

CROWN OF THORNS STARFISH

APRIL 23, 1970.—Ordered to be printed

Mr. BURDICK, from the Committee on Interior and Insular Affairs,
submitted the following

REPORT

[To accompany S. 3153]

The Committee on Interior and Insular Affairs, to which was referred the bill (S. 3153), to authorize the Secretaries of Interior and the Smithsonian Institution to expend certain sums for research on and control of the crown of thorns starfish in the tropical Pacific Ocean, having considered the same, reports favorably thereon without amendment and recommends that the bill do pass.

PURPOSE OF THE MEASURE

The purpose of this measure as introduced by Senators Fong, Inouye, Jackson, and Allott, and as recommended for enactment by the administration, is to authorize the Secretaries of Interior and the Smithsonian Institution to expend \$4.5 million in cooperation with the territories of Guam, American Samoa, the Trust Territory of the Pacific Islands, other U.S. territories in the Pacific Ocean, and the State of Hawaii, for the conservation of their protective and productive coral reefs.

The bill is designed to control the devastating crown of thorns starfish, which, because of a recent population explosion, currently threatens the economic livelihood of Guam and may soon have an adverse impact upon the economy of the Trust Territory of the Pacific Islands. Although relatively little is known about the intensity of starfish infestations in other areas of the Pacific under the jurisdiction of the United States, this menacing creature has been noted in American Samoa and the State of Hawaii.

Other functions of the bill are to ascertain what caused the population explosion of seastars, what longterm effects the damage already done will have upon the reef ecology of the insular possessions of the United States, and what should be done to prevent a recurrence of this problem.

BACKGROUND

Late last spring the Committee on Interior and Insular Affairs was informed by noted marine scientists that since 1967 more than 23 miles of the coral reefs of Guam had been almost completely destroyed by massive infestations of the crown of thorns starfish, which feeds upon living coral. The committee was further told that this menacing animal was also noted in other areas of the tropical Pacific, and if something was not done soon to control its population, it could have long-range economic repercussions, particularly since many of islanders are dependent upon the reefs and their fisheries resources for subsistence. Evidence was presented which indicated that following the destruction of the living parts of the coral by the starfish, the dead coral becomes encrusted with algae and the resident fishes diminish in total numbers because their food supply has been reduced.

In addition to providing a habitat and food source for fish, the living coral reefs offer protection to the islands during tropical storms. If the coral dies, and begins to erode, the islands become susceptible to erosion and other damage caused by typhoons.

Subsequent to this briefing, Senator Jackson wrote the Secretary of Interior on June 20, 1969, and stated in part:

Because of the obvious detrimental effects of an unchecked starfish population, I urge you to take immediate action to assess the extent of coral reef damage in the western Pacific, and to recommend a program of starfish control.

Until recently scientists believed this starfish was generally in balance with its environment and not particularly harming corals. Between 1964 and 1966, however, a population explosion of the crown of thorns starfish on the Great Barrier Reef off Australia destroyed over 100 square miles of the reef. More recently, serious coral damage has occurred on Guam, caused by the seastar.

Although several hypotheses have been offered as to why this starfish has undergone such a tremendous population increase in the past 2 years, it is the belief of several leading marine biologists that it was caused by manipulation of the reef environment by man, which upset the balance of a delicate ecosystem.

Somehow the balance of nature has been upset and has enabled the starfish to reach a position of dominance among the living creatures of the reefs. The triton, the chief predator of the adult crown of thorns starfish has been removed in large numbers from coral reefs because of the value of its beautiful shell.

Also, the dynamite blasting and excavation of coral reefs may have greatly assisted the starfish. As anomolous as it may seem, the living parts of coral are actually predatory on small starfish and help keep its population in check. When the coral is killed by blasting, the juvenile starfish survive in large numbers, and subsequently expand their geographic limits until they have matured and become predatory upon the coral.

Early last summer, the Department of the Interior contracted with the Westinghouse Ocean Research Laboratory to organize and carry out a survey of the crown of thorns starfish, particularly in the islands of the trust territory.

Last October, the results of the survey by 10 teams of scientists were made public in their final report on the crown of thorns starfish, entitled "Impact on Pacific Coral Reefs." The findings of the study substantiated reports of recent population increases of the starfish in the tropical Pacific. The scientific team noted heavy starfish infestations in Saipan, Tinian, Truk, Ponape, Rota, Palau, Ant, Guam, Majuro, and Arno.

The report summary stated that:

Team leaders considered the problem significant and in need of considerable research. A control program, which includes research into various aspects of the starfish should be instigated immediately. Such a control program should establish an active eradication effort on infested reefs that have economic or scientific value as well as an educational program to inform islanders of the nature of the problem and how they can contribute to research and control programs.

