Johnston Atoll National Wildlife Refuge
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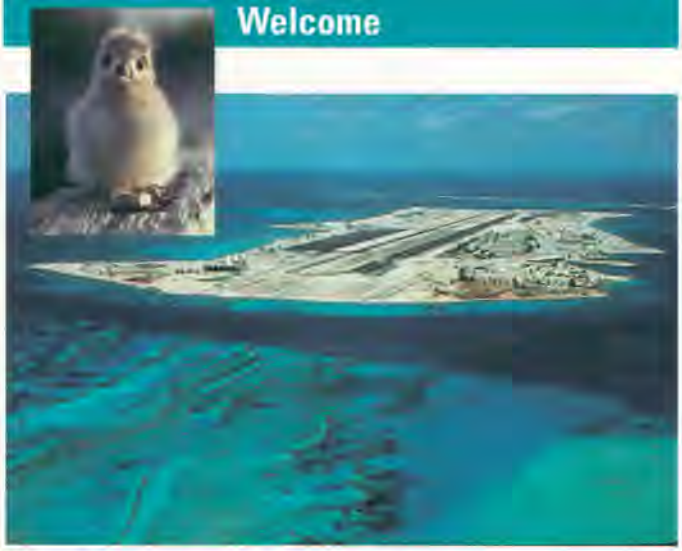
Johnston Atoll
National Wildlife Refuge

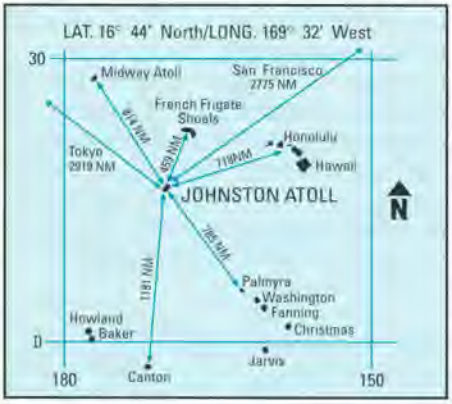
As the only shallow water and dry land area in hundreds of thousands of square miles of ocean, Johnston Atoll is an oasis for reef and bird life.

Welcome



White Tern chick (top photo)

Johnston Atoll (16° 44' N, 169° 32' W), one of the most isolated atolls in the world, is located in the central Pacific Ocean, between the Hawaiian Islands and the Marshall Islands. The atoll is 718 nautical miles southwest of Honolulu and 459 nautical miles south of the nearest point of land, French Frigate Shoals in the Northwest Hawaiian Islands.



Johnston Atoll is part of the National Wildlife Refuge System, which includes more than 500 national wildlife refuges - more than 93 million acres in all. These lands are uniquely different than other public lands, for they have been set aside first and foremost for the benefit of wildlife. We encourage you to visit other refuges throughout the Nation to experience the beauty of a tallgrass prairie, the grace of a sandhill crane in flight, the frenzy of a tern colony or the myriad of nature's other wonders!

Sooty Terns on North Island (left)
Yellow Tangs (inset)

Spotted Eagle Ray

The formation of Johnston Atoll began about 70 million years ago, when repeated submarine volcanic eruptions built up layer upon layer of basaltic lava from the floor of the ocean to its surface. Over millions of years, the island slowly eroded and subsided. As the island sank beneath the surface of the ocean, corals around its fringes continued to grow. Today, Johnston Atoll is a broad, shallow (depths of less than 100 feet) platform of about 50 square miles with four islands – Johnston, Sand, North, and East – and a marginal, emergent reef only on its northwest side.

In contrast to shallow coral reefs rich in marine life, the upper layer of the open ocean surrounding atolls is a biological desert. In these warm tropical waters, few nutrients rise to the surface and thus microscopic plant life at the base of the food chain is sparse. The presence of an atoll causes prevailing ocean currents (the westward-flowing North Equatorial Current at Johnston Atoll) to be diverted and the resultant turbulence brings rich life-sustaining nutrients to the surface.

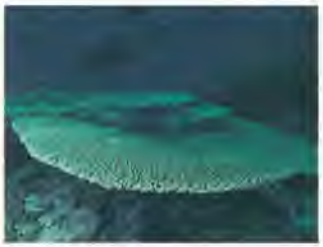


Table coral

Johnston Atoll (originally consisting of two islands) was discovered accidentally on September 2, 1796, by Captain Joseph Pierpont, when his ship, the American brig Sally, ran aground. It was not until December 14, 1807, however, when the crew of the frigate HMS Cornwallis sighted the atoll, that the larger of the two islands was named after that ship's captain, Charles J. Johnston.

