



**Report to the Fish and Wildlife Health Committee
of the Association of Fish and Wildlife Agencies
from the USGS National Wildlife Health Center*
March 12, 2015**

The USGS National Wildlife Health Center provides national leadership to safeguard wildlife and ecosystem health through dynamic partnerships and exceptional science.

Wildlife Health Information Sharing Partnership – event reporting system (WHISPers)

The USGS National Wildlife Health Center (NWHC) is in the beta testing stage of a new online database for reporting wildlife health events that will be an easy and efficient way for wildlife professionals across North America to share disease event information, such as outbreak onset and ending date, general location, species involved, numbers involved, diagnoses, and laboratory and contact names. It is a partner-driven, web-based system for tracking basic information about historic and ongoing wildlife mortality and morbidity events. The primary goal of the system is to provide natural resource partners and the public with timely, accurate situational awareness regarding these events. The system also serves as a searchable archive of historic mortality and morbidity event data. Initially, the NWHC will populate this database with the wildlife mortality data the NWHC has maintained for several years (see http://www.nwhc.usgs.gov/publications/quarterly_reports/index.jsp); after the initial rollout, other wildlife professionals will be able to enter data that can be viewed by others. A [Frequently Asked Questions](#) handout is available. **Contact:** Jonathan Sleeman, 608-270-2401, jsleeman@usgs.gov.

North America avian influenza surveillance update 2014

Highly pathogenic avian influenza virus (HPAIV) was detected in wild birds at a mortality event in Washington State (Pacific Flyway) in December 2014. Subsequent investigation of this event by the NWHC, the U.S. Department of Agriculture, Washington Department of Fish and Wildlife, and the Washington Animal Disease Diagnostic Laboratory identified three HPAI viruses (H5N8, H5N2, and H5N1) in wild waterfowl in this region. All three viruses shared at least 50% of their genetic material; most notably the H5 in all three cases was highly similar in each virus. The H5N8 is of Eurasian origin and found to be highly similar to the HPAIV H5N8 that began circulating in poultry and wild birds in the Republic of Korea during the winter of 2014. This virus had also been found in four European countries in autumn 2014 as well as in Russia and Japan. The other two HPAIVs, H5N2 and H5N1, were found to be reassortants of the HPAIV H5N8 and North American low pathogenic avian influenza viruses. The HPAIV H5N2 was initially found in poultry farms in British Columbia, Canada, where it has been responsible for the direct mortality of, or euthanasia of, approximately 250,000 birds. Subsequent surveillance in January 2015 by the USDA, NWHC and other state and federal agencies has found the HPAIV H5N8 and H5N2 in hunter-killed wild waterfowl in five additional states (California, Idaho, Nevada, Oregon, Utah), backyard poultry flocks in 3 states, captive wild raptors in 2 states, and 2 commercial poultry operations in California. To date HPAIV has not been found to cause pathology in wild waterfowl but it is believed to be the cause of death in various raptor species including Red-tailed Hawks, Gyrfalcons, Peregrine Falcons, Great-horned Owls, and Bald Eagles. The original finding of these first HPAIVs in Washington during 2014 came as a result of testing wild waterfowl found dead during a mortality event that has primarily been attributed to aspergillosis.

It is possible that one or more of these HPAIVs may continue to circulate in North America through 2015 and could be found outside of the Pacific Flyway. To date, no humans or other mammals have shown signs of disease from these particular viruses but field personnel handling live or dead wild birds should take precautions. The NWHC will continue to provide updates via [Wildlife Health Bulletins](#) and FAQs as more information becomes

*Please contact the NWHC Field Epidemiology Team at 608-270-2480 or by email at NWHC-epi@usgs.gov unless a specific contact is provided. To report wildlife mortality events in Hawaii or Pacific Island territories, please contact the Honolulu Field Station at 808-792-9520 or email Thierry Work at thierry_work@usgs.gov. Further information on NWHC's services can be found at <http://www.nwhc.usgs.gov/services/>.

available. The NWHC is continuing to monitor for HPAI viruses by testing sick and dead migratory birds, including screening all suitable raptor submissions. As we learn more about these HPAIVs, submission and testing criteria may change, please consult with a Field Epidemiologist at the NWHC if you have any specific concerns.

