Abstracts of Published Papers

ABSTRACT

The Northwestern Hawaiian Islands are the nesting grounds of about 10 million seabirds of 18 species. Fishery development proposals for this area led to a need for food habit studies of these birds to aid in their management. Food habits are diverse, with 56 families of fish, 8 families of squid, and 11 groups of crustaceans identified. Similar to other tropical seabird communities, this community feeds largely on flyingfishes and squids. In addition, however, this community consumes many Decapterus spp., juvenile goatfishes, juvenile lizardfishes, and mesopelagic fishes that rarely occur in the diets of tropical seabirds elsewhere. Albatrosses fed largely on squids and flyingfish eggs; pelicaniforms on large flyingfishes, squids, and Decapterus spp.; terns and shearwaters on flyingfishes, juvenile goatfishes, juvenile lizardfishes, and Decapterus spp.; small nocturnal procellariiform[e]s on lanternfishes and hatchetfishes; and small terns on small larval fishes and sea-striders. The breeding season for most species tends to be spring-summer and coincides with the period of maximum food availability. Most winter breeding species are adapted for nocturnal feeding, and some may be out-competed for nesting sites during spring and summer. All species seem to be opportunistic in their feeding habits, but some resource partitioning is evident both in species composition and in size of prey. Differences in diet may be a reflection of morphology, feeding techniques, time of day that feeding occurs, seasonality of breeding, and feeding location. These results will enable wildlife and fishery managers to more accurately predict the effects of various fisheries on marine birds.

ABSTRACT

The heavy metal data presented herein indicate that the wild Laysan Duck population may not be contaminated with metal-laden industrial wastes. It is therefore possible that the food chain which supports the duck population is uncontaminated, with the possible exception of prey taken from pelagic sea bird carcasses. Such a short, geographically isolated food chain, involving a non-migratory avian carnivore, could be an ideal system for the investigation of bio-concentration, bio-accumulation and bio-magnification of naturally occurring heavy metals.

ABSTRACT

The comparison of mean cadmium, mercury and selenium concentrations in the eggs, feathers and body tissues of breeding Sooty Tern from the Dry Tortugas, Florida, and Lisianski Island, Hawaii, supports the hypothesis that a physiological mechanism exists which functions in the detoxification of heavy metals. The data, collected from two geographically isolated populations of this pelagic bird, indicate that the mechanism responds in a uniform manner to widely different environmental levels of heavy metals. Our data and observations suggest that the mechanism evolved in response to natural fluxes of heavy metal concentrations in the marine ecosystem, not in response to recent injections of heavy metal laden industrial wastes.

ABSTRACT

Regurgitated food samples were collected from 18 species of seabirds on 8 of the Northwestern Hawaiian Islands between February 1978 and February 1981. Sea-skaters (Halobates sericeus) was found in the diets of 9 species, but can be considered to be an important food item for only 4 species: the blue-gray noddy (Procelsterna cerulea); the bonin petrel (Pterodroma hypoleuca); the gray-backed tern (Sterna lunata); and Bulwer's petrel (Bulweria bulwerii). The blue-gray noddy, by far the most important avian predator of Halobates spp., may at times feed exclusively on this food item and may appreciably reduce the populations of sea-skaters within their foraging territories.

ABSTRACT

A 3-1/2 month observational study of the endangered Hawaiian monk seal, Monachus schauinslandi, was conducted on Laysan Island from 15 March to 30 June, and an additional census was conducted on 10 July 1982. Monk seals were identified by natural markings and scars, and an identification file including sketches and photographs was established. A census was conducted approximately every 2 days. Reproduction, injuries, and mortalities were monitored, and scats, spews, and net flotsam were collected.

Total beach counts, excluding pups, ranged from 66 to 119 and averaged 90 seals. Thirty pups were born, and the average lactation period (for 16 mothers) was 39.4 days.

Five seals died, two of which were nursing pups. At least nine injuries occurred, two of which were serious. Three nonfatal entanglements in debris were seen, and 26 net and rope fragments capable of entangling seals were found and sampled.

Collections were made of 40 parasitic scat samples, 210 scats, 7 spews, and specimens from 3 necropsies.

Three observations not previously reported for Hawaiian monk seals were: 1) sharks killed and consumed a monk seal, 2) a pup suckled on its natural mother and a foster mother long enough to comprise a total nursing period twice the normal period, and 3) interatoll movement of an adult female was recorded wherein she pupped on Laysan Island and moved to Lisianski Island to molt.
REVISED BIBLIOGRAPHY OF THE HAWAIIAN MONK SEAL MONACHUS SCHAUINSLANDI MÄTSCHIE 1905. George H. Balazs* and G. Causey Whittow (Hawaii Institute of Marine Biology, P.O. Box 1346, Kaneohe, Hawaii 96744; John A. Burns School of Medicine, Department of Physiology, and Pacific Biomedical Research Center, Kewalo Marine Laboratory, Honolulu, Hawaii 96822). Published by University of Hawaii Sea Grant College Program Miscellaneous Report UNIHI-SEAGRANT-MR-79-03, 79 pp., 1979.

