

PARKER RIVER NATIONAL WILDLIFE REFUGE

Newburyport, Massachusetts

NARRATIVE REPORT

07/01/73 - 06/30/74

United States Department of the Interior
Fish and Wildlife Service

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Newburyport, Massachusetts 01950

Permanent Personnel

George W. Cavutis, Jr.	Refuge Manager
William Koch (Transferred in from Great Swamp N.W. Refuge, N.J., Sept. 15, 1974)	Refuge Manager (Asst.)
Bryan H. Robinson (Transferred to BLM-Montana on Aug. 15, 1974)	Public Use Specialist
William R. Forward	Wildlife (Management) Biologist
Donald G. Grover	Visitor Assistance and Safety Specialist
Linda D. Kipp (Transferred to Great Meadows N.W. Refuge, Mass. on Dec. 2, 1973)	Refuge Manager (Trainee)
Catherine A. Welch (Retired effective 12/31/73)	Refuge Clerk
Frances Randall (EOD 12/12/73, resigned 1/31/75)	Refuge Clerk
Clara V. Bell (EOD 1/10/74)	Refuge Clerk
Thomas J. Stubbs	Foreman
Raoul J. DeSerres	Maintenanceman
Irvine H. Walker, Jr.	Maintenanceman

Temporary Personnel

John W. Langan	3/27/73-8/24/73 5	Camp Director, Youth Conservation Corps
Alan Railsback	3/27/73-8/24/73 5	Work Leader, YCC
Malcolm Fraser	6/18/73-8/17/73 2	Work Leader, YCC
Daniel O'Brien	5/27/73-9/2/74 3	Refuge Clerk
William Graigaille	6/10/73-8/24/73 2	Conservation Aide
Stephen P. Doty	5/17/74-11/14/74 6	Laborer
Denny Chiu	5/27/73-9/5/73 3	Recreation Aide
Gregory Jenkins	5/27/73-8/18/73 3	Recreation Aide
Gary Petroff	5/21/73-8/25/73 3	Recreation Aide
Mark Szykowiec	5/31/73-8/23/73 3	Recreation Aide
Paul Balkus	1/20/74-3/15/74 & 5/26-9/28/74 4	Summer Aide
Darlene Brown	6/18/73-7/14/73 1	Summer Aide
Errol S. Setalsingh	6/18/73-9/1/73 3	Summer Aide

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NARRATIVE REPORT
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PARKER RIVER NATIONAL WILDLIFE REFUGE
Newburyport, Massachusetts 01950

I. GENERAL

A. Weather Conditions:

Fiscal year 1974 total precipitation (41.22") was much less than in 1973 when we had 55.93". Mean annual water equivalent precipitation is 41.5" according to the Boston Weather Bureau Station (located 35 miles south). Annual snowfall locally was 27.75" in FY 1974 compared with a mean annual total of 41.9", further reflecting the drier conditions prevalent in 1974. No serious storms occurred in FY 1974, and the mean annual temperature of 52.3° was up significantly from the long-term annual mean of 50.9° reported in Boston Weather Bureau records. This continued the generally mild trend seen in recent years.

B. Habitat Conditions:

1. Water: Despite less total precipitation over the year, water levels were adequate, followed typical seasonal patterns, and management objectives were met. Minor drawdown of South Pool and Stage Island Pool levels was accomplished as necessary. Pools were frozen in January and until February 24th when they opened up.
2. Food and Cover: Mixed growths of assorted emergent and aquatic plants developed in normal fashion. These included stands of pest plants such as phragmites, purple loosestrife and cattail, along with desirable species. As water levels receded in late summer, marginal growths of panicum grass, wild millet and smartweed volunteered.

All upland field units (86 acres in 5 fields) adjacent to the pools and marshes have been planted in a permanent grass mixture (Timothy, Viking Birdsfoot Trefoil and Empire Birdsfoot Trefoil). Migrant Canadas arrived in early October and utilized the fields well in the fall and again early in the spring of FY 1974. Salt marsh areas were as productive as usual, judging by waterfowl numbers and use patterns.

COMPARATIVE*

Annual Use Days

For Three Key Species

1969-1974

	<u>Black Duck</u>	<u>Canada Goose</u>	<u>Green-winged Teal</u>
1969	1,411,400	462,010	261,620
1970	1,118,875	341,050	232,700
1971	907,750	411,170	187,230
1972	789,600	427,460	184,020
1973	769,500	559,500	144,000
	<hr/>	<hr/>	<hr/>
5-Yr. Average	999,425	440,238	201,914
	<hr/>	<hr/>	<hr/>
1974	1,012,500	608,400	238,500
Difference From Average	+ 13,075	+ 168,162	+ 36,586

*Not precisely comparable due to use of different base units.
 (1973-74 are fiscal years; 1969-72 are calendar years.)
 However, for these purposes, the differences on an annual
 basis are not considered that crucial.

II. WILDLIFE

A. Migratory Birds:1. Waterfowl:a. Canada Geese:

This species made excellent use of the area with 608,400 use days in FY 1974 compared with 557,500 use days in FY 1973 (+9%). The increased goose use occurred chiefly in the January-June period, a reflection of the greater number overwintering due to mild winter conditions, coupled with heavier use of refuge salt marshes in the spring by this species. Peak population was 10,000 geese in March of FY 1974 while the previous November peak was 5,000 birds. Only 60 young geese in 16 broods were produced in the refuge pools and vicinity as cool, damp spring conditions reduced average brood size by chilling eggs. Total numbers of nesting pairs were also down slightly over that seen in recent years.

b. Other Geese:

Scattered snow goose use occurred over the year with 3,150 total use days, and an April 1 peak of 200 birds noted. This was in contrast to 1973 when use was negligible and is indicative of the pattern of occurrence by this species in this area.

c. Black Ducks:

In FY 1974 black ducks increased locally with 1,012,500 use days noted compared to 769,500 in FY 1973. This was a 24% increase over 1973 but since it was a local index occurring at a time of reported declines in overall population levels in this species, the increase may be more apparent than real. Peak numbers reached 12,000 in December (compared with a peak of 9,000 in 1973) and subsequent use in the relatively mild January-June period was substantial, contributing to the increased use. Migrations, insofar as could be determined, appeared to be normal as to timing. Production of black ducks followed the low output pattern of recent years with 180 young raised to flight stage.

d. Other Ducks:

Green-wing teal use days in FY 1974 climbed substantially over 1973 with 238,500 use days being noted. Total use days in 1973 were 144,000, thus there was a 40% increase. Peak numbers in 1974 were 5,000 (compared with a peak of)

3,000 in 1973). Bulk of the increase took place in the October-December period and less so in the April-June period. Production was low with an estimated 40 green-wing teal in 6 broods being raised to flight stage.

Mallard use days were similar to past years, with 67,800 in 1974 compared with 63,900 in 1973. Peak number in late October was 600. A total of 160 young were produced to flight stage as this species continued to use nest boxes and natural sites with fair consistency.

Blue-wing teal use increased some in 1974, going to 80,700 use days from 54,600 in 1973. Late September peak was 2,500 birds. An estimated 140 young blue-wings were raised to flight stage.

Gadwall continued to slowly increase, showing 25,200 use days in 1974 compared with 17,100 use days in 1973. They peaked at 200 and continued to steadily develop as a local nesting species with 120 young raised to flight stage.

An estimated 20 pintail were also produced along with 10 ruddy ducks. Interestingly, during the nesting season, several newly hatched duck broods were seen making long overland treks from the dunes to the fresh water impoundments along our main access road. A ditch along the road and upland edge would undoubtedly be much appreciated. Also of note in FY 1974 was the fact that several shoveler pairs were seen in the area through the breeding season and, although we failed to confirm nesting with a brood sighting, we suspect they did nest.

An experimental transplant of young wood duck ducklings to induce the establishment of a nesting population on the refuge took place in FY 1974. See Section V. for details.

Other visiting dabbling ducks normally expected in the locale were seen in 1974. These included widgeon which peaked in late September with 1,200; pintail with a peak of 300 on September 30; shoveler with a November peak of 300; and wood ducks with a late June peak of 150.

Diving ducks were seen infrequently as usual because of restricted fresh-water habitat and more attractive estuarine habitat in the Merrimack River several miles to the north. Observed on the refuge in FY 1974 with peak numbers were scaup (100), common goldeneye (250), bufflehead (300), ruddy (100), and old squaw (100). Most of these

birds are seen in the Plum Island River and Sound area with sporadic use of the pools by certain of the species when pools were free of ice.

Mergansers, mainly hooded, and some red-breasted were seen in small numbers in the tidal areas and less often in the pools.

2. Other Waterbirds:

American coots occurred in moderate numbers in 1974. Total use was 36,300 use days compared with 38,100 in 1973. The peak number was 1,000 in October and 80 were produced within the fresh-water pools.



May 1974

George W. Gavutis, Jr.