To learn more about the recent HPAI outbreaks, please see the following NWHC Wildlife Health Bulletins: [Detection of Novel Highly Pathogenic Avian Influenza Viruses in Wild Birds](#) and [Detection of Highly Pathogenic Avian Influenza Viruses H5N2 and H5N8 in Wild Birds of the United States](#). For more information on specific detections of HPAI, the following links summarize results from national disease surveillance efforts confirmed by the USDA's National Veterinary Services Laboratories: [HPAI in Wild Birds](#) and HPAI in [Captive Birds](#).
Contact: Hon Ip, 608-270-2464, hip@usgs.gov

NWHC surveillance for white-nose syndrome and *Pseudogymnoascus destructans*

In 2014, NWHC received carcasses from 229 bats from 12 states for diagnostic investigation of white-nose syndrome (WNS) or other causes of mortality. Of these submissions, 172 individuals were evaluated for white-nose syndrome by a combination of histopathology, fungal culture, and/or PCR. In addition, another 768 live bats and 88 environmental substrates were swabbed for enhanced *P. destructans* surveillance. In all, samples were received from 20 states, including 6 states from the central, western and southeastern regions of the country not previously sampled during winter hibernation. White-nose syndrome and/or *Pseudogymnoascus destructans*, the causative agent of WNS, was identified in 100 bats, including the first confirmation of the disease in Michigan, Wisconsin, and Arkansas (USA).

Sources of summer mortality in North American bats

In the 20 years preceding the emergence of white-nose syndrome (WNS) in the United States, less than one summer bat mortality event per year was reported to the NWHC from a total of 12 states. Since 2008, reports of summer mortality in bats have occurred annually (averaging 12 reports per year) and have originated from 29 states. Increased monitoring of bats at maternity colonies during summer months for population level impacts and increased public awareness of WNS may be responsible for this increase in bat mortality reporting rather than an overall decline in bat health. White-nose syndrome has only been identified as the cause of death in cave-hibernating bat species submitted during the hibernation period (generally, November to May), when dead or debilitated bats are found in or around hibernacula. Increased monitoring vigilance and reporting does allow some insight into common causes of summer bat mortality in North America, though almost 30% of all reported cases had undetermined causes. Known causes of death during the summer include trauma (including predation), emaciation, rabies, pasteurellosis, toxicosis, and parasitism. Summer mortality events involving bats have ranged from 1 to 2,000 individuals and were comprised of one or more species. Submission of fresh, dead bats for diagnostic evaluation from unusual or unexplained summer mortality events is encouraged to better understand the spatial and temporal patterns and species involved.

Sylvatic plague vaccine for prairie dogs

Laboratory studies have demonstrated that oral vaccination of prairie dogs against plague using raccoon pox-vector vaccine is feasible, resulting in significant protection against challenge with *Yersinia pestis*, the bacterium that causes sylvatic plague. The Sylvatic Plague Vaccine (SPV) Subcommittee, under the direction of the Executive Committee of the Black-footed Ferret Recovery Implementation Team, is continuing its work to complete development and delivery of the sylvatic plague vaccine as a management tool to combat plague in prairie dogs and promote the recovery of the black-footed ferret. Field trials completed by Colorado Parks and Wildlife and USGS National Wildlife Health Center (NWHC) in 2012 confirmed the safety of the vaccine in wild prairie dogs and non-target animals. NWHC, with numerous federal, state, and tribal partners, are beginning the third year of field trials to assess vaccine efficacy in free-ranging prairie dogs. Vaccine and placebo baits are being distributed in select prairie dog colonies in seven western states: Arizona, Colorado, Montana, South Dakota, Texas, Utah, and Wyoming. The field study will continue into 2016. Continuing field trials in 2015 may include sites in New Mexico, Mexico, and Canada. **Contact:** Tonie Rocke, 608-270-2451, trocke@usgs.gov.