AUTHOR'S ABSTRACT

A comprehensive bibliography of 416 references is presented on the subject of the Hawaiian monk seal, Monachus schauinslandi. In addition to books and papers in scientific journals, the bibliography includes newspaper articles and unpublished reports known to the authors current to January 1979.

*The author's current address is Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812.

ABSTRACT

Depth of dive data were obtained from seven Hawaiian monk seals instrumented with multiple depth of dive recorders (MDR's) at Lisianski Island, Northwestern Hawaiian Islands, 1 July-14 September 1982. Data were obtained from the following seals: 4 adult males, 1 subadult female, 1 juvenile male, and 1 juvenile female. The mean depth of dives was greater than 36 m (20 fathoms). Some dives were recorded in the maximum recording range of the MDR's used, 150-180 m.

AUTHOR'S ABSTRACT

Tag and recapture studies of immature green turtles (Chelonia mydas) living at six locations throughout the Hawaiian islands revealed mean growth rates ranging from only 8 mm to 44 mm per month in carapace length. Green turtles in the northwestern segment of the archipelago were found to exhibit the slowest rates of growth. This appears to be due to limitations on the sources and abundance of acceptable marine benthic algae used for food. The slow growth rates, and protracted time estimated as being needed to reach sexual maturity, may have significant implication with respect to mortality rates and recruitment to the breeding colony.

*The author's current address is Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812.
RECOVERY RECORDS OF ADULT GREEN TURTLES OBSERVED OR ORIGINALLY TAGGED AT FRENCH FRIGATE SHOALS, NORTHEASTERN HAWAIIAN ISLANDS.

AUTHOR'S ABSTRACT

An analysis is presented of tag recoveries resulting from 10 years (1973-83) of research monitoring the migratory breeding colony of the Hawaiian green turtle, Chelonia mydas. Tag recovery records during this period were made for 207 adult females and 87 adult males. Data summaries are given on the aspects of long-distance migrations, reproductive cycles, site fixity, longevity, and tag shedding.

*The author's current address is Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812.

AUTHOR'S ABSTRACT

The conservation status of sea turtle populations is summarized and discussed for the Central Pacific locations of the Hawaiian Archipelago, Line Islands, Phoenix Islands, Cook Islands, American Samoa, Western Samoa, Tokelau, Tuvalu, Wake, Johnston, Howland and Baker. While incomplete information exists for many of these areas, there is nevertheless evidence to indicate that the numbers of turtles have declined within historical times. Only those islands under United States jurisdiction currently have governmental regulations pertaining to sea turtles.

*The author's current address is Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812.

AUTHOR'S ABSTRACT

A comprehensive synopsis is presented of all known biological, ecological, and other information relevant to the natural history of the green turtle (Chelonia mydas) population in the Hawaiian Archipelago. Data are derived from both a review of the existing published literature, as well as original research conducted by the author. The bibliography contains 670 citations current to September 1979.

*The author's current address is Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812.
RADIO TELEMETRY OF HAWAIIAN GREEN TURTLES AT THEIR BREEDING COLONY. In Marine Fisheries Review, vol. 44, no. 5, pp. 13-20, (1982). Andrew E. Dizon and George H. Balazs* (Southwest Fisheries Center, National Marine Fisheries Service, NOAA, P.O. Box 271, La Jolla, California 92038; Hawaii Institute of Marine Biology, P.O. Box 1346, Kaneohe, Hawaii 96744).

ABSTRACT

Little is known about the range and movements of green turtles, Chelonia mydas, during the critical period of their life history when they gather on their breeding grounds to copulate and nest. In order to investigate these behaviors, we developed radio telemetry techniques to determine position and environmental temperature. Access to the turtles is facilitated because Hawaiian Chelonia have a unique behavior of land basking. For about 3 weeks in the middle of the breeding season, we plotted the movements of four males and four females.

This report concentrates primarily on tracking methods, but we also discuss the distribution of the turtles and their fidelity to the nesting beach. Although there are two nesting complexes of the breeding atoll and they are separated by 9 km, no movements between the two areas were observed. Both males and females remained in proximity to what we believe is their natal beach.

