

underwater naturalist



Vol. 22, No. 2

AMERICAN LITTORAL SOCIETY FIELD TRIP SCHEDULE

The following list of trips was gleaned from the 1994 Field Trip Schedule to remind you about the tantalizing trips coming up this year. Come, join other Littoral Society members in out-of-doors littoral adventures under the gallant leadership of seasoned naturalists. Call the office (908) 291-0055, for trip availability, then send in your deposit to ensure your spot.

May 1

MEMBERS' DAY

Members will meet at Sandy Hook for our ninth gathering. Expect morning hikes — dunes, beach, holly forest — followed by a picnic of local seafood. We'll also engage in informal discussion of coastal and Society topics. Invitation mailed to all members in early Spring.

May 13-15

CAPE COD WHALEWATCH

This year marks the fourteenth trip to Provincetown for two whale watching excursions and several natural history tours around outer Cape Cod. We'll be aboard one of the famous Dolphins Fleet vessels at the best place and time to see humpbacks and right whales on the East coast.

Cost: \$90 per person covers two half-day boat trips, guides, lectures, a big Saturday night dinner, and slide show. Lodging is not included, but motel rooms have been set aside. Call immediately re: availability.

May 18

RED KNOTS, DELAWARE BAY, NJ

Join us mid-week to witness a coastal windfall, when migrating shorebirds, including red knots and turnstones descend on lower Delaware Bay's beaches to feast on freshly laid horseshoe crab eggs. We'll meet there early morning and spend a half-day exploring beaches and their denizens.

Cost: \$10 covers guide, clams and junkfood for lunch.

May 27-28

PELAGIC BIRDS

BARNEGAT LIGHT, NJ

Friday night, we'll board a deepsea vessel, nap, talk, and awaken 80 miles offshore to watch for pelagic birds — gannets, shearwaters, etc. — and maybe whales and marine turtles. Boat leaves at 8 p.m., from Barnegat Light and returns at dusk on Saturday night.

Cost: \$85 per person covers boats and guides. Bring food and sleeping bag. Call immediately re: availability.

June 2-5

MAINE COAST WEEKEND

Our 16th trip to the seaside Craignair Inn just south of Rockland guarantees lots of walking...hiking and exploring of Clark Island's wildflowers, birds, plants and rocky shore tide pool biology. Plus, visits to the lighthouses, rocky shores and boulder beaches of Mosquito Head and Owl's Head. A one-day boat trip to Monhegan Island promises exhilarating hikes along its winding seacliff trails and views of eider ducks, seals, ravens.

Cost: \$285 per person covers room (doubles, unattached bathrooms) Thursday, Friday and Saturday evenings, meals Friday breakfast through Sunday breakfast, including a lobster dinner, and boat fare to Monhegan.

June 4-9

PUERTO RICO ECOLOGY DIVE WEEK II

Dive virtually undiscovered reefs and barrier islands, explore the Jobos Bay National Estuarine Reserve, and enjoy old world allure and history. Ecology talks, shore walks, field trips.

Cost: \$995 per person includes all diving, tanks and weights, guides, lectures, meals, lodging, ground transport but not air travel.

June 10-12

MONTAUK WEEKEND, NY

This extended weekend of natural history exploration and fun on the eastern tip of Long Island includes hiking, birding, wildflowers, butterflies, tidepools, beaches, rocky cliffs, plus a visit to Montauk Light and an optional whale watch excursion.

Cost: \$220 per person covers two nights at Montauk Manor (double), all meals, including lobster dinner, five field trips, two evening programs, pick up at LIRR station.

Continued on inside back cover.

	To the Editor	2
JOSEPH DUTTON	Around Alaska in Eight Days	3
JILL GROVER	A New Role for Cleaner Fish	9
SANDRA VAUGHN	Utah's Unique Lake	14
	TAGGING REPORT	17
DANIEL R. TARDONA	Aquatic Ecosystems of the Timucuan Preserve	34
	FIELD NOTES	
DAVE GRANT	Contemplating the Clownfish	38
STEPHEN C. SAUTNER	Chasing Coastal Herrings	42
DONALD DORFMAN	Redistributing of Freshwater Fish	44
	BOOK REVIEWS	45
D.W. BENNETT	THE LAST PAGE	48
COVER PHOTOGRAPH by THEO WILLIAMS	The harbor at Seward, home for commercial and recreational vessels. which ply Prince William Sound, 10 miles east.	
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Underwater Naturalist is the bulletin of the American Littoral Society, Sandy Hook, Highlands, NJ, 07732, and is mailed to members only as part of their dues. \$15 for students, \$25 for individuals, and \$30 for clubs. Except where otherwise noted, permission is granted to reprint all or part of any article provided the credit is given to "*Underwater Naturalist, Bulletin of the American Littoral Society*" and to the author. Printed in the United States of America. ©American Littoral Society, March 1994.

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To the editor

Holiday Plastic

...Now that we've recovered from 1993's holiday season, but are not yet facing the mad crush of this year's season, let's pause a moment and consider the question of holiday plastic. For those of us who celebrate with Christmas trees, we must face two holiday-specific uses of plastic. First, most Christmas tree vendors receive trees shipped in elaborate plastic webbing, only to unwrap them for display (and toss the plastic) and rewrap them (in new plastic) for the public to take home (and toss the plastic). In terms of its entanglement potential, this webbing makes six-pack yokes look harmless. Second, this Christmas, I first noticed 8-foot plastic bags to be used specifically to remove dying, shedding tree from the living room. No more needles on the floor, but where does all this plastic end up...what's the cost to wildlife and our seas?

This seems to me to be nothing more than an extraneous use of plastic. Can't trees be easily wrapped in twine for removal from the Christmas tree lot? And, really, do we need special plastic bags to ensure no needles touch the floor? If so, how about reusing the same bag year after year? I doubt that this giant plastic bag could serve any other practical purpose, except maybe as a body condom for a giant...and, it has no place in our trash or entering our environment.

As consumers, we need to reject these so-called conveniences and tell vendors that we don't want to play a part in adding to this harmful garbage, and neither should they. I say, let's keep the cheer in the holidays and increasing plastic out.

Erica Renier
Morristown, NJ

Kudos

...I enjoyed the Field Notes in the last magazine. Glad to see members are willing to record and send in short, interesting observations. Guess I'd better dust off the old face mask and take a second look at the watery world.

David Barringer
Montauk, NY

Where are the Fish?

...I enjoyed J.L. McHugh's article on Middle Atlantic fisheries and understand that other fish on other coasts are similarly in trouble. However, it is not clear to me that commercial fishing pressure alone can account for all the decreased landing numbers. It would be interesting to learn about the impacts of other fishing pressure (recreational), habitat loss (especially in estuaries), and pollution. That would provide the whole story.

Dominick Pasquale
Point Judith, RI

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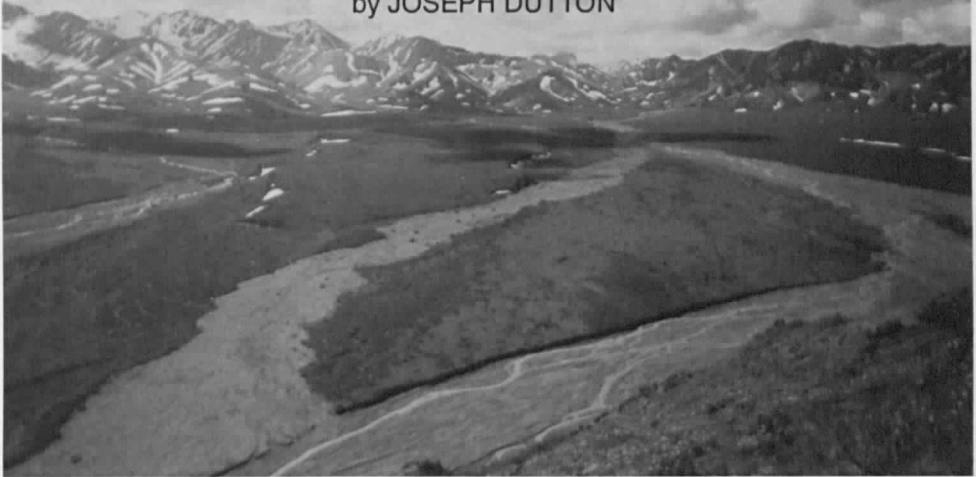
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Around Alaska in Eight Days

by JOSEPH DUTTON



Braided river atop permafrost, Denali National Park

At the Seattle airport, June 17, waiting to board Alaska Airlines to Anchorage. Where are the big rugged people in heavy parkas, fur boots, beards — grizzled wild folk heading north? Instead, sport shirts, double knits, t-shirts, and sandals. The first hint that Alaska is not all a land of snow and ice.

Two hours later, the plane drops into Anchorage, a gray day with clouds and fog, spitting rain. Below are the wide mudflats of Turnagain Arm, snow capped rocky mountains off in the distance, sand and gravel, some green grasses, no wolves or moose, no grizzly bears swatting at the plane's wheels, and a big, somewhat modern airport, not a sourdough's shack, at the end of the runway.

We meet at the car rental counter, 10 ALSers (nine actually; one is already lost), split up into two minivans and begin an eight-day exploration of Alaska, June 17-26, 1993. We will celebrate the summer solstice when and where the sun stays up a long time, getting to know something of the wonders of this huge
Dutton is a retired school teacher from eastern Pennsylvania, who previously wrote in this magazine about the Delaware River.

expanse — its terrain, its people, its wilderness. We will see puffins, jumping salmon, tundra, wild flowers, moose, caribou, grizzlies (yes), and sea lions, as well as mountain climbers, sled dogs, dogs that climb ladders, hippies, the world's largest fake igloo, Russian churches, fish hatcheries, traffic jams, and permafrost.

The itinerary is straightforward: north from Anchorage to Denali National Park, then back south past Anchorage to the Kenai Peninsula with stops at Seward and Homer, and finally back to Anchorage. Day by day, here's how it went:

Half of the half a million Alaskans live in Anchorage; it looks as if most of them arrived recently for the city sprawls into raw-dirt sub-divisions. Ship Creek runs through downtown and it's open to chinook salmon fishing with some 20-pounders being caught.

We head north on Route 3 along the Susitna River (Alaska cotton dots the marshes) to Palmer and the Matanuska Valley, which the lower 48 promoted as a future breadbasket for Alaska and encouraged the settlement there of farmers from the upper Midwest. It still produces



*Five ALSers interested in something.
The sixth is either bored or has already seen the quarry.*

hay, horses, milk, and those famous foot-wide strawberries.

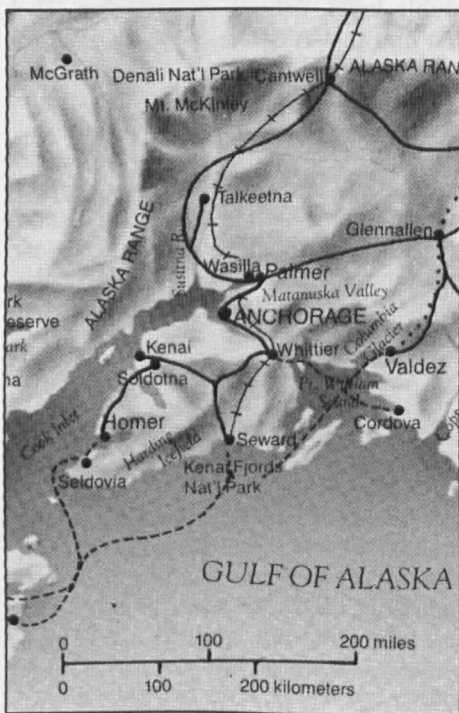
We pull into Palmer at 11 p.m. It's still light and the restaurant in the Valley Hotel is open all night. But the nearby Frontier Diner's name is enough to get our business. The fresh halibut on the menu beckons (nine orders, please); back to the hotel for huge portions of warm homemade blueberry pie, served daintily in soup bowls with ice cream mounded on top. A drive around town reveals Sandhill cranes chasing bugs on the grassy edges of the airport. ALSer #10 arrives during the night, a \$60 cab ride from Anchorage.

Palmer to Denali: the quick way is through downtown, on to Wasilla, over to the Glenn Highway, and due north to Denali. The scenic route goes over Hatcher Pass, a narrow winding gravel road hugging a roaring snowmelt stream, lots of trees and heavy undergrowth...it's sunny and cool. The road breaks out into tundra above the tree line, switches back two or three times and ends in a snow drift. The pass is not open, so we retrace our steps, get over to the Glenn Highway and attack the pass from the other direction, not because we think the snow drifts will have melted in two hours but because the road follows an equally nice stream

with beaver dams along the edges, yellow crowned sparrows singing, and, from nowhere, a moose and calf crossing the road near us: our first look at real wildlife. Abandoned goldmine shafts dot the hillsides.

Denali is North, sometimes in no traffic, other times behind long strings of mobile homes, with Ohio, Indiana, or Michigan plates (canoe on top, deck chairs and bikes

bungee-corded to the spare tire, and often a small dog with its head out the window). The driver spent 45 years assembling cars at Willow Run; it's time to hit the road to see the great north while Medicare and Social Security are still solvent.





Clear stream meets silty river on the road to Denali.

Part way to Denali it is obvious that we are in for a glorious day, sunny and 60. The Alaskan Range is visible — there are Denali and its sisters 50 miles away. Some visit Alaska a dozen times and never see the mountain; we see it for three days anytime we want. On the way north we pass a fake igloo, three stories high, a hundred yards around at the base. It's a failed motel, surrounded by a muddy parking lot next to a one-pump gas station. Inside, dusty postcards and three-day old bread. The counter is tended by two wiry guys with pointy-toed cowboy boots.

Below the Denali National Park is a smaller state park with a good-sized stream (Trouble Creek) meandering through it, ending at the Chulitna River. The path down to the main river is edged with wildflowers and towering evergreens. A dipper flies in, walks the edge and then calmly walks into the water to pick insects from submerged rocks. We are escorted by clouds of mosquitoes. The Chulitna is grey — that means it's glacier-fed. The water entering the stream is clear. The two bodies of water flow alongside each other, edge to edge, then

homogenize. Arctic terns dab in the water for food. Back to the highway and on to Denali. We stop there for two nights at Grizzly Bear Cabins on a river, the Yaneri Fork, some five miles south of Denali's entrance. We are primed for bear and the great Alaska outdoors.

Denali National Park is as big as Massachusetts. One gravel road goes out into it about 80 miles and back. The first 10 miles are open to cars; beyond that you go in yellow school buses. You can simply get on the bus, settle back and watch wilderness for eight hours while the driver points things out, or, as we did, you can take the bus for a while, then get off and walk around on your own. When the bus goes up over the hill and out of sight and sound, you are in the middle of nowhere. It's as if a bus left from Boston, dropped you in Worcester, and headed for Springfield. But imagine that only about 100 people live in Massachusetts.

Big, braided snowmelt-fed rivers cut through Denali, shallow rivers atop permafrost. A few stark black spruce break the landscape which is otherwise rock and gravel and tundra and taiga with hundreds of flowers, all shapes and colors —

purple cress, Siberian aster, Arctic lupine, dwarf fireweed, frigid shooting star, frigid arnica. Arctic flowers are subtle — small and delicate looking.

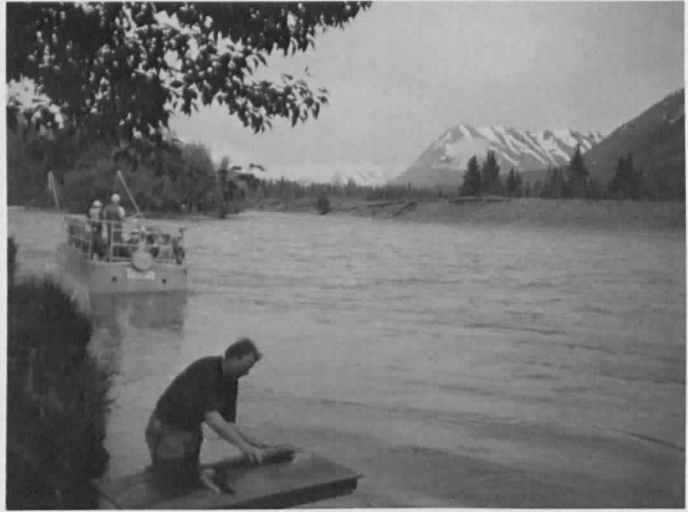
From the bus we get a good close-up look at a grizzly female and two yearling cubs browsing on willow shoots, and later we see fox, caribou, golden and bald eagles, white crowned and yellow-crowned sparrows, magpies, gray jays, Wilson's and yellow warblers, and several

nesting long-tailed jaegers, pelagic most of the year but here tending eggs several hundred miles from the nearest open ocean. Tree swallows flutter all around, though the Denali checklist says "uncommon." Hoary marmots are about and a few squirrel-looking creatures. Off on the edges of the river, valleys run up steep mountain slopes, with glaciers in the distance. To the south looms all 18,000 feet of Denali (formerly Mount McKinley). It's very quiet.

We jump on and off buses a few more times and get out of the park about 7 p.m. Because there are five more hours of light, we take a trail hike near the park entrance past a sign warning that grizzly may be around looking for newborn moose. We're unlucky — no bears.

Also at Denali are sled dog exhibitions, short day hikes, the Salmon Bake restaurant, float trips, and airplane sightseeing, but we mostly walk and climb. A fox crosses the road, and caribou lie in snow fields to avoid insects; everything is big.

Talkeetna: It's 100 miles back down the road toward Anchorage, the major jumping off point for Denali climbers. Planes from Talkeetna drop them part way up the mountain and the climbers do



On the Russian River, a successful angler cleans a red salmon while the ferry crosses with another load.

(or don't do) the rest. But climbing season is about past because the warm weather makes crevasse crossing risky; instead the town is filled with wiry bicyclers, carbo-loading with beer and spaghetti before their next leg to Denali.

We stay at the Latitude 62 Motel and tour the town (population 250): the general store and the museum, a small black dog, called "Dog," climbing a ladder to an oil storage tank outside the laundromat.

It's time to head for the Kenai. That means back through Anchorage and south along the west side of Turnagain Arm (named when a ship was trying to find a passage and instead found a deadend... "Turn again, helmsman," the captain supposedly said.) Steep cliffs to our left, landslide country, where mountain goats look down on the traffic and rock climbers practice their skills.

The road to Seward follows the Arm, then cuts through valleys and crosses the Kenai Peninsula, goes through Moose Pass, and drops into Seward, a busy commercial and recreational fishing port and heavy shipping terminal (where much of the Exxon oil spill cleanup materials and manpower were staged). Seward sits right on Resurrection Bay with 4000-foot



*The boardwalk
at Halibut Cove
with an unafraid
Northwestern
crow.*

high slopes looming over the town to the southwest, slopes where black bear sows and their cubs crop the rich grass, and the annual run up and tumble back marathon is staged every Fourth of July.

Our headquarters here is Murphy's Motel near the marina and we are up early in the morning to board a Kenai Tours vessel for a four-hour cruise of Resurrection Bay and the Gulf of Alaska, sparkling weather and wildlife all around — nesting kittiwakes, murre, crested puffins, and three species of cormorant crowd onto rocky islets. One rock is blanketed with chocolate lilies. In the water are sea otters, sea lions and seals, some hauled out...two humpback whales off in the distance, murre on the water in enormous rafts, and a sooty shearwater tearing along right above the whitecaps.

Back to Murphy's Motel and off toward Homer with a stop to hike at Exit Glacier, a look at the Russian River where the red salmon run is on, and a visit to the old Russian Church at Ninilchik and a nearby muddy creek that empties into Cook Inlet and contains fat, dark chinook salmon that anglers tease into striking at neon hoochie lures. The roadside is lined with full flowering, six-foot-high cow parsnips. Into Homer to the Heritage Hotel. A hard day's work on this

longest day of the year. While others in town celebrate the summer solstice, we are in bed by midnight with the sun shining brightly.

Homer is the town at the end of the road...literally. It ends on Homer Spit, four miles of pebble bar separating the busy port from the winds and waves of Cook Inlet. Homer is half commercial with a big fishing fleet and packing houses, and half pleasure with many charter boats (halibut), tacky stores, and expensive shoreline restaurants.

Vacationers camp on the beach and cook. At midnight, they look like lost shepherds around a smokey fire. Lots of dogs, stray and otherwise. Inside the spit is what Alaskans call a "terminal fishery." Fingerling chinook salmon are placed in cages in the harbor, allowed to imprint on the local water, then loosed to spend the next three to five years on the high seas, fattening themselves to 80 pounds and then returning to their initial cage site, a deadend of murky pond water with no spawning stream. The pond is surrounded by anglers who take home their dark, hook-jawed prizes for the smoker. If the salmon is foul hooked, it must be returned. Several days in the pond turn some of the salmon into shredded vestiges of their former silver sea-run selves. Most Alaskan seaside

towns have similar terminal fisheries; if you want fly fishing for salmon in wild surroundings, better figure on a float plane trip, several days at an expensive lodge, and a guide.

Homer is a major commercial fishing port with plenty of big offshore boats tied up, several major canneries, smoke houses, grizzly old fishermen, college cannery kids (making a fortune), long-haired dropouts, out of work roustabouts, and others who have moved up to Alaska and then down the highway to the end of the road.

This is the best port to hook up with a charter boat and go halibut fishing. It's deep sea, 10 miles out into the Inlet, 12 ounces of lead and a whole herring for bait in 180 feet of water. Halibut run to several hundred pounds, with 40 pounds usual, like huge fluke. The steaks from a big halibut are the size of standing ribs of beef. Greenhorns go halibut fishing for one day and can't lift their arms for three. The commercial season for halibut is only four days per year. Then the longliners stream from Alaska ports and land up to 10 million pounds per 24-hour period.

Time well spent in Homer includes a visit to the tidepools of neighboring islands, where the cold sea reveals its

myriad life forms — beefy starfish of many colors and a variety of tunicates.

Back up the Peninsula is the Russian River trail, a gentle 2.5 mile climb to a stream full of jumping red salmon. The river roars. There is no way a fish can get up these falls but they jump-swim-squirm on to their spawning grounds. The river's banks are sometimes cliff steep and other places like meadows. Red, yellow, and white Alaska poppies line the bank. On the way down, we spot spruce grouse, Townsend's warbler, and a three-toed woodpecker.

Outside Seward, a three-mile hike up to Grayling Lake, through bogs and up steep trails. A loon calls from the lake. It's still sunny.

Back toward Anchorage with a stop at Potter Point Refuge, with wetlands, waterfowl, and, in a tidepool, half a dozen 25-pound chinooks resting before they push on to their spawning grounds. Anchorage is a letdown after the real Alaska. It is, after all, a small city with rush hour traffic jams and fast food joints. It's decompression time. From the wilds to the 'burbs, to the city, on the plane, and back to the lower 48, where it is now obvious that too many people live too close to each other, the days are too short, and things look small.

IF YOU GO: FIRST CHOICE: Sign up for the Littoral Society trip as described here. It's a fine way to get your feet Alaska wet. If the ALS dates don't suit, try it on your own. It's easy. Fly to Anchorage and rent a car. One person or a couple can usually get motel rooms without reservations, but sometimes Denali gets very busy in July. To reserve ahead, get a copy of "Alaska — Official State Guide/Vacation Planner" from P.O. Box 110801, Juneau, AK 99811. It has lodging, lists of events, and lots more.

WHAT TO BRING, WHAT TO READ:

Be prepared for temperatures from 40 to 70. Include good rain gear, two pairs of hiking shoes (good sneakers will do), camera with long lens and close-up, and binoculars. Mosquitoes are sometimes a problem; if you don't like them bring good deet juice. Prices in Alaska are really not much higher than down below, and there are plenty of good stores, especially in Anchorage. (I forgot binoculars once and bought a pair there

for \$18; they were fine.) Supermarkets are full of fresh produce.

GOOD FIELD GUIDES ARE: "Birds of North America," Robbins, Bruun, Zim, Singer. Golden Books, New York; "Alaska's Saltwater Fishes and Other Sea Life," D. W. Kessler Alaska Northwest Pub. Co., 22026 20th Ave. SE, Bothell, WA 98201; "Field Guide to Alaskan Wildflowers (Commonly Seen Along the Highways and Byways)," V. E. Pratt, Alaskakrafts, Anchorage; "Facts About Alaska" (a yearly almanac), Alaska Northwest.

GOOD READING ABOUT ALASKA IN GENERAL: "Going to Extremes," Joe McGinnis, New American Library, New York, and "Coming into the Country," John McPhee, Farrar, Straus, Giroux, New York.

There is a good bookstore in Anchorage on Northern Lights Blvd, downtown. It has a nice selection of natural history, folklore, maps, and charts.

A New Role For Cleaner Fish: BIOLOGICAL CONTROL OF ECTOPARASITES IN AQUACULTURE

by JILL GROVER

As habitat loss, pollution, and fishing pressures continue to deplete and endanger wild fish stocks around the world, aquaculture appears to be an increasingly attractive alternative. However, aquaculture cannot be viewed as a panacea to the ailing fisheries of the world. Intensive fish culture can degrade the environment by nutrient enrichment from fish wastes and excess feed, and by the introduction of harsh chemicals or medications that are used to control diseases and parasites. Fish farmers are beginning to look underwater to employ a biological solution to one of these problems. They seek inexpensive, efficient live-in help, able to work over-time for minimal gain. To meet this need, they are looking for a few good cleaner fish to remove ectoparasites from farmed fish.

