of the harbor seal, *Phoca vitulina*, in eastern Canada. Bulletin of the Fisheries Research Board of Canada 200, 24 p.
4. **Connor**, P.F. 1971. The mammals of Long Island, New York. New York State Museum and Science Service Bulletin 416, 78 p.
5. **Evans**, P.G.H. 1987. The natural history of whales and dolphins. Facts on File Publications, New York. 343 p.
6. **Funk**, R.E. 1976. Recent contributions to Hudson Valley prehistory. New York State Museum Memoir 22, 325 p.
7. **Funk**, R.E. 1993. Personal communication to Christopher Lindner.
8. **Gaskin**, D.E. 1992. Status of the harbour porpoise, *Phocoena phocoena*, in Canada. Canadian Field-Naturalist 106(1):36-54.
9. **Gaskin**, D.E., P.W. Arnold & B.A. Blair. 1974. *Phocoena phocoena*. Mammalian Species 42, 8 p.
10. **Giese**, G.L. & J.W. Barr. 1967. The Hudson River estuary; A preliminary investigation of flow and water-quality characteristics. State of New York Conservation Department Water Resources Commission (U.S. Geological Survey) Bulletin 61.
11. **Goodwin**, G.G. 1935. The mammals of Connecticut. State Geological and Natural History Survey Bulletin 53, 221 p. + plates.
12. **Gordon**, A.L. 1970. Some comments on the factors influencing the spread of pollutants in shelf waters. P. 13-22 in A.A. Johnson, ed. Water Pollution in the Greater New York Area. Gordon and Breach, New York.
13. **Gottholm**, W., M.R. Harmon & D.D. Turgeon. 1993. Assessment of chemical contaminants in the Hudson-Raritan estuary and coastal New Jersey area. National Status and Trends Program, Marine Environmental Quality, National Oceanic and Atmospheric Administration, Silver Spring, Maryland. 20 p.
14. **Katona**, S.K., V. Rough & D.T. Richardson. 1993. A field guide to whales, porpoises, and seals from Cape Cod to Newfoundland. Smithsonian Institution Press, Washington, DC.
15. **Kiviat**, E. 1989. The role of wildlife in estuarine ecosystems. P. 437-475 in J.W. Day et al. Estuarine Ecology. John Wiley & Sons, New York.
16. **Marine Mammal Commission**. 1994. Annual report to Congress 1993. Washington, DC. 240 p.
17. **New Netherland Project**. No date. New Netherland Project; A translation program sposored by the New York State Library. State Education Department, Albany.
18. **Newby**, T.C. 1978. Pacific harbor seal. P. 185-191 in D. Haley, ed. Marine Mammals of Eastern North Pacific and Arctic Waters. Pacific Search Press.
19. **Overstrom**, N.A., S. Spotte, J.L. Dunn, A.D. Goren & H.W. Kaufman. 1991. A resident belukha whale (*Delphinapteras leucas*) in Long Island Sound. P. 143-149 in J.E. Reynolds III & D.K. Odell, eds. Marine Mammal Strandings in the United States; Proceedings of the Second Marine Mammal Stranding Workshop; 3-5 December 1987, Miami, Florida. National Oceanic and Atmospheric Administration Technical Report NMFS 98.
20. **Read**, A.J., S.D. Kraus, K.D. Bisack & D. Palka. 1993. Harbor porpoises and gill nets in the Gulf of Maine. Conservation Biology 7(1):189-203.
21. **Sadove**, S.S. & P. Cardinale. 1993. Species composition and distribution of marine mammals and sea turtles in the New York Bight. Okeanos Ocean Research Foundation, unpublished report to U.S. Fish and Wildlife Service, Charlestown, Rhode Island. 20 p. + maps.
22. **Schmidly**, D.J. 1981. Marine mammals of the southeastern United States coast and the Gulf of Mexico. U.S. Fish and Wildlife Service FWS/OBS 80/41, 165 p.
23. **Smith**, C.L. & T.R. Lake. 1990. Documentation of the Hudson River fish fauna. American Museum Novitates 2981, 17 p.
24. **Smith**, E.T. 1970. Water quality of the New York Harbor & Bight areas. P. 39-52 in A.A. Johnson, ed. Water Pollution in the Greater New York Area. Gordon and Breach, New York.
25. **Stoner**, D. 1938. New York State records for the common dolphin, *Delphinus delphis*. New York State Museum Circular 21, 16 p.
26. **Thaler**, J.S. 1989. Hudson basin precipitation regimes: Croton, Esopus, and Schoharie watersheds. Northeastern Environmental Science 8(2):106-118.
27. **van der Donck**, A. 1841. A description of the New Netherlands. Collections of the New York Historical Society 1:129-242, Second Series. (Reprinted from 1656 edition.)

