WAIKIKI AQUARIUM
PART 2 of 2 G. BALAZS
FILE

Kilo i'a

LOOKING AT THE SEA OCTOBER 1984

Ka I'a Hawai'i
The State Fish of Hawaii

Cast your ballot now for the swimmingest candidate of the year: the official state fish of Hawaii. This may be the most exciting campaign of 1984. Eight candidates have been nominated by a popularity poll early this year and are waiting for your vote.

Ka I'a Hawai'i, the State Fish Selection Campaign, began when it came to the public's attention that Hawaii, the only island state in America, has a state flower, tree, and bird, but no state fish. To correct this omission, the 1984 State Legislature, led by Waianae Rep. Peter K. Apo and Big Island Rep. Richard M. Matsuura, head of the Ocean and Marine Resources Committee, passed House Resolution No. 5 mandating the University of Hawaii's Marine Option Program (MOP) and Waikiki Aquarium to embark on a campaign to select the best finny representative for Hawaii. The campaign is also an official project of the 1984 Hawaii Statehood Silver Jubilee.

Nominees had to meet three criteria: they must be native to Hawaiian waters, culturally important to the islands, and readily seen in their natural state. While taste was a major consideration, favorites like the ahi and aku were disqualified because they are widely distributed throughout the Pacific and not easily seen.

Students and residents were asked to name favorites. After much discussion by the MOP and Aquarium scientists, eight nominees were chosen from a list of 26 eligible candidates. The finalists are: hinalea lau-wili (saddle wrasse), found only in Hawaiian waters; kala (bluespine unicorn fish); the eating-fish kumu (whitesaddle goatfish); the brilliant yellow and black lauwiliwili-nukunuku-'oi'oi (longnosed butterflyfish) from Kona; uhu-uliuli (spectacled or pale parrotfish); the striped manini (convict tang); humuhumu-nukunuku-a-pua'a (reef triggerfish) celebrated in song and story; the red and silver 'aweoweo (glasseye); or use the write-in blank for your own choice. Three of the outstanding nominees are featured in the Sea Spots column this issue.

Two of the candidates made their first public appearance by running and swimming in the Geothalassion. All the nominees marched in full regalia with their supporters in the Aloha Week Parade on September 29.

On October 19, a campaign rally will be held at the Aquarium convention center. Nominations and support speeches will be made for favorite candidates and all are invited, especially costumed delegates. Campaign materials (e.g. hats and t-shirts) are available in the Natural Selection shop.

To rally support for their campaign, the candidates will host a special costume party fundraiser for all their ocean friends on Halloween, Wednesday October 31. Costumes are required. Details will be announced.

Education packets on the nominees are now being distributed to schools to help teachers plan projects for students. Schools will submit their ballots in tabulated form to the Aquarium. Workshops and special interviews of the nominees will be conducted in October by the Aquarium's Education staff. Be sure to watch for announcements of other events!

The nominees will have special displays in community centers including Honolulu Hale. For a close-up of the candidates, we suggest you visit the Aquarium, which is Campaign Headquarters for all eight nominees.

Ballots will appear in local newspapers, on Foodland grocery bags, and in other ocean-related outlets. Your official ballot form is enclosed. Lobbying for your candidate is encouraged. But remember, the final selection will be made by the Legislature based upon the results of this popularity poll.

Ballots must be mailed or delivered to the Aquarium or the Marine Option Program, University of Hawaii, 1000 Pope Rd., Room 229, Honolulu, HI 96822, no later than 5 p.m. on November 30. ●

Sea Spots: State Fish Nominees

The 'aweoweo or glasseye *(Priacanthus cruentatus)* is a common reef fish found in tropical waters throughout the world. 'Aweoweo translates into "glowing red" which is the usual coloration although patterns ranging from mottled red and silver to pure silver are commonly found.

During the day, this fish hides under rocks and ledges in the coral reef and emerges to feed at night. The 'aweoweo is a night-time predator and its large eyes help it to find meals of free-swimming crustaceans and cephalopods.

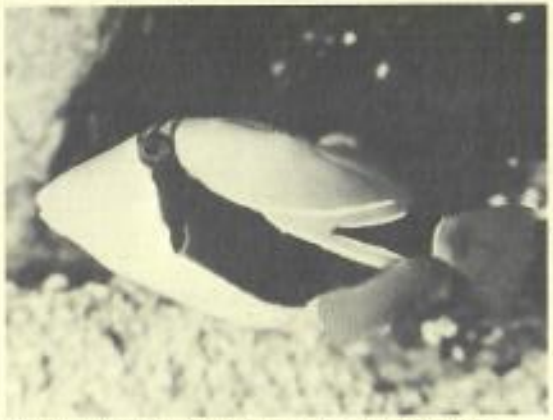
This species was and still remains a highly valued food fish although it was much more abundant in old Hawaii. A large school of 'aweoweo gathering close to shore was a mixed blessing to early Hawaiians. Appearance of these schools meant an abundance of good eating fish, but also portended death of a high chief or ali'i.

The 'aweoweo with eyes that are "better to see you with."

The humuhumu-nukunuku-a-pua'a or triggerfish *(Rhinecanthus rectangulus)*, is one of the most widely recognized Hawaiian fish. A sturdily built fish with small powerful jaws and sharp cutting teeth, it reaches up to nine inches in length. Humuhumus are often found on surge-swept basalt reefs where they swim over the bottom feeding on crustaceans and algae.

When threatened, the triggerfish swims into a hole small enough to wedge itself by locking its large first dorsal spine, making it nearly impossible to pull the fish out. A small second dorsal spine acts as a trigger and must be released before the large spine can be retracted. This is characteristic of all species in the family.

The humuhumu is not highly valued as a food fish by today's tastes. It is edible and was



The humuhumu-nukunuku-a-pua'a, the fish with a musical name.

recognized as such by the early Hawaiians who lowered baskets of cooked pumpkins or sweet potatoes into the water to lure the fish. Dried triggerfish was used as cooking fuel by Hawaiians who didn't care for its taste, or when fuel was in short supply.

The name "humuhumu," the first part of each Hawaiian name given to different species of triggerfish, means "to fit pieces together." This could possibly refer to the way some species color patterns resemble blocks of colors. The second part of this fish's name is "nukunuku-a-pua'a," and stands for "snout like a pig." Aside from its physical appearance, humuhumus have been known to grunt like pigs when lifted out of the water.

The long-nosed butterflyfish, the Aquarium's logo.

The long-nosed butterflyfish, *Forcipiger longirostris*, is a brilliant yellow colored fish numerous off the Big Island Kona Coast, but less common elsewhere in the islands. The long, forceps-like rostrum sets it apart from other butterflyfish, and aids the fish in reaching into narrow, deep spaces in the coral reef to get its meal of bottom dwelling invertebrates.

The Hawaiians called this fish lauwiliwili-nukunuku-oi'oi (lit. sharp beaked wiliwili leaf). In 1783, the long-nosed butterflyfish became the first species of fish described from Hawaiian waters by Western scientists. For this reason it was chosen for the Waikiki Aquarium's logo.

Although it has little meat, this fish was considered good to eat by the early Hawaiians. They are not often found in fish markets today, but are enjoyed by snorkelers because of their striking black and yellow colors. ●

THE WAIKIKI AQUARIUM ANNUAL REPORT 1983

LIVE EXHIBITS

Bruce Carlson, Curator of Exhibits
Beth Anderson, Quarantine Manager
King Burch, Larval Culture Specialist
Daryl Imose, Laboratory Manager
Syd Kraul, Larval Culture Specialist
Paul Nakamura, Aquarist
Michael Weekly, Asst. Lab Manager
Martin Wisner, Mgr./Collector
Reid Withrow, Nutrition Specialist
Alton Ashida, Student Help
Elly Forrest, Student Help
Kathleen McGovern, Student Help
Chris Miura, Student Help
Mark Muramoto, Student Help
Alan Nelson, Student Help
Duane Perreira, Student Help
Don Schug, Student Help
Jay Taise, Student Help
Neil Walker, Student Help
Robert Weber, Student Help
Laurel Blum, Volunteer
Alan Breed, Volunteer
Naomi Rose, Volunteer
Don Shoemaker, Volunteer

Baby cuttlefish became the Aquarium's prime attraction in 1982-83. They appeared on Hawaii television three times during the year, and in April they were filmed by the BBC and Manoa Productions for a program on cephalopods to be aired in Europe in the fall of 1983. The babies, which hatched at the Aquarium from eggs in July 1982, are nearly seven inches long after one year and they continue to amaze and delight visitors of all ages with their rapid changes in color and seemingly playful antics.

Some rare new additions to our collection of marine animals were also featured in television and newspaper stories. We obtained baby nautilus imported from the Philippines by a tropical fish wholesaler. These tiny animals averaged about 1.5" in diameter when received and are exact miniatures of the adults. They are now displayed in a special hexagon exhibit tank next to our adult Palau nautilus. At this time only the collector knows how or exactly where the babies are being collected but they are among the first ever observed by scientists and their growth rates and behavior are being carefully monitored.

A pair of yellow-bellied sea snakes made their way into our exhibit tanks. Fishermen working off the coast of the island of Hawaii near Hilo collected both specimens. Under the care of Aquarium Nutritionist Reid Withrow, both animals have adapted well to captivity. These snakes are the only native snakes in Hawaii but they are exceedingly rare and most likely drifted here from Central America. Unusual wind and current patterns during the past few months may have assisted in their ocean voyage.

Other rare animals from the east Pacific which have found their way to Hawaii and our Aquarium include the fine-scaled triggerfish, *Balistes polylepis* and three Olive Ridley's turtles, *Lepidochelys olivacea*.

Also new to the Aquarium's collection this year is a school of flashlight fishes from the Philippines. They are displayed in a completely covered tank with peep-holes for visitors to view through. All that can be seen in the black water are the blinking green lights of the fishes' light organs, which are similar to the lights of fireflies.

Black-tip sharks are not new to the Aquarium; we were in fact one of the first in the country to display this species. Rarely, however, do we have them come right to our doorstep. A baby black-tip shark approximately 18" long was spotted by beachgoers directly behind the aquarium in July, 1982. After obtaining necessary permits, our staff quickly organized an old-fashioned hukilau and shortly thereafter the baby shark was swimming contentedly in our shark exhibit with his larger brethren.

Bruce Carlson examines baby nautilus upon arrival.

Our display and holding facilities were improved and expanded by the addition of a new aeration system and an enlarged larval fish facility. Two Rotron blowers were installed by Robert Bourke to replace our aging compressor and to supply sufficient air for all our exhibit tanks. On the Ewa side of the building, a second 20′ tank was constructed as a quarantine tank for monk seal research.

Beth Anderson, who joined our staff this year, has completed our first comprehensive inventory of exhibit animals. As of June 16, 1983 561 animals representing 202 species were on display. This inventory is maintained on a daily basis on the Wang word processor and is coordinated with the Graphic Arts and Education sections so that the label system and the docents can be kept up-to-date about exhibit changes.

Daryl Imose and Paul Nakamura visited the Monterey Bay Aquarium now under construction in California. Daryl and Naka returned with valuable experience on the design and construction of artificial backdrops. Another of our fine aquarists, Michael Weekley, went to Seattle this year—permanently. He is now employed as the Tropical Biologist at the Seattle Aquarium. His replacement, Marty Wisner, arrived last fall after spending several years at Sea World in Florida and as a shark collector in Aruba.

The BIG EVENT of 1983 was Hurricane Iwa. The first hurricane to hit these islands in 23 years roared into Honolulu with little advance warning on the evening of November 23. Heavy winds and pounding surf thrashed the aquarium all night, ripping out some roofing over the outdoor mahimahi tanks and scattering debris around the yard. The Aquarium came through it with very little damage due largely to the efforts of the staff to board up and secure the facility. With the aid of a rented generator, all systems remained in operation throughout the following three days of power black-outs. After a few hours of clean-up on the morning after Hurricane Iwa (Thanksgiving Day), the Aquarium re-opened for viewing at 9:30 a.m.—only a half-hour late.

RESEARCH

Investigation on the behavior of the chambered nautilus continued this year in Palau. Dr. Peter Ward from the University of California, Davis, invited Bruce Carlson to join him to tag nautilus with sonic transmitters and track their movements over several days and nights. This work was begun during the previous year by Bruce working under a grant from the Grass Foundation. Ward's research was sponsored by the National Science Foundation and was carried out in June of 1983. Results indicate that nautilus can migrate from great depths to relatively shallow water at night and swim back to deep water again the following morning. This information was applied to the animals exhibited at the Aquarium by fluctuating the water temperature in their tank as if they were migrating between deep and shallow water. This temperature cycling stimulated female nautilus and resulted in the production of over 24 eggs. Unfortunately all of the eggs were infertile, the reason for which remains a mystery.

Bruce also spent his second week living underwater in the Hydrolab in St. Croix, Virgin Islands. Sponsored by Dr. Ernst Reese, Professor of Zoology, University of Hawaii, the mission was first carried out in May 1981 and continued in September, 1982. The project investigated the social organization of three species of angelfishes. Bruce and three other graduate students from the University of Hawaii, Tom Hourigan, Chris Kelley, and Frank Stanton, lived underwater for seven consecutive days and nights.

Aquarists transfer shark from outdoor holding tank.

Reid Withrow checks quarantine tanks during hurricane Iwa.

The Aquarium was awarded two grants from the University of Hawaii Sea Grant College Programs for studying larval mahimahi culture techniques and the behavior and production of copepods in small tanks. Funds from Sea Grant and the State Aquaculture Development Program for a two-year study to improve larval rearing techniques for marine fish will focus on larval food selection and feeding behavior of mahimahi.

We hope that our work will break through the technical bottleneck that has kept many marine fish culture projects from succeeding. Our mahimahi research is designed to elucidate general principles of larval rearing, and we hope to apply these principles to other fishes, such as skipjack tuna (aku), blue crevally (omilu), and ornamental reef fishes.

King Burch is studying otolith (earbone) growth for the purpose of determining age in fishes. Studies of age and growth are useful in analyzing changes in the population of exploited stocks. The aging technique (similar to counting rings in trees) presently concerns mahimahi but will also be applied to damselfish (kupipi) and other reef fishes.

Syd Kraul is continuing studies of artificially induced spawning and propagation of reef fishes, and is concentrating on butterflyfishes. Butterflyfishes have never been reared from eggs in captivity, and successful rearing will allow us to investigate many important facets of reef fish ecology. Planned studies include genetic overlap (intergeneric hybridization), food selection, and substrate selection at metamorphosis.

Leighton Taylor joined John McCosker and Al Giddings for a research and filming expedition to South Australia where great white sharks abound. Films and data resulting from this trip will be used in the Aquarium's new shark exhibit to open in 1983. Leighton completed the formal scientific description of the new "megamouth" shark, which represents a new family. This novel species, collected off Kahuku, Oahu in 1976, is an important discovery and our new shark exhibit will feature this unusual animal. Records of great white sharks in Hawaii and the use of this species in ancient Hawaiian artifacts were summarized in a paper presented at the Southern California Academy of Sciences. Leighton also completed a study with former student Mark deCrosta on age determination in Hawaiian tiger sharks.

EDUCATION

Leslie Matsuura, Coordinator
Carol Hopper, Science Advisor
Tad Kobayashi, Program Assistant

Docents

S. Deann Bennett
Priscilla Berenzweig
Harriet Berg
Pat Blas
Allen Breed
Edwin Brown
Ann Callies
Donna Chalmers
Dorothy Corrigan
Marion Coste
Denise Davies
Dorothy Donaldson
Margaret Floyd
Ursula Foutts
Eleanor Galimba
Joyce Gearhart
Wayne Gocke
Ray Greenfield
Cathy Guerrero
Marcia Henderson
Jane Lasell
David Leinenweber
Laurel Lindblom
James Martinez
Malamalama Maupupau
Thelma McLachlan
Lydia Mendoza
Bernice Mottley
Fred Odanaka
Herb Richardson
Louise Ripple
Darline Rita
Chris Schneider
Irene Schulte
Roger Schulte
Peter Selbourne
Cheryl Sugiyama
Frances Wong
Shige Yoshitake

Change and growth characterized the Education Section. Following the renovation of our education office and classroom this past summer, staffing was bolstered by the return of Dr. Carol Hopper as the Science Advisor this fall, and Tad Kobayashi as the Program Assistant in early spring. Added staffing has resulted in better planning, publicity, and program development. As a result class enrollment and visitor satisfaction continue to increase.

With the strong and able support of our docents, the Aquarium continued to provide guided tours and educational presentations to Hawaii's students and community organizations: 28,423 individuals were served during the 1982-1983 school year, an increase of over 33% from the previous year.

The Neighbor Island Docent Program on the island of Hawaii once again provided excellent educational programs to the students of the Big Island. Spearheaded this year by Sea Grant Extension Service Assistants Marjorie Mau in Hilo and Kelen Geller-Dunford in West Hawaii, the program continued to be the strongest element in the Aquarium's outreach effort.

Docent with children.

In the Spring of 1983, Les Matsuura convened a group of Department of Education (DOE) Marine Education Coordinators, curriculum specialists, and teacher to form the Aquarium's Education Program Advisory Committee. The committee reviewed and made recommendations on existing programs, and is assisting in planning the future of the overall program. Program development is being coordinated with current DOE guidelines and policies for aquatic education in the state. Cooperative ventures such as this allow the program to be responsive to community needs, thus assuring the Aquarium's continued role as a leader in marine education in Hawaii.

The Aquarium and the Blue-Water Marine Laboratory entered into agreements to provide training for regular staff and student instructors for a special program designed for the DOE called Ke Kula Kai (School of the Sea). The skills and knowledge obtained in this program will help high school students assist other school groups in their explorations of local marine environments.

With the concept of education as a life-long process, the Public Education Program continued its role of providing informative and enjoyable marine education experiences to the general public.

Future programs include such creative activities as seafood cooking demonstrations and batik workshops; courses on Hawaiian streamlife and shoreline fishing techniques; numerous single day workshops and a symposium on natural dyes in Hawaiian culture. Planned destinations for next year's study tours include the Galapagos Islands and New Zealand.

Formal plans to use video technology in our education programs are complete and we hope to produce quality educational videotapes on marine biology and ecology, and make them available to schools and public viewing throughout the state. Grants for capital equipment are being sought.

We were honored in May by the Department of Education District Curriculum Specialists, who unanimously nominated the Aquarium's Education Program for recognition in the national "Search for Excellence in Science Education" project of the National Science Teachers Association.

COMMUNITY RELATIONS

Patricia Raines, Coordinator
Beth Anderson, Evening Supervisor
Elizabeth Costa, Evening Receptionist
Elizabeth Hammond, Receptionist
Dianne Kobuke, Receptionist
Deanna Lee, Receptionist
Linda Levins, Clerk-typist
Iris Nakamatsu, Receptionist
Martin Wisner, Evening Supervisor

Junior Volunteers

Dawn Beyer
Baron Crenshaw
Gavin Enos
Mary Beth Hamada
James Kimura
William Kinoshita
Shanna Komatsu
David Miller
Paul Morris
David Murphy
Sean Naughton
Jennifer Richardson
Christopher Stout
Karen Sui
Maria Taylor
Rob Taylor
Kimberly Teal
Lori Torikai
Lisa Torricer
Bret Withrow

July 1982 saw the second phase of our direct mail campaign. Invitations to join the Friends of the Waikiki Aquarium went out to selected zip code areas and this direct mail effort produced over 400 new memberships. We plan to make this an annual October event.

Docent recruitment continued to be successful. The training class which began in September prepared 25 new docents to guide school children through the Aquarium. This multi-talented group was soon helping throughout the Aquarium.

Our volunteer program has expanded to include Junior Guides. This summer we had twenty enthusiastic teenagers whose duties included giving basket lectures, monitoring the Aquarium's public galleries, and encouraging Summer Fun visitors to enjoy the Aquarium while exhibiting good citizenship. They were also great help in categorizing shells for the Tapestry of the Sea exhibit.

We now have an information area (to the left of the front desk). Volunteers maintain this area Tuesdays through Fridays during our busiest hours answering questions on exhibits, membership, classes, etc.

Our annual meeting, presided over by Chairman Michael Tongg on November 21, was well attended. Acting Director Bruce Carlson previewed the 12-minute film on the Chambered Nautilus.

The Aquarium continues to be a contributing part of a growing community: more than 30 public groups used the Aquarium as an evening meeting place. We again hosted the annual Tester Symposium of the UH Zoology Department, and the American Association of Zoological Parks and Aquariums conducted their required accreditation visit to our institution.

In April we again joined forces with the New Otani Kaimana Beach Hotel to clean up the park between the two establishments. After business was completed, both staffs enjoyed lunch and a touch-football game.

Television news programs in the past year featured the arrival of the new giant clam, our cuttlefish nursery, baby nautilus, sharks off Mokuleia, and the beaching of a basking shark. Cable TV Channel 16, the Hawaii in Focus show, did a 5-minute spot for us in June which was aired in July. Radio interviews on KHPR and KSHO and feature newspaper articles helped our growing public learn more about the Aquarium.

President Reagan and Governor Ariyoshi proclaimed June Zoo and Aquarium Month for the second successive year. In observation of this event the Aquarium and the Zoo held open house with special tours on June 15th.

TOP: Leighton Taylor joins Governor Ariyoshi in proclaiming Zoo and Aquarium Month.

Waikiki Aquarium and Kaimana Beach Hotel staff join together to clean up park.

AQUARIUM OPERATIONS

Greg Enos, Manager/Fiscal Officer
John Malloe, Groundskeeper
Pamela Miike, Clerk-typist
Kiyoshi Miyasato, Maint. Mechanic
Aaron Adams, Student Help
Thomas Grant, Student Help
Dwight Jendrusch, Student Help
Paul Lux, Student Help
Darline Rita, Student Help
Dean Takiguchi, Student Help
Tim Walston, Student Help
Neil Walker, Student Help

John Malloe (background) and Neil Walker landscaping.

Fiscal restraints imposed by the University made large-scale improvements at the Aquarium difficult. However, renovation efforts begun in 1981 continued to upgrade and beautify the Aquarium's grounds and physical plant.

The retirement of groundskeeper Joseph Paekukui brought a new member to the staff, John Malloe. Since his arrival in December, John has been doing an excellent job of keeping the grounds and all our plants in fine condition. Closely tied to grounds maintenance are the new plans for landscaping projects throughout Aquarium property. Landscape designer Lester Inouye has provided expert advice on improvements that utilize native Hawaiian plants to beautify our grounds and increase the Aquarium's usefulness as an educational site.

GRAPHIC EXHIBITS AND PUBLICATIONS

Mary Morioka, Coordinator
Susie Brandt, Graphic Assistant
Cate Erbaugh, Student Help
April Akano, Student Help

Major effort during 1983 was directed toward the November completion of the Tapestry of Life in the Sea exhibit. The exhibit's main purpose is to present and interpret basic concepts of marine ecology that will increase the viewer's appreciation and enjoyment of the live exhibits.

Two video units now enhance our galleries. One color TV located by the shark tank plays an eight-minute film on the Great White Shark, produced and filmed by Al Giddings. The second unit is located next to the Nautilus display and features a 12-minute film on our nautilus collection, transport, and research. This film was produced by Paul Atkins and Grace Niska of Moana Productions and Michael deGruy of The Film Crew. Along with the nautilus film is a re-broadcast of the KGMB news story on the baby cuttlefish.

Susie Brandt, formerly of Susan-Merritt Design, joined the section as assistant graphic artist in June. Her varied skills will be harnessed to revitalize the look of all our publications: an important part of our effort to publicize the Aquarium as a leader in marine education and ocean experience.

Physical expansion of the GEP section occurred with the renovation of the front office. This area is set up to accommodate the new staff and facilitate the installation of the identification labels. Cate Erbaugh continues the tradition of skilled student help as April Akano leaves to continue her education in New York.

The first Aquarium-produced poster was completed in May and features Bruce Carlson's Nautilus photograph. We look forward to headlining a few more Aquarium animals this coming year.

Susie Brandt (background) and Cate Erbaugh in new front office.

NATURAL SELECTION SHOP

Sandi Haloulani, Manager
Phoebe Ellet, Assistant Manager
Volunteers
Kevin Allen
Marjorie Barnet
Andre Beaudry
Jane Bills
Aaron Brown
Buzzy Buchwach
Scott Calistro
Edith Chun
Yooko Fujimoto
Susan Gouveia
Mary Beth Hamada
Susanna Ho
Cathy Hoogs
Anne Hull
Kele Kameha
Thomas Kenny
James Kimura
Beverly Kuntz
Deanna Lee
Kathy Lee
Edna Liu
Kaulei Lockwood
Ron Lockwood
Miriam Medeiros
David Murphy
Jane Murphy
Ronald Nagano
Betty Nakamura
Sean Naughton
Fuki Odanaka
Tawny Potts
Anne Price
Rochelle Reed
Diane Riate
Darlene Rita
Karen Siu
Tamara Thompson
Lori Torikai
Kehau Vanderford
Elliott Wong
Sasha Wong

The Shop celebrated its 5th Anniversary in December 1982 featuring a book-signing party with wildlife artist and author Richard Ellis, a particularly appropriate guest because Richard was present at the opening of the shop in 1977. Shop sales have steadily increased during the past 5 years, following the increase in adult attendance. Per capita expenditures (total gross sales divided by total number of adult visitors) has remained steady at about $.57 per person. In 1982-83, the Natural Selection Shop contributed $12,000 to the general Aquarium budget.

Volunteer salespersons are essential to the Shop's success and this year more than 40 volunteers contributed a total of 3,720 working hours. A Junior Volunteer program was introduced in June of 1982 and will be an annual summer program. Young people, 15 years and older, contribute their time to help in the shop and gain work experience that is useful to them in years to come. They are also awarded a letter of recommendation that will aid them in obtaining paid employment.

The Shop has expanded its diverse selection of gift and book items. Noteworthy additions are the first two in a series of postcards featuring the Aquarium and its displays, and the first in a series of posters designed by Mary Morioka and featuring one of our favorite animals, the Chambered Nautilus.

FRIENDS OF THE WAIKIKI AQUARIUM

Statement of Income, Expenses and Changes in UHF Fund Balance Year ended June 30, 1983

INCOME:	
Visitor Donations	$231,435
Guidebook	2,599
Memberships	12,901
Gifts[2]	66,605
Adopt-a-Fish	125
FIN (Friend in Need) Program	1,800
Natural Selection Shop	12,000
Miscellaneous	5,542
Interest	1,794
Total Income	$334,801
EXPENSES:	
Salaries[1]	$131,335
Benefits	18,917
Supplies	8,969
Equipment	20,570
Professional Services	12,702
Publications	13,003
Promotion/Advertising	18,377
Travel	3,625
Professional Membership/Improvement	1,895
Research/Grants	4,472
Exhibits	4,669
Exhibits[2]	2,799
Miscellaneous	3,085
Communication	5,430
Discretionary	12,280
Total Expenses	$262,128
Excess of Income over Expenses	$ 72,673
Beginning Fund Balance	26,658
Ending Fund Balance[2]	$ 99,331

[1] Includes transfers to RCUH.

[2] Includes funding for major improvements and additions to live and graphic exhibits to be completed in November 1983—made possible by a $50,000 gift to the Friends of the Aquarium by the Haig Family.

RESEARCH CORPORATION OF THE UNIVERSITY OF HAWAII

INCOME:	
Transfers from UHF	$ 51,455
Marine Education Courses	5,085
Miscellaneous	130
Total Income	$ 56,670
EXPENSES:	
Salaries	$ 41,105
Benefits	4,330
Other	1,353
RCUH Administration Fee	2,178
Total Expenses	$ 48,966
Excess of Income over Expenses	$ 7,704
Beginning Account Balance	(1,877)
Ending Account Balance	$ 5,827

RESEARCH GRANT/SEA GRANT COLLEGE PROGRAMS

Marine Larval Rearing	
Research Grant 5/14/82-8/31/82	$ 3,978
9/01/82-11/30/82	4,661
Total Grant	$ 8,639
EXPENSES:	
Personnel Services	$ 5,317
Fringe Benefits	418
Materials/Supplies	344
Indirect Costs	1,982
Total Expenses	$ 8,061
Balance end of Grant Period	$ 578

Note:
Unaudited statement figures compiled by the Waikiki Aquarium Director's Office.

AQUARIUM ALLOTMENT FROM UNIVERSITY OF HAWAII, MANOA

July 1, 1982–June 30, 1983

TOTAL ALLOTMENT	$284,647
SALARIES	
Career Employees	$193,275
Student Help	18,365
Total Salaries	$211,640
OPERATING EXPENSES:	
Electricity	$ 29,869
Water	4,139
Telephone	2,279
Other Fixed Expenses	1,501
Animal Care and Collection	11,314
Building Repair and Maintenance	18,066
Equipment	867
Office & Administrative Expenses	4,972
Total Operating Expenses	$ 73,007
Total Expenses	$284,647

UNIVERSITY OF HAWAII FOUNDATION DBA NATURAL SELECTION

July 1, 1982–June 30, 1983

Sales	$ 96,519
Cost of Sales	54,299
Gross Profit	$ 42,220
Operating Expenses	31,173
Operating Income	$ 11,047
Other Income (Expense)	
Interest Income	$ 1,297
Educational Projects	(12,000)
	$ 344
Adjusted Fund Balance Beginning of Year	33,758
Total Fund Balance	$ 34,102

MEMBERS OF THE FRIENDS OF THE WAIKIKI AQUARIUM

STUDENTS AND SENIORS
Michael Aanavi
Mary Ackerman
Mrs. Glendora Alder
Fred & Louise Amos
Justin M. Anderson
R. Alexander Anderson
Harry A. Baers
Barbers Pt., Pre. School
Mr. & Mrs. Ray Belnap
Roxie Berlin
Ray Blue
Harvey M. Browne
Dolle Buet
Bruce K. Cabral
Mrs. John (Rosie) Chang
Hilde K. Cherry
David Christie
Tim Clark
Goldie Coats
Winifred Coats
Harriet Cockett
Virginia Crozier
Miriam N. Davis
Mr. & Mrs. R. H. Deisseroth
Lillian Diamond
Abel F. Doo
Daniel Dutro
Mr. & Mrs. Leslie Eastman
Fern G. Eckland
J. Ednie
Susan C. Erwin
Ruth Farmer
Ms. Ann Fielding
Ms. Leota M. Fink
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1978

WAIKIKI AQUARIUM

Kilo i'a*

a publication of the Friends of the Waikiki Aquarium

Turtle Ungirt

Chris Yamashita, Greg Enos, and Dave Clugston bid aloha to former tenant. (photo by George Balazs)

The scene on the beach in front of the Aquarium early one morning recently reminded one spectator of an old George Raft move: "You know, the one where he's wearing a new but ill-fitting suit and the prison warden gives him $20 and shakes his hand." To me, it was more reminescent of "Born Free" or at least "Lassie Come Home". The scene? The return of two green sea turtles from captivity back to their native ocean.