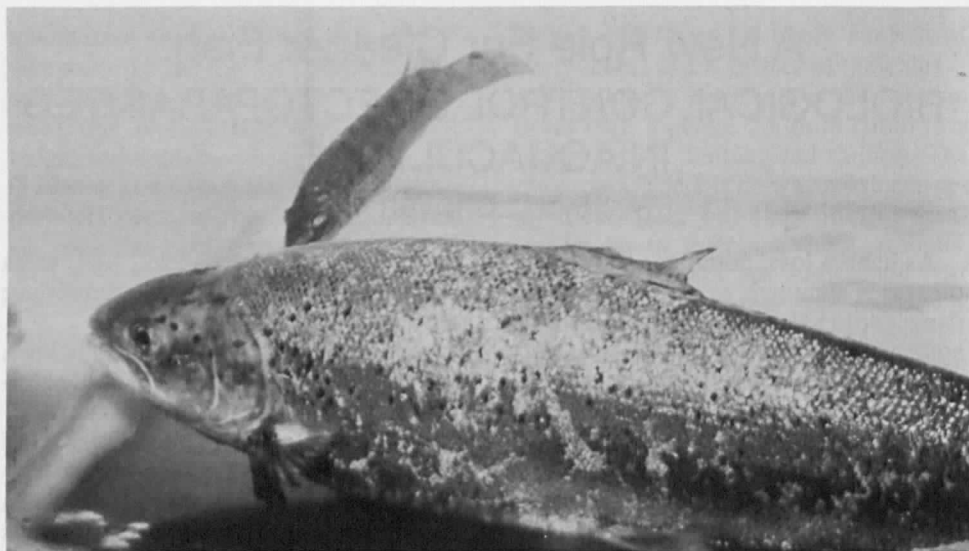
The symbiotic relationship that results in cleaners removing ectoparasites from host fish is not a new behavior, but rather, a highly evolved relationship. However, it has been documented only fairly recently, as trained observers have spent more time exploring beneath the sea. One of the earliest accounts of cleaning symbiosis was made by the American naturalist, William Beebe, off Haiti in 1928, using a diving helmet: "I was completely puzzled by a remarkable habit. A parrot [fish] would scull slowly up to a small head or branch of coral...Moving away a few feet, the great fish would then upend,— head up, tail straight down in mid-water, and hang there. I watched carefully and saw no movement of the jaws although the mouth was open...During the period of verticality...a school of little wrasse darted out and
Grover is a marine ecologist at Oregon State University's Hatfield Marine Science Center.

thoroughly cleaned cheeks, lips, teeth and scales...the parrotfish remaining quite motionless all the while."

Since the days of the diving helmet, advances in diving equipment and techniques have facilitated many additional accounts of cleaning behavior. This relationship has been observed in virtually every global marine environment in which extensive diving observations have been made. Fish are the most typical marine cleaners, representing more than 60 species in 18 families; however, shrimp and other crustaceans also demonstrate cleaning behavior. Labridae, the family of wrasses, has the most frequently reported cleaner species (22, by my count). In some cases, the relationship of cleaners to hosts appears casual, while in other cases it appears to be complex.

While cleaning relationships are usually associated with the tropics, the idea of using cleaner fish as a biological solution to a mariculture problem arose in the high latitudes of Norway. Salmon farming represents a large industry in Norway, and mass infestations of sea lice are a serious problem for sea-pen reared Atlantic salmon (*Salmo salar*). Salmon lice (*Lepeophtheirus salmonis*) are ectoparasitic copepods that feed on the mucus, skin and blood of host salmon. Lice infestations can result in open wounds that expose salmon to osmotic stress and secondary infections. Untreated infestations can result in mortality, and as a result, salmon farmers must regularly treat pens to control lice. The standard treatment for de-lousing salmon has been the application of (dichlorvos-based) organophosphate pesticides.

While chemical treatment is effective for the removal of adult lice, it is expen-



Goldsinny cleaning salmon. Photo by J.E. Fosseidengen

sive and has several drawbacks. Early stages of lice that are imbedded in the skin are not killed, necessitating repeated treatments. Further, chemical de-lousing stresses and can even kill salmon. Pesticide treatments can also be toxic to marine life in the vicinity of pens, and can represent a health risk to farm workers. Because of these drawbacks, proposals have been made to ban the use of these chemicals, and alternative, ecologically sound, de-lousing treatments have been aggressively pursued. This search for environmentally safe treatments led Asmund Bjordal, a scientist at the Institute of Fisheries Technology Research in Bergen, Norway, to initiate studies aimed at testing the feasibility of using local wrasse to clean sea lice from Atlantic salmon.

Cleaning behavior of North Sea wrasses was first reported in 1973, in the Plymouth (Great Britain) aquarium, where three species were observed cleaning in display tanks. At that time, field evidence of cleaning behavior (either direct observation or the presence of parasites in the diet) was available for only two of these species. Since then, the third species has been observed cleaning other fishes in the sea, off Sweden. These accounts prompted Bjordal, in 1987, to

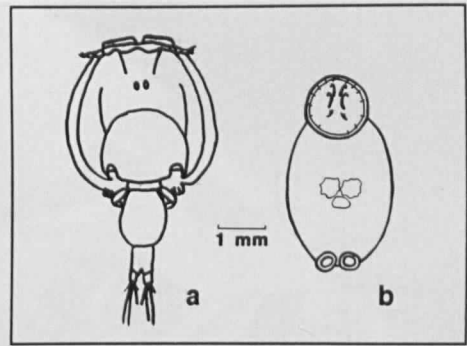
begin testing the ability of all local wrasses to clean sea lice off infested Atlantic salmon. He tested five species of wrasse, and found that four of these cleaned salmon. Goldsinny (*Ctenolabrus rupestris*) and rock cook (*Centrolabrus exoletus*) cleaned the most effectively, female cockoo wrasse (*Labrus ossifagus*) were moderately effective, and although corkwing wrasse (*Crenilabrus melops*) demonstrated cleaning behavior, they experienced high mortality.

In the earliest trials, the number of wrasse greatly exceeded the number of salmon, however, subsequent trials determined more appropriate ratios. At a ratio of 1.5 salmon per wrasse, the number of lice on salmon was reduced by 57% in 24 hours. In the first sea cage trials, ratios of 4.4 and 8.8 salmon per wrasse were used for 7 weeks. At these ratios, goldsinny and rock cook successfully controlled lice, and wrasse-treated salmon experienced reduced mortality and higher growth rates compared to chemically-treated salmon. The first full scale trial in sea cages utilized a ratio of 43 salmon per wrasse. Additional full scale trials indicate that sea lice infestations can be successfully controlled at ratios of 50 to 150 salmon per wrasse.

Commercial trials in sea cages began in 1988 and 1989 at several fish farms on the west coast of Norway (59° to 66° N latitude), and followed in Shetland, Scotland, and Ireland. The application of Bjordal's research to a production scale has been remarkably successful. In 1991, 142,000 wrasse were applied to control sea lice on 5.5 million salmon in 29 farms in Norway, and 100,000 wrasse were captured for use as cleaners in Scotland. Bjordal suggests that the application increased considerably above this level in 1992.

Presently, cleaner fish represent the most developed alternative method of sea lice control in salmon farming. Using cleaner fish enables farmers to manage a pest problem without using a chemical pesticide. Wrasse can be continuously used as cleaner fish. They are superior to pesticides because they remove both larval and adult sea lice, do not stress the host fish, can reduce fouling on sea cages, and are non-toxic to farm workers and the environment. In some cases, they may also be cheaper than pesticides.

When I learned of Bjordal's research, in 1990, the Caribbean Marine Research Center, on Lee Stocking Island, Exuma Cays, Bahamas, was engaged in aquaculture research. Their focus was on culturing Florida red tilapia (derived from a cross between *Oreochromis urolepis hornorum* and *Oreochromis mossambicus*) in seawater pools. Seawater culture of this fast growing fish represents a tremendous aquaculture potential in tropical or subtropical regions where freshwater resources are limited, such as the Bahamas and parts of the Caribbean. While many aspects of the culture of this fish were very successful, tilapia grown in seawater were susceptible to infestations by an ectoparasitic flatworm (*Neobenedenia melleni*). These parasites attach to the eyes, head, and body of tilapia, where they feed on mucus and surface epithelium. Flatworm infestations can result in external bleeding, open wounds, and severe eye damage, as well as secondary infections. Because un-

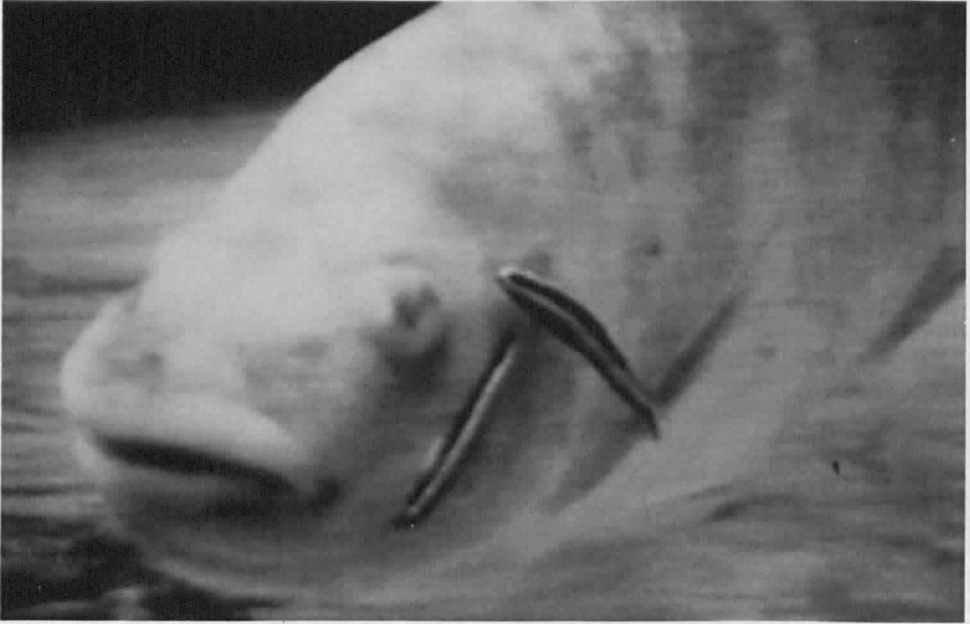


Salmon louse (a) and ectoparasitic flatworm (b).

treated infestations can result in mortality, several methods have been devised to treat the parasites. While many chemical treatments have been effectively used to control flatworm infestations, some are not approved for use on food fish, and many are potentially harmful to consumers and the environment. Two alternative, environmentally-safe treatments have been developed: 1) briefly immersing tilapia in freshwater, and 2) for tilapia reared in tanks or pools, reducing the salinity to one half full-strength seawater for a few days. However, these methods may not be practical on a commercial scale, or wherever freshwater is extremely limited. As a result, other ecologically sound anti-parasite treatments need to be developed.

During visits to Lee Stocking Island, I spent many hours in the water observing cleaner fish at work. Here was an ironic juxtaposition. Tilapia in seawater pools on the island were experiencing a major parasite problem and just a few yards away abundant, local cleaner fish were busily working in patch reefs. Bjordal's research provided the connection between the two, and he provided encouragement when I discussed research possibilities with him.

In 1990, I conducted preliminary experiments to examine the feasibility of using local fish to remove ectoparasitic flatworms from seawater-cultured tilapia. In a series of brief trials, I looked for any evidence of cleaning behavior in



Two cleaning gobies working over a tilapia. Photo by L Cowell.

juveniles of two abundant wrasse species, the slippery dick (*Halichoeres bivittatus*) and bluehead wrasse (*Thalassoma bifasciatum*), and one goby, the cleaning goby (*Gobiosoma genie*). Two of the species, juvenile bluehead wrasse and the cleaning goby, were observed cleaning tilapia.

Based on my preliminary findings, in 1991, Lauren Cowell, a graduate student at Florida Institute of Technology, conducted experiments to evaluate the ability of three species of cleaner fish to remove ectoparasitic flatworms from seawater cultured tilapia, as a Master's thesis topic. The research was conducted in aquaria on Lee Stocking Island (23°46'N latitude). She tested the two species that I had observed cleaning tilapia, the cleaning goby and juvenile bluehead wrasse, and one new cleaner fish, the neon goby (*Gobiosoma oceanops*).

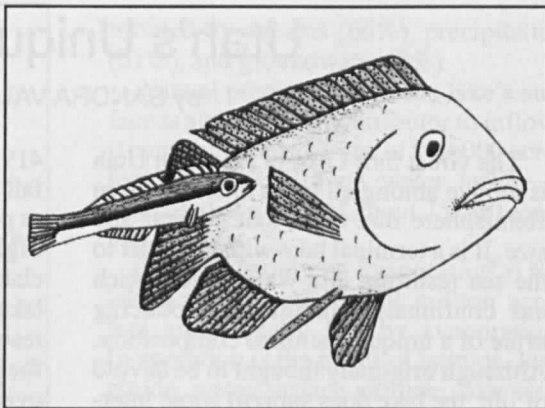
Cowell found that while all three species demonstrated an ability to remove the ectoparasites from tilapia, the performance of neon and cleaning gobies was superior to juvenile bluehead wrasse. Both of the gobies were

able to significantly reduce or eliminate the ectoparasites from tilapia with light to moderate infections. The application of these results to commercial tilapia production will not be as rapid as with salmon farming, because we still must determine: 1) the proper ratio of cleaners to tilapia in production size facilities and, 2) the effect of mesh size on cleaners in sea cages. However, these results provide an exciting glimpse at a more ecologically sound solution to persistent parasite infestation.

I would like to encourage other fish farmers to look underwater for possible cleaner fish. One northwestern Atlantic wrasse, the cunner (*Tautoglabrus adspersus*), deserves a tryout as a cleaner fish for farmed salmon in New England or the Canadian Maritime Provinces. Since wrasses do not occur locally, salmon farmers in Washington and British Columbia will need to look elsewhere for an appropriate species. However, as cleaning behavior has been documented in two surfperches in the family Embiotocidae that occur off Washington and British Columbia — young pile perch (*Rhacochilus vacca*) and kelp perch (*Brachyistius frenatus*) —

these species deserve special consideration.

One note of caution. An expanded fishery for cleaner fish may be hazardous to the environment. Although environmental impacts of the new wrasse fishery are not fully understood, they are presently being assessed in Ireland and Scotland. The costs of unregulated fishing on previously "useless" species may be high, and severely depleting local populations could adversely impact the ecology of these communities. For example, in one extreme case in the Bahamas, when all known cleaners were experimentally removed from two small isolated reefs, the number of fish visiting the reefs declined, as did the health of the resident fish population. Regulating cleaner-fish fisheries or culturing cleaner fish may eventually be necessary. Neon gobies are currently being produced commercially in the Bahamas, and culturing cleaners may prove to be the way of the future. Regardless of whether they are wild-



Juvenile bluehead inspecting a tilapia

caught or cultured, if cleaners are transported outside their native range, care must be taken to ensure that the use of non-local species does not result in escapement and the establishment of introduced species.

Utilization of cleaner fish as a non-toxic biological answer to the problem of parasite control is indeed encouraging, and if carefully developed, may provide an outstanding alternative to undesirable chemical treatment.

GUIDELINES FOR SUBMISSIONS

UNDERWATER NATURALIST is the Society's journal. We encourage members to submit articles, pictures, observations, comments, compliments or criticisms. Please follow these guidelines.

SUBJECT MATTER: Feature articles run 1,500-3,500 words (4-10 double-spaced, typed pages); please refer to back issues for guidance. For **Field Notes** and **Coast Issues**, submit no more than three pages of direct observations of interesting natural history found while walking, diving, or fishing in a coastal area. Topics can be of current interest, such as red tide in the Carolinas, whale deaths in New England, or mangrove preservation in the south; you can also submit a number of short observations or notes regarding a particular area. **Letters to the Editor** expressing thoughts on the magazine and its contents or general food for thought are especially appreciated.

ARTWORK: For illustrations, black and white prints are preferred, but clear color slides or color prints with good contrast, drawings, maps and charts will also be considered. For **Cover Photos**, we need clear, sharp 35mm color slides or color prints, either horizontal or vertical, of

littoral subjects above or below the water. Horizontals can wrap around from front to back. Action is not necessary. (Note: Unless otherwise requested, we keep all accepted art work until it is published).

HOW TO SUBMIT: Typed, double-spaced manuscripts, please. It would help, if you have access to a computer, to receive your manuscript saved as ASCII on a 3 1/2" double-sided, high-density disk. Use common, not Latin, species names. We do not carry footnotes; incorporate sources in your article. We edit for clarity using Strunk and White's *Elements of Style* as our guide and favor clear wording over specialized terminology. Send your work with a stamped, self-addressed envelope; we will acknowledge its receipt.

We do not pay for articles or illustrations, but we do send five authors' copies when published. Thank you for your interest. We look forward to receiving your submission.

Utah's Unique Lake

by SANDRA VAUGHN

The Great Salt Lake in Northern Utah is unique among all lakes in the Western Hemisphere due to its salt content and size. It is a terminal lake with no outlet to the sea resulting in a water level which has continually fluctuated, producing brine of a unique chemical composition. Although originally thought to be devoid of life, the lake does support some interesting aquatic life forms.

The Great Salt Lake is considered a remnant of prehistoric Lake Bonneville which covered much of Utah during the Pleistocene epoch. Lake Bonneville had a maximum depth of about 1000 feet and covered about 20,000 square miles of what is now Utah, Nevada, and Idaho. The prehistoric lake maintained its freshwater conditions due to its outflow through the Snake and Columbia River drainage systems which led to the Pacific Ocean. In the drier period following the Pleistocene Ice Age, Lake Bonneville was supposed to have receded leaving the Great Salt Lake. Decreases in rainfall, and evaporation loss that was greater than the inflow of the Weber, Bear, and Jordan Rivers, contributed to the lake's decline.

The earliest recorded "scientific" measurement of the lake's level was completed by John Fremont in 1843. He determined the lake's elevation to be 4200 feet above sea level. Over the years the fluctuations in surface level ranged nearly 100 feet with an all-time low of

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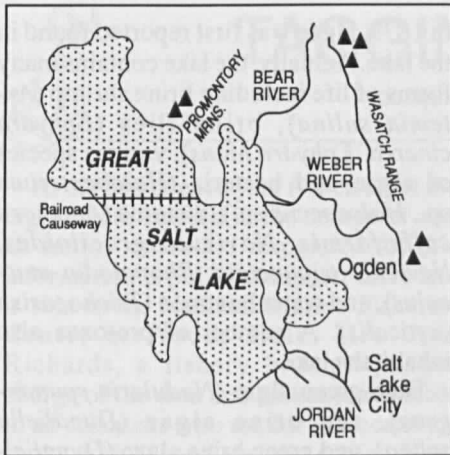
4191 feet in 1963. The drastic rise and fall in lake levels began to be a problem as people settled around the lake. During high periods (1890's), people built elaborate resorts such as Saltair on the lake front. When the water receded, the resorts were left "high and dry" while their popularity waned. Because the overall trend from 1873-1963 had been



Ruins of the Saltair Resort, January 1992. Photo by R. Butler.

declining lake levels, many people thought the lake would become dry. Railroads, highways, and industrial plants were established on the exposed lake bed. However, the lake began to rise again, and by 1982, was up to the level it had been when the pioneers arrived in 1847.

Until 1982, the fluctuations of the lake levels had never been large enough to cause any major concern. However, beginning in September 1982, a series of storms began to cross the area. This resulted in an increase in annual precipitation from the normal average of 15.75 to 22.86 inches. This resulted in much increased inflow especially from the Jordan River, as well as from the Bear and Weber Rivers and resulted in a rapid rise of the lake. In addition, evaporation was prevented by cloud cover and cool



The Great Salt Lake with railroad causeway and major inflow sources.

weather. Snowfall was high, so the snow-melt of 1983 resulted in increasing lake levels. The lake level peaked in 1984 at 4209.25 feet, covering 2300 square miles, and continued through its normal fluctuations until 1986 when it rose to 4211.85 feet. Such a rise caused extensive damage to facilities established on the exposed lake bed. Capital damage was estimated at \$285 million. Utah legislature then passed measures to build dikes and pumps designed to "contain the lake and decrease its volume." This \$71 million "West Desert Pumping Project" included a pumping station at Hogup Ridge, inlet and outlet canals, four trestles, twenty-five miles of dikes, a thirty-seven mile natural gas pipeline, and a 320,000 acre evaporation pond. The project worked and lake levels were able to be manipulated, but as water levels dropped, the project was shutdown and "mothballed" until needed.

Water surface level is the result of evaporation and the amount of water contributed by runoff, inflow, and precipitation. Fluctuating levels are thought to be due mostly to fluctuating precipitation. Some abnormal precipitation is thought to be connected with volcanic eruptions (Mount Krakatoa, for example), and the projection of ash into the atmosphere. Freshwater inflow to the lake is con-

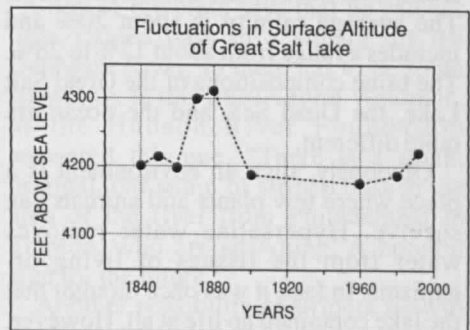
tributed by streams (66%), precipitation (31%), and groundwater (3%).

Annual precipitation on the lake's surface is also a major contributor to inflow; it contributes an average of 900,000 acre-feet annually. Ground water inflow is estimated at a total of about 75,000 acre-feet per year.

Outflow is only by evaporation at the lake's surface. About 2.9 million acre-feet are annually lost by evaporation. Evaporation is the result of latitude, longitude, water-surface altitude, lake size, and salt content.

The fluctuations in lake levels have mostly resulted from natural events. When people settled the area, however, their influences began to play a role in the level fluctuations. Consumptive use of water increased as a result of the diversion of water for irrigation, public supply, and impounding reservoirs. Lake levels were estimated to be about five feet lower in 1982 than they would have been had humans not reduced the flow of water into the lake.

A second man-made cause of fluctuating lake levels is a controversial railroad causeway built by Southern Pacific Railroad Company from 1902-1903. Twenty miles of railroad track extend across the lake from the Promontory Mountains to Lakeside and although the causeway is permeable it restricts the movement of the brine. The southern two thirds of the lake receives the most freshwater, therefore the northern third has a higher salinity. Water level in the southern part is also consistently higher. The 1986 rise,



**CONSTITUENTS:
CONCENTRATION IN BRINE, WT.%**

	GSL	Dead Sea	Ocean
chloride	14.1	17.5	1.94
sodium	7.6	3.3	1.08
sulfate	2.0	0.7	0.27
magnesium	1.1	3.4	0.13
calcium	0.02	1.4	0.04
Total Wt.%	24.82	26.3	3.46

however, forced the railroad to raise the railroad bed to prevent the causeway's destruction.

One of the most fascinating characteristics of the Salt Lake is its unique chemical composition. The saltiness of the lake is a result of its high mineral content. Streams contributing to the lake's inflow originate in the Wasatch Mountain range and bring with them varying percentages of dissolved minerals. An estimated two million tons of minerals are added to the lake each year. The resulting brine, while not as salty as the Dead Sea, is considerably more salty than the ocean. Major dissolved ions of the brine are chloride, sodium, magnesium, and potassium with chloride and sodium accounting for about 90% (by weight). In addition, the brine also contains minute quantities of calcium, bicarbonate, lithium, boron, fluoride, silica, and bromium. Salinity of the lake varies with depth (faster evaporation in shallow areas), variations in freshwater inflow, and human influence. The average salinity is about 20% and includes a range from about 13% to 28%. The brine compositions of the Great Salt Lake, the Dead Sea, and the ocean are quite different.

Obviously, such an environment is a place where few plants and animals can survive. Hypersaline water removes water from the tissues of living organisms. In fact, it was once thought that the lake contained no life at all. However,

in 1879, algae was first reported found in the lake. Actually, the lake contains many forms of life including brine shrimp (*Artemia salina*), brine flies (*Ephydra cinerea*, *Ephydra hians*), various species of algae, red bacteria (*Halobacterium* sp., *Halococcus* sp.), diatoms (*Amphora coffeiformis*, *Navicula graciloides*, *Navicula tripunctata*, *Rhopalodia musculus*), and water boatmen (*Trichocorixa verticalis*). A number of protozoa also inhabit the lake.

Blue-green algae (*Nodularia spumigena*), red brine algae (*Dunaliella salina*), and green brine algae (*Dunaliella viridis*) are the main types of algae occurring in the lake. *Nodularia spumigena* is a filamentous plant found in southern sections of the lake while *Dunaliella salina* is a unicellular plant, biflagellate, round, and bright red in color preferring very high saline conditions. *Dunaliella viridis* is a unicellular biflagellate, pyriform in shape, green in color, and is found in the southern portion of the lake in varying abundance.

Bacteria of the genera *Halobacterium* and *Halococcus* are halophiles (salt lovers) that occur in great numbers in the lake. They require 12 percent sodium chloride or more for growth. These bacteria are responsible for the purple color of the north arm of the lake when they are present in numbers up to 100 million bacteria per milliliter.

Several species of diatoms inhabit the lake during periods of lower salinity. *Amora coffeiformis* is one of the most abundant diatoms. *Navicula graciloides* is the most common in the southern portion of the lake. Other diatoms found in abundance include *Navicula tripunctata* and *Rhopalodia musculus*.

The most conspicuous animal found in the lake is the brine shrimp, *Artemia salina*. One reason why *Artemia* can survive the lake's harsh environment has to do with its reproduction. *Artemia* reproduce by two methods: the production of viviparous nauplii and by the

(Continued on page 33)



TAGGING REPORT

compiled by PAM CARLSEN

At the end of each year (when all of the tag data are entered in the computer and all return letters are responded to) this information is put on computer discs and is sent to the National Marine Fisheries Center at Woods Hole, MA. Ann Richards, a fishery biologist, takes charge of the data and makes it available to all scientists who ask for it. Recently, I spoke with her and she sent copies of the most recent requests: two were from Nancie Parrack, NMFS, Miami, FL, for amberjack data; one from Tonya Stevens, NC Division of Marine Fisheries, Manteo, NC, for red drum data; one from Dr. John Boreman, UMASS, Amherst, MA, for striped bass data; one from Mike Langan, Coastal Environmental Services, Linthicum, MD, for striped bass data and the latest request from Mark Gibson, RI Division of Fish and Wildlife, for bluefish data. Each request receives the appropriate tag-recapture data and a covering letter explaining how to use them. All striped bass data are on disc from 1965 - 12/31/92. All other species are available on discs from 1984 - 12/31/92.

