

Foreign Fishing Vessels off U.S. Coasts Decrease to 492 in August

The number of foreign fishing and fishing support vessels sighted off U.S. coasts in August, 492, decreased dramatically from the year's high of 786 sighted in July, according to preliminary figures released by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service, a Commerce Department agency.

The 492 vessels sighted are also below the 543 sighted off our coasts in August of 1976. The decrease is attributed to a reduction in the number of foreign vessels permitted to fish within the 200-mile zone and the normal seasonal decline in fishing activities.

The foreign vessels, from 11 nations, were sighted off the coasts of New England and the mid-Atlantic States, Gulf of Mexico, West Coast, and Alaska. The largest number, 352, was from Japan, which had 338 vessels fishing for salmon and pollock off Alaska, 11 fishing for squid off New England and

mid-Atlantic, 2 longline vessels fishing for tuna in the Gulf of Mexico, and 1 fishing in the Western Pacific.

The Soviet Union had 66 vessels: 47 fishing for hake off the Pacific Coast, 12 fishing for squid off New England and mid-Atlantic, and 7 catching pollock in Alaskan waters. Canada, fishing under a reciprocal agreement with the United States, had four vessels fishing for salmon off the West Coast.

Foreign vessels sighted off the coasts in 1976 were as follows: January - 420, February - 510, March - 435, April - 560, May - 924, June - 970, July - 842, August - 543, September - 514, October - 452, November - 258, December - 240. In 1977: January - 319, February - 314, March - 180, April - 235, May - 374, June - 767, July - 786, and August - 492.

The August sightings were made by representatives of the National Marine Fisheries Service and by personnel of the U.S. Coast Guard, conducting joint

fisheries enforcement patrols from Coast Guard aircraft and cutters.

A summary of foreign fishing vessels operating off U.S. coasts during August 1977 and August 1976 follows:

Area	Nation	No. of vessels	
		Aug. 1977	Aug. 1976
New England and mid-Atlantic	E. Germany	19	12
	Soviet Union	12	12
	Poland	2	3
	W. Germany	6	8
	Spain	21	3
	Japan	11	2
	Italy	3	6
	South Korea	0	3
	Greece	0	1
		74	50
Gulf of Mexico	Japan	2	4
	Cuba	0	43
		2	47
West Coast	Panama	0	4
	Japan	1	2
	Soviet Union	47	67
	South Korea	0	10
	Bulgaria	0	3
	Poland	6	9
	E. Germany	0	6
	Canada	4	10
	France	1	0
			59
Alaska	Canada	0	10
	Japan	338	219
	South Korea	10	56
	Taiwan	2	4
	Soviet Union	7	66
		357	345
Total		492	543

¹Number of Canadian vessels off U.S. shores not recorded.

FOREIGN HERRING QUOTA UNCHANGED

Foreign fishermen catching herring off the northeast coast in early September were permitted to take the full 21,000 metric tons quota originally established by the Secretary of Commerce, according to the National Marine Fisheries Service.

That announcement followed an order by the U.S. District Court in Portland, Me., dismissing a suit brought by the State of Maine against Secretary Juanita M. Kreps. The Court found that herring stocks in the area were not jeopardized because of foreign fishing, and that the preliminary fishery management

plan approved by the Secretary permitted an adequate growth rate for the depleted stock, while allowing enough herring to meet the catch capabilities of U.S. fishermen. The foreign fishing season permitted under the plan ran from 15 August to 30 September.

While preliminary management plans may not, by law, impose a catch quota on U.S. fishermen, the plan in effect estimated that the U.S. fleet would take 12,000 metric tons of herring this year off Georges Bank and southern New England—far greater than U.S. landings in past

years. The foreign fishing quota was established based on this estimated catch by U.S. fishermen, and on an optimum yield of 33,000 metric tons. The 33,000 metric ton catch level was expected to let the number of herring in the waters increase by 10-13 percent in 1977.

The Court also found that the Secretary's determinations of optimum yield, the capacity of the U.S. herring fleet, and the total allowable level of foreign fishing were in full accord with the Fishery Conservation and Management Act of 1976, the "200-mile" fishing law.

Marine Pollution Study Contracts Let by NOAA

Potential problems which may result from the transport of oil along the coasts of Alaska and Washington states and from deep ocean mining in the tropical Pacific Ocean are the subjects of more than \$600,000 in research contracts awarded to the University of Washington, Seattle, by the National Oceanic and Atmospheric Administration.