The onlooker's analogy about the old prison movie was far from correct although to some people the captivity of any wild animal is tantamount to imprisonment. Institutions that display living organisms have a serious and dual responsibility: the first obligation is to the animal, to assure that the environment, food, and behavioral setting are as suitable as possible. The second obligation is to the viewing public, to insure that the animals are displayed in a setting that encourages people to learn about the natural history of the animal as a unique species (and certainly not as a human caricature).

Really, in the final analysis, the only justification for placing animals in captivity is to assure the well-being of wild populations through increased human knowledge and understanding. Like it or not, we humans hold the survival of all life-forms in our collective grip. If we are ignorant or insensitive to our fellow species, we may inadvertently or impulsively commit irreparable damage. But with increased understanding through first-hand contact, we can guard against such damage. As an example, I think the widespread concern about the fate of the world's great whales has roots in the display of the smaller toothed whales in oceanariums.

Because our green sea turtles, hawksbills, and loggerheads had to share space with three large seals to the disadvantage of all the animals we felt that we were unable to meet the dual responsibility of exhibit standards and therefore had to consider several alternatives. One obvious solution was to improve the

* Kilo i'a means "watcher of sea life". For more information on Kilo i'a, see next page.

present facility and provide a new sea turtle pool with a nesting and basking beach. The 1976 State Legislature appropriated $100,000 for this purpose and Acting Governor Ariyoshi (then campaigning for Governor) participated in a ground breaking ceremony for the pool. Alas, the funds were never released and the pool is still a dream.

The remaining alternatives were simpler (and cheaper): find homes at other institutions, or, release the animals. For two species, release was ill-advised. The hawksbill is an endangered species and its unlikely we would be able to obtain specimens again; the Atlantic loggerheads could probably not survive in the strange waters of the Pacific. These animals are now on display as guests at our colleague-institution, Sea Life Park.

With the cooperation of Hawaii's distinguished turtle researcher George Balazs of the Hawaii Institute of Marine Biology, eight adult green sea turtles have been released to the wild. The animals have all been tagged and several have been observed more than six months later at areas far distant from release points. One adult female was seen by George Balazs one year and two months after release at East Island, French Frigate Shoals. This is the major nesting ground for Hawaiian green sea turtles. It is notable that the former female resident of the Waikiki Aquarium was observed to nest and produce live hatchlings.

So as we bid aloha to two more turtles recently we had confidence that (barring human interference) they have a good chance of resuming a natural life in their native ocean.

Leighton Taylor

Nautilus III

Micronesian Mariculture Center Director, Dr. William Hamner (far right) led a tour of the lab for Palau visitors including (l to r) Linda Taylor (WA), Ed Dols (NY Aquarium), Nixon Griffis, Carrie Denney (NYA), Maria & Rob Taylor (WA), Bill Flynn (NYA), and Mike deGruy, Bruce Carlson (WA).

From Jan 12 to February 8, Leighton Taylor, Mike deGruy, and Bruce Carlson participated in an expedition to the Palau Archipelago to collect live chambered Nautilus. The trip was sponsored by the New York Zoological Society with the support of Trustee Nixon Griffis, in order to obtain specimens for display at the New York Aquarium. Also participating in the collecting activities were Mr. William Flynn, Associate Director of the N. Y. Aquarium, and his assistant Mr. Ed Dols.

Seventy-four Nautilus were collected, including several rarely taken juveniles. Most of the adult Nautilus were tagged and released because facilities were not available for keeping so many animals. A special catch were three specimens that had been tagged and released in May and July, 1977. These were measured for growth changes and again released.

One Nautilus was also tagged with an ultrasonic transmitter provided by Dr. Don Nelson and James McKibben of California State University at Long Beach; its movements were monitored from the surface using a unidirectional hydrophone. During the early part of the evening the animal stayed at depths between 300' - 500', but near midnight it moved deeper (below 600') before the signal was finally lost.

Once again we had 100% survival on all Nautilus brought back to Hawaii. Four of these will remain with us (in addition to three animals remaining from last summer's trip to Palau); twelve more Nautilus are already on their way to the New York Aquarium. Other animals collected on this trip include colorful and bizarre fishes, corals, giant clams and other invertebrates.

A very special animal from Palau soon to be on display is a juvenile salt water crocodile obtained and donated by Mike deGruy. The baby croc is presently at the reptile house of the Honolulu Zoo and will join us soon.

Special thanks for the success of this trip are due to the Micronesian Mariculture Demonstration Center, Air Micronesia, and the University of Guam Marine Lab.

Bruce Carlson

About Kilo i'a

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Kilo i'a is produced bimonthly by the Friends of the Waikiki Aquarium and is dedicated to increasing the community's knowledge of the Waikiki Aquarium and Hawaii's marine life.

Kilo i'a means "watcher of sea life", or "watcher for fish" and refers not only to the ancient Hawaiian fishing specialists who aided others in finding fish but, herein, to all who find sustenance and pleasure in merely "watching sea life".

The editors welcome your comments, suggestions, and contributions for future issues.

Aquarium Adventures in Learning

HAWAIIAN SEA BIRDS!

The Aquarium is offering a brand new, once-in-a-lifetime class in seabird ecology, biology and identification. Hawaii's internationally respected expert on Hawaiian birdlife, Dr. Andy Berger, professor of zoology at UH and author of Hawaiian Birdlife will be the instructor. The class will meet at the Aquarium for lectures on April 19 and 26 at 7:30 p.m., and will go on two Sat. field trips. The first, April 22, will visit the seabird colonies on Rabbit (Manana) Island offshore from Sea Life Park. The second field trip will be on April 29 to the Red Footed Booby breeding colony at Kaneohe Marine Base. This class is a must for naturalists, photographers and others who enjoy learning in the out-of-doors. The $20 fee helps support the Aquarium's education programs, and covers boat fees to Rabbit Island.

ADVANCED UNDERWATER PHOTOGRAPHY!

A class in Advanced Underwater Photography will be offered May 9-25, (Tues. & Thurs.), 7-9:00 p.m. The Instructor is photo-journalist Doug Wallin. Students need to provide their own equipment. Fee $35

MAINLAND ADVENTURE!

The Friends of the Waikiki Aquarium and the National Marine Education Association are sponsoring a special tour which will combine participation in the National Marine Education Conference and a special "behind the scenes" visit to marine education centers and aquariums on the West Coast.

Included in the trip will be guided tours of the Seattle, Vancouver and Scripps Aquariums, the Marine Science Center in Poulsbo, Wash., Pacific Science Center in Seattle, Sea World in San Diego, the Hubbs-Sea World Research Institute, and the Orange County Floating Lab and On-Shore Lab in Dana Point. As an added bonus the tour will also visit the King Tut exhibit in Seattle. Ann Fielding and Pat Raines will act as tour leaders on the two-week trip.

Dates: Aug. 8 - 22
Enrollment is limited to 30
Cost: $850.00 (includes all transportation, rooms, entrance fees, and selected meals and parties)
Deadline for payment: May 5
Hawaii residents have first priority until April 7, after that the tour will be opened to educators on the Mainland. (DOE B credit will be available for teachers.)
Detailed brochures available on request. Phone 923-4725.

Spring Specials

We would like to call your attention to the following special lectures to be held in the Aquarium foyer at 7:30 p.m. All Friends are invited.

Wednesday, March 29: Dr. Ed Shallenberger, Sea Life Park, will speak on "Hawaiian Cetaceans" and show the recently produced Nat'l. Geographic film on the Great Whales. (Co-sponsored by Sea Grant and the Hawaiian Academy of Science.

Saturday, April 1: Mr. Quentin Keynes (great grandson of Charles Darwin) will lecture and show a film about his famous ancestor and his voyage aboard the Beagle. (Co-sponsored by Hawaii Geographic Society.

Friday, April 7: Bruce Carlson, Aquarium staff member, will report on "Nautilus III," the recent collecting expedition to Micronesia sponsored by the New York Zoological Society.

Wednesday, April 12: Dr. Jon Newhouse, Dept. of General Science, UH, will lecture on his research involving "Man and the Atoll Ecosystem." (Co-sponsored with Sea Grant & HAS)

Wednesday, April 26: George Balazs, Hawaii Institute of Marine Biology, will lecture on "Wildlife and Geology of the Hawaiian Leeward Islands." (Co-sponsored with Sea Grant and HAS)

Wednesday, May 10: Dr. Robert Johannes, HIMB, will talk on his research in Palau and "Micronesian Marine Lore: A Scientific Bonanza." (Co-sponsored by Sea Grant & HAS)

Taylor "Goes Fishing" on Television

Bruce Carter and Leighton Taylor discuss two rare fishes, the bigscale pomfret and the razorback scabbardfish. (Stan Wright Photo)

Watching "Let's Go Fishing", the popular local television show hosted by Bruce Carter and Hari Kojima (pride of Tamashiro Market and a "Friend" of the Aquarium), is a Sunday afternoon tradition for most local sportsmen. Leighton Taylor, Director of the Waikiki Aquarium, has been a guest on several recent shows discussing some very notable catches by local fishing boats.

Recently, viewers had the opportunity to see a "Bigscale Pomfret" and a "Razorback Scabbardfish", two very rare fish in Hawaii. Each is known from only one other specimen, both in the fish collection of the Bishop Museum. The fish were caught by the modern Hawaiian fishing vessel Mokihana, on standard tuna longline gear. The scabbardfish is over 2-1/2 m long (7'5") but only about 13 cm (5") high. Both specimens will be curated by Dr. Taylor for deposit in the study collection of the Bishop Museum. He expressed his gratitude to Bruce Carter and local fishermen for bringing these rare specimens to public attention.

Meet the Staff: Greg Enos

Expediter. Resource person. Guide. Teacher. Counselor. At any one time Gregory K. Enos might be serving in several of these capacities while still performing his regular duties as Aquarist Foreman.

Greg is an eight year veteran of the Aquarium having joined the staff in March of 1970, and in the years that he's been employed he has taken on more tasks and responsibilities than would be expected of him normally, always maintaining an unruffled but quietly efficient mien.

Raised on Kauai, he graduated from Oahu's Kam School in 1965 and from the Church College of Hawcii four years later. He worked for Hawaiian Telephone Co. for a year before settling in at the Aquarium. The Enos Family - Greg, wife Sharon Ann, Gavin, age 9, and Gaylin, age 8 - are long-time residents of Kapahulu.

When he is not in green apron attending his tanks, Greg can be seen directing Explorer Scouts or Community Quest students as they perform various Aquarium jobs, or serving as their mentor when they learn about the ocean. Or he might be organizing a task force to pick up such varied items as food for the animals, chairs for evening lectures, tools, chemicals or office desks. He has lectured to various groups on aquarium keeping, counseled hobbyists in the care of their animals, served as Science Fair judge, hosted visiting school groups, scientists and aquarium people. He has served as fiscal officer, cashier, mechanic, custodian and SCUBA diver.

Greg is continuing his education at the University - working for his teaching certificate. He has been a serious stamp collector for many years. Greg is the co-captain of the Aquarium's off and on volleyball team, an avid rod and reel shore caster, and a faithful follower of Monday-night football.

He is also a person possessed of an unusually long middle name; the "K" stands for Kailipolohilani, and if anybody can catch him during an unbusy moment (he might explain what it means. (Greg's smiling face appears on the first page of this newsletter.)

Charles DeLuca

Bubbles from the Director's Snorkel

Good News! Long-time (and long-suffering) volunteer Pat Raines is now a paid staff member. As an employee of the University of Hawaii Foundation, she will handle all Friends business and continue to help in our education and docent programs. The position of Education Coordinator, formerly and ably filled by Sara Peck (who is presently freezing in Montana), is now the job of Mr. Les Matsuura. Welcome aboard, Les! We're glad you're in the same boat!

The Natural Selection Shop continues to be a success with visitors and staff alike. Please drop in and see the variety of items for sale, including autographed prints of Richard Ellis' humpback whales and original watercolors of Hawaiian fish by staff artist K. C. Miller. The shop will be open before and after the special spring evening lectures (listed elsewhere) and will feature price reductions for selected products for those nights only.

Thanks are due to the New York Zoological Society and Trustee Nixon Griffis for their sponsorship of the Aquarium's recent collecting and research trip to Micronesia. More Nautilus have joined our staff along with a perky little saltwater crocodile whose mother was probably 12 feet long! Bruce Carlson will report on the trip on April 7.

Recipients of the Friends' sponsored Employee-of-the-Month bonus selected by staff voting are: Oct. Ralph Alexander, Nov. Aileen Wun, Dec. Greg Enos, Jan. Harry Cordeiro and Feb. Paul Nakamura. Congratulations!

Be prepared for a special event in June to mark the first anniversary of the Friends of the Waikiki Aquarium.

Aloha from the Aquarium staff!

Leighton Taylor

WAIKIKI AQUARIUM
University of Hawaii
2777 Kalakaua Avenue
Honolulu, Hawaii 96815

WAIKIKI AQUARIUM

1983

Kilo i'a

LOOKING AT THE SEA

HURRICANE IWA

Hurricane Iwa moved over Hawaii November 23 and gave these islands a thrashing they haven't experienced in 23 years. On Tuesday morning, November 22, a hurricane watch was posted for all the Hawaiian islands and by all accounts there was no way the storm was going to miss us. The Aquarium staff was assembled early in the day to organize operations for boarding up the building. A sand-bag crew busily filled plastic bags with beach sand for use on the roof, others boarded up windows, moved plants indoors, and tied down anything that could move. The bookshop was closed only a few minutes after it had been opened for business and all inventory was moved to safe quarters in the library. Plans were also made early to rent a generator to power the air pumps —a move which seemed to be costly at the time but proved to be cheap insurance in the end. By noon the Aquarium was as secure as a fortress, and staff who wanted to leave to secure their own homes were allowed to do so; the doors were closed to the public shortly thereafter. The sun was still shining at that point and the winds were slight which unfortunately left many people in the surrounding area with a false sense of security. An hour after the folks from Atlas Electric finished installing the generator the power went out and stayed out for 15 hours. During that period the storm increased in ferocity and for Tad Kobayashi, Marty Wisner, Tom Grant and myself, who remained at the Aquarium throughout the night, it was an incredible evening. At the height of the storm, waves crashing against the sea wall hurled water 20 feet or more in the air completely covering the trees behind the building. By 10:00 p.m. the winds had shifted and blew in directly from the sea causing the only damage sustained by the building: the new roof installed over the outdoor mahimahi tanks was ripped apart. It would have been totally destroyed however, had it not been securely tied down earlier in the day. By dawn the storm was long past and the damage could be assessed. Palm fronds were everywhere and salt spray coated everything but thanks to the efforts of the staff and a stalwart generator that kept chugging throughout the storm not one animal was lost in any display tank and very little real damage was sustained by the building. After a few hours of clean up the Aquarium was open for business at 9:30 a.m. Only the rolling black-outs which continued for the next few days reminded us that not everyone on the islands was as lucky as we were. *B.C.*

SPRING PROGRAM

Spring 1983 at the Waikiki Aquarium offers something for both the avid student of marine studies or the occasional beach goer and can fit all personal schedules and interest levels.

Experienced tour leader and Aquarium associate Ann Fielding leads Spring and Summer Tours throughout the Pacific. For 23 days in February, study and enjoy New Zealand. Paddle Palau on the 18 day trip in April. In May, dive and tour the Philippines for 17 days. Participate in a NAUI certified underwater photography and wreck diving course in Palau and Truk during June. And sail and dive Tonga in July. Ask for our specific tour brochure on each of these activities.

The Aquarium's One-Day Activities and Mini-Courses for Spring 1983 provide perfect ways to be involved without extended time commitments. Day and evening reef walks make up the single day activities. "Marine Aquarium Set-Up," taught by professionals on our staff, "Hawaiian Limu," with internationally recognized expert Dr. Isabella Abbott, and "Nature Photography" with Dr. Art Reed from the University of Hawaii's Zoology Department are the topics of the new three session mini-courses.

Our one full course for Spring is "Introduction to Marine Biology" taught by Aquarium Science Education Advisor, Dr. Carol Hopper. This course introduces the marine environment, basic principles of marine biology and ecology, and the major groups of marine animals.

Among the Aquarium's most exciting programs each year are lecture series which feature current, often controversial topics related to Hawaii's marine environment and animals. In 1983, our expanded lecture offerings include two series of timely and informative lectures. The Spring Lecture Series, "Living Marine Resources of Hawaii and the Pacific," will focus on man's use of the ocean's productivity. The presence of fish in our waters and the supply of food fish in our markets depend upon our wise use of these resources. Fisheries biologists and ecologists will explain man's impact on fisheries resources and the critical need for balanced development and management of Hawaii's precious marine and coastal resources.

Hawaiian waters provide a natural laboratory for understanding the wonders of marine life. Discoveries in Marine Biology is a new lecture series which spotlights Hawaii's active community of marine scientists and their exciting research advancements and discoveries from magnetic tuna to bizarre deep-sea organisms.

SEA SNAKE

When is a sea snake really a sea snake? 99% of the time they're not. The Aquarium receives calls nearly every week from people who claim to have just seen a sea snake at Hanauma Bay, or Waikiki, or Waianae. They are always positive in their identification and are usually just calling to report their find. But upon questioning a bit deeper it is usually apparent that what they really saw was just a harmless snake eel. The snake eels abound in Hawaii and really do resemble sea snakes so most calls received on this subject are usually treated with some skepticism—but not always. We knew that someday someone would call in with the real thing, but the last time that happened was over a decade ago. The call we waited for so patiently finally came in last October. Dr. Leon Hallacher, assistant professor of zoology on the Big Island, phoned us that two fishermen had just brought in a live yellow-bellied sea snake from the waters off Hilo. There was no mistaking his description, they had a real live sea snake! The animal was immediately shipped over to us and after re-fitting tank #24 with an escape-proof lid, it was put on display for everyone to see.

Yellow-bellied sea snakes are the only snakes native to Hawaii. No one knows for certain if a breeding population exists here or if they just swim in from other locations like Central America where they are abundant. They are also the only snake that is completely pelagic, spending their entire lives out at sea. This is one of the reasons they are so infrequently observed and collected. Like other sea snakes, this sea snake is highly venomous but fortunately is not particularly aggressive and may not inject venom even if it does bite. The venom is primarily used to incapacitate its prey which is comprised entirely of fish, including small mahimahi which it encounters out at sea.

Our sea snake is being cared for by Reid Withrow who spent many hours coaxing the animal to feed. Nearly three weeks passed before it accepted its first fish offered from the end of foot long forceps. It now feeds regularly on small mosquito fishes. Curiously, it frequently ties itself in knots over and over apparently to rid itself of small organisms such as barnacles which may attach themselves to its body. Apparently for the same reason, it frequently sheds its skin sometimes as often as once per week. To date, the only difficulty we have experienced with the sea snake has been its tendency to rub its nose against the sides of the tank resulting in a sore spot on the tip of its snout. This is being treated with antibiotics.

Please take the time to stop by and view this new addition to our galleries. Also, before you call in with a report of a sea snake on your favorite reef, take a good look at the snake eels just around the corner from the first real sea snake that anyone has seen around Hawaii in years.

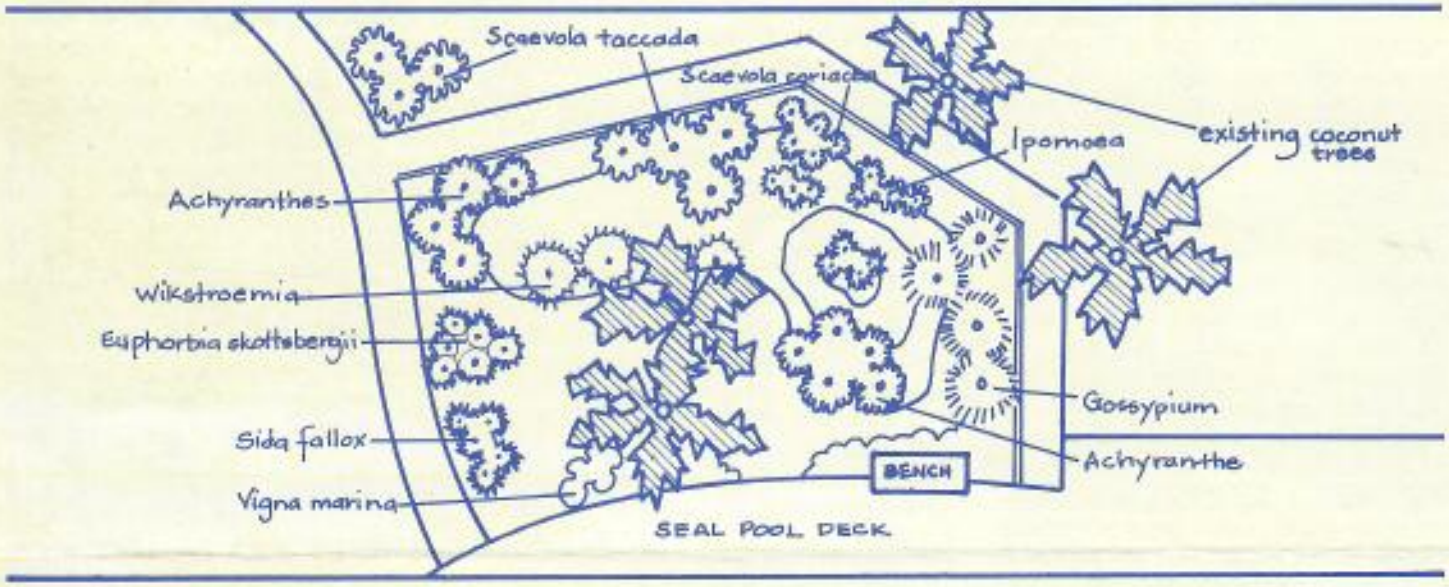
WHO'S NEW

The Aquarium work force has recently been bolstered by two new aquarists with considerable expertise: Ms. Beth Anderson and Mr. Martin Wisner. Beth joined our organization last August to replace Michael Weekley who is now with the Seattle Aquarium. Prior to her move here Beth worked as an aquarist/biologist first at Sea World in Orlando, Florida, and most recently at Marine World-Africa in Redwood City, California. The Sea World experience brought her in contact with a wide range of marine organisms from sharks to mammals to birds, and while there she learned many aspects of aquarium life support systems. One of her primary areas of responsibility included work at Sea World's Shark Encounter where she learned to collect, transport and maintain some of the largest sharks ever kept in captivity. Her experience in water quality evaluation, and the recognition and treatment of fish diseases will be put to good use here at the Waikiki Aquarium. Beth is now in charge of quarantine and disease control and is also responsible for the beautiful new exhibits called "Miniature Marine Life" in gallery #3.

Marty Wisner, who arrived November 10, also comes to us with a wealth of experiences from Sea World's Shark Institute at Long Key, Florida, and most recently from a shark collecting venture in Aruba in the Caribbean. Many of the sharks he helped collect and transport are now on display in major aquariums across the country. Moving such large animals including tiger sharks to distant locations is no small task, but Marty learned these techniques and more from some of the most experienced people in the profession. In addition Marty brings with him technical experience in the repair of SCUBA equipment which he learned in formal courses and on the job at his father's SCUBA shop. Marty will be working on the habitat exhibits in gallery #2 and on maintaining our diving equipment and boat.

We are very pleased to welcome both Beth and Marty to our Aquarium. In the event that the Waikiki Aquarium someday realizes its plans to expand, we will certainly be calling on both of them for advice on the construction and maintenance of giant ocean tanks and the fishes that go with them. We also wish to thank them as former Floridians for their experienced advice in what to do "in the event of a hurricane."

COASTAL PLANT GARDEN



A new addition to the Aquarium's expanding exhibits is the newly planted garden that features native Hawai'ian coastal plants. The initial plans originated back in May of 1976. A small group of people whose concerns centered around the perpetuation of Hawai'i's native plants proposed to the city that the Natatorium/Aquarium park area be expanded to include a higher concentration of native plants.

The Coastal garden project fell prey to many obstacles during its inception. Although the Aquarium used native plants to accent its Hawai'ians and the Sea exhibit, it wasn't until 1981 that plans for a garden got sufficient backing. Sea Grant Marine Advisory Program sponsored a seminar called "Protecting Hawai'i's Coastal Ecosystems." It was at this seminar that the Committee for the Conservation of Native Coastal Plants, now called the Coastal Garden Committee, was formed. Botanists, science teachers, and Hawai'ian plant enthusiasts composed most of the committee. Ken Nagata and Bert Kimura, co-authors of the book, *Hawai'i's Vanishing Flora* and Ray Tabata of Sea Grant are among those who lend their expertise to the committee. The main goal for the committee is to perpetuate rare coastal plants by developing demonstration gardens and showing people how these plants can be grown and incorporated into gardens and landscapes.

My involvement with the Coastal Gardens Committee is largely due to Ray Tabata. Through our combined efforts construction began on the new garden at the Aquarium. As the newly planted garden takes hold, it will provide the Aquarium with a decorative and ethnobotanical atmosphere. The garden will also provide students and visitors a variety of coastal plants for closer study.

The original proposal for the Natatorium park area is being renewed. You will be kept up to date in future issues of the Kilo i'a and also enjoy a series of articles that will focus on some of the individual plants in the garden.

FRIENDS ANNUAL MEETING

The 6th Annual Membership Meeting was the first meeting for more than 400 new members who joined during the past year. Everyone enjoyed the renovated galleries and the delicious pupu table prepared by caterer Adele Davis and the staff of the Fun Food Cookbook Company.

All members voted to change Section 3 of the Friends By-Laws to read: The classes of membership and their qualifying amounts of annual donation shall be determined by the Board of Directors. Suggested classes are as follows: Student/Senior Citizen—$10, Individual—$20, Family—$25, Contributing—$50, Sustaining—$100, Institutional—$250 or more, and Patron—$500 or more.

Bruce Carlson, Curator, presented a review of current Aquarium research on the chambered *Nautilus*. The evening was highlighted by a 12 minute pre-view of the new documentary film, soon to be seen on public television, and a slide show of his recent trip to the South Pacific.

The new 1983 Executive Committee and the Board of Directors are as follows:

Chairman: Mr. Michael Tongg
Vice-Chairman: Mr. Lynn Donaldson
Secretary: Mrs. Tessa Dye
Treasurer: Mr. Gary Schnacke
Board: Dr. John Bardach
Mr. Gordon Damon
Dr. David Heenan
Dr. Richard Kosaki
Mr. Robert Miura
Dr. S. Arthur Reed
Ms. Ceil Sinnex
Mrs. Donn Carlsmith
Mr. Les Gamble
Mr. Keith Hudson
Mr. Hideto Kono
Mr. Gary "Skip" Naftel
Mr. Burton Roberts
Ex-Officio: Mr. Donald C. Mair
Mrs. Patricia Raines

We would like to extend our sincere thanks to Mrs. Betty Smyser, Mr. Philip Spalding, Mr. Cliff Slater, and Mr. Michael Oschin who have served on the board of Directors during the past five years. They have contributed greatly to the success of the Friends by volunteering their time and talents.

DOCENT PROGRAM

Each year for nearly a decade the Aquarium has provided educational services to Hawaii students and other community organizations because it has the services of docents. The hours that these energetic folks contribute to our programs, especially in education, are no luxury. Without them our efforts to supplement marine education in the schools and the community would be seriously hampered.

The Fall Docent Training Course completed in October of last year produced one of the largest groups of graduates the program has ever enjoyed. This enthusiastic group of twenty-one out of a beginning group of thirty-two participated in a thirty-eight hour survey of marine biology with special emphasis on marine ecology as well as an introduction to the components of the Aquarium's Education Program. Lectures and lab sessions were conducted by Aquarium staff members and faculty from the University.

The class is an interesting cross-section of age groups and backgrounds. Students, retired persons, divers, teachers, medical people, and a staff member from a sister aquarium are members of the class This is a quality that has always enhanced the docent experience at the Aquarium and contributes immeasurably to its success.