*The author's current address is Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812.
BASKING BEHAVIOR OF THE HAWAIIAN GREEN TURTLE (CHELONIA MYDAS).
A. Burns School of Medicine, Department of Physiology, and
Pacific Biomedical Research Center, Kewalo Marine Laboratory,
Honolulu, Hawaii 96822; Hawaii Institute of Marine Biology, P.O.
Box 1346, Kaneohe, Hawaii 96744).

ABSTRACT

Observations were made on green turtles basking on the
white sand beaches at French Frigate Shoals in the
Northwestern Hawaiian Islands. The highest rectal tem-
perature recorded from the basking turtles was 31.3°C,
but the surface temperature of the carapace attained
values as great as 42.8°C. During basking, the turtles
flipped sand onto their carapaces, but they did not
appear to orientate their position in relation to the
sun. The duration of basking was inversely related to
the mean temperature of a black globe, and the basking
beaches were relatively cool. The pattern of breathing
during basking consisted of periods of breath-holding
alternating with single breaths. The amount of time
that the turtles basked varied from 0.3 to 7.5 percent
of the total time they were under observation. The
biological significance of basking and the advantages
that might accrue to Hawaiian green turtles from their
unique basking behavior are discussed.

*The author's current address is Southwest Fisheries Service
Honolulu Laboratory, National Marine Fisheries Service, NOAA,
P.O. Box 3830, Honolulu, Hawaii 96812.

323

ABSTRACT

Observations were made on green turtles basking on the white sand beaches at French Frigate Shoals in the Northwestern Hawaiian Islands. The highest rectal temperature recorded from the basking turtles was 31.39°C, but the surface temperature of the carapace attained values as great as 42°C. During basking, the turtles flipped sand onto their carapaces but they did not seem to orientate their position in relation to that of the sun. The duration of basking appeared to be inversely related to the mean black-globe temperature, and the basking beaches were relatively cool. The pattern of breathing during basking consisted of periods of breath-holding (x = 219 sec) alternating with single breaths. Among the advantages which might accrue to Hawaiian sea turtles from their unique basking behavior, evasion of tiger sharks, their main predator, may be important.

*The author's current address is Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812.

ABSTRACT

Present occurrence of the coral genus *Acropora* in Hawaii has long been questioned. This paper reviews the scientific literature concerning this controversy and presents the results of a recent resource survey of the entire Hawaiian Archipelago that clearly establishes the presence of three species of *Acropora* in Hawaii. These species are *Acropora cytherea*, A. *valida*, and A. *humilis*. Taxonomic descriptions for each species are presented, along with notes on their worldwide geographic distributions. In Hawaii, the three species are found only on six islands in the middle of the chain. Extension of their ranges throughout the archipelago may be limited by discontinuous and sporadic larval recruitment.

ABSTRACT

Acropora was present in Hawaii during the Miocene but disappeared from the geological record during the Pleistocene. In the present (Holocene), Acropora appears to be in the process of recolonizing the archipelago. Three species have been found, all with centers of distribution in the middle of the chain at French Frigate Shoals. The most likely source of the Acropora recolonizing Hawaii is Johnston Island by way of the subtropical countercurrent. Few other species of coral in Hawaii were extirpated during the Pleistocene. Thus the history of Acropora in the archipelago may not be representative of shallow-water marine forms in general. Nevertheless, the record of Acropora in Hawaii supports the theory that distributional discontinuities between many Pacific Island coral reef faunas are due to the net product of local extinction and recolonization.
COMMUNITY STRUCTURE, SUCCESSION AND DEVELOPMENT OF CORAL REEFS IN HAWAII. In Marine Ecology - Progress Series, vol. 11, pp. 1-14, ©1983 Inter-Research. Richard W. Grigg (Hawaii Institute of Marine Biology, P.O. Box 1346, Kaneohe, Hawaii 96744).

ABSTRACT

Reef building corals in the Hawaiian Archipelago consist of only 42 species belonging to 16 genera. The Hawaiian coral fauna is highly depauperate relative to the Indo-West Pacific Ocean, a result most likely due to geographic isolation. Although impoverished, the species composition of reef building corals is remarkably uniform throughout the archipelago. Differences in species composition which do exist appear to be caused by varying patterns of disturbance and recruitment. Although patchy distributional patterns exist within islands, the differences in species composition between islands are small. Where adequate substrata prevail within the euphotic zone most species are present. Hence species composition tends to be an all or none phenomenon. Contrary to most terrestrial ecosystems, a positive correlation does not exist between species richness and habitat area (0 to 20 m). This may be due to low habitat complexity within the zone for reef building corals and high rates of recruitment between islands. It also suggests that most reef building corals in Hawaii are generalized species. The fact that most do not drop out moving northwestward in the chain is evidence of their generalized life history (eurytopy). The most significant differences between coral reefs found on different islands, are differences in community structure. On seaward reefs differences in community structure appear to be primarily caused by differences in physical disturbance from long period swell; they can be interpreted as differences in successional age. Moving northwestward within the chain, coral growth rates steadily decline. This has the effect of lengthening the successional process and increasing the likelihood of intervening disturbance. A hypothetical model operational over generations is presented demonstrating the effect of disturbance on the successional process for coral reefs in general. The development of large-scale morphological features
such as spurs and grooves, fringing and barrier reefs and atolls involve processes operational over geological periods of time. The chronology of the Hawaiian Archipelago is now sufficiently well known to serve as a time scale against which the development of these structures can be measured.