The contracts, awarded by the Commerce Department, agency's Environmental Research Laboratories in Boulder, Colo., include \$200,000 let to the Zoology Department, \$378,698 to the Oceanography Department, \$56,500 to the Fisheries Research Institute, \$27,032 to the Division of Marine Resources, and \$20,500 to the Applied Physics Laboratory. They were announced by Commerce Secretary Juanita M. Kreps.

Marine research conducted by the Zoology Department and the Fisheries Research Institute is part of an intensive study of northern Puget Sound to determine the probable impact of increasing oil shipment and refining activities there. The study is funded by the U.S. Environmental Protection Agency, and managed by NOAA's Marine Ecosystems Analysis (MESA) program.

Principal objective of the continuing research is to document marine life inhabiting the northwest Washington tidal regions adjacent to the Strait of Juan de Fuca now to enable scientists to assess the environmental effects of a potential oil spill.

Results of the research will be compared with data the university has collected from the San Juan Archipelago, a group of islands northwest of the Strait in the San Juan Island-Cherry Point-Anacortes oil refining area, under a separate contract with the Washington State Department of Ecology.

The Applied Physics Laboratory and the Oceanography Department at the university will conduct research to help determine the potential effects of deep sea mining on the marine environment as part of NOAA's Deep Ocean Mining Environmental Study (DOMES), a

MESA project conducted by NOAA's Pacific Marine Environmental Laboratory in Seattle, Wash.

Supplemental funds have been given to the university's Division of Marine Resources for its Arctic Dynamics Joint Experiment to conduct additional research on the interaction of oil with sea ice in the Beaufort Sea on the northern coast of Alaska. Additional funds were awarded to the Oceanography Department to continue study on Bristol Bay oceanographic processes and begin a new study of the Norton Sound-Chukchi Sea oceanographic processes.

The contract is part of a major environmental study conducted by NOAA for the Interior Department's Bureau of Land Management as part of its Outer Continental Shelf Environmental Assessment Program. These studies seek to determine the probable ecological impacts of oil exploration and development activities on Alaska's outer continental shelf.

In addition, contracts totaling \$132,067 have been awarded to firms in Massachusetts and Maryland for research on the effects of oil spills on marine environments. The awards were made to the Marine Biological Laboratory of Woods Hole, Mass.; Energy Resources Company, Inc.,¹ of

Cambridge, Mass.; and ARCTEC, Inc., of Columbia, Md. The contracts were also let by the agency's Environmental Research Laboratories.

The Woods Hole firm will do biological studies of the effects of two oil spills on Cape Cod environments—the Argo Merchant and Buzzards Bay oil spills. Energy Resources will conduct field sampling services, extraction processes, and gas chromatograph analysis of sediment samples from the Buzzards Bay area, located between the mainland and the southern portion of Cape Cod peninsula.

ARCTEC will make research studies of both the Buzzards Bay and Hudson River oil spills which occurred on 28 January and 4 February 1977. This contract work is also part of a major marine environmental study conducted by NOAA's Environmental Research Laboratories for the Interior Department's Bureau of Land Management as part of its Outer Continental Shelf Environmental Assessment Program. These studies seek to determine the probable ecological impacts of oil exploration and development activities on Alaska's outer continental shelf. John Robinson, project manager for the hazardous materials response group of NOAA's Marine Ecosystems Analysis program office, will be monitoring the contract work for all three firms.

Federal, State Agencies Study Hawaiian Sea Life

Under a cooperative agreement for the survey and assessment of living resources of the little known Northwestern Hawaiian Islands area, researchers from the Commerce Department's National Marine Fisheries Service, the Interior Department's U.S. Fish and Wildlife Service, and the state of Hawaii's Division of Fish and Game visited each of the islands and worked in adjacent waters from 4 July through 17 August. NOAA ship *Townsend Cromwell*, home-ported in Honolulu, provided the work platform.

¹Mention of trade names of commercial firms does not imply endorsement by the National Marine Fisheries Service, NOAA.

The 5-year study will provide a detailed survey and assessment of the biological resources upon which to base management decisions about long-range use and preservation of the living resources of the area.