NEW EXHIBIT ADDITION

The juvenile fishes are back! One of the most popular exhibits from the "old" aquarium has made a comeback in gallery #3 along with a series of small tanks highlighting the wee animals of the coral reefs of Hawaii. Tiny green, red and yellow gems of juvenile reef fishes are displayed in one small tank and include such species as the red and white wrasse *Coris gaimard*, and one of the tiniest green dragon wrasses, *Novaculichthys taeniourus*, that anyone can remember seeing. Nearby is a very contented pair of bizarre harlequin shrimp, outfitted in weirdly contorted white exoskeletons spotted with purple polka-dots. They are nearly always to be found sitting under their rock munching on their favorite food: starfish! These little creatures should be on everyone's "must see" list at the Aquarium. Also on display in this area are the first kupipi and maomo ever raised from eggs in an aquarium. These little sergeant-majors, as they are commonly called, have just settled out from the plankton stage and, like privates getting a promotion, they're just now getting their chevrons. Two rare deep water lobsters and a regal lobster add important new invertebrates to our collection of animals and are on display in other miniature reef tanks. One final exhibit includes the comical leaf-fish which always seem to have trouble staying upright. These small brown, yellow, or sometimes red fish sit on the bottom around rocks trying to fool other small fishes that they are merely swaying vegetation. A future exhibit in this area is still under construction but should be completed by January. Our plan is to display some of those tasty red prawns that Skip Naftel of the Easy Rider has been marketing recently. These prawns come from water nearly a half mile deep and special tank conditions including very cold water need to be developed before this exhibit is completed. Keep in touch, they'll be coming soon.

Nautilus Up-Date

Whatever happened to that film about the nautilus? It is still in the production stages but now seems closer than ever to reaching your home television set. Paul Atkins of Moana Productions and Mike deGruy of The Film Crew have recently completed a 12 minute promotional film distilled from 26 hours of footage shot in Palau and Hawaii. This short film will be used by them to help raise the final sum of money needed to complete the project. So far the reviews from the general public have been unanimous in praise of the film. FOWA members were given a special showing at the Aquarium's annual meeting and they too expressed their acclaim for the production. And what about the professionals' opinions back in New York? The top producers of programming for public television have all reviewed it and they too want to see more. It's still too early to write the final line on this story but it seems a sure thing that you are going to hear much more about it next year.

About Kilo i'a

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WAIKIKI AQUARIUM

University of Hawaii
Waikiki Aquarium
Honolulu, Hawaii 96822

Getting Old

BY ANNE INNIS DAGG

IN the wild, an animal generally lives such a hard life that the chances are mighty slim that it will ever reach what's considered to be a ripe old age for the species, whether it's 3 years for a mouse or 60 for a crocodile. Yet, lately, scientists have become very interested in "senescence," or aging, in wildlife, and some of the answers they've found are surprising and may help us better understand ourselves as well as other animals.

Until recently, almost everything we knew about creatures that lived to be old came from zoos, but such information was often unreliable or incomplete. For one thing, some species such as lions and tigers simply weren't kept past their prime: at the New York Zoological Park, lions which could conceivably have lived to be 25 were kept only until they were 14 at the most, at which time they looked too mangy and scrawny to be exhibited. Another problem is the fact that an animal tends to live much longer in the security of a zoo than it would in the wild. For example, a song sparrow can survive for over 17 years in captivity, but a wild one that survives past infancy rarely lives to be 8 years old. Now, two modern types of research enable us to learn more about how old age works in nature. One is the study by behaviorists of how animal groups live in the wild; the other is a growing body of work on how we can tell how old an animal actually is.

We have few old-age records from the wild, but zoo records do give us an appreciation for some species' potential life spans. The oldest elephant lived to be 77; the oldest hippopotamus, 49; the oldest zebra, 38. And many birds at least equal these. The oldest condors and vultures may be over 65 years old, although these ages are hard to authenticate. Parrots may outlive their owners, and swans can survive to be 70 or more. One cockatoo named Dick died in the National Zoo in Washington, D.C., when he was about 70. Cold-blooded animals last even longer, with tortoises reaching 150 years; sturgeon, 100; carp, 50; and toads, 36. Some small mammals may live longer than others of similar size because they spend part of their lives in hibernation or dormancy, their bodies barely functioning. The perpetually active short-tailed shrew is old at 16 months, while the record life span for the little brown bat, which spends much of its life in some degree of dormancy, is 30 years. That of the pocket mouse, which passes the hot desert season in a state of torpor, is five years.

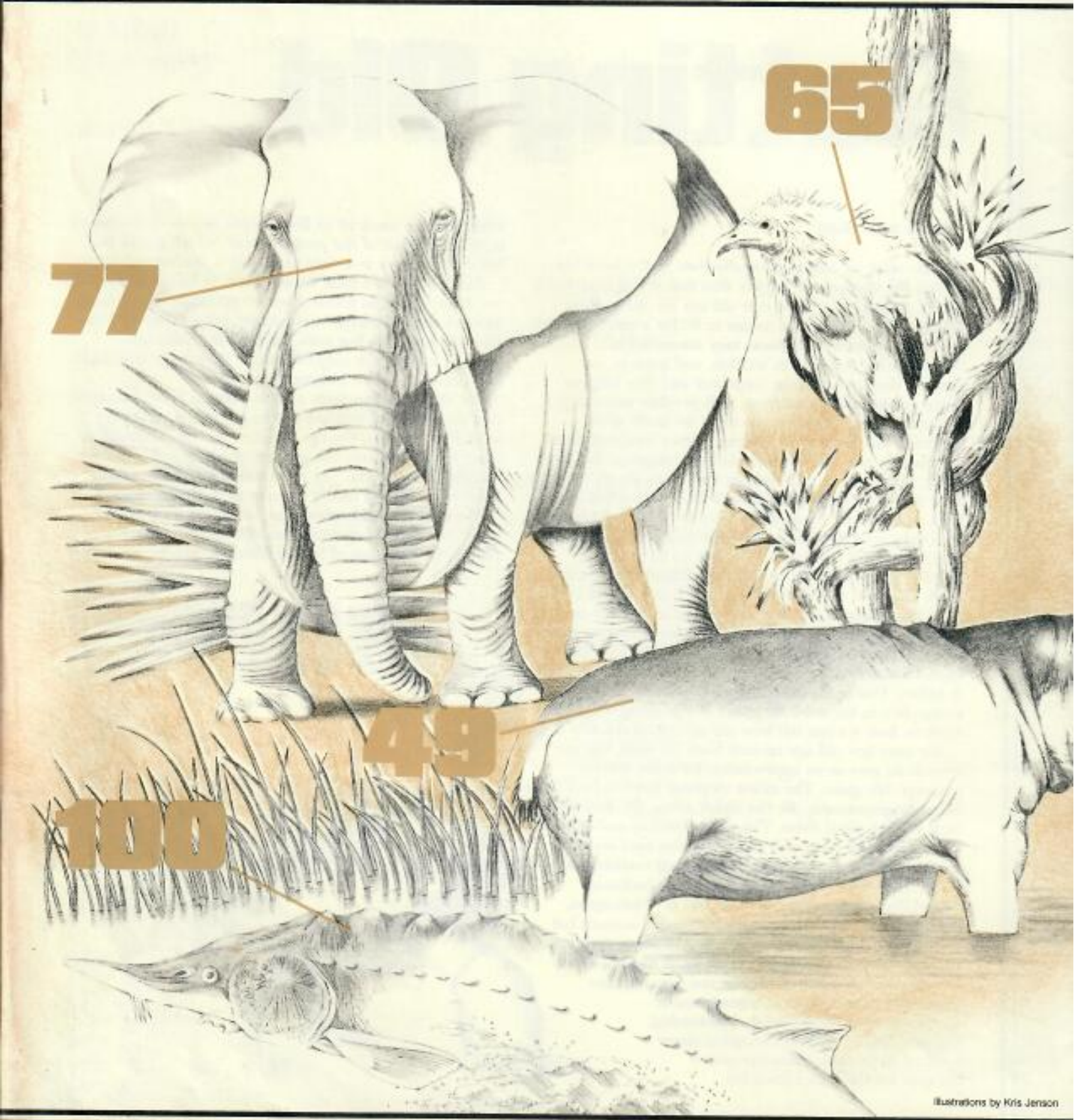
Animals that are most likely to live to be old in the wild are those which, as adults, have no predators except man. Most of these are large — elephants, hippos, rhinos, lions, tigers and wolves. But some, such as the Galapagos tortoise, survive not only because of their large size, but also because of their isolated island home.

But even freedom from natural enemies is no guarantee that an individual will live out its life to the full in the wild. For example, George Schaller, who studied African lions, found that only ten percent of adults and subadults reached old age. The rest were killed by men or other lions, were injured fatally by prey or died of disease.

The age of a wild animal can be estimated in many ways, such as by inspecting the lens from the eye of a rabbit, the thickness of baleen plates in whales, the annual

150

This is a zoo record, but a wild tortoise, too, may live 150 years. Scientists studying old age in nature say the tortoise's big body, thick shell and safe habitat make longevity possible.



Illustrations by Kris Jenson

rings in the horns of sheep and antelope, and tooth wear or, in some species, the "rings" in a tooth. To determine a grizzly bear's age, biologists cut the fourth premolar tooth in cross section so that the yearly broad cementum rings laid down during active summer periods can be seen, alternating with the narrow rings deposited during periods of winter torpor.

Studies of many species show that most wild mammals live only as long as their teeth hold out. When an individual can no longer chew its food properly, its days are numbered; it will soon become undernourished and subject to disease, parasites and predation. Old lions in Africa (age 10 to 15 or more) are missing most of their incisor teeth and their canines are worn to stumps. Wolves over ten years of age have worn and broken teeth which make it difficult for them to obtain food. Old elephants are defined as those with badly worn sixth molar teeth. (The other molars have already been worn down in sequence and discarded.)

Behaviorists who have lived among some species for years in the field say that aging in wild animals takes on new meaning in the context of a society. In solitary species, such as tigers and rhinos, individuals will deteriorate and die when they are no longer able to chew their food or compete with others of their own kind.

But in social species, old age presents a more complicated picture, with males and females undergoing different experiences. Males are generally of prime importance to a social group only when they are dominant. During this time, they mate with most of the females and fight off any male challengers or predators. However, as months or years pass, the dominant males become less able to retain their place at the top of the group's hierarchy. Eventually, they are driven from their position of authority and are expelled from the group by younger males. For example, African buffalo males over ten years of age are usually found alone or with a bachelor companion rather than in a herd. Old bull elephants are also classic loners and are apt to erupt in anger if disturbed. Others join casually with one or two younger bulls, perhaps near swamps, where the food is succulent and easy to chew.

More record zoo ages — but few of these animals will live this long in the wild. The creatures shown here are subject to rheumatism and other ills as they grow old. The hippo and elephant, like most mammals, usually die when their teeth become too worn for chewing. A vulture is almost sure to weaken and starve before it reaches 65. Only the sturgeon is apt to reach its full lifespan, as cold-blooded creatures tend to live the longest.

In social species, old females are generally not forced to become loners when they grow old, as males are, but continue to take part in the social life of their group. Even the feeblest lionesses are allowed to share the kills of other pride members. Among most species, old females usually continue to reproduce, although they have fewer young than the younger females. For example, elephant females have fewer young after they are 40 or 50 than before, although the matriarch still functions as a leader. By the time a cow is 55, she has virtually stopped breeding. This is one of the few species which, along with rhesus monkeys and humans, experiences a type of menopause.

Another social species which has been extensively studied in the wild is the chimpanzee. Female chimpanzees breed right up to the end of their lives, sometimes also continuing as leaders of their groups. Researcher Jane Goodall describes the old female, Flo, which was so frail that Goodall wondered if the chimp would be able to survive another pregnancy and birth. Flo's most recent young had been a male, Flint, which grew up to be "infantilely behaved" and spoiled. He was still suckling at the age of five, even though Flo had tried to wean him when he was three. It's possible that the aging Flo was unable to cope with Flint's tantrums.

Do older animals, which have "learned" a great deal during their lives, contribute to the survival of their species? Of course there is no simple answer. Among most species, besides civilized human societies, oldsters tend to be a liability. They have run-down tissues because of stress, past disease and exposure to toxic substances; they do not reproduce as well as young adults; they use up resources such as food which are needed by the younger animals.

There are analogies to all this in some early human cultures, where people were killed or abandoned when they grew old. For the Siriono, who lived in the Bolivian forests, and the Yakuts, who led a seminomadic life in Siberia, food was so scarce and life so hard that old people were cast out and allowed to starve. Had they not been so treated, the younger people who had to share what little was available might also have died.

Now, of course, most human societies revere their elders — mandatory retirement and inadequate care facilities for the aged notwithstanding. Ideally, like the elephant matriarch that continues to help run the herd, a person with long years of experience has much to contribute. As the American industrialist Henry Ford once said: "You take all the experience and judgment of people over 50 out of the world and there wouldn't be enough left to run it." And ultimately, there's often the option of retirement, as when the African buffalo bull leaves the herd to spend his remaining years peacefully in an area he knows well. ■

Anne Innis Dagg teaches in Ontario, Canada, at the University of Waterloo and is also a free-lance biologist.

International Wildlife
Vol, No. 1
Jan-Feb 1981

PHOTOGRAPHS BY HOWARD HALL

These elegant cousins of the earthworm look like tiny Christmas trees as they emerge from protective tubes to feed

RADIANT SPIRALS OF THE CORAL SEA

SOME worms suck blood. Others cause debilitating, even lethal, diseases in people and animals. Still others make plants wilt and die. To most people, they are creepy, crawly creatures with no backbones. Even the "good" worms that aerate soil or lure bass to a hook hardly seem appealing. Indeed, there's no such thing as a beautiful worm . . . or is there?

Ask photographer Howard Hall. He took the accompanying pictures on the reefs of the Coral Sea off Australia, and he submits them as evidence that worms — albeit underwater varieties — can be downright elegant. Of all the inhabitants of coral reefs in warm seas around the world, worms often seem the most striking. Certainly, these spiral gill worms *(Spirobranchus)* add a dramatic flourish of vibrant colors.

When these creatures feel safe, they extend their delicate tentacles from tubes in the coral. Fully spread, their spiraled clusters appear flowerlike, and they come in all shades and hues of red, orange, yellow, green, violet, blue and black. So fantastic is this display of color that people regularly mistake these unheralded creatures for showy polyps of coral.

At even the slightest disturbance, the "flowers" vanish into the coral, for the worms are sensitive to danger. A shadow cast by a fish swimming overhead or a slight rippling caused by a diver's flipper is enough to disturb them. Each little Christmas tree of tentacles is quickly folded and drawn out of sight into the tube. Within seconds, the reef becomes somber.

The last tentacle withdrawn is special. Stalked and bearing a disclike plate on top, it is a tight, protective lid over the tube's opening. When the lid is raised, the worm cautiously spreads its tentacles again. Arranged in a spiral like a conifer tree, the tentacles serve two functions. First, they are breathing organs; the branched and feathery filaments remove oxygen from the water that passes over them. Second, they collect the worm's food, trapping bacteria and other microscopic forms of life that drift in the water. The food moves along a slime-filled channel on each tentacle to the worm's mouth in the center.

Spiral gill worms, which are only four to six inches long, make their tube homes in living coral by secreting a protective limy shell, or encasement, around their soft bodies. The lime for the tubes is secreted from special glands around the worm's collar, the area just below the crown of tentacles. Slime glands on the worm's body secrete mucus that makes it possible for the worm to move freely within its tube.

Only by capturing one of the worms and pulling it free of its tube, can you be convinced that these spectacular reef dwellers are truly worms. They are, in fact, annelids, which makes them close cousins of earthworms and leeches. They belong to a special group of some 3,000 related species that live in the sea. Below the spiral gill worm's feathered tentacles are the revealing "rings" of the worm's segmented body, confirming its kinship to other annelids. In the spiral gill worm, this normally concealed portion of the body may consist of 200 or more segments.

Staying in their homes as they do, how do these worms beget more of their kind? Reproduction is certainly not a romantic interlude. Ripe eggs and sperm are simply released in countless numbers into the water, where some meet by chance. The fertilized eggs hatch into free-swimming larvae that soon settle and begin forming the tubes in which they spend the remainder of their amazingly colorful lives. — *George S. Fichter*

VANCOUVER PUBLIC AQUARIUM In Stanley Park, P.O. Box 3232, Vancouver, B.C., Canada V6B 3X8, (604) 685-3364

October 4, 1982

Dr. George H. Balazs
Assistant Marine Biologist
Univeristy of Hawaii at Manoa
P.O. Box 1346
Coconut Island
Kaneohe, Hawaii 96744

Dear Dr. Balazs:

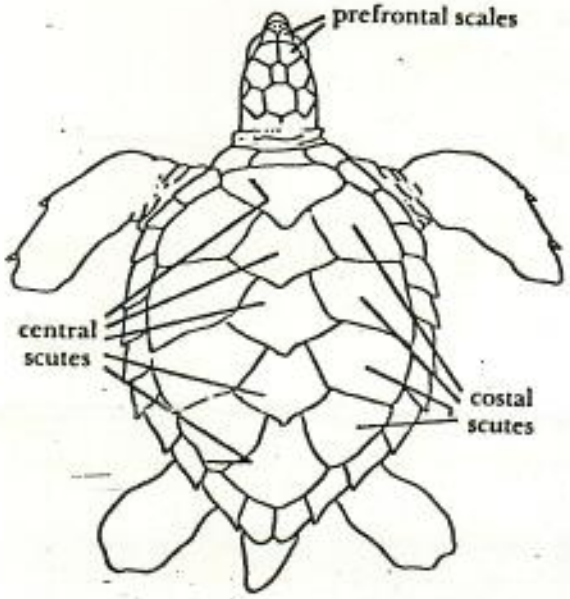
Please find enclosed a photocopy of the diagram you sent in your letter of September 14th. Measurements and weights are in the bottom right hand corner. Measurements were taken using a flexible tape over the curve of the shell. Average temperature in the tank has been 26°C.

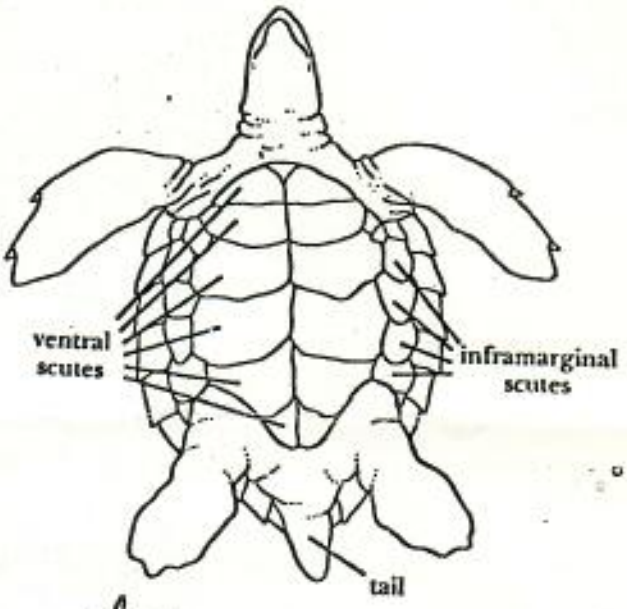
I look forward to hearing the results of your survey.

Sincerely,

K. Gilbey Hewlett
Curator

GH:kr
Enc.

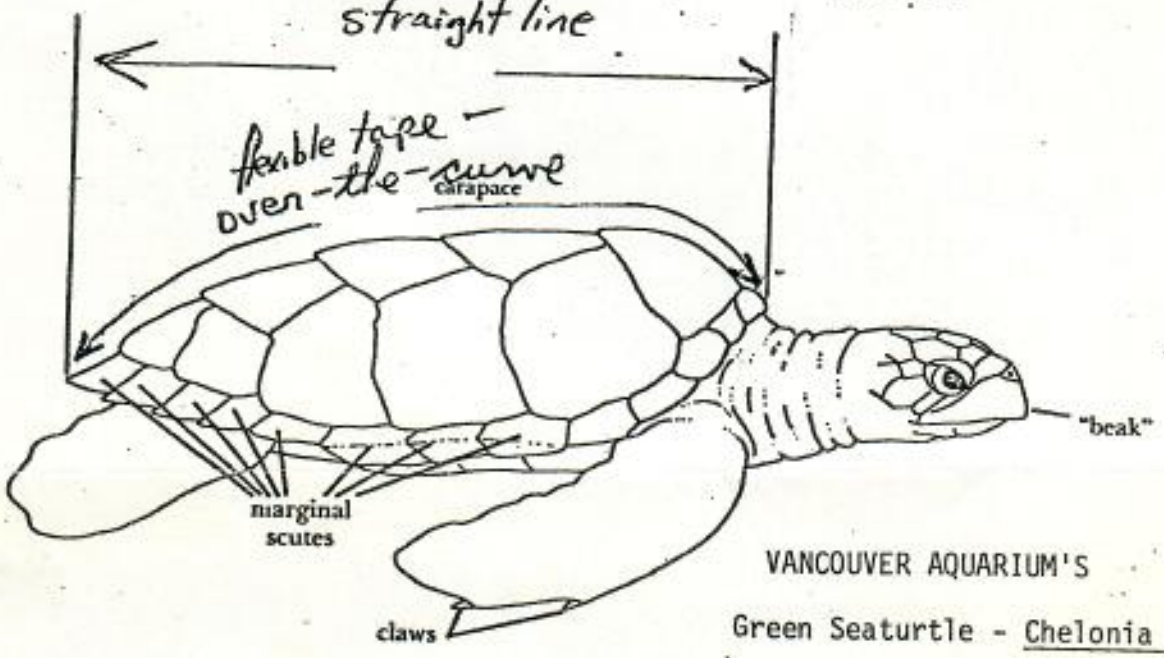




DORSAL VENTRAL

Caliper measurement — straight line

flexible tape — over-the-curve carapace



LATERAL

VANCOUVER AQUARIUM'S

Green Seaturtle - Chelonia mydas

	Carapace	Weight
Turtle A (female)	28⅛ in.	100 lbs.
Turtle B (male)	32¼ in.	155 lbs.

The above two Green Seaturtles were acquired from Waikiki Aquarium in 1956

VANCOUVER PUBLIC AQUARIUM In Stanley Park, P.O. Box 3232, Vancouver, B.C., Canada V6B 3X8, (604) 685-3364

April 6,1982

Mr. George H. Balazs
Assistant Marine Biologist
Hawaii Institute of Marine Biology
P.O.Box 1346
Coconut Island
Kaneohe,Hawaii
96744

Dear Mr. Balazs:

Of the three green sea turtles sent to Vancouver in 1956, two are alive at this time. The third died in 1960.Both the remaining turtles weighed approximately 40 pounds upon arrival. The male is now approximately 140 pounds and the female, approximately 100 pounds. The carapace size of the male is 24" head to tail and 26" across the carapace; of the female 24" head to tail and 23" across.

These turtles are on display with a loggerhead turtle and a hawksbill turtle. They are fed 20-40 pounds of smelt, squid and cod fillet each week, between the four animals.

I do hope this information will be of use to you in your study.

Yours truly,

K.Gilbey Hewlett
Curator
KGH/mb

INFORMATION RELATING TO MARINE TURTLE RELEASES

by G. H. Balazs

Group	Releases		WAIKIKI AQUARIUM
A	29 Jan 1973	10	sub-adult greens released from shore adjacent to Aquarium
B	24 Mar 1973	7	adult and 4 sub-adult greens released at sea off N coast of Niihau

	Recoveries	Site	Interval (yrs/mos)		Condition
A	28 Nov 1973	Iloli Pt. Molokai	0	10	normal (?)
B	9 Dec 1973	Palaoa Pt. Lanai	0	8	lost wt.-weak
A	20 Jan 1974	Hauula, Oahu	1	0	normal (?)
B	3 June 1974	East Is. FFS	1	2	normal-nesting
A	9 June 1975	Hana, Maui	2	5	normal (?)

21 releases, 5 recoveries

Group	Releases		SEA LIFE PARK
C	6 Dec 1973	9	sub-adult greens released at Makapuu
D	10 Jan 1975	8	sub-adult greens released at Makapuu

	Recoveries	Site	Interval (yrs/mos)		Condition
D	13 Apr 1975	Kailua Bay	0	3	very weak
C	16 Jan 1976	Whale-Skate, FFS	2	1	RF limb missing-2" Increase in shell length

17 releases, 2 recoveries

Marine Turtles Released from the Waikiki Aquarium

June 1, 1976 - Hanauma Bay

compiled by G. H. Balazs

Tag Nos.	Straight carapace measurements 2/2/76	Sex	Species
1751; 924RFL	27½ x 23	M	green
1753; 916^{LF}	29 1/8 x 24⅛	F	green
919LFL; 920^{RF}	26½ x 21½	M	green
1750; 921	22½ x 18 1/8	?	green
917LFL; 918RFL	30 1/8 x 24 1/8	F	hawksbill
922LFL; 923RFL	adult size	F	green

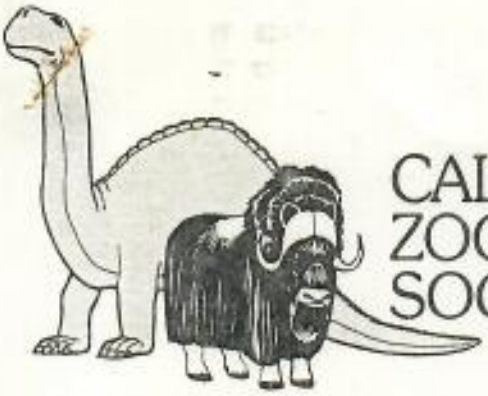
Green Turtles Released from the Waikiki Aquarium

October 13, 1977 - Queen's Surf

compiled by G. H. Balazs

Tag Nos.	Carapace measurements straight	curved	Sex
2008, 2406, 2407, 2408	32 x 25 1/4	33 1/2 x 30 3/4	F
2409, 2410, 2411	34 3/8 x 25 1/4	36 x 33 3/4	M

Need file from HIMB to write an article



CALGARY ZOOLOGICAL SOCIETY

CALGARY ZOOLOGICAL SOCIETY
P.O. BOX 3036, STATION "B"
CALGARY, ALBERTA T2M 4R8

ST. GEORGE'S ISLAND, CALGARY, ALBERTA / TELEPHONE (403)265-9310

December 15, 1982

George H. Balazs
Assistant Marine Biologist
University of Hawaii at Manoa
Hawaii Institute of Marine Biology
P.O. Box 1346
Coconut Island, Kaneohe
Hawaii 96744

Dear Mr. Balazs:

I'm answering your letter on behalf of Mr. Karsten who is out of town at this time. The two sea turtles which were sent to Calgary in 1960 did not actually come to the Calgary Zoo but to a totally separate institution the Calgary Aquarium. In the mid to late 60's the Aquarium was disbanded and the stock from that Aquarium was transported to several other institutions and I'm not aware of any way of tracing the various animals that were in the collection. If the matter is particularly significant we may be able to trace some of the employees who worked there but with the time that has passed since the aquarium disbanded you can I think appreciate the difficulties involved.

I hope this information will be of some help to you and sorry we could not provide a more positive answer.

Sincerely,

Greg Tarry

Greg Tarry
Curator of Animal Collections
CALGARY ZOO

GT/pj

11-17-82

Hi George!

Long time no see. Thanks for the shark article – Keep 'em coming. I think the idea of a follow-up on turtles now in Vancouver is a great idea. I've asked our editor for Kilo I'a (many moons) to contact you.

Best regards LT

9-12-82

George – Where in the dickens do you find all this stuff? Thanks for the arcane tutelage.

Peter Karsten, Director
Calgary Zoo, Botanical Garden & Prehistoric Park (!)
Box 3036 – Station "B"
Calgary, Alberta Can.
T2M 4R8

Phone 403-265-9310

Lunch sounds great – How about the O.C.C. any day you're in town? Aloha LT

WAIKIKI AQUARIUM

George Balazs
National Marine
Fisheries Service
Dole Street Lab

Campus Mail

University of Hawaii • 2777 Kalakaua Avenue • Honolulu, Hawaii 96815

WAIKIKI AQUARIUM

HONOLULU HI 968
1982

BX 3830
96822

George Balazs
Natl Mar. Fisheries Service
Dole Lab.
2570 Dole street
Honolulu 96822

University of Hawaii • 2777 Kalakaua Avenue • Honolulu, Hawaii 96815

Page 2 HSB Aug 29, 1960

Waikiki

Six Vie for Title Of Isle 'Miss Samoa'

Sina — Tasi — Lillian

Louisa — Fualili — Vatau

Six girls are in the running for "Miss Samoa in Hawaii," the winner to be announced Saturday at a big Samoan community luau.

The luau is from 1:30 to 4:30 p.m. at the Ala Moana Park Pavilion and is open to the public by reservation. Entertainment and introduction of "Miss Samoa" are included on the program.

The six candidates are Lillian Faleafine, Vatau Gelbai, Louisa McMoore, Sina L. McMoore, Fualili Patalo and Tasiaeafe Silvara.

Entertainment will be by the John Pulani Watkins hula troupe with Jimmy Walker master of ceremonies.

Cyrus K. Afalava is luau chairman for the sponsoring Samoan Civic Association. Tickets may be reserved by calling him, 77-683. They are also available at Waikiki hotel travel desks.

Tour Leader to Arrive With Couple to Be Wed

Dr. M. S. Harvey of Akron, Ohio, who has brought eight tour groups to Hawaii, is returning August 30 with 24 people on the last lap of an around-the-world trip.

During his stay here he and the Reverend Abraham K. Akaka will perform a wedding ceremony for a couple who met on a Harvey tour to the Islands two years ago and who are returning here to be married.

The ceremony for Patricia McClister and Zimri Oseman Jr. will be at Kawaiahao Church September 11.

Dr. Harvey and his group will be at the Halekulani Hotel. He is with the Akron First Methodist Church.

Aloha Turtles Go to Canada

Two Waikiki residents moved to Calgary, Alberta, over the week end to spread Hawaiian aloha around the inland capital city.

They are two marine turtles, lately of the Waikiki Aquarium, which were flown to Calgary on request of the director of Calgary's aquarium.

Spencer Tinker, local aquarium director, said the travelers flew on their backs, crated to prevent their banging around. They left here Saturday night by Canadian Pacific Air Lines.