ABSTRACT

A threshold for atoll formation, herein termed the Darwin Point, exists at the northern end of the Hawaiian Archipelago at 29° N latitude. Hawaiian atolls and coral islands transported northwest by tectonic movement of the Pacific Plate appear to have "drowned" near the Darwin Point during the last 20 million years. Measures of gross carbonate production by corals across the archipelago show that growth rates decrease with increasing latitude. At the Darwin Point, corals may contribute only 20% of the calcium carbonate necessary to keep pace with recent changes in sea level and thus appear to be more important as builders of framework than producers of limestone. Reduction in this function rather than total carbonate production may be the determining factor in the formation of atolls and coral islands. Elsewhere in the world other Darwin Points may exist but probably not at the same latitude due to differences in ecological conditions, coral species composition, island area, rates of erosion and tectonic histories.

ABSTRACT

On April 27, 1980, the Greek freighter "Anangel Liberty" went aground on the reef at French Frigate Shoals, a National Wildlife Refuge in the Hawaiian Islands. The vessel was refloated with no major damage or fuel spillage after 2,200 tons (2,200,000 kg) of kaolin cargo had been jettisoned on the reef. Huge plumes of suspended clay raised major concern over the possibility of widespread ecological damage. However, field investigations conducted 14 d after the kaolin was dumped revealed that environmental impact was very minor and highly localized; it was evident that most of the kaolin had been suspended and removed from the area. The only significant damage was a 2 to 3 m deep channel plowed through the reef by the freighter. Within 50 m of both sides of the channel, some coral was smothered and colonies of Pocillopora spp. were alive but slightly bleached. Beyond 50 m there was no apparent impact, nor did any clay settle on the bottom. This incident illustrates that some events which initially appear to have potential pollutant impact do not produce significant and irreversible environmental changes and emphasizes the need to analyze such events on a case-by-case basis.
THE STATUS AND CONSERVATION OF SEABIRDS IN THE HAWAIIAN
ARCHIPELAGO AND JOHNSTON ATOLL

Craig S. Harrison, Maura B. Naughton, and Stewart I. Fefer
U.S. Fish and Wildlife Service, P.O. Box 50167,
Honolulu, Hawaii 96850

ABSTRACT

The Hawaiian Archipelago and Johnston Atoll are impor-
tant breeding areas for more than five million seabirds
of 22 species. This area encompasses a large portion
of the worldwide breeding range of nine species and
sub-species. Today, most of the important colonies are
in state or federal wildlife refuges, but strict
enforcement of refuge regulations is rare or ineffec-
tive. Populations in the Northwestern Hawaiian Islands
have generally recovered from the severe depredations
of the early twentieth century, which included guano
mining, feather hunting, and the introduction of rab-
bits which destroyed native vegetation and nesting
habitat on important colonies. Threats today include
the introduction of predators (especially rats), inci-
dental take from military activities, competition with
commercial fisheries, introduced plants, and a general
exposure to the man-made threats of the twentieth
century. On the main Hawaiian islands, several sub-
species are in danger of extinction from introduced
predators and increasing urbanization. Many conserva-
tion projects are underway and most areas are well-
surveyed. Research is needed to better understand many
aspects of the biology of seabirds, develop methods to
recognize stress on a population, and learn to control
or eliminate introduced flora and fauna. In certain
areas, feral animals must be eliminated. Fisheries
proposed in waters adjacent to colonies in the North-
western Hawaiian Islands must be regulated to reduce

*The complete paper has been accepted for publication in ICBP
Technical Bulletin and is currently in press.
competition with birds for prey resources and to prevent the incidental introduction of exotic flora and fauna.
BIOLOGY AND CONSERVATION OF THE LAYSAN DUCK (ANAS LAYSANENSIS)*

Daniel W. Moulton and Milton W. Weller

U.S. Parks and Wildlife Department, Austin, Texas 78744; Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas 77843

ABSTRACT

A two-summer study of Laysan Ducks (Anas laysanensis) resulted in a population estimate of 500 based on mark-recapture methods with over 90 percent of the population marked. The recommended estimation technique for non-banded populations is based on crepuscular or nocturnal rather than diurnal observations.