While the three agencies have overlapping scientific interests and, to some extent, jurisdictional authority as well, each has specific areas of interest. The National Marine Fisheries Service focuses on fishery resources occupying bottom and slope areas, and the open water or pelagic areas adjacent to the islands. The Hawaii Division of Fish and Game is primarily concerned with fishery resources from the shoreline out

to the beginning of the deepwater slope areas. The U.S. Fish and Wildlife Service, which manages the extensive Hawaiian and Pacific Islands National Wildlife Refuge, is interested in the area's seabirds and mammals. In addition, it shares the responsibility for management of sea turtles and the Hawaiian monk seal with NMFS.

Large numbers of tunas were spotted in 30-100 fathoms of water adjacent to the islands, according to NMFS fishery biologist Robert A. Skillman, who served as field party chief during the cruise and is overall coordinator of the study. The most abundant of the tunas were kawakawa, which resemble the local skipjack tuna, or aku. Where kawakawa around Oahu average about 5 pounds, the fish located farther to the northwest commonly weighed 15-20 pounds. Yellowfin tuna, or ahi, weighing about 10 pounds, were also present, as were wahoo, or ono. Almost 1,000 of these fish were tagged and released by NMFS in order to study their migration patterns.

The Hawaii Division of Fish and Game recorded over 150 species of fishes in the reef and inshore areas. Some are not found in the main Hawaiian Islands and a few have not been identified. The larger atolls harbored moi, aholehole, mullet, manini, and the baitfish piha in abundance, while ulua and large schools of papio were found throughout the Northwestern Hawaiian Islands.

Sharks were plentiful everywhere. Tiger sharks up to 12 or 13 feet in length were occasionally observed in knee-deep water. In addition to a collection of scientific information on fishes, algae, and corals, the State agency brought back samples of 57 species of fish for further study.

Green sea turtles and the endangered Hawaiian monk seal were surveyed on all the islands by Fish and Wildlife Service personnel. Of particular interest was the presence of seals at Nihoa and Necker Islands and at Maro Reef. Maro is a remote coral reef with only a small rock protruding above the ocean surface.

Information collected on these

mammals will supplement that obtained earlier this year in an extensive NMFS-FWS monk seal survey. Fish and Wildlife Service scientists also re-

corded information on the endangered endemic birds of the island chain and on the several million seabirds that nest and feed there.

Fish Accumulate Benzene, Toluene—Water-Soluble Components of Crude Oil—After Brief Contact

There may be far-reaching consequences for estuarine and near-shore fishes constantly exposed to low levels of oil in inshore areas. The effects are not as immediately evident as those caused by more short-lived, catastrophic events such as tanker spills or marine oil-well blowouts, but in the long run they may prove to be more dangerous to marine populations.

Of particular concern to scientists studying the effects of constant oil exposure on ocean organisms are the prevalent components of petroleum and petroleum-related products that are both water-soluble, and toxic to fish. Two such components are the volatile aromatics, benzene and toluene, the most prevalent components in the water soluble fraction (Anderson et al., 1974). They probably exist at very low concentrations in areas subject to chronic oil exposure where few actual measurements have been made. If fish accumulate such aromatics, even at the assumed low levels, and if they must use additional energy to metabolize, detoxify, and deplete these substances, long-term physiological damage may result.

A recent study (Korn et al., 1977) was made by scientists of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), to determine which of these prevalent aromatics, benzene or toluene, poses the greater threat to marine life. It was hypothesized that toluene, although it is less soluble in seawater than benzene (Anderson et al., 1974), may be more toxic and exhibit greater accumulation levels and persistence. To test this theory, Sid Korn, Nina Hirsch, and Jeannette Struhsaker of NOAA's National Marine Fisheries Service, working at the Tiburon Laboratory, Southwest

Fisheries Center, in California, compared the uptake, distribution, and depuration of benzene and toluene by fish at sublethal concentrations. A radioactive tracer technique was used in these studies. The radioactive isotope, carbon-14 (^{14}C), was combined with the chemically similar oil components, allowing the amount of benzene or toluene present to be determined by scintillation counting.

Pacific herring were selected as test animals because they are important as estuarine and nearshore forage fish for many important recreational and commercial species, including striped bass and chinook salmon.

Live herring were obtained from a San Francisco Bay bait dealer and transported to the Tiburon Laboratory dock. After a period of acclimation, the fish were exposed to low-level concentrations (100 parts per billion) of either ^{14}C benzene or ^{14}C toluene for 48 hours. Gall bladder, intestine, pyloric caeca (first part of the small intestine), gill, brain, liver, muscle, kidney, and immature male and female gonad tissues were sampled for radiometric analysis after 6 hours of exposure, and then each day for 7 days.