Hawaiian Rodeo Looks for Riders

Local horseback riders are being invited to participate in the grand entry parade of the Hawaiian Roundup and Rodeo, a benefit for the Navy Relief Society, September 3

Poet Compiles Isle Verse Book

A San Francisco poet-

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

January 26, 1982 F/SWC2:GHB

Sea Turtle Stranding Report

Date of stranding	- November 28, 1981
Location	- Puko'o, island of Molokai, State of Hawaii (approximately 21°06' N, 156°48' W)
Species	- Lepidochelys olivacea (olive ridley)
Lateral scute counts	- 5-5
Straight line measurements	- Carapace length 22.0 cm, carapace width 20.1 cm; plastron length 17.6 cm
Weight	- 1.52 kg
Circumstances of stranding	- Turtle was found entangled in plastic line and washed up on shore
Condition of turtle	- Cuts present in proximal areas of three flippers resulting from entanglement in line; moderate emaciation apparent from appearance of plastron and limb muscles. Numerous photographs taken. Turtle was transferred to the Waikiki Aquarium (University of Hawaii) where it is undergoing successful recuperation.
Persons that found the turtle	- Clayton Afelin and Bill Puleloa
Person submitting this report to SEAN	- George H. Balazs NMFS, Honolulu Laboratory P. O. Box 3830 Honolulu, Hawaii 96812

Endangered turtle on view at aquarium

By Barbara Hastings
Advertiser Science Writer

The tiny olive ridley sea turtle at the Waikiki Aquarium is accepting visitors now.

The baby turtle, only 9 inches long, washed up on Molokai in November and was taken to the aquarium. He has rested in seclusion since then, getting used to his surroundings.

But he's ready for company now, say aquarium officials.

A baby sea turtle so small of any variety isn't often seen in the wild, and the olive ridley sea turtle is a rare sight indeed in Hawaii waters, aquarium officials say.

Green sea turtles are common in Hawaii waters — but not the olive ridley, which is an endangered species. It usually ranges from Mexico along the coast to Costa Rica and Panama, or on the Great Barrier Reef off Australia and in Southeast Asia.

Aquarium director Leighton Taylor and turtle specialist George Balazs believe that this little one came from the Mexican coast.

Another olive ridley turtle, 28 inches long, was captured during the Kona billfish tournament in July and was released back into the wild. The two turtles, a yellow-bellied sea snake found off Oahu a few weeks ago and a finescale triggerfish that the aquarium has all are believed to have come from the Mexican coast.

Advertiser photo

The 9-inch baby turtle paddles around at Waikiki Aquarium.

This has led Taylor to speculate that there's been "a greater preponderance of west-flowing surface currents in 1981."

Because it is endangered, the baby olive ridley turtle is being kept at the aquarium under special permit from the federal government.

Visiting hours are every day from 9 a.m. to 5 p.m.

First Issue November — 1981

Unusual sight off the coast

Reprinted from Oregon Wildlife.

It has been an unusual summer for strange sightings off the Oregon coast. The striped marlin reported earlier this summer was probably the most bizarre, but other word comes of another sighting of a species of sea turtles seldom seen in our waters.

There had been rumors of sightings of a large sea turtle by fishermen this summer but no positive identification of species. Then Chuck Koski, fishery biologist with the National Marine Fisheries Service, was on a busman's holiday fishing for salmon out of Tillamook.

He had heard reports of the sightings and by the descriptions surmised the turtle may have been a leatherback, the largest turtle in existence. So when he heard reports via the CB of a turtle sighting in progress, and only a mile away, he hurried over to try to capture the animal on film. By good fortune, the turtle was still there when he arrived.

"He looked like something from prehistoric past," Koski said, "a behemoth of the deep with a monstrous head and dark back lined with three prominent ridges." The ridges identified the turtle as a leatherback which can reach sizes of eight feet and weights of 1,500 pounds.

Koski turned the wheel over to one of his passengers and positioned himself in the bow of the boat to try for a picture. It obligingly surfaced right in front of him. "He must have been surprised to see the boat so close in his path," Koski said. "He floated for a few seconds staring at me. I forgot for a moment that I should be taking photos as I looked at his coloring — white spots along the dark background of his neck, pinkish red under his chin mottled with white, and a leathery sheen on his ridged back. Another striking feature was a baseball-size orange spot in the center of his head."

Soon the animal took a deep breath and dove. It did not reappear within sight of the several boats in the area.

The leatherback, said Koski, is the largest of all turtles, land or sea. Its back, unlike the hard shell of other turtles, is leathery, although protected by seven rows of bony protrusions. Three are readily visible in the water, but the other four are usually underwater along the sides. The species is classified as endangered under the provisions of the Endangered Species Act.

The leatherback, Koski says, is an omniverous feeder; that is he will eat nearly anything including algae, seaweed, squid, fish and sea urchins. It is reported that jellyfish is its principal food. When this turtle was first sighted, Koski said, there were more Velella jellyfish floating around than anyone could remember seeing in many years. This might partly explain the turtle this close to the Oregon coast in such cool water.

Nesting usually occurs on the beaches of tropical seas and although not rare, the sighting is definitely unusual here. Occasionally, Koski says, the leatherback is found in arctic waters and apparently has the ability to regulate its body temperature unlike other cold-blooded reptiles, including other tropical turtles.

OMM/FISH/MART
AND WORK BOAT SHOWS
ewport, Ore.
gate Beach, Hilton
ov. 15, 16, 17, 1981

Purse Seining Chinese Style / 11

Market News / 32

MAILED NO LATER THAN NOVEMBER 4, 1981

SECOND CLASS POSTAGE PAID AT SEATTLE, WASHINGTON (ISSN0015 2994)

The Fishermen's News

. 37, No. 21

The Voice of the Pacific Coast Fishing Industry

First Issue November — 1981

35¢

MARINE MAMMAL STRANDINGS & SIGHTINGS
NATURAL HISTORY SPECIMENS
MARINE TURTLES

ABBREVIATIONS

AMH.....Astoria Memorial Hospital, Astoria, OR
BNM.....Biscayne National Monument, Elliot Key, FL
FSL.....Friends of the Sea Lion, CA
GISP.....Galveston Island State Park, TX
HBM.....Hanna-Barbera Marineland, Rancho Palos Verdes, CA
LACVS.....Los Angeles County Veterinary Services, CA
LBTPD(NJ).....Long Beach Township Police Department, Long Beach Township, NJ
LCSP.....Leo Carrillo State Park, CA
LJBTC.....La Jolla Beach and Tennis Club, La Jolla Shores, CA
PDZ.....Point Defiance Zoo, Tacoma, WA
PSU(OR).....Portland State University, Portland, OR
SHPD(NJ).....Stone Harbor Police Department, Stone Harbor, NJ
TPSP.....Torrey Pines State Park, CA
USFBI.....United States Federal Bureau of Investigation
USMC-CPNRO.....Natural Resource Office, US Marine Corps, Camp Pendleton, CA
"VQ".....Vessel "Viking Queen", Portsmouth, NH

NATURAL HISTORY SPECIMENS
MARINE TURTLES

SPECIES / LOCALITY	DATE OF EVENT	NO.& SEX	LENGTH / WIDTH	REMARKS	REPORTER / EXAMINER / DISPOSITION	ORIG.NO. / REFNO
CHELONIA MYDAS Galveston Island Gulf side of TEXAS USA 292000N., 0945000W.	1981 07 26	1 ? ?	20 CM 16 CM	HUMAN RELATED ALIVE Brought to SM by unidentified person who had found it on beach in shopping bag. Turtle had chip out of rear carapace. Being treated at SM. To be released.	Obs. notif. PINS/NMFS-SEFC. Obs. Thane R. Wibbels SM	TRW81-7-26A 6805
CHELONIA MYDAS Port Saint Lucie Intake canal at Florida Power & Light Co. plant FLORIDA USA 271200N., 0800900W.	1981 08 06	1 ? ?	? 25 CM	STRANDING DEAD, CONDITION UNKNOWN Had tag NNC359. Specimen acquired.	Obs. notif. FDNR-JB/NMFS-SEFC. Obs. DJH/FDNR-JB: Ross Whitham FDNR-JB: Ross Whitham	DJH81-8-6A 6803
CHELONIA MYDAS Mustang Island Fish Pass, Mustang Island State Park TEXAS USA 274900N., 0970600W.	1981 09 27	1 ? ?	27 CM 24 CM	INCIDENTAL CATCH ALIVE Juvenile. Had been caught by child in cast net. Tagged 82235 & released. Data collected.	Obs. notif. PINS/NMFS-SEFC. Obs. Richard V. Harris	RVH81-9-27A 6804
DERMOCHELYS CORIACEA Off Narragansett - RHODE ISLAND USA 4125--N., 07127--W.	1981 10 06	1 ? ?	137 CM 98 CM	INCIDENTAL CATCH ALIVE Est wt. 205-225 kg. Caught in fish trap. Brought in by fisherman. Not breathing. Resuscitation included electric shock treatment. Tag (UF 84325) applied to RF flipper & back marked with orange paint. Released into Narragansett Bay 6 Oct 81.	URI(CETAP)/NMFS-SEFC notif. URI(CETAP): C. Robert Shoop URI(CETAP)	CRS81-10-6A 6808
DERMOCHELYS CORIACEA Stone Harbor 102nd St. beach NEW JERSEY USA 390250N., 0744540W.	1981 10 14	1 M	157 CM ?	BOAT COLLISION DEAD, MODERATELY DECOMPOSED Est wt. 270 kg. Had propeller cut across carapace (127 cm incision). Liver sample taken. Remains buried.	SHPD(NJ) MMSC: Bob Schoelkopf MMSC	26-81 6807
DERMOCHELYS CORIACEA Beach Haven 72nd St. beach NEW JERSEY USA 393330N., 0741410W.	1981 10 22	1 F	150 CM ?	STRANDING DEAD, FRESH Wt. 195 kg. Had large no. of plastic bags in posterior stomach & extending 13 cm into intestine; also, claylike mass blocking intestinal valve. Photos taken. Flipper & liver sample acquired for YU. Remains buried.	LBTPD(NJ) MMSC: Bob Schoelkopf MMSC	27-81 6806

January 24, 1983

Mr. Robert Klocek
Curator/Fishes
John G. Shedd Aquarium
1200 S. Lake Shore Dr.
Chicago, Illinois 60605

Dear Mr. Klocek:

I saw your request in the Bebruary 1982 issue of AAZPA News and I am writing to ask if anyone was able to tell you the origin of your 5 adult green and 4 adult loggerhead sea turtles. Were these turtles released into the Caribbean as planned? If so, I would greatly appreciate hearing the details of this operation. For instance, how did you transport the turtles to the Caribbean?

Thank you in advance for any information you can provide on this interesting subject.

Sincerely,

GEORGE H. BALAZS
Assistant Marine Biologist

GHB:ec

V13 N2 FEBRUARY 1982 AAZPA NEWS.

INFANT DIETS NEEDED

The following list of Mammal Orders are NOT presently represented in the INFANT DIET NOTEBOOK:

MARSUPIALIA	- all families except Didelphidae, Dasyuridae and Macropodidae
INSECTIVORA	- all families except Tenrecidae, Macroscelididae and Tupaiidae
CHIROPTERA	- all families except Pteropodidae and Phyllostomidae
PRIMATES	- Indridae, Daubentoniidae and Tarsiidae not represented
RODENTIA	- all families except Sciuridae, Castoridae, Pedetidae, Hystricidae, Caviidae, Hydrochoeridae and Dasyproctidae
PINNIPEDIA	- all families except Phocidae
SIRENIA	- Trichechidae represented
ARTIODACTYLA	- all families except Suidae, Tayassuidae and Tragulidae

If you have any infant mammal diets, especially for families or orders not currently represented, please submit them to: Claudia Collier, Superintendent, Santa Ana Zoo, P.O. Box 1988, Santa Ana, CA 92702.

(S. Taylor)

WILDLIFE REHABILITATION WORKSHOP TO BE HELD

The Santa Fe Community College Teaching Zoo and Florida Audubon Society will co-sponsor a workshop entitled "An Overview of Wildlife Rehabilitation" on 6 March 1982. The workshop is open to all persons interested in wildlife rehabilitation. Zoo personnel are also invited to attend. Topics to be covered include legal aspects, marine strandings, veterinary care and the relationship of zoos, nature centers, etc. to rehabilitation programs. A registration fee of $8 will include lunch; however, preregistration is requested for lunch arrangements. A workshop proceedings will hopefully be published following the workshop. For further information, write or call the SFCC Teaching Zoo, 3000 N.W. 83rd St., Gainesville, FL 32602. (904) 378-9758.

INFORMATION REQUESTED

The John G. Shedd Aquarium wishes to release five adult Green sea turtles and four adult Loggerhead turtles into Caribbean waters. The origin of these specimens is unknown. Anyone having information regarding Atlantic and Pacific subspecies differentiation or anyone working in this field is urged to contact Roger Klocek, Curator/Fishes, 1200 S. Lake Shore Drive, Chicago, IL 60605. (312) 939-2426.

REHABILITATED PELICANS AVAILABLE

The Florida Wildlife Sanctuary again has available some rehabilitated Eastern brown pelicans and a few other species for public display in zoological parks. Last year, they were able to send various species to 20 zoological parks and are anxious to distribute more. The birds are permanently disabled. The only charges will be those for transportation. Zoos with federal permits are urged to contact Carlton Teate, Florida Wildlife Sanctuary, 2600 Otter Creek Lane, Melbourne, FL 32935 (305) 254-8843.

(R. Wagner)

SFCC GRADUATES SPRING CLASS

In April 1982, Santa Fe Community College Biological Parks Program will graduate approximately 12 students. A number of these students will be seeking employment in the zoo field immediately following graduation; therefore, we would appreciate hearing from any facilities seeking entry-level zoo keepers. Copies of application forms, etc. which would help simplify processing would be appreciated. Any questions or comments regarding the program or graduates should be directed to: Jim Ellis, Teaching Zoo Coord., or Richard Rosen, Program Coord., 3000 N.W. 83rd St., Gainesville, FL 32602.

JOHN G. SHEDD AQUARIUM

1200 SOUTH LAKE SHORE DRIVE CHICAGO ILLINOIS 60605
312-939-2426

WILLIAM P. BRAKER DIRECTOR

February 25, 1983

George H. Balazs
Assistant Marine Biologist
University of Hawaii at Manoa
Hawaii Institute of Marine Biology
P.O.Box 1346
Coconut Island
Kaneohe, HI 96744

Dear Mr. Balazs,

Thank you for your recent inquiry about our latest turtle release. The U.S.F.W.S. was finally able to confirm the origin of all of the turtles as Caribbean. Unlike past releases where we would airfreight the turtles upside-down in a tire and shell-wedged into a fiberglass tub with burlap sacking, the F.W.S. had two agents drive the turtles to South Carolina for tagging and releasing there. The turtles were placed upside-down in tires in an enclosed trailer. They were shell-wedged in place with burlap sacking, and their heads were supported by more packing. They were wet down every four hours or so, and were on the road about twenty-eight hours. They survived the trip well and were released without a problem. Thanks for your interest in the release.

Cordially yours,

Roger Klocek

Roger Klocek
Curator of Fishes

cs

November 29, 1982

Mr. Peter Karsten, Director
Calgary Zoo, Botanical Garden
and Prehistoric Park
Box 3036 - Station B
Calgary, Alberta T2M 4R8
CANADA

Dear Mr. Karsten:

Dr. Leighton Taylor, Director of the Waikiki Aquarium, gave me your name and address and suggested that I write to you about the following subject. In August of 1960 two sea turtles from the Waikiki Aquarium were flown to your facility. No records of this transfer still exist at the Waikiki Aquarium, but I was able to find a brief news item in the Honolulu Star-Bulletin (copy attached). As a researcher of Hawaiian sea turtles, I would be interested to learn if the two turtles are still alive at your facility. If they died, are there any records telling how long they lived and the approximate sizes they reached? Were they in fact the green sea (Chelonia mydas), or some other species? Any information that you can provide on this subject will be greatly appreciated.

Sincerely,

GEORGE H. BALAZS
Assistant Marine Biologist

GHB:ec

Enclosure

CALGARY ZOOLOGICAL SOCIETY

P. O. Box 3036, Station "B"
Calgary, Alberta, Canada T2M 4R8
Telephone (403) 265-9310

CALGARY ZOO, BOTANICAL GARDEN & PREHISTORIC PARK

March 7, 1983

George H. Balazs
Assistant Marine Biologist
University of Hawaii at Manoa
P.O. Box 1346
Coconut Island
Kaneohe, Hawaii
96744

Dear Mr. Balazs:

I have forwarded the correspondence and photographs, that you sent to us, on to Mr. Elmer Taylor of the Metro Toronto Zoo. Mr. Taylor was active in the aquarium when it was located in Calgary.

Sincerely,

Greg Tarry
Curator of Animal Collections
CALGARY ZOO

GT/pj

Green Turtle Flipper Tag No. 3686

9-21-82 8.3 cm
sent to Seattle
6-25-83 (9 months)
At Aquarium

RFL

C - 26.2 x 23.5

7 March 84
released at
FFS
Kam/Gustavo
have photos
of
release

from Aquarium
3687
release?
No graft spot

Sent to
FFS 3/7/84
To be released
by A. Kam -
GP

Star-Bulletin Photo by Dean Sensui

Bruce Carlson holds the dead snake.

Poisonous Sea Snake Comes Ashore at Lanikai, Then Dies

By Peter Wagner
Star-Bulletin Writer

A little black snake with beady eyes and sharp teeth wiggled ashore at Lanikai Beach yesterday, startling morning strollers.

Officials at the Waikiki Aquarium identified it as a yellow-bellied sea snake, which is highly poisonous. The snakes have been showing up with increasing frequency in Hawaiian waters.

The foot-long serpent, found in the sand near 1080 Mokulua Drive about 9:15 a.m., died after coming ashore.

So poisonous is the creature that a single drop of venom is enough to kill three people, aquarium officials say.

A SCIENTIST at the aquarium, Reed Withrow, said at least four or five of the eel-like snakes have been seen in Hawaiian waters this year — about twice the number sighted in recent years. Withrow said scientists don't know why the sea snakes, common in Pacific waters near Central America, have come to call on Hawaii.

"They seem to have turned up more this year than usual," Withrow said. "I don't know if there's a breeding population around Hawaii or what. Maybe it has to do with (the weather condition called) El Nino."

The yellow-bellied sea snake is jet black on its upper half and olive green on its lower half with a yellow band between, Withrow said. Sometimes, it is entirely yellow. The tail is flat and sometimes speckled with black spots.

THE SNAKE grows up to about three feet long and is a poor swimmer. It can dive deep, but must come to the surface to breathe. It lives near the surface of the ocean, Withrow said, and because it is a weak swimmer, is often swept along by ocean currents. It is found in great numbers where currents converge, he said.

Although usually docile, the sea snake can be dangerous when it is hungry, Withrow said.

"They're not aggressive, but when they're feeding, they'll bite at anything that moves nearby. I've even seen one turn around and bite itself."

HNL Advertiser

More than a chef

His special mixture keeps fi

Mix three pounds each of romaine lettuce, carrots, herring, squid and trout chow, four pounds of shrimp, 1/4 pound of brewer's yeast, three to four ounces of multi-vitamins and a couple of tablespoons of vitamin C. Blend. Add to nine pounds of plain gelatin dissolved in hot water.

That's what Waikiki Aquarium nutritionist Reid Withrow does every month to make a month's supply of special fish food.

The mixture is poured into cafeteria-sized trays and, when jelled, cut into three-inch squares, placed in individual plastic bags and stored in the freezer. They're thawed and served when needed to most of the aquarium's fish population.

Withrow oversees all the feeding needs of marine animals ranging in size from huge seals to baby fishes and turtles.

Withrow's a scientist who learned marine nutrition mostly from on-the-job experience. He has to keep on hand a constant supply of refrigerated or frozen herring, squid, shrimp, smelt, commercial fish flakes, vitamins and the special concoction he makes.

Herring, which is the main food of the seals, is purchased 1,000 pounds at a time to last about three months. It's also fed to sharks and moray eels and put in the gelatin mix. Sometimes the seals get treated to mahi-mahi.

Advertiser photo by David Yamada

Withrow and Scoops tend to a seal at feeding time at the aquarium.

Live fresh-water minnows, which are fed to the sea snake and the lion (or turkey) fish, are caught in Manoa Stream by staff members every few weeks. The frozen deep-water shrimp fed to the chambered nautilus are donated by a shrimp company.

The feeding schedule is varied, but the day I worked with Withrow was a busy one because all the creatures were due to be fed. Some are fed only three times a week while, at the other extreme, the flash fish must be fed five times a day.

First, Withrow removed some herring and gelatin squares from the freezer to thaw. Commercial fish flakes are used to feed the tenants in the 43 display tanks, and many "back-shop" holding tanks and quarantine tanks. (The commercial food is thin flakes of fish, completely different from the powdery kind of fish food used in home aquariums.)

Then, he stuffed vitamin pills into the gills of two of the thawed herring and fed them to the two seals on display in the courtyard tank.

Next it was time to make the rounds with Withrow's gelatin delight, a cutting board and a knife. At each tank, little cubes of gelatin mixture were cut and mashed.

21 Sept 1984 A-3

sh going

scoops at work

scoops kreger

Most of us don't have a very clear picture of what other people's jobs are like. Veteran Advertiser columnist Scoops Kreger explores Honolulu's working world, each week taking a look at a different job. And, if there are any you'd like to know about, she'd like to hear from you at 525-8078.

Withrow didn't just sprinkle food in and move on to the next tank. He closely monitored the feeding to make sure all the animals got a share of the food and also to look for signs of sickness. In tanks with several varieties of marine animals, he'd have to make sure that the aggressive ones didn't eat all the food.

It was easy to see one of his favorite charges is an unusual bright yellow puffer fish that looks like a ripe papaya (usually, they're black with white spots). Withrow said the fish is blind even though its eyes look normal and aren't covered with a film. He said it took awhile to discover the blindness, but with special attention the fish has learned to get its fair share of food and is thriving. When it came to the surface of the tank to get food, Withrow scratched its head lovingly.

Withrow said our aquarium has as fine a collection of South Pacific marine animals as you'll find anywhere in the world. His interest in marine creatures started when he learned to scuba dive and started collecting tropical fish. This led him to the University of Hawaii to get a degree in zoology and to work part time at Waikiki Aquarium. He's been on the job since 1979 and loves his work as scientist-nutritionist. He is training a UH student as an assistant who takes over on his days off.

Weekdays, the public can see the seals being fed at noon and 4 p.m.; weekends, around 2 p.m. Other aquarium occupants are not fed at set times.

INFORMATION RELATING TO MARINE TURTLE RELEASES

by G. H. Balazs

Group	Releases		WAIKIKI AQUARIUM
A	29 Jan 1973	10	sub-adult greens released from shore adjacent to Aquarium
B	24 Mar 1973	7	adult and 4 sub-adult greens released at sea off N coast of Niihau

	Recoveries	Site	Interval (yrs/mos)		Condition
B	July 1973	Kawailoa	0	4	Bloomfield
A	28 Nov 1973	Iloli Pt. Molokai	0	10	normal (?)
B	9 Dec 1973	Palaoa Pt. Lanai	0	8	lost wt.-weak
A	20 Jan 1974	Hauula, Oahu	1	0	normal (?)
B	3 June 1974	East Is. FFS	1	2	normal-nesting
A	9 June 1975	Hana, Maui	2	5	normal (?)

21 releases, 5 recoveries

Group	Releases		SEA LIFE PARK
C	6 Dec 1973	9	sub-adult greens released at Makapuu
D	10 Jan 1975	8	sub-adult greens released at Makapuu

	Recoveries	Site	Interval (yrs/mos)		Condition
D	13 Apr 1975	Kailua Bay	0	3	very weak
C	16 Jan 1976	Whale-Skate, FFS	2	1	RF limb missing-2" Increase in shell length

17 releases, 2 recoveries

January 8, 1985 F/SWC2:GHB

Mr. Gary Bloomfield
61-134 Ikuwai Street
Haleiwa, HI 96712

Dear Mr. Bloomfield:

Although I have been involved in various studies of Hawaiian sea turtles for the past 13 years, it was only this week that I became aware of the tagged turtle you recovered near Haleiwa in July of 1973. While cleaning out old files at the Waikiki Aquarium, a staff member came across a copy of a letter written to you by Mr. Eugene Kridler, former administrator with the U.S. Fish and Wildlife Service. The copy was forwarded to me and has been enclosed herein.

You may be interested to learn that only two other recoveries have been made from the 11 tagged turtles released by the Aquarium in March of 1973. One was found in a weak and emaciated condition in December 1973 off Lanai. The other turtle was seen by me in June of 1974 nesting on one of the islets at French Frigate Shoals. I am pleased to now be able to add your tag recovery to the formal historical record of information on this group of turtles.

I have enclosed several articles on sea turtles, as well as an identification poster illustrating the various species. When your time permits, I would appreciate having the opportunity to talk with you about your experiences with these animals. Perhaps you could telephone me here at my office during the daytime at 943-1221. I look forward to hearing from you.

Sincerely,

George H. Balazs
Wildlife Biologist

Enclosure

cc: Balazs
HL

Page B2 March 21 1973 Honolulu ADVERTISER

Advertiser Photo by David Yamada

turtle's the issue

Rep. Howard Oda watches solemnly as a baby sea turtle is shown to a House committee. The turtle was one of two taken to the hearing Monday in connection with a protection bill.

HONOLULU ADVERTISER
Wed., March 7, 1973 C-3

11 turtles to get ride out to sea

Eleven green sea turtles will be passengers aboard the Coast Guard cutter Buttonwood when it leaves Sand Island Monday morning.

The turtles, all wearing tags, will be taken to an area off Lehua Island just north of Niihau. There, they will be released.

"We are hoping they won't be caught by fishermen and that they will breed," said Charles DeLuca, curator of the University of Hawaii's Waikiki Aquarium.

THE TURTLES to be released have been housed at the Aquarium, where they were being used for a study of turtles serum by investigators at the University's department of microbiology.

After the study was finished, the turtle population at the Aquarium needed to be thinned out. Some of the smaller turtles were released off Waikiki.

This still left the problem of the larger turtles, some of which weigh as much as 400 pounds.

THE PLAN TO release the turtles at sea was devised by Eugene Kridler, administrator of the Hawaiian Islands National Wildlife Area, and Michio Takata, director of the State Division of Fish and Game.

The Coast Guard agreed to furnish transportation for the turtles.

"We want to release the turtles in an area that is fairly inaccessible to fishermen," Takata said. "We want to watch for these turtles, and see if they will breed and join in the migration of the other green sea turtles from their nesting grounds to their feeding grounds.

"When the Aquarium indicated it had some surplus turtles, we thought it would be a good time to see how much information on turtle migration we could get."

wilderness proposal hearing set

A public hearing on the proposal to include most of the Hawaiian Islands National Wildlife Refuge area in the National Wilderness Preservation System will be held at 9 a.m. April 14 at the Airport Holiday Inn, 3401 Nimitz Hwy.

The proposal calls for the National Wilderness Preservation System to take in Laysan Island, Lisianski Island, Nihoa Island, Pearl and Hermes Reef, French Frigate Shoals, Necker Island, Gardner Island and Maro Reef.

DESIGNATION AS a wilderness area would take an act of Congress. Such designation would not remove or alter the area's status as a national wildlife refuge.

A brochure on the proposal can be obtained from the Wildlife Administrator, Hawaiian Islands National Wildlife Refuge, 337 Uluniu St., Kailua, HI 96734.

Oral statements will be heard in the public hearing, but officials ask that arguments be submitted in writing. These statements may be mailed to the Regional Director, Bureau of Sport Fisheries and Wildlife, P. O. Box 3737, Portand, Ore., 97208 or given to the hearing officer at the time of the hearing.

Division of Wildlife Refuges
337 Uluniu Street
Kailua, HI 96734

September 6, 1973

Mr. Gary Bloomfield
61-134 Ikuwai Street
Haleiwa, Hawaii 96712

Dear Gary:

Thanks for the information about the female green sea turtle, Tag No. T-74, which you reported as having been taken off Kawailoa near Haleiwa the week of July 3, 1973.

Our records show that this was an adult female which was tagged by us and released several miles off Kawaihoa Point on the south end of Niihau on March 25, 1973. This was one of eleven animals that had been kept in captivity for some years at the Waikiki Aquarium. The Aquarium wanted to reduce the number they had so they cooperated with us in allowing us to tag, measure and weigh the animals The Coast Guard then transported these animals to Niihau for us and released them there.

At the time of tagging on March 24, No. T-74 weighed 290 pounds. Its carapace measurements (straight line) were 36 inches long by 28 1/2 inches wide. The plastron length was 29 1/2 inches. Using a tape on the curve, the carapace was 38 1/4 inches long by 36 3/4 inches wide. Thickness was 15 inches.

Sincerely,

Eugene Kridler
Wildlife Administrator

cc: Ron Walker
Hawaii Div. of Fish & Game, Honolulu
Charles Delucca
Waikiki Aquarium, Honolulu

March 1985
KILO i'a
WAIKIKI AQUARIUM

Sea turtles used to be a familiar sight on coral reefs but overfishing has greatly reduced their numbers worldwide. The two most common species in Hawaii are the threatened green turtle, and the rarer hawksbill turtle, which is on the endangered list.

The story of the plight of the turtle should be familiar to everyone. From the day a mother turtle lays her eggs, they are prime targets for man and other predators. Hunters kill off the mother while she is laying, and then dig up the eggs for food. Baby turtles that have escaped detection from the egg robbers, struggle out of their nests and race for the water only to be nabbed by hungry sea-birds.