All other species typical of the area were seen at appropriate times. These included common gallinules (7,200 use days) which produced an estimated 100 young; snowy egrets (which do not nest) which provided 12,000 use days and a September peak of 700; glossy ibis, with a peak of 60, and black-crowned night herons which produced an estimated 150 young and provided 17,600 use days.

Least bitterns, pied-billed grebes, sora and Virginia rails nested in the pools in small numbers.



1974

Walter Soroka

3. Shorebirds, Gulls and Terns

Use by shorebirds was generally similar to recent years based on scattered observations. Noteworthy was the appearance of 50 Hudsonian godwits in late August.



June 1974

Walter Soroka

Stilt sandpiper feeding in salt pans near parking area #3 - a popular spot with local birders.

Gulls were also noted in species and numbers typical of the locale with Herring gulls predominating.

Terns continued to be seen in numbers and kinds typical of recent years. Common terns were most numerous with an estimated 100 young again produced in the nest boxes and on islands and muskrat houses scattered within the fresh-water pools. Least terns continued at low ebb with an estimated 30 young produced at scattered points along the high beach. Even fewer piping plovers hatched in the same general area. A combination of human disturbance, an apparent trend toward a narrower and lower upper beach, periodic excessively high tides and skunk predation on eggs are all operating to reduce the nesting success of these species in our area.

4. Doves were noted almost on a year-round basis in small numbers. They peaked in early September at 600 and an estimated 40 young were produced.

B. Upland Game Birds:

Ring-necked pheasant continued to concentrate in and around the pool system and grassland units. Interchange between the Plum Island portion of the refuge and mainland occurs as environmental conditions fluctuate. A total of 50 young were raised and a peak of 100 birds occurred in late September.

C. Big Game Animals:

A few white-tailed deer occur within the refuge. They freely interchange with the adjacent mainland in response to various factors including periods of heavy public use and changing environmental conditions. A peak of 8 animals was noted and 2 fawns were known to have been produced.

D. Fur Animals, Predators, Rodents and Other Mammals:

Musk rats have built up slightly in the pool units apparently in response to more favorable water conditions. The bulk of the animals are in the North Pool and Stage Island Pool.

Fall Muskrat Populations

	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>
Stage Island	700(140)	500(100)	450(90)	250(50)	350(70)
South Pool	--	--	10(2)	10(2)	10(2)
North Pool	<u>700(140)</u>	<u>500(140)</u>	<u>500(100)</u>	<u>300(60)</u>	<u>400(80)</u>
	1,400	1,000	960	560	860

Figures in parenthesis represent number of houses.

Population figures estimated and based partially on house counts.

Various other mammals and rodents were seen during the year, including a few red fox, striped skunks, woodchucks and short-tailed weasels. Norway rats are found near Subheadquarters and other buildings.

Cottontail rabbits continued to be found in moderate but increasing numbers now that red fox are reduced as a result of mange. They are concentrated in brushy areas along the main road and in and around the field areas.

E. Hawks, Eagles, Owls and Crows:

Most species were seen at normal times and in usual numbers. Such species as the threatened Arctic Peregrine Falcon were rarely seen, however 2 were noted one day in October. Marsh hawks peaked at 15 in early September. American kestrels were seen in reduced numbers over recent years with a maximum of 6 seen at one time in April. American rough-legged hawks were seldom seen in 1974 with a peak of only 2 noted in early February.

One immature bald eagle was seen briefly over the refuge area at the beginning of November.

Snowy owls were also seldom seen in 1974 with a maximum of 3 individuals noted on February 20. Also seen in 1974 was a long-eared owl, short-eared owls, and a saw-whet owl.

F. Other Birds:

A female yellow-headed blackbird was seen in May. The prolonged cool wet spring conditions in May also reduced insect population levels to the point where an unprecedented flight of scarlet tanagers landed at points in the Northeast, including the refuge, with up to 50+ seen looking weak and moping around on the ground looking for insects. They suffered considerable mortality along superhighways in the Northeast.



May 1974

William R. Forward

Our local martins were also subject to this same spell of wet weather and resultant shortage of insect foods for a period of time which disrupted their nesting cycle. A raven (semi-tame) was picked up from the refuge beach following several reports of it in May. It was turned over to the Squam Lake Science Center in New Hampshire.

Bank swallows continued to nest at isolated points in the dunes and on Grape Island. Tree swallows as well as martins nested in boxes set up for them. Kingfishers were also summer residents and may nest in the banks on Grape Island.

G. Fish:

Surf fishing in FY 1974 was similar to recent past years, except for the fact we had a solid run of blue fish on the North Shore (reportedly for the first time in 60 years) which provided con-

siderable sport in the July-August period. These fish ran up to a reported 17 lbs. and many were taken from the surf while they ran terrified schools of herring out onto the beach. Striped bass and mackerel fishing declined considerably while the blues were present and, in fact, it never was what could be considered very good in 1974.



UPSIDE DOWN
←

June 1974

William R. Forward

Many novice blue fishermen failed to use steel leaders resulting in an abnormally large number of plugs floating away and being found by gulls.

Several hundred mosquito fish (Gambusia) were transplanted from Great Swamp National Wildlife Refuge in New Jersey during June into several upland ponds. These fish appeared to adapt, thrive and overwinter successfully (aided by the mild winter conditions) and we are hopeful they will add a biological control factor to our mosquito control.

The special summer fishing program for the crippled children from Camp Sea Haven continued this year. It provided an enjoyable opportunity for many of the youngsters to catch the "scrappy" white perch which are found in the North Pool area.

H. Reptiles:

Eggs of amphibians such as the wood frog and green frog were collected outside the refuge and placed in several of our pools and marshes to augment limited natural populations and encourage their

increase. The salt marsh has thus far proved to be a significant barrier for most species in this group despite the suitable habitat.

Several sightings of garter snakes, snapping turtles and, rarely, painted turtles occurred during the year.

I. Disease:

Sea clams remained toxic from Paralytic Shellfish Poisoning during the year according to the Massachusetts Public Health Department.



1974

George W. Gavutis, Jr.

Red or pink water and green foam associated with Paralytic Shellfish Poisoning occurrence.

III. REFUGE DEVELOPMENT AND MAINTENANCE

A. Physical Development:

1. Marsh and Water:

None.

2. Roads and Trails:

The refuge road was periodically graded and several loads of gravel were hauled to maintain the road in a passable condition throughout most of the period. The Youth Conservation Corps Camp enrollees placed wood chips on the Hellcat and Kettle Hole Nature Trails; the placing of the wood chips helped to delineate

the trail and encouraged the public to stay on the trail. Five more boardwalks were constructed and laid over the sand leading from six parking lots to the beach front. This encourages beach users to stay on a single trail and should reduce dune erosion and damage to vegetation caused by people walking on many different trails. Three wells left from former camps on Grape Island were filled in by the YCC enrollees for safety reasons. A one-way spike treadle traffic control device (manufacturer's product name - Traf-I-Trol) was installed at the north boundary in the exit lane of the refuge road.



1974

George W. Gavutis, Jr.

This enabled us to lock the entrance gate at night to prevent cars from entering and leave the exit gate open to allow people who had night fishing and camp permits or other legal authority and who had entered before the entrance was closed to remain in the refuge or exit over the one-way spikes at any time. This device has worked very satisfactorily and has reduced the need for late night patrol and warning the entrance gate during the closed hours. While quite a few people have figured ingenious methods to get over the spikes using mattresses, boards, etc., the great majority turn away and leave because they know they no longer can say they just drove in, not noticing the "Closed" signs, as they had in the past. One group of five cars which either didn't see or didn't believe the warning signs made it down the road several miles before their tires started going flat. They had enough spares to get to a gas station with a load of flats -- sufficient punishment. Occasional patrols and

stake-outs were made after the gate was closed to monitor the effect of the spikes. It got to be popular duty. The funniest incident noted was when a car pulled up and the intellectual driver and occupants got out to look and put their heads together. They quickly jumped back in, turned the car around, and proceeded to back over the spikes.

3. Fencing and Posting:

The refuge boundary was maintained during the period. Directional and informational signs were installed, taken down and maintained as seasons and conditions dictated.

4. Buildings:

All buildings located at Headquarters and the new comfort station were painted by the YCC enrollees. We purchased \$1,200 worth of plexiglass to repair the north lighthouse located on Thatcher's Island (a satellite refuge). This lighthouse is a National Historic Site under Executive Order 11-598, and the Service has the responsibility to maintain it. Since we started to proceed with temporary repair we have encountered many setbacks, such as attempting to get acceptable bids from contractors; the one price we received was over \$3,000 which exceeded both our money and open market purchase authority. The Town of Rockport agreed to appropriate \$3,000 in matching funds but neither they nor we (including the Regional Office or our Finance Division) knew how the Federal Government could spend the Town of Rockport's money. The top of the lighthouse was subsequently vandalized on two occasions, resulting in several thousand dollars worth of additional damage. The one improvement to the lighthouse was our temporary repair to and rehangings of the metal doors leading into the tower which now permits us to lock the building. In these times of increasingly tight money nobody needs a Thatcher's Island.

