Environment and Natural Resources Trust Fund
Emerging Issues Account
Adopted 1/15/08 by LCCMR

116P.08 TRUST FUND EXPENDITURES.
Subd. 4. **Legislative recommendations.**
d) The commission may recommend the establishment of an annual emerging issues account in its annual legislative bill for funding emerging issues, which come up unexpectedly, but which still adhere to the commission's strategic plan, to be approved by the governor after initiation and recommendation by the commission.

Emerging Issues Account Criteria
The funds in the Emerging Issues Account may be recommended for an effort that has an unexpected and urgent need, such as:

- Addressing environmental or disease issues where delay will threaten the viability of segments of the State's natural resources or human health;
- Implementing a natural resource corrective action where delay will be detrimental to the State's natural resources;
- An opportunity to enhance natural resource management in a timely manner;
- An opportunity to acquire critical land in a timely manner.

Use of the funds must be consistent with the Commission's strategic plan. Notification of the availability of the Emerging Issues Account will be posted on the LCCMR web site.

Requesting funds
To be considered for a LCCMR recommendation for use of the Emerging Issues Account, a letter (one page limit) must be submitted to the LCCMR requesting funds. The letter must:

- Describe the specific urgency;
- Explain how the request fits the emerging issues account criteria;
- Explain the proposed use of the funds including proposed results and deliverables.

Attached to the letter requesting consideration of funding must be a description of the organization describing its capability to carry out the activity proposed.

Awarding funds
- The Commission will review requests at least semi-annually at posted and open meetings.
- For a request to be approved, a quorum of the Commission must be present and at least 60% of those members present must vote in favor of approval.
- If a request is approved by the LCCMR it will be sent to the governor for consideration per M.S. 116P.08, Subd. 4.
- If the commission recommends that funds be put in the emerging issues account and those funds are made available through the legislative process, the funds should be available starting July 1, for the same two-year period as other recommended funds.
    - o Funds are available for recommendation by the commission to address unexpected and urgent needs until they are spent within the two-year period.

o If the funds are not spent for an unexpected and urgent need before the start of the second legislative session within the two-year period, the commission may recommend that they be added to an existing Environmental and Natural Resources Trust Fund project that has a critical need for additional funding to achieve the goals of the project.

May 20, 2016

LCCMR Emerging Issues Request for Funding Proposal and Budget for our project, "Avian Influenza distribution, evolution, and impacts on Ring-billed and Herring Gulls in Minnesota."

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PROJECT TITLE: Avian Influenza distribution, evolution, and impacts on Ring-billed and Herring Gulls in Minnesota

I. PROJECT STATEMENT

We propose to examine the impacts of avian influenza virus (AI) infections in Minnesota's Ring-billed (*Larus delawarensis*) and Herring gulls (*Larus argentatus*) to determine if they have suffered from or played a potential role in the deadly highly pathogenic AI (HPAI) H5 outbreak in Minnesota in 2015. In April 2005, the largest known HPAI H5 outbreak in wild birds occurred in north-central China at Qinghai Lake - an area devoid of domestic poultry. Over 6000 colonial nesting waterbirds died within a two month period, including six percent (3300 birds) of the world's population of bar-headed geese (*Anser indicus*), 1300 great cormorants (*Phalacrocorax carbo*), 930 great black-headed gulls (*Chroicocephalus ridibundus*), 570 brown-headed gulls (*C. brunnicephalus*), and 150 ruddy shelducks (*Tadorna ferruginea*). Since then, HPAI H5N1 has mutated and changed, and now wild birds survive infections and distribute the disease locally or along migratory routes. Ten years later, in April 2015, the largest known outbreak of HPAI in the United States occurred in domestic poultry in Minnesota – an area with abundant wild bird populations. The introduction of HPAI H5 to Minnesota was the most devastating animal disease ever to reach this state in recent memory. These Eurasian H5 viruses (clade 2.3.4.4) found in North America in 2015 are the only HPAI viruses known to circulate in wild birds (likely through migratory routes). Although reservoir species like dabbling ducks can survive infections (depending on HPAI strain) and potentially distribute virus, there is a major gap in our surveillance and understanding of AI dynamics in birds such as gulls. The capacity of these viruses to mutate and change is an eminent threat for susceptible wild birds and domestic poultry. Of critical concern are information gaps preventing us from understanding the origins of last year's outbreak or what lingering consequences there are on our wild bird populations. It is disconcerting that the origins of the outbreak remain undetermined, leaving us with several questions to be answered.