Nesting occurred in spring and early summer in spite of the subtropical climatic regime. Nests were mainly in clumps of the grass, Eragrostis, and hatching success was low, due in part to egg predation by Laysan Finches (Telespyza cantans). Only a small proportion of nesting hens seem successful in rearing young. Duckling mortality due to exposure is common during rainstorms, but no direct predation was noted. The species seems to be long-lived and with a low reproductive rate as is common in K-selected species.

Pair bond characteristics resemble those of continental populations of Mallards. Pairs are conspicuous in spring and bonds last until incubation is well along. Males tend to return to mates after brood-rearing or loss of brood or nest. Year-to-year mate switching occurs over half the time even when previous mates are alive. Males do not assist in care of the brood.

During spring and summer, ducks of all ages rely heavily on invertebrate foods. Radio-marked pairs

*The complete paper has been accepted for publication in Condor and is currently in press.
consistently used the same upland areas during the day, where they may have fed on larvae and pupae of the moth, *Agrotis dislocata*, and other terrestrial invertebrates. At night, most ducks moved to the lake to feed, and to drink at freshwater seeps, which were communal areas.

Feeding and drinking activity is dominantly crepuscular and nocturnal at the lake, but laying hens or hens with broods sometimes fed throughout the day as well. Adult brine flies (*Neoscatella sexnotata*) on the mud flats around the lake were the major food of ducks of all ages, and a late summer shift to the uplands may have been due to reduced numbers of brine flies at the lake. Nevertheless, the lake is vital to the success of the species, and it is unlikely that a significant population could survive on terrestrial resources alone. The species make little use of tidal areas except for bathing.

Conservation of the species requires monitoring of duck populations and habitat conditions, and surveillance for accidentally introduced predators such as rats. Intensive management will be necessary only if blowing sands fill the lake, predators become established, or the vegetation is seriously damaged in some way.
ENCOUNTERS OF HAWAIIAN MONK SEALS WITH FISHING GEAR AT LISIANSKI ISLAND, 1982*

John R. Henderson

Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

During a 6 month field study at Lisianski Island in 1982, 10 of the 26 pups born there (38.5%) were observed to investigate or become entangled in lost or discarded netting or line. Four of these pups became entangled in debris, necessitating release by biologists. Twenty-one net fragments which washed ashore were cataloged and sampled, suggesting that such debris may be ubiquitous in the waters surrounding the Northwestern Hawaiian Islands. Presence of such debris, coupled with a general propensity of monk seal pups to explore the reef environment, could lead to mortality of Hawaiian monk seal pups.

*The complete paper has been accepted for publication in Marine Fisheries Review and is currently in press.
EFFECTS OF TAGGING ON MONK SEAL PUPS: PRELIMINARY RESULTS

John R. Henderson and Thea C. Johanos

Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

To assess potential effects of tagging on Hawaiian monk seal pups, one half (n=13) of the 1982 pup cohort at Lisianski Island were tagged and marked at weaning, while the remaining 13 were only marked. For 6 months the pups' presence and location on the island, duration of trips away from the island, and behavior while on the island were monitored. Preliminary analysis of the movement and haulout patterns revealed no significant difference between the tagged and non-tagged groups.
RECOVERY PLAN FOR THE HAWAIIAN MONK SEAL, MONACHUS SCHAUINSLANDI

William G. Gilmartin

Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

This recovery plan is a "working plan" prepared by a knowledgeable team of scientists to guide research and management which will aid the recovery of the endangered Hawaiian monk seal. The plan presents available information concerning the background and present status of the species, identifies problems (both biological and human related), outlines a plan of research addressing these problems, and recommends management policies.
FIRST OBSERVATION OF A FATAL SHARK ATTACK ON A HAWAIIAN MONK SEAL

Doris J. Alcorn and Alan K.H. Kam

Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

Sharks fatally attacked a Hawaiian monk seal on 28 May 1982 off Laysan Island, Northwestern Hawaiian Islands. Two species of sharks were present (tiger sharks, Galeocerdo cuvier, and gray reef sharks, Carcharhinus amblyrhynchos), and it is thought that tiger sharks initiated the attack. The victim of the attack was a subadult with dorsal injuries apparently inflicted by adult male seals at least 2 days prior to the shark attack.
THE HAWAIIAN MONK SEAL, *MONACHUS SCHAUINSLANDI*,
AT FRENCH FRIGATE SHOALS, 1982

Ruth Ittner
Southwest Fisheries Center Honolulu Laboratory, National Marine
Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

