



Session No./Title: 70. Wildlife and Sport Fish Restoration Program in the Pacific
Date/Time: 17 October 2012/8:30AM – 12:20 PM
Location: Oregon Convention Center A107-109

Organizers: Fred Caslick, Ph.D. (503-231-6257; fred_caslick@fws.gov)
U.S. Fish and Wildlife Service, Pacific Region
Wildlife and Sport Fish Restoration Program
911 NE 11th Ave., Portland, OR 97232
and
Ruth C.B. Utzurrum, Ph.D. (808-792-9571; ruth_utzurrum@fws.gov)
Wildlife and Sport Fish Restoration Program – Honolulu
300 Ala Moana Blvd. Rm 5-207 (P.O. Box 50167)
Honolulu, HI 96850

Sponsor: U.S. Fish and Wildlife Service, Pacific Region
Wildlife and Sport Fish Restoration Program
911 NE 11th Ave., Portland, OR 97232

The symposium, **Wildlife and Sport Fish Restoration Program in the Pacific**, presents an array of projects on diverse fauna across the tropical and subtropical Pacific that were/are supported in full or in part with funds from the Wildlife and Sport Fish Restoration Program of the U.S. Fish and Wildlife Service. The talks will illustrate approaches to conservation, management, and species recovery in the islands and waters of the Hawaiian Archipelago, the Mariana Islands, and American Samoa, a geographically vast area composed of simple and complex ecosystems, of (nearly) pristine and highly altered environments, and of contemporary and traditional lifestyles. Presentations will demonstrate the links between science and conservation, and, in so doing, celebrate the continuing relevance of the Pittman-Robertson, Dingell-Johnson, and State Wildlife Grant programs in advancing conservation and management of resources in the Pacific Islands for the maintenance of wildlife and sport fish diversity. As the program celebrates the 75th Anniversary of the Pittman-Robertson Act of 1937, the symposium also serves to recognize the significant contributions of the state agency partners towards the success of the Wildlife and Sport Fish Restoration Program.

PRESENTATION ABSTRACTS (in order of presentation; presenter name in bold)

The proposed symposium line-up extends the traditional scope of wildlife to include studies in the marine environment that have conceptual significance to conservation and management approaches in Hawaii and the US Pacific Territories. Included herein are talks that demonstrate the utility of: a) basic inventories and life history studies, where a dearth in information precludes actions for conservation and management of species (*marine mammals and sport fish studies in American Samoa*); b) long-term surveys and monitoring for assessing effectiveness of management actions (*fish communities in MPAs in the Northern Mariana Islands*), as well as predicting population responses to environmental change (*long-term dynamics of bird populations in American Samoa*); c) translocation and reintroduction as tools for pre-empting threats to isolated (single island) populations (*avian translocation in the Northern Mariana Islands*), or for recovery of already endangered species (*establishing populations of a Hawaiian honeycreeper and the Guam rail*); d) connectivity studies among geographically-dispersed populations for management of harvested species (*ulua [trevally] tagging in Hawaii islands and genetic analysis of rabbitfish and unicornfish populations in Micronesia*); and e) movement and habitat use patterns for management of species at both local (*radiotracking of flying foxes in American Samoa*) and regional scales (*photo-identification of marine mammals in American Samoa*).

0830-0850

Flying foxes of American Samoa - a synthesis of population studies for conservation and management: 1998-2007

Ruth B. Utzurrum, Department of Marine and Wildlife Resources, Pago Pago, American Samoa

Pteropus samoensis (Samoan flying fox) and *P. tonganus* (Insular flying fox) are two of three species of mammals indigenous to the islands of American Samoa, an unincorporated territory of the United States in the South Pacific. *Pteropus samoensis* is characterized by a small population size and is largely solitary; *P. tonganus*, on the other hand, is colonial and occurs in significantly larger numbers. Annual monitoring of both species in the main island of Tutuila since the late 1980s showed populations were impacted by hunting, and whose numbers significantly drop following severe hurricanes. However, both species also showed a capacity to recover when afforded full protection through a hunting ban. These longitudinal estimates of numbers serve as baseline indices of the health of the populations of both species. To better understand the conservation needs and management challenges of the two species, we conducted studies on home range and habitat use using radiotelemetry, examined biogeographic structuring using mtDNA analysis, and screened for vector-borne hematozoic infections through microscopic screening of blood smears. We found: 1) *P. samoensis* to have smaller home ranges than *P. tonganus*, but with home ranges that were overlapping among individuals of the same species and between species; 2) greater genetic structuring in *P. samoensis* than in *P. tonganus* across their distribution in the central south Pacific, but equally low nucleotide diversity in both species; and 3) a significantly higher prevalence of the malaria-like protozoan, *Hepatocystis* sp., in *P. samoensis* than in *P. tonganus*. Results from these various studies suggest the need for species-specific approaches to conservation and management, with potentially varying significance at local and regional scales.

