HONOLULU FIELD STATION

A Quarterly newsletter of the Honolulu Field Station, part of the USGS-National Wildlife Health Center in Madison, WI

Focus: Avian Botulism outbreaks

What: Since the beginning of the year, there have been several avian botulism outbreaks throughout the main Hawaiian Islands. Botulism is a naturally-occurring bacterial toxin in soil that can accumulate in filter-feeding invertebrates. Birds get the disease either by ingesting invertebrates or eating maggots from contaminated dead birds. Affected birds become lethargic, weak, and unable to hold their head up (thus drowning) or die from respiratory arrest.

Who: Most commonly affected birds include Hawaii's endangered coots, ducks, moorhens, stilts, geese, and various migratory waterfowl and shorebirds.

Where: Major outbreaks occurred at the Hanalei National Wildlife Refuge (Kauai) with over 300 sick/dead birds (mainly endangered Koloa ducks), Lanai Sewage Treatment Lagoons (over 60 dead birds mainly endangered coots) and Kanaha Pond State Wildlife Sanctuary (Maui) where 100 birds (mainly endangered stilts) were lost.

When: December through mid-April 2012 for Kauai and Lanai outbreaks, then June for Maui.

How: HFS collaborated with the U.S. Fish and Wildlife Service and the Hawaii Department of Land and Natural Resources to investigate and confirm botulism as a cause of waterfowl mortality. The HFS team necropsied several freshly dead carcasses, and Botulinum type C toxin was confirmed at the National Wildlife Health Center in Madison, Wisconsin. It is estimated that at least 400-500 waterfowl died from the disease most of them endangered species. If botulism is detected early enough, several management measures including draining or flooding wetlands and removing carcasses can help reduce bird losses. To ensure early detection, the HFS and other agencies strongly encourage public and private landowners and managers to frequently survey their wetlands for sick and/or dead birds, remove any dead or dying birds from the wetland, and contact their local state department of fish and wildlife (DOFAW) biologists for guidance on confirming presence of this toxin on their wetlands.

Hawaiian stilt or Ae'o.
Photo credit © Dan Clark

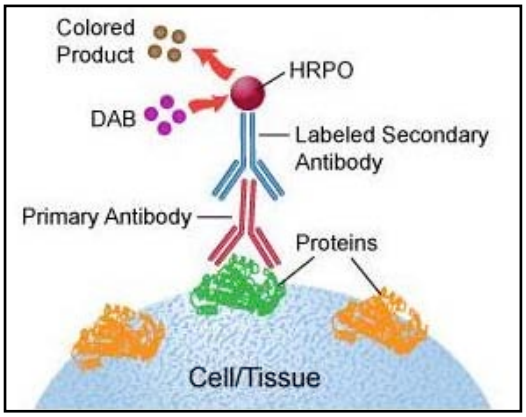
Necropsy Files

Purple-capped fruit dove.
Photo credit © Tavita Togia

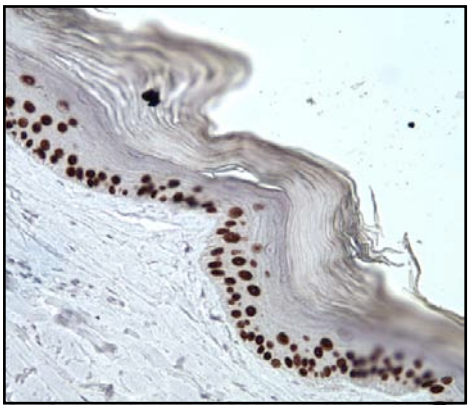
Amongst the many carcasses examined by the HFS, one case involving a purple-capped fruit dove - submitted from American Samoa - was found dead and showed unusual characteristics. Tissues examined under the microscope revealed parasitic massive infection with characteristics similar to *Toxoplasma gondii*. *T. gondii* is transmitted by feral cats and has caused mortality of several endangered species (seals, nene geese, coots, Hawaiian crows) in Hawaii. Pacific islands without feral cats do not have the parasite. Efforts are ongoing to confirm the identity of the parasite. If confirmed, this would be the first time this parasite has killed native wildlife in American Samoa.

Technical corner: Immunohistochemistry

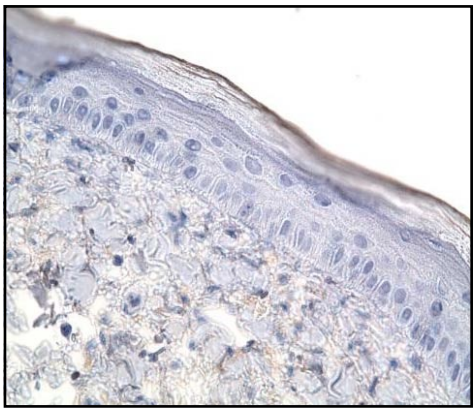
Emphasis is placed on microscopic examination of tissues (histology) to figure out what kills wildlife. However, sometimes routine histology does not allow us to detect particular organisms or cells easily. Immunohistochemistry (IHC) is a technique that uses special molecules called antibodies that attach to particular sites in tissues. These antibodies are coupled to a marker molecule that leads to a brown color change (HRPO-see diagram right). The photomicrograph (top right) shows turtle skin and the brown dots are a special type of skin cell labeled by antibodies. The use of these antibodies allows us to detect these cells that would otherwise not be visible (unstained skin photo lower right). IHC is a very powerful technique that helps us understand how animals respond to infectious organisms at the cellular level, thereby shedding light on exactly how diseases kill wildlife.



Immunohistochemistry.
Photo credit www.leinco.com



Green turtle skin stained with p63 antibody.
Photo credit USGS-HFS



Green turtle skin unstained.
Photo credit USGS-HFS

Recent papers

Below are titles and URL addresses of our most recent papers. Other HFS papers can be found on our website at http://www.nwhc.usgs.gov/hfs/.

- *Candidatus Renichlamydia lutjani*, a Gram-negative bacterium in internal organs of blue-striped snapper Lutjanus kasmira from Hawaii. http://www.ncbi.nlm.nih.gov/pubmed/22535875.
  *Describes a new bacterium found in blue lined snappers in Hawaii.
- Bacterial communities associated with healthy and Acropora white syndrome-affected corals from American Samoa. http://www.ncbi.nlm.nih.gov/pubmed/22283330.
  *Reveals that sick and healthy corals have different bacterial communities in their tissues.
- Infection by *Haemoproteus* parasites in four species of frigatebirds and the description of a new species of *Haemoproteus* (Haemosporida: Haemoproteidae). http://www.ncbi.nlm.nih.gov/pubmed/21992108.
  *Describes a new blood parasite in frigatebirds and its relationship to a similar parasite found in frigatebirds from Hawaii.

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