Avian paramyxovirus-1 outbreaks in cormorants in the Midwest

Outbreaks of avian paramyxovirus-1 (APMV-1) in Double-crested Cormorant (*Phalacrocorax auritus*; DCCO) nesting colonies in the U.S. have been sporadically reported since 1992. The majority of APMV-1 viruses isolated from DCCO have been further classified as virulent Newcastle Disease virus (NDV). This virulent strain of NDV has the potential to cause disease in poultry; thus, knowledge of this disease is important for both wildlife management and agricultural production. In 2014, virulent NDV was documented in DCCO from Stutsman County, North Dakota and Meeker County, Minnesota. A third mortality event in Cass County, Minnesota was suspected to be attributed to APMV-1 based on microscopic examination of brain tissue, but no virus was isolated. All three of these counties have had APMV-1 associated DCCO mortality events in previous years; however, the specific DCCO breeding colony affected within Stutsman County in 2014 had no previous record of this disease. The last large APMV-1 outbreak in DCCO (over 1,000 DCCO total) was in 2012 and occurred at nine different mortality sites in four states: Minnesota, North Dakota, South Dakota, and Wisconsin. There were no APMV-1 mortality events in DCCO populations reported to, or investigated by, the USGS National Wildlife Health Center in 2013.

As is typical during APMV-1 mortality events in DCCO, mortality was also observed in other co-occurring species such as American White Pelican (*Pelecanus erythrorhynchos*), gulls (*Larus* sp), Canada Goose (*Branta canadensis*), and Killdeer (*Charadrius vociferus*) at the 2014 mortality sites. No carcasses of these species were examined in 2014 but, in past years, species other than DCCO have been found to have alternate causes of death, including West Nile virus and botulism type C. Concurrent diagnostic findings found in APMV-1 positive DCCO examined during 2014 included avian cholera, aspergillosis, salmonellosis, and parasitism.

NWHC surveillance for ranaviruses

A total of 211 frogs, toads, salamanders and turtles from 34 mortality events in 14 states were tested for ranaviruses by virus isolation (in zebra fish cell line) or real time PCR (rt-PCR). Ranavirus infections were confirmed by virus isolations to be the cause of 11 mortality events in 7 states (Delaware, New Jersey, Maryland, Kentucky, Wisconsin, Florida and California). Testing is in progress on 8 mortality events from the state of Maine, but ranavirus infections are suspected in all 8 events. Confirmed ranavirus-infected species include wood frogs (*Lithobates sylvaticus*), bullfrogs (*L. catesbeianus*), southern leopard frogs (*L. sphenoccephalus*), spotted salamanders (*Ambystoma maculatum*), rough-skinned newts (*Taricha granulosa*) and eastern box turtles (*Terrapene carolina*). Isolation of a ranavirus from the skin of one newt (*T. granulosa*) is considered a first for the species.

Investigation of lead levels in USFWS Region 3 eagles

While the use of lead shot for waterfowl hunting was prohibited in 1991, lead in shotgun pellets and rifle ammunition is still widely used for terrestrial hunting. Bald Eagle (*Haliaeetus leucocephalus*) mortalities from lead poisoning are on-going. The USFWS Region 3 together with the NWHC designed an investigation to collect and submit eagle carcasses for gross examination and lead level testing. The NWHC conducted necropsies on 112 Bald Eagles and 1 Golden Eagle (*Aquila chrysaetos*). Eagles were collected from Wisconsin (75), Iowa (18), Illinois (13), Minnesota (6) and North Dakota (1). Carcasses were collected in the following years 1996 (1), 2006 (1), 2009 (2), 2010 (1), 2011 (6), 2012 (52), 2013 (44), not determined (6). All eagles were radiographed and 14 had radiographic evidence of gunshot or ingestion of ammunition. Of the 106 livers tested for lead, 42 had detectable levels of lead with 12 testing greater than 6 ppm, wet weight, indicative of clinical lead poisoning. Bones of 6 eagles were tested for lead. Five of those had detectable levels of lead with 2 testing greater than 20 ppm, indicative of clinical lead poisoning. One carcass was unsuitable for lead testing. No inhibition of brain cholinesterase was observed in any of the eagles tested. All eagles tested negative for West Nile virus. Suitable carcasses were saved frozen for shipment to the eagle repository. Samples were saved frozen for future stable isotope analysis.