Design, production, and map by Kathy Anne Schmidt. Special thanks to the following for data and comments: Dennis Kipp, American Museum of Natural History, Hudson River National Estuarine Research Reserve, New York State Museum (Paul F. Connor), Smithsonian Institution (James Mead), U.S. Fish and Wildlife Service (Andrew Milliken), Bard College Library, and individuals who related their observations. Gretchen Stevens, Laura Pilkington and Dennis Mildner commented on drafts. Donors, organizations, and individuals acknowledged do not necessarily agree with the concepts and opinions expressed in *News from Hudsonia*.

The material that follows is from Hudsonia's ***Manual for the Identification of Biodiversity Resources in the Hudson River Greenway Corridor***, in preparation by Erik Kiviat and Gretchen Stevens and scheduled for publication at the end of 1995. The Manual will include habitat profiles, rare species profiles, literature citations, and guidelines for interpreting maps, reviewing environmental documents, and using natural history literature. We intend the *Manual* to be a tool for planners, consultants, developers, and environmentalists to use in the identification, assessment, and conservation of habitats.

Habitat Profile: Hudson River Rocky Islands

Islands in estuaries, rivers, lakes, and seas are of great biological and conservation interest. The relative isolation of islands by water reduces human disturbance, predation by terrestrial predators (mammals and snakes), and possibly other biological interactions. Some organisms sensitive to disturbance or predation might be expected to thrive on islands; nesting water birds and raptors are examples. Small islands isolated by larger expanses of deeper water are at one end of the spectrum, and the gradient of ecological isolation runs from there through larger islands closer to shore, to islands connected to the mainland by causeways or fill (e.g. Cruger and Iona islands), to natural peninsulas and points (like Stony Point and Little Stony Point). Along much of the east shore and portions of the west shore of the Hudson River, islands and peninsulas contain most of the areas that have not been directly altered by the railroad. Some Hudson River islands have been protected (especially upriver) as park lands although their biological values are little known. Rocky islands have similarities to rocky crest habitats due to thin, infertile, droughty soils and other features. Species mentioned in this profile are those resident in, or using, upland (terrestrial) habitats; species of intertidal and subtidal habitats around islands are discussed in other profiles.

Longitudinal and Elevational Distribution

Rocky islands are sparsely distributed through large reaches of the estuary, with most between Saugerties and Peekskill. Islands range from sea level "reefs" to high crests (Iona Island at 30 m, and Constitution Island at 43 m, both in the Hudson Highlands, are the highest).

Ecological Description

Extent: Hudson River rocky islands range from a few square meters to ca 69 ha (Constitution Island) in area above high tide level.

Substrate: The rocky islands vary from graywacke (sandstone) and shale in the Mid-Hudson (e.g. Cruger, Magdalen, Esopus islands), to various hard metamorphic rocks in the Highlands and Westchester. Soils range from loamy to sandy (Astor Point) to clayey (Jones Island). Some islands have a bedrock core with added sandy spoil (e.g. Rogers Island).

Surface waters: There are few nontidal streams on Hudson River islands due to their small size. Some islands have intermittent or permanent pools, many of which seem to have been human-altered; examples are on Magdalen, Cruger, and Constitution islands.

Vegetation: Because islands were popular for recreation, gardens, and in a few cases homes (e.g. Cruger) during the 1800s and early 1900s, some rocky islands have large numbers of introduced woody species. Some introductions are bizarre (e.g. fiveleaf acanthopanax), whereas other species are near their natural range limits and may be difficult to judge as native or planted (sweet gum on Cruger Island and river birch on Astor Point are examples). Prehistoric human use of rocky islands resulted in enrichment of soils by calcium and other nutrients from the remains of food organisms discarded in middens; such areas often have calcicolous plants.

Indicators

Identification: Recognized by isolation or near-isolation (at least at high tide) from larger upland areas. Historic and current maps may be ambiguous or conflicting with regard to the degree of isolation by open water or wetland.