Johnston Atoll was one of 30 central Pacific islands claimed by the United States under the Guano Act of 1856. This act granted Americans the privilege of removing guano (the accumulation of seabird excrement) for use as a rich fertilizer.

In 1923, scientists from the Bishop Museum, Honolulu, joined in a scientific expedition to Johnston Atoll. Based on their findings, President Calvin Coolidge issued Executive Order 4467 in 1926, which designated Johnston Island and nearby Sand Island as a federal bird refuge. In 1934, by Executive Order 6935, President Franklin D. Roosevelt placed the atoll under U.S. Navy control, but the atoll also retained its status as a refuge.

History

Gray reef shark

In 1936, the Navy began the first of many changes to the atoll. By 1964, dredge and fill operations had increased the size of Johnston Island to 596 acres from its original 46 acres, also increased Sand Island from 10 to 22 acres, and added two new islands, North (Akau) and East (Hikina) of 25 and 18 acres.

Today, Johnston Atoll is an unincorporated territory of the United States. Guidance for management is provided to the Department of the Interior and the Department of Defense by a "Memorandum of Understanding." Despite their different missions, these two agencies have cooperatively managed this atoll to meet the needs of both wildlife and people. Headquarters Pacific Air Forces manages the infrastructure and the military mission on Johnston Island, while the U.S. Fish and Wildlife Service has full responsibility for managing natural resources on all four islands and the surrounding coral reef environment.

Female gray reef sharks gather in large numbers each spring near Sand Island for unknown reasons

In July 1990, the Johnston Atoll Chemical Agent Disposal System (JACADS) became an operational prototype plant for the incineration of chemical munitions. It was designed to comply with all Federal environmental laws and regulations to ensure that its activities do not harm the atoll's environment. In addition, the Department of Defense funds independent environmental studies, marine research, and other projects that benefit the wildlife management goals of the Refuge.

Atoll Ecology

As the only shallow water and emergent land in hundreds of thousands of square miles of surrounding ocean, Johnston Atoll is an oasis for reef and bird life. Corals and coralline algae are responsible for the existence of the atoll. Although corals are true animals, many species often contain microscopic, symbiotic algae (zooxanthellae) within their tissues. These algae capture the sun's energy as plants on land do and, through the process of photosynthesis, provide their coral hosts with organic carbon as a source of food. There are 33 known species of coral at Johnston Atoll; most of these species contain zooxanthellae. The most conspicuous species is the large table coral (*Acropora cytherea*), which may form colonies up to 10 feet in diameter.

Achilles Tangs

Slightly more than 300 species of fish have been recorded from the reefs and nearshore waters of Johnston Atoll, considerably fewer than the number found in the Hawaiian Islands or Marshall Islands. This is most likely the result of the atoll's isolation, small size, and lack of diverse habitat. One species of angelfish is endemic to Johnston Atoll (i.e., found only there). Most of the fish are edible, but some may contain a poison (ciguatoxin) within their tissues. Ciguatoxin is produced by a microscopic alga similar to those that cause "red tides." The alga is consumed by herbivorous reef fish grazing the bottom and causes these fish no harm, but the toxin can be concentrated in predatory fish, higher up the food chain, when they feed on the grazers. Humans can get very sick from ciguatera poisoning by eating fish that have accumulated large amounts of this toxin.

Endangered Species

Three species of marine animals found at Johnston Atoll are protected under the Endangered Species Act: the Green Sea Turtle (*Chelonia mydas*), the Hawaiian Monk Seal (*Monachus schauinslandi*), and the Humpback Whale (*Megaptera novaeangliae*).

Green Sea Turtles are reptiles that spend their entire lives at sea except for brief visits ashore to deposit their eggs in holes dug in the sand above the high tide line. The hatchlings will easily fit in one's hand but the adults can weigh as much as 300 to 400 pounds and may take 30 to 40 years to reach reproductive maturity. Green Sea Turtles are highly vulnerable to human predation and disturbance in some parts of the world. Many turtles at Johnston Atoll have been tagged by researchers seeking to understand migration routes and estimate growth, reproduction, and mortality. The tag recovery of a nesting female at French Frigate Shoals and subsequent satellite tracking research indicate that at least some of the Johnston Atoll population nests there.