2015 Flyway meetings national summary for 2014

During 2014, 161 avian morbidity and mortality events were investigated by or reported to the NWHC. More than 48,000 birds were estimated to be affected during these events. There were more epizootic events reported from Pacific flyway (63) than any other flyway in 2014 (Mississippi = 52, Central = 21, Atlantic = 25). The estimated avian mortality was also higher in the Pacific flyway (~32,000) than any other flyway (Mississippi ~6,300, Central ~5,600, Atlantic ~4,000). Infectious disease was responsible for 90% (43,307/48,065) of these avian deaths across the US during 2014.

Atlantic Flyway summary

During 2014 (January-December), 25 mortality events involving migratory birds in the Atlantic Flyway region were reported to the NWHC. The NWHC received carcasses for diagnostic investigation from 15 of these events with other reports originating from the Southeastern Cooperative Wildlife Disease Study as well as individual state laboratories. From the 25 avian mortality events (6-yr average = 27 events, range = 20 - 35), 12 different etiologies (causes) were identified and total mortality was estimated to be 4074 birds (6-yr average = 3,100, range = 1,300 – 6,300). Emaciation (from 7 reported events) and suspected botulism type E (from 1 reported event) were identified as the cause of 68% of the avian mortality in 2014, with most of these deaths from both causes occurring around Lake Erie. Of all the causes of mortality identified, salmonellosis and pigeon paramyxovirus were the only infectious diseases identified as primary causes of mortality and were identified as the cause of death in 431 and 6 birds, respectively.

Total estimated mortality due to emaciation as the primary cause of death in the Atlantic Flyway in 2014 was 1877 birds from 7 reported mortality events. Larger events occurred along the southern shore of Lake Erie but similar reports were received throughout the Great Lakes region. Moribund and dead birds were found around the shores of Lakes Michigan, Erie, and Ontario starting in early January. Species most affected were diving ducks. Waterfowl were also affected on smaller bodies of water inland from the Great Lakes. Emaciation was likely caused by the severe winter conditions in 2013/2014 resulting in increased ice cover on lakes and inaccessible food sources. According to the National Oceanic and Atmospheric Administration's Great Lakes Environmental Research Laboratory, ice covered more than 90% of the Great Lakes at peak in 2014, compared to an average annual maximum of 51.4% since 1973. Waterfowl carcasses from the Great Lakes region evaluated at various diagnostic laboratories were negative for a variety of other possible etiologies. Also detected in carcasses associated with groups of emaciated waterfowl were signs of trauma and drowning, likely due to harsh environmental conditions and/or weakened condition of the birds. Given the large avian population at risk and the broad geographical scale, the total waterfowl mortality associated with harsh winter 2013/2014 conditions in the Great Lakes region was likely far greater than reported.

Another mortality event was reported from Lake Erie in October that was suspected to be caused by botulinum neurotoxin type E. Total mortality was estimated to be 876 individual birds of multiple taxa including loons, gulls, ducks, and hawks. Of the estimated total, common loons were the most highly impacted species with an estimated 675 dead.

Mississippi Flyway summary

During 2014 (January - December), 52 wildlife mortality events involving migratory birds were reported to the NWHC from within the Mississippi Flyway region. This exceeds the average annual number of avian mortality events reported during the previous 5 years (41 events \pm 7) for the Flyway, although the total estimated mortality (6,292) was well below that of the 5-year average (15,560 \pm 5,132). This represented 13% of all avian mortalities reported to NWHC nationwide in 2014. NWHC directly investigated 23 of these events. Of the 52 avian mortality events, 13 different etiologies were identified. Three etiologies in particular (emaciation/starvation, trematodiasis, and toxicosis) contributed to avian mortality in similar proportions and accounted for almost 75% of all mortalities in the Mississippi Flyway. More than 1,900 birds (including 14 species, mostly diving ducks) were reported dead around the Great Lakes between January and April 2014. Frigid temperatures and prolonged, extensive ice cover on the lakes is thought to have prevented overwintering populations from feeding. Trematodiasis due to *Sphaeridiotrema globulus*, *Cyathocoytle bushinensis*, and/or *Leygonimus polyoon* primarily