Quality: We believe that greater isolation from mainland, less disturbance, compaction, and excavation of upland soils, less alteration (damming, dredging) of pools, fewer artificial structures (buildings, navigational lights, etc.), less recent clearing of vegetation, fewer plantings or spontaneous invasions of exotics, and less historic dumping of spoil or other filling are indicators of better habitat quality on rocky islands.

Biodiversity Values

Flora: A Heritage-listed species, river birch, occurs on Astor Point (1 tree, possibly planted). Regionally-rare vascular plants include downy arrowwood, fragrant sumac, dwarf sumac, ninebark, and wild lupine, all of which also occur on the mainland in our study area. Some scarce vascular species seem to thrive where trampling and grazing are reduced; Dutchman's-breeches is abundant on Magdalen Island. Regionally-rare mosses include *Sphagnum compactum*. Two crustose lichens new to North America were reported from Skillpot Island in Tivoli South Bay; at least one of these also occurred along the mainland shoreline of South Bay. Other rare species of rocky crests (e.g. dittany) could occur on rocky islands.

Fauna: Harbor seal, regionally-rare, uses rocky islands as well as docks for hauling-out. Osprey (threatened) and bald eagle (endangered) use snags or large live trees on islands for hunting perches and apparently nocturnal roosts; trees on the shoreline and occasionally the railroad are also used for perches. American black duck (declining) nests on Hudson River islands, often concealed by shrubs in niches on rocky ledges. A turkey vulture nest was reported on a ledge on one island. Map turtle (regionally-rare) basks and nests on rocks and small islands.

Communities: The plant communities of rocky islands resemble mainland crest communities on similar rock types. Some islands also have "lowland" terrestrial communities on deeper soils. Areas with shell middens support a distinct calcicolous element including e.g. basswood, hackberry, slippery elm, and round-leaf dogwood.

Human Uses, Sensitivities, Impacts

Islands are attractive sites for homes, hunting-fishing cabins, camping, picnicking, and archeological excavation (mostly amateur and illegal). Islands with road access such as Cruger Island are popular sites for birdwatching and other nature study, because they may support upland or wetland species less common on the mainland. Campfires can result in vegetation fires, but fire impacts may be negative or positive depending on the communities and species present. Human use of islands often causes soil erosion and compaction, loss of sensitive flora through trampling, and visual and noise disturbance of sensitive wildlife.

Conservation and Management

Islands are sensitive to human use, and if habitats are to be protected the manner of use needs to be "lightened." This means protection of soil and native vegetation (e.g. less erosion, compaction, digging, building). In some cases, recreational use will have less impact on rare elements if it is shifted from rocky islands to dredge spoil islands. Once special values are identified (e.g. raptor nest sites), use can be steered away from the most sensitive areas.

(Supported by Sweet Water Trust and Hudson River Foundation.)

* * *

Errata:

In NFH 10(1), we mispelled Marjorie M. Smith (p. 8) - we apologize. "Sea porpoise" (p. 7) should have read "seal, porpoise."

The dwarfed purple loosestrife (*Lythrum salicaria*), referred to in *NFH* fall 1989 and June 1993 (9[2]) in connection with calcareous wetlands, was a misidentification of winged loosestrife (*Lythrum alatum*). Fortunately, I had herbarium specimens and photographs for verification - crucial in field biology. --EK

Hudsonia Project News

Hudsonia and the Institute for Ecosystem Studies are characterizing reference wetlands in the Mid-Hudson region to provide the U.S. Environmental Protection Agency with information for regulatory decision-making. This project includes surveys of amphibians, flora, and soil biogeochemistry in red maple swamps, intermittent woodland pools, clay meadows, and fens.

The Rural New York's Land Trust Grant Program administered by the Land Trust Alliance of New York, with the support of The J.M. Kaplan Fund sponsored a live-trapping and radio-tracking study of the Blanding's turtle at a Dutchess County site. The results will be used for planning habitat conservation.

Technical assistance projects included biological surveys in the Bronx River Parkway Reservation in White Plains (NY) for a bridge reconstruction (Westchester Co. Department of Planning), and archeological and biological assessments on the Old Croton Aqueduct from Dobbs Ferry to Yonkers, NY, for a gas pipeline (Stearns & Wheler, Tennessee Gas Pipeline).