5. Equipment:

During the subject period we received two half-ton pickup trucks with power steering, power brakes and large eight-cylinder engines. Our requisition to the Regional Office was for simple six-cylinder engines but because gas guzzling eight-cylinders had become a drag on the market, we had to agree to eight-cylinder engines, etc. in order to receive the vehicles when needed. Needless to say, it won't be any easier to meet the mandatory 25 $\frac{1}{2}$ % reduction in fuel consumption.

6. Plantings:

None.

7. Collections and Receipts:

None.

8. Control of Vegetation:

See Section V.

9. Planned Burning:

None.

10. Fires:

Three insignificant fires (grass and brush) occurred in or adjacent to the public use areas and along the roadside, probably caused by carelessly discarded cigarettes. The total burned area was less than one acre.

IV. RESOURCE MANAGEMENT

A. Grazing:

None.

B. Haying:

Cutting of salt marsh hay increases shorebird, waterbird and waterfowl use of marsh areas. One special use permit was issued for the harvest of 25 tons of salt hay. Fee \$25.00.

C. Fur Harvest:

None.

D. Timber Harvest:

None.

E. Commercial Fishing:

None.

F. Other Uses:

Receipts from the special use permits for rental of life-use buildings amounted to \$1,212.25.

Three special use permits were issued without charge to the Colonial Retriever Club for the purpose of conducting one three-day retriever trial and two one-day field trials.

V. FIELD INVESTIGATION OR APPLIED RESEARCH

A. Waterfowl Banding:

Eight hundred thirteen birds were banded in pre-season operations as our portion of the annual Atlantic Flyway banding program. The State quota was 500 black ducks; we trapped and banded 502 blacks, plus 238 mallards, and scattered other species using conventional wire traps with cracked corn as bait. Included in the total birds banded were 33 Canada geese (not part of Flyway quotas and chiefly locals) to provide us with information on our local flock and to demonstrate techniques to the Youth Conservation Corps. The cost per bird to band 780 ducks was .50 each (not including extra assistance given by other temporary employees and YCC members being given orientation), including costs for permanent personnel involved, materials and bait. The Refuge Manager (Trainee) did a good job in this program.

B. Wood Duck Transplant:

A total of 42 wood ducks (almost all locals) was transplanted from Great Swamp National Wildlife Refuge in New Jersey, banded as experimental, and released prior to flight stage (a few, capable of early flight, had developing primaries which were pulled - to provide a temporary delay in flight achievement) on July 18, 1973 in the North and Stage Island Pools. Nest boxes were placed in these release areas by the next spring's breeding season. We were hopeful that young female wood ducks, imprinted during pre-flight and early flight periods to these specific ecological units, would return and perhaps be induced to nest in an area where wood duck production has never been known to occur. The pools are occasionally used by migrant wood ducks and regularly used by molting males and the cattail backwaters seem to provide excellent wood duck brood habitat. Unfortunately, no wood ducks nested in the impoundment the next spring but at least one female homed back to our area instead of its birthplace at Great Swamp. Unfortunately, she decided to check out nesting possibilities in a chimney near the mainland portion of the refuge instead of the nest boxes in our pools and she was killed. We probably did not move enough birds and authorization could not be obtained for a follow-up attempt the next year. Also possible is that the breeding woodies

miss the tall timber and thus prefer to look on the mainland for nest sites.

C. Dove Banding:

Mourning dove banding was moderately successful this year as we cooperated in an expanded program to sample the eastern population. Four hundred twenty-one doves were banded at a cost of .35 per dove. We continued to use the modified Kniffen type traps with wheat bait very effectively.

D. Purple Loosestrife Control:

Experiments in purple loosestrife control by use of approved chemicals continued this period in the North Pool for the third and probably final year. Dicamba was used in a ground application at a rate of up to 3 $\frac{1}{2}$ AI/acre in water carrier with a backpack-mounted Solo mist blower during June-July and 8 acres were treated in the margin of the pool. This turned out to be an extremely difficult and time-consuming job, and based on an analysis of results seen from treatments of previous years, the final effectiveness will probably be less than desired. Previously treated areas showed a surprisingly strong regrowth pattern in this plant species which has been discouraging and reflects its aggressiveness and the difficulty in controlling it by chemical means.

The South Pool was reflooded once in late August with tidal water in our annual attempt at controlling purple loosestrife by salt-water or biological methods. As usual, the bulk of all emergent vegetation including stands of purple loosestrife, particularly in the lower parts of the pool which were flooded longest, was killed back by the effects of the salt water. This control method seems to help but we find that regrowth subsequent years by small seedlings is usually sufficient to maintain viability of the purple loosestrife community on a long-term basis. We are now hoping to encourage research toward finding what, if any, natural controls keep the plant in check in its native Europe.

E. Artificial Nesting Devices:

All nesting structures (100) in the pools were checked and refurbished as necessary before the season. Old wire cones were replaced with our standard wooden box which contains hay and has a slit down the front to permit ducklings to exit. As in the past, only one nesting check was made early in the season (5/4-18) to see what and how many birds attempted to use them. No standard nesting study data was developed because of disturbance factors. Use, particularly in the Stage Island Pool, continued at a relatively low rate.

<u>North Pool</u>				
<u>Nest Devices</u>		<u>Use</u>		<u>Remarks</u>
<u>Type</u>	<u>No. Available</u>	<u>No.</u>	<u>Percent</u>	
Wooden Box	45	11	24	Eight mallards attempted nesting; 2 blacks and 1 Canada goose
<u>South Pool</u>				
Wooden Box	10	1	10	1 mallard attempted nesting
<u>Stage Island Pool</u>				
Wooden Box	45	3	6	1 mallard, 1 black and 1 Canada goose attempted nesting
	—	—	—	
Total	100	15	15	

We are still hopeful these new boxes will be more productive than what we have had heretofore, once an adequate number of adult breeders become imprinted to them and assuming their survival and homing patterns are adequate.

Due to the fact the Plum Island portion of the refuge is separated from the mainland, large trees suitable for denning are lacking, distemper has reduced overall raccoon numbers in this area, and possibly for other reasons as well, these mammals, a primary source of predation on artificial nesting devices in many areas, have not been a factor in use of our nesting devices thus far. No other mammals seem to have caused any predation.

Two of our sole group of 5 purple martin houses at Subheadquarters were removed and 4 new ones were installed elsewhere, making a total of seven. New sites included Lot 9, Cross-farm, Stage Island field and the north end of Plum Island at Headquarters. This was an attempt to spread out the colony located at Subheadquarters and, despite the damp spring conditions which cut into productivity, the effort was successful in part. Martins nested at three points, although the two new sites (Stage Island and Headquarters) were only used in minimal fashion. All of the houses were investigated by young martins and we are hoping they will return to nest next year.



June 1974

William R. Forward

F. Natural Areas:

The Research Natural Area of 150 acres was checked and signs were upgraded and replaced as needed around the area. Significant encroachment was noted in the vicinity of Parking Lot 7 near the northern boundary despite numerous closed area signs. Fencing and possibly phase-out of Lot 7 may be necessary to adequately protect the natural character of this area.

The 200-acre dunes section south of the Research Natural Area was approved as a Public Use Natural Area following submission last year. All 350 acres in both areas are called the Ludlow Griscom Dune Natural Area.

G. Other:

In response to the phase-out of management responsibility by the Division of Law Enforcement and the new Fish and Wildlife Service program structure, Biologist Forward coordinated Winter Trend Surveys in 1974 for the States of Vermont, New Hampshire and Maine. The surveys were run by Federal and State cooperators with no significant problems. The biologist also made contacts and coordinated Woodcock and Dove surveys for the States of Vermont, New Hampshire and Massachusetts with 50 routes being successfully run by Federal, State and private cooperators. One of the Massachusetts routes was conducted by Biologist Forward in this cooperative program.

VI. PUBLIC RELATIONS

A. Recreational Uses:

A total of 325,575 visits were made to the refuge this year compared to 240,720 the previous year. Peak use was in June with 65,231 visits. In August 1973 visitor use increased almost four times over August 1972 with 49,700 and 10,000 visits respectively. August is our greenhead fly season which, along with the entrance fee charged in 1972, probably discouraged many visitors. Eliminating the fee in 1973 indicates that people would rather get bitten on the "bod" than in the wallet! The refuge was filled to capacity, forcing us to close the entrance gate, on 20 days out of the year.

Three field trials were held on the refuge by the Colonial Retriever Field Trial Club.

B. Refuge Visitors:

Official refuge visitors included persons from Patuxent, the Regional and Central Offices, Massachusetts Division of Fisheries and Game, Law Enforcement, Marine Fisheries, the Department of Natural Resources, State and local police, Coast Guard, and the Division of Law Enforcement.