NEED

On March 18, a hearing was held on S. 3153, before the Subcommittee on Territories and Insular Affairs, at which time testimony was received from administrative witnesses, territorial representatives and leading marine scientists. Dr. Robert Jones, director of starfish control and research activities on Guam, and a marine ecologist at the University of Guam stated:

Today, while this hearing goes on, thousands of these starfish are devouring coral species on the island of Guam and our neighboring islands of the trust territory. The people of Guam are delighted to see this bill presented and to observe its progress through the orderly and precise channels of democracy. We look forward with great hope to its eventual passage and with anticipation for the help it will bring to us.

Dr. R. H. Cheshier, the marine scientist who first noted the starfish problem while working at the University of Guam, testified at the hearing, stating that:

There are large infestations of the crown of thorns starfish killing vast amounts of coral in the U.S. possessions and trusts of the Pacific. This was proved last summer by an expedition of 45 prominent scientists and divers from several countries.

It is important to recognize this as fact. The infestations are there and reefs are dying rapidly and on a large scale. The expedition also proved that the starfish is quite rare on healthy reefs. Both these facts had been recognized before the expedition through work done in Australia and Guam. The expedition demonstrated that the starfish represents a broad-based problem, not an isolated curiosity, and it provided evidence for the necessity of action from a large number of qualified observers whose collective analysis is unimpeachable.

(2) Corals require a long time to grow. A conservative estimate of the age of corals killed in Guam indicates that many were over 200 years old. Clearly this means the reefs will not reach their former development for another 200 years if they began to recover immediately. In Australia, however, reefs killed up to 10 years ago by the crown of thorns show only scattered regrowth by a few species of coral and starfish can be found feeding on this new settlement.

(3) Modern coral reefs developed over 50 million years ago. They are the oldest biological assemblage on this planet. Balance of existence in such a community is intricate and delicate. Destruction of the major element, living coral, has profound after effects on the surviving animal life.

(4) Coral reefs are economically important to man. In the U.S. Pacific possessions and trusts, depending on the size and development of the community, the economic worth centers on recreation, fisheries, and coastline protection.

(a) *Recreational*.—Because of their great beauty and unusual assemblage of exotic life, coral reefs provide a natural environment that is important for recreation and is a valuable tourist resource. This is true not only in the State of Hawaii and the territory of Guam which are already tourist centers of widespread recognition, but also in the U.S. trust territory. The trust territory, despite its natural splendor, is economically impoverished and hopes to enrich itself through a growing tourist industry. Coral reefs offer the main attraction of these remote islands.

(b) *Fisheries*.—Fishing, besides being of recreational value, is done on a sustenance level in many parts of the Pacific. In the U.S. trust territory people fish to survive. Living coral forms a basic part of the ecology and food web of reef fishes.

(c) *Protection of coastlines*.—Coral reefs protect coastlines from erosion by oceanic and storm waves. The nature of the reef and of the coastline dictates the importance of living coral in any particular case.

The need for enactment of this measure is elaborated upon further in the report submitted on S. 3153 by the Department of the Interior.

SECTION-BY-SECTION ANALYSIS

Section 1 declares the policy and purpose of the act. The purpose of the act is to conserve and protect the coral reef resources of the tropical islands of interest and concern to the United States in the Pacific, to safeguard critical island areas from possible erosion, and to maintain the recreational and esthetic uses of Pacific coral reefs.

Section 1 also authorizes the Secretaries of Interior and the Smithsonian Institution to cooperate with and provide assistance to the governments of the State of Hawaii, the territory of Guam, the territory of American Samoa, the Trust Territory of the Pacific Islands, and other U.S. territories in the Pacific Ocean in carrying out the purposes of this act.

Section 2 authorizes the Secretaries of Interior and the Smithsonian Institution to: (1) conduct the necessary studies deemed desirable to ascertain the causes of the recent population explosion of the crown of thorns starfish, their effects on corals and coral reefs, and the stability and regeneration of reefs following predation; (2) to monitor and determine future needs for control of areas where the starfish is increasing in numbers; (3) to develop better methods of control, and to carry out programs of control in areas where these are deemed necessary; (4) to take such other actions as deemed desirable to gain an understanding of the ecology and control of the crown of thorns starfish.

Section 3 authorizes appropriations of \$4.5 million from the date of enactment of the act until June 30, 1975.

