SURVEILLANCE OPTIMIZATION PROJECT FOR CHRONIC WASTING DISEASE (SOP4CWD)

SOP4CWD is a multi-state project aimed at increasing the effectiveness of CWD surveillance in the Eastern United States. The project merges CWD surveillance research and emerging data science techniques to identify the most efficient sampling strategies for disease detection and management. Eight states wildlife agencies and USGS are project partners; additional states are welcome to join the project. All participating states will be provided new web-based tools for managing their surveillance programs with decision points built in to meet their specific objectives.

The project is led by the Cornell Wildlife Health Lab at the Cornell College of Veterinary Medicine and by the Boone and Crockett Quantitative Wildlife Center at Michigan State University. Initial funding has been provided by Michigan Department of Natural Resources and New York Department of Environmental Conservation. We welcome additional financial support from other state wildlife agencies, and we are continuing to explore additional funding opportunities to ensure the long-term success of the project.

■ Participating States
■ States considering participation
■ Future invitees

SCIENTIFICALLY AND STATISTICALLY SOUND SURVEILLANCE

The project uses mathematical modeling and data science tools to enhance our overall understanding of the spread of the disease and to refine surveillance sampling. The system will merge analytical techniques of risk weighting, Bayesian modeling, and geospatial analysis with machine learning algorithms to aggregate surveillance data, mathematically explore and rank alternative sampling strategies, and to generate summary reports and recommendations for state agencies to target surveillance effort and enhance early detection.

PROJECT TIMELINE

PHASE 1. KNOWLEDGE TRANSFER
NOVEMBER 2019 – JANUARY 2020

The success of the project will be measured by the benefits it provides to the participating states. Understanding each state's surveillance objectives and workflows will be essential to shaping the surveillance model and developing the system. An initial in-person meeting between state wildlife agency representatives, project leads, modelers, and developers will take place in East Lansing, Michigan in January 2020. At this meeting, state agencies will share information about their surveillance programs and discuss the mathematical modeling and data science tools that will be used in the project.

PHASE 2. MODEL DEVELOPMENT
SEPTEMBER 2019 – SEPTEMBER 2020

Model developers will derive linkages between extant modeling formulas and data science techniques to synthesize regional data into actionable surveillance recommendations. Model development will include the mathematical derivation, software development, validations, and efficiency assessments of the new analytical tools. The toolset will provide for stakeholder predictions of CWD risk and surveillance recommendations, including information on whether diseased deer are more likely to be harvested.

PHASE 3. SURVEILLANCE SYSTEM DEVELOPMENT
SEPTEMBER 2020 – SEPTEMBER 2021

The regional CWD surveillance database will build on existing systems states are already using to provide participants the means to transfer sample data, explore alternative strategies, and select an optimal sampling scheme given the agency's goals and limitations. The SOP4CWD system should provide a user-friendly interface for state biologists to explore model options, track progress toward sampling goals, and provide summary reports in near real time. The technology will be transferable and accompanied by appropriate documentation. The data will be used to continue to refine the model in subsequent sampling seasons. The system will also provide features that assist the states in the surveillance planning and data management.

PHASE 4. DEPLOYMENT AND MAINTENANCE
JANUARY 2021 - FUTURE

The SOP4CWD system will include state-specific surveillance recommendations given regional and local trends discovered in the data. States will be provided access to this system, which should integrate into their workflow. Adaptation of the system to future needs, ideas, or desires of the participating states will require additional capital and support from wildlife agencies. Our final meeting in Michigan will address deployment and ongoing maintenance funding of this system.

EXPECTED CONTRIBUTIONS FROM PARTICIPATING STATES

KNOWLEDGE TRANSFER
Participating state agencies will play a key role in the planning and outcomes of the project. State agencies will provide important information about their CWD surveillance programs, including workflows and objectives. The purpose of the information sharing is to ensure that the project accounts for states' needs and that the products can be integrated seamlessly into state CWD surveillance programs.

DATA SHARING
Contributed data from participating states will be essential for the initial development of the surveillance model. The following data related to their CWD surveillance programs and activities is critical for model development:

> *Population Demographic Data*
> Agency data that includes: *population estimates*, *location-specific buck-doe ratios*, and any additional demographic information.

Population Management and Hunting Data
Historical agency information on population management activities, including *hunting seasons* and *dates*, *location-specific tags* and *success rates*, and *number of hunters*.

CWD Testing Data
All sampling and test data that includes *the animal's age and sex, date of harvest or death, location of harvest or death, why the animal was tested* (for example: clinical suspect, roadkill, annual surveillance program)*, test method, facility, and result*. Metadata that includes *the standard protocol used to collect the data*, *harvest*, *death date*, *and data accuracy*.

CWD Introduction Risk Hazard Data
Available information *locations of taxidermists*, *meat processors*, and *captive cervid facilities and any related data*.

CWD Surveillance Activity Data
Agency data that includes *emphasis on particular locations, staffing, and policies around disease management areas.*