Green Sea Turtle

Endangered Species

Hawaiian Monk Seal with pup

Hawaiian Monk Seals, found mainly in the Northwest Hawaiian Islands, occasionally visit Johnston Atoll. Their population has declined sharply in this century, at least partly because of killing by humans, competition with fisheries, and disturbance at breeding colonies. Monk seals feed on fish, octopus, crustaceans, and squid and, though capable of spending long periods at sea, often haul out on sandy beaches to bask in the sun. Because overly aggressive male seals sometimes kill females and pups, nine potentially destructive males were translocated to Johnston Atoll from the Northwest Hawaiian Islands in 1984 and two more were brought here in 1998.

Humpback Whales can be seen around Johnston Atoll during the winter months. Humpback Whales observed here are probably from the eastern north Pacific population, which migrates from Hawaii and Mexico to Alaska and California. This population is estimated at about 2,000 animals. Humpback Whales often travel alone or in small groups at speeds up to 20 miles per hour.

Hawaiian Monk Seal

Seabirds

White Tern

Seabirds are the most conspicuous form of wildlife on Johnston Atoll. These birds obtain their food from the ocean; they possess webbed feet and have beaks adapted for feeding on fish and squid. They also have salt glands that allow them to drink salt water and excrete the excess salt. Many species have long, narrow wings that are efficient for nearly effortless gliding and soaring flight. Seabirds are among the longest-lived birds in the world; life spans in excess of 30 years are common for some species. Compared to many other birds, most seabirds produce fewer young over their lifetime, and the young generally take longer to mature – up to seven years for some species. Many seabirds mate for life, and both males and females incubate, brood, and feed their young.

Seabirds evolved on islands where natural predators were absent and thus they lack a well developed fear of people or predators. Long life-spans and the ease with which chicks and adults can be captured for banding and marking make them ideal subjects for long-term scientific studies. Seabirds serve as useful monitors of marine ecosystems because their numbers and movements can quickly reflect changes in these environments.

Red-tailed Tropicbird

Brown Booby

These species belong to a highly distinctive group of marine birds that are readily identified by their hooked bills and also by their nostrils, which are sheathed in horny tubes arising near the base of the bill, hence the name "tubenoses." Each member of this group lays a single egg. The plumage of some species often has a characteristic musty odor, which may help them to locate nest sites or to identify mates. The results of some studies suggest that olfaction may play an important role in nest site location and in finding food; large and highly developed olfactory lobes provide further evidence for the importance of the sense of smell in these birds.

Bulwer's Petrel

Bulwer's Petrels (*Bulweria bulwerii*) are the smallest of the tubenoses occurring at Johnston Atoll. They are sooty-brown in color with lighter bars on the upper wings, a short wedge-shaped tail, and black legs and feet. Between April and September, approximately 60 to 70 pairs of this small seabird nest in the rocky crevices along the causeway on Sand Island.

Christmas Shearwater

Christmas Shearwaters (*Puffinus nativitatis*) have a short, rounded tail; their plumage, legs, and feet are dark. Most nest on Sand Island under tufts of grass or in already existing burrows of the Wedge-tailed Shearwater; a few breed on North Island.

Shearwaters and Petrels

Wedge-tailed Shearwaters

Wedge-tailed Shearwaters (*Puffinus pacificus*) are the larger of the two local shearwater species and have a distinctly wedge-shaped tail and flesh-colored legs and feet. They use their bills and feet to dig burrows; these are re-excavated and renovated before each breeding season. The eastern portion of Sand Island remains in its original, natural state and 3,000 to 4,000 of these birds nest there. A few dozen pairs also nest on Johnston and East Islands. Their unique moaning calls at night can give the colonies an eerie character.

Wedge-tailed Shearwater chick

Tropicbirds, Frigatebirds, and Boobies

These are medium-sized to large birds, distantly related to the pelicans. All have webbing between all four toes, instead of three as in most other seabirds. Tropicbirds and frigatebirds move awkwardly on the ground because of their short, weak legs. Except for tropicbirds, the chicks hatch naked and blind. Boobies and tropicbirds feed by plunging from heights into the ocean, while frigatebirds pick their prey from the surface, scarcely getting their plumage wet.

Great Frigatebird

White-tailed Tropicbird

White-tailed Tropicbirds (*Phaethon lepturus*) are similar in appearance to the Red-tailed Tropicbird except that the two elongated tail feathers are white; also, these birds are smaller and more streamlined. The upper wing edges and the eyes are lined with black, and the bill is yellow. White-tailed Tropicbirds are relatively rare at Johnston Atoll. Elsewhere, they typically nest in cavities in trees or on cliffs, but here the few known nests have been on the ground under shrubs or trees. A single egg is laid.