0850-0910

Long-term dynamics and hurricane resilience of birds in American Samoa

Joshua Orland Seamon¹, Ruth B. Utzurrum^{1,2}, Ailao Tualualelei¹, Siaifoi Fa'aumu¹, Visa Vaivai³, Roger Meyer¹

¹Department of Marine & Wildlife Resources, Pago Pago, American Samoa;

²US Fish and Wildlife Service, Honolulu, HI,

³National Park Service, Pago Pago, American Samoa

Terrestrial ecosystems in American Samoa are prone to hurricane-induced disturbances, which vary both in intensity and spatial extent. Long-term studies made possible by Pittman-Robertson funds allow resource managers to assess the impacts of these storms on native bird species and the resources upon which they depend. We investigated the spatial and temporal relationships of three components of forest communities on Tutuila, American Samoa: small forest birds, large frugivorous birds, and resource use by the largest avian frugivore.

Our analyses were based on a decade of Distance-derived abundance data on seven native species, augmented by systematically collected foraging observations of Pacific Imperial-pigeons. This time period overlapped the close passage of Hurricane Heta, a category 5 hurricane, in 2004. Its direct impact on forests was spatially variable, but relatively low tree mortality coupled with extensive leaf loss and small branch pruning were its most frequent consequences.

The hurricane had surprisingly little impact on abundances of most common forest bird species, but we did observe post-hurricane shifts in overall community structure. This was attributable in part to a significant increase in the proportion of the community composed of exotic species. Abundances of large frugivorous birds showed pronounced spatial variation in responses to the hurricane, but only one species declined at a majority of sites. Imperial-pigeon foraging exhibited a lagged response, with greater inequality in post-hurricane use among resource species, but this effect was ephemeral.

We infer that terrestrial bird communities in American Samoa are resilient to moderate environmental disturbances. Climatic change that increases the frequency of such low-amplitude disturbances may not cause significant declines in most bird species. However, climatic change that increases the intensity or magnitude of hurricanes may well have a more deleterious impact.

0910-0930

Conservation introduction as a preemptive management strategy for avifauna of the Commonwealth of the Northern Mariana Islands

Paul Radley¹ and Fred Amidon²

¹Division of Fish and Wildlife, Department of Lands and Natural Resources, CNMI

²USFWS Pacific Islands Fish and Wildlife Office, Honolulu, HI

The Commonwealth of the Northern Mariana Islands (CNMI), in cooperation with the U.S. Department of the Interior (DOI), determined that Saipan supports an “incipient” population of the Brown Treesnake. This led to the creation of the Marianas Avifauna Conservation (MAC) Project, a cooperative endeavor between CNMI Division of Fish and Wildlife (DFW), Association of Zoos and Aquariums (AZA), and U.S. Fish and Wildlife Service (USFWS). The goal of the MAC project is to safeguard CNMI’s unique avian species from invasive ones such as the Brown Treesnake via (1) zoo sponsored captive management and propagation programs and (2) a DFW lead Conservation Introduction effort to establish redundant, satellite populations on other islands in the Mariana archipelago that afford safety from the Brown Treesnake. In 2008 DFW undertook its first translocation of 50 Bridled White-eyes from Saipan to Sarigan followed in 2009 by 50 more translocated from Tinian to Sarigan. Point-transect

distance surveys on Sarigan in 2010 yielded 32 detections from 41 stations (mean = 0.78 detections per station; range = 0 – 8) while surveys in 2012 produced 108 detections from 24 stations (mean = 4.5; range = 0 – 9) in 179 ha of forest on the island, representing an 82.7% increase in mean detections between the two years. Abundance and density estimates via Program DISTANCE 6.0 are forthcoming. In 2011 DFW translocated 24 Golden White-eyes from Saipan to Sarigan followed by 50 more and 10 Marianas Fruit Doves in 2012. DFW will continue its ongoing Conservation Introductions efforts in the Northern Marianas using Federal Aid funds into the foreseeable future.