COST

The estimated cost of the program is approximately \$4.5 million. The agencies within the Department of Interior expected to share responsibility for carrying out the purposes of the act include the Office of Marine Resources, the Bureau of Commercial Fisheries, and the Federal Water Pollution Control Administration. The committee felt that if the Bureau of Commercial Fisheries were called upon to play a significant role in this program it would be exceedingly difficult to reprogram funds from their already limited budget. The appropriation for the Bureau of Commercial Fisheries was reduced from \$52 million in fiscal year 1970 to a proposed level of \$45 million for fiscal year 1971. This 15 percent budget cut has already necessitated mothballing several marine research vessels, the closure of a marine aquaculture laboratory, and a reduction of scientific personnel.

The committee felt that because this proposed research and control program constitutes a new requirement upon the Department, and one which could not be anticipated, the funds necessary to carry out the purposes of the act should be in addition to the present budgetary ceilings, rather than a mere reprogramming of existing funds.

COMMITTEE RECOMMENDATIONS

The Interior and Insular Affairs Committee recommends that S. 3153 be enacted.

EXECUTIVE COMMUNICATIONS

The executive communications from the Department of the Interior, dated March 17, 1970, from the Smithsonian Institution, dated March 17, 1970, from the Department of Navy, dated March 20, 1970, and from the Bureau of the Budget, dated March 18, 1970, are set forth in full as follows:

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., March 17, 1970.

HON. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This is in response to your request for the views of this Department on S. 3153, a bill to authorize the Secretaries of Interior and the Smithsonian Institution to expend certain sums,

in cooperation with the territory of Guam, the territory of American Samoa, the Trust Territory of the Pacific Islands, other U.S. territories in the Pacific Ocean, and the State of Hawaii for the conservation of their protective and productive coral reefs.

We strongly recommend the enactment of this legislation.

The bill authorizes \$4,500,000, the appropriation of said sum to be available through the fiscal year ending June 30, 1975, for use by the Secretary of the Interior and the Secretary of the Smithsonian Institution, in cooperation with the State of Hawaii, the territories and possessions of the United States, including Guam and American Samoa, the Trust Territory of the Pacific Islands, and other island possessions of the United States, in the study and control of the seastar—*Acanthaster planci*, also known as “crown of thorns.”

Reports of widespread coral mortality of Pacific coral reefs caused by populations of predatory starfish led the Department of the Interior to contract with Westinghouse Electric Corp. to make a survey, during July and August of 1969, of the condition of the coral reefs of the Trust Territory of the Pacific Islands. During that same period, the University of Hawaii, supported by the sea-grant program of the National Science Foundation, conducted a similar survey in the Marshall and Hawaiian Island groups. Because of a sense of urgency stemming from the extensive destruction already reported and apprehension about progressive devastation of Pacific coral reefs, this study was limited to an investigation of the nature and scope of the problem.

The report on the survey, released October 15, 1969, stated, among other things, that (1) crown of thorns starfish in the trust territory is widespread and the amount of coral being killed is in excess of that which is desirable, and (2) that control techniques are not only necessary but should be initiated in various degrees as soon as possible. Serious infestations of this predator were also found in Guam, and its presence on some Hawaiian reefs and in American Samoa warrants further investigations.

Death of living coral, as noted in the report, means a decrease in fisheries production for the nearby societies who depend heavily upon marine sources of protein. It also forecasts an adverse affect upon tourism, a factor offering more for the economic development of the trust territory than any other single prospect. Of serious consequence also is the erosion of portions of the shoreline through repeated breakage of dead coral by storm waves, if current trends continue. Failure to meet this dangerous situation could have long-range economic repercussions in the Pacific reef areas.

This Department is deeply concerned for the well-being of the coral ecosystem which is the basis for all life in the island territories. We are also concerned that this fragile system might be irrevocably harmed by ill advised and conceived crash programs for the control of *Acanthaster planci*. A well-planned research program with concern for all aspects of the atoll ecosystem, which will first determine the need and then recommend a control program in harmony with this ecosystem is desirable. The authority for the action is well placed in the Department of the Interior and the Smithsonian Institution.

We support this bill because it provides additional authority to the Department of the Interior which is needed to carry out research,

monitoring, and control in the broad areas of the tropical Pacific. Our concern here is with the ecology of reefs as it affects man's welfare in the Pacific. This Department commenced work on the problem because of our responsibility, and concern for the citizens in the Trust Territory of the Pacific Islands and for their general welfare. However, more needs to be done on this problem in areas outside the trust territory. We have been told by parties in Hawaii that it is important that this Department be in a position to cooperate with the State in protecting the reefs off Hawaii should additional problems develop there. The program may also require work at other tropical islands, such as Johnston or Wake, and very little is known about the situation in American Samoa and the associated islands. Thus, we believe that the Secretary of the Interior would have a clear direction from the Congress to proceed with further work if this bill is enacted into law.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

HARRISON LOESCH,
Assistant Secretary of the Interior.