Therefore our goals of this proposed project are to determine:

1) if gulls played a role in the past outbreak.
2) the presence or distribution of AI in gulls and the evolutionary potential of AI viruses in MN gulls.
3) possible ways to predict or prevent a massive China-like outbreak in Minnesota's wild birds.
4) if there are any negative effects of AI infection in the migratory or breeding gulls in Minnesota.

Given that HPAI H5 has only been confirmed in a single Cooper's Hawk (*Accipiter cooperii*) and has not been detected in wild ducks in Minnesota, our overall goal of the project is to perform AI surveillance testing on gulls in Minnesota. Gulls are a known host for AIVs, can migrate long distances and occur in relatively large numbers in Minnesota and Midwestern U.S., yet are under-represented, compared to ducks, in surveillance efforts. Poultry and grain farmers frequently report large flocks of gulls on farms and in fields and have questioned the role these birds may play in distributing AI on the landscape. Furthermore, gulls are commonly infected with AI viruses, are species that, when infected, facilitate AIV change. Since gulls have long migrations, they can move AI viruses internationally, and the 2015 HPAI H5 outbreak that devastated MN birds was the result of a virus that had changed and that contained portions of viruses from Europe and Asia. So, gulls could be a contributing factor of this outbreak. Nonetheless, gulls remain under-represented in current Minnesota AI surveillance strategies as they are non-game species and access to gulls is not as easy as for hunter-killed ducks.

The outcomes of this comprehensive AI surveillance of Ring-billed and Herring gulls in MN are:

1) track virus evolution in these gulls through whole genome sequencing (WGS) of the viruses detected,
2) define the role of one or both gull species in the AI outbreak in Minnesota, and
3) assess any negative effects on gull populations after the outbreak.

This project will achieve these outcomes through a collaborative surveillance approach with the University of Minnesota, Department of Natural Resources, Leech Lake Division of Management Resources, US Fish and Wildlife Services, US Department of Agriculture–Wildlife Services, and the Minnesota Turkey Growers . This will include banding and AI testing of gulls in breeding colonies, gulls on farm fields, and gulls in wildlife areas during the fall and spring migrations. The information generated will be novel and help determine the role gulls may have in the spread of AI in Minnesota and the impacts the AI infection may have on them. If banded gulls are available for recapture, these studies could help us discover the possible negative effects, such as delayed migration or weight loss, that AI infection may have on the gulls studied or their close relatives [e.g. Caspian (*Hydroprogne caspia*) or common terns (*Sterna hirundo*)], some of which are threatened or endangered species in the Great Lakes area.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1: Testing of Gulls in Breeding Colonies for AI ($109,276)

Gulls are underrepresented in Minnesota surveillance efforts despite frequent reports of gulls on poultry farms. Additionally, gulls are the most frequently detected AI positive wild birds in global surveillance for AI. Our teams will visit two gull breeding colonies in Minnesota. Each colony will be visited once weekly for 4 weeks. At each visit, we will collect 100 fecal samples from the environment and catch 50 gulls by snare or box trap. The gulls will be banded with a uniquely numbered aluminum leg band plus a combination of colored plastic bands to facilitate future identification and recapture. Additionally, an oral (OP) swab, cloacal (CL) swab, and blood sample will be collected from each gull. All swabs will be tested for AI by a rapid PCR test. Any AI positives will be further characterized by completing whole genome sequencing of the AI found. The blood samples will be tested for antibodies to AI to determine any previous exposure and susceptibility to subsequent exposure.