0930-0950

Captive breeding and introduction as a recovery strategy: The Guam rail project

Suzanne J. Medina

Division of Aquatic and Wildlife Resources, Department of Agriculture, Government of Guam

The accidental introduction of the brown treesnake, *Bioga irregularis*, resulted in the loss of nine of the eleven forest birds native to Guam during the 1980's. Emergency measures to prevent the extinction of the endemic Guam rail, *Gallirallus owstoni*, resulted in the collection of as many adults, chicks, and eggs that could be found in the wild (n=21). Following extirpation of the rail in the wild, a captive breeding program was established early in the conservation program and, by 1989, a program to re-establish the species in the wild began on Guam's neighboring island of Rota. The creation of this non-essential experimental population of Guam rails on Rota largely depends on the success of the captive breeding program to supply sufficient amounts of rails to be released. Initially, wild caught rails reproduced without difficulty. However, aggressiveness within pairs and towards eggs and chicks emerged with the captive bred generations and continue today. In 1998, Guam staff began profiling individual birds and was able to categorize behavior issues associated with age and breeding experience. The success of the profiling led to an increase of reproduction at the Guam facility by over 400% which, in turn, resulted in large cohorts of rails released on Rota. Releasing large cohorts allowed for birds to overcome other limiting factors preventing the success of the releases, mainly cat predation and wide-spread dispersal from release sites. Of the ten release sites, the Dugi area remains the most promising, where rails persisted for over four years without cat control or reinforcements. Approximately one-third of released rails were harnessed with radio transmitters to determine sources of mortality, dispersal, home-range size and habitat preference. Annual playback surveys document establishment and population trends. The 2011 survey confirmed at least 120 rails living in the Dugi area.

0950-1010

Establishing a second Maui Parrotbill population: filling knowledge gaps and restoring lost habitat

David L. Leonard¹, Hanna Mounce², Kirsty Swinnerton³, and Dusti Becker⁴

¹Hawaii Division of Forestry and Wildlife and the Pacific Cooperative Studies Unit, HI

²Maui Forest Bird Recovery Project, Olinda, HI

³Island Conservation, Santa Cruz, CA

⁴Life Net, Wilcox, AZ

The endangered Maui Parrotbill (*Pseudonestor xanthophrys*; n ~ 500) is restricted to 40 - 50 km² of high-elevation rainforest on windward east Maui. Their distribution is an artifact of habitat loss and the distribution of avian malaria and occupied habitat is likely suboptimal; storms cause many nests to fail. Historically, parrotbill inhabited drier low-elevation forests, including mesic koa (*Acacia koa*) forest which is likely the species' preferred habitat. Establishing a second population is a high priority recovery action and experimental releases into koa forest on leeward east Maui will begin as soon as possible.

This area supports few mosquitoes and storm frequency and severity is lower compared to windward habitats. Parrotbill are part of a captive breeding program, however, to date production has been low and translocation of wild birds will be necessary to establish a second population. To examine the effects of removing birds from the donor population, reproduction and survival data have been collected. Knowing the distribution of haplotypes of the donor population will facilitate the selection of birds that will minimize founder effects and these data are in the final stages of analyses. To quantify food availability, arthropod data from the species' current range and leeward forest remnants has been collected and are being analyzed. Finally, field tests of feeding stations are underway, which if used, will facilitate the establishment of a second parrotbill population. Fencing and removing ungulates are important first steps in restoring native forests and these efforts are ongoing. Experimental trials to determine the best methods to reestablish mesic koa forest have been initiated and results will guide restoration efforts. This is a multi-partner effort and federal entities and NGOs have contributed significant funding to this long-term effort.