Personnel in 1994

Dear Friend of Hudsonia,

Our 13th year has been a good one thanks to your support via donations, sponsorships, grants, and contracts. Hudsonia activities are helping the EPA, Hudson River Foundation, Scenic Hudson, Dutchess Land Conservancy, Westchester County Department of Planning, Salisbury Association, Concerned Citizens of Cattauraugus County, Tenneco, Pawling Savings Bank, and many others make decisions in which the conservation of native biological diversity is a paramount concern.

The next time you see eroding soil on a construction site, the fragmentation of a forest, a dump in a woodland pool, or a dead turtle on the road, remember that Hudsonia is uniquely equipped to translate natural history and science into information for environmental conservationists and planners who care about nature.

Where else would you find out about marine mammals in the Hudson, or the inner workings of a fen? **Hudsonia needs your continued support** to ask the questions, do the research, and make the recommendations that you can't find elsewhere. Please assist Hudsonia in these endeavors by sending a donation today.

Erik Kiviat, Executive Director

Hudsonia Ltd. is a non-advocacy, public interest organization that conducts research, technical assistance, and education but does not support or oppose development projects. Our annual financial report is available from our office or the New York Department of State Office of Charities Registration, Albany, NY 12231. Donations of cash and goods to Hudsonia are tax-deductible as allowed by law, and are used only for Hudsonia's research and education programs as a 501(c)(3) organization under the rules of the Internal Revenue Service. IBM and other businesses will match employees' cash donations to Hudsonia.

* * *

REMAINING 1994 NATURAL HISTORY COURSES

Westchester County Significant Habitats, 13 August, Ken Soltesz
Wetland Delineation, 27 August, Gretchen Stevens
Mid-Hudson Region Significant Habitats, 10 September, Gretchen Stevens
Acidic Crests, 24 September, Spider Barbour
Stream and Wetland Restoration, 1 October, Sven Hoeger

News from Hudsonia is published in February, June and October in an edition of 8,000.

Special thanks to the following :

RESTRICTED GRANTS

Bay Foundation
Hudson River Foundation
Hudson River Improvement Fund
Norcross Wildlife Foundation
Sweet Water Trust
U.S. Environmental Protection Agency

SUPPORTERS

Anchorage Romney Sheep
Hudson River Foundation
Karen Iacovelli
Elaine Colandrea and Erik Kiviat

FRIENDS

David and Constance Clapp
William R. Coleman
Mary Lou Lutters
Sheila Newman
Tom and Gail Rockwell
Shawangunk Valley Conservancy
Henriette Granville Suhr

SPONSORS

Kent D. Anderson, Law Offices
Vernon Benjamin
Zachary C. Berk
Heinz and Elizabeth Bertelsmann
Besicorp Group Inc.
Joseph T. Bridges
Canal Press
Walter C. Cliff
Mrs. Beatrice A. Duggan
Dutchess Land Conservancy
Dutchess Quarry and Supply Company, Inc.
Fairfax Biological Laboratory
David F. Frankel

SPONSORS

Drayton Grant, Esq.
J. Kenneth and Elizabeth W. Greenburg
GREENPLAN, Inc.
Julia T. Hall
Mr. and Mrs. David R. Hathaway
John and Mary Honey
Jerry C. Jenkins
Kellar & Kellar, Attorneys at Law
Marilyn Marinaccio
George and Cathy Michael
Millbrook Garden Club
Millbrook Rotary Club
Millbrook School

SPONSORS

Museum of the Hudson Highlands
Dr. Steven and Kathleen Pavlakis
Susan F. Perrins
Michael Rivlin
Matthew D. Rudikoff & Associates
Joel S. Russell, Woodlea Associates
RYLANCE PRINTING
Ms. Kathryn Salomon
Billy Steinberg Music
Anton Wilson
Winter Sun
Woodstock Percussion
William H. Zovickian, D.D.S., Sharon Dental Associates