Outcomes of Activity 1	**Completion Date**
Visit Gull colonies; capture, and band gulls; collect samples	May 2017
Test Swab samples for AI	June 2017
Test Blood samples for AI	July 2017
Perform Whole Genome Sequence (WGS) on AI positive samples	August 2017
Analyze WGS results	September 2017

Activity 2: Testing of Gulls during Spring and Fall Migration for AI ($104,167)

In the late summer, gulls leave their breeding colonies and intermingle with other migratory birds during the fall migration, creating a situation for exchange of AI viruses among species. Migratory gulls also return to Minnesota in the spring during which time they again mix with other wild birds and exchange AI viruses. We will live-capture gulls via netting techniques weekly for three consecutive weeks during spring and fall migration through Minnesota wildlife areas and on farm fields near poultry farms. This effort will result in a total of 36 gull netting occurrences (18 in the spring and 18 in the fall). During each netting occurrence, our goal will be at least 20 birds captured at each site, with OP swabs, CL swabs and blood samples collected from each bird.

Outcomes of Activity 2	**Completion Date**
Visit areas with spring migrating gulls; capture, band, and sample gulls	Feb/Mar 2017
Test Swab samples for AI	Mar/Apr 2017
Test Blood samples for AI	Apri/May 2017
Perform Whole Genome Sequence (WGS) on AI positive samples	May/June 2017

Analyze WGS results	June/July 2017
Visit areas with fall migrating gulls, capture, band, and sample gulls	Aug/Sep/Oct 2017
Test Swab samples for AI	Sep/Oct 2017
Test Blood samples for AI	Oct/Nov 2017
Perform Whole Genome Sequence (WGS) on AI positive samples	Nov/Dec 2017
Analyze WGS results	January 2018

III. PROJECT STRATEGY

A. Project Team/Partners

Carol Cardona, DVM, PhD, DACPV, collaborator, is Professor and Pomeroy Chair of Avian Health at the University of Minnesota, in the Department of Veterinary and Biomedical Sciences. She is an internationally recognized expert in the fields of avian diseases and avian influenza infections in poultry. Dr. Cardona is also the laboratory director of the University of Minnesota's Mid-Central Research and Outreach Center (MCROC) where the majority of the testing will occur.

Tom Cooper, collaborator, Chief of the R3 Migratory Bird Program, U.S. Fish and Wildlife Service, will provide expertise and equipment for gull netting and handling.

Marie Culhane, DVM, PhD, principal investigator, is an infectious disease expert with a DVM and a PhD from the University of Minnesota. Dr. Culhane is a member of the joint OIE/FAO influenza working group (OFFLU) and has been actively involved in swine, human, and avian influenza global research and surveillance for 9 years. She designed the project plan and will assist with test result interpretation and selecting gene sequence analyses.

Francesca Cuthbert, PhD, collaborator, is a Distinguished Teaching Professor in the Department of Fisheries, Wildlife and Conservation Biology at the U of MN. Dr. Cuthbert has a wealth of experience with both species of gulls in the state (including rocket netting Ring-billed Gulls) and her lab has records on gull nesting colonies in MN to guide the colony surveillance efforts. She has conducted research on waterbirds for more than 30 years.

Todd Froberg, Graduate Student, U of MN, is pursuing a master's degree in Conservation Biology. He recently worked as an intern with the DNR and will perform the gull studies under the advisement of Drs. Cuthbert, Jenelle, and Culhane.

Dave Halvorson DVM DACPV, collaborator, is Professor Emeritus and former Extension veterinarian in Avian Health at the University of Minnesota. His research career was dedicated to science-based methods for poultry disease prevention and control, and he engaged in Extension efforts with poultry producers to translate findings into practice. His area of research was respiratory diseases of poultry with particular emphasis on avian influenza and avian metapneumovirus infections.

Chris Jennelle, PhD, collaborator, is a Research Scientist with the Wildlife Health Program at the Minnesota Department of Natural Resources. He has a strong background in the design, data collection, and analysis of surveillance data for wildlife diseases including avian influenza, chronic wasting disease, and *Mycoplasma gallisepticum*. His research interests also include quantitative modeling, parameter estimation, and prediction of wildlife disease dynamics.

Doug Marthaler, PhD, collaborator, is an assistant professor at the U of MN in the Department of Veterinary Population Medicine. Dr. Marthaler will use his expertise in the analysis and WGS of viruses to reveal the evolutionary changes in the virus and direction of transmission of virus genes found in wild birds and their introduction into domestic poultry.