C. Refuge Participation:

1. Newspapers - A total of 138 newspaper articles appeared in local newspapers covering refuge activities. Public Use Specialist Bryan Robinson continued writing his weekly column, "The Wildlife Man," which was widely accepted by the public.
2. Conducted Tours - Refuge personnel led 9 groups on tours of the refuge roads and trails. Four of these groups were conducted by the Youth Conservation Corps enrollees.
3. Talks - Two slide programs were given by refuge personnel to a total of 105 people, and a Career Day program was presented to 30 students at a local high school.

At six different exhibits, a total of 126,500 visitors were contacted. Included were the Topsfield Fair (112,500 visitors), National Hunting and Fishing Day (1,000) at Lynn and Danvers Sportsmen's Clubs, New England Aquarium (10,000), Northern Essex Community College (3,000), and Essex Agricultural and Technical Institute.

4. Radio & TV - Eleven radio broadcasts and four television programs were presented. The refuge installed an international radio station at the gate in April which was not operational until FY 1975.
5. Meetings - Fourteen meetings were attended by refuge personnel during the report period.

The annual "Johnny Horizon" cleanup of Plum Island took place on Sunday, April 28th. A total of 250 people participated. Cooperation was received from many organizations, including the City of Newburyport, Town of Newbury, Boy Scouts of America, Girl Scouts of America, Plum Island Surfcasters, Massachusetts Beach Buggy Association, other interested groups and many private individuals. Thirty-five cubic yards (7 dump truck loads) of trash were collected and removed from the island. Refreshments were provided by local people and public spirited organizations.

Approximately 100 people attended a public hearing on the Parker River Wilderness Proposal on April 25. Mr. Redmond, Regional Solicitor for the Department of the Interior conducted the hearing and Regional Director Richard E. Griffith presented a statement. Opposition to the proposal was strong from sportsmen's groups, the Commonwealth of Massachusetts Department of Natural Resources, and the Division of Fish and Game, among others. The Sierra Club, Massachusetts Audubon Society and a few individuals supported the proposal. The general tenor of opposition as outlined by the State was that "the Parker River Refuge does not fulfill the traditional concepts of a wilderness area. Present management programs under the Refuge Act have proved adequate from the standpoint of habitat protection and public utilization. In a highly urbanized state such as ours, public access with controlled limits is of primary importance." There was also concern about the refuge's ability to meet unforeseen future management needs to protect wildlife.

On May 11 the annual spring teachers' workshop, under the Parker River Environmental Project (PREP), took place in and around the Camp Sea Haven area of the refuge. Two hundred teachers, engaged in field studies under the general heading "Introduction to the Seashore Environment", participated in the program. Teachers are familiarized with the refuge and shown how to come back and use it with their students. Refuge Manager George Cavutis, Public Use Specialist Bryan Robinson and Conservation Education Coordinator Bill Whalen, of the Regional Office, welcomed the group and contributed input to the program.

PLANNING COMMITTEE

CHRISTINE BAILEY
Hamilton

JOSEPH BALSAMA
Swampscott Public Schools

JOHN FERRICK
Ipswich Schools

WILLIAM FORWARD
Parker River
National Wildlife Refuge

GEORGE GAVUTIS, MANAGER
Parker River
National Wildlife Refuge

RALPH GOODNO
Cooperative Extension Service

LEO KENNEY
Reading High School

ROBERT KNIGHTS
Pentucket Regional High School

BRIAN ROBINSON
Parker River
National Wildlife Refuge

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Manchester High School

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Swampscott High School

STEPHEN SPOFFORD
Saugus

W. ELLIOTT WHALEN
U.S. Bureau Sports Fisheries
and Wildlife

Issued by the Cooperative Extension Service, A. A. Spielman, Director, in furtherance of the Acts of May 8, June 30, 1914; University of Massachusetts, United States Department of Agriculture and County Extension Services cooperating.

WORKSHOP PARKER RIVER ENVIRONMENTAL PROJECT III

INTRODUCTION TO THE SEASHORE ENVIRONMENT

at the
PARKER RIVER
NATIONAL WILDLIFE REFUGE
Plum Island, Newburyport, Massachusetts

SATURDAY, MAY 11, 1974

Sponsored by:
Cooperative Extension Service,
University of Massachusetts
United States Department of Agriculture
and County Extension Services Cooperating
United States Department of the Interior,
Fish and Wildlife Service,
Bureau of Sports Fisheries and Wildlife
Essex Agricultural and Technical Institute

INVITATION —

In May, Plum Island is alive with wheeling gulls, nesting waterfowl, blossoming plants, fishermen, birders, and beach walkers. It's a pleasant and fascinating place, and fun to study the interesting ecosystems that make up this important barrier island.

The hosts of PREP invite you to discover the "balance of nature" with our ecologist staff so that you may understand the relationships which man frequently disturbs in his conversion and use of land.

SUGGESTIONS

Come dressed for hiking in the outdoors - rain or shine.

Bring your own lunch (we'll supply coffee and tonic), notebook, and pencil. Bring cameras, binoculars, and tape recorders if you wish.

Park your car at the main parking lot (inside the main gate), lock it, and board one of the busses that will leave at 8:30 AM for our study area.

Bring co-workers or friends with you - there are many areas of interest that easily relates to our coastal environment.

Open to the public without regard to race, color, or national origin.

PROGRAM

Morning Session

8:00 AM Busses leave from the Main Parking Lot.

9:00 AM WELCOME — W. Elliott Whalen, Conservation Education Coordinator, Bureau of Sports Fisheries and Wildlife.

9:10 AM The Plum Island Story — a briefing by members of the Refuge staff on the history, geology, flora & fauna, land uses, and refuge programs.

9:45 AM — Coffee Break

10:00 AM — 12:00 Noon Field Work
participants will be arranged into three groups, and will rotate from one unit to another as indicated below. In this way all participants can attend each study.

10:00 — 11:00 AM

Group A

Life on the sandy shore — Sarah Robbins, Director of Education, Peabody Museum of Salem.

Group B

Sand Dune Ecology — Robert Knights, Science Supervisor, Pentucket Regional High School, and Dave Ryan, Science Dept., Manchester High School.

Group C

Introduction to the Salt Marsh — Joseph Balsama, Science Supervisor, Swampscott Public Schools, and Harold Wiper, Science Dept., Newton High School.

11:00 AM — 12:00 Noon

Group A

Sand Dune Ecology — Knights and Ryan

Group B

Introduction to Salt Marsh — Balsama
and Wiper.

Group C

Life on the Sandy Shore — Robbins

12:00 Noon — 1:00 PM Lunch

Coffee and tonic available at Sea Haven
Lodge.

AFTERNOON PROGRAM

1:00 — 2:00 PM FIELD WORK

Group A

Introduction to the Salt Marsh — Balsama
and Wiper.

Group B

Life on the Sandy Shore — Robbins

Group C

Sand Dune Ecology — Knights and Ryan

2:00 Interaction by Participants

Ideas, Experiences, Evaluation.

2:20 PM Adjournment.

NATIONAL WILDLIFE REFUGE



U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF
SPORT FISHES AND WILDLIFE
UNAUTHORIZED ENTRY PROHIBITED

REGISTRATION FORM

WORKSHOP — PARKER RIVER ENVIRONMENTAL PROJECT III

SATURDAY, MAY 11, 1974

Attendance limited to 100. Please register early.

Registration fee — \$3.00. Make checks payable to the Ecology Workshop Fund.

Mail to: Ralph H. Goodno, Cooperative Extension Service, Essex Agricultural and Technical
Institute, Hathorne, Mass. 01937.

Full Name _____ Phone _____

Address _____

Affiliation _____



1974

Edward S. Moses

Refuge Biologist Forward discussing findings
of teachers along transect during workshop.

Teachers have attended the workshops since the inception of the program in 1971. These same teachers have returned with thousands of students, giving us a much greater return per hour invested than would have been realized if we had tried to conduct the tours ourselves.

D. Hunting:

1. The third and final year of a State-wide experimental zoned waterfowl season occurred in the fall of 1973. Parker River Refuge was situated in the coastal zone portion with a late duck season which commenced November 16 and ran to December 25. The Canada goose season, in contrast, was State-wide and split, starting October 20 and running to November 17, breaking until December 8 and then running to January 17, 1974. Basic bag limits were 4 ducks (including not over 2 black ducks per day) and 3 Canada geese per hunter per day.

As in the past, the public hunting program was held on Areas A, B and C under all appropriate Federal, State and local laws and regulations. These included daily hunter limits, 25 shell limits per hunter per day, and requirements for written permits obtained through the mail prior to the date of the hunt for Opening Days, Saturdays and Holidays.

Regular Waterfowl Season - 1973

Hunters Participating	1,485
Birds Killed	567
Birds Per Hunter	.39

Hunter success was only fair to poor this year again, because of the lateness of the season dates which did not give hunters much chance at such early season favorites as green-winged teal, which often provide a lot of early season hunting, and also due to the fact that persistent mild weather patterns most of the fall had a negative effect on bird movement and hunter success.