The Aquarium is currently participating in a project with the National Marine Fisheries Service to give some baby turtles a head start in life. This past summer NMFS personnel at French Frigate Shoals, in the Northwest Hawaiian Islands, dug up turtle nests after most of the babies had hatched and made their way to sea. Remaining in the nests were babies that were too weak to dig their way out. If they had not been rescued, they certainly would have died. Instead they were brought to the Aquarium and raised in outdoor tanks. A few are now large enough to be displayed (tank #10). They will stay at the Aquarium until next summer when they will be returned to French Frigate Shoals and released. If this program is successful, the project will be repeated next year. It is our hope that this effort will aid in the recovery of Hawaii's green turtle population. ●

Photo by Pepi Nieva.

These and many other questions will be discussed in a special class to be taught by Aquarium Director, Dr. Leighton Taylor, Thursday nights in March. Biologists' answers were quite different as recently as the 1960's. Much new information about shark biology has been learned in the past ten years and will be reviewed in this series.

Last July Leighton co-taught this class at the California Academy of Sciences in San Francisco with Steinhart Aquarium Director, Dr. John McCosker. Its success and the public's continuing fascination with sharks convinced us to design a similar course at the Aquarium. Topics will include taxonomy, ecology, reproduction, behavior, sensory biology, and interactions with other species, including humans.

The only prerequisite to enrolling for the class is an interest in sharks. The information will be presented at an advanced undergraduate level and outside reading will be suggested. A special field trip to inspect Megamouth I at the Bishop Museum will be scheduled. First class meets Thursday, March 7. Enrollment is limited, so call the Ed Section to sign up now.

Isn't it amazing how an entire nation can get swept up in a fad or craze? Trivia, and the various forms of pursuing it have captured the leisure time of the American people including the Aquarium staff. You may have played the Baby Boomer and Silver Screen versions, but here are 15 questions from the new Aquarium Edition. If you successfully answer these questions, consider yourself well-versed in topics marine and related to the Waikiki Aquarium. Answers appear on page 4.

1) What was the name and original occupation of the first director of the Aquarium?
2) Where and when was the first great white shark displayed alive?
3) What was the admission fee to the Aquarium in 1904? in 1975?
4) Name five species of animals that have been displayed in the large outdoor pool at the Aquarium built in 1955.
5) How do you pronounce GHOTI?
6) In which year of the Aquarium's 80 year history was the attendance the highest?
7) Name a former employee of the National Marine Fisheries Service who is now the Director of a popular Kapiolani Park facility that maintains a diverse collection of living organisms from Hawaii and the tropical Pacific.
8) When was it first suggested that the Natatorium and the Aquarium should be connected by a reef walkway which passed through an underwater observatory?
9) Name the aquarium to first display living chambered nautilus.
10) How did the marlin get its Hawaiian name?
11) In 1976 an extraordinary animal was accidentally "collected" by the U.S. Navy. What was it?
12) What three reptiles are commonly displayed at the Waikiki Aquarium?
13) Why is the Hawaiian monk seal displayed at the Waikiki Aquarium unique in the world?
14) What is the largest fish found in the world today?
15) Has the Aquarium ever had paper nautilus (argonauts) on display? ●

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Washington, D.C. 20235

F/M41:WCM

JAN 13 1983

TO: F/M4 - Richard Roe

FROM: F/M41 - W. Cain Miller

SUBJECT: Further Information on the Hawaiian monk seal being maintained at the Waikiki Aquarium under Permit No. 413 Issued to SWFC

On Thursday, January 12, 1984, Gail Peiterson called in response to my calls to her of January 10, 1984. Ms. Peiterson says that she is the person to whom the Waikiki Aquarium reports every day on the status of the monk seal. In that light, I asked her to answer some of the questions we had developed on this situation.

I first asked if it was intended that the animal be maintained in the larger pool or returned to the research pool. Ms. Peiterson said that the seal was scheduled to be returned to the smaller pool on Monday, January 16, for two weeks. This move was occurring because the larger pool is going to be used for another purpose, and because they want to determine whether or not the coliform count problem has been overcome. At the end of the two weeks a decision will be made on returning the animal to the larger pool or leaving it in the smaller. Ms. Peiterson said that Dr. Gilmartin, scheduled to return on January 26, will make that decision.

Ms. Peiterson explained that the animal was moved to the larger tank because of the coliform count problem, and because it was felt that the larger tank provided a better, less sterile environment until the research was begun. She expects the proposal on the research to be submitted this month. She also asked what the problems were in this situation and I explained that the ESA does not authorize the issuance of public display permits for endangered species. Whether or not the endangered monk seal could be in a pool subject to public viewing was the question that had been raised.

Ms. Peiterson said that if we needed any further information we could contact her.

cc: Peiterson

WAIKIKI AQUARIUM

26 May, 1985

Aloha, George,

Since I am going to be gone to French Frigate Shoals when you get back from Molokai, I wanted to give you an update on the sick Green turtle. Dr. Jim Brock looked at him, took a scraping and identified the problem as a fungus, on his recommendation I started treating with an anti-fungal ointment called Aftate,for athletes foot. I dried him off and rubbed the stuff on him twice, but he went downhill very quickly. On Friday,June 24, I call Dr. Brock and asked him to euthanize it. The little guy was in bad shape,sunken plastron, sunken eyes, he lost scads of tissue every time I dried him off, very weak, etc. Dr. Brock is going to do an autopsy to see if it was a systemic problem and to see if he can identify the organism responsible.

There is another turtle that is coming down with the same type of lesions, it is isolated also and Beth Anderson is going to treat it while I'm gone. I have checked all the other turtles and as of the 24th, they looked clean.

If you have any questions please check with Beth and Dr. Brock.
See you when I get back June 12.

Reid Withrow

Reid Withrow

Sept 85 Kilo i'a Waikiki Aquarium

The Case of the Speared Turtle

The unfortunate incident of the green sea turtle that died from a speargun wound in July underscores the importance of increasing the public's awareness about marine life. The green sea turtle, along with other marine turtles found in Hawaii-the hawksbill, olive ridley and loggerhead-are considered threatened or endangered species.

Once numbering in the tens of millions worldwide, the sea turtle population may now have fewer than 200,000 mature females, 350 of which nest annually in Hawaiian waters. Protected by federal and state laws, the turtles cannot be taken or caught for any purpose and can be displayed in Aquariums only with permission from National Marine Fisheries Service (NMFS). Americans visiting foreign countries may not trade or bring back to the U.S. souvenirs made from sea turtles. Penalties for flouting these laws range from six months in prison and a $10,000 fine for civil cases to one year and $20,000 for criminal cases. Turtle riding by divers is also illegal.

In a *Honolulu Star Bulletin* interview, the young man who speared the turtle said he was unaware of any law protecting endangered species. Otherwise, "why would I walk through Waikiki carrying a dying turtle in plain view of everybody?" he said. "Everything in the ocean is beautiful, but some are good to eat, too." The 22-year-old Kapahulu resident has been charged with cruelty to animals, a misdemeanor, and cited by NMFS for taking an endangered species.

The NMFS now plans to publish 15,000 pamphlets on Hawaiian sea turtles. A recovery team sponsored by NMFS and the Fish & Wildlife Service has recently been organized to determine what steps are necessary to protect these animals.

The public can help by reporting poaching activity to the NMFS Enforcement Division, 546-5670 or the DLNR hotline 548-5918. Nesting or basking activities as well as dead, sick, injured or accidentally caught turtles should be reported to the Fisheries' Laboratory 943-1221, Sea Life Park or the Waikiki Aquarium. For more information, contact the NMFS, P.O. Box 3830, Honolulu, Hawaii 96812, telephone 955-8831. ●

George Reid will call us in the future I discussed this w/ him — Bill
6/4/85

Bill - This note from Reid was in my mailbox when I returned from Molokai. Did he coordinate all of this through you? I sure hope so, as it doesn't seem right for him to be making decisions as when to euthanize.

Almost sounds like the "athletes foot ointment" contributed to the turtles demise.

Maybe I'm wrong feeling this way, but it also seems to me that Reid/Waikiki Aquarium should confer with us about asking State people to look at our animals. Has this problem come up before?

GB

WAIKIKI AQUARIUM

November 3, 1985

Dear George,

It's Sunday and I'm catching up on Aquarium business. Time for a quick update to you. The Hawaii Ocean Center is finally on track and progressing rapidly. Thought you would like to know that a turtle exhibit is still very much in the works at this time. Since they are incompatible with seals and pretty messy in fish tanks, they will have their own exhibit tank. If you have some recommendations on the design of such an exhibit, especially to make it more than just a "turtle bathtub" please let me or LT know so they can get incorporated in the design. None of the specifics of the design have been planned yet but should be in the next few months.

BEACH BASK

Reid leaves me a log of weekly events so I can get caught up on what's going on over here. Hope everything with the baby turtle worked out OK, haven't heard any more about it. It's small enough that keeping it shouldn't present any problems but when the day comes to release it - well??? Maybe the new Ocean Center will be completed by then and the hawksbill and Ridley will both have a nice new home!

TRANSFER TO SLP?

Hope to see you again when I get out of purgatory next spring.

Best regards,

Bruce

Bruce A. Carlson

University of Hawaii • 2777 Kalakaua Avenue • Honolulu, Hawaii 96815 • (808) 923-5335

Tagging and measurements of sea turtles on November 4, 1985 by G. H. Balazs

Size 1 tag No. ALL 53-4 Left	Right	Size 681 applied 11/4/84		Straight carapace cm Length	Width
N579**	N580**	8690		20.3	16.5
N379**	N380**	8691		19.5	15.4
850**	851**	8692		19.0	14.7
924**	925**	8693		19.8	15.4
		Size 1 applied 11/4/85			
N389**	N390**	E007 RFL	E008 LFL	17.5	14.2
938**	887**	E006 RFL	E025 LFL	16.7	13.2
N395[1]	N396[1]	--		18.5	14.4
--	--	E002[2]	E003[2]	7.3	5.8
		--	E004[2]	6.3	5.2
		--	E005[2]	6.5	5.3
Philippines hatchling hawksbill[1]		--	--	4.3	--

*Titanium alloy tags; all others are Monel.

**RELEASED AT BELLOWS BEACH, WAIMANALO BAY, OAHU (6 TURTLES).

1 Not released; kept at the Waikiki Aquarium for display; Graft on 3rd lateral left; Tag N395 imbedded and cause of deformity in 3-4th Scales.

2 Three post-hatchlings brought to the Aquarium by Dick Wass for the Seattle Aquarium. Shells soft with scute material Sloughing.

RECENT TRANSFER FROM PBRC WHITTOW TO KEWALO NMFS Subsequently to Mauna Lani Bay Hotel

5683; 8689 (NEW) 56.3 42.0
GRAFT ON 1ST lateral right - photos taken.

November 7, 1985 F/SWC2:GHB

Mr. Bruce Carlson
Curator
Waikiki Aquarium
University of Hawaii
2777 Kalakaua Avenue
Honolulu, HI 96815

Dear Bruce,

Many thanks for your recent request for input on the design of a sea turtle exhibit planned for the Hawaii Ocean Center. I was delighted to learn that such an exhibit is in the works. Actually, it would be a severe deficiency to have such a facility without displaying our native Hawaiian marine reptiles.

A well-planned display should promote good health in the turtles, enhance their graceful and naturally attractive attributes to people looking at them and, if at all possible, give them space and proper habitat to bask and breed in captivity if they wish. On this last point, a small sand beach would be needed. I believe that a lot can be learned from Sea Life Park's experience with Hawaiian sea turtles. We can build upon their successes, and try to correct for the few problems they have experienced.

Call me when you want to talk about this more. I'm sure that Steve Kaiser would also be willing to contribute his expertise.

Sincerely,

George H. Balazs
Zoologist

GHB/ll

bc: HL, Balazs

AQUARIUM FILE

Harm Done to Seal Research

I have watched with dismay the events and media presentations of the recent controversy surrounding the use of two Hawaiian monk seals at the Waikiki Aquarium for research. Except for the March 8 article in the *Honolulu Star-Bulletin*, none of the media presented the issues adequately. Instead, TV and newspapers chose to present only the emotional aspects of the issue, ignoring press releases thoughtfully prepared by those involved.

Since the 1950s monk seal populations have declined by over 50 percent. Where have the newspapers and TV stations been during these years? Where are the stories documenting the research efforts of dedicated biologists living for months at a time on uninhabited islands? Where are the stories describing the multifaceted research program aimed at saving this magnificent animal?

Had there been some coverage of these aspects of the issue, perhaps the public would have been able to understand the pressing need for both field and laboratory research, and their associated risks.

For many years I have enjoyed and even provided some of the educational opportunities available at the aquarium. My last contribution, a lecture on Hawaii's endangered wildlife, including the urgent need for research, does not seem to have been effective. For the last five years I have spent two to five months each year in the Northwestern Hawaiian Islands studying endangered birds and assisting the National Marine Fisheries Service (NMFS) monk seal research team with various research projects, sharing their frustration with the seals' continuing decline. Like aquarium director Leighton Taylor, I strongly advocated research on captive animals as an important part of the overall research plan.

Two of the three seals brought to the Aquarium were saved from certain death from starvation by NMFS biologists. The third was a healthy animal taken for the captive research program from Laysan Island in 1983. It is illegal to bring individuals of endangered species into captivity unless they are to be used for captive propagation or for research that will promote the survival of the species in the wild.

proach to saving dozens of seal lives annually.

Understandably those volunteers working with the seals became emotionally attached to the animals. Not so understandable is that those volunteers chose to reciprocate the affection and pleasure they got from their interactions with seals by precipitating the demise of an essential element in a research program aimed at conserving this unique and highly endangered animal species. It is impractical to take adult animals from the wild and train them to participate in the research. The difficulty and expense of capturing the aquarium animals, as well as keeping and training them has been great, but it has been largely wasted. Emotionalism that demands the preservation of individual research animals at the expense of an entire species is misguided.

Something else the confrontation has accomplished is to drive the scientists, who have attempted to keep the seals and the research fully accessible to the public, behind closed doors to conduct research that is clearly in the public interest. This is the very thing for which scientists are most often feared and criticized. NMFS is to be congratulated for honoring the demands of an outraged public, whipped into a frenzy by the media. Scientists have quietly resolved to start again from scratch on their program of captive animal research aimed at saving monk seals for the future.

So where are we now? Did the news media responsibly present both sides of the issue? Can the aquarium legally hold these seals and display them to the public without simultaneously carrying on a meaningful research program? Or do we have simply an exhibit maintained at the expense of the 1,500 or so monk seals that hover on the brink of extinction?

Did the aquarium win the battle and lose the war? Surely the two monk seals may have won a longer life, and that is good — for them. I wonder how many dozens of other monk seal lives it will cost.

Sheila Conant
Associate Professor
and Chairwoman
Department of General Science
University of Hawaii at Manoa

The seals at the aquarium were brought there specifically for research and the volunteers knew it. Taylor was present at a December 1984 meeting where the proposed research was described. Every year 30 to 50 seals die at French Frigate Shoals alone. The experiment which the aquarium opposed was to directly examine the causes of that mortality. Continued research could have provided an ap-

STAR-Bulletin
3/26/86

letters

'Senior power' and seals

Skill, joy and pride

Here in Hawaii we have ample demonstration of the vitality of our senior citizens and the rich contributions that they make in the daily life of our community.

In the Department of Social Services and Housing, we have programs which are designed to operate on "senior power." These are our Foster Grandparent, Senior Companion, and Respite Services programs. They employ 244 able-bodied and low-income seniors who devote more than 16,800 hours a month to helping, encouraging and caring for their 500 clients of all ages.

We in the social services are particularly concerned over the probability of severe reductions in many of our programs as a consequence of the Gramm-Rudman Act. We are optimistic, however, that the DSSH programs which employ senior citizens will be maintained unscathed; and we expect that our "older workers" will continue to serve as they now do — with skill, with joy and with pride.

FRANKLIN Y.K. SUNN
Director, DSSH

Research and survival

I wish to make four points concerning the Hawaiian monk seals in the care of the Aquarium which have been the subject of recent articles in your paper and on television.

1. Although the private citizen who confronted the National Marine Fisheries Service (NMFS) biologist on Aquarium property is known to many staff members, we had no foreknowledge of his actions; they are unsanctioned by the Aquarium and we recognize them to be illegal. The seals are legally in the custody of the NMFS (although practically they are in our care). The Aquarium was prepared to permit the NMFS to remove the seals.

2. The Aquarium recognizes the need to conduct research on monk seals in the wild and in captivity in order to ensure the survival of the species. But we believe that there are better, safer ways of conducting the research. Review and scrutiny of the research methods by other parties are needed. The modification-to-permit process which we asked NMFS to follow allows such review.

3. Such issues are never simple. Careful readers of your news articles are probably aware of the complexity of the problems of research on captive, hand-raised animals. However, understandably, many readers are busy and distracted, and often infer an oversimplified conclusion.

For example, the opinion has been expressed that the Aquarium's major motivation in this episode was to "save their pets" and "assure that they have monk seals on display so that attendance would not fall, thereby trading a short-time gain for the significant long-term loss of monk seals in the wild."

Such a simplistic conclusion, while understandable, is definitely not warranted. Our major motivation was to avoid the death of another captive seal. In our view, two deaths due to the same experiment would be judged harshly by both the public and the scientific community, and would seriously jeopardize all research on monk seals.

4. The two seals that remain in the care of the Waikiki Aquarium are still in the legal custody of the NMFS and will still be the subject of research that we hope will benefit the survival of the wild population. Such research should be of low risk to the animal and should take advantage of their behavioral conditioning.

LEIGHTON TAYLOR,
Director
Waikiki Aquarium

More on derelict cars

In response to Mr. Bud Thuener's letter editor (3/5), we agree that the registered owners should be held responsible for an abandoned vehicle if they have not submitted the legally required notice of transfer upon sale of their vehicle.

Unfortunately, the present law does not allow the imposition of such fines or criminal prosecution unless a police officer witnesses an individual abandoning a vehicle. However, House Bill No. 1830, which has passed the House of Representatives, will correct this deficiency by placing the responsibility of an abandoned or derelict vehicle upon the last known registered owner.

Monk seal

By Tom Kaser
Advertiser Staff Writer

A young Hawaiian monk seal died recently at the Waikiki Aquarium during an experiment to determine what can be done to reduce the high death rate among monk seal pups at French Frigate Shoals.

The young seal, named Tuffy, went into "capture shock syndrome" during the experiment and died of kidney failure Jan. 3, said William Gilmartin, leader of the Marine Mammals and Endangered Species Program of the National Marine Fisheries Service, which had been conducting the experiment for about three weeks.

Hawaiian monk seals are an endangered species and an estimated 1,300 to 1,400 of them live in the 1,000 miles of the Hawaiian Islands northwest of Kauai.

Of the nearly 170 pups that are born in those islands each year, about 100 are born at French Frigate Shoals.

But an unusually high proportion of the French Frigate Shoals pups — about 20 percent — die in their first year, and Gilmartin suspects a similarly high percentage die during the second year.

"No species can stand that high a loss of its young without experiencing an overall decline in its population," he said. "We need to know what's wrong at French Frigate Shoals.

"Maybe the problem is genetic, which we can't do anything about. Maybe it's a food resource problem — not enough food in that area to feed the monk seal population. We know that whenever food is scarce, the young animals lose out most."

Honolulu Advertiser 1-15-86

pup dies during experiment

This Hawaiian monk seal was photographed at the Waikiki Aquarium in 1983. Advertiser photo

Gilmartin said Tuffy was an emaciated 35 pounds when he was captured at French Frigate Shoals in 1984. The animal had been born that summer, had just been weaned, should have weighed at least 150 pounds, "and would have died if left on its own."

At the Waikiki Aquarium, Tuffy was nursed back to health and weighed about 180 pounds before the experiment began in December.

"The experiment called for us to physically restrain Tuffy in an drained tank so he could be injected with radioisotope material. Unknown to us, however, he went into capture shock syndrome without giving any outward sign of being in that state.

"This syndrome isn't unusual in species that are just not used to being restrained in any way — especially exotic ones, like some species of dolphins. But it's very uncommon among seals."

He said that in Tuffy's case it caused extensive muscle damage, which in turn sent damaged muscle cells in the blood stream to the kidney.

"The muscle damage was not from Tuffy fighting us but from a passive reaction that goes on inside the animal's body. It's partly psychological."

The National Marine Fisheries Service has two other male monk seals at the aquarium and Gilmartin said one of them will soon be used to continue the experiment.

"But we will administer the radioisotope material in a different way."

Monk Seal

Killed by 'Capture Shock

By Helen Altonn
Star-Bulletin Writer

Tuffy was a young Hawaiian monk seal who earned his name because "he was a fighter," says Reid Withrow, the Waikiki Aquarium's monk seal trainer.

He was abandoned by his mother as a pup and struggled for survival with the help of aquarium staff and volunteers who "hand-raised" him.

He was "more than just an animal," said Aquarium Director Leighton Taylor. "He was a member of the family."

The young seal died Jan. 3 of kidney failure resulting from "capture shock syndrome" when he was restrained for a research project.

The study was planned by the National Marine Fisheries Service (NMFS) and the University of Hawaii to determine if severe losses of monk seal pups at French Frigate Shoals are related to limited food resources.

Tuffy was born in 1984 at French Frigate Shoals, in the Northwestern Hawaiian Islands. He was emaciated and near death when NMFS scientists rescued him and took him to the aquarium in August of that year.

"HE WAS the smallest weaned pup we ever tried to rehabilitate," said William Gilmartin, wildlife biologist at the fishery service's Honolulu laboratory. "The aquarium staff, through force-feeding and hand-feeding, nursed it back to health."

Gilmartin heads the NMFS Marine Mammals and Endangered Species Program, which includes the Monk Seal Recovery Team.

He said about two-thirds of all monk seals born each year — roughly 100 out of 150 — are at French Frigate Shoals. But 20 percent of the pups die during the first year. One possibility is that they can't find enough food and "slowly waste away," he said.

He said it's "critical" to learn what is causing the losses because French Frigate Shoals has the largest monk seal population and the only one that's stable. "If that goes into decline, the population will be in a critical stage throughout the archipelago."

Gilmartin said he worked with G. Causey Whittow, chairman of the physiology department in the John Burns School of Medicine, to plan the experiment.

IT WAS decided to test the procedures on Tuffy before using them on the wild population, he said. "That's the reason we have captive monk seals, to help us solve the problems facing the species in the wild." Only males are taken for experimental work because there is an excess of them in the population, he said.

He said Tuffy was strapped on a stretcher on Dec. 20 and given some radioisotope material and blood samples were taken.

HONOLULU STAR-BULLETIN 1-15-86

Dies at Aquarium

Syndrome' After Experiment

The experiment was believed to be safe, but Tuffy suffered from "capture shock syndrome," he said. "This is a partly psychological and partly physiological response to being held, captured or restrained," he said. "It results in a lot of muscle damage."

Dolphins display such a condition but it wasn't known to affect seals, so Tuffy's response was "totally unexpected," he said.

HE SAID the project was stopped as soon as it was realized what was happening. But it was decided not to try to treat the seal because it would involve more handling. "We opted to leave him alone and hoped the damage was not so severe that it would cause kidney damage that he would die."

Tuffy's behavior seemed "near normal," but he wouldn't eat for three weeks, Gilmartin said. As a result, he wasn't getting fresh water from food sources to flush out his kidneys.

Gilmartin said he contacted Mainland people experienced with such problems and they suggested putting the seal in a tank of fresh water in hopes that he would drink that.

The seal was placed in the fresh water Jan. 2. But he was found dead on Jan.3.

"It's especially difficult for myself and the volunteer trainers when we spent so much time with the animal and saw him go from an emaciated, starving pup to the best health," Withrow said.

Seals normally weigh 150 to 200 pounds after their mothers stop nursing them and they live on their fat until they learn how to catch fish and eat.

BUT TUFFY weighed only 32 pounds when he was delivered to the aquarium, Withrow said. "You could pick him up in one hand."

The seal weighed 170 pounds at the time of the experiment, he said.

Taylor said the aquarium's policy is to allow research on animals only if they can be trained to cooperate and don't have to be forced into restraints.

Withrow and other trainers had worked with Tuffy, touching and patting him and exposing him to the restraint apparatus — a plywood platform with canvas straps. Withrow had even tested it on himself. "I struggled to see how it felt," he said.

Withrow said volunteers observed Tuffy almost constantly after the experiment. On the evening before his death, the seal pushed a partially deflated basketball around pool, Withrow said. "We had no way of knowing he was as far gone as he was."

"It's a shame to lose any animal, but researchers did learn from this kind of treatment," Taylor said.

Honolulu STAR-Bulletin MARCH 8, 86

EXPERIMENTAL SEAL—Waikiki Aquarium staff and volunteers have developed a bond with Maka, a Hawaiian monk seal brought to Hawaii for research. —Star-Bulletin Photo by Terry Luke.

Aquarium Opposes Planned Experiments on Monk Seal

By Helen Altonn
Star-Bulletin Writer

A young Hawaiian monk seal has become the focus of an unusual dispute between the National Marine Fisheries Service and the Waikiki Aquarium.

The aquarium has hand-raised Maka, a 1½-year-old male, since NMFS scientists brought him here in June 1984 as a pup from French Frigate Shoals.

The fishery scientists plan to remove the seal from the aquarium Monday and take it to Sea Life Park for an experimental project opposed by the aquarium.

Fisheries officials said Maka and two other seals — Tuffy and Nuka — were brought to Hawaii to conduct research that might help restore their declining population at French Frigate Shoals.

THE AQUARIUM objects to the research because Tuffy died after a similar experiment conducted by NMFS scientists at the aquarium Jan. 3. Tuffy, also a young male, suffered from "capture shock syndrome" when it was restrained for the project. This response wasn't known to happen in seals.

"We can only speculate that there may be something about these young seals that makes them more susceptible than wild seals to captive shock syndrome," Aquarium Director Leighton Taylor said. "However, we do not wish to have our speculation proven by the death of a second seal."

Taylor said he told NMFS researchers that only "non-intrusive" and "low-risk" behavioral research will be allowed on seals at the aquarium.

The experiment planned on Maka "sounds kind of ominous but it is a standard procedure or technique used widely in experimental work to get information we can't get any other way," said Richard Shomura, NMFS' Honolulu Laboratory director.

NMFS WILDLIFE biologist William Gilmartin is conducting the project. He heads the NMFS Marine Mammals and Endangered Species Program, which includes the Monk Seal Recovery Team.

G. Causey Whittow, chairman of the physiology department at the John Burns School of Medicine, is working with Gilmartin on the experiment.

Maka will be given a capsule containing water and a heavier component that can be measured through blood samples to study the amount of energy used by the animal to feed, Shomura said.

Tuffy was given an injection instead of a pellet but that wasn't the factor leading to the animal's death, Shomura pointed out. "He just went through a stress syndrome that ended in death. This is very unusual for seals . . .

"We can't guarantee there will never be mortality, but the design of the experiment isn't fraught with high probability of death being the end result."

SHOMURA SAID the research is important to determine if a high number of deaths among young seals at French Frigate Shoals is related to an inadequate food supply.

"We agree that research must be done to find out what is going on with the animals," said Aquarium Curator Bruce Carlson. "But it shouldn't be done on Maka."

He said the aquarium suggested that NMFS do the research on the wild seals at French Frigate instead of those hand-raised at the aquarium.

"If Maka was just one of a million seals, maybe it wouldn't matter so much," Carlson said. "But he is one of a dying breed and an ambassador for the species. A million people have been here and seen Maka and enjoyed his antics and playing around. They have an emotional bond with the animal. . ."

The loss of the animal from the aquarium also is "very traumatic" for the aquarium staff and volunteers who have spent "hundreds of hours" training Maka, Carlson said.

SHOMURA SAID the fisheries service and the aquarium have had a "mutually beneficial arrangement. They'd have the animals for display in captivity and promote the fact that the seal is an endangered species and we'd have the animal for experiments."

But, he said, "The sole reason for bringing the animals into captivity and holding them was to run experiments . . . and not to develop close monk seal-man relationships.

Fisheries Service Plans to Move Monk Seals to Lab for Research

7-16-86 HSB

By Helen Altonn
Star-Bulletin Writer

The National Marine Fisheries Service plans to transfer its two Hawaiian monk seals, Maka and Nuka, from the Waikiki Aquarium to the NMFS laboratory at Kewalo Basin for research.

However, NMFS officials said they won't do the type of experiment on those seals that resulted in the death of Tuffy, another monk seal, in January.

Aquarium Director Leighton Taylor was informed of the plan to move the seals before he left last week on a leave of absence to work at the California Academy of Sciences, said Richard Shomura, NMFS Honolulu Laboratory director.

"In our letter we indicated that we hoped at some point we'd be able to work with the aquarium on a compatible basis," Shomura said.

"We haven't closed the door on any future activities, but we did bring these seals in for this purpose (research) and we feel obligated to do this."

THE FISHERIES scientists collected the three seals from French Frigate Shoals under a permit for research to determine why so many of the animals are dying in the wild population.

About 20 percent of the pups die in the first year, according to William Gilmartin, wildlife biologist who heads the NMFS Marine Mammals and Endangered Species Program.

The experiment with Tuffy concerned the ability of the animals to obtain enough food to survive. NMFS, University of Hawaii and aquarium scientists conducted the project at the aquarium.

The animal suffered "capture shock syndrome," a condition not known to occur in monk seals, and died of kidney failure after being restrained and injected with radioisotope material.

"We agree with NMFS that certain kinds of research need to be done that poses a risk to animals, but it shouldn't be to animals raised in captivity — animals that you rehabilitate from the wild and hand-raise," Taylor said before leaving last week.

HE SAID hand-raised captive seals possibly are more sensitive than wild seals. "Maybe pups are abandoned for a reason because they're genetically unfit, and maybe when they go under stress, they die."

