

Instant Ocean®

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Advancing the Hobby of the Marine Aquarist

Audubon Sea Turtle Response Efforts

Sarah Burnette, Audubon Nature Institute

Audubon Nature Institute in New Orleans is actively engaged in saving wildlife affected by the Deepwater Horizon oil spill in the Gulf of Mexico.

The Louisiana Marine Mammal and Sea Turtle Rescue Program (LMMSTRP), coordinated by Audubon Aquarium since 1993, is the primary responder for the rescue, rehabilitation, and release of all marine mammals (dolphins, whales and manatees) and sea turtles along the Louisiana coast. As such, Audubon Aquarium and LMMSTRP have been named by NOAA as the primary responders for the state of Louisiana during the Gulf oil spill. Audubon Aquatics Center rehabilitates all the oil-affected sea turtles and marine mammals rescued off the coast of Louisiana. Audubon Aquatics Center, a facility of Audubon Nature Institute, is the largest turtle triage facility along the Gulf Coast.

To date, almost 200 oiled sea turtles have been cared for by Audubon Nature Institute staff.

On August 18, 2010 a significant milestone was reached when turtles nursed back to health by Audubon Nature Institute were released back into their native Gulf of Mexico habitat by Audubon and NOAA officials.

While the ongoing care of the turtles yet to be released is an unprecedented challenge, it is also an unusual opportunity for scientists to learn more about how turtles are affected by and recover from the effects of oil. Audubon is working closely with many other organizations

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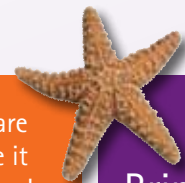


A juvenile Loggerhead sea turtle awaits care by Audubon Nature Institute veterinarians.

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including Louisiana Department of Wildlife and Fisheries, NOAA, and the U.S. Coast Guard to monitor the situation and respond to stranded and injured marine wildlife.

Weather permitting, boats are dispatched regularly to scour the Louisiana coast for turtles in trouble. Sometimes the boats come back empty. More often, though, the boats recover anywhere from a few to more than a dozen turtles from the oily water.

Once ashore, the turtles are rushed to Audubon Aquatics Center, a secure,

performs a quick external examination of the animal. They look for any secondary injuries such as lacerations, bite marks, body condition issues, etc. The vet also looks at the turtle's eyes to see if there are any ulcers present, which can be caused by the oil. They draw a small amount of blood which is analyzed in a matter of minutes. After this initial exam, as the vet is waiting for blood results, the turtle is sent off for a bath to remove the oil. This bath, or "spa treatment," usually lasts 10-15 minutes. The turtle is coated with a very thin layer of vegetable oil and

As the days go on, the turtles continue to be handfed and provided with supportive care. Every day includes careful monitoring to ensure the turtles remain healthy and strong.

While the future for the turtles is uncertain due to evolving conditions in the Gulf of Mexico, what remains strong is Audubon Nature Institute's commitment to caring for these incredible creatures. Regardless of environmental conditions, the team of experts at Audubon Aquatics Center is dedicated to making a difference in helping endangered sea turtles survive.



This juvenile Kemp's Ridley sea turtle is among the most numerous patients that Audubon Nature Institute has been caring for during the BP Deepwater Horizon oil spill. To date, Audubon Nature Institute has provided care to almost 200 oil-affected sea turtles and two dolphins.

private facility located on the campus of Audubon Center for Research of Endangered Species on the outskirts of New Orleans. There, a team of biologists, veterinary care professionals and trained volunteers stands by to triage the turtles.

The majority of turtles received at Audubon Aquatics Center are Kemp's Ridley, followed in numbers by the Green, Loggerhead and just a few Hawksbill sea turtles, representing four out of the five species of sea turtle found in the Gulf of Mexico. The Kemp's Ridley sea turtle is the number one most critically endangered sea turtle species.

The intake process for every sea turtle includes receiving an identification tag and number, along with being photographed, weighed and measured. After this first step, a veterinarian

then scrubbed with Dawn dish soap and a toothbrush. A toothbrush works the best on the tiny turtles because it really allows the wash team to get into all the crevices and wrinkles of the turtle. After the bath is over, the turtle returns to the vet. By now the vet has the preliminary blood work and can determine if the animal needs additional supportive care beyond normal protocol. The vets clean the eyes, mouth and esophagus with a mixture of mayonnaise and cod liver oil. This mixture helps bind and break down the oil. Then the vets administer fluids, vitamins, antibiotics and any other treatments the individual turtle needs. The very last thing the vet will perform on the turtle is to tube feed the mayonnaise/cod liver oil mixture. This helps bind to any oil the turtle may have ingested. The turtles are then put in individual pools for the night to rest.

Long after the well is capped and the media attention has turned to other stories, Audubon Nature Institute experts will be immersed in marine mammal and sea turtle rescue and rehabilitation.