This report presents information collected during 1982
at French Frigate Shoals on the Hawaiian monk seal.
Data are from 8 of the 12 low sandy islets, and include
the following: identification of individuals (based on
natural markings), census results, haulout patterns,
reproduction, wounds, entrapments, deaths, and
miscellaneous observations.
HAWAIIAN MONK SEAL POPULATION RESEARCH, LISIANSKI ISLAND, 1982

Sheridan H. Stone
Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

The absolute number of Hawaiian monk seal, Monachus schauinslandi, in the population at Lisianski Island was determined by identifying individuals on the basis of applied bleach numbers or natural marks, and conducting 98 island censuses 17 March to 14 September, and 26 October to 22 November, 1982. The alternate day censuses provided data on temporal and spatial haulout patterns for individual seals. Data were collected daily on pupping, weaning, molting, and other factors that may influence haulout patterns. Injuries, deaths, and entanglements in fishing gear and other debris were documented.

In addition to 28 pups of the year, 215 seals consisting of the following were identified: 18 male and 10 female juveniles, 24 male and 21 female subadults, and 101 male and 41 female adults. Only two of these seals (an adult female and adult male) were known to have moved to Lisianski Island from other islands during the study. Three pups died, and a subadult female disappeared and is presumed dead. There were three serious injuries: two adult females with dorsal wounds, and a shark-injured adult male. Four weaned pups had to be removed from entangling debris, and other entanglements were seen.
SCAT AND SPEW ANALYSIS OF THE HAWAIIAN
MONK SEAL, MONACHUS SCHAUINSLANDI

Rodney T. Watson and Gail A. Peiterson
Southwest Fisheries Center Honolulu Laboratory, National Marine
Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

Monk seal scats and spews were collected at five locations in the Northwestern Hawaiian Islands (Kure Atoll, Pearl and Hermes Reef, Lisianski Island, Laysan Island, and French Frigate Shoals). Preliminary identification of fish scales and cephalopod beaks has been made on materials collected through 1982, and a list of prey items is included in this report. A comprehensive analysis of monk seal food items is ongoing.
PECUNDITY OF THE SPINY LOBSTER, PANULIRUS MARGINATUS
(QUOY AND GAIMARD), IN THE NORTHWESTERN HAWAIIAN ISLANDS

Victor A. Honda
Southwest Fisheries Center Honolulu Laboratory, National Marine
Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

Fecundity estimates were made for the spiny lobster, 
Panulirus marginatus, based on 75 berried females 
collected in the Northwestern Hawaiian Islands. Eggs 
from 22 berried females ranging in size from 53.1 to 
143.8 mm carapace length were examined for differences 
in egg size within the brood. Variation in fecundity 
of spiny lobsters from Necker Island and Maro Reef was 
examined also. The number of eggs carried (113,000 to 
1,021,000) generally increased in relationship to an 
increase in carapace length.
DETERMINATION OF SIZE AT Maturity IN THE HAWAIIAN SPINY LOBSTER, *Panulirus margina tus*, FROM CHANGES IN RELATIVE GROWTH

James H. Prescott

Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

The size (carapace length, CL) at maturity of two populations of *Panulirus margina tus* (Quoy and Gaimard 1825) from Oahu and Necker Islands, Hawaii, were studied. Three regression analysis procedures were used to estimate size at maturity from changes in the allometric growth of some pairs of the walking legs. Estimates of the size at maturity were 58.6 mm CL for the females around Oahu and 60.7 mm CL for those at Necker Island. The males' estimated size at maturity around Necker Island was 59.2 mm CL and 63.6 mm CL around Oahu. On the basis of these results, it appeared that there were no significant differences in size at maturity between either sex or locality studies. Several general models for allometric growth are discussed as well as methods for fitting them. The use of changes in allometric growth to estimate size at maturity versus the more commonly used method and probability plots of the proportions of mature specimens in given size classes, are also discussed.
NOTES ON THE DIETS OF HERBIVOROUS FISHES FROM THE
NORTHWESTERN HAWAIIAN ISLANDS

Lisa H.C. Gouw

Hawaii Cooperative Fishery Research Unit, 2538 The Mall,
Edmondson Hall 165A, University of Hawaii, Honolulu, Hawaii 96822

ABSTRACT

Diets of suspected herbivorous and omnivorous fishes
from Midway and French Frigate Shoals were examined as
part of a larger study of the trophic relationships of
inshore fishes. Algal gut contents were systematically
analyzed from 189 specimens of 24 common species in
nine families. These included almost all of the most
numerous species that might be expected to be of great-
est ecological significance as herbivores.