This is just a theory, he said. "But I hate to prove it by killing more captive seals."

The Honolulu laboratory has approval to do metabolic research, such as that on Tuffy, Gilmartin said.

However, to satisfy the concerns, he said, "We told the permit office that particular research would not be performed on those two animals (at the aquarium) and we requested permission to collect another male to do that work."

He also said the experiment also has been modified so the radioisotope material will be fed to the seal instead of injected.

WAIKIKI AQUARIUM

March 17, 1986

Richard Shomura
NMFS
Honolulu Laboratory
P.O. Box 3830
Honolulu, Hawaii 96812

Dear Richard:

I have received your letter dated March 14 which apparently passed my letter of the same date in the mail. In it you address a number of issues, the substance of which are not all relevant to the subject at hand. Your mention of certain extraneous issues reveals what I think is an unfortunate attitude and opinion about the Aquarium which I would like to work together to correct. I'll repeat my suggestion made in my March 14 letter that we meet in the company of a facilitator skilled in conflict resolution. I would suggest someone from the Neighborhood Justice Center. The Aquarium is willing to cover the expenses for such a meeting. My motive is to begin to heal the schisms between our offices.

Let me now address the pertinent issues put forth in your letter. First of all, I sincerely apologize for the oversight of not providing you with a copy of the press release which was distributed on March 7. Such an oversight is counter to our written policies and I regret very much that a copy was not made immediately available to you. For your records, a copy is attached.

As I mentioned in my previous letter, actions of Skip Naftel were not known to us in advance and we do not sanction them. We were prepared to release both Maka and Nuka to you on March 10. This is your legal right. Our prime motivation in calling public attention to your research was to avoid consequences that would greatly jeopardize research not only on monk seals, but on captive marine mammals in general. We were prepared to lose both seals from our public exhibit areas and to risk the wrath of your office in order to do what we felt was our legal, moral, and scientifically ethical duty.

You inquire in your letter as to what the future will bring. Of course, none of us know that, but I can assure you that if another circumstance arises in which I and the institution for which I am responsible, must take an unpopular, yet ethically required stance, we will do so again.

To look to the future in a more positive stance, I hope that you will accept my offer to sit and talk and resolve this conflict. Please consider it seriously and with the sincerity in which it is offered. I don't have to remind you that the two monk seals in the care of the Aquarium are still in the legal custody of NMFS and can still contribute positively to research efforts that we hope will produce information critical to the survival of seals in the wild. Aquarium staff and volunteers have been pleased to contribute time and money to the rehabilitation of young female seals which have subsequently been released in the wild. These animals have never been on public display. We are prepared to continue to contribute to the survival of monk seals through this project. In addition, both Maka and Nuka have been trained to participate in research projects such as audiograms and selected types of physiological research.

We hope that Dr. Gilmartin will continue to cooperate with our staff in the conduct of this research. In addition, the Waikiki Aquarium, in collaboration with the University of Hawaii Marine Mammal Lab and selected other scientists, will soon submit an application for an Endangered Species Permit and a Marine Mammal Permit for the conduct of behavioral research on monk seals. We have been told by Dr. Gilmartin of the high priority of his energetics research, but we feel there is a wide array of behavioral research that also needs to be done.

I note from your letter of March 14 that you have distributed copies to a number of people. I feel that it is only proper that I provide them with a copy of this letter, as well as with a copy of our press release, our draft policy for research, my letter to you of March 14, and a copy of a Letter-to-the-Editor to the two daily newspapers that is an attempt to correct some faulty inferences on the part of the public.

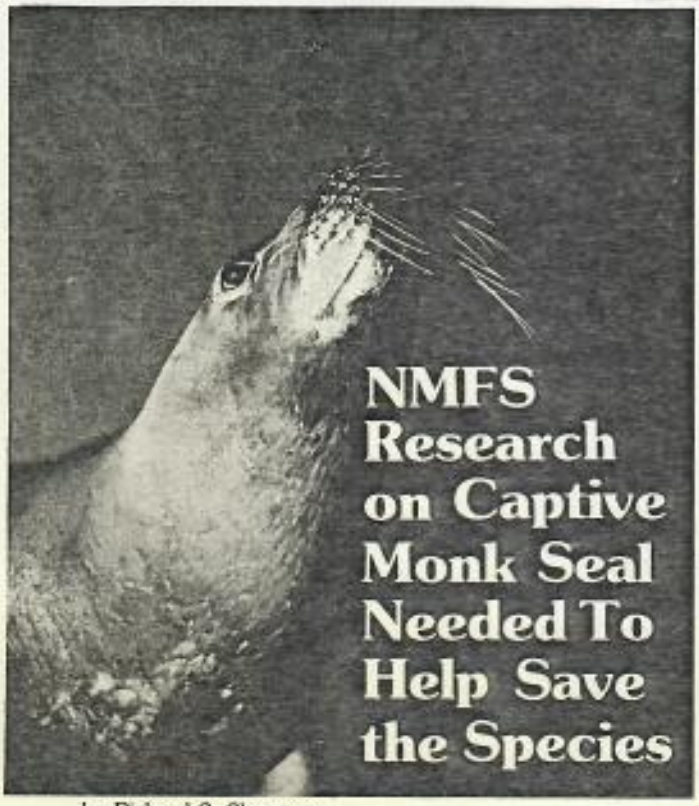
Richard, in conclusion, let me say that I think that writing indignant letters back and forth to one another is not going to heal the situation. I sincerely hope that we can all sit down together and talk and re-establish the positive working relationships that we have enjoyed in the past.

Sincerely,

Leighton Taylor

cc: L. Donaldson, Chairman, FOWA
I. Barrett, Director, Southwest Center, NMFS
E. Fullerton, Director, Southwest Region, NMFS
A. Simone, President, University of Hawaii
D. Yount, Vice-President for Research, UH
W. Gilmartin, Honolulu Lab, NMFS

APRIL 1986



NMFS Research on Captive Monk Seal Needed To Help Save the Species

by Richard S. Shomura

■ Maka, a 2-year-old male Hawaiian monk seal, has received much attention lately because the National Marine Fisheries Service (NMFS) plans to move Maka from the Waikiki Aquarium to Sea Life Park to continue NMFS monk seal research. The purpose of this research on captive seals is to help save the Hawaiian monk seal from extinction. Dr. Leighton Taylor, director of the Waikiki Aquarium, is opposed to removal of the two NMFS monk seals from the Aquarium. Some of the recent media coverage of the issue based on a press release issued by Dr. Taylor gives an incomplete picture of the problem and situation.

Recently a meeting involving officials from the aquarium, the University of Hawaii and NMFS was held at the Honolulu Laboratory in an attempt to resolve the problem. Dr. Taylor, who is currently traveling on the mainland, was represented at the meeting by acting aquarium director Bruce Carlson. Others from the aquarium included Reid Withrow, a seal specialist, and Wayne Gocke, a member of the Waikiki Aquarium Board and an active volunteer worker at the aquarium. NMFS was represented by Richard S. Shomura, director of the Honolulu Laboratory, and Wiliam G. Gilmartin, head of the Marine Mammals and Endangered Species Program of the laboratory. Dr. Phil Helfrich, director of the Hawaii Institute of Marine Biology, chaired the meeting at the request of Dr. David Yount, University of Hawaii vice president for research. The aquarium is operated by the university, and Dr. Taylor reports to Dr. Yount.

Richard Shomura reported that "an agreement was reached in which Nuka (the older of the two seals at the aquarium) would remain at the aquarium for research, which would be within the guidelines established by the aquarium. This was a considerable concession by NMFS, since it reduced the research capabilities of the laboratory. Maka, the younger of the two seals, would go to Sea Life Park, with our (NMFS) assurance to the aquarium staff that we would have the details of a modified research plan reviewed by the NMFS Permit Office."

Shomura added, "The aquarium representatives were satisfied that the planned research was necessary and that this final approval of the new procedure would assure minimal risk to Maka."

Before a joint press release could be issued, Taylor called Helfrich to say that the agreement and the pr ss release were unacceptable to him.

In reviewing the research to be conducted on Maka, Gilmartin emphasized that "the research involving Maka is high priority if we are to find out what is causing the deaths of several dozens of Maka's cousins at French Frigate Shoals annually. Young seals at French Frigate Shoals are experiencing a significantly higher mortality than at any other breeding island in the Northwestern Hawaiian Islands chain, and the cause may relate to availability of food. The experiment with Maka was to develop procedures to determine how efficiently monk seals feed in the wild. The double-labeled water technique, which Taylor objects to, is a standard procedure used by biologists on a number of wildlife including other species of seals."

Gilmartin further stated that "since the death of Tuffy, we have modified the test procedure and are confident that the study will present no more risk to the seal than force-feeding and collecting blood samples from Maka. Both procedures have been performed previously at the aquarium on Maka as well as on several other monk seals."

Shomura added that while he "believes this type of research is fully covered by our Federal Endangered Species Act Permit, our plans are to postpone the work until a fully detailed research outline has been reviewed by the NMFS Permit Office in Washington, D.C." Shomura expressed "surprise at Taylor's negative reaction to the research since Taylor was present when details of the research were given to the Hawaiian Monk Seal Recovery Team by Dr. Causey Whittow of the University of Hawaii in December 1984." Dr. Taylor is a member of the recovery team.

Shomura and Gilmartin believe NMFS has made a major concession in leaving Nuka at the aquarium and that, in taking Maka under the conditions mentioned earlier, they have satisfied most of the concerns for the safety of the animal voiced by the aquarium staff at the recent meeting.

Gilmartin said, "Maka will be moved at our earliest convenience for adaptation to the Sea Life Park facility and continuation of training for an audiogram study. While this research work is the only justification for keeping this endangered seal in captivity, public display will continue to be as much a part of Maka's life as possible, as it was at the aquarium." . . . Richard

If you love to fish and like to write, HFN has immediate openings for area reporters for the islands of Moloka'i, Kaua'i and O'ahu's North Shore.

Call 395-4499 for more information.

About Kilo i'a

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WAIKIKI AQUARIUM

Kilo i'a

LOOKING AT THE SEA

Hawaiian Turtles in Canada

Throughout the years, sea turtles have been a popular attraction at the Aquarium. Visitors can currently see three species of them while learning about their unique ecology and threats to survival. The 11 inch olive ridley in gallery 1 offers a special treat since this species is seldom seen at such a young age. This particular one was found washed ashore on Molokai, tangled-up in plastic line. He was sent to the Aquarium 15 months ago, has since been restored to health and is now growing. Sharing the outdoor seal pool is an active adolescent hawksbill, with its longer beak and spiny-edged shell, and a larger male loggerhead who sleeps quietly on the bottom most of the time.

The number of turtles at the Aquarium has waxed and waned over its 79 year history. Green turtles or Honu, the most common of Hawaiian sea turtles, were once heavily exploited for food but are now legally protected. In the past, when a surplus existed from too many donations, turtles were tagged for research and returned to the sea. Some of the green turtles released in this manner were later found happily breeding at French Frigate Shoals, 500 miles up the Hawaiian chain. In 1952, three surplus green turtles left the Aquarium under somewhat novel circumstances —aboard Canadian Pacific Airlines. This interesting and nearly forgotten story was pieced together from an old newspaper article and recent correspondence with the Vancouver Aquarium where two of the turtles are still living 27 years later. These "high-flying" turtles were sent up to Canada by former Waikiki Aquarium Director, Spencer Tinker to help celebrate the grand opening of the Vancouver Aquarium. Sea turtles don't normally occur off Vancouver, so the gift has provided millions of Canadians the unique opportunity of seeing these amazing reptiles.

It's just possible that these immigrant turtles have set a record for the length of time a green turtle has been kept in captivity. No one really knows just how long they can live, so records like this are helpful. The growth rates are also of interest. During the 27 years, the two turtles, one male and one too small to determine its sex, grew from a shell length of about 19 inches to sizes of 32¼ and 28¼ inches.

If you are ever in Vancouver, please stop by and say Aloha to our old friends!

UH marine biologist George Balazs has been studying Hawaiian sea turtles for the past 11 years and is an active supporter of the Aquarium.

INFORMATION SUMMARY ON THE VANCOUVER AQUARIUM GREEN TURTLES

George H. Balazs
Southwest Fisheries Center Honolulu Laboratory
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96822-2396

Two green turtle, Chelonia mydas, were returned to Hawaii on March 20, 1986 from the Vancouver Aquarium. The turtles had originally been shipped to Vancouver in 1956 by Spencer Tinker, former Director of the Waikiki Aquarium. They were estimated to measure 45-50 cm in straight carapace length at that time. Transport of the turtles both to and from Vancouver was made courtesy of Canadian Pacific Airlines.

The turtles arrived in Hawaii in excellent condition and have been permanently housed at Sea Life Park on Oahu. Numerous color photos were taken of them on March 25th and April 9th. They were double-tagged on April 9th shortly before being moved into the Park's "Turtle Lagoon." Data are as follows:

	Straight carapace		Curved carapace	
Tag No.	Length	Width	Length	Width
NNW 780 NNW 781	78.6	58.3	82.5	69.0
NNW 782 NNW 783	70.2	56.1	74.0	64.5

While in Vancouver the turtles were held in an inside display tank with fluorescent lighting. Seawater temperature averaged about 25°C. Feeding occurred twice a week to satiation on a diet of frozen chopped fish.

The dorsal surfaces of the turtles are black, except for cream-colored seams between the scales on the head and flippers. The ventral surfaces are cream-colored or whitish. Upon arrival in Hawaii the turtles were completely free of algae and other fouling growth. However, by April 9th, some algal growth was present on the carapace and dorsal skin surfaces.

The larger turtle is clearly an adult male. Its tail is very thick at the base and measures at least 40 cm in length. The smaller turtle's tail measures only 29 cm and has a considerably smaller diameter to the base. This turtle is either an immature male, or an inter-sex individual. Upon being placed in the Turtle Lagoon, several of the existing male green turtles vigorously mounted this turtle to copulate.

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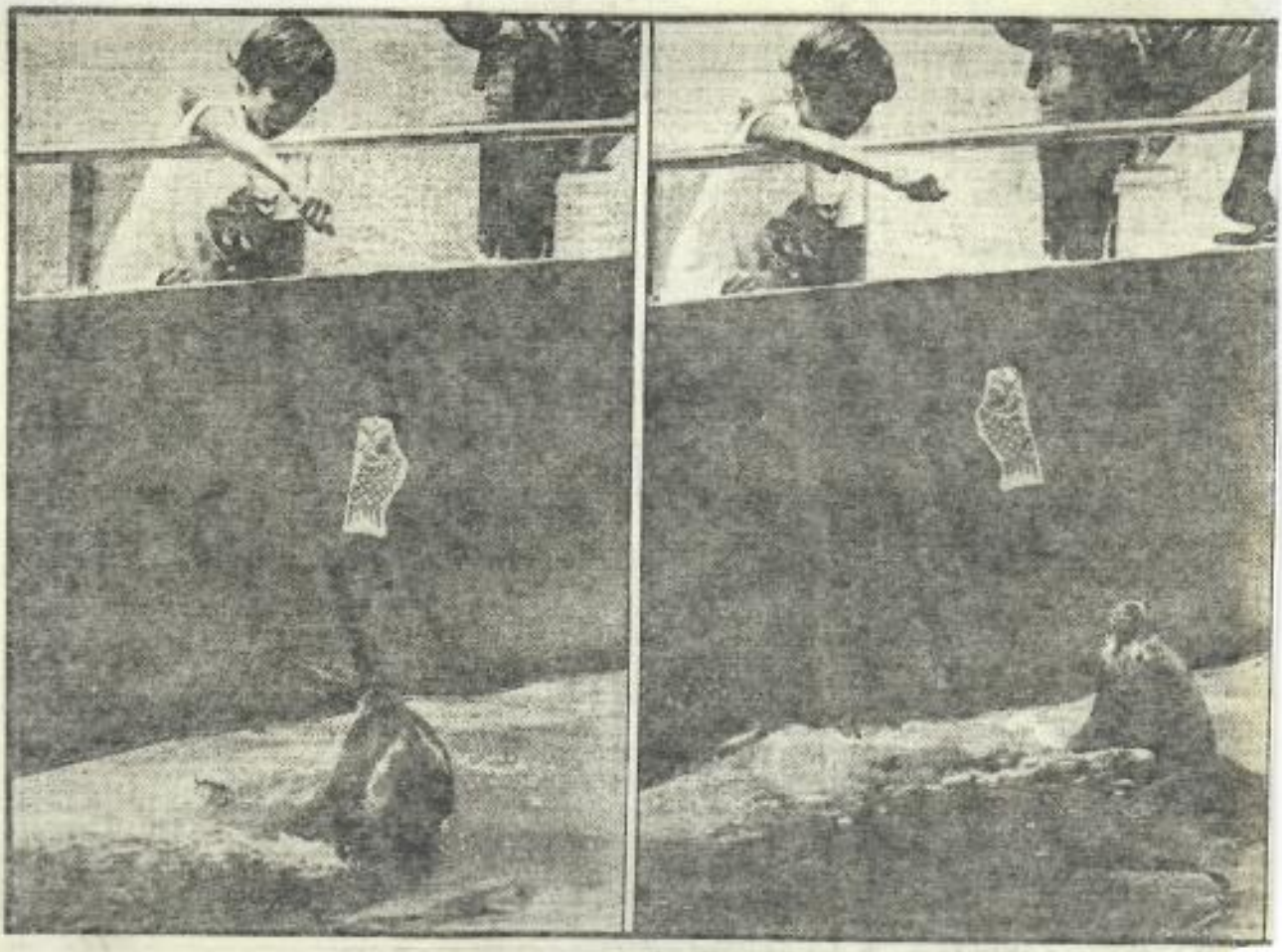
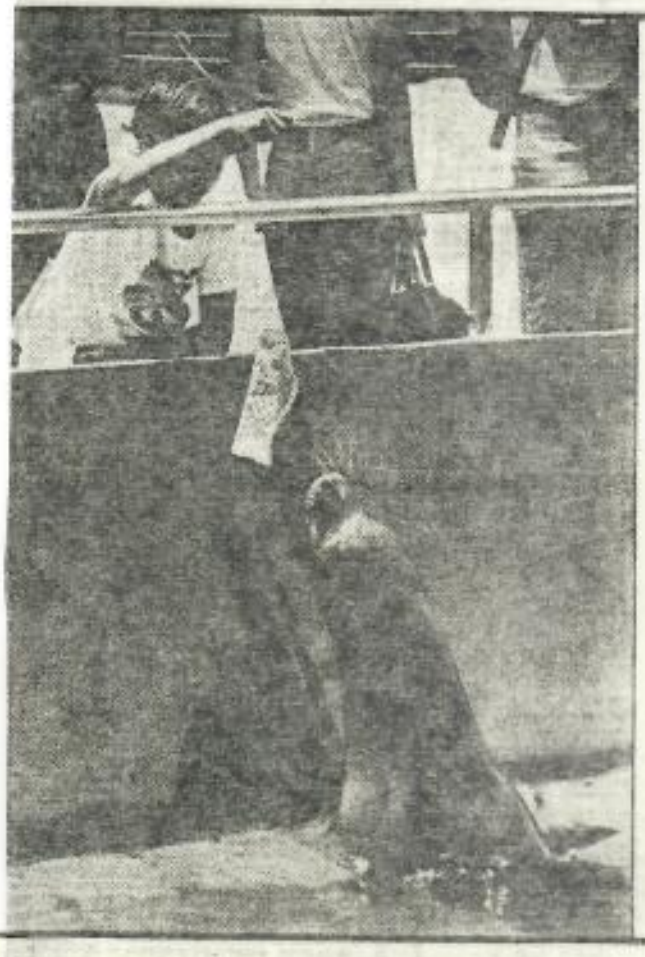


The Honolulu



Sighed, sealed and undelivered

This seal was just passing by and did a double-take at an apparent snack dangling in mid-air — then he grabbed for it. The seal missed the paper carp and the boy got to keep the banner, which he made at yesterday's Children's Day celebration at the Waikiki Aquarium. The event was co-sponsored by the aquarium and Temari, the educational Center for Asian and Pacific Fibers. Temari artisans gave children lessons in gyotaku (fish printing), suminagashi (Japanese paper marbling), kabuto (samurai paper helmet folding) and koinobori (carp banner making). Today is Children's Day.

Advertiser photos by Ron Jett

Advertiser

5-5-86

Final Edition Oahu Edition 35¢ Beyond Oahu 40¢

Pair of Hawaiian Monk Seals Will Be Released at Kure Atoll

By Helen Altonn
Star-Bulletin Writer

Two Hawaiian monk seals were flown by the Coast Guard today to Kure Atoll to help build up the declining seal population.

For several weeks, however, the young females will be kept in a "head start" pen so they can learn to feed on their own, said William G. Gilmartin, who accompanied the seals.

Gilmartin is a wildlife biologist at the National Marine Fisheries Service's Honolulu laboratory. He leads the Marine Mammals and Endangered Species Program, which includes a Monk Seal Recovery Team.

The scientists started a "head start" project on Kure to protect female pups from sharks and adult male seals. They also have been using the pen for "rehabilitated" pups that they find abandoned at French Frigate Shoals.

Three female monk seal pups that were rescued from there, fattened up in Hawaii and released at Kure last year are doing well in their new home, Gilmartin said. He said they are seen regularly on Kure's beaches.

THE TWO THAT left today were found starving to death last summer at French Frigate Shoals. They now weigh about 200 pounds each after care and hand-feeding at the Waikiki Aquarium and the NMFS Kewalo Research Facility.

The transplanted seals will live temporarily in a large fenced enclosure of sandy beach and water that has been stocked with live fish and lobster collected by NMFS biologists and off-duty Coast Guard personnel.

They won't be released until they learn to catch food for themselves, Gilmartin said.

They aren't being taken back to French Frigate Shoals because it's believed there isn't enough food there to support the seal population, Gilmartin said. Also, it is hoped new females will increase Kure's seal population, which has decreased more than 80 percent in the past 25 years.

Kure is about 1,200 miles northwest of Honolulu in the Northwestern Hawaiian Islands.

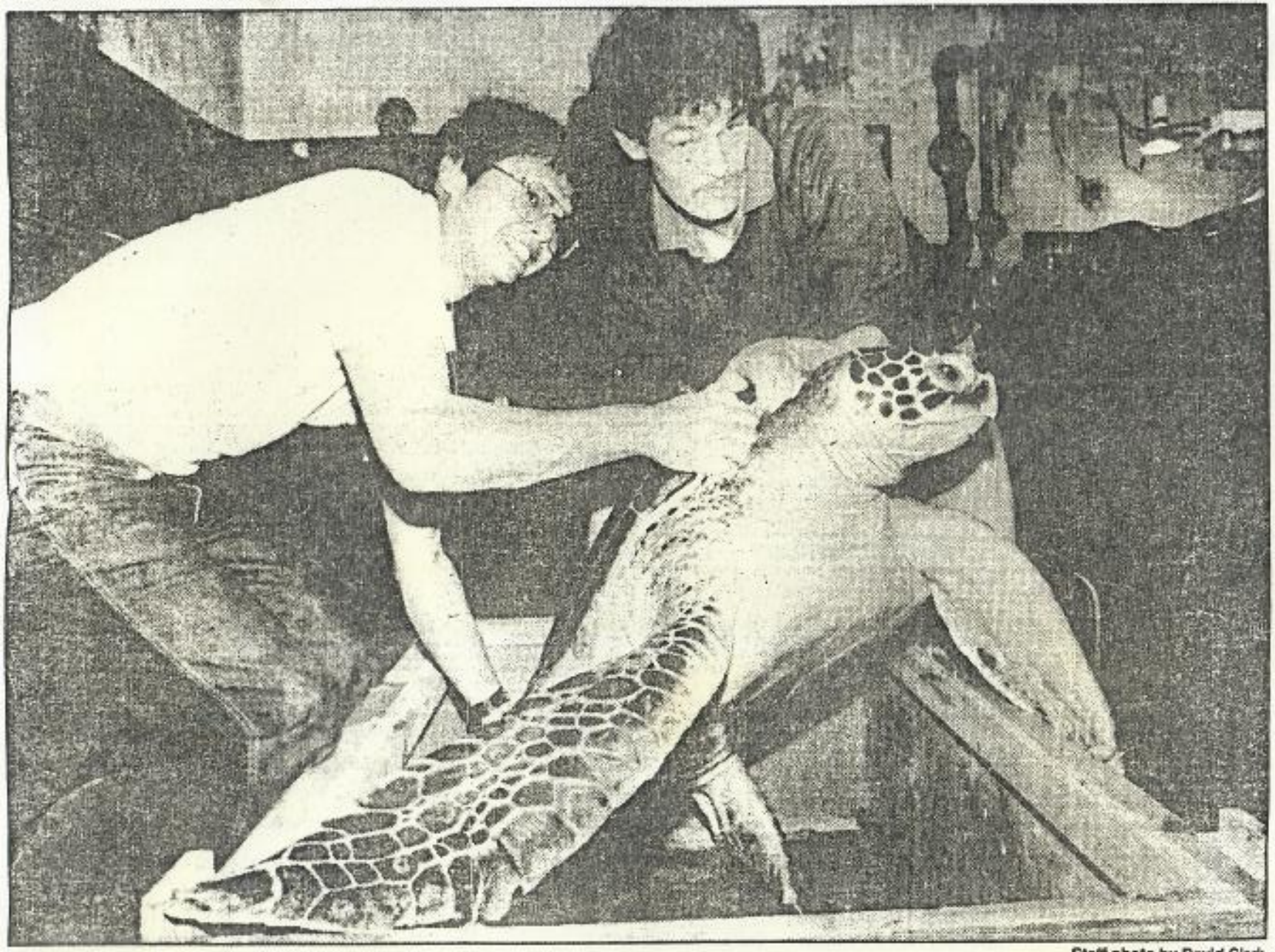
SPECIAL DELIVERY—National Marine Fisheries biologist William G. Gilmartin readies two female Hawaiian monk seals for a flight to Kure Atoll today. —Star-Bulletin Photo by Craig T. Kojima.

Group Aids Lizard

COACHELLA, Calif. (AP) — The California Nature Conservancy has completed acquisition of a $25 million preserve to protect the endangered Coachella Valley fringe-toed lizard.

The tiny lizard, which skitters atop the sands on fringed feet, exists only on the 13,000-acre preserve and on two smaller properties elsewhere in the Coachella Valley.

VANCOUVER, CANADA Province, MARCH 20, 1986



Staff photo by David Clark

Aloha-bound

It's goodbye Canada for Molokai, a crusty-looking green sea turtle at Vancouver Aquarium. He's going to Hawaii. Tim Low (left) and Chris Thorsteinsson see him off.

RALPH BOWER

HAWAII-BOUND, one of a pair of green sea turtles is loaded into a box by Tim Low and Chris Thorsteinsson at the Vancouver Aquarium today. Turtles came from a Waikiki aquarium in 1956; now they are being exchanged for six juvenile sea turtles.

ADVERTISER 6/2/86

Monk seal pups find Isle haven

By Gabriele Doering
Advertiser Special Writer

The three new Hawaiian monk seal pups in the National Marine Fisheries Service tank at Kewalo basin are so young they don't even know yet that they're supposed to eat fish.

The pups sniff briefly at dead herrings and then start shoving them around. The fourth pup, who's been around awhile, isn't interested in fish at all. He opens one eye, closes it again and continues to sunbathe on the wooden platform.

Fisheries biologist John Henderson smiles. "It's a good sign that they sniff and mouth the fish. Eventually they start chewing them up and figure out how to swallow," he explains.

Because the new pups, all about one month old, are too young to feed themselves, "it takes three men to force feed them," Henderson said.

Three of the four pups are new guests in the concrete tank at Ala Moana Boulevard. They were brought in last week after biologists Theo Johannos and Robert Forsyth discovered them on French Frigate Shoals 350 miles northwest of Oahu and found them underdeveloped and without enough fat reserves to survive on their own.

One was flown in Wednesday, the other two on Friday on a charter flight financed by the Center for Environmental Education, a private organization dedicated to protect ocean life and environment. The fourth pup, who's now about six weeks old, was flown in under similar circumstances a couple of weeks ago.

"We really don't know exactly why we find the underdeveloped pups there," Henderson said.

But the large numbers of monk seal mothers and pups on French Frigate Shoals might be a reason, he explained.

"The mothers exchange pups sometimes and some simply don't get enough milk. And when the mothers leave they (the pups) are not fat enough to get through the time they need to learn how to feed themselves."