Ken Sprankle, a UMASS graduate student, has finished his master's degree in ichthyology (see U.N. Vol. 20 #3 and 21 #4). In this issue, we track 23 more of Ken's double tagged stripers, tagged off of Hatteras, NC in January and February of 1991 and 1992. The returns found two fish in MA, two in CT, two in NY, one in NJ, nine in the MD Chesapeake, six in the VA Chesapeake, and one in the ocean 1/2 mi. south of the VA/NC border. We have asked Ken for a copy of his completed thesis and will report on all of his findings in a later issue.

George and Tom Dulka of Virginia Beach have been doing some double tag-

ging of amberjack, offshore of Rudee Inlet, using our tag and one provided by the National Marine Fisheries Service. Interest has been shown in this particular species.

Some requests for data come directly to the ALS office. Paul Diodati of the MA State Division of Fisheries was interested in MA stripers for the years 1988 to the present. Bob Ballou of RI Fisheries was interested in all fish tagged and released in RI 1990 - 1991. Cindy Zipf of Clean Ocean Action requested a NY harbor print out showing the sport fishery resource, especially in the area of proposed borrow pits. Another time Clean Ocean Action requested tagging information showing the correlation of inshore fish to offshore waters.

Requests for all types of information come to the ALS tagging desk. Two new books, one just published and one yet to be released have tagging chapters. "Fishing for Striped Bass" by Gary Caputi is available here (\$16 postpaid). Capt. Al Anderson's "Gamefish Tag & Release" will be a future offering of the Fisherman Library. Both of these authors are ALS Taggers. Taggers request information of all kinds, on fish, on fish diseases, on release techniques, and on their own tagging records. Some questions need further research such as the question posed by Elizabeth Cairns of Philadelphia, PA. "A boy in my class says that he catches little striped bass in a stream off the Delaware River, so there has to be some spawning. Is this true?". John Waldman, of the Hudson River Foundation answered this one. "There is a small, original, old strain of striped bass in the area of the river from Philadelphia to Trenton, who are spawning. A hopeful sign for the future."

Another possibility of stripers spawn-

ing became evident when a fish tagged by Paul Rothe on 7/27/90 on the south side of the Sea Bright bridge at 18 1/2" was recaptured by the NJ Division of Fish, Game, and Wildlife in an anchored gill net in the Swimming River 5/6/93 at 25". This area was stocked with juvenile stripers six years before and the Division of Fisheries has been taking many

plankton samples to determine if there are any juvenile striped bass. When this tagged bass was recovered, it raised hopes that it was a stocked bass returning to spawn.

What follows is a long list of recaptures to catch us up with ever busy taggers. Interspersed are comments from anglers' communications.

TAGGING RETURNS

Species	Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
Black Sea Bass								
12	M	Ross	West Bank Lt., NY	08/29/92	D Fiorella	Tin Can Grounds, NY	12	11/15/92
10	K	Case	Merrick Bay, NY	09/24/92	F/V Mt. Vernon	Offshr., Washngtn Cnyn	10	02/26/93
08	T	Camp	Offshr., Cape May, NJ	05/30/93	J McTommonney	Offshr., Cape May, NJ	08	06/30/93
Bluefish								
18	S	Sturgeon	Cape Cod Bay, MA	07/25/91	S Gibbons	Unknown, probably RI	21	02/12/92
30	S	Klimek	Shrewsbury Rocks, NJ	05/30/92	J Gervascio	Niantic, CT		08/15/92
29	B	Stromko	Mud Hole, Offshr, NJ	06/14/92	R Tuveson	Marblehead, MA		08/28/92
30	G	Dukla	Offshr, Rudee Inlet, VA	06/15/92	F LeBuhn	Darien, CT	31	08/29/92
31	T	Marburger	Shinnecock Inlet, NY	08/23/92	G Keenan	Shinnecock Inlet, NY		09/01/92
32	T	Wood III	Ocean City, NJ	06/07/92	A Nunez	Jamestown, RI	32	09/06/92
21	J	Foti	Verrazano Bridge, NY	05/29/92	B Hastings	Montauk Pt., NY		09/06/92
22	S	Keiper	Indian R. Inlet, DE	06/16/92	B Alix	Milford, CT	22	09/09/92
22	S	Klimek	Offshr, 17 fathoms, NJ	08/22/92	R Swansen	Plum Gut, NY		09/12/92
17	S	Penta	Boston, MA	07/29/91	M Dombrowski	Cold Spring Inlet, NJ	25	09/28/92
31	T	Marburger	Shinnecock Inlet, NY	09/08/92	K Darienzo	Shinnecock Inlet, NY		09/30/92
22	H	Sweet	Narragansett Bay, RI	07/23/92	L Stone Jr.	Riverside, RI		10/03/92
24	H	Sweet	Narragansett Bay, RI	07/24/92	J Usko	Thames R., CT		10/08/92
19	T	McCandless	Narragansett Bay, RI	08/27/92	S Hammons	Somerset, MA	22	10/10/92
20	T	Wood Jr.	Ocean City, NJ	05/23/92	H Lapan	West Haven, CT	24	10/11/92
21	H	Sweet	Prudence Is., RI	06/28/92	D Lamothe	Middletown, RI		10/11/92
24	S	Sturgeon	Cape Cod Bay, MA	09/02/92	L Gage	Cape Cod Canal, MA		10/15/92
31	W	Kobel Jr.	Moriches Inlet, NY	07/05/92	D Kalosli	Moriches Inlet, NY	34	10/20/92
22	R	Ferland	Narragansett Bay, RI	09/06/92	E Peters	Montauk Pt., NY		10/22/92
20	S	Penta	Boston, MA	08/30/92	S Logue	Boston, MA		10/23/92
31	P	Donahue	Gloucester, MA	09/13/92	J McAvoy	Offshr, Long Branch, NJ		10/26/92
28	T	Marburger	Northport, NY	11/03/91	M Kurzynski	L.I. Sound, NY		10/28/92
27	R	Kyker	Stamford, CT	10/10/92	S Rispoli	Horton's Pt., NY		11/10/92
30	P	Donahue	Gloucester, MA	09/09/92	L Gaspar	Rhode Is. Sound		11/15/92
28	H	Anderson	Cape Cod Bay, MA	09/13/92	A Ristori	Seaside, NJ		11/29/92
33	H	Sweet	Prudence Is., RI	10/20/92	K Daniels	Offshr., Cp Hatteras, NC		12/15/92
22	B	Finke	Stamford, CT	10/15/92	R Sanderson	Bethany Beach, DE		05/21/93
24	B	Balmer	Offshr., Asbury Pk., NJ	05/30/93	F Kriegsmann	Offshr., Brngt Inlet, NJ	26	06/13/93
Fluke								
	M	Fitzgerald	Great South Bay, NY	08/23/91	F/V Stirs One	Inshr Georges Bk, MA	14	
14	M	Mucha	Lloyd Neck, NY	08/25/92	F/V Heather Lynn	Offshr., Montauk Pt., NY	15	
13	R	Hipp	Merrick, NY	06/08/93	J Andryuk	Merrick, NY	13	
13	F	Spall	Sandy Hook, NJ	07/02/91	G DeFazio	Earle Pier, NJ	13	07/15/91
	D	Aries	Freeport, NY		A Malm	Captree Boat Bsn, NY	16	07/14/92
12	B	McCarey	Fire Is. Inlet, NY	07/02/92	M Goldstein	Fire Is. Inlet, NY		07/30/92
13	M	Greatsinger	Fire Is. Inlet, NY	06/13/92	A Kost	Fire Is. Inlet, INY		08/05/92
13	G	Clusman Jr.	Sandy Hook, NJ	06/25/92	R Dinklage	Sandy Hook, NJ	13	08/12/92
11	J	Brittin	Cape May Pt., NJ	07/15/92	P Thompson	Cold Spring Inlet, NJ	12	08/15/92
12	A	Evangelista	Sandy Hook, NJ	08/08/92	R Brue Sr.	Verrazano Bridge, NY	12	08/29/92
14	R	Haug	Moriches Bay, NY	08/20/92	F Mazurkiewicz	Moriches Bay, NY	14	08/30/92
11	R	Joyce	Pt. Judith, RI	07/10/92	R Trifussi	Pt. Judith, RI	14	08/30/92
13	D	Warner	Wildwood, NJ	08/21/92	H Venditto	Cape May, NJ	13	08/31/92

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
15	Discovery '92	Sandy Hook, NJ	08/08/92	A Emann	Leonardo, NJ	15	09/01/92
12	S Stepanski	Delaware Bay, NJ	07/30/92	J Ronketty	Delaware Bay, NJ	14	09/02/92
12	M Greatsinger	Fire Is. Inlet, NY	06/06/92	C Wurster	Fire Is. Inlet, NY	12	09/02/92
12	W Swartz III	N. Barnegat, NJ	08/28/92	F Soden	Island Beach St. Pk., NY		09/02/92
13	S Carlsen	Shark River, NJ	05/26/92	S Duca	Shark R. Inlet, NJ		09/03/92
11	A Hagovsky	Chincoteague Inlet, VA	07/18/92	M Bard	Assateague Is., VA		09/04/92
13	P Hahn	Atlantic Hlds., NJ	08/22/92	M Golabek	Sandy Hook, NJ	14	09/05/92
12	M Daniewicz	Verrazano Bridge, NY	06/09/92	L Zakrzewski	Hoffman Is., NY	14	09/05/92
13	R Anderson Jr.	Fire Is. Inlet, NY	08/11/91	B Stack	Jerusalem, RI	15	09/05/92
13	K Morgan	Hudson R., NY	08/29/92	P Bonczkowski	Verrazano Bridge, NY	13	09/05/92
11	S Fries	Governor's Is., NY	08/20/92	S Quinn	Flatlands, Bklyn, NY		09/07/92
12	S Knapik	Pt. Lookout, NY	06/08/92	C Flynn	Lido Beach, NY	13	09/07/92
12	D Obropta	Sandy Hook, NJ	09/02/92	A Durastanti	Sandy Hook, NJ	12	09/07/92
12	A D'Amato	Delaware Bay, NJ	08/26/92	W Stelmach	False Egg Is., NJ	13	09/07/92
10	F Waltzinger III	Manasquan, NJ	08/13/92	M Golabek	Shrewsbury R., NJ		09/08/92
13	R Anderson Jr.	Fire Is. Inlet, NY	08/21/92	B Platt	N. Babylon, Ny	13	09/08/92
13	R Joyce	Pt. Judith, RI	08/11/92	B Chapin	Jamestown, RI	15	09/09/92
13	R Anderson Jr.	Fire Is. Inlet, NY	08/20/92	J Columbus	Fire Is. Inlet, NY	13	09/10/92
13	R Anderson Jr.	Fire Is. Inlet, NY	08/20/92	M Klueber	Fire Is. Inlet, NY	14	09/12/92

"Mr. Lytle, a younger man, had just caught this bass. I asked him if he were going to keep it, and he responded that he thought he would. Sensing some hesitancy on his part, I remarked that had he been intending to release the fish, I would have been happy to have tagged it for him. Immediately, Mr. Lytle responded that he wanted his fish tagged. After inserting the tag, I

carried the fish down the rocks to release it, and it swam off with no apparent difficulties. Later Mr. Lytle thanked me for tagging the fish and indicated that he really felt good about releasing the bass. It is this type of success which I would hope to see repeated many times in the interest of saving the striper from extinction."

GEORGE EPPLE, BEDFORD, MA

13	M Daniewicz	The Narrows, NY	06/09/92	L Johansen	Hoffmn & Swnbrn I., NY	15	09/13/92
12	D Obropta	Sandy Hook, NJ	08/05/92	S Liedeker	Sandy Hook, NJ		09/13/92
11	I Donatiello	Manasquan, NJ	07/07/92	F Orlando	Manasquan Inlet, NJ	13	09/15/92
13	G Fousek-Blackley	Fire Is. Inlet, NY	08/10/92	J Duerr	Fire Is. Inlet, NY	13	09/16/92
13	R Wolfskeil	Spring Lake, NJ	07/11/92	M Statin	Avon, NJ	14	09/17/92
12	S Wisnewski	Barnegat Lt., NJ	07/10/92	A Ryden Jr.	Barnegat Inlet, NJ	13	09/18/92
10	D Obropta	Sandy Hook, NJ	07/02/92	D Obropta	Sandy Hook, NJ	13	09/18/92
10	S Carlsen	Deal, NJ	09/18/91	K Lutz	Massapequa, NY	16	09/19/92
12	S Wisnewski	Barnegat Lt., NJ	07/10/92	P Hierholzer	Island Beach St. Pk., NJ	14	09/20/92
14	R Haug	Moriches Bay, NY	09/01/92	B Cornillow	Moriches Inlet, NY	15	09/20/92
12	D Obropta	Sandy Hook, NJ	09/06/92	R Sherman Jr.	Sandy Hook, NJ	12	09/21/92
13	S Carlsen	Shark River, NJ	07/23/91	I Nagel	Deal, NJ		09/22/92
13	K Morgan	Brooklyn, NY	08/22/92	M Egloff	Red Hook, NY	13	09/25/92
14	M Galdorisi	Great Kills, NY	08/21/92	P Horzepa	Deal, NJ	14	10/02/92
14	S Knapik	Pt. Lookout, NY	07/09/92	F Simonette	Reynolds Chan., NY		10/05/92
13	R Anderson Jr.	Fire Is. Inlet, NY	08/21/92	Unkwn fisherman	Fire Is. Inlet, NY	16	10/17/92
12	S Carlsen	Deal, NJ	08/02/92	G Ciriello	Offshr., Sandy Hook, NJ	16	10/18/92
12	T Stanik	Hatteras Inlet, NC	10/19/92	J Keller	Cape Hatteras, NC	12	10/31/92
11	T Stanik	Hatteras Inlet, NC	10/28/92	R Miller	Frisco, NC		11/11/92
11	T Stanik	Hatteras Inlet, NC	10/28/92	R Hollifield	Hatteras Inlet, NC	11	11/16/92
12	G Dulka	Ches. By Brg. Tun, VA	10/24/92	K Falana	Currituck Beach, NC	13	12/02/92
15	K McDonald	Amityville, NY	05/09/92	F/V Leslie & Charles	Offshr., Seaside Pk, NJ	18	12/18/92
09	A Doohaluk	Asbury Park, NJ	09/20/91	F/V Jenna Lynn	Offshore in 53 fathoms	16	12/19/92
13	A Evangelista	Sandy Hook, NJ	08/08/92	E Joseph	Offshr., Hudson Canyon	13	12/20/92
12	F Spall	Sandy Hook, NJ	07/16/91	F/V Shelby Ann	Offshr., Veatch Canyon	15	01/08/93
12	R Anderson Jr.	St Boat Chan., L.L. NY	06/25/91	F/V Patricia Ann	Offshr., RI	14	01/11/93
13	J Calamia	Democrat Pt., NY	08/30/92	S Banks	Offshr., Cape Henry, VA	14	01/12/93
12	L Ruch Jr.	Asbury Park, NJ	09/12/92	F/V Scott & Mike	Offshr., Hudson Canyon	14	01/15/93
13	C Fiorello	Spring Lake, NJ	07/20/92	Palmetto Seafood Co	Hampstead, NC		01/20/93
09	S Carlsen	Deal, NJ	09/16/91	F/V Travis & Natalie	Offshr., Block Canyon		02/11/93
10	S Knapik	Pt. Lookout, NY	07/06/92	Unknown F/V			02/15/93
13	R Meyer	Sandy Hook, NJ	09/07/92	F/V Carolina Lady	Offshr., Lng Bch Is., NJ		02/19/93
11	S Carlsen	Atlantic Highlands, NJ	06/22/91	E Todd Jr.	Offshr., Veatch Canyon	16	02/21/93

Species	Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
11	R	Joyce	Pt. Judith, RI	06/27/92	R Barber	Narragansett, RI		03/15/93
10	J	Beard	Great South Bay, NY	09/01/91	F/V Sundance	Offsh., Mth's Vnyd, MA	16	03/26/93
12	B	Poyott Jr.	Island Beach St. Pk., NJ	07/11/92	F/V Clara Sue	Offsh., Nrlfk Cyn, VA		03/28/93
13	A D'	Amato	Delaware Bay, NJ	08/22/92	F/V Clara Sue	Offsh., Nrlfk Cyn, VA		03/28/93
14	C	Witek	West Islip, NY	08/27/91	D Neronha	Sakonnet Pt., RI		05/07/93
17	J	Dotsey	Lido Beach, NY	05/08/93	M Tabor	Pt. Lookout, NY	17	05/17/93
13	R	Meyer	Sandy Hook, NJ	09/07/92	R Golly	Babylon, NY	15	05/21/93
13	J	Dotsey	Lido Beach, NY	05/08/93	D Rosen	Long Beach, NY	14	05/23/93
12	W	Swartz, III	N. Barnegat, NJ	08/29/92	J Zaleckas	Shark R., NJ	15	05/29/93
12	J	Dotsey	Lido Beach, NY	05/07/93	E French	Jones Beach, NY		06/02/93
12	R	Anderson	Captree, NY	06/05/93	A Buglione	Captree, NY	13	06/04/93
12	R	Anderson Jr.	Captree, NY	06/01/93	S Pobiner	Robert Moses Brdg., NY	12	06/05/93
12	T	Wilkinson	W. Islip, NY	05/30/93	G Samak	Fire Is. Inlet, NY		06/06/93
12	S	Knapik	Freeport, NY	05/27/93	J Nizza	Jones Beach, NY	15	06/06/93
14	S	Knapik	Pt. Lookout, NY	05/31/93	L Moss	Jones Inlet, NY	16	06/07/93
15	S	Carlsen	Atlantic Highlands, NJ	06/21/92	J Hoffman	Atlantic Highlands, NJ	17	06/08/93
13	B	Shillingford	Somers Pt., NJ	05/17/93	R Miller	Beasley's Pt., NJ	15	06/10/93
15	C	Witek	Babylon, NY	05/31/93	D Vaccaro	Great South Bay, NY	15	06/11/93

"I am returning this tag I was lucky enough to catch in a striped bass 6/6/93 at Hingham, MA. The fish was 23 lbs. and 37 1/2" long. I was going to eat this fish, but it looked too good to eat so I gave it a big kiss and wished it all the luck in the world. I am a retired carpenter and like to fish bass."

ANTHONY ANASTASIO, HOLBROOK, MA

10	J	Timmermann	Pt. Lookout, NY	06/05/93	J Montero	Long Beach, NY		06/12/93
14	J	Timmermann	Pt. Lookout, NY	06/13/93	D Rosen	Long Beach, NY	14	06/13/93
11	S	Knapik	Pt. Lookout, NY	05/31/93	B Behr	Lido Beach, NY	11	06/13/93
15	J	Dotsey	Lido Beach, NY	05/09/93	D Dwyer	Jones Inlet, NY	15	06/14/93
16	I	Ponomareva	Raritan Bay, NJ	08/19/92	D Butcher	Nantucket, MA	16	06/14/93
15	J	Dotsey	Lido Beach, NY	05/08/93	E Stewart	Pt. Lookout, NY		06/16/93
16	J	Dotsey	Lido Beach, NY	05/06/93	E Amorie	Reynold's Channel, NY	16	06/17/93
08	J	Crawson	State Boat Channel, NY	06/06/93	S Robiner	Captree, NY	11	06/18/93
12	J	White	Robert Moses Brdg., NY	06/07/93	S Robiner	W.R Moses Bdg, NY	12	06/18/93
11	R	Wolfskeil	Sandy Hook Bug Lt., NJ	05/28/93	T D'Anna	Sandy Hook Bay, NJ	12	06/19/93
12	R	Anderson Jr.	Robert Moses Brdg., NY	06/05/93	J Biliitsky Jr.	Robert Moses Brdg., NY		06/20/93
13	J	Dotsey	Lido Beach, NY	05/09/93	S Parrillo Sr.	Reynolds Chan., L.I., NY	13	06/21/93
10	R	Anderson Jr.	Fire Is. Inlet, NY	06/13/93	D Martin	Captree, NY		06/21/93
12	R	Anderson Jr.	Fire Is. Inlet, NY	08/24/91	J Tortorici	Robert Moses Brdg., NY	16	06/21/93
11	J	Calamia	Pt. Lookout, NY	06/14/93	C Goldstein	Freeport, NY		06/22/93
13	J	Timmermann	Pt. Lookout, NY	06/13/93	R Berler	Lido Beach, NY	15	06/22/93
14	E	Feret	Freeport, NY	06/06/93	A Prisco	Lido Beach, NY	14	06/22/93
16	J	Dotsey	Lido Beach, NY	05/09/93	F Beuth	Pt. Lookout, NY		06/24/93
15	R	Meyer	Sandy Hook Bay, NJ	05/31/93	C Voorhes	Sandy Hook, NJ	16	06/24/93
12	J	Calamia	Merrick, NY	06/14/93	P Raiano	Merrick, NY		06/25/93
14	P	Hahn	Sandy Hook, NJ	06/12/93	R Nielsen	Sandy Hook, NJ	14	06/25/93
10	S	Knapik	Point Lookout, NY	07/06/91	J Pelzman	Moriches Bay, NY	16	06/25/93
12	M	Ladjack	Belmar, NJ	06/11/93	L Curtis	Shark R., NJ	15	06/25/93
11	A	Evangelista	Sandy Hook, NJ	06/18/93	R Law	Keansburg, NJ		06/26/93
13	J	Calamia	Merrick, NY	06/13/93	T Meehan	Merrick, NY	14	06/27/93
12	S	Carlsen	Atlantic Hglds., NJ	07/01/92	F McGue	Merrick, NY	15	06/30/93
13	J	Timmermann	Freeport, NY	06/19/93	C Hermann	Swift Creek, NY	13	06/30/93

Great Barracuda

19	J	Wright	Venice, FL	07/24/92	E O'Rear	Venice, FL	19	07/30/92
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Grouper

19	F	Waltzinger III	Johnson Key, FL	03/02/93	F Waltzinger IV	Johnson Key, FL	19	03/05/93
12	D	Sherman	Offsh., Savannah, GA	01/22/93	J Cavuoto	Savannah Lt. Tower, GA	12	05/06/93

Mangrove Snapper

09	R	Meyer	Marathon, FL	09/30/92	T Wehrstein	Marathon, FL	09	01/29/93
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Northern Kingfish

13	S	Carlsen	Deal, NJ	07/19/92	R Soriano	Manasquan, NJ	15	10/15/92
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Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
Nurse Shark							
56	J Wright	Venice, FL	06/28/92	J Boyce	Cayo Costa Is., FL		05/15/93
Red Drum							
16	JC Wright	Chesapeake Bay, VA	10/04/92	J Browning	Duck, NC	17	10/20/92
16	G Fuss	Bald Head Is., NC	11/30/92	M Mitchell	Bald Head Is., NC	16	12/01/92
17	E Fuss	Bald Head Is., NC	12/14/92	S Tyner	Southport, NC	18	06/23/93
18	E Fuss	Bald Head Is., NC	11/10/92	B Glover	Bald Head Is., NC	18	06/24/93
Striped Bass							
18	K Black	Merrimack R., MA	07/08/92	R Blanchette	Newburyport, MA	19	
26	A Anderson	Block Is., RI	10/03/92	F/V Lady Joy	Offsh., Ocean City, MD		
28	E Lelie	Lambertville, NJ	06/21/91	J Ranochak	New Hope, PA		
33	D Mann	Quick's Hole, MA	08/02/92	S Weber	Quick's Hole, MA	33	
18	R Grobarz	Sandy Hook, NJ	11/29/90	G Perry Jr.	Sakonnet Pt., RI		
27	R Chmiel	Westerly, RI	06/30/93	J Yee	Montauk, NY		
21	B Bottino	Deal, NJ	06/27/89	K Knapp	Deal, NJ		08/15/90
17	W Hraska	Throgs Neck Bridge, NY	09/13/90	Fisherman John	Manhattan Beach, NY		12/05/90

"This fish was caught about 100 yards from where the gun used in the Charles Stuart murder case was tossed in the Pines River, Revere, MA.

This fish could be an eye witness. Ha! Ha! Keep up the good work."