Area "A" continued to be the most successful of the three public hunting areas. The October goose-only season, which came in prior to the opening for conventional game ducks, left much to be desired from an enforcement standpoint, and should be avoided in the future if at all possible. It subjects many protected species to gunning pressure.

2. The Youth Waterfowlers' Training Program hunts were conducted for the 9th year in a special area set aside for this program.

The 1973 (FY 1974) Youth Waterfowlers' Training Session was held on September 30, 1973 at the Danvers Fish and Game Club building. A total of 80 youths and 26 instructors completed the program consisting of a broad array of waterfowl conservation, management and historical subject matter.

Three actual hunts were held on October 20, October 27, and November 3, 1973 with 70 youths requiring 724 shots to retrieve 51 birds (all Canada geese) for an average of .73 birds per hunter. This amounts to 14 shots per bird and 10 shots per hunter. Cripples reported lost were 14.

Part of this year's program involved a comparative field test of lead vs. steel shot. A box of soft steel or lead in #2 goose loads was provided to an equally divided sample of hunters. The bulk of the hunters did not know which kind they had. In essence, the steel shot worked out to be almost the same in terms of results as the lead shot. The size of the sample was, however, so small that actually no positive conclusions were possible.

E. Violations:

Law enforcement activity during the fiscal year continued to be heavy with:

923 documented violations

142 prosecutions

31 official warnings - written

12 official warnings - State (hunting)

Most of the above violations were drug abuse, trespass, hunting, motor vehicle: speeding, unregistered/uninsured, driving to endanger, no license/registration, operating under the influence, illegal parking; possession of dangerous weapons, disorderly conduct, minors in possession of alcohol and/or drugs, assault, and low flying aircraft.

Of the 142 cases prosecuted, 63 were for drugs, 32 were for trespass, 24 were for illegal hunting, 14 were motor vehicle cases, 2 were possession of dangerous weapons, 2 were for assault with dangerous weapons, 4 were for disorderly conduct, and 1 was for contributing to the delinquency of a minor.



1974

Walter Soroka

visitor - au naturel - jogging on the beach before he was contacted. Despite the streaking craze, we had less nudism than ever - evidently due to the nude beach area at the Cape Cod National Seashore.

Convictions resulted in all the above except for three of the drug cases. Two low flying aircraft cases are pending with the Federal Aviation Agency. This does not include cases made on the refuge by State and local police and other federal agencies.

The overall number of cases was down slightly from 1973 which is encouraging. This is the first year that we have begun to realize any degree of success in our enforcement activities. Most of the people contacted have indicated that they had heard that Parker River is no longer "the place to go to do their thing."

Cooperation with other federal agencies involved: Immigration and Naturalization, Alcohol, Tobacco and Firearms, Drug Enforcement Agency, U. S. Coast Guard, Federal Aviation Agency.

VII. OTHER ITEMS

A. Satellite Refuges:

The following areas are under the administration of Parker River National Wildlife Refuge and appropriate comments relating to each are given below:

Rachel Carson National Wildlife Refuge, Maine
 Pond Island National Wildlife Refuge, Maine
 Thatcher's Island National Wildlife Refuge, Massachusetts
 Wapack National Wildlife Refuge, New Hampshire
 John Hay National Wildlife Refuge, New Hampshire

As a result of travel restrictions, a spin-off of the energy shortage, and for other reasons, only minimal visits were made to these units in FY 1974.

1. RACHEL CARSON NATIONAL WILDLIFE REFUGE:

Rachel Carson National Wildlife Refuge was established on December 6, 1966 with the acquisition of the first tract of 15.5 acres on the Lower Wells unit in Wells, Maine. Primarily established to preserve vital natural salt marsh habitat in southeast coastal Maine, the refuge will ultimately consist of 4,000 acres in 9 separate units, stretching for a distance of 45 miles from Kittery Point in the south to Portland, Maine in the north. Currently, 1,856 acres have been acquired.

A Youth Conservation Corps work crew spent several days in southeast coastal Maine in July going over boundaries at Brave Boat Harbor, Moody, Lower Wells, Upper Wells and Spurwink units guarding the recently surveyed boundary corners with sign posts (150 posts were used in all).

Waterfowl use days for the year totaled an estimated 154,350, up slightly from FY 1973's 135,000. Major species were black ducks with 68,100 use days in 1974, green-winged teal with 18,600 use days, bufflehead with 17,100 use days and common goldeneye with 14,700 use days. Canada geese totaled 12,750 use days in 1974. Since visits to this refuge were few, those figures are estimates and in future years should be refined in accuracy as more time can be spent.

Production of waterfowl was negligible in FY 1974 with 60 blacks and 20 blue-winged teal estimated as being raised to flight stage.

Only scattered other wildlife data was estimated for species which customarily utilize the refuge and this information was submitted on appropriate refuge output reports.

In January 1974 a dead tree causing a hazard was removed from an inholding at the Spurwink Division of Rachel Carson per special request of an adjacent landowner. With acquisition and adjacent development continuing, neighbor problems can be expected to increase markedly.

During March 1974, Biologist Forward spent several days in field reconnaissance of Brave Boat Harbor, Moody and Lower Wells units in initial preparation of biological assessments followed by office work necessary to facilitate completion of acquisition of all remaining tracts outstanding in these units.

2. POND ISLAND NATIONAL WILDLIFE REFUGE:

In July 1974, Manager George Gavutis, Manager Trainee Linda Kipp, and Biologist William Forward inspected the newly acquired 10-acre Pond Island National Wildlife Refuge (surplus from Coast Guard which still maintains an automated light) located just off Popham Beach, Sagadahoc County, Maine with the aid of the U. S. Coast Guard from Boothbay Harbor. The area was checked for gull and eider nesting, potential recreational use, and refuge boundary signs were posted to properly mark the property. The island is a favorite local bass and blue fishing spot in the mouth of the Kennebec River but

surrounding waters are often treacherous.



1974

George W. Gavutis, Jr.

Habitat typical of that found on Pond Island
National Wildlife Refuge.

3. THACHER'S ISLAND NATIONAL WILDLIFE REFUGE:

In July 1974, Manager George Gavutis, Manager Trainee Linda Kipp, and Biologist William Forward inspected the 22-acre portion of Thacher's Island included in the Thacher's Island National Wildlife Refuge. This island is located on the Atlantic Ocean just off Rockport, Massachusetts (Cape Ann) and was checked for general condition and sea bird nesting potential. The area was posted with standard refuge boundary signs to denote our ownership. The lighthouse (one of two on the island - the other is still functional and manned by the Coast Guard on the other half of the island), situated on the north end of the island, is a National Historic Site. It was checked for general condition and much work (up to \$12,000 worth) will be required to restore the building.

The twin lighthouse towers are on the official emblem and seal of the Town of Rockport on the nearby mainland. Refuge Foreman Thomas Stubbs met in April with Selectmen of the Town of Rockport concerning proposed cooperative repairs to the lighthouse.

4. WAPACK NATIONAL WILDLIFE REFUGE

No official visits were scheduled or occurred in FY 1974 to this refuge near Peterborough, New Hampshire in Hillsborough County. Established in 1972 with the donation of 850 acres from Lawrence K. Marshall, the area covers a rugged, unspoiled mountainous area comprising North Pack Monadnock Mountain in its entirety, rising 1,200 feet from the surrounding valley. According to our Realty Division, there are so many exceptions in the deed that management programs will be very limited.



September 1974

William R. Forward

Overview of Wapack National Wildlife Refuge looking North-Northeast from adjacent Miller State Park - showing typical terrain.

5. JOHN HAY NATIONAL WILDLIFE REFUGE:

No visits were scheduled or occurred in FY 1974 to this refuge located on Lake Sunapee near Newbury, New Hampshire. Established in 1972 with the donation of 164 acres from Mrs. Clarence L. Hay (who has life use), no visits or posting of this area have occurred thus far.

B. Youth Conservation Corps:

A non-resident Youth Conservation Corps camp was conducted in the summer of 1973 (FY 1974) at the Parker River National Wildlife Refuge for the second successive year. As in the previous year, a total of 20 youths (50% male, 50% female, 15-18 years of age) were chosen for the program from nearby school districts and they commuted daily. The camp ran eight weeks and the highly motivated youths led by a fine staff (Director, John Langan; Group Leaders: Alan Railsback (EE) and Malcolm Fraser) performed a considerable number of practical conservation-oriented work projects and covered a significant amount of environmental education. Listed below are some of the projects they worked on:

- a. Nature trail wood chipping
- b. Boundary posting at Parker River and Rachel Carson National Wildlife Refuges
- c. Built and placed additional beach access boardwalks
- d. Continued general debris removal
- e. Goose banding drive
- f. Duck and dove banding
- g. Added to refuge herbarium collection.