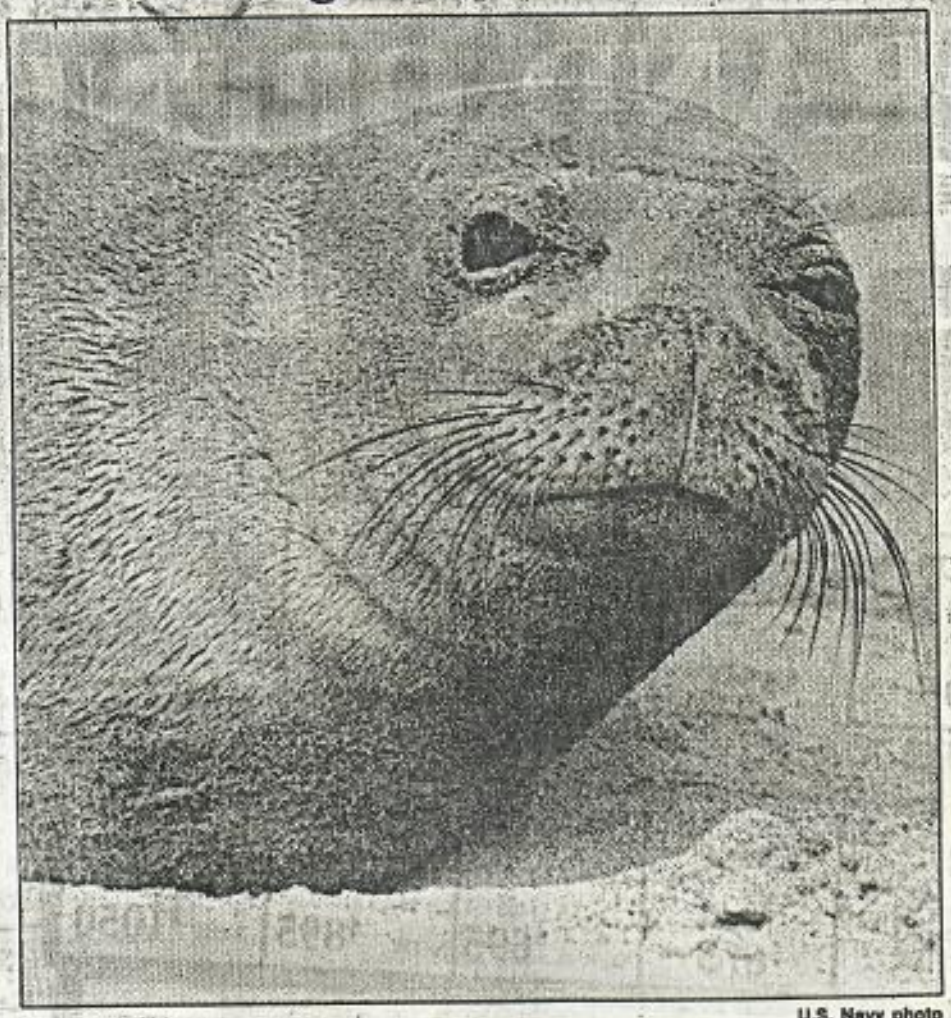
The young monk seals will probably stay at the Kewalo research facility until next April or May. "Besides feeding, we also want to screen them for diseases," Henderson said.

Before the seals will be finally released into the open, ocean researchers will set up a "program" in which the seals will learn how to fish for themselves.

Advertiser photo by T. Umeda

The three Hawaiian monk seal pups at their new temporary home at Kewalo.

The mysterious case



U.S. Navy photo

If you know of a Hawaiian monk seal in Hawaii Kai, the National Marine Fisheries Service would like to hear from you. This one was spotted on a Kauai beach in February.

of the monk seal

11/7/86 HA

By Jay Hartwell
Advertiser Staff Writer

Somewhere in Hawaii Kai, a rare Hawaiian monk seal is barking and splashing in a backyard pool.

Such seals are supposed to be in the Northwestern Hawaiian Islands, basking on a beach and otherwise enjoying the life of a federally protected endangered species.

But last Wednesday, the National Marine Fisheries Service got a call from an anonymous man who claims he found his pup in the Northwestern Hawaiian Islands three years ago, brought the seal home and raised it in his pool.

The man said the seal now weighs 200 pounds and has gotten too large and angry to handle. So he was thinking of returning it to the Pacific.

That made the experts at the fisheries service gasp because they believe the man — and told him the seal would die if released. What's worse, the seal also could threaten the survival of the remaining 1,500 monk seals.

The man refused to identify himself.

Yesterday, the fisheries service asked the public to help them find the one Hawaii Kai pool that has the seal.

"We're more interested in getting the seal back than penalizing the fellow," said Lew Consiglieri, a spokesman for the fisheries service.

He said the service wants to put the animal in quarantine to see if it has any diseases before releasing it. Some diseases are likely because the seal probably was raised in fresh water, rather than in salt water, which kills certain parasites. It's also possible that diseases from other mammals (including the owner or any other pets) could have been transmitted to the seal through what biologists call "interspecific transfer."

If the seal carries these diseases to the wild population, which has no immunity, "it could be devastating," said John Henderson, a fishery biologist.

The biologists also believe the pet seal doesn't know about sharks, which feast on wild monks, or how to find the reef fish, octopus and eels it's supposed to eat.

Consiglieri said the fisheries service has six monk seals in captivity. These animals were undersized and likely to die when found as pups. The service tries to fatten them up with vitamin supplements and seven pounds of frozen fish a day (usually herring) and also cure any diseases before returning them home, usually after a year. Fully grown monks can reach seven feet in length and weigh up to 500 pounds.

The seal barks like a dog and produce small, gulp-like grunts. Anyone with information about the Hawaii Kai seal is asked to call 546-5670. All information will be handled confidentially.

A clue pops up in mysterious case of the monk seal

By Jay Hartwell
Advertiser Staff Writer

The National Marine Fisheries Service got its first lead Sunday on the whereabouts of a rare Hawaiian monk seal: The seal may be swimming in Maunalua Bay off Hawaii Kai.

The case began two weeks ago, when the service got an anonymous call from a man who said he found a wild monk pup three years ago in the Northwestern Hawaiian Islands and had taken it home and raised it in his Hawaii Kai pool. But it got too big and nasty to feed safely, so the man told the service he was going to release it into the ocean.

The Fisheries Service biologists said don't do that; the seal will die because it doesn't know how to find wild food or protect itself from sharks. What's more, it could have diseases that could kill wild monk seals.

But the man hung up and the public was unable to help the service find the seal.

Until Sunday afternoon, when Craig Tanaka, his wife Soon Goo and their 2-year-old son Wayne were picnicking beside Maunalua Bay, on the Haunama Bay side of the boat ramp.

Tanaka, an employee of the Pearl Harbor Naval Shipyard, said they were looking across the boat channel, when an animal's head surfaced. At first he thought it was a turtle, but when the animal jumped out of the water, "My wife said, 'That's not one turtle.' . . . It was a regular seal," Tanaka said.

Five times the animal jumped up and dove back in. When jetskiers motored past, the seal disappeared.

Tanaka went to his Hawaii Kai home and called The Advertiser. We called the Fisheries Service, who sent a biologist out to look. No seal.

Service spokesman Lew Consiglieri said the service will be watching the area and if the seal appears, biologists will try to capture it and determine whether it's wild or tame.

If anyone sees the animal, Consiglieri said, he or she should immediately call the Honolulu Labortatory of the Fisheries Service at 943-1221 or its Law Enforcement Division at 541-2727.

Dec. 30, 1982

George,

Thought I'd send this to you at HIMB since you said your turtle data is over there. Whenever you have time, I'd still like to have any collection data, size, weight, etc. for our hawksbill and the Ridley. You gave me some general info over the phone as you recall but also said you had more specific info at HIMB. Hope it's not too much trouble to look it up for me. Thanks.

I've spoken to Mary Morioka re; your memo. She will be in touch soon if she hasn't already.

Best wishes for the New Year!

Sincerely

George,

Jan. 11, 1983

Thanks for the info. Sealy was put on a funeral pyre so nothing's left - except for the eyes. The eyes were sent to an ophthamologist in N.Y. who is studying eye problems in marine mammals.

Maybe next time (hopefully that won't be for many years). I'll keep the paper on file. Find any turtle data for us yet?

George Balazs
Hawaii Institute of Marine Biology
P.O. Box 1346
Coconut Island, Kaneohe
Hawaii, 96744

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BX 3830
96814

George Balazs
National Marine Fish. Service
2570 Dole St.
Honolulu, 96822

University of Hawaii • 2777 Kalakaua Avenue • Honolulu, Hawaii 96815

3 May 1986

Mr. George Balazs
National MarineFisheries Service
2570 Dole Street
Honolulu, Hawaii 96822

Friend Balazs:
Thank You for sending me the xerox describing the return and arrival of two turtles from Vancouver,B.C Aquarium. I had forgotten about them, although I had seen them in Vancouver.
Theastonishing thing about this transaction is the slow rate of growth of the two turtles. In nature or in Waikiki, they would have been much larger.
Thnak You again for your thoughtfulness.

Cheerio,

Spencer Tinker

III/12/87

Dear George,

Just a quick note as a reminder. The next time you have some baby green turtles from FFS that need "rescuing" please let me know. A few months back you and I discussed setting up a program here similar to the one at the Seattle Aquarium and I am still very interested in trying it out. Our Ridley's turtle is doing "too well" and will soon be too large to maintain in our display tank which is really best suited for babies. Daryl is reluctant to keep any turtles in the new shark tank because of the amount of organic pollution they cause so I am afraid the Ridleys will have to go. Hopefully that can be coordinated with the arrival of some baby greens. Keep plugging for our new facility where I hope we will be able to keep all the Hawaiian species of marine turtles on display. Keep in touch.

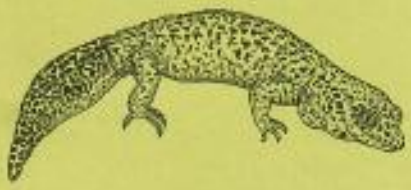
Best regards,

Bruce Carlson

Longevity of Reptiles and Amphibians in North American Collections

by

J. Kevin Bowler



Published by the society for the study of amphibians and reptiles
and the philadelphia herpetological society

Society for the Study of Amphibians and Reptiles

Miscellaneous Publications

Herpetological Circular No. 6

George R. Pisani, Editor
Biology Department
University of Kansas
Lawrence, Kansas 66045

Barbara Paschke, Assistant Editor
Institutional Research and Planning
University of Kansas
Lawrence, Kansas 66045

Production Staff - Jan Ripley

Single copies are available at U.S. $2.00 each ($1.50 each for orders of 20 or more) including postage. Orders may be sent to Douglas H. Taylor, Department of Zoology, Miami University, Oxford, Ohio 45056.

A list of other Society publications, including those of The Ohio Herpetological Society, Facsimile Reprints in Herpetology, Herpetological Review, and the Catalogue of American Amphibians and Reptiles, will be sent on request, by writing the Publications Secretary, Douglas H. Taylor (address above).

Membership in the Society includes subscription to Herpetological Circulars, the facsimile reprint series, the Society's technical journal (Journal of Herpetology), and Herpetological Review. Currently, Regular dues are $10.00 ($8.00 for students), Sustaining $15.00, Contributing $20.00. Institutional subscriptions are $20.00. All inquiries about membership or subscriptions should be addressed to the Treasurer, Henri C. Seibert (Zoology Department, Ohio University, Athens, Ohio 45701).

	Sex	Minimum Known Age (yrs mos days)			Origin	Contributor
Hyla rosenbergi *	5.0	3	6	17	w-adult	PZ
Hyla septentrionalis	0.1	12	11	2	w-adult	PZ
Hyla vasta *	1.0	5	1	22	w-adult	BdZ
Litoria caerulea *	0.0.1	8	6	26	w-adult	DZ
Pachymedusa dacnicolor *	0.1	7	6	6	w-adult	ASDM
Phrynohyas hebes	0.0.1	5	8	15	w-adult	PZ
Pternohyla fodiens	0.0.1	5	1	15	w-adult	ASDM
Smilisca baudini baudini *	0.0.1	5	2	6	w-adult	BdZ
Smilisca phaeota *	0.0.2	3	6	17	w-adult	PZ
Trachycephalus jordani *	0.0.7	3	6	17	w-adult	PZ
Triprion spatulatus reticulatus	0.0.1	8	10	23	w-adult	CZ
Leptodactylidae						
Ceratophrys calcarata *	1.0	10	10	0	w-juv.	LP
Ceratophrys cornuta	0.1	10	4	7	w-adult	PZ
Ceratophrys ornata	0.1	11	3	26	w-adult	PZ
Leptodactylus pentadactylus	0.0.1	15	8	27	w-adult	PZ
Physalaemus pustulosus	0.0.1	7	5	19	w-adult	DZ
REPTILIA						
Pelomedusidae						
Pelomedusa subrufa olivacea *	0.1	7	3	23	w-adult	TBZ
Pelomedusa subrufa subrufa *	0.0.1	16	0	4	w-adult	SDZ
Pelusios adansoni	0.1	4	8	2	w-adult	PZ
Pelusios castaneus derbianus *	0.1	24	10	0	w-adult	BZ
Pelusios niger	0.1	14	8	13	w-adult	NYZS
Pelusios sinuatus *	0.1	6	1	3	w-adult	PZ
Pelusios subniger	0.0.1	29	3	4	w-adult	PZ
Podocnemis cayennensis *	0.0.1	5	2	7	w-adult	DZ
Podocnemis expansa	0.1	16	2	10	w-adult	NYZS
Podocnemis sextuberculata *	0.1	6	1	3	w-adult	PZ
Podocnemis unifilis *	1.1	8	10	15	w-adult	DZ

	Sex	Minimum Age (yrs	Known Age mos	Age days)	Origin	Contributor
Chelidae						
Batrachemys dahli *	1.0	4	11	12	w-adult	PD
Batrachemys nasuta	0.1	13	6	11	cb	DtZ
Chelodina longicollis	0.0.1	35	1	5	w-adult	PZ
Chelodina oblonga *	1.0	4	5	16	w-adult	PZ
Chelys fimbriata *	1.0	16	2	5	w-adult	TBZ
Hydromedusa tectifera	0.1	8	10	14	w-adult	PZ
Mesoclemmys gibba *	0.0.1	6	4	0	w-adult	DtZ
Phrynops geoffroanus hilairi * 1	1.0	34	9	29	w-adult	PZ
Platemys platycephala *	1.0	19	8	27	w-adult	BZ
Chelydridae						
Chelydra serpentina rossignoni	0.0.1	23	2	29	w-adult	SLZ
Chelydra serpentina serpentina	0.0.1	38	8	27	w-adult	PZ
Macroclemys temmincki *	1.0	58	10	0	w-adult	PZ
Kinosternidae						
Kinosternon bauri *	0.1	7	7	15	w-adult	TBZ
Kinosternon cruentatum *	1.0	6	11	7	w-adult	BdZ
Kinosternon flavescens	0.0.1	10	4	25	w-adult	CZ
Kinosternon herrerai *	1.0	19	6	1	w-adult	IP
Kinosternon scorpioides	0.0.1	14	0	0	w-adult	NYZS
Kinosternon sonoriensis	0.0.1	27	9	1	w-adult	PZ
Kinosternon subrubrum hippocrepis	0.0.1	18	4	12	w-adult	SLZ
Staurotypus salvini *	1.0	11	8	17	w-adult	FWZ
Staurotypus triporcatus *	0.1	19	9	8	w-adult	PZ
Sternotherus carinatus	0.0.1	13	6	0	w-adult	PZ
Sternotherus minor minor *	1.0	23	11	0	w-juv.	PZ
Sternotherus odoratus	0.0.1	54	9	0	w-adult	PZ
Platysternidae						
Platysternon megacephalum	1.0	15	0	0	w-adult	BdZ
Emydidae						
Batagur baska *	0.1	6	1	3	w-adult	PZ

1 - (Erroneously identified as Podocnemis expansa in Int. Zoo Yb., 6:488.)

	Sex	Minimum Known Age (yrs mos days)			Origin	Contributor
Chinemys megalocephala *	1.0	7	8	3	w-adult	BdZ
Chinemys reevesi	0.0.1	24	3	11	w-adult	PZ
Chrysemys concinna suwanniensis	1.0	40	8	4	w-juv	JK
Chrysemys floridana	0.0.1	12	6	9	w-adult	PZ
Chrysemys nelsoni *	0.0.2	15	9	28	w-adult	CZ
Chrysemys picta dorsalis *	0.0.1	16	7	2	w-adult	CZ
Chrysemys picta marginata *	0.1	16	2	0	w-juv.	PD
Chrysemys picta picta *	0.1	14	0	28	w-adult	BZ
Chrysemys rubriventris *	0.1	4	3	24	w-adult	PZ
Chrysemys scripta elegans	0.0.1	30	6	0	w-unk.	SLZ
Chrysemys scripta hiltoni *	0.0.1	25	4	29	w-unk.	SDZ
Chrysemys scripta scripta *	0.1	8	7	0	w-adult	TBZ
Chrysemys stejnegeri granti	0.1	8	1	14	w-adult	BdZ
Clemmys bealei	0.0.1	27	4	6	w-adult	PZ
Clemmys caspica rivulata	1.0	13	3	0	w-adult	PZ
Clemmys guttata *	1.0	8	3	27	w-adult	DZ
Clemmys insculpta	0.0.1	12	6	1	w-adult	PZ
Clemmys muhlenbergi	0.0.1	13	7	11	w-adult	PZ
Clemmys mutica *	0.1	7	1	28	w-adult	TBZ
Cuora amboinensis	0.0.1	38	2	24	w-unk.	SLZ
Cuora trifasciata *	1.0	9	7	5	w-juv.	BdZ
Deirochelys reticularia *	0.1	6	1	27	w-adult	PZ
Emydoidea blandingi	0.0.1	12	9	0	w-adult	PZ
Emys orbicularis *	1.2	7	5	10	w-adult	BdZ
Geoclemys hamiltoni *	2.0	11	8	27	w-adult	SLZ
Geoemyda grandis *	0.0.1	14	4	12	w-adult	SDZ
Geoemyda pulcherrima pulcherrima	1.0	20	5	13	w-adult	PZ
Geoemyda rubida	0.1	11	9	1	w-adult	SLZ
Geomyda spinosa *	0.1	9	4	25	w-juv.	BdZ
Geoemyda trijuga	0.1	40	0	12	w-adult	PZ
Graptemys barbouri *	0.1	5	10	9	w-adult	PD
Graptemys geographica	0.1	5	6	5	w-adult	PZ
Graptemys kohni *	1.0	19	10	0	w-juv.	CZ
Graptemys oculifera	0.1	4	8	22	w-adult	PD
Graptemys pseudogeographica	0.0.1	32	6	1	w-adult	PZ

	Sex	Minimum Known Age (yrs mos days)			Origin	Contributor
Graptemys pulchra	0.0.1	15	8	1	w-adult	PZ
Heiremys annandalei *	0.1	9	4	29	w-adult	CZ
Kachuga smithi *	1.0	9	10	0	w-adult	FWZ
Kachuga tecta tentoria *	0.2	11	0	17	w-adult	FWZ
Malaclemys terrapin *	1.0	9	3	0	w-unk.	DZ
Notochelys platynota *	0.1	8	5	12	w-juv.	CZ
Ocadia sinensis *	0.1	12	5	6	w-adult	CZ
Terrapene carolina bauri	0.0.1	22	7	1	w-unk.	SLZ
Terrapene carolina carolina *	1.2	26	5	6	w-adult	RZ
Terrapene carolina major	0.0.1	21	7	3	w-unk.	SLZ
Terrapene carolina triunguis *	1.1	24	3	9	w-adult	RZ
Terrapene coahuila *	0.1	9	5	12	w-adult	FWZ
Terrapene mexicana yucatana *	1.0	15	5	0	w-adult	SLZ
Terrapene nelsoni *	1.0	11	9	6	w-adult	BdZ
Testudinidae						
Geochelone carbonaria	0.1	13	9	15	w-adult	PZ
Geochelone chilensis *	0.1	19	10	0	w-juv.	CZ
Geochelone denticulata *	1.0	14	1	14	w-adult	BmZ
Geochelone elegans	0.1	14	1	15	w-unk.	NYZS
Geochelone elephantopus *	1.0	47	7	0	w-unk.	PZ
Geochelone gigantea *	0.0.10	37	3	17	w-unk.	DtZ
Geochelone pardalis	0.1	7	3	23	w-unk.	PZ
Geochelone radiata *	1.1	12	10	13	w-adult	SLZ
Geochelone travancorica *	0.1	11	9	18	w-unk.	NYZS
Gopherus agassizi	0.1	2	9	15	w-adult	PZ
Gopherus berlandieri *	1.0	4	5	29	w-adult	BdZ
Gopherus flavomarginata	0.1	4	9	23	cb	BdZ
Gopherus polyphemus	0.0.1	8	6	0	w-adult	PZ
Homopus areolatus	0.1	7	4	12	w-juv.	LPZ
Kinixys belliana belliana	0.0.1	14	5	14	w-adult	SDZ
Kinixys erosa *	2.0	10	4	11	w-adult	BdZ
Malacochersus tornieri	0.0.1	7	3	23	w-adult	PZ
Testudo graeca	0.0.1	4	8	13	w-adult	PZ
Testudo hermanni	1.0	8	3	7	w-adult	FWZ

	Sex	Minimum Age (yrs	Known mos	days)	Origin	Contributor
Cheloniidae						
Lepidochelys kempi *	0.1	3	7	23	w-adult	PZ
Carettochelyidae						
Carettochelys insculpta *	0.1	17	3	5	w-unk.	NYZS
Trionychidae						
Lissemys punctata *	0.0.1	12	10	3	w-adult	SLZ
Pelochelys bibroni	0.0.1	10	1	17	w-adult	DtZ
Trionyx cartilagineus *	1.0	7	3	23	w-adult	TBZ
Trionyx ferox	0.0.1	16	10	5	w-unk.	PZ
Trionyx spiniferus spiniferus *	0.1	25	2	17	w-adult	RZ
Trionyx triunguis *	1.0	34	10	0	w-unk.	NZP
Gekkonidae						
Coleonyx variegatus	1.0	4	11	25	w-adult	LAZ
Eublepharis macularius *	0.1	15	6	1	w-adult	SAM
Gehyra oceanica	1.0	10	6	24	w-unk.	LPZ
Gekko gecko *	0.0.1	13	0	11	w-adult	CZ
Gonatodes albogularis fuscus	0.0.1	1	6	0	w-unk.	RC
Gymnodactylus spyrurus	1.0	10	8	0	w-adult	LPZ
Hoplodactylus pacificus	0.0.1	2	11	11	w-unk.	PZ
Oedura marmorata *	0.0.1	8	1	14	w-adult	DZ
Oedura robusta *	0.0.1	8	1	14	w-adult	DZ
Pachydactylus bibroni *	1.0	4	7	12	w-adult	JEG
Phelsuma laticauda	1.0	4	0	21	w-adult	FWZ
Phelsuma lineata	0.0.1	3	0	26	w-adult	LPZ
Phelsuma madagascarensis	0.0.1	10	0	0	w-adult	CiZ
Ptyodactylus hasselquisti	1.0	3	3	16	w-adult	SAM
Sphaerodactylus notatus notatus	0.0.1	1	4	5	w-adult	RC
Tarentola mauritanica	0.0.1	4	1	29	w-adult	PZ
Teratoscincus microlepis	0.0.1	3	1	10	w-adult	BdZ
Teratoscincus scincus *	1.0	9	3	4	w-adult	BdZ

	Sex	Minimum Known Age (yrs mos days)			Origin	Contributor
Xantusiidae						
Klauberina riversiana *	1.0	5	4	0	w-adult	PZ
Lepidophyma flavimaculata flavimaculata*	0.1	9	11	0	w-adult	BdZ
Xantusia vigilis	0.0.1	3	10	13	w-adult	ASDM
Iguanidae						
Amblyrhynchus cristatus	1.0	6	5	17	w-adult	BdZ
Anolis carolinensis carolinensis	1.0	7	1	29	w-adult	AH
Anolis equestris *	0.1	8	4	11	w-adult	LAZ
Anolis luteogularis	1.0	2	10	28	w-adult	PZ
Anolis stejnegeri stejnegeri	1.0	2	11	9	w-adult	BdZ
Basiliscus basiliscus	0.0.1	3	4	18	w-adult	PZ
Basiliscus plumbifrons	1.0	5	1	20	w-juv.	BdZ
Basiliscus vittatus	0.0.1	5	10	28	w-adult	PZ
Brachylophus fasciatus *	1.0	5	11	19	w-adult	DZ
Conolophus pallidus *	0.1	17	1	18	w-adult	SDZ
Conolophus subcristatus	1.0	7	3	14	w-adult	PZ
Corytophanes cristatus	0.0.1	5	2	15	w-adult	DZ
Ctenosaura hemilopha	0.0.1	9	7	4	w-adult	ASDM
Ctenosaura pectinata *	1.0	8	2	15	w-adult	DZ
Ctenosaura similis	1.0	4	9	13	w-adult	BdZ
Cyclura cornuta *	1.0	16	8	9	w-adult	CAF
Cyclura figginsi *	0.0.4	8	8	16	w-adult	DZ
Cyclura inornata	1.0	5	7	7	w-adult	WMC
Cyclura macleayi caymanensis	0.0.1	8	8	16	w-adult	DZ
Cyclura macleayi lewisi	1.0	5	7	10	w-adult	WMC
Cyclura pinguis	0.1	3	2	14	w-juv.	WMC
Cyclura rileyi nuchalis	1.0	5	7	19	w-juv.	BdZ
Cyclura rileyi ssp.	0.0.1	7	1	4	w-adult	DZ
Deiroptyx vermiculatus	1.0	1	11	9	w-adult	PZ
Dipsosaurus dorsalis	1.1	14	7	5	w-adult	WMC
Iguana delicatissima	0.0.1	4	5	22	w-adult	PZ
Iguana iguana	0.1	12	5	0	w-juv.	WMC
Leiocephalus carinatus	1.0	10	10	14	w-adult	BdZ
Mariguana agassizi	0.0.1	5	2	3	w-adult	LPZ

	Sex	Minimum Known Age (yrs mos days)			Origin	Contributor
Oplurus cyclurus *	0.0.1	9	3	0	w-adult	CiZ
Phrynosoma douglassi	0.0.1	1	0	15	w-adult	PZ
Sauromalus obesus tumidus	0.0.1	5	6	0	w-unk.	ASDM
Sceloporus cyanogenys *	0.0.1	6	8	17	w-adult	DZ
Sceloporus woodi	1.0	1	8	17	w-adult	SAM
Uma notata notata	0.0.1	8	1	5	w-adult	ASDM
Agamidae						
Agama stellio	0.1	2	4	28	w-adult	PZ
Amphibolurus barbatus *	1.0	9	11	8	w-adult	LPZ
Amphibolurus nobbi *	0.1	2	2	10	w-adult	SAM
Chlamydosaurus kingi	0.0.1	6	4	23	w-adult	DZ
Hydrosaurus amoinensis	1.0	3	6	1	w-adult	PZ
Leiolepis belliana	0.1	5	7	22	w-adult	RHW
Physignathus cocincinus *	0.1	2	10	11	w-adult	DZ
Physignathus lesueuri	0.0.1	7	6	27	w-adult	PZ
Chamaelionidae						
Chamaeleo chamaeleon	0.1	1	9	27	w-adult	SAM
Chamaeleo jacksoni	0.1	1	10	0	w-adult	PZ
Chamaeleo melleri	0.1	1	0	14	w-adult	BdZ
Scincidae						
Chalcides ocellatus	0.0.1	3	8	24	w-adult	PZ
Corucia zebrata *	0.1	2	10	16	w-adult	PZ
Egernia bungana	0.0.1	8	7	4	w-adult	LAZ
Egernia cunninghami	0.0.1	10	5	0	w-adult	SLZ
Egernia hosmeri *	0.0.3	3	3	16	w-adult	PZ
Egernia major	0.0.1	10	9	26	w-adult	LPZ
Eumeces algeriensis *	0.0.1	9	0	5	w-adult	DZ
Eumeces laticeps	0.1	7	8	22	w-adult	AMNH
Eumeces obsoletus	0.0.1	6	2	19	w-adult	ASDM
Eumeces schneideri *	1.0	9	3	0	w-adult	LAZ
Lygosoma casuarinae	0.0.1	5	3	20	w-adult	PZ
Ophiomorus tridactylus	0.0.1	5	10	17	w-adult	CZ

	Sex	Minimum Known Age (yrs mos days)			Origin	Contributor
Riopa fernandi	0.0.1	1	6	16	w-adult	PZ
Tiliqua scincoides	0.1	9	0	5	w-adult	PZ
Trachydosaurus rugosus	0.0.1	14	6	8	w-adult	CZ
Cordylidae						
Cordylus giganteus	0.0.1	5	3	0	w-unk.	PZ
Cordylus polyzonus *	0.0.1	9	1	21	w-adult	BdZ
Cordylus warreni *	0.0.1	4	4	21	w-adult	PZ
Gerrhosaurus major *	0.1	11	1	4	w-adult	CZ
Gerrhosaurus nigrolineatus auritus	0.0.1	8	3	5	w-adult	CZ
Gerrhosaurus validus *	0.0.2	4	0	9	w-adult	PZ
Platysaurus guttatus *	1.0	10	4	19	w-adult	CZ
Platysaurus intermedius subniger *	0.1	3	1	26	w-adult	PZ
Zonosaurs laticaudatus *	0.0.1	8	0	28	w-adult	CZ
Lacertidae						
Lacerta lepida lepida	0.0.1	5	3	29	w-adult	PZ
Teiidae						
Ameiva ameiva	1.0	2	9	22	w-adult	PZ
Cnemidophorus neomexicanus	0.1	3	2	12	w-adult	SAM
Dracaena guianensis	0.1	9	3	28	w-adult	LAZ
Tupinambis nigropunctatus	1.0	11	11	10	w-adult	PZ
Tupinambis rufescens	1.0	10	7	27	w-adult	PZ
Tupinambis teguixin	0.0.1	7	7	11	w-adult	PZ
Anguidae						
Anguis fragilis	0.0.1	8	3	28	w-adult	PZ
Gerrhonotus liocephalus infernalis	0.0.1	3	6	15	w-adult	PZ
Gerrhonotus multicarinatus	0.0.1	5	2	12	w-adult	LPZ
Ophisaurus apodus *	0.0.2	17	0	10	w-adult	LPZ
Ophisaurus koellikeri	0.0 1	9	4	23	w-adult	PZ
Ophisaurus ventralis	0.0.1	3	9	5	w-adult	PZ