1010-1040 SESSION BREAK

1040-1100

Marine mammals in American Samoa: What we knew then and what we know now

Alden Tagarino¹, Jooke Robbins², and David Mattila³

¹Department of Marine and Wildlife Resources, American Samoa

²Provincetown Center for Coastal Studies

³Hawaiian Islands Humpback Whale National Marine Sanctuary

Historic data on species presence, population estimates, distribution and status of marine mammals in American Samoa are limited. Waters within the limit of the Exclusive Economic Zone (EEZ) of American Samoa (AS) are included in the home range of up to 30 species of cetaceans found in the Pacific. Humpback whales (*Megaptera novaeangliae*) were first documented in the Territory in 1983 and minke whales (*Balaenoptera acutorostrata*) in 1995. A 1999 compilation of earlier studies and whaling records additionally confirmed the presence of six odontocete species: sperm whale (*Physeter macrocephalus*), killer whale (*Orcinus orca*), short finned pilot whale (*Globicephala macrorhynchus*), common bottlenose dolphin (*Tursiops truncatus*), pantropical spotted dolphin (*Stenella attenuata*), and spinner dolphin (*Stenella longirostris*). In 2006, the Department of Marine and Wildlife Resources (DMWR) made cetaceans a priority under its State Wildlife Grant Program. Initial efforts were focused on reviewing and summarizing available information, responding to and collecting information from strandings, participating in annual counts, biopsy sampling, and photo-identification of humpback whales and other cetaceans, and developing local capacity for independent conduct of inventory and monitoring surveys particularly of resident species. To date, cooperative initiatives have contributed to an increasing body of understanding of cetaceans in the region. Among the informational gains are: 1) the addition of Cuviers beaked whale (*Ziphius cavirostris*), false killer whale (*Pseudorca crassidens*), rough toothed dolphins (*Steno bredanensis*), and striped dolphin (*Stenella coeruleoalba*) to the list of documented species in AS waters; and 2) compilation of photo-identifications, acoustics and genetic information on stock structure and migratory patterns of humpback whales in the region. We will summarize this information, recognize the agencies and partnerships instrumental for development of American Samoa's cetacean program, and put into perspective the scope of the effort advancing cetacean conservation in the region.

1100-1120

A case study in integrating of sportsfish population survey and life history data: implications for fisheries management

Domingo Ochavillo¹, Saolotoga Tofaeono¹, Marlowe Sabater¹ and Elizabeth D. L. Trip²

¹ Department of Marine and Wildlife Resources P.O. Box 3730, Pago Pago, American Samoa 96799

² Ecology and Evolution, School of Biological Sciences, University of Auckland, Private Bag 92019, Auckland, New Zealand

We combined size-at-age and underwater survey (UVS) data to investigate the spatio-temporal distribution of life-history stages of the bristletooth surgeonfish, *Ctenochaetus striatus*, around Tutuila Island, American Samoa. Three age-based size categories (recruits, juveniles and adults) were determined by examining the relationship between size, age and gonad maturity. The results from combining size-at-age with UVS density data showed varying densities at the scales examined (years, exposure, sector, and habitat) on the fore-reef slopes of Tutuila Is. While recruit densities were uniform, juvenile densities varied by year, exposure and sector, and adult densities were significantly higher at topographic sites that were comparatively more exposed to water motion than inside bays. Densities of recruits were positively correlated with habitat (rubble) illustrating the importance of this substratum for the survivorship of early life history stages. Densities of adults were positively correlated with coralline algae, which may suggest co-occurrence responding to similar physical environment of adult habitat that is possibly indirectly correlated to feeding. However, densities of juveniles were negatively correlated with food source although the variance accounted for was low. We hypothesize that some other substratum may possibly be important for juveniles. There was a negative correlation between recruit and adult densities, indicating the presence of ontogenetic shifts in habitat with age and size. It is proposed that ecosystem-based fishery management of *C. striatus* in Tutuila Is should consider the high abundance of adults in exposed topographic habitats in the establishment of marine protected areas. We have shown that size-at-age data when combined with underwater fish surveys significantly expands its utility in the study of the population structure of a coral reef fish thus allowing the identification of areas characterized by high abundance of particular life stages for management.

1120-1140

Contrasting patterns of population connectivity for two heavily exploited reef fish in the southern Mariana Islands

Jenny McIlwain¹, Andrew Halford¹, Mark Priest², John Horne³, and Jay Gutierrez⁴

¹University of Guam Marine Laboratory

²Red Sea Research Center, King Abdullah University of Science and Technology, Thawal Saudi Arabia

³James Cook University

⁴Division of Aquatic and Wildlife Resources, Department of Agriculture, Government of Guam

Understanding and quantifying patterns of population-level connectivity is essential for the effective management and conservation of marine ecosystems. While the underlying premise of an MPA is they are a larval source for adjacent fished areas, many are managed with little understanding of the larvae's origin or where they go. The degree of larval exchange between adult habitats is contingent on factors such as oceanographic processes and is increasingly measured using molecular markers. We investigated connectivity patterns of two commercially important coral reef fish, the scribbled rabbitfish (*Siganus spinus*) and the bluespine unicornfish (*Naso unicornis*) using an array of mtDNA and microsatellite markers. Sampling for this study occurred across multiple-spatial scales from >1000 km (west Pacific), to <10 km (within islands of the Mariana Is). For both species separate recruitment events