The YCC enrollees also engaged in overnight camping and exchange programs to other stations, including Rachel Carson and Moosehorn Refuges in Maine. The overall effect of the program in 1973 (FY 1974) at Parker River National Wildlife Refuge was considered very beneficial and effective.



1974

Alan Railsback

Picture of young green herons in Hellcat Swamp nest taken by YCC member.

C. Camp Sea Haven:


Camp Sea Haven, originally established on the site of the former Coast Guard Station for those afflicted with infantile paralysis, was founded in 1947 by the late Daniel R. Harrington of Haverhill who was a polio victim himself. In 1970, due to the virtual elimination of polio, the camp was turned over to Cerebral Palsy of Greater Boston, and the purpose was broadened to provide camping and recreation for all handicapped people.

Located midway on the refuge's ocean front, facilities now include a salt water pool, a large recreation-dining hall, and individual cottages as well as a dormitory. The government grants a free 5-year renewable special use permit. The camp is open for an eight-week period from the end of June to the middle of August, with up to 100 persons at one time and a total of about 200 during the summer supervised by a resident staff. A gasoline generator provides electricity.

The camp is shut down and boarded up most of the rest of the year except for our use during the annual spring teachers' workshop. Vandalism is aggravated by the lack of a caretaker and the unfortunate location of our Parking Lot #10 which sends people through the compound year-round at all hours of the day and night.

D. Personnel:

Mrs. Catherine Welch, Refuge Clerk, retired effective December 31, 1973 after 23 years of Federal service. A dinner party was held for her on November 30, 1973 at the Sportsmen's Lodge in Newburyport with many friends and former co-workers attending. She received several nice gifts and also was the recipient of a \$150.00 Special Achievement award. She will be sorely missed and is currently helping us out occasionally (gratis) until a permanent qualified replacement is obtained.



E. Credits:

Sections I, II, V, VI-D, and VII - Biologist William Forward

Section IV and VI-A, B, and C - Assistant Manager William Koch

Section III - Refuge Foreman Thomas Stubbs

Editing and Review - Refuge Manager George W. Gavutis, Jr.

Photographs - Various contributors from staff.

Approved, Regional Office:

Signature

Title

Date

Submitted by:

G. W. Gavutis, Jr.
Signature

Refuge Manager
Title

8-11-75
Date

NEVERMORE

Early in the month of May 1974, we received several reports of what birders felt (but couldn't quite believe) was a raven near Subhead-quarters.

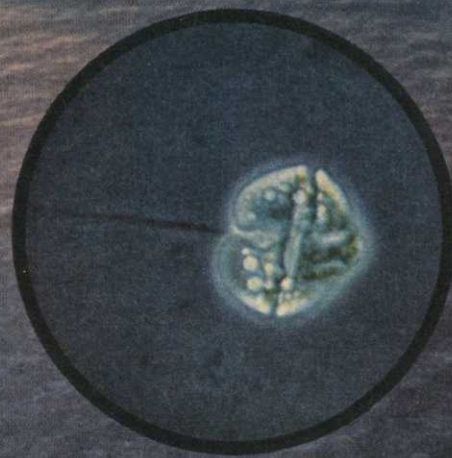
A couple weeks later, Visitor Assistance and Safety Specialist Grover responded to a call on the beach that a large black bird was harassing visitors. The bird turned out to be a raven and he was busily flying from blanket to blanket, sauntering up to within a few feet of the puzzled occupants, fluffing his feathers, spreading his wings and uttering a throaty squawk. The horrified onlookers would promptly vacate the area, leaving the raven to pilfer the goodies from the picnic basket in true Yogi-Bear fashion and check over the purses for trinkets and mementos before flying on to his next customer.

At one point, he stopped to molest two topless bathing beauties - who just couldn't imagine why he repeatedly jumped up at them. Officer Grover, fashioning himself as somewhat of a bird behavior specialist, surmised that ravens probably are very fond of strawberries and the bird must have thought he saw some.

The bird met his Waterloo when he tried his heretofore successful routine on Officer Grover. When Grover failed to scurry for the dunes, the bird thoroughly tested out the strength of his new Justin boots, one of which was promptly placed on the bird's neck. The vociferous catterwailing that followed aroused visitors for miles up and down the beach as the bird, after being advised of its rights, was evicted from the refuge. We had been wondering why that section of beach was receiving such light visitor use and, for a time, seriously considered recruiting a few of his ebony comrades for a new approach in visitor control. After all, we aren't blessed with poisonous snakes or alligators like other more fortunate refuges.

The bird is now terrorizing certain portions of Kensington, New Hampshire. He glowers at those who dared to pluck his wing feathers just because he ate a few rows of freshly planted corn and peas, and lopes around behind the neighborhood kids patiently waiting for his new feathers so he can return to the air for nevermore.

Riddle of The RED TIDE



View of a red tide; in circle is photomicrograph of Gymnodinium, one of common culprits

U.S. Fish and Wildlife photo by Edward S. Moses
Karen Steidinger photo (circle)

IN THE SUMMER OF 1971, I drove along Florida's lower west coast when it was wrapped in the death-dealing cloak of a peaked red tide. From Marco to St. Petersburg dead fish drifted ashore with each tide, and the kill was greatest from Venice to the mouth of Tampa Bay. In some spots there, the fish were piled in stenchy windrows.

Signs of the red tide had first come in April, but those early reports of fishkills were spotty and alarmed no one. Week by week and then day by day the tally mounted. The slow buildup coincided with the end of an eight-month-long drought. As daily rains drenched the peninsula, lakes and streams began pouring their surplus waters into the Gulf, producing the mixture of salt and fresh water needed to trigger explosive growths of the red-tide organism. A red tide of major proportions was in the making, and by July it had formed in some places a mile-wide ribbon of brick-red water just offshore.

On the beach near Sarasota a motel owner told me that he had buried thousands of dead fish every morning for a month. Every day he found a greater number until finally he had to hire help to get the chore done. When I was there, he was doing a lot of the digging himself; he had plenty of time, because there were no guests in his motel.

In places where no one felt personally obliged

What is this lethal organism that ravages our coasts, and what can be done about it?

By GEORGE S. FICHTER



Karen Steidinger photo

This big jewfish succumbed to Florida's red tide in summer of 1971



Biologist Bill Forward examines a duck poisoned by red tide

Riddle of The RED TIDE continued

to clean up the shore, the odor of rotting fish was almost intolerable. Public-health officials pitched in to help collect and bury the decomposing carcasses before they could play host to hordes of breeding flies and become still another kind of health hazard.

People who lived squarely in the paths of red-tide streaks

registered another complaint: an irritating gas that rose from the reddened waters and swept inland with the salt spray made their eyes puffy and gave them scratchy throats that brought on coughing and choking spells.

The day I got to St. Petersburg, city cleanup crews had hauled away or bulldozed under the sand about 100 tons of fish, a costly operation that had been repeated every day for more than a week. Officials were worried about the expense; they had no item labeled "red tide" in their budgets. Workers were weary of the seemingly unending job. Businesses depending on the tourist trade were suffering badly.

In the early days of the outbreak south of St. Petersburg, only a few gamefish were found floating belly-up in the bays and on the beaches. But the fish I saw were the kind to send sportfishermen into delirium. There were weakfish (seatrout), jewfish, tarpon, snook, redfish, and dolphin—and some of them were genuine tackle-busters. One jewfish was estimated at close to 300 pounds.

Tourist fishermen took one look at the sad sight and promptly packed up and headed across the state to waters not ravaged by a red tide. The few fishermen who stayed around, however, got phenomenal fishing

right at the peak of the tide, and many of the fish caught were large. The catches of tarpon, snook, and redfish hit the top mark of the year. Reasons for this strange turn of events are purely speculative, but one seemingly logical explanation is that small fish were the first to succumb to the tide and that the remaining large fish were left ravenous because of the scarcity of prey.

But in most areas, the number of fishermen was definitely at a minimum. I saw baitshops with CLOSED signs nailed over their doors, and others where the owners were stubbornly staying open even though they had no customers. Commercial fishermen either folded their nets for the 1971 season or, like sportfishermen, set out to find new fishing waters.

Exactly what causes the red tide? Florida's death-dealing discolorations are caused by a near-saturation abundance of a particular one-celled free-swimming alga called *Gymnodinium breve*.

I held up to the light a quart jar in which a biologist estimated were probably 30-million *Gymnodinium* algae. Each was too small to see with the naked eye, and—most unusual—the water looked clear. I could nevertheless detect a slow, swirling motion to the water, and it felt slick and sticky, almost viscous.

Under a microscope, the individual cells could be seen swimming. Their movement was looping and fluttering, much like the motion of falling leaves. Most astonishing, they were yellowish-green rather than red. The Gulf waters look muddy-red because of the reflection and refraction of sunlight by the countless billions of cells in the great masses when there are population explosions.

I asked Karen Steidinger, marine biologist with Florida's Department of Natural Resources, whether the concentration out in the Gulf was as great as in the jar I held.