D O N O R S

Gregory Andrew, BioSystems
Zachary C. Berk
John Bierhorst
Kay Blumberg
Gilbert and Wilma Boehm
Stan Braja, CIC, Spacaccia, Ryan & Haas, Inc.
Eleanor Buthmann
Richard P. Canuteson
Drew Casertano
Walter C. Cliff
Charles R. Colmant
William C. Cooke
Mr. James Denitto
Joe Deschenes
Reta Diekman and Gregory Andrew
Mrs. Allen Eastman
Jean M. French
Gabrielson's Fisheries
Barry H. Garfinkel
Martha S. Gearhart, D.V.M.
John and Jane Geisler
M.J. Gladstone
Sarah D. Griffen
Ms. Susan Hajjar
Jane P. Hansen
Robert S. Hare
David and Sharon Hessney
Historic Hudson Valley
Mr. and Mrs. C.K. Howe
Alice D. Jones
Elizabeth Kaester
David A. Kane
Jean L. Klaiss
R. Beth Klopett, Ph.D.
William Koff
Charles J. Kruzansky
Andrew Labruzzo
Rudolph E. Lapar
Melissa Mercier
Richard D. Morse, Jr.
Dave Norris
John M. Osborne
Barry K. and Edith J. Rosen
John J. Ryan
David S. Sampson
Mr. and Mrs. J. David Schmidt
F. Karl Schoenborn
David E. Schwab II
Ms. Devi U. Sharp
Kira E. Sherwood
Andre V. Starrett
Billy Steinberg
Noel Tepper
Judy Isacoff Thomas
Anita Wiener
Mary Yegella
Mr. Harry L. Zeilman

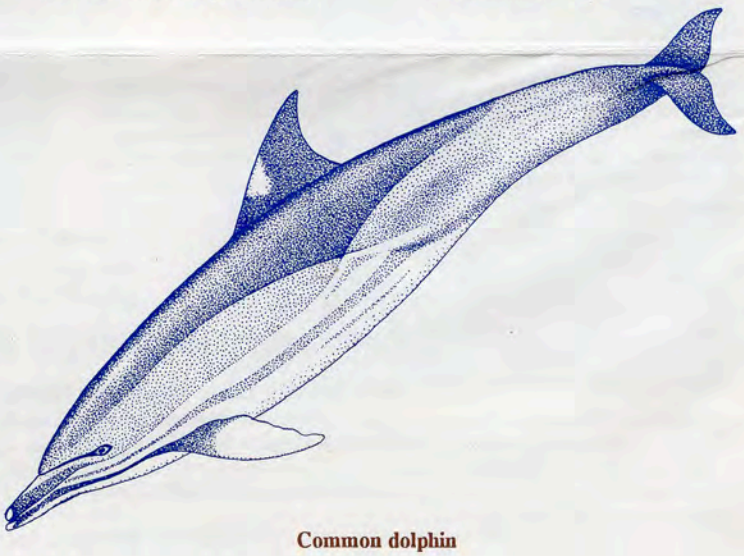
DONORS OF GOODS AND SERVICES

Richard Andrus - identifying specimens
Bagdon Environmental Associates - turtle traps
Lin Fagan - herbarium work
Tanessa Hartwig - data management
C. Barre Hellquist - identifying specimens
Judith Hochhauser - herbarium work
Jerry C. Jenkins - identifying specimens
Charles Kiviat - use of truck
Robin Knauth - books
Barry Koffler - field equipment
Robert O. Linck - periodicals
Lisa Mazzocut - herbarium work
Heinz Meng - identifying specimens
Richard O. Ostfeld - loan of equipment
Peter J. Petokas - loan of equipment
Steve Reid - roof consultation
Robert E. Schmidt - periodicals
Richard and Emoke Severo - canoe, jon boat, motor
Ray Sims - field assistance
C. Lavett Smith - computer
Martine Vermeulen - lodging
Peter Warny - books, periodicals
Bethia Waterman - periodicals
Robert Wills - roof consultation

DONORS TO THE SAUGERTIES ARCHAEOLOGICAL RESEARCH PROJECT

Marion F. Baker
Barry Benepe
Petra Cabot
Mr. and Mrs. Rene Clarke
Darlene F. Edwards
Arlene W. Hershenson
Barbara Hoefinger
K.L. McKenna
Dr. and Mrs. Joseph Mueller
Sandra Ostoyich
Margaret and Edward Parkinson
Mr. Richard S. Reinhart
Howard Rothstein
Phyllis and Gordon Rubin
Stephen and Elizabeth Shafer
Norman Silverman
Alan Spivack
C. Christina Wright

News from Hudsonia basic Sponsorship is $200 per year or $75 per issue, listed as business, personal, or on behalf of a nonprofit organization. Higher levels of sponsorship ($500-2500+ per year) entitle a Donor to an inscribed copy of Wild Flora of the Northeast by Anita and Spider Barbour, discounts for Hudsonia courses and events, and assisted use of Hudsonia's library.



Common dolphin