All herring tissues had higher levels of toluene than of benzene. Certain trends were common to both aromatic components. The tissue with the highest accumulation was the gall bladder. Its benzene level was 31 times the initial water concentration, and its toluene level was 340 times the initial water concentration. The immature gonads had the lowest level of maximum accumulation. Pyloric caeca and intestine had varying amounts of bile, producing a range of ^{14}C activity and a resulting wide variation in calculated concentrations.

Most tissues rapidly reached

maximum accumulation levels; within 24 hours, all tissues except the gall bladder and pyloric caeca had maximum residues. Before benzene had peaked, toluene was at the maximum level in all tissues except the gall bladder and intestine.

Residues were depurated rapidly; most tissues had nondetectable amounts after 3-4 days (1-2 days after termination of exposure). However, the gall bladder, intestine, and pyloric caeca retained residues through the duration of the study (7 days).

Since accumulation levels in the gall bladder were based solely on radiometric analysis of the ^{14}C present and could include metabolites of the aromatics as well as unchanged benzene or toluene, an additional study was made to interpret the residue. After herring had been exposed for 2 days, the gall bladders were removed, weighed, and extracted. The extracts were analyzed for benzene and toluene by gas chromatography. No detectable benzene was measured. This indicated that most or all of the radioactivity measured in the gall bladders of fish exposed to benzene is not the parent compound, but one or more metabolites. Fish exposed to toluene had only a small amount of the parent compound. This result and the delayed depuration in the gall bladder, intestine, and pyloric caeca support the contention that benzene and toluene are metabolized in the liver, stored in the gall bladder, passed into the intestine, and excreted with the feces.

The results of this study are generally consistent with previous work by the same investigators (Korn et al., 1976) exposing striped bass and northern anchovy to ^{14}C benzene at the same concentration (100 parts per billion) and exposure period (48 hours), except for the considerably higher accumulation in the anchovy than in the other species. This is probably a result of the higher stress, activity level, and scale and mucus loss in the anchovy while in captivity.

The herring gonads sampled in this study were immature and had low accumulation levels. In another study where mature spawning herring were

exposed to benzene (Struhsaker, 1977), the accumulation was higher in the ovary, with associated deleterious effects on the ripe ovarian eggs and on development of larvae. Immature herring appear less sensitive to exposures than mature herring in spawning condition.

Of the two components, toluene appears to be potentially a greater problem to fish. Toluene can be rapidly accumulated to high levels after even a brief contact during an oil spill. Since toluene is one of the more prevalent water-soluble oil components, further research on the effects and uptake of this component are indicated. Also, chronic exposures are probably more important to the survival of fish populations than are spills, and studies of long-term exposure to chronic concentrations should be made. Finally, the probability that benzene and toluene are rapidly metabolized or converted to metabolites (possibly phenol, which is also highly toxic) points up a need for metabolite research.

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P. K. Park Heads NOAA Ocean Dumping Program

P. Kilho Park, an oceanographer and expert on the chemical aspects of the marine environment, has been appointed manager of the National Oceanic and Atmospheric Administration's Ocean Dumping Program. As manager of the new program in NOAA's National Ocean Survey, Park will study industrial waste sites in the Gulf of Mexico, off Puerto Rico, and off the Atlantic seaboard adjacent to the New York Bight where NOAA is cur-

rently studying the ecological impacts of oceanic pollution. His office is at NOS headquarters in Rockville, Md.

Formerly with the Commerce Department agency's Environmental Research Laboratories in Boulder, Colo., Park was head of the National Science Foundation's Oceanography Section in 1970-71. He previously had been program director for physical and chemical oceanography at the Foundation in 1969-70.

Born in 1931 in Kobe, Japan, Park holds a B.S. degree in fisheries from the Fisheries College in Pusan, Korea. In 1957, he received an M.S. in Oceanography from Texas A&M, and a Ph.D. from the same university in 1961. He became a U.S. citizen in 1968. From 1961 to 1976, Park was a faculty member at Oregon State University where he became professor of oceanography in 1971. Park is a member of numerous professional societies including the American Geophysical Union, the Geochemical Society, and the International Association of Geochemistry and Cosmochemistry.