Steve Mortenson, collaborator, Fish, Wildlife & Plants Director, Leech Lake Band of Ojibwe Division of Resource Management, will provide his expertise regarding the gull breeding colonies in the Leech Lake area and assist with sampling.

Steve Olson, collaborator, Executive Director of the MN Turkey Growers Assn, MN Turkey Research & Promotion Council, Chicken & Egg Assn of MN, Midwest Poultry Federation, will assist with coordination and outreach to the poultry producers of Minnesota to allow us access to fields where gulls will be captured and released.
Tim White, collaborator, USDA APHIS Wildlife Services, will use his expertise as a Wildlife Disease Biologist to assist in opportunistic sampling, occasional field sampling, and educating the citizen scientists and other team members in wild bird handling and sampling.

B. Project Impact and Long-Term Strategy
This project will provide valuable information to help maximize understanding of the role of gulls in introducing AI infections into Minnesota and the potential negative impact of spillback of infection to gulls. This project will focus on gull breeding colonies in Minnesota, where waves of influenza infection have been described to occur in other countries. Research will also extend out to the farmlands and wetlands of Minnesota, where mixing with other migratory birds and domestic poultry may occur. Results will inform future international wildlife AI surveillance plans and the Minnesota HPAI response plan , identify the potential risk to endangered terns that share breeding colonies with these gulls, and formulate predictive risk models of AI. The WGS of the viruses found in the gulls will be subjected to detailed evolutionary and genetic analyses to determine directionality of virus movement (poultry to gulls or gulls to poultry; Asia to North America or North America to Asia) and the most likely common ancestor strain in gulls and other birds. Finally, through collaborative and data-sharing efforts at the University of Minnesota and state agencies such as the Minnesota DNR, this project will be part of a larger effort to understand and better implement surveillance efforts for diseases such as AI that have tremendous impact on both wild and domestic bird health.

This project will succeed due to the previous funding provided to the U of MN from the state legislature through the Minnesota Department of Agriculture appropriation Avian Influenza research. The award titled "University of Minnesota Response to Avian Influenza," with a contract period of performance from 12/31/15 to 6/30/18, funded primarily laboratory capacity building and staffing to respond to the crisis. With laboratories, such as the U of MN Mid-Central Research and Outreach Center (MCROC) laboratory, fully functional and operational due to that funding, the AI tests from this project can be performed accurately and rapidly. The gulls studied here can augment the information gained from other domestic animal, wild bird and zoological collection studies conducted at the U of MN College of Veterinary Medicine by Dr. Carol Cardona ($763,850 (multiple projects), Dr. Zheng Xing ($262,400), Dr. Larissa Minicucci ($106,000) and Dr. Mickey Trent ($38,000). With the many collaborators here, we are able to reach across sectors and disciplines to address this HPAI problem head-on. We have the capacity to determine when and where to attach real time, satellite monitoring devices on gulls to investigate gull movement dynamics and for AIV spread in Minnesota. Tracking is an expensive endeavor, but after a year of comprehensive AI surveillance, future efforts could be greatly refined to the higher risk gull species and the landscape for surveillance narrowed to a specific colony or wildlife area in the state.

C. Timeline Requirements

Immediately after money is awarded, the team will assemble and be prepared to deploy at the next appropriate season or sampling period. To clarify, the timeline below assumes funding theoretically provided in August 2016 and the project would commence immediately and proceed with fall migratory gull sampling. However, the timeline can be adjusted as needed. For example, if the funding was provided in January 2017, the project would commence in January 2017 and proceed with spring migratory gull testing. Total time period, regardless of start date, is 18 months.