Red-tailed Tropicbirds (*Phaethon rubricauda*) are mainly white, but their plumage is often suffused with pale pink; they have two long, thin, red tail feathers. The bill is bright red, and a black stripe extends in front of and behind the eyes. The single egg is typically laid under vegetation because shade is required at the nest site. Immature birds have black bars over the back and upper wing surfaces. Several thousand birds return to the atoll each year, primarily during the winter months. They nest on all islands of the atoll, though most of the birds breed on Johnston Island. They are quite tolerant of human activity.

Red-tailed Tropicbird

Tropicbirds, Frigatebirds, and Boobies

Brown Booby

Brown Boobies (*Sula leucogaster*) have a deep chocolate brown coloring on the back and upper wing surfaces, which is sharply delineated from the white chest and underwings. This species nests mostly on Sand and East islands, but a few pairs have recently started nesting on North Island. They build a cuplike nest of dried vegetation on the ground and lay two eggs. Usually, however, only one chick is reared successfully because the older chick typically evicts its younger and weaker sibling from the nest.

Red-footed Boobies (*Sula sula*) occur in five different color forms on Johnston Atoll; some are predominantly white, others mostly brown. Regardless of coloration, the legs and feet are an unmistakable bright red and the beak is light blue. Unlike the other two booby species found here, Red-footed Boobies lay only one egg and prefer to nest on bushes and some trees, but will nest on the ground. They nest on the three outer islands.

Red-footed Boobies

Tropicbirds, Frigatebirds, and Boobies

Masked Booby and chick

Masked Boobies (*Sula dactylatra*) are the largest of the local booby species. They are all white except for a small black face mask, and black trailing edges on the wings; the bill is yellow. Their bright golden eyes are distinctive. The nest is a small, shallow scrape on bare ground. As with the Brown Booby, they lay two eggs, but raise only one chick because one is evicted by its sibling. They nest only on East Island.

Great Frigatebird chicks

Great Frigatebirds (*Fregata minor*) have the longest wingspan of any seabird on Johnston Atoll – more than seven feet. They have a forked tail and a hooked bill. Adult males possess a bright red throat pouch, which is inflated during courtship displays in the breeding season. Among the most efficient of soarers and aerobatic flyers, they glide on the wind or thermal updrafts, and often harass other seabirds to steal their catch. Their active predatory habits extend to the nesting grounds, where they take unattended eggs and chicks of even their own species. Frigatebirds nest on Sand and North Islands.

Great Frigatebird

Terns and Noddies

Terns are small to medium-sized birds with narrow, graceful wings and thin, sharp bills. They feed by plunging or snatching prey from the surface of the water. Like many seabirds, their primary food-feeding strategy is to locate schools of small fish that have been driven to the surface by the feeding activities of larger fish. Tern chicks hatch with their eyes open and are covered with down. The common name "noddy" comes from the stereotyped head-nodding courtship displays between adults.

Sooty Tern

Sooty Terns (*Sterna fuscata*) have long, narrow wings and a forked tail; they are black on top and white on their breast and belly. They nest in large, dense colonies and each lays a single egg on the ground. This is Johnston Atoll's most abundant bird; an estimated 150,000 pairs may breed on the three outer islands. They have a harsh, screeching call and, when in breeding colonies, a brash, somewhat assertive personality, readily walking or flying up to intruders. On Johnston Atoll, they normally lay eggs from December through February, but breeding activity can be unpredictable, especially during El Niño years. Though they spend 90 percent of their adult lives at sea, they almost never sit on the water, making them one of the most aerial of all species.

Gray-backed Tern

Gray-backed Terns (*Sterna lunata*) are smaller than Sooty Terns but similar in general appearance. The upper surfaces are gray instead of black, and the white blaze over the face and eyes extends well behind the eyes. As many as 500 pairs breed on North Island during the summer. A single egg is laid on the ground in colonies that are much less dense than those of Sooty Terns.

White Tern

White Terns (*Gygis alba*) are unmistakable with their pure white plumage and black bill (blue at the base). Their habit of fluttering curiously over visitors assures that their presence will be noticed; the wings and tail often appear translucent when the bird is directly overhead. No nest is built; a single egg is laid directly on a tree branch, ledge, or any suitable surface. The introduction of trees to Johnston Island has greatly increased the available nesting habitat for this species. Only a few pairs nest on the outer islands.

Brown Noddy

Brown Noddies (*Anous stolidus*) or Common Noddies are dark brown birds with an indistinct gray-white forehead and crown; the legs, feet, and bill are black. Several thousand nest on the three outer islands, making this the second most numerous species breeding at Johnston Atoll. A single egg is laid in a nest on the ground.