SAM MAC ALLISTER, REVERE, MA

27	G Eick	Lambertville, NJ	07/15/91	J Nolan	Lambertville, NJ	27	07/17/91
24	R Leja	Bridgeport, CT	10/16/88	W Cuevas	Seaside Park, NJ		07/25/91
31	M Merly	Bridgeport, CT	07/12/91	D Albantides	Fairfield, CT	31	09/11/91
13	S Radossi	Jersey City, NJ	11/26/88	A Sand	Stony Brook, NY		11/15/91
25	D Doyen	Fishers Is., NY	10/03/90	R Beckwith	Waterford, CT	32	11/20/91
18	D Kay	Fall River, MA	10/28/89	D Colella	Somerset, MA	24	12/01/91
16	J Della Porta	Boston, MA	04/08/90	T Loughman	Mystic R., MA		01/06/92
29	A Anderson	Charlestown, RI	11/16/91	M Rankin	Delaware Bay, NJ		04/24/92
16	D Kay	Swansea, MA	05/26/90	A Balan	Swansea, MA	21	05/01/92
21	B Pearse	Atlantic Highlands, NJ	08/31/91	T Bozan	Shrewsbury R., NJ	22	05/02/92
18	D Kay	Swansea, MA	05/27/90	E Beckwith Jr.	Mouth of CT River, CT		05/15/92
30	G Karr	Island Beach St. Pk, NJ	05/23/92	D Talerico	Island Beach St. Pk., NJ	33	05/27/92
21	P Hierholzer	Barnegat Light, NJ	12/08/91	A Lotz	Westport, MA		05/27/92
21	J Zaffuto	Democrat Point, NY	05/05/92	A Lotz	Little Compton, RI		05/27/92
19	J Reiches	Dauids Island, NY	05/24/91	V Field	Sandy Hook Bay, NJ		05/29/92
26	G D'Amato	Stratford, CT	10/20/91	S Mari	Derby, CT	29	06/05/92
28	T Marburger	Northport, NY	05/09/90	M Sanchez	Larchmont, NY	32	06/07/92
19	C Guinta	Sandy Hook, NJ	10/15/91	F Urban	Sandy Hook Bay, NJ	26	06/10/92
34	S Witthuhn	Cold Spring Harbor, NY	05/26/91	A Marmorale	Robt. Moses Csway, NY	36	06/15/92
29	L Molnar	Shinnecock Inlet, NY	06/09/92	L Menocal III	Shinnecock Inlet, NY	29	06/17/92
33	G Keenan	Fishers Island, NY	11/21/91	R Konikowski	The Race, L.I. Sound		06/18/92
27	G Ciriello	Sandy Hook, NJ	11/10/91	R Moffatt	New Castle, NH	27	06/21/92
22	P Licis	Newport, RI	11/15/91	K Andrews	Mass. waters		06/23/92
30	G Kerkhan	Sea Bright, NJ	06/18/92	J Carey	Sea Bright, NJ	30	06/23/92
30	R Babuschak	Island Beach St. Pk., NJ	11/06/89	W Fuller Jr.	Amesbury, MA		06/23/92
32	R Greene	Cuttyhunk, MA	06/27/92	J Skammels	Cuttyhunk, MA	34	06/28/92
18	R Ries	Cold Spring Harbor, NY	05/29/89	P Kos	Cold Spring Hbr, NY	28	06/28/92
	D Mann	Quick's Hole, MA	06/22/92	J McAfee	Quick's Hole, MA	36	07/02/92
28	G Kerkhan	Sandy Hook, NJ	12/02/91	D Vipriano	Race Pt., MA	34	07/05/92
22	O Van Helmond	Stony Brook, NY	06/08/92	D Guansini	Port Jefferson, NY		07/06/92
27	D Wells	Stratford, CT	05/30/92	J Hull	Kelsey Pt., CT	27	07/10/92
22	J Karolides	Crane River, MA	05/24/91	M Leboeuf	Beverly, MA	26	07/12/92
27	J Caputo	Hart Island, NY	06/26/92	M Xanthakys	Little Neck Bay, NY	31	07/13/92
23	R Krueger	Atlantic Beach, NY	06/23/90	A Musumarra	Atlantic Bch. Bridge, NY	27	07/14/92
29	J Doyle	Trenton, NJ	07/01/92	R Mors	Trenton, NJ		07/14/92
34	B Billerman	Newburyport, MA	08/06/92	A Butler Jr.	Merrimack River, MA		07/15/92
34	S Penta	Boston Harbor, MA	07/15/91	R Burgess	Boston Harbor, MA		07/15/92
36	A Anderson	Block Island, RI	10/20/90	D Friden	Pt. Judith, RI	37	07/15/92
24	D Kay	Somerset, MA	11/02/91	J Donahue	Assonet R., MA		07/15/92
	J Drum	Fairfield, CT		R Mountford	Fairfield, CT	37	07/16/92

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
34	R Allardice	Beverly, MA	07/28/91	M Leboeuf	Beverly, MA	37	07/17/92
29	B Billerman	Newburyport, MA	06/07/91	A Butler Jr.	Merrimack River, MA	29	07/25/92
33	G Keenan	Shinnecock Inlet, NY	07/22/92	K Darienzo	Shinnecock Inlet, NY	34	07/29/92
33	J Della Porta	Winthrop, MA	06/28/92	T Loughman	Boston, MA	35	08/01/92
36	J Karolides	Beverly, MA	05/24/92	M Leboeuf	Beverly, MA	37	08/09/92
17	J Sullivan	Merrimack R., MA	06/04/89	J Sullivan	Merrimack R., MA	26	08/09/92
20	R Greger	Romer Shoal, NJ	11/29/91	F Ambrosia	Atlantic Bch Brdg., NY		08/10/92
19	T Prisco	East Rockaway Inlet, NY	11/05/90	F Ambrosia	Atlantic Bch Brdg., NY		08/10/92
32	K Larsen	Hull, MA	07/26/91	T Abbadesa	Hull, MA	39	08/10/92
23	D DiMaio	Winthrop, MA	06/27/92	M Rooney	Boston, MA	23	08/10/92
20	J Karolides	Danvers, MA	07/02/92	C Riley	Danvers, MA	20	08/10/92
21	S Penta	Boston, MA	06/19/92	S Penta	Boston, MA	22	08/10/92
24	J McAfee	Quick's Hole, MA	07/02/92	J Pitera Jr.	Quick's Hole, MA		08/11/92
33	D Magnasco	Boston, MA	09/02/91	S McKinney	Boston, MA	36	08/11/92
26	T Pendyk	Verrazano Bridge, NY	06/25/92	V Tinari	Verrazano Bridge, NY	26	08/12/92
30	J Della Porta	Winthrop, MA	09/19/91	R Stearns	Boston, MA	32	08/12/92
23	H Goldblum	Coney Island, NY	11/28/91	L Napolitano	Rockaway Inlet, NY		08/12/92
17	D Kelly	Sag Harbor, NY	06/26/90	H Fischer	Montauk, NY	20	08/12/92

"A few years ago I thought I had a lifetime supply of tags—all gone. I only tag 13-13 3/4" fluke. Went fishing yesterday with a friend and

caught 42 fluke, 8 keepers and used up the last of my tags. Keeps me busy."

WARREN GANO, EAST MORICHES, NY

11	K Morgan	East River, NY	12/23/90	J Serrano	Manhattan, NY	12	08/12/92
29	J Della Porta	Boston, MA	09/18/89	T Loughman	Boston, MA	36	08/13/92
38	A LoCascio	Manhasset Bay, NY	07/01/91	W Denning	Manhasset Bay, NY	38	08/13/92
35	A Dangelo	Block Island, RI	06/09/92	M Bonvouloir	Nantucket, MA		08/13/92
16	J Mester	Staten Island, NY	08/09/85	D Blackwell	Bath, ME	32	08/13/92
19	S Penta	Boston, MA	08/03/92	E Shaw	Boston, MA	21	08/14/92
18	J Mettler	Fishers Island, NY	11/04/89	T Ngo	Milford, CT	34	08/14/92
15	D Kay	Somerset, MA	07/27/91	H Fischer	Montauk, NY	21	08/14/92
19	C Guinta	Sandy Hook, NJ	10/15/91	E Close	Montauk Pt., NY		08/14/92
18	J Sullivan	Newburyport, MA	07/05/91	T Ngo	Milford, CT		08/14/92
22	T Rinaldi	Duck Pond Pt., NY	08/17/90	B Brewer	Gull Island, NY	27	08/15/92
34	T Rinaldi	Montauk, NY	11/09/90	P Falvey	Old Saybrook, CT	37	08/15/92
20	P Krueger	Atlantic Bch. Brdg., NY	07/22/92	C Bachmann	Atlantic Bch. Brdg., NY		08/15/92
25	D Reitz	Matunick, RI	06/17/92	C Troutman	Watch Hill, RI		08/15/92
32	B Perlman	Atlantic Bch., NY	11/18/90	J Codner	Cape Cod Bay, MA	34	08/15/92
29	W Edwards	Housatonic R., CT	05/26/90	P Clark	The Race, L.I. Sound	35	08/16/92
30	J Posh	Housatonic R., CT	07/27/90	G Mastrangelo	Housatonic R., CT	33	08/16/92
20	S Kennedy	Danvers, MA	08/22/90	E Richards	Salem, MA	25	08/16/92
17	J Karolides	Danvers, MA	06/17/92	S Matton	Beverly, MA	18	08/16/92
35	S Penta	Boston, MA	06/15/92	K Bearce	Cape Cod Canal, MA		08/16/92
18	R Lane	Oak Bluffs, MA	05/13/90	J Della Porta	Lynn, MA	25	08/17/92
21	D Kelly	Orient Point, NY	11/03/90	D Gittins	York River, ME	28	08/17/92
16	J Karolides	Danvers, MA	05/27/92	J Brindamour	Newburyport, MA	17	08/17/92
18	J Karolides	Danvers, MA	06/11/92	J Karolides	Danvers, MA	19	08/17/92
27	D Kelly	Orient Pt., NY	07/14/92	E Kingsley	Plum Gut, NY		08/18/92
30	R Canfield	Westport, CT	06/02/91	J LeBlanc Jr.	Darien, CT	34	08/18/92
25	J Anton	Sandy Hook, NJ	07/01/90	E Matt	Sandy Hook, NJ	29	08/19/92
17	W Matuszak	Gilgo Beach, NY	05/11/92	B Todd	Shinnecock Inlet, NY	19	08/19/92
20	J Della Porta	Deer Is., MA	05/29/92	C Parsons	Quincy Bay, MA		08/19/92
33	D Magnasco	Boston, MA	05/26/91	B Holmes	Boston, MA	34	08/20/92
21	D Kay	Taunton River, MA	09/21/90	D Fiola	Fall River, MA	31	08/20/92
26	W Matuszak	Gilgo Beach, NY	07/06/91	H Mayher	Moriches Inlet, Ny	34	08/20/92
21	D Magnasco	Boston, MA	06/12/92	W Keenan	Newburyport, MA	24	08/21/92
33	D Krantz	Hampton Bays, NY	11/05/91	K Muise	Nahant, MA	34	08/21/92
33	B Billerman	Newburyport, MA	06/02/92	R Buturlia	Newburyport, MA	33	08/22/92
24	A Poreda	Throgs Neck Brdg., NY	08/25/91	K Janousek	Throgs Neck Brdg., NY	28	08/22/92
18	T Marburger	Northport, NY	04/07/92	H Xenelis	Essex River, MA	20	08/23/92
22	R Rizzie	Croton, NY	04/26/87	T Kelley	Bath, ME	39	08/23/92
28	J Mettler	Fishers Is., NY	11/02/91	R Zieba	Merrimack R., MA		08/24/92
33	B Billerman	Newburyport, MA	06/29/92	R Currier Jr.	Merrimack R., MA	35	08/24/92

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
27	A Poreda	Throgs Neck Brdg., NY	08/25/91	L Colban	East Chester Bay, NY		08/24/92
24	J Foti	Ft. Wadsworth, NY	08/02/92	S Pisano	Verrazano Brdg., NY		08/24/92
26	P Krueger	Atlantic Bch. Brdg., NY	07/29/92	B Isser	Atlantic Bch. Brdg., NY	26	08/25/92
32	G Ministeri	Cape Cod Bay, MA	08/22/91	A Barboza	Nomans Is., MA		08/25/92
23	A LoCascio	Manhasset Bay, NY	10/12/91	F Cifarelli	Manhasset Bay, NY		08/25/92
30	A Anderson	Block Island, RI	10/05/90	J Chase	Fishers Is. Sound, CT	32	08/26/92
24	D Kelly	Orient Pt., NY	10/23/89	J Lomartra	Westbrook, CT	30	08/26/92
34	L Molnar	Shinnecock Inlet, NY	06/25/92	M Cingolani	Montauk Pt., NY	34	08/27/92
20	F Urban	Sandy Hook, NJ	06/14/91	R Madison	Tin Can Grounds, NY	25	08/27/92
24	T Rinaldi	Montauk, NY	11/07/91	D Pike	Phippsburg, ME	26	08/28/92
36	B Quick	Harvey Cedars, NJ	07/14/92	K Rives	Loveladies, NJ	37	08/29/92
23	P Krueger	Atlantic Bch. Brdg., NY	06/26/91	V Rossi	Long Beach, NY	26	08/30/92
23	J Foti	Verrazano Bridge, NY	07/03/92	S Festa	Verrazano Bridge, NY		08/30/92
32	R Allardice	Beverly, MA	08/14/91	D Hoffman	Beverly, MA		08/30/92
22	K Gleason	Darien, CT	08/05/91	D Feigherg	Stamford, CT	28	08/30/92
16	J Karolides	Danvers, MA	08/04/91	D Hoffman	Beverly, MA		08/30/92
29	T Ziobo	Bridgeport, CT	06/23/92	C Weyant	Latimer Light., CT		08/31/92
16	J Karolides	Danvers, MA	06/21/92	J Karolides	Beverly, MA	17	08/31/92

"Saturday, the fluking was so fast at Ambrose Channel that I actually ran away from the fish. I was too busy tagging and couldn't enjoy the fishing, as I was looking for the big fish. They

seemed to have disappeared, but signs for the future are great."

STUART FRIES, BROOKLYN, NY

28	K Sprankle	Outer Banks, NC	02/04/92	B Halsell	Tuckernuck Is., MA	33	08/31/92
33	R Krueger	Atlantic Beach, NY	05/30/90	G Keenan	Shinnecock Inlet, NY	36	09/01/92
20	J Della Porta	Mystic River, MA	11/14/90	S Logue	Boston, MA		09/01/92
20	J Karolides	Danvers, MA	08/25/92	D Ramsdell	Salem, MA	20	09/01/92
34	L Molnar	Shinnecock Inlet, NY	07/16/92	G Keenan	Shinnecock Inlet, NY	34	09/01/92
19	S Kellner	Orient Pt., NY	11/17/91	R Nystrom	Stratford, CT	22	09/01/92
23	T Rinaldi	Horton's Pt., NY	08/21/92	R Wellman	Horton's Pt., NY	23	09/02/92
34	B Shillingford	Cape May, NJ	11/08/91	J Groves	Orleans, MA	36	09/02/92
15	J Karolides	Danvers, MA	05/27/92	J Karolides	Danvers, MA	16	09/02/92
27	D Magnasco	Boston, MA	08/25/92	J Della Porta	Winthrop, MA	27	09/02/92
24	F Stunkel	Darien, CT	08/15/92	F Stunkel	Darien, CT	24	09/02/92
26	J Karolides	Danvers, MA	09/07/90	J Wyman	Sandwich, MA	31	09/02/92
33	J Caputo	W.L.I. Sound, NY	06/21/91	C Froatz	Dauids Is., NY		09/03/92
18	GM Hall	Reedy Pt., DE	07/22/92	R Oakes	Delaware City, DE		09/03/92
32	D Kelly	Orient Pt., NY	07/04/90	D Kelly	Orient Pt., NY	33	09/04/92
31	D Mann	Quick's Hole, MA	08/02/92	D Mann	Quick's Hole, MA	31	09/04/92
18	D Kay	Taunton River, MA	07/18/90	D Fiola	Fall River, MA	20	09/04/92
24	J Karolides	Danvers, MA	07/14/92	Unknown fisherman	Beverly, MA		09/05/92
21	J Karolides	Danvers, MA	05/25/92	Unknown fisherman	Mousam R., ME	24	09/05/92
30	A Baron	Housatonic R., CT	06/21/92	R Lacondrata	Stratford, CT		09/05/92
43	J Tucker	Orleans, MA	08/09/92	J Tucker	Nauset Beach, MA	43	09/05/92
24	A LoCascio	Manhasset Bay, NY	09/25/91	F Cifarelli	Manhasset Bay, NY		09/05/92
21	M Matula	Raritan R., NJ	06/01/91	M Habel	Keasbey, NJ	24	09/06/92
34	D Magnasco	Boston, MA	07/24/92	M Favale	Boston, MA	34	09/06/92
28	R Leja	Bridgeport, CT	07/08/89	M Moran	Bridgeport, CT	30	09/06/92
21	D Kelly	Orient Pt., NY	07/07/92	R Wellman	Mulford Pt., NY	22	09/06/92
21	F Casey	Boston, MA	05/01/92	N Chaput	Boston, MA	27	09/06/92
17	W Lemon	Jamaica Bay, NY	06/26/92	M Rivera	Rockaway, NY	21	09/07/92
	R Gray	Block Island, RI	10/13/91	R Tuveson	Ram's Island, MA	39	09/07/92
15	T Rinaldi	Horton's Pt., NY	05/29/92	N Spear	Stratford, CT	16	09/07/92
29	D Kelly	Orient Pt., NY	10/12/89	T Beebe	Plum Island, NY	36	09/07/92
39	A LoCascio	Hart Island, NY	05/28/92	R Jacobs	Orient Pt., NY	42	09/07/92
29	T Marburger	Shinnecock Inlet, NY	08/02/92	T Johnson	Shinnecock Inlet, NY		09/07/92
23	J Mettler	Fishers Island, NY	10/12/91	G Cairns	Plum Is., MA	27	09/08/92
33	D Kelly	Orient Pt., NY	07/08/92	M Catania	Orient Pt., NY		09/08/92
25	K Sprankle	Outer Banks, NC	02/04/92	M Abbott	Plymouth, MA	29	09/09/92
30	D Magnasco	Boston, MA	07/02/92	P Irwin	Boston, MA		09/10/92
21	T Hoagland	Popham Beach, ME	06/28/87	C Rivera	New York City, NY	38	09/10/92

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
15	J Karolides	Danvers, MA	07/20/92	J Grover	Salem, MA		09/10/92
36	A Anderson	Block Island, RI	06/24/92	W Sharshon	Offshr., Montauk, NY	37	09/11/92
17	D Partusch	Shrewsbury R., NJ	05/09/92	I Piorkowski	Oceanic Brgd., NJ	22	09/12/92
21	T Rinaldi	Horton's Pt., NY	07/25/92	P Dinizio	Plum Island, NY		09/12/92
30	F Stunkel	Stamford, CT	11/18/91	D Scheffler	Chatham, MA	30	09/12/92
10	M Aiken	Milford, CT	08/28/92	M Ferrari	Housatonic R., CT		09/12/92
16	J Karolides	Danvers, MA	08/13/92	R Belanger	Danvers R., MA	16	09/12/92
18	S Penta	Boston Harbor, MA	09/13/91	C Payne	Boston, MA	20	09/13/92
19	S Carlsen	Natco Lake, NJ	09/26/91	P Triolo	Union Ave. Creek, NJ	24	09/13/92
16	S Carlsen	Natco Lake, NJ	09/29/91	P Triolo	Union Ave. Creek, NJ	22	09/13/92
24	B Billerman	Sandy Hook, NJ	11/20/91	W Lewis	Barnstable, MA		09/13/92
20	J Della Porta	Boston, MA	01/03/90	S Logue	Boston, MA		09/13/92
21	J Karolides	Danvers, MA	05/28/92	K Hatch	Danvers, MA	23	09/14/92
19	S Kellner	Matituck, NY	06/21/91	A Fogal	Plum Gut, NY	26	09/15/92
21	G D'Amato	Stratford, CT	07/23/90	CT D.E.P.	Milford, CT	28	09/15/92
19	M Chapin	Eastham, MA	05/20/92	G Smith	Kennebec R., ME	19	09/15/92
20	T Marburger	Northport, NY	02/09/92	M Lewchik	Griswold Pt., CT	23	09/15/92
24	K Sprankle	Outer Banks, NC	01/26/91	J Lassahn	Kent Pt., MD		09/15/92

"We had a 40 pounder on 11/2. Sorry no tag, the guy with me is going to mount it. We could tag it on the wall though. Ha! Ha!"

FRANK HEAL, STATEN ISLAND, NY

"A superb summer, caught 355 bluefish all released for another day."

JOHN HARDY, NANTUCKET, MA

"Caught a 14" weak on shrimp then caught a \$250 rod and reel, lost 10 minutes earlier on a larger weak. Very lucky."

CAPT. BRUCE HROBAK,
BARNEGAT BAY, NJ

17	S Gross	City Island, NY	10/25/91	J Leonard	Stamford, CT	23	09/15/92
12	J Kenny	Merrimack R., MA	06/22/90	G Avadanian	Merrimack R., MA	22	09/15/92
23	E Adams	Sea Bright, NJ	07/05/92	Unknown Fisherman	Sandy Hook, NJ	24	09/15/92
24	P Licis	Newport, RI	09/14/91	W Anderson	Westerly, RI	27	09/15/92
23	F Stunkel	Stamford, CT	10/12/91	S Durkee	Stratford, CT		09/15/92
23	J Foti	Ft. Wadsworth, NY	08/02/92	P Mareno	Verrazano Bridge, NY	26	09/15/92
24	D Mann	Quick's Hole, MA	08/02/92	P DeGrassie	Dartmouth, MA	24	09/16/92
28	F Heal	Staten Island, NY	08/17/92	G Cavasin	Old Orchard Lt., NY		09/16/92
17	S Radossi	Liberty State Park, NJ	11/24/91	R Kowalski	Statue of Liberty, NY	21	09/16/92
37	J Dotsey	Tobay Beach, NY	11/04/91	S Witthuhn	Montauk Pt., NY	39	09/16/92
18	J Della Porta	Mystic River, MA	05/18/91	A Arcabascio	Verrazano Bridge, NY		09/16/92
26	A LoCascio	Manhasset Bay, NY	10/13/91	D Effertz	Manhasset Bay, NY	26	09/16/92
28	D DiMaio	Winthrop, MA	08/07/92	R Williams Jr.	Barnstable, MA		09/16/92
22	J Foti	Ft. Wadsworth, NY	08/02/92	J Gillis	Tappan Zee Brgd., NY	22	09/17/92
20	F Stunkel	Darien, CT	08/04/92	F Stunkel	Darien, CT	21	09/18/92
18	D Kay	Taunton River, MA	11/24/90	R Medeiros	Swansea, MA	24	09/18/92
20	M Munro	Waterford, CT	05/23/91	R Schulte	Newport, RI	24	09/19/92
33	D DiMaio	Winthrop, MA	07/24/92	N LaBonte	Saugus R., MA	34	09/20/92
35	S Sinclair	Sakonnet Point, RI	08/18/91	J Little	Little Compton, RI	42	09/20/92
29	J Della Porta	Winthrop, MA	09/26/91	T Emmith	Boston, MA	31	09/20/92
25	J Hodnicky	Sandy Hook, NJ	10/20/90	A Berdan	Sandy Hook, NJ	31	09/21/92
24	M Romano	Kill Van Kull, NY	07/26/92	D Dolan	Bayonne, NJ	25	09/22/92
30	F Casey	Boston, MA	06/12/92	F Flaherty	Boston, MA	34	09/22/92
32	F Stunkel	Darien, CT	06/05/92	F Stunkel	Darien, CT	34	09/22/92
21	J Karolides	Danvers, MA	09/12/91	A D'Onofrio	Deal, NJ	25	09/23/92
21	J Karolides	Danvers, MA	10/12/91	B Ivey	Danvers, MA	23	09/23/92
24	D Kocher	Boston Harbor, MA	06/23/91	J Columbo	Boston, MA		09/24/92
28	K Sprankle	Outer Banks, NC	01/28/91	G Perschino	Norwalk, CT		09/24/92
26	C Pierce	Great Egg Harbor R., NJ	07/22/92	C Ingersoll	Great Egg Harbor R., NJ		09/24/92
20	J Karolides	Danvers, MA	06/20/92	J Lomasney	Beverly, MA		09/25/92
16	J Karolides	Danvers, MA	06/23/92	S MacAllister	Revere, MA	19	09/25/92
20	S Kellner	Orient Pt., NY	11/16/91	R Shanley	Branford, CT	22	09/25/92
34	A Bendersky	Fire Island, NY	06/13/92	G Stein	Fire Island, NY	36	09/25/92
18	J Karolides	Danvers, MA	05/23/92	S Penta	Boston, MA	20	09/26/92
32	J Karolides	Danvers, MA	05/22/92	R McKinley	Beverly, MA	33	09/27/92