were sampled to assess the temporal stability of gene flow and levels of self-recruitment. We found contrasting results with respect to large-scale spatial genetic structure. For *Siganus spinus* populations, Bayesian analyses revealed three genetically homogenous clusters: the Southern Mariana Islands, East Micronesia, and the West Pacific. *Naso unicornis*, by contrast, lacked any genetic structure across the Indian and Pacific Oceans. Analyses of temporal samples from Guam showed no genetic differentiation between life-history stages of either species (adults versus recruits), or between separate recruitment events, indicating temporal genetic stability of both populations. At the scale of the Mariana Is we suggest this group of islands is demographically open for *S. spinus* and *N. unicornis* and would benefit from a co-operative management approach that transcends current jurisdictions. For *S. spinus* however, we found four recruits were determined as self-recruiting back to Guam and Saipan. These results suggest limited connectivity of this species with the rest of Micronesia and highlight the potential role of self-recruitment in regulating population dynamics at island-wide spatial scales.

1140-1200

Sport fish resource assessment utilizing a statewide volunteer angler-based tagging program

Annette Waii Tagawa and Clayward K.M. Tam

State of Hawaii, Department of Land & Natural Resources, Division of Aquatic Resources, Honolulu, HI

The involvement of anglers in organized fish tagging programs has been in existence for over 50 years. Valuable data has been gathered through such programs that has contributed toward developing management strategies for fishery resources throughout the world. In Hawaii, the State Department of Land & Natural Resources, Division of Aquatic Resources administers a statewide volunteer angler-based fish tagging known as the Ulua Tagging Project where volunteer anglers are asked to capture, tag and release all marine species known in Hawaii as ulua and papio, also known as jacks, which are classified under the Family Carangidae. Locally, the term “ulua” refers to jacks that are 10 lbs. or more in weight while those under 10 lbs. are referred to as “papio.” These species contribute to and account for the most popular recreational fishery in the entire state. Yet there was little information available regarding the status of these species in Hawaii. Utilizing local fishermen as volunteer taggers has proven to be the most effective arrangement to gather this much needed information. The combined tagging efforts of volunteer anglers produce a large volume of tagged fish information, which provides the critical data needed to assess the ulua and papio resources at minimal cost. In the program’s 12-year existence, volunteers have tagged close to 40,000 fish with close to 5,000 recaptures giving us a 12% recapture rate. Information on growth rates, migration patterns, and habitat have been collected and used to assess the status of current ulua and papio populations. As island populations continue to grow, the increased demand on the ulua and papio resources may jeopardize the supply of these fishery stocks. More information is needed on these species to promote better management strategies to keep up with current and future demands by the islands’ fishing communities.

1200-1220

Fish Reigns...When it Rains: an island perspective to restoring resiliency to coastal fishery and preparing for climate change

Robert T. Nishimoto, Troy E. Shimoda, and Troy S. Sakihara

Division of Aquatic Resources, Department of Land & Natural Resources, State of Hawaii, USA

Many coastal recreational game fish species in Hawaii are diadromous. One example is the circumtropical Gray or Striped Mullet, *Mugil cephalus*. In Hawaii, the juveniles and young adults are common inhabitants of estuaries and coastal habitats. The general decline of many marine coastal fishes prompted the Hawaii Division of Aquatic Resources (DAR) to develop a prototype marine stock

augmentation program (Stock Enhancement of Marine Fishes in Hawaii) in 1990, focusing on this popular recreational mullet fishery in Hilo, Hawaii. Monitoring results of this 10 year program indicated a severe decline of near-shore stocks. These results impelled DAR to identify and address threats to this fishery at a local scale; by implementing more restrictive fishing regulations, planting native riparian vegetation for juvenile habitat, developing population control strategies for the alien Kanda Mullet, *Valamugil engeli*, and identifying and characterizing juvenile Striped Mullet habitats for management consideration. The results are promising and will continue. However, the more imminent threat of global climate change looms, especially sea level rise and freshwater availability on the efficacy of estuaries, which serves as critical juvenile (nursery) habitat.

The 2012 State legislature authorized funding for the Governor's initiative, The Rain Follows the Forest, which seeks to ameliorate the threat to Hawaii's water supply from hotter and drier conditions due to climate change. Protecting the full function of the native forest in the upper watershed is imperative, and the most cost effective and efficient way to ensure capture of rainwater for healthy stream flows and replenish groundwater. In addition, protection of native forest is quintessential to aquatic productivity. This solution is not novel, in fact this perspective has been embodied in two native Hawaiian proverbs (Pukui & Ebert, 1983); "*rain follows the forest*" and "*there is life in the water from the clouds*"- healthy forest, healthy fish.