Start, Mobilize team	Aug 2016
Visit areas with fall migrating gulls, capture, band, and sample gulls	Aug/Sep/Oct 2016
Test Swab and blood samples for AI	Sep/Oct/ Nov 2016
Perform Whole Genome Sequence (WGS) on AI positive samples	Nov/Dec 2016
Analyze WGS results, share preliminary results	January 2017
Visit areas with spring migrating gulls; capture, band, and sample gulls	Feb/Mar 2017
Test Swab and blood samples for AI, Share preliminary results	Mar/Apr / May 2017
Perform Whole Genome Sequence (WGS) on AI positive samples	May/June 2017
Visit Gull colonies; capture, and band gulls; collect samples	May 2017
Test Swab and Blood samples for AI	June/July 2017
Analyze WGS results	June/July 2017
Perform Whole Genome Sequence (WGS) on AI positive samples	August 2017
Analyze WGS results	September 2017
Present and Publish Preliminary Results	October/November/December 2017
Publish Final Results	January /February 2018

2017 Detailed Project Budget for the Emerging Issues Account

Project Title: Are Minnesota's Ring-billed and Herring Gulls Infected with Avian Influen

IV. TOTAL ENRTF REQUEST BUDGET 1.5 years

BUDGET ITEM	AMOUNT
Personnel:	**$ 89,273**
Marie Culhane, principal investigator, project design and oversight, publication assistance and analysis of results, 5% FTE for one year, 75 % salary, 25% benefits	$ 9,440
Doug Marthaler, collaborator, whole genome sequencing and bioinformatics, 2% FTE for one year, 75% salary, 25% benefits	$ 2,942
Todd Froberg, graduate student in wildlife ecology and research assistant, 50% FTE for one year, 52% salary, 48% benefits	$ 44,522
TBN, wildlife data technician, to participate in field studies, collect samples from wildife, data management, and provide citizen education. 75% FTE for one year, 75% salary, 25% benefits	$ 32,369
Professional/Technical/Service Contracts:	**$ 9,100**
Undergraduate student workers, for data entry and data collection, $13.00/hour for 700 hours over one year	$ 9,100
Equipment/Tools/Supplies/Test Fees	**$ 87,375**
Binocular for bird observation	$ 250.00
Waterproof notebooks for recording bird observations	$ 50.00
Gloves and other PPE for field sampling	$ 1,427.00
Sample preservation of collected samples	$ 100.00
Mailers for samples	$ 490.00
PCR tests of 3040 bird and enviromental fecal samples for detection of AI at U of MN MCROC Laboratory at $22.86 per test	$ 69,494.40
Whole Genome Sequence of AI viruses detected at U of MN CVM	$ 10,284.00
Serology on wild bird blood samples collected at U of MN MCROC Laboratory	$ 5,280.00
Travel:	**$ 27,695**
Overnight lodging and per diem meals in greater MN is $179 per person X 4 people X 34 nights	$ 24,344.00
weekly car rental at $228 per week for 10 weeks	$ 2,280.00
mileage charges of $0.17 per mile X 6300 miles	$ 1,071.0(
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	**$ 213,443**

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ To Be Applied To Project During Project Period:		
Endowment from the Minnesota Turkey Growers for the Pomeroy Chair and Pomeroy Legacy Scholars for Cardona's applied research and training activiites	$ 100,000	Secured
Other State $ To Be Applied To Project During Project Period:		
U of M OVPR funding for MCROC laboratory capacity building and providing laboratory testing services to support of applied field research in rural minnesota;	$ 172,000	Secured
U also MN DRIVE funding to Characterize to characterize the location and timing of influenza virus circulation in wild birds on poultry farms;	$ 280,300	Secured
Ag Appropriations, received by UMN College of Veterinary Medicine from the state legislature for Avian Influenza research. The award title is "University of Minnesota Response to Avian Influenza."	$ 1,170,250	Secured
In-kind Services To Be Applied To Project During Project Period: Salaries of Cardona, Halvorson, and Cuthbert are covered by the U of MN, Salary of White is covered by USDA, Salary of Jennelle is covered by MN DNR, Salary of Mortensen is covered by LL DRM, Salary of Cooper is covered by USFWS	$ 55,000	Secured
Funding History:		
USDA APHIS Outbreak studies on HPAI (Cardona)	$ 299,058	Secured
RARF, Surveillance for High-consequence Poultry Diseases in Wild Bird Reservoirs: Influenza and Newcastle Disease (Redig)	$ 140,509	Secured
AES GAR for WRC resopnse, M (Willette) Incorporating Captive Managed Avian Collections into Minnesota's Avian Influenza Response Planning	$ 14,976	Secured
Remaining $ From Current ENRTF Appropriation:	$ -	not applicaple