in American Coot (*Fulica americana*) and Lesser Scaup (*Aythya affinis*) within the Upper Mississippi River NWR (Pools 7, 8, and now Pool 5) contributed over 20% of all bird mortalities in the Flyway during 2014. Spring and fall die-offs have occurred annually since 2002 and total estimated mortality is nearly 120000 individuals since its discovery. Two die-offs accounted for more than 80% of all mortalities attributed to toxicoses. Fusariotoxin poisoning killed ~260 mixed ducks feeding in a flooded rice field in Arkansas during late December, while ~1000 grackles and Brown-headed Cowbirds (*Molothrus ater*) died in Mississippi from suspected poisoning in January. The cumulative estimated mortality from avian botulism (types C and E) remained low (3%) in the Mississippi Flyway during 2014 and localized around Lake Michigan.

In 2014, NWHC was involved with several research projects targeting migratory birds in the Mississippi Flyway. NWHC continues to investigate transmission dynamics of avian paramyxovirus-1 (APMV-1) and virulent Newcastle Disease virus (vNDV) in Double-crested Cormorants. Small NDV outbreaks occurred at 2 of 3 study sites in 2014; lack of maternal antibodies appears to play a role in these outbreaks. This study will conclude after the 2015 season. NWHC is also investigating causes of death in Bald Eagles nationwide for inclusion in the USFWS Eagle Database.

Central Flyway summary

During 2014 (January – December), 21 wildlife mortality events, involving an estimated 5624 migratory birds were reported within the Central Flyway region. This represented 12% of all avian mortalities reported to USGS National Wildlife Health Center (NWHC) nationwide in 2014. The NWHC directly investigated 19 of these events. Of the 21 avian mortality events, 11 different etiologies were identified. Avian cholera accounted for over 80% of all mortality in the Central Flyway in 2014. The largest die-off attributed to avian cholera occurred at Bosque del Apache National Wildlife Refuge (New Mexico) between November and December and involved more than 3,800 birds including geese, ducks, grebes, coots, and Sandhill Cranes (*Grus canadensis*). Smaller avian cholera events also occurred in Nebraska and Kansas. Interestingly, at least one American White Pelican (*Pelecanus erythrorhynchos*) tested positive for avian cholera at a mortality event involving multiple etiologies (suspect botulism C, West Nile virus, salmonellosis, acanthocephalosis) between August and September at Bowdoin National Wildlife Refuge (Montana). Trauma, the next largest source of avian mortality in the Central Flyway (5%), was most often associated with severe weather and/or impact. Fatal pigeon paramyxovirus infections in Eurasian Collared Doves (*Streptopelia decaocto*) continued to spread in the Central and Pacific Flyways in 2014 with four new counties in Texas, Arizona, and Nevada reporting die-offs. Of note, NWHC received a report of nestling mortality among Mountain Bluebirds (*Sialia currucoides*) at Bighorn National Forest (Wyoming) estimated to involve 20-40% of nests examined. Affected chicks had malformed beaks, necrotic skin around the mouth, and neurologic signs. Stomatitis of uncertain origin was diagnosed by the Wyoming Veterinary Diagnostic Laboratory. Mortality among Greater Sage Grouse (*Centrocercus urophasianus*) continued in 2014. No consistent etiology was identified as the cause of mortality among the 17 birds examined from Montana. Emaciation and predation trauma were similar to 2013 findings; West Nile virus was not detected. Mortality due to botulism C in the Central Flyway was at its lowest levels since 2000 and was only identified or suspected in two events in Montana during 2014.

Beginning in 2014, NWHC has been involved with several research projects targeting migratory birds in the Central Flyway. In collaboration with USFWS Region 6, over the next two years NWHC will be examining 140 Bald and Golden Eagles found dead in and around prairie dog towns for potential exposure to anticoagulant rodenticides and various heavy metals. NWHC is also investigating causes of death in Bald Eagles nationwide for inclusion in the USFWS Eagle Database.