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
17	P Governale	Moriches Bay, NY	07/12/92	V Magnus	Pt. Lookout, NY		09/27/92
10	M Aiken	Milford, CT	08/28/92	M Aiken	Milford, CT	12	09/27/92
11	T Lake	New Hamburg, NY	09/16/92	E Robles	Liberty State Pk, NJ		09/27/92
12	M Aiken	Milford, CT	08/29/92	M Aiken	Milford, CT	14	09/27/92
29	J Mester	Staten Island, BY	06/24/91	A Arcabascio	Old Orchard Lt., NY	29	09/28/92
34	L Molnar	Shinnecock Inlet, NY	06/22/92	D Krolikowski	Moriches Inlet, NY	37	09/28/92
27	J Sullivan	Newburyport, MA	07/05/91	G Kenney	Cape Cod Canal, MA	33	09/29/92
16	J Karolides	Danvers, MA	06/04/92	C Batdorf	Beverly, MA	18	09/29/92
26	K Sprankle	Outer Banks, NC	02/04/92	R Hieatzman	Ches. Bay Bdg. Tn., VA	24	10/01/92
24	D Kay	Somerset, MA	11/02/91	J Daucette	Taunton R., MA	26	10/01/92
19	F Casey	Boston, MA	05/04/92	J Columbo	Boston, MA	21	10/01/92
28	T Rinaldi	Mulford Pt., NY	09/18/92	J Tuthill	Orient Pt., NY		10/01/92
36	R Fink	Rockaway Pt., NY	05/24/92	R Wasnewski	Cape Cod Canal, MA	37	10/01/92
24	R Anderson Jr.	Fire Is. Inlet, NY	07/03/92	R Muller	Ellis Island, NY		10/01/92
15	D Kay	Taunton River, MA	07/31/90	A Balan	Swansea, MA	21	10/02/92
15	J Karolides	Danvers, MA	08/13/92	J Karolides	Danvers, MA	15	10/02/92
26	K Sprankle	Outer Banks, NC	01/26/91	R Cole	Kent Is., MD	28	10/03/92
20	A Walker	Shrewsbury River, NJ	05/20/92	D Partusch	Shrewsbury R., NJ	22	10/03/92
34	L Molnar	Shinnecock Inlet, NY	06/29/92	D Baldwin	Moriches Inlet, NY	35	10/03/92
23	R Leja	Fairfield, CT	05/18/86	D Marcin	Ram Island, CT	35	10/04/92
18	F Norton	Island Beach St. Pk., NJ	11/22/90	R Carlson Jr.	Charlestown, RI	24	10/04/92
42	G Dulka	Ches. Bay Bdg. Tn., VA	01/12/92	G Wood	Middletown, RI	44	10/04/92
21	J Della Porta	Mystic River, MA	04/08/91	N Chaput	Boston, MA	28	10/04/92
18	J Della Porta	Boston, MA	01/28/90	S Logue	Boston, MA		10/05/92
19	G Lundquist	Chatham, MA	06/30/92	D Lopes	Dennis, MA	22	10/05/92
32	F Stunkel	Darien, CT	07/04/92	S Yarish	Darien, CT	33	10/06/92
25	K Sprankle	Outer Banks, NC	02/04/92	P Folan	Chesapeake Bay, MD	27	10/07/92
19	M Romano	Kill Van Kull, NY	08/14/92	V Squitieri	Kill Van Kull, NY		10/07/92
36	R Allardice	Manchester, MA	08/25/91	D Boerem	Montauk, NY	37	10/07/92
28	D Kelly	Orient Pt., NY	10/13/89	J Lukowski	Moriches Inlet, NY	33	10/07/92
27	K Sprankle	Outer Banks, NC	02/03/92	E Helm	Cove Pt., MD	30	10/07/92
19	GS Gray	Charlestown, RI	11/03/90	R Turner Jr.	Tiverton, RI	19	10/07/92
17	G Kerkhan	Sandy Hook, NJ	10/26/91	M Habel	Keasbey, NJ	21	10/07/92
33	D Wells	Stratford, CT	06/22/90	L O'Brien	Stratford, CT		10/08/92
31	R Anderson	Westbrook, CT	08/15/91	J Plodzki	Westbrook, CT	34	10/08/92
27	H Fisher	North East R., MD	04/15/92	C Ubaldo	Pooles Is., MD	27	10/08/92
24	R Leja	Bridgeport, CT	05/29/91	A Paine	Bridgeport, CT		10/08/92
13	M Keegan	Montville, CT	06/01/89	A Dangelo	Waich Hill, RI	25	10/08/92
20	M Christiansen	Ocean City, NJ	09/06/90	M Christiansen	Ocean City, NJ	26	10/09/92
18	T Marburger	Northport, NY	04/23/92	D Tretter	Niantic, CT	22	10/09/92
28	K Sprankle	Outer Banks, NC	02/04/92	R Hime	Chesapeake Bay, MD	29	10/09/92
13	M Aiken	Milford, CT	08/28/92	R Steinfeld	Stratford, CT	16	10/09/92
19	J Karolides	Danvers, MA	06/08/92	R Torsney	Boston, MA		10/09/92
26	K Sprankle	Outer Banks, NC	02/04/92	C Keener	Montauk Pt., NY		10/10/92
16	J Gibbons	Sandy Hook, NJ	07/31/91	C Igneri	Great Kills, NY	21	10/10/92
19	A Anderson	Charlestown, RI	10/20/92	H Parsons	Fishers Is., NY		10/11/92
33	S Sylver	Cape Cod Bay, MA	06/30/91	R Kehlenbach	The Race, L.I. Sound	36	10/11/92
10	M Aiken	Milford, CT	09/01/92	J Pivarnick	Housatonic R., CT	12	10/11/92
22	R Leja	Bridgeport, CT	05/28/90	P Novicki	Guilford, CT	32	10/11/92
11	M Romano	Kill Van Kull, NY	10/07/92	M Armstrong	Kill Van Kull, NY	11	10/11/92
28	D Mann	Quick's Hole, MA	08/02/92	J Aylward	Cuttyhunk, MA	32	10/12/92
16	D Rahn	Hampton R., NH	09/12/92	M Wheeler	Merrimack R., MA		10/12/92
30	C Wendel	Martha's Vineyard, MA	05/22/92	A DeRosa	Martha's Vineyard, MA		10/13/92
19	R Comellas	Moriches Inlet, NY	09/27/91	B Conklin	Moriches Inlet, NY	24	10/13/92
16	T Marburger	Northport, NY	04/23/92	A Malgieri	Bristol, RI	18	10/13/92
22	C Payne	Boston, MA	08/11/92	S Penta	Boston, MA	22	10/14/92
17	K Black	Merrimack R., MA	07/27/91	G Allen	Portsmouth, RI	20	10/14/92
19	J Della Porta	Swampscott, MA	10/01/89	A Dangelo	Waich Hill, RI	25	10/14/92
24	C Bassano	Nantucket, MA	06/24/92	S Gierer	Montauk Pt., NY		10/15/92
25	S Malkiewicz	Barneget Lt., NJ	11/17/90	T Parisi	Cape May, NJ	27	10/15/92
25	K Sprankle	Outer Banks, NC	01/27/91	J Grauer	Worton Pt., MD	27	10/15/92
39	A Anderson	Block Island, RI	11/08/91	P Gatta	Block Island, RI		10/16/92
19	G Kerkhan	Provincetown, MA	10/14/92	R Granfield	Nauset Beach, MA	20	10/16/92
27	B Billerman	Newburyport, MA	08/16/91	P Goodwin	Plum Island, MA	31	10/17/92

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
26	GS Gray	Charlestown, RI	10/16/92	M Reynolds	The Race, L.I. Sound		10/17/92
26	K Muisse	Boston, MA	06/21/92	T Comstock	Watch Hill, RI		10/17/92
24	A Anderson	Quonochontaug, RI	10/16/92	T Duckworth	Quonochontaug, RI	26	10/17/92
22	S Giaccone	Throgs Neck Brdg., NY	04/21/92	M Schardt	Chatham, MA	25	10/17/92
17	B Billerman	Newburyport, Ma	06/21/91	J Rovinski	Pt. Judith, RI	24	10/18/92
20	R Kyker	Northwalk, CT	08/01/92	J Turechek Jr.	Milford, CT	23	10/18/92
15	T Marburger	Northport, NY	05/03/92	A Baruffa	Groton, CT	21	10/18/92
24	F Casey	Boston, MA	10/06/92	J Columbo	Boston, MA		10/20/92
28	D Goodwin	Indian R. Inlet, DE	10/04/92	J Marchman	Indian R. Inlet, DE	28	10/20/92
22	T Marburger	Northport, NY	04/28/92	A Dangelo	Charlestown, RI	24	10/21/92
21	J Mester	Staten Island, NY	11/01/90	L Toth	Raritan Bay, NJ	27	10/21/92
21	R Pearson Jr.	Breezy Pt., NY	10/20/92	E McDonald	Breezy Pt., NY		10/21/92
20	S Penta	Boston, MA	10/04/92	D Fetig	Nauset Beach, MA		10/21/92
18	K Black	Merrimack R., MA	06/17/92	D Fetig	Nauset Beach, MA		10/21/92
24	B Shillingford	Corson's Inlet, NJ	10/09/92	E Rutecki	Corson's Inlet, NJ	24	10/21/92
24	J Halligan	Sandy Hook, NJ	07/08/92	J Sullivan	Sandy Hook, NJ	25	10/23/92
22	R Robertson	Cuttyhunk, MA	08/09/92	C Fellows	Fishers Is. Sound, CT	24	10/22/92
26	K Gleason	Stamford, CT	10/07/89	F Stunkel	Darien, CT	29	10/22/92
38	G Ministeri	Cape Cod Bay, MA	08/11/91	R Chew	Gr. Egg Hbr. Inlet, NJ	38	10/22/92
35	A Dangelo	Block Island, RI	05/30/91	J Messina	Fire Is. Inlet, NY		10/23/92
34	A Gumbus	Milford, CT	08/31/87	C Ambrogio	Stratford, CT	42	10/23/92
21	R Grobarz	Sandy Hook, NJ	09/02/92	R Peterson	Sandy Hook, NJ	23	10/23/92
39	T Sledzik	Stonington, CT	06/15/92	T Cunningham	Moriches Inlet, NY	40	10/23/92
19	H Bergere	Stratford, CT	07/28/92	J Jones	Stratford, CT	26	10/23/92
24	K Sprinkle	Outer Banks, NC	01/26/91	R Mosko	Patapsco R., MD	27	10/25/92
22	J Kane	Kennebec R., ME	09/24/92	J Carroll	Cape Cod Canal, MA	25	10/25/92
17	C Olsen	Hingham, MA	06/07/90	J Columbo	Cape Cod Canal, MA	31	10/25/92
17	GS Gray	Charlestown, RI	06/11/91	J Diange	Montauk, NY	25	10/25/92
24	G Ministeri	Wellfleet, MA	05/30/92	K Kuykendall	Cape Cod Canal, MA	26	10/27/92
18	J Karolides	Danvers, MA	09/30/91	B Miller	Atlantic Beach, NY	24	10/27/92
20	R Grobarz	Sea Bright, NJ	11/03/91	P Rijo	Green Pt. Pier, NY	26	10/27/92
21	S Kellner	Mattituck, NY	07/02/91	G Stratton	Niantic, CT		10/29/92
22	J Gervascio	Niantic, CT	05/26/92	R Luce	E. of Nantucket Is., MA		10/29/92
35	W Matuszak	Gilgo Beach, NY	08/17/90	H Einselen	Barnegat Inlet, NJ	35	10/30/92
21	R Templeton	Charlestown, RI	09/27/92	P Nugent	Mt. Sinai, NY		10/30/92
36	A Dangelo	Block Island, RI	05/30/91	W Arnold	Fire Island, NY	37	10/31/92
31	K Sprinkle	Outer Banks, NC	02/03/92	S Maines	Little Egg Inlet, NJ	36	10/31/92
24	G Dulka	Ches. Bay Bdg. Tn., VA	11/11/92	J Taylor	New Pt. Light, VA		11/01/92
34	P Grippo	Jones Inlet, NY	10/22/92	J Buser	Fire Is. Inlet, NY	34	11/01/92
24	C Edwards	Fishers Island, NY	08/27/91	G Bucholz	Riverhead, NY		11/01/92
08	M Aiken	Milford, CT	08/26/92	J Turechek Jr.	Milford, CT	10	11/01/92
17	K Black	Merrimack R., MA	08/07/92	D Carlisle	Narragansett, RI		11/01/92
15	J Della Porta	Boston, MA	11/10/89	M Lewchik	Old Lyme, CT	25	11/02/92
22	B Billerman	Sandy Hook, NJ	11/19/91	K Moschitta	Montauk Pt., NY	25	11/02/92
32	F Stunkel	Darien, CT	08/05/92	G Shonning	Darien, CT	32	11/02/92
19	D Kelly	Orient Pt., NY	10/28/92	D Rogers Sr.	Orient Pt., NY		11/04/92
25	D DiMaio	Winthrop, MA	07/25/92	A Hendrick	Plum Is., NY	28	11/04/92
20	A Poreda	Little Neck Bay, NY	09/29/91	D Rogers Sr.	Orient Pt., NY		11/04/92
28	N Jalbert	Narragansett, RI	07/18/92	D Rogers Sr.	Orient Pt., NY		11/04/92
18	K Black	Merrimack R., MA	07/18/92	P Cardi	Port Jefferson, NY		11/06/92
25	D Kay	Somerset, MA	08/03/91	A Balan	Swansea, MA	25	11/06/92
18	T Marburger	Northport, NY	02/25/92	C Stevens	Riverhead, NY	20	11/07/92
24	G Hall	Susquehanna Flats, MD	04/11/92	P Davidson	Chesapeake Bay, MD	24	11/07/92
26	K Sprinkle	Outer Banks, NC	02/04/92	A Michaelson	Montauk Pt., NY	27	11/07/92
30	C Jalbert	Bonnett Shores, RI	07/11/92	J Bitler	Little Egg Inlet, NJ	35	11/08/92
23	D Kelly	Orient Pt., NY	10/12/92	J Harrison	Montauk, NY		11/08/92
23	D Kelly	Orient Pt., NY	11/09/88	F Adams	Sandy Hook, NJ	30	11/09/92
23	P Krueger	Atlantic Bch. Brdg., NY	07/29/92	C DeCrescenzo	Romer Shoal, NJ		11/11/92
29	D Kelly	Orient Pt., NY	06/16/92	R Helms	Cape May, NJ		11/12/92
19	S Sturgeon	Brewster, MA	05/29/91	R Perlow	Shinnecock, NY		11/12/92
16	J Kling	Gay Head, MA	10/17/92	C Shanahan	Millstone Pt., CT		11/12/92
35	K Lockwood	Valient Rock, CT	05/25/91	G Hackett III	Fire Island, NY	38	11/12/92
27	P Donahue	Cape Cod Canal, MA	08/30/92	B Torry	Raritan Bay, NJ	28	11/12/92
16	J Karolides	Danvers, MA	06/09/92	A Dangelo	Pt. Judith, RI	20	11/12/92

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
	W Hraska	Throgs Neck Bridge, NY	06/23/92	R Montague	Keansburg, NJ	30	11/13/92
34	B Dymarcik, Jr.	Stratford, CT	06/10/91	D Schmidt	Moriches Inlet, NY	35	11/13/92
23	S Kellner	Southold, NY	05/24/92	B Ricca	Montauk, NY	26	11/14/92
24	A Anderson	Charlestown, RI	09/26/92	L Sisco	Montauk, NY	26	11/14/92
31	F Jessup	Shinnecock Inlet, NY	11/15/91	R Young	Shinnecock Inlet, NY		11/15/92
24	A Formisco	New Rochelle, NY	06/25/92	H Leemann	Ellis Is., NY	23	11/15/92
33	R Granfield	Nauset Beach, MA	05/28/92	S Buzzetta	Offshr., Jones Inlet, NY	38	11/15/92
19	J Mettler	Fishers Island, NY	10/15/91	N.Y.S.D.E.C.	Southampton, NY	20	11/16/92
20	M Aiken	Milford, CT	09/28/92	T McArthur	Centre Is. reef, L.I. Sound		11/16/92
16	J Karolides	Danvers, MA	09/11/92	D Rogers Sr.	Orient Pt., NY		11/17/92
24	M Mucha	Greenwich Cove, CT	05/12/91	W Yackel	Montauk, NY	27	11/17/92
22	A Dangelo	Watch Hill, RI	10/29/92	D Rogers Sr.	Orient Pt., NY		11/17/92
20	R Comellas	Orient Pt., NY	11/12/92	D Rogers Sr.	Orient Pt., NY		11/17/92
19	P Governale	Moriches Bay, NY	07/12/92	N Savene	Atlantic Beach, NY		11/18/92
30	D Sowerby	York Beach, ME	09/03/92	F/V Showboat	Martha's Vineyard, MA	31	11/18/92
30	A Anderson	Block Island, RI	10/20/90	L Sisco	Montauk, NY	32	11/19/92
36	GS Gray	Charlestown, RI	10/17/92	H Laub	Plum Gut, NY	36	11/20/92
20	F Stunkel	Stamford, CT	10/26/92	H Leemann	Governors Is., NY	21	11/20/92
21	S Penta	Boston, MA	08/12/92	Unknown fisherman	Shoreham, NY		11/20/92
32	N Anello	Stony Brook, NY	07/07/89	F Signorelli	Tobay Beach, NY		11/20/92
23	S Kellner	Mattituck, NY	09/04/92	B Koliner	Fire Island Inlet, NY		11/20/92
19	O Van Helmond	Smithtown, NY	09/12/90	J Kaminsky	Mattituck, NY	25	11/20/92
	A Fette	South Kingstown, RI	10/17/92	T Rintala	South Kingstown, RI	29	11/21/92
23	T Rinaldi	Mattituck, NY	11/05/92	J Kaminsky	Mattituck, NY	23	11/21/92
16	K Black	Merrimack River, MA	05/26/91	J Brown	Noank, CT	20	11/22/92
33	T Marburger	Montauk, NY	10/08/92	C Shreaves	Great Bay, NJ	33	11/22/92
23	J Karolides	Danvers, MA	09/10/91	B Cotiaux	Gardiners Is., NY	25	11/22/92
23	B Bottino	Deal, NJ	07/06/88	F Adams	Sandy Hook, NJ		11/23/92
20	T Marburger	Northport, NY	04/12/92	J Wiacek	Eatons Neck, NY	24	11/23/92
16	J Calamia	Astoria, NY	11/17/92	R Anastasio	Astoria, NY		11/24/92
17	G D'Amato	Bridgeport, CT	04/06/92	R Hentschel	Huntington, NY	21	11/24/92
22	T Rinaldi	Montauk, NY	11/01/92	B Heggen	Sandy Hook Pt., NJ	25	11/25/92
20	G Cook Jr.	Allenhurst, NJ	11/18/90	M Stillwagon	Cape May, NJ	22	11/25/92
21	GS Gray	Charlestown, RI	05/25/91	N.Y.S.D.E.C.	Hudson River, NY	24	11/25/92
24	W Anderson	Provincetown, MA	10/07/92	B Wixson	Shinnecock Inlet, NY		11/27/92
22	P Krueger	Atlantic Bch. Brgd., NY	06/12/91	F Maltese	Tuckerton, NJ	27	11/27/92
22	S Kellner	Orient Pt., NY	11/14/92	J Kaminsky	Off Mattituck Inlet, NY	23	11/28/92
37	R Grobarz	Montauk Pt., NY	10/10/92	J Stech Jr.	Deltaville, VA	37	11/29/92
31	D Brierley	E. Dennis, MA	08/28/92	C Hall	Ches. Bay Bdg. Tn., VA	32	11/29/92
26	K Sprankle	Outer Banks, NC	02/04/92	R Peele	Ches. Bay Bdg. Tn., VA	26	11/30/92
20	D Magnasco	Boston, MA	10/18/92	F Marco	Montauk Pt., NY		11/30/92
21	D Dixon	Rappahannock R., VA	05/07/92	A Thrift	Remlik, VA	21	11/30/92
21	G Cardel	Lloyd Neck, NY	10/18/91	J Kaminsky	Off Mattituck Inlet, NY	23	12/01/92
20	S Penta	Boston, MA	08/18/92	J Kaminsky	Off Mattituck Inlet, NY	22	12/01/92
18	A Schweithelm	Northport, NY	11/29/92	R Doyle Jr.	Hempstead, NY	18	12/01/92
28	A Anderson	Charlestown, RI	11/09/91	C Bailey	Montauk Pt., NY	29	12/01/92
42	A Anderson	Charlestown, RI	11/09/91	P Eppinger	Raritan Bay, NJ		12/01/92
24	K Sprankle	Outer Banks, NC	02/04/92	B Sedel	Ches. Bay Bdg. Tn., VA	24	12/01/92
16	M Aiken	Milford, CT	09/26/92	R Doyle Jr.	Hempstead, NY	17	12/02/92
27	A Dangelo	Watch Hill, RI	10/14/92	T Tyrrell	Strathmere, NJ	29	12/03/92
27	A D'Amato	Cape May, NJ	12/02/92	F Pecikonis	Wildwood, NJ	28	12/04/92
14	S Penta	Boston, MA	10/08/92	E Gonzalez	Thames River, CT	17	12/05/92
20	J Karolides	Danvers, MA	09/28/92	R Odell	Ship Bottom, NJ		12/05/92
22	B Cotiaux	Gardiners Bay, NY	10/29/92	M Saraco	Rockaway, NY		12/06/92
36	J Dotsey	Jones Beach, NY	10/27/92	F/V Rita Diane	Ocean City, MD		12/07/92
18	J Kane Jr.	Saco, ME	09/18/92	J Lentoni	Breezy Pt., NY	18	12/07/92
21	P Grippo	Haunts Creek, NY	08/08/90	J Golemi	Breezy Pt., NY		12/07/92
28	S Penta	Boston, MA	08/29/92	F/V Lady Joy	Ocean City, MD	28	12/08/92
28	J Kane Jr.	Delaware R., NJ	06/18/92	J Kacergis	Ches. By Brg. Tun., VA		12/08/92
40	A Anderson	Block Is., RI	10/29/92	R Lang	Ocean City, NJ	42	12/09/92
25	K Sprankle	Outer Banks, NC	01/27/91	R Cahoon	Elizabeth R., VA	27	12/12/92
25	D Dixon	York River, VA	11/29/92	V.I.M.S.	York River, VA	27	12/12/92
18	A LoCascio	Manhasset Bay, NY	10/13/91	J Manette	Pawcatuck R., RI		12/13/92
33	D Goldberg	Long Beach, NY	11/01/91	F/V Tony & Jan	MD & VA border	34	12/21/92

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
18	J Karolides	Danvers, MA	09/21/91	T Hoden	Bridgeport, CT		01/01/93
24	K Sprinkle	Outer Banks, NC	02/04/92	J Heffernan	1/2 mi. s VA/NC brdr	28	01/03/93
17	J Karolides	Danvers, MA	06/15/92	M Napolitano	Northport, NY	18	01/04/93
22	T Tully	Eatons Neck, NY	11/08/90	J Weller	Matapeake, MD	28	01/11/93
21	T Rinaldi	Montauk Point, NY	10/04/90	B Lowery	Sharps Is. Light, MD		01/19/93
22	R Hartmann	Eaton's Neck, NY	06/27/92	A Lombardo	Northport, NY	24	01/25/93
15	T Marburger	Northport, NY	03/10/92	J Brady	Northport, NY	19	01/26/93
27	T Marburger	Northport, NY	01/10/93	H Cowen	Northport, NY		02/14/93
23	K Sprinkle	Outer Banks, NC	01/27/91	R Grimes	Potomac R., VA	25	02/20/93
34	C Wendel	Martha's Vineyard, MA	05/23/92	F/V Atlantic Dawn	Ocean City, MD	35	02/26/93
22	S Penta	Boston, MA	09/06/92	J Yingling	Fenwick Is., DE		03/02/93
23	N DelPrato	Boston, MA	06/07/92	E Soares	Winthrop, MA	25	03/06/93
31	R Anderson	Plum Island, NY	06/08/91	B Eunice	Annapolis, MD		03/12/93
19	M McNerny	Cold Spring, NY	10/25/90	J Locascio	Northport, NY	25	03/15/93
20	D Dixon	York R., VA	11/29/92	W West Jr.	York R., VA		03/17/93
18	T Rinaldi	Horton's Point, NY	05/30/92	W West Jr.	York R., VA		03/17/93
22	T Tully	Eatons Neck, NY	11/21/90	R Grandinetti	Northport, NY	29	03/20/93
22	J Anderson	South Shore, RI	08/13/92	T Baum	Delaware Bay, NJ	23	03/23/93
19	F Danylczuk	Pt. Jefferson, NY	05/01/92	T Baum	Delaware Bay, NJ	20	03/25/93
20	B Messinger	Narragansett Bay, RI	05/14/92	T Baum	Delaware Bay, NJ	21	03/25/93
22	D Dixon	Rappahannock R., VA	04/23/92	R Brown	Rappahannock R., VA		03/25/93
20	D Beshara	Merrimack River, MA	07/05/91	J Boon	Adler Cove, NJ		03/27/93
	J Matier	Jamaica Bay, NY	10/07/92	T Baum	Delaware Bay, NJ	21	03/30/93
32	P Bombino	Sheepshead Bay, NY	06/14/92	D Jenkins	York River, VA		04/05/93
13	J Karolides	Danvers, MA	06/03/92	D Stratton	Norwich, CT		04/06/93
23	J Banas	Sandy Hook, NJ	11/10/92	T Baum	Delaware Bay, NJ	23	04/08/93
19	T Marburger	Northport, NY	04/06/93	A Campbell	Northport, NY		04/09/93
21	G O'Driscoll	Strathmere, NJ	10/24/92	B Cross	Delaware Bay, NJ	21	04/10/93
18	J Karolides	Danvers, MA	05/29/92	G Miller	Uncasville, CT	20	04/10/93
15	G Ottavio	Cape May, NJ	09/20/92	T Sopko	Delaware R., NJ	17	04/11/93
26	D Kay	Somerset, MA	08/03/91	M Enos	Taunton, MA	32	04/14/93
19	W Kobel Jr.	Northport, NY	02/22/93	K Frigenti	Northport, NY		04/16/93
22	P Krueger	Far Rockaway, NY	11/22/91	T Baum	Brigantine, NJ	26	04/18/93
18	D Kay	Taunton River, MA	07/11/91	R Osborne	Swansea, MA	22	04/18/93
25	G Hall	Susquehanna Flats, MD	04/15/92	C Peterson	Susquehanna Flats, MD	26	04/18/93
22	M Habel	Perth Amboy, NJ	10/23/91	T Lake	Tappan Zee Bldg., NY	24	04/20/93
16	M Matula	Arthur Kill, NY	09/29/90	S Lovkis	Bayonne Bridge, NJ	22	04/20/93
16	T Rinaldi	Mattituck, NY	11/25/92	B Kobel	Northport, NY	16	04/21/93
25	J Brotz Jr.	Plum Island, MA	08/16/92	F Kriegsmann	Beach Haven, NJ	28	04/21/93
23	T Rinaldi	Horton's Point, NY	06/02/92	F McNally	Augustine Beach, DE	27	04/21/93
22	F Casey	Boston, MA	09/27/92	J Della Porta	Mystic River, MA	21	04/21/93
20	D Goodwin	Indian R. Inlet, DE	10/03/92	D Thomas	North East, MD	20	04/22/93
15	B Billerman	Newburyport, MA	07/02/91	E Feldman Jr.	Mystic Is., NJ	18	04/22/93
22	F Stunkel	Stamford, CT	11/24/92	R Bigler	College Pt., NY	23	04/24/93
23	T Rinaldi	Horton's Pt. NY	06/16/92	J Mylod	2 mi. s of Pkeepsie, NY		04/24/93
18	D Kay	Taunton River, MA	07/29/90	J Mansfield	Dighton, MA	30	04/24/93
24	D Kay	Taunton River, MA	10/21/90	S Ferris	Taunton, MA	34	04/25/93
17	K Black	Merrimack R., MA	09/06/92	W Meadows	Mohgn/Pequot Br., CT	18	04/25/93
22	E Phillips	Jamaica Bay, NY	10/01/89	M Garcia	Hudson River, NY	48	04/26/93
16	R Wellman	Mulford Pt., NY	09/28/92	G Alfonso	Elizabeth, NJ		04/28/93
22	A Schweithelm	Fort Salonga, NY	04/17/93	T Marburger	Northport, NY	22	04/29/93
30	T Marburger	Shinnecock Inlet, NY	07/14/92	F Kriegsmann	Beach Haven, NJ	31	05/01/93
21	T Rinaldi	Mattituck, NY	07/15/91	L Ceckowski	Roanoke Beach, NY		05/01/93
37	B Hoagland	Egg Harbor R., NJ	04/28/92	B Hoagland	Egg Harbor R., NJ	39	05/01/93
17	J Karolides	Danvers River, MA	05/25/91	H Cano	Jersey City, NJ	18	05/01/93
14	W Anderson	Provincetown, MA	05/29/92	T Sledzik	Thames R., CT	16	05/01/93
29	C Pumphrey	Great Egg Inlet, NJ	11/18/92	A Mangold	Egg Harbor R., NJ		05/01/93
28	F Tellefsen	Lower NY Bay	10/27/92	J Novello	Princess Bay, NY	29	05/02/93
31	G Kerhan	Sea Bright, NJ	06/12/92	D Reynolds	Nwbrgh/Bcon Br., NY	32	05/02/93
10	C Pierce	Great Egg Hrbr R., NJ	07/05/92	J Caccioppoli	Great Egg Hrbr R., NJ	13	05/02/93
13	M Matula	Raritan River, NJ	07/27/91	M Habel	Keasby, NJ	18	05/04/93
37	R Wellman	Montauk Pt., NY	10/09/92	H Pratt	Aberdeen Prvg Gr., MD	39	05/04/93
16	D Kay	Swansea, MA	05/05/90	A Peruzza	N. of Bay Bridge, MD	26	05/05/93
24	R Lane	Vineyard Haven, MA	05/12/92	J Klaszky	Cape May Rips, NJ	24	05/05/93