Coast Energy Impact Program Wins First Construction Grant

Award of a \$798,618 grant to the State of Louisiana—the first construction grant to be made under the Coastal Energy Impact Program—has been announced by Secretary of Commerce Juanita M. Kreps. The grant, from the National Oceanic and Atmospheric Administration (NOAA) through its Office of Coastal Zone Management, will provide a critically needed water supply facility on Grand Isle in Jefferson Parish.

“Grand Isle is both an extremely appealing recreational spot and an important base for energy production,” said Robert W. Knecht, Director of NOAA's Office of Coastal Zone Management. “The islands's water supply is adequate to handle the town's permanent residents, but cannot meet the increased recreational demand because of

the coastal energy activity. This situation is one that the Coastal Energy Impact Program was designed to alleviate."

Grand Isle is the base for several oil companies' operations and also attracts visitors, fishermen, campers, and beachgoers by the thousands during weekends and in the summer. South of Louisiana's marshlands and near Barataria Bay, it is one of the few places in the state where surf bathing can be enjoyed throughout the year.

Site of much of the recreational activ-

ity is a 100-acre state park visited by 380,000 persons in 1976. Frequently during the year, the park had to be closed because of a water shortage, and the Louisiana Department of Public Works has postponed construction of two additional bath houses there because of insufficient water supply.

The new water system will provide an adequate water supply for present and anticipated needs, and will enable full recreational facilities to be restored. Under the grant, land will be acquired, a million gallon ground stor-

age tank erected, and pumping, piping, and chlorinating facilities installed.

The Coastal Energy Impact Program was created by 1976 amendments to the Coastal Zone Management Act of 1972. Its purpose is to help states and communities plan for, and deal with, the effects in the coastal zone of coastal energy development. It includes credit assistance, planning grants, environment grants, and formula grants. First allotments of funds to coastal states under the program were announced by Secretary Kreps on 18 May.

Ohio Slated for First Freshwater Sanctuary

A grant for \$894,152 to the Ohio Department of Natural Resources, to acquire lands near Huron, Ohio, for the nation's first freshwater estuarine sanctuary, has been awarded by the National Oceanic and Atmospheric Administration (NOAA), Secretary of Commerce Juanita M. Kreps has announced. The grant follows nearly 2 years of public review and comment upon the desirability of creating an estuarine sanctuary along Old Woman Creek, a 647-acre river and wetlands area near Huron.

Following land acquisition, the area would be designated a national estuarine sanctuary under provisions of the Coastal Zone Management Act of 1972. One sanctuary, marine, already exists, at Sapello Island, Ga.; and land is being acquired for two others, at Coos Bay, Oreg., and in Hawaii.

The purpose of the estuarine sanctuary program is to preserve unspoiled lands and waters for scientific research and public appreciation. The program is administered by NOAA's Office of Coastal Zone Management. NOAA is part of the Commerce Department.

According to Ohio officials, the state intends to construct a visitors' center along a highway bordering the planned sanctuary. Laboratory facilities will be made available to students and university researchers. Emphasis will be given to public education, as well, in

view of the sanctuary's proximity to Cleveland and Toledo.

Although in a heavily populated area of the state, the land making up the sanctuary has been kept relatively un-

Oceanic Education Gets NOAA Support

A program to develop materials for use in marine education for students in the fourth through eighth grades in North Carolina has received a \$31,000 Sea Grant from the National Oceanic and Atmospheric Administration. The project, which will be augmented by \$15,500 in non-Federal matching funds, is one of two educational projects announced by Ned A. Ostenson, Director of the National Sea Grant Program. The other program, to be carried out at the University of Maine under a \$19,801 grant from the Commerce Department agency, will develop curriculum materials that concentrate on the coastal problems and resources in Northern New England. That grant will be supported by \$12,333 in non-Federal matching funds.

The North Carolina program, which is expected to run over a 3-year period, also is designed to train middle school teachers in marine education through special 4-week summer courses covering a number of educational disciplines. The course, entitled "Man and the Seacoast—Past and Present," will

consist of lectures, seminars, and field trips. The program will include presentations and educational materials on the coastal aspects of marine science, anthropology, history, literature, sociology, engineering, economics, and resource planning.

There are more than 500,000 children and 16,000 teachers in North Carolina's middle schools. These students and teachers are distributed in 145 school systems. North Carolina Sea Grant officials estimate that through the acceptance of 30 teachers a year in the program, training could be provided to teachers in 90 of those 145 systems in a 3-year period.