"In some places, yes," she told me, "but generally it is less. It takes only about two-hundred-fifty-thousand per quart to be killing."

"What exactly kills the fish?" I asked.

A cleanup crew labors to remove thousands of dead fish, victims of red tide, that were washed into a bayou at St. Petersburg



Right, red tide's deadly legacy: poisoned fish rot amid strands of seagrass on a Sarasota County beach—common sight in '71 outbreak. Below, biologist collects a water sample from a red tide

Marine Research Lab., Florida Dept. of Natural Resources



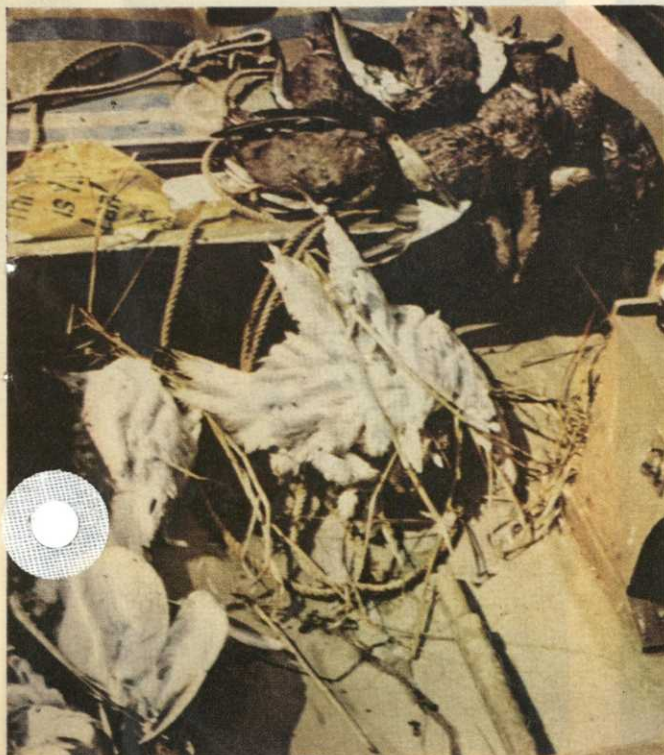
Karen Steidinger photo

"Poison," she replied. "Back in the eighteenthundreds these outbreaks were not called red tides. They were referred to as 'poison waters'—a very apt name. Each *Gymnodinium breve* produces a minute amount of a toxin that, in its effect, is much like the venom of cobras and related snakes. This poison attacks the nervous system of the victims. Death comes either because the heart stops beating or because the respiratory system ceases to function, causing death by suffocation."

A fish poisoned by the red tide loses control of its ability to guide itself. It swims crazily, twisting and turning. Then it rolls onto its side and is dead. The death is swift and dramatically violent. One researcher reported that the toxin has a potency about 10 times greater than that of strychnine.

Dangerous to man? So far no human deaths have been attributed to the red tide, but there have been symptoms indicating that dosages lethal to human beings (*continued on page 199*)

Some of the ducks and gulls killed in Massachusetts by *Gonyaulax* explosion during September 1972



U.S. Fish and Wildlife photo by Edward S. Moses



Bandit BEARS of Kashmir

Wiry ponies carry us up rocky slopes toward cloud line for our second hunt



Hadji Butt sprinkles flower petals on Jeanne to celebrate first bear kill
After a hard day's hunting, Jeanne takes relaxing shikara ride on Dal Lake



Two Himalayan black-bear cubs scamper up a slope. Moments later, I spotted huge trophy



Lew Craig, Fred Morris, and Donald B. Brunn.

Brunn, from Big Bend, Wis., put into the finals three of the five dogs he handled, a signal accomplishment. One of them was F.T.C. Easter's Martini, owned by Mrs. Dora Hanks, West Covina, Calif. Martini had to rank as one of the pre-trial favorites, having compiled the highest point total of any Springer in trial competition during the year.

Brunn also had reason to be proud of his son Dean, an amateur who handled his own dog, Dondea's Samson, through six of the seven series.

Lorenz and Chick are the only active handlers who have won four championships, and each has done it with three dogs. Lorenz's double winner was Gwibernant Ganol, and Chick's was Staindrop Breckonhill Chip.

Steve Studnicki, now retired, also won four times, twice with Micklewood Scud. MacQueen has won the title three times, twice with Ludlovian Bruce of Greenfair, as has now-retired Cliff Wallace, twice with Saighton's Sizzler.—David Michael Duffey.

RIDDLE OF RED TIDE

(continued from page 71)

probably are possible. In 1962, people in Sarasota who ate oysters infested with *Gymnodinium* became nauseated and suffered severe abdominal pains. As a precaution, taking shellfish for human consumption is now prohibited when the red-tide organisms are abundant in the water. Biologists working with the red tide treat it with respect and caution, not only because of the Sarasota incident but also because of other documented evidence of various kinds of algal poisonings in both fresh and salt waters.

Perhaps the best known of these is mussel poisoning, a dangerous illness that crops up occasionally along the Pacific Coast from Mexico to Alaska. The cause is a virulent toxin from a one-celled plant called *Gonyaulax*, closely related to *Gymnodinium*. The odorless and tasteless toxin is one of the most potent poisons known—reportedly 160,000 times more toxic than an equivalent amount of cocaine. Its effect is compared to that of the deadly curare. Those who eat the infected shellfish show signs almost immediately of short-circuited nervous systems. Their sense of direction and equilibrium is disrupted in the same way that fish are affected by the red tide. Human deaths have occurred as a result of eating as few as six clams.

When there is evidence of *Gonyaulax* organisms in lethal numbers, coastal areas are posted to warn people not to eat shellfish. Warnings are also carried in newspapers and other media, with maps showing the specific areas where clam digging is prohibited. Sometimes the beaches are patrolled as a further precaution.

Outbreaks of *Gonyaulax* in killing quantities also occur from time to time

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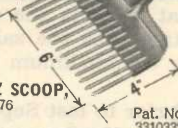


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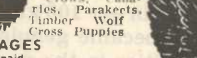
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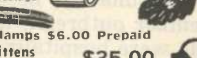


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on the Atlantic coast to as far north as Nova Scotia. The most recent was in September 1972. First detected off Cape Ann, Massachusetts, about the middle of September, the bloom soon contaminated coastal waters from Cape Cod to Maine, spreading over 250 miles.

As in the case of *Gymnodinium*, the *Gonyaulax* organism is always present in offshore waters, but usually in limited numbers. In the cold Atlantic, it is unusual for conditions to be "just right" to generate a population explosion. No one knows, in fact, precisely what combination of environmental factors it is that triggers the outbreak, and speculation runs the same sort of gamut as for *Gymnodinium* in Florida.

Prior to last September's bloom along the Northeast Coast, rains had been heavy in the region, diluting to a degree the salinity of the offshore waters. Coupled with this condition was uncommonly warm weather that raised the water temperature above normal. Only one other factor is known to be needed for a rampant growth of the organisms: nutrients. These may have come from the stirring up of sediment by wind-churned waves. Some observers suggest that these sediments have become much enriched by pollution from communities along the coast, and it was pointed out also that a dredging operation near the point of the initial outbreak may have aggravated the condition.

Sampled clams in a restaurant showed a concentration of about 9,000 micrograms of toxin per 100 grams of meat. In some areas, the toxicity level in clams and mussels exceeded the upper limits of the measuring devices. To be safe for eating, the shellfish should have a concentration of less than 80 micrograms of toxin per 100 grams of meat. Authorities became genuinely worried because fatalities in the past have been as high as 20 percent of those afflicted.

Fortunately, no one died in the September outbreak, though about 35 people were hospitalized, mostly in Massachusetts; several had to be placed in iron lungs. If a victim survives the first 24 hours, he will probably live, but so far there are no known antidotes for the poison, and it is *not* destroyed by cooking.

As soon as the outbreak was detected, state authorities placed a ban on the harvesting and sale of shellfish all along the New England coast. The economic effect was devastating, the loss calculated at several million dollars per week. Though the ban was specifically on oysters, scallops, clams, and mussels—the filter-feeding shellfish—the sale of lobsters and fish in restaurants and retail markets also dropped.

Concern mounted for seabirds and waterfowl. In the area of heaviest concentration of *Gonyaulax*, dead gulls and then hundreds of ducks were discovered. Authorities considered closing the 1972 hunting season. They also became worried about the welfare of eagles and other predator birds that might get concentrated dosages of the toxin as a result of biological magnification.

The alarm eased when the outbreak

subsided in early October, with no signs of bloom anywhere along the coast. Officials remained watchful, however, because a cyclic recurrence is not unusual.