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
17	J Karolides	Danvers, MA	07/20/92	G Somers	Union Beach, NJ	18	05/06/93
18	P Rothe	Sea Bright, NJ	07/27/90	R Allen	Tinton Falls, NJ	25	05/06/93
24	D Kelly	Orient Pt., NY	09/12/92	J McCarthy	Saugerties, NY		05/08/93
18	D Kay	Taunton River, MA	10/25/90	T Souza	Somerset, MA	26	05/08/93
21	K Lohraff	Sandy Hook Bay, NJ	10/13/91	H Clougher	Sea Bright Bridge, NJ	25	05/11/93
20	J Della Porta	Swampscott, MA	06/17/91	H Clougher	Sea Bright Bridge, NJ	25	05/12/93
22	M Christiansen	Longport, NJ	09/27/92	B Hoagland	Great Egg Inlet, NJ	26	05/13/93
20	J Karolides	Danvers, MA	10/07/92	J Medling	New London, CT	22	05/13/93
17	M Matula	Raritan River, NJ	06/09/91	M Habel	Keasby, NJ	22	05/14/93
20	J Karolides	Danvers, MA	09/25/92	R Hammond	Beacon, NY		05/14/93
25	I Gordon	Jamaica Bay, NY	10/19/91	R Rivera	Rockaway, NY		05/14/93
17	T Rinaldi	Mattituck, NY	10/23/92	L Schellinger	Gardiners Bay, NY		05/14/93
47	A Cordts M.D.	Falmouth, MA	05/23/90	M Lamparelli	Falmouth, MA		05/14/93
15	S Penta	Boston, MA	08/12/92	J Sullivan	Sakonnet R., RI		05/15/93
19	J Karolides	Danvers, MA	09/13/91	J Sullivan	Sakonnet R., RI		05/15/93
15	T Marburger	Northport, NY	05/05/91	M Ferretti	Newburgh, NY	22	05/15/93
15	J Karolides	Danvers, MA	07/29/92	J Sullivan	Sakonnet R., RI		05/15/93
15	K Black	Merrimack River, MA	06/01/91	J Sullivan	Sakonnet R., RI		05/15/93
20	A Dangelo	Charlestown, RI	10/25/92	J Sullivan	Sakonnet R., RI		05/15/93
	G Cardel	Huntington, NY	05/13/89	J Pepas Jr.	Rye, NY	37	05/15/93
16	S Giaccone	Throgs Neck Brdg., NY	05/02/93	F Apuzzo	New Haven, CT		05/15/93
24	G Horvath	Barnegat Inlet, NJ	06/10/92	B Long	Barnegat, NJ	27	05/15/93
17	M Aiken	Milford, CT	09/07/92	M Aiken	Milford, CT	18	05/15/93
23	R Nystrom	Stratford, CT	09/17/92	L Ceckowski	Roanoke Beach, NY		05/15/93
29	K Sprankle	Outer Banks, NC	01/28/91	M Mulligan	Pt. Lookout, MD		05/17/93
20	R Wellman	Mattituck, NY	07/27/91	K O'Brien	Cornwall, NY	23	05/18/93
21	S Kellner	Orient Pt., NY	10/30/91	W Silvia Jr.	Warren, RI	25	05/18/93
19	R Fink	Northport, NY	01/07/93	E Schlutz	Thames R., CT		05/19/93
27	J Della Porta	Swampscott, MA	09/13/90	C Hermanowski	Providence R., RI	36	05/20/93
18	R Nystrom	Bridgeport, CT	12/24/92	S Schkoda	Smithtown, NY	19	05/20/93
27	G Dulka	Ches. By Brg. Tun., VA	11/15/92	J Firmani	Chesapeake Beach, MD	32	05/20/93
09	G Horvath	Trenton, NJ	10/02/92	G Horvath	Trenton, NJ	09	05/20/93
	J Sullivan	Sandy Hook, NJ	10/10/92	W Sharpe	Navesink R., NJ	19	05/21/93
24	S Sinclair	Sakonnet Pt., RI	07/30/91	M Carbone	Middletown, NJ	29	05/21/93
30	K Sprankle	Outer Banks, NC	02/04/92	A Vrablic	Edgewater, MD		05/21/93
19	T Rinaldi	Horton's Point, NY	08/28/91	G Lombardi	3 Mi. Harbor, NY		05/21/93
33	G Keenan	Shinnecock Inlet, NY	07/16/92	G Keenan	Shinnecock, NY	34	05/21/93
14	GS Gray	Charlestown, RI	06/13/91	T Rinaldi	Mattituck, NY	21	05/21/93
18	T Nowell	Plum Island, MA	09/01/91	J Ready	Monument Beach, MA		05/22/93
31	T Marburger	Shinnecock Inlet, NY	07/14/92	G Keenan	Shinnecock, NY	34	05/22/93
36	B Cotiaux	Montauk Pt., NY	10/28/92	S MacNally	Cape Cod Canal, MA		05/22/93
26	D Kelly	Orient Pt., NY	10/23/89	K O'Brien	Corwall, Ny	34	05/22/93
20	G Cardel	Caumsett State Park, NY	10/18/91	R Clark	Bayville, NY	24	05/23/93
33	H Blazer	Cape May, NJ	12/20/91	R Holsapple	Saugerties, NY	35	05/23/93
12	M Aiken	West Milford, CT	07/20/92	A Weygant	Cornwall, NY	22	05/23/93
12	K Morgan	East River, NY	11/09/90	J Shastay Jr.	The Battery, NYC	15	05/23/93
28	D Kamienski	Trenton, NJ	07/24/87	J Doyle	Trenton, NJ	32	05/23/93
17	J Zaffuto	Cedar Beach, L.I., NY	11/28/91	L Schellinger	Gardiners Bay, NY	19	05/24/93
30	J Posh	Fishers Is., NY	09/15/92	W Wilczek	The Race, L.I. Sound	32	05/24/93
23	R Fink	Northport, NY	04/02/93	I Martin	Getty Sq. Heliport, NY		05/24/93
28	J Doyle	Delaware River, NJ	05/24/91	F Buselli	Trenton, NJ	34	05/25/93
18	T Nowell	Newburyport, MA	06/09/91	M Aguis	Wantagh Bridge, NY	24	05/25/93
21	B Dalton	Shrewsbury R., NJ	06/21/91	T Kiernan	Wantagh, NY		05/25/93
20	D Partusch	Shrewbury River, NJ	04/30/92	A David	Leonardo, NJ	28	05/25/93
22	A Fette	South Kingstown, RI	05/01/93	J Mead	Cape Cod Bay, MA	22	05/26/93
22	T Shaheen	Navesink, NJ	05/09/93	W Sharpe	Navesink R., NJ		05/26/93
19	GS Gray	Charlestown, RI	11/16/86	N Ciampini	New Haven, CT	36	05/27/93
30	T Marburger	Shinnecock Inlet, NY	06/30/92	G Keenan	Shinnecock, NY	33	05/27/93
22	W Sharpe	Navesink R., NJ	11/27/92	B Jellig	Fire Is. Inlet, NY	23	05/27/93
24	J Karolides	Danvers, MA	06/19/92	M Sacken	Atlantic Beach, NY	28	05/27/93
23	L Richards	Atlantic Beach, NY	09/05/92	M Berger	Debs Inlet, NY	24	05/27/93
29	D Kelly	Orient Pt., NY	11/04/91	L Pirilli Jr.	Rye, NY		05/27/93
28	R Leja	Bridgeport, CT	09/15/91	E Wargo	Bridgeport, CT	36	05/28/93
26	B Sobka	Shrewsbury R., NJ	06/18/92	T Sobka	Highlands Brdg., NJ	29	05/28/93

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
24	G Cardel	Eatons Neck, NY	11/06/92	H Zebroski	Eatons Neck, NY		05/28/93
29	T Sobka	Highlands, NJ	05/12/93	R McDowell	Moriches Inlet, NY		05/28/93
19	J Karolides	Danvers, MA	09/28/92	D Schmidt	Moriches Inlet, NY	21	05/28/93
25	J Karolides	Danvers, MA	09/13/91	V Gordon	Danvers, MA	32	05/28/93
22	J Della Porta	Mystic R., MA	06/18/92	M Berger	Debs Inlet, NY	22	05/29/93
15	J Sullivan Jr.	Merrimack River, MA	05/31/91	J Beyea	Narragansett Bay, RI	20	05/29/93
21	B Billerman	Sandy Hook, NJ	11/28/92	J Beyea	Narragansett Bay, RI	22	05/29/93
17	S Kellner	Mattituck, NY	05/22/93	R Edwards	Montauk Pt., NY		05/30/93
25	D Magnasco	Boston, MA	08/25/92	G Stewart	Charles R. Dam, MA	30	05/30/93
24	A Anderson	Misquamicut, RI	10/02/92	P Bilodeau	Watch Hill, RI	26	05/30/93
26	F Stunkel	Stamford, CT	08/02/91	J Bailey	Stamford, CT	28	05/31/93
18	P Donahue	Merrimack R., MA	08/23/92	R Lynch	Newburyport, MA		05/31/93
18	D Kay	Somerset, MA	06/02/91	J Zackaseski	Fall River, MA	21	05/31/93
34	P Grippo	Tobay Beach, NY	10/28/92	J Treat	Cuttyhunk, MA	36	05/31/93
25	O Van Helmond	Montauk, NY	09/04/91	B Lizotte	Buzzards Bay, MA		05/31/93
17	T Lynch	Stamford, CT	10/29/92	B Kyker	Stamford, CT	17	05/31/93
30	A LoCascio	Manhasset Bay, NY	09/15/91	J Bombardi	Manhasset Bay, NY	32	05/31/93
19	F Urban	Sandy Hook, NJ	07/24/91	T Surgent	S. of Rumson Brg, NJ	24	06/01/93
22	S Kellner	Montauk, NY	11/09/91	L Ceckowski	Orient Pt., NY		06/01/93
25	A Anderson	Block Is., RI	08/03/92	J Carr	Fishers Is., NY	28	06/01/93
33	P Krueger	Atlantic Bch. Brdg., NY	10/22/92	J Kraus	Southampton, NY	33	06/01/93
28	W McDonald	Montauk Pt., NY	06/04/92	F Walter	Great South Bay, NY		06/01/93
20	D Kay	Taunton River, MA	06/14/91	G Dubrule	Plum Gut, NY		06/01/93
33	M Epstein	Fogland Pt., RI	06/02/92	B Mauri Jr.	Southport, CT	36	06/01/93
20	M Aiken	Milford, CT	05/23/93	M Aiken	Milford, CT	20	06/01/93
27	D Carusoe	Providence R., RI	05/30/93	J Bonanno	Seekonk R., RI		06/01/93
20	E Lelie	Lambertville, NJ	06/14/92	D Pangaldi	Lambertville, NJ	22	06/02/93
24	A Dangelo	Block Is., RI	06/09/92	A Anderson	Block Is., RI	25	06/02/93
20	P Grippo	Jones Beach, NY	07/11/92	P D'Agostino	Jamaica Bay, NY	25	06/03/93
26	W Sharpe	Navesink R., NJ	05/22/93	R Silvers	Highlands Brdg., NJ	26	06/03/93
24	F Casey	Boston, MA	10/15/91	R Eddy	Somerville, MA	34	06/03/93
22	R Ledergerber	Sandy Hook, NJ	10/26/92	H Praetorius	Catskill Creek, NY	27	06/03/93
24	T Lake	Chelsea, NY	04/22/92	F Phaneuf	Watch Hill, RI	25	06/03/93
29	J Foti	The Narrows, NY	06/28/92	A Ponte	Sandy Hook, NJ	31	06/04/93
21	A Anderson	Quonochontaug, RI	10/04/92	A Rosa Jr.	Middletown, RI		06/04/93
18	J Della Porta	Winthrop, MA	07/18/90	C Payne	Boston, MA	25	06/05/93
20	M Romano	Kill Van Kull, NY	10/07/92	M O'Connell	Bayonne, NJ	24	06/05/93
34	C Jalbert	Bonnet Shores, RI	07/11/92	C Jalbert	Narragansett, RI	36	06/05/93
24	B Cashin	Island Beach, NJ	11/18/91	D Etienne	Black Pt., CT		06/05/93
33	L Richards	Atlantic Beach, NY	09/12/92	K Itak	Atlantic Bch Brdg., NY	33	06/06/93
27	C Lienau	Montauk, NY	08/31/92	J Kraus	Shinnecock Bay, NY	32	06/06/93
32	W Paolozzi	Narragansett Bay, RI	07/08/92	J DeAngelis	Warren R., RI	38	06/06/93
33	D Magnasco	Boston Harbor, MA	06/20/90	A Anastasio	Hingham, MA	37	06/06/93
27	L Richards	Atlantic Beach, NY	09/10/92	A Hochberg	Debs Inlet, NY	27	06/06/93
17	W Anderson	Provincetown, MA	06/03/92	F Adams	Raritan Bay, NJ	26	06/06/93
31	W Perlman	Atlantic Beach, NY	10/03/92	G Lake	Atlantic Bch. Brdg., NY	33	06/06/93
26	I Fuchs	Ellis Is., NY	11/18/92	M Longworth	Green Is., NY		06/06/93
20	H Fischer	Augustine Beach, DE	07/15/92	V Orzel	Trenton, NJ	26	06/07/93
19	M Chapin	Eastham, MA	05/18/93	G Hoag	Eastham, MA		06/07/93
21	J Andia	Highlands Brdg., NJ	06/05/90	F Urban	Highlands Brdg., NJ	29	06/08/93
18	D Kay	Swansea, MA	04/23/90	C Marr	Matunuck, RI	23	06/08/93
26	E Lelie	Lambertville, NJ	06/18/92	J Vernam	Lambertville, NJ	26	06/08/93
21	A Anderson	Quonochontaug, RI	10/20/92	J Burke	Cape Cod Canal, MA	23	06/08/93
31	E Adams	Sea Bright, NJ	06/04/92	N Genoune	Sea Bright, NJ	32	06/08/93
34	A Anderson	Block Is., RI	07/30/92	G Glass	Fire Is. Inlet, NY	36	06/08/93
29	P Garlepy	Barrington R., RI	04/27/93	C Day	Warren R., RI	29	06/08/93
34	L Molnar	Shinnecock Inlet, NY	07/16/92	F/V E. Carl Rice Jr.	Offshr., Pt. Judith, RI	38	06/10/93
15	K Black	Merrimack River, MA	07/14/91	D Paradis	Barrington R., RI	18	06/10/93
25	G Hall	Susquehanna Flats, MD	04/11/92	N Koenigsburg	Pt. Lookout, MD		06/10/93
29	R Canfield	Norwalk, CT	08/18/91	B Newmark	Norwalk Is., CT	30	06/10/93
21	R Canfield	Norwalk, CT	07/04/92	B Newmark	Norwalk Is., CT	23	06/10/93
27	G Ottavio	Cape May, NJ	11/29/92	M Smith	Catskill, NY	30	06/10/93
21	J Della Porta	Swampscott, MA	09/02/90	L Peragine	Fire Is. Inlet, NY		06/11/93
36	F Stunkel	Stamford, CT	07/13/91	R Kach	Stamford, CT	42	06/11/93

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
17	T Marburger	Northport, NY	04/27/93	D Harris	Southport, CT	18	06/12/93
27	R Grobarz	Sea Bright, NJ	05/31/93	M Shucavage	Monmouth Beach, NJ	28	06/12/93
30	G Ruest	Quick's Hole, MA	09/21/92	D Mann	Quick's Hole, MA	29	06/12/93
28	C Nelson	Darien, CT	06/22/91	R Yarish	Darien, CT	36	06/12/93
29	P Westcott	Offshr., Tekuck Is., MA	06/18/91	T McCann	Providence R., RI	32	06/12/93
19	M Matula	Arthur Kill, NY	09/29/90	R Johnsen	Tottenville, NY	20	06/13/93
34	M Berger	Debs Inlet, NY	09/07/92	G Lake	Atlantic Bch. Brdg., NY	34	06/13/93
33	S Fries	Montauk, NY	08/22/91	G Larsson	Providence R., RI	33	06/13/93
19	M Romano	Kill Van Kull, NY	09/04/92	M Romano	Kill Van Kull, NY		06/14/93
17	H Goldblum	Haverstraw Bay, NY	04/27/91	W Wojcik	Shrewsbury R., NJ	24	06/14/93
17	M Romano	Kill Van Kull, NJ	05/28/92	J Wademan	Kill Van Kull, NY	18	06/14/93
20	G Kerkhan	Cliffwood Beach, NJ	05/11/93	J Nemeth	Union Beach, NJ		06/14/93
21	M Aiken	Milford, CT	06/01/93	A Baron	Housatonic R., CT		06/15/93
19	M Romano	Kill Van Kull, NY	07/16/92	D Dolan	Kill Van Kull, NY	19	06/15/93
29	G Caputi	Island Beach St. Pk., NJ	11/14/91	D Roberts	Connecticut R., CT	34	06/15/93
22	A Olivieri	Quincy Bay, MA	06/12/93	B Jeffrey	Boston, MA	24	06/15/93
34	T Peltz	Martha's Vineyard, MA	06/28/89	J Mineo	Rockaway, NY	39	06/15/93
36	E Miller	Hell Gate, NY	10/06/91	J Ciplej	Hell Gate, NY	38	06/15/93
25	A Anderson	Charlestown, RI	10/24/91	M Cahill	Plymouth Rock, MA	25	06/16/93
25	P Grippo	Jones Inlet, NY	11/07/91	B Luginbull	Enfield Dam, CT	32	06/16/93
25	T Rinaldi	Horton's Point, NY	09/19/90	G Gelette	Martha's Vineyard, MA		06/16/93
25	G Horvath	Spring Lake, NJ	08/29/92	A Buonantuos	Highlands Brdg., NJ		06/16/93
19	B Hoagland	Egg Harbor River, NJ	04/06/91	C Ingersoll	Beesleys Pt., NJ	24	06/17/93
24	J Caputo	W. L. I. Sound	10/16/89	A Endriss	Throgs Neck Brdg., NY		06/17/93
35	N Jalbert	Bonnett Shores, RI	07/11/92	E Freinberg	Bonnett Shores, RI	35	06/17/93
18	G Cardel	Eatons Neck, NY	11/27/92	M Aiken	Milford, CT	20	06/17/93
31	P Governale	Moriches Inlet, NY	06/15/93	D Baldwin	Moriches Inlet, NY		06/17/93
21	J Koundouros	Jersey City, NJ	04/25/93	M Marcoulier	Provincetown, MA	21	06/18/93
22	J Hardy III	Nantucket, MA	10/28/92	B Nurnberger	Huntington, NY	25	06/18/93
23	T Marburger	Northport, NY	05/02/93	R Cressman Jr.	Bonnett Shores, RI	23	06/18/93
27	B Mellish	Montauk, NY	10/06/89	L Barker	Newburyport, MA	34	06/18/93
28	F Urban	Flynns Knoll, NJ	06/17/92	L De Fonteny	Island Beach, NJ	32	06/19/93
26	G Hall	Susquehanna Flats, MD	04/11/92	B Pipkin	Mth of Potomac R., MD	29	06/19/93
35	T Marburger	Shinnecock Inlet, NY	07/14/92	R Setnikar	Shinnecock In., NY	36	06/19/93
20	D Zambretta	Narragansett Bay, RI	06/28/91	M Viveiros	Tiverton, RI	30	06/19/93
29	D Goodwin	Indian R. Inlet, DE	10/04/92	J Bennett	Indian R. Inlet, DE	30	06/19/93
34	B Billerman	Newburyport, MA	06/02/92	J Hollis Jr.	Merrimack R., MA	38	06/19/93
33	B Billerman	Newburyport, MA	07/29/92	W Wecal	Merrimack R., MA	37	06/19/93
32	F DeMenezes	Newport, RI	05/29/92	M Shea	Newport, RI	37	06/20/93
32	S Armsworthy	Rye, NY	07/04/92	R Biagi	Greenwich, CT		06/20/93
27	A Anderson	Pt. Judith, RI	09/23/92	M Silva	Prudence Is., RI	29	06/20/93
26	D Kay	Somerset, MA	11/07/91	M Bryan	Merrimack R., MA		06/20/93
32	B Billerman	Newburyport, MA	08/08/91	J McMenaman	Newburyport, MA	37	06/20/93
24	D Kelly	Orient Pt., NY	10/12/92	J Polando Sr.	Warren, RI	25	06/20/93
22	T Tully	Eatons Neck, NY	11/09/90	D Ambrico	Breezy Pt., NY		06/20/93
37	M Keegan	The Race, L.I. Sound	06/29/92	J Bonnevie	The Race, L.I. Sound	39	06/20/93
32	W Wilczek	The Race, L.I. Sound	05/24/93	J Bonnevie	The Race, L.I. Sound	32	06/20/93
31	S Jakubowski	Ambrose Chan., NY	11/21/92	J Foti	Ft. Wadsworth, NY	31	06/20/93
28	K Sprinkle	Outer Banks, NC	02/03/92	B Hamm	St. Mary's R., VA	31	06/20/93
30	B Shillingford	Cape May, NJ	11/12/92	B Hamill	Hull, MA		06/21/93
32	J Caputo	Barkers Pt., NY	06/06/93	W Denning	Sands Pt., NY	33	06/21/93
26	J Della Porta	Swampscott, MA	08/03/91	M Noyes	Cos Cob, CT	28	06/21/93
26	G D'Amato	Milford, CT	05/14/93	T Hodun	Stratford, CT		06/22/93
25	A Anderson	Charlestown, RI	10/05/92	T Urquhart	Charles R., MA		06/22/93
29	A Anderson	Charlestown, RI	11/06/92	P Westcott	Offshr., Mth Vnyd, MA	31	06/22/93
17	T Rinaldi	Mattituck, NY	06/26/92	J Kaminsky	Mattituck Inlet, NY	20	06/23/93
34	J Doyle	Trenton, NJ	09/07/92	J Lavan	Trenton, NJ		06/23/93
21	G Cook Jr.	Allenhurst, NJ	07/30/89	J Giordano	East River, NYC	30	06/24/93
31	E Baracchini	Cape Cod Canal, MA	06/06/91	B Harding	Cape Cod Canal, MA	35	06/24/93
29	R Canfield	Norwalk, CT	08/21/92	R Canfield	Norwalk, CT	31	06/24/93
37	A Anderson	Block Is., RI	07/30/92	A Ibanez	Jones Beach, NY	38	06/25/93
23	G D'Amato	Long Beach, CT	04/27/92	C Jernberg	Newport, RI		06/25/93
14	T Russano	Plum Island, MA	05/21/92	J Fichera	Newburyport, MA	20	06/25/93
22	W Perlman	Atlantic Bch, NY	06/19/93	P Steensen	Atlantic Bch., NY		06/25/93

Species

Lgth	Tagger	Place Tagged	Date	Recapturer	Location	Lnth	Date
31	T Marburger	Shinnecock Inlet, NY	07/19/92	B Behr	Shinnecock Inlet, NY	32	06/25/93
21	S Kellner	Horton's Point, NY	11/15/90	J Kenny	Newburyport, MA	25	06/26/93
27	D Kelly	Orient Pt., NY	09/20/89	E Liss	Manhasset Bay, NY	34	06/26/93
20	T Marburger	Northport, NY	04/20/92	M Vodola	Stamford, CT		06/27/93
31	K Sprinkle	Outer Banks, NC	02/04/92	E Beckwith Jr.	Old Saybrook, CT		06/27/93
23	S Kellner	Orient Pt., NY	09/07/92	R Girzadas	Orient Pt., NY	25	06/27/93
16	D Kay	Taunton River, MA	07/21/90	G Askew	Fall River, MA	28	06/27/93
17	W Edwards	Stratford, CT	06/03/93	P Marino	Milford, CT	18	06/27/93
21	V Rossi	Long Beach, NY	11/22/92	C Dudick	Atlantic Bch. Brdg., NY	23	06/27/93
22	T Lake	Balmville, NY	05/06/93	G Sims	Noank, CT	24	06/27/93
35	A Bendersky	Fire Island, NY	06/11/92	A Lorenzetti	Fire Is. Inlet, NY	37	06/27/93
25	P Krueger	Atlantic Bch. Brdg., NY	06/23/93	M Dore	Breezy Pt. Jetty, NY		06/27/93
20	T Lake	Liberty Is., NY	11/27/92	B Paradine	Bayonne, NJ		06/28/93
29	B Silva	Staten Island, NY	06/23/93	J Scaramuzzo	Snug Harbor, NY		06/28/93
12	R Larsen	Fire Island Inlet, NY	07/24/91	J Gonzalez	Cross Bay Channel, NY		06/28/93
20	S Penta	Boston, MA	09/26/92	R Mott	Quincy, MA		06/28/93
30	D Kay	Somerset, MA	10/22/91	J Silva	Tiverton, RI	34	06/28/93
30	F Tellefsen	Verrazano Brdg., NY	11/13/92	H Edwards	Moriches Inlet, NY	32	06/29/93
27	P Krueger	Atlantic Bch. Brdg., NY	05/29/93	P Governale	Moriches, NY	33	06/29/93
18	W Edwards	Stratford, CT	05/27/93	P Marino	Milford, CT	20	06/29/93
33	T Marburger	Northport, NY	01/03/93	M Torelli	Stony Creek, CT	34	06/29/93
20	A Anderson	Quonochontaug, RI	10/16/92	W Davin	Chapin Bch., MA	24	06/29/93
32	D Kelly	Orient Pt., NY	10/28/92	J Clarke	Greenwich, CT		06/30/93
25	G Cardel	Eatons Neck, NY	11/29/91	A Wiedemann Jr.	New Rochelle, NY		06/30/93
21	A Olivieri	Quincy Bay, MA	06/22/92	S O'Connell	Chatham, MA		06/30/93
27	P Krueger	Atlantic Bch. Brdg., NY	06/23/93	L Curlucci	Breezy Pt., NY		06/30/93
23	B Toohey	E. Rockaway Inlet, NY	06/11/92	G Herlitty	Montauk Pt., NY		06/30/93