Wildlife Regulations

The Commanding Officer at Johnston Atoll has prescribed regulations concerning wildlife that reflect and support Federal laws and National Wildlife Refuge regulations. It is prohibited for any person to take the eggs of any bird or to harass, willfully disturb, hunt, trap, capture, or kill any bird or any species designated as threatened (Green Sea Turtles) or endangered (Hawaiian Monk Seals and Humpback Whales). Entry to Sand, North, and East Islands is controlled because of the presence of seabird colonies. Other regulations govern fishing activities and export of marine life from Johnston Atoll.

Terns and Noddies

Black Noddy

Black Noddies (*Anous minutus*), also known as White-capped or Hawaiian Noddies, are smaller and darker than the Brown Noddy. The white on the forehead and crown is more distinct and extends farther back than on the Brown Noddy. Black Noddies are common on Johnston Island; they build their relatively elaborate nests in trees and lay a single egg. None nest on the outer islands.

Blue-gray Noddy

Blue-gray Noddies (*Procelsterna cerulea*) are the smallest of the noddies found on Johnston Atoll. Their bluish-gray back and soft white underside give them a delicate, porcelain-like appearance. This species has only rarely been seen nesting on the atoll; the first nesting record was in 1986. It nests on the ground under bushes, usually on Sand or North Island.

Migrant Birds and Waterfowl

Migrant birds occurring at Johnston Atoll include species that breed in the arctic and subarctic, and migrate to the south and central Pacific for the winter. These include shorebirds that arrive regularly and occasional waterfowl. Many other species of shorebirds, ducks, egrets, hawks, and owls have reached Johnston Atoll as stragglers.

Every winter several species of ducks (and occasionally geese) will find Johnston Atoll on their migratory journeys. Johnston Atoll must be a welcome rest for some, but many of the arrivals are too weak to depart. Their survival is unlikely because the atoll lacks appropriate waterfowl habitat.

Shorebirds

Shorebirds are commonly seen on Johnston Atoll during their wintering season, arriving here in August and September and departing in April and May. These birds breed in the far north and make remarkable transoceanic migrations to reach their tropical wintering grounds. On Johnston Atoll these birds are most often found (sometimes in mixed flocks) feeding or resting in grassy or gravelly areas although some are found along the shoreline. Some may stop to rest and feed before flying farther south, others spend the winter here, while still others may remain on Johnston Atoll through the following summer season.

Pacific Golden-Plover in breeding plumage

Pacific Golden-Plovers (*Pluvialis fulva*) are the most abundant shorebirds at Johnston Atoll. Wintering birds are drab, but golden flecks on a brownish back and long grayish black legs make them easy to recognize. Some individuals defend winter territories and can be seen in the same place (often on a lawn) day after day; others are non-territorial and occur in flocks of varying sizes. Prior to spring migration, males (and to a lesser extent females) become very colorful with a prominent black face, throat, and belly, and a white stripe over the eye and down the neck. Their breeding range extends across the tundras of Siberia to western Alaska. Birds at Johnston Atoll are probably from the Alaska breeding grounds.

Pacific Golden-Plover in nonbreeding plumage

Shorebirds

Bristle-thighed Curlew

Bristle-thighed Curlews (*Numenius tahitiensis*) are the largest shorebirds that winter on Johnston Atoll. They have a conspicuous down-curved beak, brownish body, rust-colored tail with brown bars across it, and a light stripe over the eye. Their distinctive whistled call is usually repeated several times in succession. They breed on the tundra in western Alaska. This curlew is relatively rare and Johnston Atoll is one of the few inhabited islands where the species can be viewed.

Ruddy Turnstone

Ruddy Turnstones (*Arenaria interpres*) are small shorebirds with a distinctive calico-like pattern of black, white, and chestnut plumage and short, orange legs. They show a conspicuous pattern of dark and white on the upper surfaces when in flight. Their migratory pattern is believed to be directly southward from the arctic to the atoll in the fall, but the northward spring migration is via the western Pacific along the Asian coast. Their breeding range is circumpolar on arctic tundras.

Wandering Tattler

Wandering Tattlers (*Heteroscelus incanus*) are solitary birds usually seen along the shoreline. They are slate-gray above, light gray below, have yellow legs, and a long, straight beak. When in their breeding plumage, the light underparts show fine bars of dark gray. The wintering population on Johnston Atoll is quite small. They breed in Alaska.