Pacific Flyway summary

Sixty-three events from the Pacific Flyway in 2014 was slightly higher than the 56 wildlife mortality events reported in 2013. NWHC investigated 43 of these 63 events and the remaining events were reported by partnering agencies. There were 13 etiologies (causes) identified that accounted for an estimated 32,075 individual deaths. Avian botulism type C (7,285) and avian cholera (13,460) caused 65% of the avian mortality in the Pacific Flyway during 2014. The national summary for each of these two infectious diseases is provided

below. Also below are summaries of two other substantial findings in the Pacific Flyway in 2014: highly pathogenic avian influenza in wild birds and unusual mortality in Cassin's Auklets.

Avian botulism Type C national summary

Avian botulism type C was the laboratory-confirmed or suspected diagnosis associated with 22 wildlife mortality events during 2014. NWHC received carcasses for diagnostic investigation from 13 of these events. The other nine events were reported by the California Department of Fish and Wildlife, the Michigan Department of Natural Resources, or the Utah Division of Wildlife Resources. Reported bird mortality spanned from early June to late October and occurred in all four migratory bird flyways (nine states) with a total estimated mortality of 7,810 birds. The majority of the reported mortality (88%) occurred at Tule Lake National Wildlife Refuge, California (6,841 birds between July and October), with the remaining 21 botulism type C events involving an average of only 46 dead birds per location. Mallards (*Anas platyrhynchos*) or mallard hybrids were affected in at least 20 of the 22 events, with over 4,000 total known dead (3,860 at Tule Lake). Other ducks impacted include teal (Cinnamon [*A. cyanoptera*], Blue-winged [*A. discors*], and Green-winged [*A. crecca*]; n = 1,009), Northern Pintail (*A. acuta*; n = 722), and Northern Shoveler (*A. clypeata*; n = 446).

Avian cholera national summary

During 2014, the NWHC received carcasses from 15 wildlife mortality events and 5 additional reports from other laboratories that were confirmed or suspect avian cholera cases. These 20 events were spread over 12 states and three Flyways (Mississippi, Central, and Pacific). The total avian cholera mortality reported was ~18,500, which accounts for almost 40% of the total avian mortality reported in 2014.

Four events involved 3,000 or more dead birds: Tule Lake National Wildlife Refuge (NWR)/Lower Klamath NWR in California (February through April, n = 3,500), Great Salt Lake in Utah (November and December, n = 6,000), Bosque del Apache NWR in New Mexico (ongoing since November, n = 3,850 dead birds), and Walker Lake in Nevada (ongoing since December, n = 3,000). Of these events, three (New Mexico, Nevada, and California) involved primarily geese and ducks with Snow Goose (*Chen caerulescens*; n = 3,674), Ross's Goose (*C. rossii*; n = 647), and American Coot (*Fulica americana*; n = 750) being the most affected species during 2014 cholera outbreaks. This is the first detection of avian cholera mortality in the state of Nevada since 1999 when over 2,500 ducks were reported dead in Churchill County. The Great Salt Lake event involved Eared Grebes (*Podiceps nigricollis*; n = 6,000), which is similar to what has been reported in past years.

Cassin's Auklet mortality during 2014

Beginning October 2014 and continuing into January 2015, surveyors conducting routine beached-bird surveys recorded unusually high numbers of dead and debilitated Cassin's Auklets (CAAU, *Ptychoramphus aleuticus*) on beaches from central California, up the Pacific coast through Oregon, Washington, and to Vancouver Island, British Columbia. Preliminary mortality estimates suggest that tens of thousands CAAU have washed ashore, at rates 10-100 times "normal."

A total of 153 carcasses were examined to document age, sex, and body condition, and to attempt to assess probable cause of death. Necropsies were performed by NWHC (n = 12 from CA, OR, and WA in November and December), California Department of Fish and Wildlife (n = 32 from CA in November), California Academy of Sciences (n = 23 from CA in November and early December), Oregon State University (n = 5 from OR in December and January), and the British Columbia Ministry of Agriculture (n = 81 from BC in December). Most of the birds necropsied from California, Oregon, and Washington were emaciated or in poor body condition and most were presumed to have died of starvation. A consistent finding in birds examined from all sites was gastrointestinal hemorrhage, interpreted as a sign of physiological stress. No pathogenic bacteria or viruses were isolated from birds submitted to NWHC. We continue to investigate additional carcasses from this event to rule out disease, and determine the cause of death.