Surgeonfishes (Acanthuridae) were found to contain a
wide variety of brown, red, and green algae. The
phaeophyte, Lobophora variegata, was a dominant, iden-
tifiable algal species, which occurred in the guts of
Acanthurus nigrois, A. leucoparicus, A. olivaceus,
Naso unicorns, and N. lituratus. In 20 specimens
examined of the two Naso species, L. variegata com-
prised about 90 percent of the gut contents. The
chlorophyte, Boodlea composita, also occurred widely
among the diets of acanthurid species. Two balistid
species, Melichthys niger and M. vidua, were heavy
algal consumers. Their gut contents were dominated by
brown, green, and red algae, especially greens and
corallines. The nenue, Kyphosus bigibbus, fed primar-
ily on algae (browns, reds, and especially greens),
with Lobophora variegata and large quantities of
Halimeda opuntia identified. Guts of three parrotfish
(Scaridae) species contained a milky chyme consisting
of fine calcium carbonate particles and digested algae.
This is consistent with the common observation of
scarids feeding by scraping algae from coral surfaces.
Boodlea composita, Acanthophora spicifera, Laurencia
sp., Grateloupia sp. and Siphonocladius tropicus were
identifiable in these contents. The latter two algae also occurred among the acanthurids.

Of four species of butterflyfishes examined, only Chaetodon fremblii contained significant algae. All identifiable food in its guts was green algae, including Halimeda. Among the damselfishes (Pomacentridae), only Abudefduf abdominalis and the abundant Dascyllus albisella were analyzed. Over 60 percent of Abudefduf specimens contained algae, including browns, reds, and greens. Less than 20 percent of Dascyllus specimens contained algae, including browns, greens, and some filamentous forms. Both these pomacentrids contained small crustaceans as well; for Dascyllus this animal prey seemed to dominate the diet. Centropyge potteri, the only abundant pomacanthish species, appeared to consume considerable algae (mostly greens) and very little else. Of all the specimens of the common puffer, Canthinogaster jactator, that contained food, algae (primarily reds and particularly corallines) occurred in a little less than 40 percent, mixed with a variety of benthic invertebrates. Additional fish species examined that contained traces of algae were Flammeo sammara, Thalassoma ballieu, T. duperrey, Parupeneus pleurostigma, Priacanthus meeki, and Pervagor spilosoma.

In total, at least 20 species of fish out of 129 species examined appeared to eat substantial quantities of algae. It is probably reasonable to characterize 18 species as obligate herbivores, even though some amount of animal food may be taken as well. Several of the herbivorous species, especially some of the acanthurids and scarids, are quite widespread and abundant, although they appear subjectively to be less so than in similar high island situations. Based on the number of predator individuals within which various prey types occurred and the relative species composition of the complete fish community as determined by quantitative collections of patch reefs, algae directly provide about 8 percent of the food base for the entire fish community. Fish herbivory is clearly an important trophic pathway in these reef communities.
FOOD AND FEEDING HABITS OF THE WAHOO, Acanthocybium solandri, 
in the Northwestern Hawaiian Island Waters

Steven H. Kramer

Southwest Fisheries Center Honolulu Laboratory, National Marine 
Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

Wahoo, Acanthocybium solandri, stomachs collected from 
fish caught during 1976-82 in the Northwestern Hawaiian 
Islands (NWHI) were examined for food contents and 
stomach parasites. Approximately 85% of the stomachs 
contained food items. Wahoo feed on fish, cephalopods, 
and to a small extent, crustaceans. Fish were the 
major prey items and Decapterus sp., Monocanthis, 
Scombridae, and Acanthuridae occurred most frequently 
in the stomachs. Cephalopods consisted mostly of 
Teuthioidea. Crab megalops and Squillidae represented 
the small crustacean portion of wahoo diet. Although 
Wahoo feed on a wide variety (approximately 30 
families) of prey items, in the NWHI they feed heavily 
on a relative few, primarily littoral, species such as 
Decapterus sp. and monocanthis. Decapterus sp. was 
the major prey item in every season except summer, 
during which cine monocanthis were more important 
followed by Decapterus sp. Gastric parasites included 
trematodes, nematodes, and cestodes. A large trematode, 
Hirudinella ventricosa, occurred in 100% of the 
stomachs. Cestodes of the order Trypanorhynchca occurred 
in 10.7%. Unidentified nematodes occurred in 2.2% of 
stomachs. Wahoo in the NWHI probably patrol the outer 
reefs and banks for the majority of their food, feeding 
on prey in depths ranging from near the surface to 
close to the bottom.
AHERMATYPIC SCLERACTINIA FROM THE HAWAIIAN ISLANDS

Stephen D. Cairns

Department of Invertebrate Zoology, Smithsonian Institution
Washington, D.C. 20560