LMMSTRP's efforts are made possible by a federal grant, Audubon Nature Institute operations, and the financial support of concerned individuals around the country.

To learn more, please visit:
AudubonInstitute.org/gulf-oil-spill-resources



**Audubon Aquarium
of the Americas**
A Facility of Audubon Nature Institute

MACNA XXII, 2010

On September 4, 2010, Instant Ocean and Marineland were the Gold Banquet Sponsors of the Marine Aquarium Conference of North America (MACNA) in Orlando, Florida. The sponsorship included hosting the Saturday evening banquet held at the Marriott Resort and Convention Hotel.

MACNA (www.MACNA2010.com) is the largest and oldest marine aquarium conference held in the United States and Canada. Throughout the conference, aquarium enthusiasts and avid reef keepers have the opportunity to meet and mingle with peers and professionals and learn from leading researchers in the fields of aquaculture, marine biology, diving and oceanography.

Further, in the aftermath of the largest oil spill in U.S. history, Instant Ocean has partnered with Georgia Aquarium in Atlanta, Georgia and Audubon Aquarium of the Americas in New Orleans, Louisiana and was pleased to support each facility's work as they help to rescue and rehabilitate marine life in the Gulf. Through the sponsorship with MACNA, Instant Ocean inserted informational flyers into attendee gift bags in an effort to raise awareness for marine life in the Gulf. The flyers highlighted the rescue and rehabilitation work of the two aquariums and gave details on how attendees could help.

To donate to either Georgia Aquarium or Audubon Nature Institute please visit: www.georgiaaquarium.org/supportus/adopt.aspx or www.auduboninstitute.org/oil-spill-rescue-fund

A CONTINUING SERIES

Marine Fish Nutrition

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Visit www.instantocean.com to read the earlier issues of this newsletter.

OUTLINE

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The popularity of marine aquariums is increasing, as improvements in technology make it easier for us to provide the right conditions to keep fish and invertebrates healthy. A key element of this progress involves our understanding of marine fish nutrition and the increased amount of research into the production of suitable dry diets. This echoes the early days of the freshwater hobby some 55 years ago or so, where the move from live foods to dry diets made aquarium ownership accessible to a wide audience.

Natural feeding strategies

As with freshwater fish, reef fish are a diverse group of species, employing a variety of strategies to gain the nutrients and energy they need for growth, health, and reproduction. For clarity, they are often divided into herbivores (eating plants), omnivores (eating plants and animals), or carnivores (eating animals). Many reef fish consume a range of small animals and algae, but some species represent some of the most specialist herbivores known in the fish world. For example, some surgeonfish have a range of microorganisms living inside their digestive system, which help them to digest and gain nutrition from the toughest parts of the algae they consume. However, inevitably even these herbivores will take in some

animal matter on the algae they consume, and some closely related species may include animals as a main part of the diet, so the distinctions can become confusing.

Natural feeding behavior has several implications for keeping marine fish in captivity. For example, many fish that include algae in their diet (including some species of Damselfish, Parrotfish, Blennies, and Surgeonfish) tenaciously defend patches of algae from other fish. Equally, fish that prey on corals (e.g., Angelfish and Butterfly Fish), or other prized invertebrates should be avoided if you want a peaceful reef aquarium. As with freshwater fish, there are also larger predators (e.g., Moray Eels, Lionfish, Groupers) that cannot be kept with smaller fish and invertebrates such as crabs and shrimp.

The physical way in which fish feed is also important. Some marine fish will feed in midwater on plankton, others will browse over rocks looking for algae and small animals, and some sift through the substrate. Fish will be more reluctant to move out of their preferred zone to feed, especially to start with, so you will need to offer them a food that "behaves" in the right way (i.e., floating, slow-sinking, or fast-sinking). Timid or nocturnal feeders also have to be catered to, as they may miss out at feeding

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time. It may be best not to mix them with more active fish, or alternatively ensure there is a wide range of natural and artificial food available for them to feed on, at the time they want it.

Natural feeding behavior and physiology is a means to gaining the nutrients and energy the fish needs to remain healthy. Whatever the natural diet consists of, and however they get hold of it, fish generally all need the same nutrients (i.e., proteins, oils, vitamins, etc). Herbivores have evolved ways to extract and convert these nutrients from algae, whereas carnivores get them from animal prey. Because the latter is more nutrient and energy dense, carnivores generally spend less time feeding, whereas some herbivores may graze for much of their time. In captivity, many fish are very flexible in their dietary requirements, which is one reason why they can be kept successfully. For example, many herbivores will adapt to discrete meals of a more nutrient-rich food than they would eat in the wild. This allows us to select from a wide range of potential foods that are readily available to us from aquatic stores. Provided they are digestible by the fish, and deliver the right balance of nutrients they need, there is fortunately no need to precisely replicate their natural diet. The few species that are not good at adapting should ideally not be kept except by experienced aquarists, and this comes down to doing some research before you buy a fish. You'll save a lot of headaches by ensuring the feeding behavior of any new fish is compatible with the existing stock, and that you can properly cater to it.