At major CAAU breeding colonies in California (Farallon Islands) and British Columbia (Scott Islands; >80% of the world population of CAAU), breeding success in 2014 was very high, resulting in an exceptional number of

hatch-year birds dispersing away from colonies after the 2014 breeding season. Ocean conditions in the North Pacific during summer and fall 2014 were unusually warm. This warm water remained offshore from the Gulf of Alaska south to the northern California current for much of 2014 then, with the relaxation of upwelling in late summer, the warm water moved inshore to the coast in approximately September 2014. The anomalously warm water seemed to affect zooplankton community composition; krill (*Euphausiaceae*) were detected at normal abundance on trawl surveys off central California during July, but were absent during surveys in September. Winter storms began affecting the northern portion of the study area during late October 2014. These storms may have also affected both ocean conditions and CAAU energetics.

Two New Publications on the Detection of Highly Pathogenic Avian Influenza in Wild Birds in North America

Ip HS, Torchetti MK, Crespo R, Kohrs P, DeBruyn P, Mansfield KG, et al. Novel Eurasian highly pathogenic influenza A H5 viruses in wild birds, Washington, USA, 2014. *Emerging Infectious Diseases*, 2015 May [online ahead of print]. <http://dx.doi.org/10.3201/eid2105.142020>

Torchetti MK, Killian M-L, Dusek RJ, Pedersen JC, Hines N, Bodenstein B, White CL, Ip HS. 2015. Novel H5 clade 2.3.4.4 reassortant (H5N1) virus from a green-winged teal in Washington, USA. *Genome Announcements* 3(2):e00195-15. doi:10.1128/genomeA.00195-15 (in press).

New USGS Wildlife Health Circulars

Friend, Milton, 2014, Why bother about wildlife disease?: Reston, Va., U.S. Geological Survey Circular 1401, 76 p., <http://dx.doi.org/10.3133/cir1401>.

USGS Circular 1401, *Why bother about wildlife disease?*, provides a pragmatic assessment of wildlife disease that is irrespective of the reader's orientation towards wildlife conservation. This publication highlights the changing role of disease over time as a wildlife conservation factor. That transition is relevant to the insights provided for current and future efforts focused on sustaining global biodiversity and desired levels of wildlife populations in nature.

Measures, L.N., 2014, Anisakiosis and pseudoterranovosis: Reston, Va., U.S. Geological Survey Circular 1393, 34 p., 2 appendixes, <http://pubs.usgs.gov/circ/1393/>

USGS Circular 1393, *Anisakiosis and Pseudoterranovosis*, is about two parasitic zoonotic diseases that are caused by infection with specific larval nematodes or roundworms, whose life cycles are complex and involve three marine hosts: invertebrates, fish, and marine mammals. Humans can be infected by consuming raw, poorly cooked, cold smoked, lightly salted, or marinated marine fish or squid, the intermediate hosts infected with larvae. Human infections are becoming more common with the popularity of eating raw fish as well as increased detection due to improved medical diagnostics.

Disease Investigation Services

To request diagnostic services or report wildlife mortality, please contact the NWHC at 608-270-2480 or by email at NWHC-epi@usgs.gov, and a field epidemiologist will be available to discuss the case. To report wildlife mortality events in Hawaii or Pacific Island territories, please contact the Honolulu Field Station at 808-792-9520 or email Thierry Work at thierry_work@usgs.gov. Further information can be found at <http://www.nwhc.usgs.gov/services/>.

[Wildlife Mortality Reporting and Diagnostic Submission Request Form](#)

Weekly updates on nationwide mortality events can be viewed in tabular format at http://www.nwhc.usgs.gov/mortality_events/ongoing.jsp.

To view NWHC Quarterly Wildlife Mortality Reports, please visit:

http://www.nwhc.usgs.gov/publications/quarterly_reports/index.jsp

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