	Sex	Minimum Known Age (yrs mos days)			Origin	Contributor
Helodermatidae						
Heloderma horridum alvarezi *	1.0	27	4	11	w-adult	IHN
Heloderma horridum horridum *	0.1	20	2	3	w-adult	KCJ
Heloderma horridum ssp. *	0.1	22	10	0	w-unk.	PitZ
Heloderma suspectum suspectum	1.0	16	5	1	w-juv.	PZ
Heloderma suspectum ssp. *	0.0.1	27	10	0	w-unk.	LRZ
Varanidae						
Varanus acanthurus brachyurus *	0.1	10	0	26	w-adult	DZ
Varanus bengalensis	0.0.1	10	0	0	w-unk.	SIZ
Varanus flavescens	1.0	4	6	5	w-adult	PZ
Varanus giganteus *	0.0.1	5	11	13	w-adult	DZ
Varanus gouldi *	0.0.1	7	10	0	w-adult	DZ
Varanus griseus	1.0	4	6	5	w-adult	PZ
Varanus komodoensis	0.1	8	11	12	w-adult	NZP
Varanus mertensi *	0.0.1	6	7	9	w-adult	DZ
Varanus mitchelli *	0.0.1	6	7	9	w-adult	DZ
Varanus niloticus	0.0.1	6	7	8	w-juv.	PZ
Varanus salvator	1.0	12	4	5	w-adult	SDZ
Varanus spenceri	0.0.1	4	3	1	w-adult	LAZ
Varanus timorensis *	0.0.1	6	10	9	w-adult	DZ
Varanus tristis *	0.0.1	8	3	20	w-adult	CiZ
Varanus varius *	1.0	9	6	25	w-adult	PZ
Lanthanotidae						
Lanthanotus borneensis *	0.0.1	6	11	3	w-unk.	NYZS
Amphisbaenidae						
Amphisbaena alba *	0.1	13	4	14	w-adult	FWZ
Bipes biporus	0.0.1	3	3	6	w-adult	ASDM
Boidae						
Acrantophis madagascariensis	1.0	8	7	24	w-adult	PZ
Aspidites melanocephalus *	0.0.1	7	2	4	w-adult	CZ
Boa constrictor amarali *	0.0.1	15	7	16	w-adult	ENF
Boa constrictor constrictor * 2	0.1	38	10	0	w-adult	ESS

2 - Specimen at PZ since 3 December 1970

	Sex	Minimum Age (yrs	Known Age mos	Age days)	Origin	Contributor
Boa constrictor imperator *	0.1	29	1	1	cb	PZ
Boa constrictor ortoni	1.0	11	11	20	w-adult	CZ
Candoia aspera *	0.1	5	11	25	w-adult	LAZ
Charina bottae bottae	0.0.1	11	5	0	w-unk.	MG
Chondropython viridis *	0.2	15	1	0	w-adult	BdZ
Corallus annulatus	0.0.1	12	4	4	w-adult	PZ
Corallus caninus	0.1	15	5	27	w-adult	SLZ
Corallus enydris cooki	0.1	14	3	0	w-adult	SDZ
Corallus enydris enydris	0.0.1	10	4	0	w-adult	SLZ
Epicrates angulifer	0.1	22	7	0	w-unk.	SDZ
Epicrates cenchria cenchria	0.0.1	21	5	7	w-adult	PZ
Epicrates cenchria crassus	0.1	16	11	0	cb	SIZ
Epicrates cenchria maurus	0.0.1	27	4	0	w-unk.	NYZS
Epicrates inornatus fordi	1.0	7	6	10	w-adult	LAZ
Epicrates striatus fosteri	0.1	10	11	4	w-adult	FWZ
Epicrates striatus ssp.	1.0	22	1	0	w-adult	PZ
Epicrates subflavus *	0.0.1	9	10	0	w-adult	FWZ
Eryx colubrinus *	0.0.1	10	5	7	w-adult	CZ
Eryx conicus *	0.1	14	5	14	w-adult	PZ
Eryx jaculus *	0.1	18	4	2	w-adult	SIZ
Eryx johni	0.0.1	19	6	19	w-adult	SDZ
Eryx tataricus	0.0.1	8	4	4	w-adult	LAZ
Eunectes barbouri	0.1	13	11	8	w-adult	PZ
Eunectes deschauenseei	0.1	13	9	26	w-adult	PZ
Eunectes murinus	0.0.1	28	0	0	w-unk.	NZP
Liasis amethystinus kinghorni *	0.0.1	10	11	12	w-adult	CZ
Liasis childreni *	0.0.1	9	10	9	w-adult	CZ
Liasis fuscus fuscus	0.0.1	10	2	0	w-adult	CAF
Liasis fuscus ssp. *	0.1	18	8	27	w-juv.	CAF
Liasis mackloti mackloti *	0.0.1	6	3	0	w-adult	CZ
Lichanura trivirgata roseofusca	0.0.1	18	7	0	w-unk.	PM
Loxocemus bicolor *	1.0	32	10	1	w-adult	PZ
Morelia argus argus	0.1	9	4	16	w-adult	SDZ
Morelia argus variegata *	1.0	12	9	26	w-adult	SDZ

	Sex	Minimum Known Age (yrs mos days)			Origin	Contributor
Python curtus curtus	0.1	27	9	16	w-adult	SDZ
Python molurus bivittatus	0.1	28	3	9	cb	SDZ
Python molurus molurus	1.0	34	2	11	w-adult	ESS
Python regius *	1.0	30	6	5	w-adult	PZ
Python reticulatus	1.0	25	4	14	w-adult	SLZ
Python sebae	0.1	27	4	20	w-unk.	SDZ
Sanzinia madagascariensis *	0.0.1	8	0	28	w-adult	CZ
Tropidophis canus curtus	1.0	4	0	0	w-adult	JKB
Tropidophis caymanensis parkeri *	0.0.1	8	8	16	w-adult	DZ
Ungaliophis continentalis	0.0.1	17	8	0	w-unk.	GOW
Xenopeltidae						
Xenopeltis concolor *	0.0.1	9	4	29	w-adult	CZ
Acrochordidae						
Acrochordus javanicus	0.0.1	5	9	25	w-adult	CZ
Colubridae						
Ahaetulla tristis	0.1	4	3	8	w-adult	LPZ
Alsophis portoricensis	0.0.1	2	0	20	w-adult	PZ
Arizona elegans noctivaga *	0.0.1	12	2	24	w-adult	PxZ
Arizona elegans occidentalis	1.0	10	1	1	w-adult	SDZ
Boaedon fuliginosus	0.1	7	0	16	w-adult	LAZ
Boiga blandingi	0.1	8	10	17	w-adult	CZ
Boiga cynodon *	1.0	9	1	15	w-adult	LAZ
Boiga dendrophila	0.0.1	13	0	1	w-juv.	CZ
Boiga irregularis	1.0	9	3	24	w-adult	LAZ
Boiga trigonata	0.0.1	8	2	19	w-adult	LAZ
Chilomeniscus cinctus	0.0.1	4	0	0	w-adult	ASDM
Chrysopelea ornata	0.0.1	4	4	18	w-adult	PZ
Clelia clelia	1.0	11	6	22	w-adult	PZ
Conophis vittatus vittatus	0.0.1	2	1	15	w-adult	PZ
Crotaphopeltis hotamboeia	0.1	2	4	25	w-adult	PZ
Cyclagras gigas	0.1	16	10	2	w-adult	PZ

	Sex	Minimum Age (yrs	Known Age mos	Age days)	Origin	Contributor
Dasypeltis atra *	0.1	5	2	3	w-adult	MLS
Dasypeltis medici *	0.1	4	0	9	w-adult	BdZ
Dasypeltis scaber	0.0.1	13	7	2	cb	SDZ
Dinodon rufozonatum	0.1	13	8	27	w-adult	PZ
Dispholidus typhus	1.0	8	8	25	w-adult	BdZ
Dryadophis bifossatus	0.0.1	4	2	4	w-adult	LAZ
Drymarchon corais corais	0.0.1	5	1	0	w-adult	CZ
Drymarchon corais couperi	0.0.1	25	11	0	w-unk.	JGM
Drymarchon corais melanurus	0.1	9	0	1	w-adult	PZ
Drymarchon corais rubidus	0.0.1	11	7	10	w-juv.	KCJ
Drymobius margaritiferus margaritiferus	0.1	4	4	17	w-adult	PZ
Dryophis nasuta	1.0	6	9	28	w-adult.	BdZ
Elaphe climacophora *	1.0	12	0	17	w-juv.	SLZ
Elaphe flavirufa	0.0.1	7	9	25	w-adult	PZ
Elaphe guttata emoryi	0.0.1	21	1	25	w-adult	TZ
Elaphe guttata guttata	0.0.1	21	9	0	w-adult	PZ
Elaphe guttata rosacea	0.0.1	15	1	18	w-adult	BZ
Elaphe longissima	0.0.1	3	2	16	w-adult	PZ
Elaphe obsoleta bairdi * 3	0.0.1	9	5	2	w-adult	DM
Elaphe obsoleta lindheimeri	0.0.1	7	0	12	w-adult	LP
Elaphe obsoleta obsoleta *	0.0.1	20	1	23	cb	LP
Elaphe obsoleta quadrivittata	1.0	17	1	16	w-unk.	SDZ
Elaphe obsoleta spiloides	0.0.1	13	11	0	w-unk.	RMS
Elaphe oxycephala	0.1	5	5	17	w-adult	LAZ
Elaphe quadrivirgata *	0.1	16	9	29	w-adult	RHW
Elaphe quatuorlineata	0.0.1	5	2	7	w-adult	PZ
Elaphe subocularis	0.0.1	13	9	26	w-adult	SIZ
Elaphe taeniura	0.0.1	9	8	21	w-adult	PZ
Elaphe triaspis intermedia	0.1	9	6	19	w-adult	ASDM
Elaphe vulpina gloydi	0.1	7	5	18	w-adult	LAZ
Enhydris chinensis	0.1	4	2	25	w-adult	PZ
Farancia abacura reinwardti	0.1	18	0	10	w-adult	PZ
Helicops schistosus	0.0.1	12	3	17	w-adult	PZ
Heterodon nasicus kennerlyi	0.0.1	9	2	7	w-adult	LP
Heterodon nasicus nasicus *	1.0	8	2	16	w-adult	PZ
Heterodon platyrhinos *	1.0	4	0	29	w-adult	PZ

3 - Specimen kept at DZ

	Sex	Minimum Known Age (yrs mos days)			Origin	Contributor
Hypsiglena torquata texana	0.0.1	9	3	0	w-adult	LPZ
Lampropeltis calligaster calligaster	0.1	11	0	0	w-adult	SIZ
Lampropeltis getulus californiae	1.0	14	8	12	w-unk	SDZ
Lampropeltis getulus floridana	1.0	12	0	16	w-unk.	SDZ
Lampropeltis getulus getulus	1.0	21	5	2	w-adult	JBZ
Lampropeltis getulus holbrooki	1.0	14	5	22	w-adult	SLZ
Lampropeltis getulus niger	1.0	13	5	17	w-adult	FWZ
Lampropeltis getulus nigritus *	1.0	11	1	25	w-juv.	LP
Lampropeltis getulus splendida	0.1	12	10	29	w-juv.	AMNH
Lampropeltis getulus yumensis *	0.0.1	23	3	0	w-juv.	WHW
Lampropeltis pyromelana infralabialis	0.0.1	4	5	10	w-adult	TBZ
Lampropeltis pyromelana pyromelana *	0.1	15	4	26	w-adult	PitZ
Lampropeltis pyromelana woodini *	1.0	9	3	0	w-adult	LAZ
Lampropeltis triangulum amaura	0.0.1	20	7	0	w-unk.	GPM
Lampropeltis triangulum annulata *	0.0.1	20	2	0	w-adult	DH
Lampropeltis triangulum elapsoides	0.1	13	0	17	w-adult	PZ
Lampropeltis triangulum nelsoni *	1.0	13	1	0	w-adult	ASDM
Lampropeltis triangulum polyzona	0.1	14	1	8	w-adult	PZ
Lampropeltis triangulum syspila	0.1	10	0	19	w-adult	SLZ
Lampropeltis triangulum triangulum	0.1	21	4	14	w-adult	PZ
Lampropeltis zonata multicincta *	1.0	16	4	0	w-adult	PitZ
Lampropeltis zonata multifasciata	0.0.1	13	5	20	w-unk	SDZ
Lampropeltis zonata parvirubra *	0.0.1	11	11	25	w-adult	SA
Lampropeltis zonata zonata *	1.0	21	2	0	w-adult	PitZ
Leptodeira annulata	0.0.1	3	5	26	w-adult	PZ
Leptodeira septentrionalis polysticta	0.1	10	11	26	w-adult	BZ
Leptophis mexicanus	0.0.1	7	8	5	w-adult	LPZ
Lioheterodon madagascariensis *	1.0	9	0	24	w-adult	LAZ
Liophis anomalus	0.0.1	4	10	17	w-adult	PZ
Masticophis flagellum flagellum	1.0	16	7	21	w-juv.	PitZ
Masticophis flagellum flavigularis	0.0.1	13	5	13	w-unk.	SDZ
Masticophis flagellum piceus	1.0	12	1	26	w-unk.	SDZ
Masticophis flagellum testaceus	0.0.1	8	3	0	w-adult	LP
Masticophis striolatis *	0.0.1	9	3	0	w-adult	LAZ

	Sex	Minimum Age (yrs	Known Age mos	Age days)	Origin	Contributor
Mehelya capensis	0.0.1	10	11	0	w-adult	NZP
Natrix erythrogaster erythrogaster	0.0.1	8	10	2	w-adult	PZ
Natrix erythrogaster transversa	0.0.1	4	2	22	w-adult	PZ
Natrix piscator	0.0.1	7	10	24	w-adult	PZ
Natrix septemvittata *	1.0	19	3	17	w-adult	RZ
Natrix sipedon sipedon *	0.0.1	7	4	7	w-adult	ENF
Natrix tessellata	0.0.1	2	4	4	w-adult	LAZ
Natrix tigrina tigrina	0.0.1	3	1	3	w-adult	PZ
Oxybelis aeneus	0.0.1	5	0	0	w-adult	SLZ
Pituophis melanoleucus affinis	0.1	15	0	0	w-adult	SIZ
Pituophis melanoleucus annectens	1.0	20	5	18	cb	SDZ
Pituophis melanoleucus catenifer	0.0.1	11	0	0	w-adult	SDZ
Pituophis melanoleucus deserticola	0.1	15	10	16	w-juv.	RHW
Pituophis melanoleucus melanoleucus	0.1	20	9	2	cb	SDZ
Pituophis melanoleucus mugitus	0.0.1	13	0	0	w-adult	BdZ
Pituophis melanoleucus sayi	0.0.1	22	5	1	w-adult	RMM
Psammophis subtaeniatus	0.0.1	5	10	0	w-adult	LAZ
Pseudaspis cana	1.0	8	4	16	w-juv.	FWZ
Ptyas mucosus	1.0	11	1	3	w-adult	FWZ
Rhamphiophis oxyrhynchus	1.0	13	4	0	w-adult	SLZ
Rhinocheilus lecontei lecontei	0.1	18	3	7	w-unk.	SDZ
Rhinocheilus lecontei tessellatus*	1.0	16	5	2	w-adult	SIZ
Salvadora hexalepis hexalepis	1.0	14	3	20	w-adult	SDZ
Salvadora mexicana	0.0.1	6	3	24	w-adult	LAZ
Sphalerosophis diadema *	0.1	9	7	11	w-adult	CZ
Spilotes pullatus	0.1	13	7	5	w-adult	SDZ
Storeria occipitomaculata occipitomaculata	0.0.1	2	2	0	w-adult	PZ
Telescopus semiannulatus	0.0.1	7	7	27	w-adult	CZ
Thamnophis butleri	0.0.1	2	0	3	w-adult	PZ
Thamnophis couchi hammondi	0.0.1	7	8	23	w-adult	LAZ
Thamnophis cyrtopsis ocellata *	1.0	6	0	16	w-adult	PZ
Thamnophis elegans	0.0.1	6	1	4	w-adult	LAZ
Thamnophis marcianus *	0.1	7	2	5	w-adult	LAZ
Thamnophis proximus proximus	0.0.1	3	7	1	w-adult	PZ

	Sex	Minimum Age (yrs	Known mos	days)	Origin	Contributor
Thamnophis radix haydeni	1.0	3	7	19	w-adult	PZ
Thamnophis sauritus sauritus	0.0.1	3	11	29	w-adult	PZ
Thamnophis sirtalis sirtalis	0.0.1	10	0	0	w-unk.	BF
Thrasops jacksoni	0.0.1	5	9	27	w-adult	LAZ
Tretanorhinus variabilis lewisi *	0.1	4	4	11	w-adult	SAM
Trimorphodon fasciolata	0.0.1	4	10	11	w-adult	LAZ
Trimorphodon lambda	0.0.1	5	3	0	w-unk.	ASDM
Trimorphodon vandenburghi	0.0.1	6	0	9	w-adult	JEG
Uromacer oxyrhynchus *	1.1	12	1	27	w-adult	PZ
Elapidae						
Acanthophis antarcticus antarcticus *	1.1	7	2	4	cb	CZ
Acanthophis antarcticus laevis *	1.0	6	2	28	w-adult	CZ
Acanthophis antarcticus pyrrhus	0.0.1	3	5	23	w-adult	CZ
Acanthophis antarcticus rugosus *	0.1	6	2	28	w-adult	CZ
Aspidelaps scutatus	0.0.1	11	1	8	w-adult	CZ
Bungarus caeruleus	0.0.1	10	6	1	w-adult	SLZ
Bungarus fasciatus * 4	0.0.1	11	6	1	w-adult	SLZ
Bungarus multicinctus	1.0	9	5	0	w-adult	PZ
Demansia textilis *	1.0	9	4	4	w-adult	LAZ
Dendroaspis angusticeps *	0.1	14	4	7	w-adult	FWZ
Dendroaspis jamesoni	0.0.1	9	4	25	w-adult	CZ
Dendroaspis polylepis *	0.1	10	1	1	w-adult	CZ
Dendroaspis viridis	0.0.1	12	6	6	w-adult	SIZ
Elapsoidea sundevalli *	0.0.1	8	7	17	w-adult	LAZ
Hemachatus haemachatus	0.0.1	11	9	0	w-unk.	BdZ
Micrurus affinis affinis	0.1	4	5	29	w-adult	PZ
Micrurus fulvius *	0.0.1	6	10	29	w-adult	BdZ
Naja haje *	1.0	9	2	23	w-adult	LAZ
Naja melanoleuca	0.1	29	1	11	w-unk.	SDZ
Naja naja atra	0.0.1	11	8	18	w-adult	PZ
Naja naja kaouthia	0.0.1	12	10	19	w-juv.	CZ
Naja naja naja	1.0	17	3	5	cb	SDZ

4 - Not the same specimen as listed by Shaw 1968.

	Sex	Minimum Known Age (yrs mos days)			Origin	Contributor
Naja naja samarensis	0.0.1	11	5	0	w-adult	CAF
Naja naja sputatrix	0.0 1	13	6	0	w-adult	CAF
Naja naja ssp. *	0.1	23	11	1	w-adult	NZP
Naja nigricollis mossambica *	1.0	13	0	0	w-adult	CZ
Naja nigricollis ssp.	0.0.1	22	1	0	w-unk.	BdZ
Naja nivea	0.0.1	23	7	29	w-adult	LP
Notechis scutatus	1.0	14	1	0	w-unk.	SDZ
Ophiophagus hannah	1.0	17	1	24	w-adult	LPZ
Pseudechis australis	0.0.1	11	1	0	w-adult	CAF
Pseudechis porphyriacus	0.0.1	5	1	10	w-juv.	CZ
Walterinnesia aegyptia	1.0	6	8	29	w-adult	LAZ
Hydrophidae						
Pelamis platurus	0.1	2	1	7	w-adult	BdZ
Viperidae						
Agkistrodon acutus	1.0	7	6	24	w-adult	LAZ
Agkistrodon bilineatus bilineatus	0.0.1	24	4	19	w-unk.	IHN
Agkistrodon contortrix contortrix *	1.0	14	6	29	w-adult	LP
Agkistrodon contortrix laticinctus	1.0	21	6	9	w-unk.	SDZ
Agkistrodon contortrix mokasen	0.1	29	10	6	w-adult	ESS
Agkistrodon contortrix pictigaster *	1.0	20	5	3	w-adult	PZ
Agkistrodon halys blomhoffi	0.1	6	2	3	w-adult	LAZ
Agkistrodon halys brevicaudus	1.0	12	6	5	w-unk.	SDZ
Agkistrodon hypnale *	0.0.1	7	4	26	cb	LAZ
Agkistrodon piscivorus conanti	0.0.1	15	8	7	cb	LP
Agkistrodon piscivorus leucostoma	1.0	16	6	4	w-juv.	SLZ
Agkistrodon piscivorus piscivorus	1.0	13	1	24	w-adult	NCSM
Agkistrodon piscivorus ssp.	0.0.1	18	11	0	w-unk.	RMS
Agkistrodon rhodostoma	0.1	5	9	25	w-adult	JZ
Atheris squamigera	0.0.1	4	6	3	w-adult	CZ
Atractaspis bibroni *	0.0.1	8	11	19	w-adult	BdZ
Bitis arietans arietans	1.0	15	10	7	w-unk.	SDZ

	Sex	Minimum Age (yrs	Known Age mos	days)	Origin	Contributor
Bitis caudalis	0.0.1	5	3	18	w-adult	LAZ
Bitis gabonica gabonica	1.0	10	9	17	w-adult	SDZ
Bitis gabonica rhinoceros	0.1	13	3	10	cb	PZ
Bitis nasicornis	0.1	8	3	4	w-adult	CZ
Bothrops atrox asper	0.0.1	20	2	17	w-unk.	IHN
Bothrops atrox atrox	0.0.1	8	6	11	w-adult	CZ
Bothrops godmani	0.0.1	7	5	29	w-adult	CZ
Bothrops jararaca	0.0.1	6	6	12	w-adult	CZ
Bothrops lansbergi	0.0.1	3	8	1	w-adult	CZ
Bothrops melanurus	0.0.1	4	0	23	w-adult	LP
Bothrops nasutus	0.0.1	6	6	26	w-adult	CZ
Bothrops nummifer nummifer *	0.0.1	19	1	0	w-unk.	IHN
Bothrops ophryomegas	0.0.1	5	2	15	w-adult	CZ
Bothrops picadoi	0.1	3	6	26	w-adult	LAZ
Bothrops schlegeli schlegeli	0.0.1	16	7	3	w-unk.	IHN
Cerastes cerastes	0.1	17	0	21	w-unk.	SDZ
Cerastes vipera	0.0.1	6	0	27	w-adult	BdZ
Crotalus adamanteus	0.0.1	22	9	3	w-juv.	LP
Crotalus atrox	0.1	25	10	27	w-juv.	CSW
Crotalus basiliscus basiliscus	0.1	12	10	24	w-adult	CZ
Crotalus catalinensis	0.1	10	3	22	w-adult	SDZ
Crotalus cerastes cerastes *	1.0	8	1	11	w-adult	LP
Crotalus cerastes cercobombus	1.0	10	8	21	w-juv.	LP
Crotalus cerastes laterorepens	0.0.1	13	9	0	w-unk.	JFC
Crotalus durissus durissus	0.0.1	12	0	0	w-unk.	SLZ
Crotalus durissus terrificus	0.0.1	13	5	19	w-unk.	SDZ
Crotalus enyo enyo	0.0.1	17	1	13	w-unk.	SDZ
Crotalus horridus *	1.0	30	2	1	w-adult	FJR
Crotalus lepidus klauberi *	0.0.1	23	3	24	w-adult	WHW
Crotalus lepidus lepidus	0.0.1	17	11	10	w-adult	SIZ
Crotalus lepidus maculosus *	1.0	7	2	3	w-adult	LP
Crotalus mitchelli pyrrhus *	0.1	15	6	1	w-juv.	CAF
Crotalus mitchelli stephensi *	0.1	12	5	23	w-unk.	SLZ
Crotalus molossus molossus	1.0	15	6	14	w-adult	CZ

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Crotalus molossus nigrescens *	0.0.1	11	2	0	w-adult	LP
Crotalus polystictus *	1.0	5	8	12	w-adult	LP
Crotalus pricei miquihuanus *	1.0	5	1	17	w-adult	LP
Crotalus pricei pricei *	1.1	3	6	0	w-adult	SIZ
Crotalus pusillus	0.0.1	5	8	17	w-adult	LP
Crotalus ruber ruber	1.0	14	5	17	cb	SDZ
Crotalus scutulatus scutulatus	0.1	13	0	19	w-juv.	ASDM
Crotalus tigris	1.0	15	3	3	w-adult	SIZ
Crotalus tortugensis	1.0	18	3	21	w-unk	SDZ
Crotalus triseriatus triseriatus	0.1	7	0	13	w-adult	LP
Crotalus unicolor	0.0.1	14	10	0	w-unk.	SDZ
Crotalus viridis cerberus	0.0.1	12	5	4	w-adult	PxZ
Crotalus viridis helleri	1.0	19	5	4	w-juv.	SDZ
Crotalus viridis lutosus *	1.0	17	1	9	w-juv.	RHW
Crotalus viridis nuntius *	1.0	6	2	6	w-juv.	LP
Crotalus viridis oreganus	0.0.1	11	0	11	w-adult	CiZ
Crotalus viridis viridis	1.0	19	3	10	w-unk.	SDZ
Crotalus willardi willardi *	0.1	21	3	24	w-juv.	CRH
Echis carinatus	0.1	11	10	15	w-adult	NYZS
Echis coloratus *	0.1	11	10	16	w-juv.	CZ
Eristocophis macmahoni *	1.0	9	4	11	w-adult	LAZ
Lachesis muta stenophrys *	0.0.1	8	6	1	w-adult	AZ
Sistrurus catenatus catenatus	0.1	9	11	28	w-adult	SIZ
Sistrurus catenatus tergeminus	0.0.1	12	10	6	w-adult	SIZ
Sistrurus catenatus ssp.	0.0.1	14	0	0	w-unk.	TC
Sistrurus miliarius barbouri	1.0	15	1	28	w-adult	SIZ
Sistrurus miliarius miliarius	0.0.1	7	2	19	w-adult	BmZ
Sistrurus milarius streckeri	0.0.1	6	7	13	w-juv.	LP
Sistrurus ravus	1.0	10	0	14	w-unk.	SDZ
Trimeresurus albolabris *	0.1	9	4	29	cb	CZ
Trimeresurus elegans	0.0.1	10	3	0	w-unk.	NZP
Trimeresurus flavoviridis flavoviridis*	0.0.1	8	11	0	w-adult	DZ
Trimeresurus gramineus	0.0.1	6	2	19	w-adult	CZ
Trimeresurus monticola	1.0	3	11	3	w-adult	PZ

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Trimeresurus okinavensis	0.0.1	10	9	21	w-adult	NYZS
Trimeresurus popeorum	0.0.1	6	8	25	w-adult	CZ
Trimeresurus purpureomaculatus *	0.0.1	8	11	0	w-adult	DZ
Trimeresurus stejnegeri	0.0.1	7	0	0	w-adult	CZ
Trimeresurus trigonocephalus *	0.0.1	5	2	26	w-adult	DZ
Trimeresurus wagleri	0.1	5	9	11	w-adult	CZ
Vipera ammodytes ammodytes *	2.0	9	4	19	w-adult	LAZ
Vipera ammodytes montandoni	0.0.1	8	9	12	w-adult	CZ
Vipera ammodytes ssp.	0.0.1	7	1	21	w-adult	CZ
Vipera aspis	1.0	7	10	3	w-adult	LAZ
Vipera latasti	0.1	5	6	16	w-adult	LAZ
Vipera lebetina obtusa *	1.0	10	1	16	w-adult	BdZ
Vipera lebetina schweizeri	0.0.1	11	3	28	w-adult	CZ
Vipera lebetina turanica	0.0.1	5	1	17	w-adult	CZ
Vipera lebetina ssp.	0.0.1	11	4	24	w-unk.	SDZ
Vipera russelli russelli *	0.0.1	13	3	28	cb	CZ
Vipera russelli ssp.	1.0	11	7	20	cb	SDZ
Vipera xanthina palaestinae *	1.0	10	1	26	w-adult	CZ
Vipera xanthina raddei *	1.0	6	1	19	w-adult	NYZS
Sphenodontidae						
Sphenodon punctatus *	1.0	7	0	14	w-adult	CAF
Alligatoridae						
Alligator mississippiensis *	0.0.1	47	10	0	w-unk.	RA
Alligator sinensis *	1.1	38	1	3	w-unk	NZP
Caiman crocodilus	0.0.1	21	11	1	w-unk.	SLZ
Caiman latirostris	0.1	22	0	29	w-unk	PZ
Melanosuchus niger *	1.0	13	1	14	w-juv.	SLZ
Paleosuchus palpebrosus	0.1	2	5	9	w-unk.	PZ
Paleosuchus trigonatus *	0.0.1	16	4	22	w-juv.	DtZ

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Crocodylidae						
Crocodylus acutus *	0.1	32	11	21	w-adult	IHN
Crocodylus cataphractus *	1.0	42	5	0	w-juv.	SLZ
Crocodylus intermedius *	1.0	17	4	6	w-adult	LPZ
Crocodylus moreleti *	0.1	25	5	20	w-adult	IHN
Crocodylus niloticus *	1.0	18	5	0	w-adult	CAF
Crocodylus palustris *	0.0.1	28	5	4	w-juv.	PZ
Crocodylus porosus	1.0	41	8	20	w-adult	NZP
Crocodylus rhombifer *	1.1	18	3	4	w-juv.	CAF
Osteolaemus tetraspis *	0.1	42	2	23	w-adult	NZP
Tomistoma schlegeli	0.1	14	4	28	w-adult	PZ
Gavialidae						
Gavialis gangeticus	0.1	27	9	10	w-adult	NYZS