SMITHSONIAN INSTITUTION,
Washington, D.C., March 17, 1970.

HON. HENRY M. JACKSON,
*Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR SENATOR JACKSON: Thank you for the opportunity to submit our comments on S. 3153, a bill to authorize the Secretaries of Interior and the Smithsonian Institution to expend certain sums, in cooperation with the territories of Guam, American Samoa, other U.S. territories in the Pacific Ocean, and the State of Hawaii, for the conservation of their protective and productive coral reefs.

This bill would give authority to the Secretary of the Interior and the Secretary of the Smithsonian Institution to conduct studies, research, and investigations on the crown of thorns seastars and on their effects on coral and coral reefs; to monitor areas where seastars are increasing; to develop improved methods of control and carry out programs of control on crown of thorns seastars; and to take such other action as deemed desirable to gain an understanding of the ecology and control of the seastar crown of thorns.

The seastar crown of thorns (*Acanthaster planci*) has burgeoned in population in recent years, the causes of which are not fully understood. The destruction of protective and productive coral reefs surrounding many islands in the Pacific Ocean as a result of the seastars is of immediate concern to the well-being of these islands. The Smithsonian Institution would welcome an opportunity to conduct studies, research, and investigations on the seastar crown of thorns, their effects on corals and coral reefs, and the stability and regeneration of reefs following predation, providing that funding could be supplied.

Because of the Institution's involvement in basic studies of ecology and the valuable contributions which can be made by our scientific staff to this problem of the seastar, the Board of Regents of the Smithsonian Institution favored this legislation at its meeting of January 28, 1970. I have conferred with the interested scientists of the Smithsonian who have already carried out studies of the seastar *Acanthaster planci*; they would be happy to have the opportunity to continue these studies in greater depth.

The Bureau of the Budget has advised that there is no objection to the presentation of this report to the Congress from the standpoint of the administration's program.

Sincerely yours,

S. DILLON RIPLEY, *Secretary.*

DEPARTMENT OF THE NAVY,
OFFICE OF LEGISLATIVE AFFAIRS,
Washington, D.C., March 20, 1970.

HON. HENRY M. JACKSON,
*Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: Your request for comment on S. 3153, a bill to authorize the Secretaries of Interior and the Smithsonian Institution to expend certain sums, in cooperation with the territory of Guam, the territory of American Samoa, the Trust Territory of the Pacific Islands, other U.S. territories in the Pacific Ocean, and the State of Hawaii, for the conservation of their protective and productive coral reefs, has been assigned to this Department by the Secretary of Defense for the preparation of a report thereon expressing the views of the Department of Defense.

This bill would authorize the Secretaries of Interior and Smithsonian Institution to expend a sum not to exceed \$4.5 million for the protection and conservation of coral reefs in the Pacific Ocean that are of interest and concern to the United States. More specifically, the Secretaries are authorized to cooperate with and provide assistance to the governments of the State of Hawaii, the territories and possessions of the United States, including Guam and American Samoa, the Trust Territory of the Pacific Islands, and other island possessions of the United States, in the study and control of the seastar crown of thorns (*Acanthaster planci*).

The Department of the Navy, on behalf of the Department of Defense, has no objection to the enactment of S. 3153.

This report has been coordinated within the Department of Defense in accordance with procedures prescribed by the Secretary of Defense.

The Bureau of the Budget advises that, from the standpoint of the administration's program, there is no objection to the presentation of this report on S. 3153 for the consideration of the committee.

For the Secretary of the Navy.

Sincerely yours,

JOHN D. H. KANE, Jr.,
Captain, U.S. Navy, Deputy Chief.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., March 18, 1970.

HON. HENRY M. JACKSON,
*Chairman, Committee on Interior and Insular Affairs,
New Senate Office Building, Washington, D.C.*

DEAR. MR. CHAIRMAN: This is in response to your request for a report from the Bureau of the Budget on S. 3153, a bill to authorize the Secretaries of the Interior and the Smithsonian Institution to expend certain sums, in cooperation with the territory of Guam, the territory of American Samoa, the Trust Territory of the Pacific Islands, and other U.S. territories in the Pacific Ocean, and the State of Hawaii, for the conservation of their protective and productive coral reefs.

The background and the purposes of the proposed legislation are discussed in the reports being submitted to your committee by the Smithsonian Institution and the Department of the Interior. The Bureau of the Budget concurs with the views expressed in those reports and would have no objection to enactment of S. 3153.

Sincerely,

WILFRED H. ROMMEL,
Assistant Director for Legislative Reference.

○