

# HONOLULU FIELD STATION

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

## The National Wildlife Health Center (NWHC) celebrates 40 years



*National Wildlife Health Center in Wisconsin.*

The NWHC was established in Madison, Wisconsin in 1975 to serve the US and its territories on wildlife health related issues. In the 1980s and 1990s, the NWHC did groundbreaking research on waterfowl diseases like avian botulism, avian cholera, and lead poisoning, the latter of which led to nationwide bans on use of lead shots. Recently, the NWHC has branched out to wildlife health issues of conservation or public health concern such as white nose syndrome in bats, chronic wasting disease of deer, avian influenza, and sylvatic plague. Although times have changed, the NWHC remains committed to national leadership to safeguard wildlife and ecosystem health through dynamic partnerships and exceptional science.



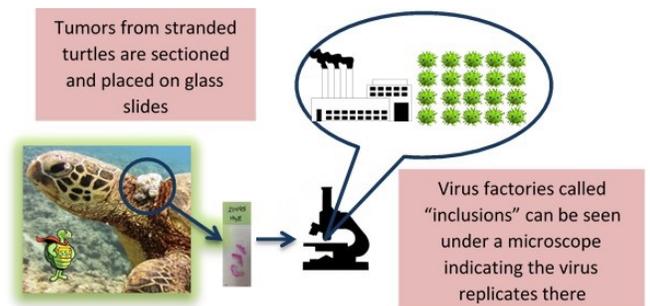
## Supershedders may be involved in transmission of tumor viruses in sea turtles

Sea turtles in Hawaii are affected by fibropapillomatosis (FP), a disease that causes unsightly tumors on the skin and internal organs of green turtles. FP is closely associated with a herpesvirus, and the virus is found in large amounts in tumors but not in normal tissues. To date, no one has been able to grow the virus in the lab, so the best evidence we have that this virus causes FP is the association between presence of virus and tumors.

**Viruses and transmission:** Herpes viruses can cause tumors in other animals including chickens and even humans. A big mystery is how such viruses are transmitted. For instance, in humans, it is known that herpesviruses that are associated with tumors are often secreted in saliva, and that is a potential means of transmission. In the case of turtles, other than knowing that the virus is present in tumors, we really do not know the dynamics of virus transmission. Knowing how viruses are transmitted is important because this allows one to better target disease management or surveillance strategies.

**Microscopy to the rescue:** Because herpesviruses are quite large, we can often actually see them under the microscope. Typically, the viruses are seen in the skin where they presumably slough off and move from one animal to the next. We used this to our advantage and examined the skin from a large numbers of tumors from several green turtles to see whether presence of virus depended on tumor size or individual animals. The findings were surprising.

**Virus shedding:** It turns out that only about 20% of turtles with tumors actually shed herpesvirus in the skin, and those that do have many tumors shedding virus. In addition, smaller tumors shed more virus than bigger ones. The phenomenon of few animals being responsible for a majority of disease transmission in animal populations is not new, and such animals are referred to as “supershedders”.





One in five tumored turtles has multiple tumors where the virus is actively replicating

A good example in humans is Typhoid Mary, a single person who was responsible for many salmonella (a bacterial disease) outbreaks in the 1800s. The finding of more virus in smaller tumors is also useful information because it allows investigators to target particular tumors for attempts to grow the virus in the lab. **This of course leads to new questions.** How often do supershedders contact susceptible turtles? How efficiently are viruses transmitted from supershedders? Do smaller tumors really increase our chances of isolating the herpesvirus? It is these kinds of things that make investigation of wildlife disease so fascinating. *Work TM, Dagenais J, Balazs GH, Schettle N, Ackermann M (2014) Dynamics of virus*

*shedding and in-situ confirmation of chelonid herpesvirus 5 in Hawaiian green turtles with fibropapillomatosis. Veterinary Pathology.*

## Starvation and Trauma are Major Causes of Death in Endangered Hawaiian Geese

A 30-year review conducted by the HFS found that the most common causes of death in the Hawaiian goose or Nēnē (in decreasing order of importance) were starvation, trauma, and infectious disease. Of the infectious diseases, the parasite *Toxoplasma gondii* was a prominent player. This parasite is transmitted by feral cats and has played an important role in extirpation of native Hawaiian crows from their native range. Toxicoses played a minor role in causing Nēnē death and comprised mainly lead poisoning and more rarely botulism. While some of the causes are difficult to prevent, others such as vehicle collisions and toxoplasmosis are preventable if proper management tools are implemented (feral cat control and traffic speed reduced/increased road signage). This is another example where understanding causes of death aids in the management and recovery of endangered birds. *Work TM, Dagenais J, Rameyer R, Breeden R (2015) Mortality patterns in endangered Hawaiian geese (Nene; Branta sandvicensis). J Wildl Dis 51:688-695.*



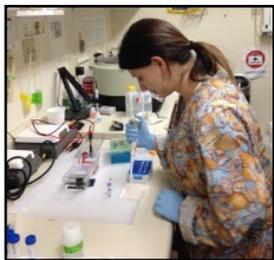
Hawaiian goose or Nēnē.  
Photo credit © Dan Clark

### Necropsy Files Update

*The identity of the parasite, Toxoplasma gondii, suspected of having caused the death of a purple-capped fruit dove in American Samoa (see Newsletter 2), was confirmed. This is the first case of this parasite killing native wildlife in that territory.*

## Recent HFS visiting Scientists

### Isabela Domiciano (Brazil), January thru July 2015



A candidate for a PhD in Brazil, Isabela interned at the HFS for 6 months, working on identifying latent herpesvirus gene expression in sea turtle tumors, histopathology of tumors in turtles from Paraná state, Brazil and worked toward developing tools in order to better understand tumor biology. RNA extractions, RT-PCR, agarose gel electrophoresis, SDS-PAGE, western blotting and immunohistochemistry are some of the techniques she acquired. Isabela also performed sea turtle and bird necropsies, and assisted HFS staff with various tasks pertaining to wildlife diseases. We wish her the best of luck in obtaining her doctoral degree!



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