In November 1972 a surprising outbreak of a *Gymnodinium* tide occurred in Florida. It was surprising because it came late in the season and also because red tides are rare on Florida's east coast, where the water is generally too cold and deep for the organisms to be generated in epidemic numbers. From Miami to Palm Beach, people complained of a stinging gas coming in from the Atlantic. A few dead fish drifted to shore. At one point it was feared that currents might sweep some of the offshore bloom southward and then up the Florida west coast, where the warmer shallower waters provide much more favorable conditions for the rampant growth of the organism.

Biologists all along the coast took samples from the water every few hours. Then, almost as suddenly as it had appeared, the freakish outbreak vanished, perhaps destroyed by the season's first cold spell.

Shellfish provide one of the biologists' best checks for discovering the presence of red-tide organisms. Shellfish cannot move quickly from one area to another; oysters, in fact, are attached to their beds and cannot escape. Like other mollusks, they breathe and get their food by drawing currents of water through their shells. The current eventually passes out of the shell, but solid particles, such as the tiny cells of *Gonyaulax* or *Gymnodinium*, are caught and retained in the gill filaments. In time they move along the food channel into the animal's gut. Before long, the shellfish becomes a lethal capsule.

Public-health officials periodically inspect shellfish beds to determine whether they are toxic. If they discover many dead mollusks, they examine them carefully to determine whether a buildup of toxic organisms might have been responsible.

Well-documented reports of red tides on Florida's west coast go back to 1844, and outbreaks occurred every few years up to 1932. Then came an unexplainable 14-year absence of red tides—or at least there were no reports. The comeback, during the 1946-47 season, was devastating. Fish littered the shores at about 100 pounds per linear foot from Boca Grande Pass southward to Cape Romano. Officials estimated the total kill at about 200-million pounds.

During the 1950's, red tides occurred several times. In one marathon outbreak, the reports of kills continued for more than 18 months. Another extensive kill came in 1963.

Colored tides are fairly common in many parts of the world. Great masses of some kinds of shrimp can give the sea a reddish cast, as will some jellyfish, sea anemones, and countless kinds of tiny one-celled plants. Off southern California the ocean sometimes turns a deep purplish-red and is then called the Purple Sea. The Baltic Sea is called the Sea of Blood when it becomes crimson from

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heavy growths of a red alga. Red waters also occur off the Gulf of Guinea and along Japan's shores. The Red Sea itself is so named because it harbors a perpetual—and fortunately harmless—abundance of a red alga.

A comparable condition occurs in freshwater ponds and lakes in summer. Suddenly there are blooms of algae that turn the water thick and slimy with a rich green growth. The fish die of suffocation (it's called summerkill), because the heavy growth of algae uses up all the oxygen in the still waters.

In the sea, deaths from plankton blooms are not caused by a lack of oxygen, since the wide expanse of water is continually churned and aerated by the wind and waves. Deaths occur in red-tide waters because the organisms themselves are poisonous and the bloom is held in calm waters by onshore winds. If the winds become strong and the waves even moderately heavy, the surprisingly fragile cells of *Gymnodinium* tend to disintegrate. Cell particles and the poison clinging to them form the characteristic irritating gas.

Biologists have been challenged with predicting when and where a red tide will occur and then with trying to bring it under control. They know that the blooms always start in relatively shallow and warm Gulf waters and that they almost invariably occur after a period of heavy rains when the runoff of fresh water is held close to land by onshore winds. These conditions produce a large area of ocean water that has a lower than average salinity. But other factors, some of them not clearly understood, also encourage the bloom.

It is known that *Gymnodinium* populations explode only when the waters are rich with nutrients, including some trace elements and vitamins. These nutrients come from the decayed remains of plants and animals that have died and sunk to the bottom. The tendency is to put the blame on man-caused pollution, such as sewage and industrial wastes. Admittedly, these pollutants should be eliminated, but a look at the records seems to indicate that the relationship between civilization and red tides is not great. Some of the worst red tides occurred from Sanibel Island southward before the area was populated and where even today pollution is minimal.

One of the most reliable indexes for predicting a red tide on Florida's west coast is the amount of chelated iron carried down the Peace River into Charlotte Harbor, about midway between St. Petersburg and Naples. When the iron content rises, there is danger of a *Gymnodinium* explosion. The source of the iron has nothing to do with man. It comes naturally from the soils in the river's watershed. Because no agency is charged with keeping check on the red tide, no iron indexes were taken in the spring of 1971, and the red tide came without prediction.

Even if its coming had been known, however, nothing could have been done to prevent the occurrence. Proposed methods of control are either impractical or too expensive; some are ineffec-

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tive, and others might cause more harm than the red tide itself.

In small, nearly enclosed bays in Japan, the organisms are killed by putting copper sulphate into the water, a method used in this country to halt the growth of algae in farm ponds. But chemically treating areas the size of Tampa Bay plus long stretches of coastal waters would be an impossible task.

Other suggestions have included:

- Mounting giant fans on barges to move the water and break up the tiny cells by increased wave action.

- Laying perforated pipes across the mouths of bays and estuaries to create screens of bubbles through which the organisms possibly would not swim. Bubble fences work well for fishes and many large creatures but might not be effective at all against the algae.

- Building dams across all the freshwater inlets so that the amount of fresh water flowing into the bays could be controlled.

- Biological controls — culturing planktonic predators, such as the bioluminescent *Noctiluca* or tiny crustaceans, in enormous numbers and turning them loose to devour the rampant red-tide organisms.

Not one of these controls is workable today. The only solution is to let nature run its course. In a limited area, the red-tide organisms will in time consume all the special nutrients that aided in bringing about the explosion. The red tide will literally bloom itself into oblivion. But even before that happens, strong winds generally produce waves that disintegrate the organisms.

One mystery of the menace for many years was where *Gymnodinium* went into hiding during the periods between outbreaks. It seemed to vanish without leaving the slightest trace. Biologists even had difficulty keeping cultures of the organism in the laboratory. It dies quickly or changes into a resting stage.

Federal biologists set up a research station on Sanibel Island, near Fort Myers, and began an intensive search for the elusive alga. They took samples all along the coast and also far inland—from Lake Okeechobee, the Peace and Caloosahatchee rivers, and even the landlocked swamp waters of the cypress country. They found *Gymnodinium* present year-round out in the waters of the Gulf from the Ten Thousand Islands northward, but in very limited numbers. The organism becomes a killer only when conditions are just right for a population explosion.

The biggest problem of all—controlling a red tide once it is on the loose—remains unsolved. But the capacity of the Gulf to replenish its larder is tremendous. In the Tampa Bay region alone, the total fishkill during the 1971 outbreak is estimated to have exceeded 2-million pounds. Vacuums created by these mass kills are soon filled with fish again. The times of the red tides are brief compared with the long periods when the fishing is incomparably good. This season's fishermen will probably never suspect that millions of fish died in these waters two summers ago. THE END

ARCHERY

(continued from page 158)

couldn't resist telling the counselor to invest in a camouflage bow sock and a bow-quiver that protects the blades.

The attorney is not a member of an archery club, because, he says, "I'm not a joiner." That's fair enough, I suppose, but I'll bet my best bow that if this guy were a member of a good field-archery club, he'd have a camouflaged bow and a safe bow-quiver.

Possibly the biggest plus for many bowhunters in joining a club is the opportunity to do some quality deer hunting. Many archery clubs take annual leases on some choice deer properties. Some landowners wouldn't consider permitting one or two unknown individuals to hunt on their farms, even for a fee. The same landowners feel differently, however, when they're approached by a responsible organization whose members respect property and livestock. In some instances, club members who want to participate in the hunt must pay an extra fee, but it's usually worth it.

If the club has no leased hunting grounds, chances are good that some of the seasoned bowhunter-members have their favorite deer haunts. Usually these fellows are glad to include a new member in their hunting party. And many hunting-minded archery clubs set up long-distance hunting trips for other big-game species. Some clubs occasionally have group rabbit hunts and seasonal carp shoots and varmint hunts.

It's a mistake to think that all members of the antihunting societies are little old grannies in tennis shoes. On the contrary, many of these people are smooth and sophisticated in their efforts to raise funds for an emotional cause in which they really believe.

The best way to fight antihunting sentiment is to get the facts across to all the news media and to public officials. One of the soundest ways to do that is to support an effective archery, sportsmen's, or wildlife organization—for example, the local Izaak Walton League chapters or the state affiliates of the National Wildlife Federation. If you'd prefer to join a national outfit that's strictly archery-oriented, there's the N.F.A.A. special bowhunting membership at \$3 per year.

It's up to you which outfit you sign up with, but it should be an organization that packs some local and national clout. Among archery groups, it could be one like the New York State Field Archery Association, which has about 4,000 members. It is connected with the N.F.A.A. and also works closely with New York game authorities, legislators, and sportsmen to support sound bowhunting regulations.

Somewhat different is the Bowhunters of Alabama. Although these bowmen are not affiliated with the N.F.A.A., the group has more than 3,000 members. Some of those members have won friends by voluntarily collecting 13 truckloads of litter on a national wildlife refuge, and by giving archery instruction to Boy Scouts. It is no coinci-