ABSTRACT

Eleven hundred fifty specimens of ahermatypic ("deep-water") Scleractinia were examined from 185 stations made throughout the Hawaiian Islands. Forty-two of these stations were made by the National Marine Fisheries Service vessels Townsend Cromwell and David Star Jordan. A total of 54 ahermatypic species are now known from the Hawaiian Islands, 19 of which are new records. Twenty-one species extend to the Northwestern Hawaiian Islands or have been taken only from there. Eight new species are described in the genera: Fungiocyathus, Caryophyllia, Premocyathus, Deltocyathus, Trochocyathus, Coenosmilia, Flabellum, and Cladopsamia. Forty-two species of hermatypic ("reef") Scleractinia are known from the Hawaiian Islands (Grigg and Wells, 1981), bringing the scleractinian fauna to 96. Clearly, there are more species of deep-water corals than shallow, a ratio also found in the Atlantic Ocean but not in the Indo-West Pacific, where hermatypes are so prolific.

Zoogeographically, the Hawaiian deep-water Scleractinia are an attenuated Indo-Pacific fauna, with no relationship to the eastern Pacific. Seventeen percent of the fauna is cosmopolitan, 15 percent Indo-West Pacific, 17 percent is found throughout the central and western Pacific, and 48 percent is endemic (one species has a disjunct distribution in the eastern Atlantic). The percentage of endemism, cited as 70 percent by Vaughan and Wells (1943), will probably continue to fall as the Indo-West Pacific fauna becomes better known. Hawaiian ahermatypes have been collected between 29 and 2,056 m; however, they are most common between 200 and 500 m.
TRAPPING SURVEYS FOR THE DEEPWATER CARIDEAN SHRIMPS, HETEROCARPUS LAEVIGATUS AND H. ENSIFER, IN THE NORTHWESTERN HAWAIIAN ISLANDS

Reginald M. Gooding
Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

Baited traps were used to assess the geographical and depth distribution of the deepwater caridean shrimps, Heterocarpus laevigatus and H. ensifer, in the Northwestern Hawaiian Islands. Traps were set in depths ranging from about 290 to 880 m. Both species occurred throughout the length of the chain. Catch rates varied markedly with depth. Highest catches of H. laevigatus were made in 500-800 m, and the mean catch rate was 0.91 kg per trap-night. For H. ensifer optimum trapping depths were 350-600 m, and the mean catch rate was 1.66 kg per trap-night. For both species mean catch rates were the same for spring-summer and fall-winter seasons.
GROUNDFISH FISHERIES AND RESEARCH IN THE VICINITY OF SEAMOUNTS IN THE NORTH PACIFIC OCEAN

Richard N. Uchida and Darryl T. Tagami

Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

The trawl fishery over the central North Pacific seamounts expanded rapidly after exploratory fishing by Soviet trawlers in 1967 demonstrated commercial concentrations of pelagic armorhead, Pentaceros richardsoni, and smaller quantities of alfonsin, Beryx splendens. In 1969, Japanese trawlers entered the fishery but experienced wide catch fluctuations in 1969-71. After 1971, the fishery stabilized and the catch peaked to 34,538 metric tons (MT) in 1974.

Hancock Seamounts, which fall within the U.S. Fishery Conservation Zone around the Hawaiian Archipelago, were fished in 1972-76 by Japanese trawlers which produced annual catches from 653 to 8,518 MT. In 1978-81, United States observers accompanied three Japanese trawlers that made six trips to Hancock Seamounts. Observer data indicated that the pelagic armorhead stock had recovered to some extent from the intense fishing prior to 1977. The catch per unit of effort in 1980 and 1981 improved and showed an upward trend.
CURRENT TRENDS IN HAWAIIAN FISHERIES

Paul M. Shiota and Richard N. Uchida

Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

Existing data of commercial fishery landings in the State of Hawaii for the years 1961 to 1981 are presented. Historically, practically all of the fishery landings in the past were of species harvested in close proximity to the main Hawaiian Islands; however, in recent years waters around the Northwestern Hawaiian Islands have become increasingly important as major commercial fishing areas to the State of Hawaii. The current status and description of the major fisheries and the newly developing fisheries are also presented.
FISHERY ATLAS OF THE NORTHWESTERN HAWAIIAN ISLANDS

Richard N. Uchida and James H. Uchiyama
Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P.O. Box 3830, Honolulu, Hawaii 96812

ABSTRACT

This atlas contains historical background and descriptions of the islands, atolls, banks, reefs, and seamounts in the Northwestern Hawaiian Islands. Also included are descriptions of the climatic, oceanographic, and biological characteristics of the area, and descriptions of fishing gears used to sample the marine resources. Of the species in 109 families of crustaceans, molluscs, and fishes found in the waters of the area, only a few are thought to be of any commercial value. The atlas also provides information on geographic and depth distributions, biology, and ecology of commercially important species and an extensive literature citation.