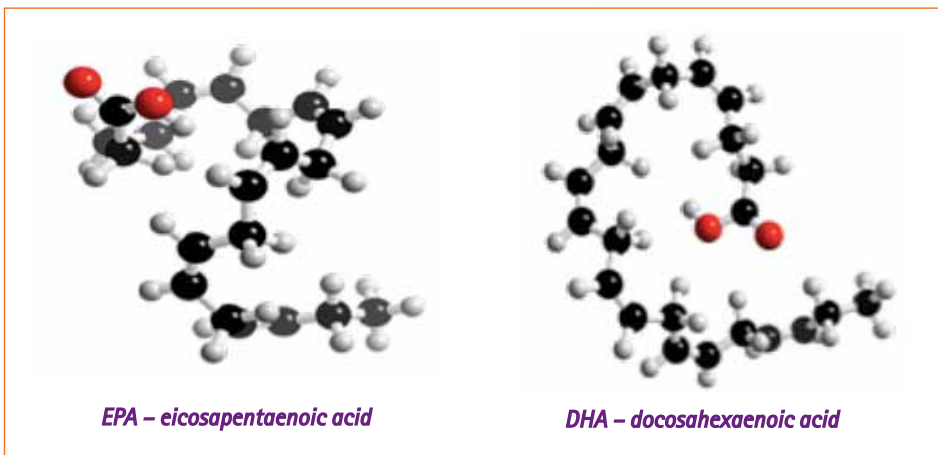
Marine vs. freshwater nutrition

Many of the nutritional requirements of marine fish are similar to freshwater species. However, there are some key differences worth noting:

Acceptability

One of the major challenges in keeping marine fish, and in developing dry diets for them, is the tendency for some to be very fussy eaters. Even though it's possible to provide the nutrient and energy requirements of most fish in a flake or

pellet, if they simply won't consume it then it's of little value. This may derive from the fish in question having a very specialized natural diet, or because many marine fish are wild-caught and aren't as accustomed to dry foods as many of their farmed freshwater cousins. Acceptability is therefore a key issue in developing artificial diets for marine fish, and advances have certainly been made in recent years, with more and more fishkeepers reporting the successful use of such foods. Improvements in the types of natural attractants used, texture,



and appearance of dry foods have all helped in this area. However, inevitably for those fussier eaters, the use of frozen, fresh, or live foods will remain important for the time being. If you want a marine aquarium that's simple to feed, then avoid these species and stick to those that will readily eat a good quality dry food.

Waste production

Levels of nitrogen and phosphorus (as nitrate and phosphate) are extremely low on coral reefs, and in higher quantities they will harm some invertebrates and reduce the overall quality of the water. In fact, better technology for controlling these is one reason why reef aquarium keeping is easier now than it once was. Importantly, the main source of these pollutants is the food fed to the fish. Nitrogen is a key constituent of protein, and phosphorus is an essential nutrient for fish. Although it's important whatever fish you are keeping, for a marine aquarium it is essential that you

use a good quality food. A well-formulated and manufactured product will produce less waste because of its higher availability, leading to a slower build-up of nitrate and phosphate. This makes it easier to maintain the conditions needed for healthy fish and invertebrates.

Specific nutrient requirements

Marine fish differ slightly from freshwater species in terms of some of the nutrients they require. The most well-known difference is in the type and quantity of

essential fatty acids (EFAs) needed in their diet. These are present in the oils that fish derive from the plants or animals they eat. In the marine ecosystem (from algae on upwards), there is a higher presence of highly unsaturated fatty acids (HUFAs). In particular, highly unsaturated omega-3 fatty acids are important. These have found fame as beneficial ingredients in human foods, for example, and play a critical role in cell membrane structure, the nervous system, stress response, and energy production. Freshwater fish do use them, and they can certainly add benefits to the diets available for them. However, they also have the ability to produce them from certain fatty acids more commonly found in their environment. Many marine fish do not have this ability, so they are essential components of the diet. In particular, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are the key HUFAs required. Any diet used for marine fish should contain these in their correct proportions.

PUBLICATION INFORMATION

SeaScope® was created to present short, informative articles of interest to marine aquarists. Topics may include water chemistry, nutrition, mariculture, system design, ecology, behavior, and fish health. Article contributions are welcomed. They should deal with pertinent topics and are subject to editorial reviews that in our opinion are necessary. Payments will be made at existing rates and will cover all author's rights to the material submitted.

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