Tautog

10	P Krueger	Atlantic Bch. Brdg., NY	08/12/92	D Durando	Atlantic Bch. Brdg., NY	10	09/21/92
12	K Case	Pt. Lookout, NY	09/23/92	A Froitzheim	Jones Inlet, NY		09/27/92
10	K Case	Pt. Lookout, NY	09/23/92	A Froitzheim	Jones Inlet, NY		10/01/92
11	D Mann	Old Field Pt., NY	09/29/91	P Daley	Middle Ground Lt., CT	14	10/11/92
11	K Case	Pt. Lookout, NY	09/23/92	G Nisito	Jones Inlet, NY	11	10/12/92
12	K Case	Pt. Lookout, NY	09/23/92	G Nisito	Jones Inlet, NY	12	10/12/92
09	B Longstreet	Atlantic Bch Reef, NY	01/29/92	B Longstreet	Atlantic Bch Reef, NY	12	10/18/92
12	R Wellman	Orient Pt., NY	06/02/91	M Scheriff	Orient Pt., NY	15	10/18/92
10	D Mann	Middle Grounds, NY	10/07/92	R Dreher	Middle Grounds, NY		10/24/92
11	B Longstreet	Atlantic Beach, NY	04/06/91	B Longstreet	Atlantic Bch. Reef, NY	15	10/31/92
11	B Longstreet	Atlantic Bch. Reef, NY	04/19/92	K Case	Atlantic Beach, NY		11/05/92
10	B Longstreet	Atlantic Bch. Reef, NY	04/25/92	R Yeznach	Atlantic Bch. Reef, NY	11	11/07/92
12	B Longstreet	Atlantic Bch. Reef, NY	04/24/93	R Borish	Hempsted Reef, NY	12	05/16/93
11	T Camp	Offshr., Cape May, NJ	05/23/93	J McTommonney	Offshr., Cape May, NJ		06/11/93
14	T Murphy	Lwr Chesapeake Bay, VA	09/07/92	N Messer	Mathews County, VA		06/18/93
14	T Camp	Offshr., Cape May, NJ	05/23/93	G Strassler	Offshr., Cape May, NJ		06/25/93

Triggerfish

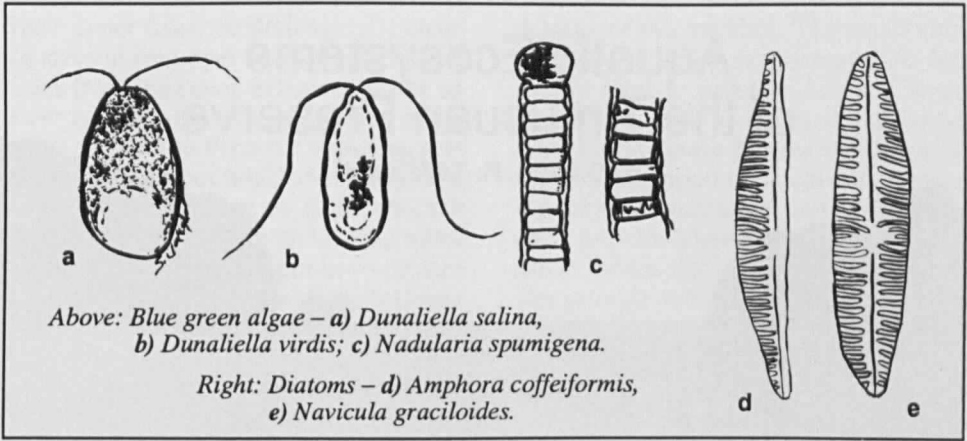
10	D Sherman	Offshr., Tybee Reef, GA	05/21/93	J Cavuoto	Offshr. Tybee Reef, GA		05/25/93
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Weakfish

29	M Nugent	Lower Delaware Bay	05/16/92	J Brown	Lewes, DE	30	05/30/92
18	T Nugent	Delaware Bay, DE	06/01/92	V Codrey	Broadkill Bch., DE	18	06/02/92
22	G Ottavio	Cape May Pt., NJ	05/23/92	G Ottavio	Cape May Pt., NJ		07/18/92
27	G Horvath	Barnegat Inlet, NJ	09/04/92	D Bonanni	Barnegat Inlet, NJ		09/16/92
14	H Kruse	Rappahannock R., VA	09/15/92	J Jacobson	Rappahannock R., VA		11/12/92
22	S Keiper	Indian R. Inlet, DE	06/11/93	Unkwn Fisherman	Cape May, NJ	22	06/27/93

Winter Flounder

15	G Ottavio	Cape May Pt., NJ	10/05/91	P Thompson	Cape May, NJ	16	07/20/92
13	W Brett	Provincetown, MA	07/28/92	J Dutra	Cape Cod Bay, MA	13	11/01/92
10	W Anderson	Provincetown, MA	10/20/92	D Morse	Provincetown, MA	11	12/04/92



Above: Blue green algae – a) *Dunaliella salina*,
b) *Dunaliella viridis*; c) *Nodularia spumigena*.

Right: Diatoms – d) *Amphora coffeiformis*,
e) *Navicula graciloides*.

(Continued from page 17)

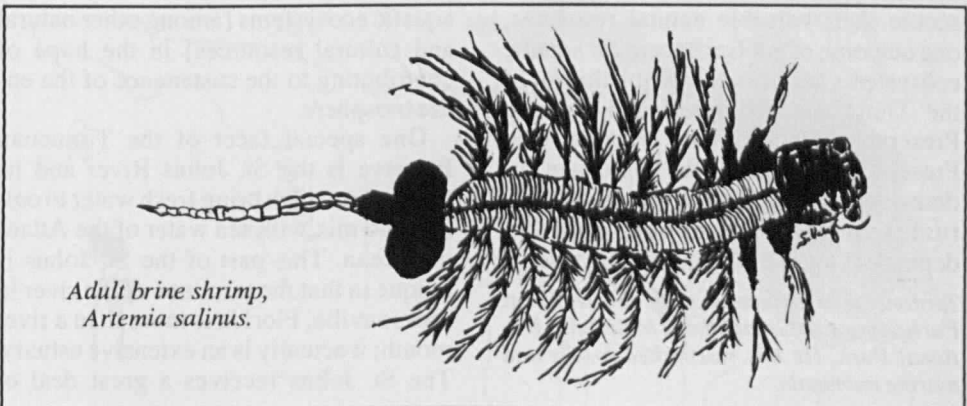
production of encysted embryos. Experiments with the encysted forms to see how varying salt concentrations affected the eggs found that although eggs would not hatch in high salinity solutions, they remained viable and hatched upon transfer to lower salinity solutions. Brine shrimp eggs are harvested annually for use in the aquaculture industry.

The brine flies of the Great Salt Lake, *Ephydra cinerea* and *Ephydra hians*, are the only noxious insects produced in saline water. Their life cycle is typical and consists of four stages: egg, larva, pupa, and adult. Eggs are continually laid on the surface of the water or on floating debris (usually dead brine shrimp). Although brine flies do not feed on animals or man, they occur in such abundance (dead and alive) as to make it difficult to endure them. These flies are responsible

for the repulsive odor of the beaches around the Salt Lake.

Coroxids and “water boatmen” (*Trichocorixa verticalis*), predators of brine shrimp and brine flies, occur on the water surface at the southern end of the lake. Water boatmen are medium to small insects with flattened bodies characterized by a gray mottled color. Since they have a lesser tolerance for the salinity of the lake, they breed in the fresher side pools.

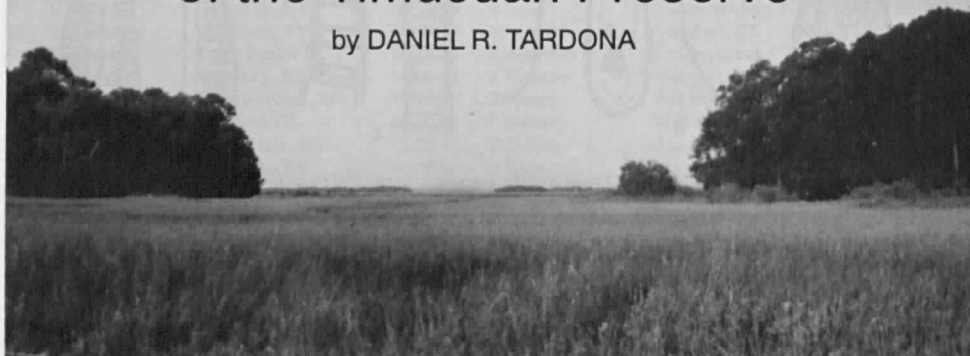
No other place on earth is quite like the lake with the exception of the Dead Sea in the Holy Land. Although the lake is viewed by some to be inhospitable and is indeed acrid and seemingly barren, one who looks carefully will find an abundance of life within unique surroundings. The life in the lake has made fascinating adaptations to these unique challenges and deserves our attention.



Adult brine shrimp,
Artemia salinus.

Aquatic Ecosystems of the Timucuan Preserve

by DANIEL R. TARDONA



Despite the oppressive humidity of northeastern Florida, a glance out over the large expanse of coastal marsh cordgrasses intermingled with tidal creeks, refreshes and frees the eyes and spirit. The simplicity of the salt marsh stands in sharp contrast to the great diversity of the aquatic life protected in this estuary. The still greenness of fresh water ponds lightly rippled by the thin legs of a wading bird communicates a richness of life and calms the urban restlessness. Brackish rivers flow with the excitement and joy of dolphins as they glide through the air and silently slice the river on their return to the aquatic environment.

The realization that aquatic ecosystems are beneficial to all of us has heightened public concern for the protection, restoration and preservation of such biological systems. While there is still much to do to secure their valuable natural resources, one outcome of public concern for aquatic ecosystems has been the establishment of the Timucuan Ecological and Historic Preserve in Jacksonville, Florida. The Preserve is named for the Timucuan Indians, who thrived in the region for centuries before European contact, dependent upon the same aquatic resour-

Tardona is a naturalist with the National Park Service at Great Smoky Mountains National Park. He has researched fossils and marine mammals.

ces found in the region today. The Preserve is a step forward in the protection and restoration of important aquatic ecosystems in coastal Florida.

The Timucuan Preserve protects a remnant of productive salt marshes once prevalent along the Atlantic coast. Contained within the Preserve are aquatic habitats that support endangered wildlife such as the Atlantic loggerhead turtle, West Indian manatee and wood stork. Currently, the Timucuan Preserve contains approximately 46,000 acres, 5,000 of which are owned by the National Park Service. Other portions of the Preserve are owned by various Federal, State and local government agencies as well as corporations and individual private land owners. The management of the area is a unique advance in the future of cooperative conservation efforts to preserve aquatic ecosystems (among other natural and cultural resources) in the hope of contributing to the sustenance of the entire biosphere.

One special facet of the Timucuan Preserve is the St. Johns River and its tributaries which bring fresh water to collide and mix with sea water of the Atlantic Ocean. This part of the St. Johns is unique in that the terminus of the river in Jacksonville, Florida is more than a river mouth; it actually is an extensive estuary. The St. Johns receives a great deal of

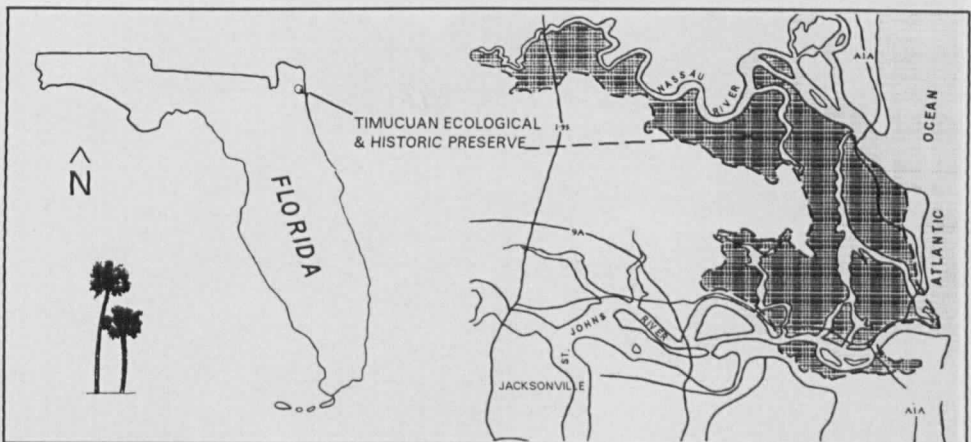
fresh water from the drainage of a chain of lakes in the upper basin. Each day, the tides from the ocean bring salt water up river and into the estuary. In fact, many areas within the Preserve experience as much as an 8 foot tidal range daily. The result of this mixing of fresh and salt water in combination with varying water depths and temperature gradients creates a variety of aquatic habitats, supporting a diverse community of organisms. There is an abundance of fish fauna, both fresh and salt water species, including many euryhaline fishes (fish that can tolerate wide ranges of salinity). These fish in turn provide food sources for dolphins and a great variety of birds including ospreys, brown pelicans, and the endangered bald eagle.

The salt marsh and tidal creek communities of the Timucuan Preserve consist of dense salt tolerant plants that form the base of marine and brackish water food chains, and provide cover for a rich diversity of resident and transient aquatic animals. In the nearshore shallow waters of the Preserve, fresh and salt water mix in the tidal creeks and bays creating a unique ecosystem where a variety of marine organisms spend all or part of their life cycles. Algal mats hold small communities of microscopic invertebrates such as flatworms, nematodes, protozoans, copepods and many other tiny creatures. Some tiny species of copepods feed upon the single-celled plankton and

detritus of the marshes. The small crustaceans and other invertebrates in turn supply food to juvenile fish and larger crustaceans such as the mud and fiddler crab. Fiddler crabs burrow into the sediments that support marsh plants, increasing oxygen exchange and stimulating plant growth. They also feed on the organic debris and microalgae which in turn provide nutrients for aquatic plants.

The salt marsh aquatic ecosystem of the Preserve provides critical spawning and rearing grounds for many kinds of fish. In the oyster beds, small fish such as gobys, blennys and pipefish nest. Young of species such as snapper and grouper breed and grow only in tidal marshes close to the ocean and frequent the tidal marshes of the Preserve. Juvenile Atlantic menhaden (*Brevoortia tyrannus*) are found in the marshes. Even adult menhaden occasionally enter the shallow marshes apparently to escape predators in the open sea. A rare population of snook (*Centropomus undecimalis*) appears to exist in some of the warm tidal creeks and shallow bays of the Preserve making it the northernmost limit of year-round snook populations.

Pink and brown shrimp are found in the salt marshes. While shrimp spawn offshore, the larvae move into shallow marsh areas. The larvae develop in stages, and the young shrimp that make it to the salt marsh find refuge from predators by concealing themselves in



the marsh seagrasses and algae. Numerous insects live in the marshes feeding on living or dead plant tissue or other animals. A plethora of insects deposit their eggs within the stems of *Spartina* grass, then hatch the following spring when survival conditions allow. Other common visitors to the salt marshes are stingrays, seatrout, drum and needlefish all feeding on the smaller residents. Occasionally, even bottlenose dolphin enter the marshes at high tide to prey and manatees sometimes venture into the tidal creeks to feed on cordgrass. Above, around and in the marsh waters are a variety of resident marsh birds including various egrets and herons, white ibis, black skimmers and the endangered seaside sparrow (*Ammodramus maritimus*). Dowitchers, greater yellowlegs and black-bellied plovers visit in winter. This great diversity of life is just a small sampling of the total life supported by the salt marshes and tidal creeks of the Timucuan Preserve.

There are a number of fresh water ponds and creeks within the Preserve. Spanish Pond, the largest fresh water pond, is seasonal, the water level fluctuating with the annual rainfall. The edge of the pond is in constant flux. Wet and dry

tolerant plants move in and out as water level changes. In places, sawgrass (*Cladium jamaicense*) grows so tall and close that competitors are shaded out. The leopard frog (*Rana pipiens*) is perhaps one of the most common amphibians of the fresh water ponds. Alligator Pond has a similar aquatic community and at least one alligator nest has been observed there. Alligators here are usually shy and rarely observed. Birds of the ponds include various wading birds and many migrant stopovers including purple gallinule, wood ducks and anhingas.

Fresh water creeks are also found in the preserve. Hammock Creek rises in a fresh water pond and empties into a salt marsh. A number of wetland tree species grow on a strip of low ground bordering the creek, which will flood during periods of heavy rainfall. Black gum, loblolly pine and water oak are found growing above fetterbush, Virginia willow, cinnamon fern and netted chain fern along the creek bank. Hammock Creek provides fresh water for animals along the way to the marsh and provides drainage for surrounding uplands. River otter (*Lutra canadensis*) and water snakes are spotted in this creek from time to time.

The Timucuan Preserve has a rich his-

Round Marsh. Photo by D. Tardona.





Little blue (left) and tricolored (right) herons. Photo by D. Tardona

tory to share. Archeological sites tell of people living in the area for thousands of years. Timucuan Indians and their precursors depended on the natural resources offered in the area for their survival. It is a story of the French attempting to establish a colony as far back as 1562 and subsequent Spanish, British

and Americans trying to survive in a rich but difficult environment.

Today the Timucuan Preserve not only offers recreational opportunities to those of us who visit the area but also contributes economically by its preservation of biodiversity. Perhaps the single most important component to all these aquatic ecosystems in need of protection, restoration and preservation is the water itself. These waters support the life within it, as well as the upland terrestrial islands and mainland ecosystems within the boundaries of the preserve. They influence surrounding waters and lands. All these ecosystems directly benefit in storing water, controlling the effects of erosion and flooding, supporting commercial and recreational fisheries and acting as a natural filter for water pollution.

Rachel Carson said, "In the sea nothing lives to itself...each living thing is linked with all that surrounds it." This same perception should bolster the cooperative effort necessary in protecting the Timucuan Ecological and Historic Preserve.

GENERAL STORE

Here is a list of books the Littoral Society keeps in stock at discount prices, plus other items for sale. All prices listed include cost of postage.

BOOK SHELF

Discovering Sharks. Edited by Samuel H. Gruber. Covers feeding habits, reproductive strategies, anatomical features, and sensory systems from deep-sea dwellers to coastal cruisers. \$10.

Natural Lives: Modern Times, by Bruce Stutz, chronicles the people, places, and natural history of the Delaware River. \$20.

Anglers' Guide to Sharks, by John Casey. A reprint of this classic brief on how to identify sharks. \$3.

AMERICAN LITTORAL SOCIETY BOOKS

By Lyons & Burford, Publishers

The Underwater Naturalist: A Layman's Guide to the Vibrant World Beneath the Sea, by David K. Bulloch. A natural history of the sea. \$20, hardcover.

The Seaside Reader. Edited by Dery Bennett. A coastal anthology mixing nature writing and other casual coastal musing. \$20, hardcover.

The Whale Watcher's Handbook, by David K. Bulloch. A field guide to the whales, dolphins and porpoises of North America. \$10, paper.

The American Littoral Society Handbook for the Marine Naturalist, by David K. Bulloch. Basic techniques, projects, and activities to guide amateur explorations on the beach. \$10.

A Field Guide to the Atlantic Seashore, by Kenneth Gosner. Peterson Series. Paperback \$12.

OTHER ITEMS

Fish Tag Hats: Blue/white baseball cap sporting tagged striped bass and ALS Tagging Program logo. One size fits all, \$7.

Crew Neck Sweatshirts: A littoral scene featuring night heron, bass, shellfish on grey Jerzees 50/50 (teal ink). M, L, XL, \$18.

New T-shirts: Same as sweatshirt 100% cotton; ash grey with purple, red, or teal accent oval border, collar trim and roll-up cuffs. Specify color. M, L, XL, \$15.

Littoral Society Logo: Blue and white. Jacket patch, \$4; window decal, \$1.

Fish Tag kits: Regular kit of 10 tags, needle, instructions, \$5; tagger's jacket patch, \$4.

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Contemplating the Clownfishes

by DAVE GRANT

Whether you do your fish-watching in tropical seas or pet stores, one of the most interesting and ubiquitous families of fishes is the Pomacentridae, or demoiselles. The family is usually divided into three groups:

- the damselfishes – which off our southeast coast include the sergeant-major and the beau-gregory;
- the Pacific damsels of the genus *Dascyllus*;
- and the clownfishes, which are also confined to the Indo-Pacific.

As a family they also are some of the most entertaining fishes in the sea, and the most amusing of three groups are the clownfishes.

There are twenty-six species in the clownfishes group. The most familiar of these belong to the genus *Amphiprion*; all of them boldly patterned in orange, red, white or black. Noted for their association with sea anemones, they are never found far from a host and flee to it when threatened. Not adapted to life in the open reef and helpless prey to larger fishes there, the clownfishes have come to rely on their relationship with coelenterates for survival. In fact, they are so dependent on these coelenterates that they are also commonly known as anemonefishes. The mechanism that the clownfish employs to avoid being stung by the anemone is not completely deciphered, but it is the classic example of symbiosis and one of the best examples of the complexity of the coral reef ecosystem.

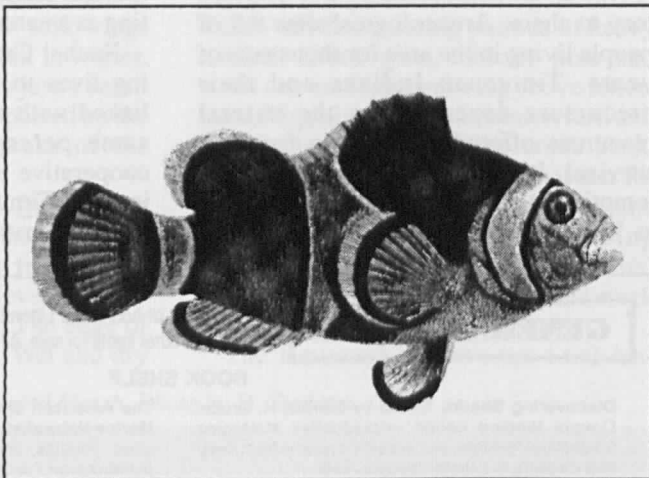
Grant, the Society's chief naturalist, is a year-round beachcomber and directs Brookdale Community College's Ocean Institute at Sandy Hook, NJ.

There are a number of theories that account for the clownfishes' imperviousness to the anemone's stinging tentacles. Apparently the key is disguising yourself with mucous so the host anemone recognizes your skin as itself and doesn't discharge any stinging cells. In experiments where fishes that have had their mucous removed by detergents or scraping, they succumb to the stings.

Clownfishes are always busy and frequently seem to mouth, bite, and even eat

small bits of the tentacles. They may be removing microorganisms or feeding on slime. They even eat regurgitated food and excretions of the anemone. It's not apparent what benefit the anemone derives from this arrangement, although some have suggested the clownfish acts as a lure for prey for the anemone, or that it is purposely gathering food for it, or that the anemone may even utilize the fish's droppings. Regardless, it is a neat deal for the clownfish and fun to watch.

When confronted with a new anemone, clownfishes will approach it cautiously, teasing it with their tail until it opens. Apparently they are sensitive to its



Underwater Naturalist

stings initially. The acclimatization process is fast though and soon a clownfish will chase away other fishes that are not part of its community on the host, and happily lounge about in the safety of its new home.

My first experience with clownfishes was as a proud owner of a pair of small specimens that I purchased along with a sea anemone. The three thrived together in an aquarium for over a year, giving me many opportunities to observe their behavior. Clowns are an especially appealing group of fish, having a pleasant neotonic look — like that wide-eyed and baby-faced expression Walt Disney used to make Mickey Mouse lose his rat-like appearance.

In the aquarium, clownfishes spend most of their time frolicking in the tentacles of their “home” anemone. They are distracted only by food, the approach of a predator, or another clownfish, and I would expose them to a mirror to watch their responses. Notoriously defensive when

other clownfish are near, they will bully others away from their anemone. In captivity, they care for their anemone and bring food particles within its grasp, although it is not clear whether they fret as much over their host in the wild.

At night or when the anemone closes, the fishes hide deep within its tentacles, but apparently never become dinner; although the anemone’s stings may help keep the clownfishes free of external parasites. It seems like a perfect relationship, at least for the clownfish.

Many years later I had the opportunity to work on the Red Sea and observe the clownfish in its own environment. The fringing reefs of the Sinai Desert are considered the finest in the world by many Europeans, and divers, anemones, and clownfishes are fairly abundant in its warm waters.

Because of the isolation of the gulf and high salinity waters here, the reefs harbor over 100 types of coral, quite a number of endemic reef creatures, and an outstanding assortment of fishes, including several species of clownfishes.

I was here working on an aquaculture project that allowed plenty of time for diving on the reefs adjacent to the lab. Occasionally we would assist each other on various projects, the “fishiest” being ongoing research by a behaviorist studying the similarities between clownfishes and damselfishes. He was comparing their aggressiveness in defending territory as a measure of how closely the various species of each group are related. In essence, letting the fishes communicate through their behavior, what the taxonomists could not do by measuring and comparing this similar-looking group.



Diver and clownfish. Photos by D. Grant.



Now, I couldn't enjoy watching fishes more if I were a cat, and it's always a toss-up as to who is more entertaining, animals or the researchers who study them; so it was never difficult to drag me along for some fish watching.

His project was a classical "gradual" school endeavor consisting of endless variations of the same theme: Find an anemone inhabited by a group of clownfishes; stay underwater until you are shivering uncontrollably and on the verge of hypothermia; observe the behavior of resident clownfishes when they are presented with various poorly constructed models of closely and distantly related clownfishes; determine which of the postures they made were defensive or submissive "displays"; compare how aggressively the fishes defended their "home" anemone from being usurped; and finally, conclude that you really only got decent observations at the very end of the dive and that it all had to be repeated again tomorrow.