At the University of Maine, the major thrust of the project will be to adapt an educational program developed through the Delaware Sea Grant College Program to the problems and resources of northern New England. The program in Maine, which also will include in-service training of teachers, will be geared to students from kindergarten through the twelfth grade.

Marine "Costs" of Deep Sea Mining Monitored

The first operational tests of systems for gathering manganese nodules from the floor of the ocean began late in 1977 in the central Pacific Ocean, with scientists from the National Oceanic and Atmospheric Administration (NOAA) measuring the "cost" to the marine environment of deep sea mining.

Four international mining consortia plan systems tests over the next several years, according to the Commerce Department agency's Environmental Research Laboratories. The first to field its gear will be Deepsea Ventures, the operational arm of Ocean Mining Associates. Its activities will be monitored by NOAA scientists involved in the agency's Deep Ocean Mining Environmental Study (DOMES), using scientific instrumentation on the NOAA research ship *Oceanographer*.

DOMES scientists also will be aboard the two Deepsea Ventures mining ships.

The dual efforts—the mining tests and the environmental study—represent for both industry and science the second step in harvesting the roundish lumps of rock containing high concentrations of iron, manganese, copper, and nickel. While industry has been working to develop techniques for collecting this wealth, DOMES researchers have been engaged in baseline studies of the state of the waters, life forms, and sea bed, prior to mining. These studies have focused on three sites in the central Pacific judged representative of the range of environmental regimes that mining might affect.

The tests NOAA scientists are to monitor will be of hydraulic systems for mining the nodules. A collector, or dredgehead, will travel along the sea floor, drawing in water, nodules, and

whatever else lies in its path. The system will separate the nodules from other material, discharging much of the latter near the sea floor while pumping the nodules upward through a pipe to a ship. The remainder of the excess material will be discharged at the sea surface.

Over a 20-day period the scientists will concentrate on the effluent discharged at the surface. Researchers aboard the mining ships will note how, where, and how fast the materials are discharged into the sea; the nature of the discharge (its temperature, salinity, concentration of solids); and, finally, what is done with the nodules that are collected or discarded.

From the *Oceanographer*, DOMES scientists will track the surface plume as it leaves the mining ship. They will try to define the growth of the plume in three dimensions, by collecting water samples and analyzing them for telltale traces of effluent material, making measurements of the clarity of the water at different places, and probing the water with sonar. The shipboard scientists hope to supplement their observations with images from satellites.

Even after the mining test has ended, the DOMES research will continue, watching the site to see how it recovers, and how long the process takes. The NOAA scientists plan to remain on the site for a period following completion of the mining test, as the sediments settle again to the bottom or are dispersed by the currents; and will return for followup studies at several-month intervals for as long as mining effects persist.

On later mining tests, the DOMES scientists hope to monitor the effects of the dredgehead on the sea floor, and the waste plume discharged into the bottom waters. They want to observe how rapidly the collector moves across the bottom, how its movement clouds the waters, and how deep a scar it leaves. In addition to the same observations used to track the surface plume, the scientists will collect bottom samples, and lower underwater cameras to record events on the sea floor.

Violation Notices Given 30 Tuna Vessel Skippers

Notices of violation, carrying possible fines up to \$10,360, have been issued to 30 skippers of U.S. yellowfin tuna purse seine fishing vessels—most from the west coast—for failing to follow regulations governing their activities in 1976, the National Oceanic and Atmospheric Administration (NOAA) has announced.

NOAA's National Marine Fisheries Service, which issued the notices, said most of the violations were for failure to use proper porpoise-saving procedures while fishing. Other notices of violation were issued for not having certificates of inclusion (which permit the fisherman to take porpoises in association with the yellowfin tuna), and failure to report as required.

The amount of a fine is determined by a complex formula based on points for procedural violations assessed against a skipper, the

number of porpoises killed per set by the skipper, and a comparison to the fleet average of the number of porpoises killed per set.

Observations were made on 747 sets of which more than 92 percent were carried out in compliance with regulations. Lack of the required two manned speed boats to hold fishing nets open accounted for more than 73 percent of the violations, while others included failure to use two rescuers continuously to assist porpoise out of nets, failure to release porpoises by hand continuously, the use of sharp pointed instruments in removing the porpoises, and failure to use required boat maneuvers when the porpoises were in the net.

Skippers may elect to pay a fine, request a hearing to seek relief from the fine, or accept a compromise fine through administrative procedures in lieu of a hearing.