It was soon apparent that while my associate knew plenty about behavioral psychology, he was weak in basic biol-

ogy and not a very good model maker. I like simple solutions to problems and suggested trying mirrors or perhaps real fishes (Some might say all such research is "smoke and mirrors!").

Weeks later, things became a bit awkward when I arrived at work one morning to find live clownfishes sealed in plastic bags drifting in one of the holding tanks. The fishes were obviously stressed from lack of oxygen and some were resting on their sides, gasping for air.

I sought out my acquaintance, who quickly began telling me of his latest strategy involving live fishes. "I bag up clownfishes from one anemone and move them towards another anemone that is defended by more clownfishes; and I'm finally getting great results! Look at the display behavior!"

We discussed the responses he was observing as we headed towards the tanks and when we reached his captives I suggested that perhaps the lack of oxygen in the bags was affecting the fish's behavior. His reaction was memorable. As the implications of what I said began to sink in, his eyes focused on something that must

have been miles behind me and his mouth dropped open like a two dollar suitcase. "Oxygen? Oxygen! Well...I never considered that!"

Curiously, I was not invited on any other diving excursions, but I suspect that his research confirmed what many aquarists have discovered when they keep members of this group; that they are territorial and aggressive towards other fishes, particularly those that are closely related to them and might compete with them for food or space. And one should be mindful of these survival instincts when choosing aquarium mates.

My experiences underwater with fishes have always been interesting, but the most memorable were with the clownfishes near Eilat. Whether it is because they live in a stressed environment with fewer resources or simply that I had more exposure to them here, I found them to be feistier than any other little fish I've ever encountered.

Snorkeling over the shallow reef near the lab I regularly noticed larger clownfishes rising from their home anemone to inspect me. However, being new to the area and trying to absorb as much scenery as possible — as well as avoid fire coral, urchin spines and lionfishes — I didn't really focus my attention on these small inoffensive friends of the reef. Initially I assumed they were merely curious or were used to being fed by other divers, but I soon learned they were squaring off with me and defending their territory. When I came too close with my camera they would become visibly agitated and would charge it, behavior I'd seen before in Caribbean damsels.

I laugh when I think about how unaware we are of the world around us and it took several encounters with large clownfishes for me to realize what was happening with them. Or rather, what they were trying to tell me. One day I came across a particularly robust pair of fishes living in a large *Stoichactis* anemone on an isolated patch of reef.

This would be the pair I would photograph for an entire roll of film on just clownfishes.

The fishes were cooperative...too cooperative. As they swam out from their anemone to meet me I thought, "This will be easy." Apparently the larger clownfish had the same thought, but for different reasons. Squaring off in front of my face, it stubbornly blocked my path to the anemone and its companion. It was "Turk against Turk" over the reef in Eilat.

Clownfishes can move their eyes independently so they have a very expressive face. And if looks could kill, this fish was going about to do just that. At the same instant it finally dawned on me that all along these poor fishes had been reacting to their reflection in my camera lens and face mask and were defending their anemone, the clownfish decided it was about time to show this intruding member of its race just who had the hometown advantage. It charged head-on and rammed my mask! I'm not certain which of us was more flabbergasted.

Things look about one third larger underwater, and an angry fish that routinely chews on stinging anemones, even a small one, is *not* what I want hovering too close to my face. However, the fish had an expression like it had just banged heads with the "mother" of all clownfishes. We both returned to our corners eyeing each other warily until I retreated far enough that the clownfish felt secure and reciprocated by burying itself in the anemone and pouting.

Tucked away somewhere I still have my photo essay of clownfishes. Half the shots of a distant anemone with two tiny fish, the other half, a series of orange and white blurs of a clownfish that was too close and out of focus.

For the clownfish it was just another moment guarding the old homestead and doing chores around the anemone. For me, it was a day to remember. Another opportunity to learn from the sea and a chance to commiserate with an endearing clownfish.



Chasing Coastal Herrings

by STEPHEN C. SAUTNER

The anadromous members of the herring family (which includes the American shad, hickory shad, blueback, and alewife) have passionate, though often localized, followings among anglers up and down the east coast. Spawning runs bring the herrings into freshwater rivers — providing that no dams block their progress. The farther south the river, the earlier the run. For example, in November, both American and hickory shad enter the St. John's in Florida, while in July, a fine run of American shad (a.k.a. "poor man's salmon") enter the St. John's in New Brunswick, Canada. The hickory shad is mostly a southern fish, not found in significant numbers north of the Chesapeake, while the alewife is a more northern species. Both the American shad and the blueback are found in good numbers throughout its range, but the American shad is by far the most popular species among anglers.

The Delaware River boasts the east coast's longest unobstructed American shad run (over 350 dam-free miles) and is a real mecca for shad anglers. Shoals of boats, and armies of shorebound anglers can be seen throughout the river, beginning at Washington's Crossing, near Trenton in late March. By early May, the 50-mile stretch from the Delaware Water Gap to the Zane Grey Pool, at the mouth of the Lackawaxen River, is the place to be. The Junction Pool, where the East and West Branches of the Delaware meet 300 miles above tidewater, is about as far up the river you can go to catch shad in any numbers. It peaks around Memorial Day weekend.

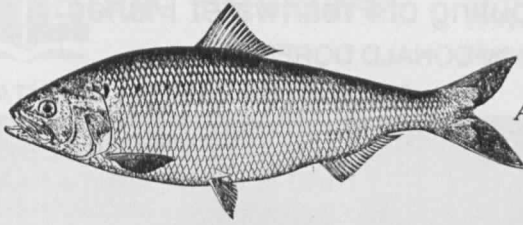
But while the shad is the real glamour fish of the Delaware, my own personal favorite of the family may be the *A staff member of Clean Ocean Action, Sautner is an avid fisherman who will be contributing regularly to the UN.*

blueback herring — a much smaller but infinitely spunkier fish. A hooked blueback is a real fireball, providing more leaps, runs, and head-shakes in 30 seconds than any 12-inch fish has a right to. A 14-incher is hell on wheels. Bluebacks enter the Delaware by the millions. They arrive later than shad, and migrate only about 30 miles above tidewater to somewhere around Bull's Island, New Jersey. If everything works out right, by the time I'm ready to fish for bluebacks, most of the shad are gone from the lower river — and so are most of the fishermen.

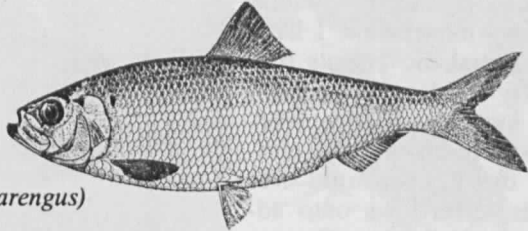
And if shad fishing on the Delaware means gearing up with neoprene, Thinsulate, Goretex, noodle rods, darts, and flutter spoons; or hopping in a boat armed with downriggers, fishfinders, dual anchors, and cassette decks, herring fishing means just the opposite. "Herring-wear" simply consists of a pair of cut-offs, old canvas sneakers, and a fly rod. The boat is left at home. The standard lure couldn't be more simple either. A size 10 gold hook, a small gold spoon, or a tiny jig with a couple of split shot ahead of it is hard to beat. If I'm feeling ambitious, I'll tie some herring flies consisting of a gold hook and maybe a wing of yellow bucktail. I can fit my entire arsenal into a mini tackle box, or better yet, an old tobacco tin slipped into my back pocket.

I look for bluebacks in small (and very wadeable) pools, riffles, and eddies. The deep holes that I reserve for shad fishing, I leave alone. A good spot is one where I can feel herring constantly knocking into my shins, and a good day will be in the 50-fish range. The only other fishermen I usually see are osprey and great blue herons.

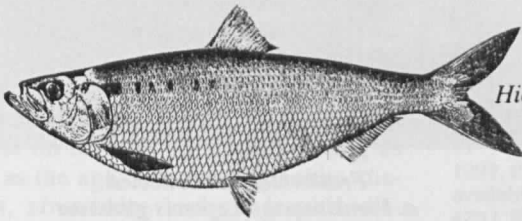
An added charm of herring fishing is the incidental catch of other species. The



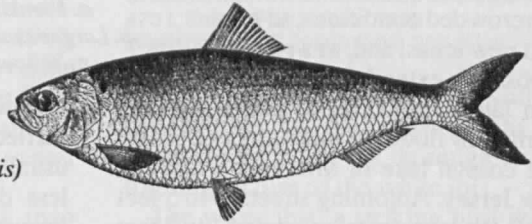
American shad (Alosa sapidissima)



Alewife (Pomolobus pseudoharengus)



Hickory shad (Pomolobus mediocris)



Blueback (Pomolobus aestivalis)

peak of the herring run often coincides with a three-week period when the lower Delaware turns into a fishbowl of warmwater fishes, and the chances of catching five species on five casts are very good. The common bycatch consists mostly of white perch, smallmouth bass, rock bass, and several species of sunfish, but the odd catfish, trout (usually stocked fish) or fallfish will occasionally come along. Sometimes larger fish are hooked. One morning a few springs ago, while casting a gold spoon into a nice-looking run, I hooked three fish on three successive casts: a six-pound walleye, a 12-inch blueback, and a six-pound walleye. Early morning and late evening excursions may bring flurries of striped

bass blasting into the bluebacks. Yes, I bring a heavier rod along for these occasions.

For true industrial-strength herring fishing, the old Fisherman's Wharf in Trenton is a must. Indeed, a visit to the New Jersey State Capital in spring isn't complete without watching the herring pros hauling bluebacks in two at a time. Sometimes the tail of a fat roe shad will be sticking out of one of the old spackle buckets otherwise filled with herring.

I once heard a shad angler fishing the lower Delaware bemoan a hooked herring that had taken her shad spoon, complaining that it meant the end of the run. Little did she know that for some of us, it really meant just the start.

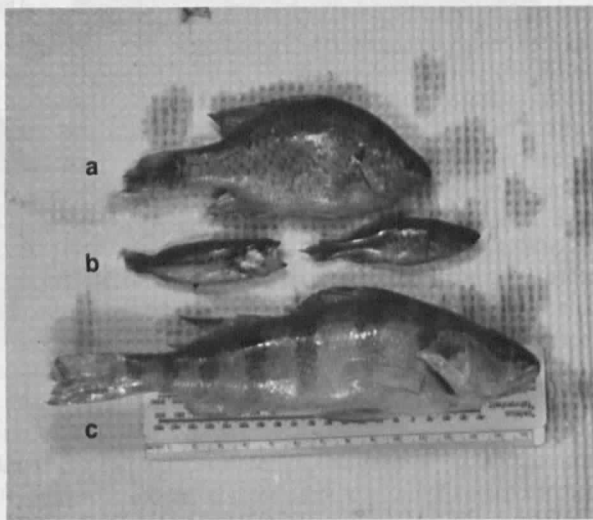


Redistributing of Freshwater Fishes

by DONALD DORFMAN

Many freshwater fishes normally migrate upstream and downstream and these fishes may also demonstrate lateral migratory movements. I have found lateral movements particularly evident in tropical water systems. Rivers overflow, as a result of heavy rainfalls, during seasonal wet periods. Overflows onto adjoining flood plains are accompanied by movement of fishes onto the flood plains to feed and spawn. This same type of movement occurs in temperate regions, but not with the same frequency. Such movement enables fishes, often because of overcrowded conditions, to exploit new areas, and, as a result, to possibly extend their range.

In late August, 1992, heavy rainfalls resulted in flooding in Deal Lake, a 155 acre coastal lake in Monmouth County, New Jersey. Adjoining streets, 4 to 5 feet above the lake, were inundated 1 to 2 feet with flood waters. A street paralleling the lake was seined in two seine hauls, and the three fish species caught included pumpkinseeds, large mouth bass, and



Freshwater fish collected
a. Pumpkinseed – *Lepomis gibbosus*
b. Largemouth bass – *Micropterus salmoides*
c. Yellow perch – *Perea flavescens*

yellow perch. Freshwater fishes may be carried into coastal waters during unusually heavy rainfalls when the lighter, less dense, fresh waters 'float' on the heavier salt waters, and in this manner these fishes may be introduced into adjoining watersheds, or provide a greater gene pool with their species already inhabiting these waters.

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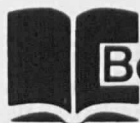


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Highlands, NJ 07732



Book Reviews

STATUS OF FISHERY RESOURCES OFF THE NORTHEASTERN UNITED STATES FOR 1992 NOAA Technical Memorandum NMFS-F/NEC-95

available from: Information Services Unit,
NMFS/NOAA

166 Water St., Woods Hole, MA 02543-1097

Granted it's not "The Hunt for Red October" but if you want a good glimpse of how the National Marine Fisheries Service accumulates and uses data to assess fishery stocks, this is it. Keeping track of what is caught and what effort it took to catch it is just a part of the job. Research trawls gather data over a wide geographic range using nets with small mesh sizes which allows NMFS to get a handle on the up-and-coming young as well as the age, sex, feeding habits, diseases, abundance and geographic distribution of the adults. Started in 1963, these spring and fall trawls covering waters from 5 to 200 fathoms from Cape Hatteras to the Canadian border are the longest running time series of vessel sampling in the world.

All these data get reduced into monitoring and predictive indicators that summarize the present and probable future of important commercial and recreational fish.

How are things going? Not so good. Groundfish like cod, pollock, and haddock have been and are being seriously overexploited. The same goes for all species of flounders. The commercial fishermen also face a considerable increase in effort and expenditure to bring in fewer and fewer fish. Not every species is down, however. Pelagics such as herring and mackerel are increasing and a number of finfish seem to be holding their own.

In waters as heavily exploited as the New England shore you wouldn't think a new fishery possible but one has sprung up — green sea urchin landings rose

from zip in 1986 to 9300 tons annually in 1991. One can't help but wonder what changes their diminution will bring.

DKB



WHITE IBIS: Wetland Wanderer

by KEITH L. BILDSTEIN

1993, 272 pp. hardback
available from the Smithsonian Institution Press
470 L'Enfant Plaza, Suite 7100
Washington, DC 20560 (202) 287-3738
\$22.50

This well-written book, laden with excellent pictures, drawings, graphs and tables, provides a very thorough and intriguing picture of the white ibis.

The white ibis, a striking bird with a distinguishing long, downwardly curving bill, is found mostly in colonial nesting habitats in coastal North and South Carolina, Georgia, Louisiana, and Florida. It is currently under siege due to habitat, especially freshwater feeding site, loss.

The author is director of research at Hawk Mountain Sanctuary in Kempton, Pennsylvania and a research fellow at the Baruch Institute for Marine Biology and Coastal Research in South Carolina, and has spent the last ten years studying ibises. He uses multiple techniques, including an illustrated natural history, his own field notes, comparative studies of other species in the family, and detailed discussion of behavioral observations to successfully provide the reader with a very complete grasp of the ecology of the

white ibis and its crucial wetland environment.

The author answers many provocative questions, such as why do wading-bird colonies form at certain localities?, what is the functional significance of the ibis' uncommon decurved bill?, and what happens to a colony of wading-birds after a devastating episode such as Hurricane Hugo which hit the SC coast in September, 1989? **WHITE IBIS** also provides an excellent discussion of the Scarlet ibises struggle in Trinidad, including an exciting solution.

In his discussion of the conservation of ibises, the author encourages the reader and wildlife managers to make decisions that retain the fundamental ecological principle of the interconnectedness of coastal ecosystems. In his powerful conservation message, the author asserts that ibises need both a "kitchen" and a "bedroom," and concludes that habitat loss, especially in the coastal zones, is deleterious to all creatures in the near and distant future. PRJ

THE EDGE OF THE FOSSIL SEA

by EDWARD J. PETUCH

1992, 80 pp. paper
available from the Shell Museum
PO Box 1580, Sanibel Island, FL 33957
\$14 pp.

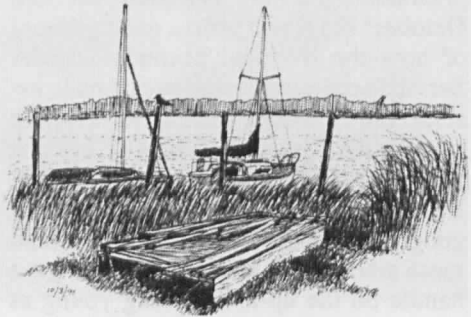
South Florida is shell country and has been from geologic time. Although south Florida is now covered by land, fresh water lakes, and swamps, it was once — a mere million years ago — an immense shallow sea. Deep layers of fossil shells underlie the peninsula. The shell fauna of the middle Pleistocene was much richer than are the shores of present day Sanibel or, for the matter, the present day Barrier Reef or the Philippines.

Although flat without feature, as the cane fields north of the Everglades attest, enough quarries, canals, and borrow pits have been cut into the landscape to give the author, a professional geologist, a good look at the last three million years. Concentrating on the middle Pleistocene,

mainly the Bermont formation, the author has both mapped and examined its contents.

The author has studied the text with photos of fossil shells and drawing reconstructing what land and sea must have looked like in those days. A good read if you are passively interested in the region's geologic history and a must if you intend to collect fossil shells down here.

DKB



ONE SQUARE MILE ON THE ATLANTIC COAST

by JOHN R. QUINN

Walker and Co., NY
186 p. \$17.95 (paper).

How to publish a very good book: find an author who is steeped in his subject; narrow the focus to encourage depth of coverage; have the author illustrate his own writing (and make sure he draws well). This book is the result of such happy marriages.

Quinn has taken the area around Shark River Inlet, NJ, and dealt with it comfortably and well, with charm and accuracy. He covers mudflats, piling communities, sea birds, crabs, migrating fish, flotsam, angling, and just plain beachcombing in all seasons and at all tides. He is a naturalist, a diver with a trained eye; his words are accompanied by sketches showing the finer points of his subjects. While the book concentrates on a small part of the Jersey shore, it will excite the general coastal reader. Highly recommended (available from ALS for \$12.00 postpaid).

A BIOLOGICAL SURVEY FOR THE NATION

by the National Research Council
1993, pp. 205, paper
available from the National Academy Press
2101 Constitution Avenue, NW, Box 285,
Washington, DC 20055 (800) 624-6242
\$26.00 paper

This publication is actually a report regarding the enormous project announced last March by the new Secretary of the Interior Bruce Babbitt: the National Biological Survey (NBS). As described by Babbitt:

"The National Biological Survey will produce the map we need to avoid the economic and environmental "train wrecks" we see scattered across the country. NBS will provide the scientific knowledge America needs to balance the compatible goals of ecosystem protection and economic progress. Just as the U.S. Geological Survey (USGS) gave us an understanding of America's geography in 1879, the National Biological Survey will unlock information about how we protect ecosystems and plan for the future."

Following in the footsteps of the USGS, created to establish baseline data on mineral resources, the NBS is designed to be "an independent biological science agency created by combining existing research, inventory and monitoring and information transfer programs of seven Interior bureaus." The NBS, intended to become a world class science organization, was hatched in response to this demand for credible and consistent biological information. It was made operational on October 1, 1993 by the President's signing of the Interior Appropriations bill for FY 1994.

A BIOLOGICAL SURVEY FOR THE NATION, prepared by the National Academy of Sciences, is the first report on the NBS. It discusses in some detail the intended scope of this broad and ambitious undertaking and conclusively asserts that the NBS should facilitate information ex-

change and research partnerships with multiple entities including states, universities, non-governmental organizations (such as the American Littoral Society), and interest groups.

The report defines the NBS, and its mission to "gather, analyze and disseminate the information necessary for the wise stewardship of our Nation's natural resources, and to foster an understanding of our biological systems and the benefits they provide to society." Part of this scheme is NBS' leadership role in the establishment of the National Partnership for Biological Survey, a national, multisector cooperative program of all the above-listed entities to collect and assess the data necessary to understand the status of the nation's biological resources and the related trends. In an effort to put this highly bureaucratic effort into perspective, this publication answers questions such as:

- What needs will a biological survey for the nation address and how will it be created?
- How will the national partnership strengthen the information base for planning and operational decisions.
- How will the national partnership provide an organized framework for collaboration among its participants?
- How will the national partnership provide improved programmatic efficiencies and economies of scale? How should the national partnership be implemented and what are its limits?

Fortunately, the sometimes circuitous discussions of laudable goals and tasks is broken-up with intriguing discussions of issues and information-networking projects in the U.S. and around the world. Not exactly light reading, but an important work if you are interested in understanding the intended face of things to come in Washington's biological bureaucracy and its effects nationwide.

PRJ



THE LAST PAGE

Easy Answers To Tough Questions II...

Several issues ago, we tried to answer readers' sea-related questions. The response was astounding. Mail poured in, with even more difficult questions. But, enough introductory material. Let's open the envelopes and get right to it. (Special tip to school kids: use these answers on your next test; your teacher will be impressed.)

Q: Last week, the little woman and I took a cruise to Bermuda, and we noticed how blue the ocean was offshore. What causes this color?

A: Rainwater falling on land dissolves lots of minerals. Rivers run to the sea, carrying their loads of solubles, which, in turn, tint the ocean. Between here and Bermuda, the ocean is blue because of dissolved cobalt.

Q: What makes the ocean salty?

A: Anchovy paste.

Q: What causes tides?

A: Frankly, no one knows for sure. One theory has to do with the alignment of the sun and moon, but tides also occur on cloudy days, shooting that theory down. Others credit (blame?) tides to (on?) gillnetters, but archaeological records refer to tides many centuries ago, before gillnets were invented. Best to just admit that tides happen and preserve their mysteries.

Q: What is the difference between an estuary and a bestiary?

A: An estuary is where polluted water meets clean water; an example would be New Bedford Harbor in Massachusetts.

A bestiary is a place where medieval scholars studied animal behavior. And, at no extra charge, an aviary is a cage full of flying animals except bees, in which case it is called a beehive.

Q: Why do people dump poisons like dioxin in the ocean?

A: Because that's the best place to dump them; the ocean is so big it will never be polluted.

Q: (Follow up) How big is the ocean?

A: Your question is imprecise. There are several oceans — the Atlantic, the Pacific, etc. And they're all huge. For example, the Pacific Ocean is bigger than Lake Superior.

Q: Can dogs drink ocean water?

A: Yes, but it makes them sick.

Q: Are there really such things as giant clams that drown people?

A: Absolutely. Just last week, such an incident was reported in the WEEKLY EAGLE. See "Killer Clam Claims Canadian Coed," Vol. 71, No. 4. And tune in to "Clam Widows: Will It Ever Stop?" on the next Geraldo Rivera.

Q: Can flying fish really fly?

A: Of course. How do you think they got that name?

Q: Why do fools fall in love?

A: Sorry, we're out of space. See next issue.

D.W. Bennett

Continued from inside front cover.

July 13

SHARK/TUNA FISHING/TAGGING

For the 12th annual trip, we'll board small, fast boats (outfitted by Greater Point Pleasant Charters and the Jersey Coast Shark Anglers) to search for, maybe find, hook, fight, tag, and release makos, blues, and duskies. If tuna and/or bluefish are around, we'll try for them, or just sit back, relax and look for seabirds and marine turtles.

Cost: \$75 per person covers boat, bait, tackle, tags and guides.

August 7

CRAB FEAST

MARYLAND EASTERN SHORE

Our 21st annual crab eating frenzy and volleyball duel. All the big, steamed crabs you can eat plus burgers, dogs, salads, beer, soda, under the merciful shade of the Tuckahoe Steam and Gas Association Park near Easton, MD.

Cost: \$20 per person (kids under 10 free).

August 18-21

CAPE ANN WHALEWATCH, MA

This new trip features a sunset sail, beach and bird walks, two half-day boat trips offshore to watch whales, seals, pelagic birds and nest eiders. A northerly summer treat.

Cost: \$245 per person covers three nights lodging (double), all boat and guided tours, but no meals.

October 4-11

BERMUDA WEEK

The reefs, West Indian invertebrates, fishes, ocean life, tropical flora and beautiful beaches of this oceanic gem beckon. We'll snorkel, walk, wade and learn in special places like Harrington Sound, Whalebone Bay and Tobacco Bay.

Cost: \$860 per person covers room (double) and board (except Sunday evening) at Bermuda Biological Station, boats and activities, transport, lectures, guides, but not airfare.

October 20-29

GALAPAGOS

Our fourth trip to this spectacular world of islands, iguanas, birds and turtles, led by trustee Mickey Cohen, offers boating, snorkeling, beachcombing, and exploring at volcanic craters, rocky seashores, mangrove

forests, sandy beaches and more. We'll see a variety of treasures such as masked boobies, red-billed tropicbirds, Galapagos hawks, fur seals, and albatross in these enchanting islands.

Cost: \$3348 per person with optional jungle extension for \$948. Write or phone for more details.

AMERICAN LITTORAL SOCIETY

REGIONAL OFFICES

The Society maintains regional offices where members may keep up with local issues and events. Call the chapters for newsletters and local field trip information.

NEW YORK

28 West 9th Road, Broad Channel, NY 11693
718-634-6467

NEW JERSEY

American Littoral Society

Highlands, NJ 07732, 908-291-0055

NY/NJ HARBOR BAYKEEPER

American Littoral Society

Highlands, NJ 07732, 908-291-0176

**WATERSHED ASSOCIATION
OF THE DELAWARE RIVER**

P.O. Box 753, Lambertville, NJ 08530
609-397-4410

DELAWARE RIVERKEEPER

12 Delaware, Lambertville, NJ 08530
609-397-3077

**SOUTH ATLANTIC/
GULF COAST**

Box 3828 Sarasota, FL 34230
813-951-0884

SOUTHEASTERN FLORIDA

7601 S.W. 134 Avenue, Miami, FL 33183
305-385-6880

PROJECT REEFKEEPER


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305-858-4980

**CAPE FLORIDA PROJECT
An Ecological Restoration**

1200 South Crandon Blvd.
Key Biscayne, FL 33149
305-667-4166

WESTERN REGION

P.O. Box 6048 Olympia, WA 98502
206-754-1417



AMERICAN LITTORAL SOCIETY

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