NATIONAL *fish, wildlife & plants*
CLIMATE ADAPTATION STRATEGY

Project Title: Assessing the impacts of climate change on North American waterfowl population distributions and dynamics

Headline Title (2-5 words): climate change and waterfowl populations

Brief Summary (Abstract): Climate change exacerbates the key sources of uncertainty that challenge managers to make informed decisions through adaptive harvest management. We examined the relationships between climate, habitat, and waterfowl populations and developed predictive models relating waterfowl population dynamics to climate change. Our initial results provide essential information that will allow us to adjust adaptive harvest management protocols to directly anticipate and respond to climate change.

Project Location: Patuxent Research Refuge, USFWS, Laurel, Maryland.

Partners: U.S. Geological Survey, Colorado State University, Canadian Wildlife Service (CWS)

Background: The vital wetland habitats that govern North American waterfowl population dynamics are responding to climate change. Although climate-related impacts on wetland habitat availability and waterfowl population dynamics have been recognized, the spatial relationships between local, regional, and larger-scale environmental effects are poorly understood and have not been incorporated in models that support waterfowl management decision-making frameworks. In addition, multi-species management may not be practical if interspecific interactions are not well understood, given that such interactions are also influenced by environmental factors such as habitat heterogeneity and climate.

Project Goals: (1) Examine the relationships between environmental factors and the spatial and temporal variability in waterfowl distributions and abundance; (2) develop models relating waterfowl population dynamics to climate change scenarios to predict population responses to climate change; (3) evaluate the implications for long-term waterfowl monitoring and adaptive harvest management programs that anticipate and respond to climate change.

Strategy Goals Implemented:

1) Develop predictive models relating waterfowl population dynamics to wetland habitat and climate change.
2) Predict areas where waterfowl populations may be vulnerable or resilient to future climate change (e.g., drought).
3) Improve population monitoring by predicting the effects of climate change on the distribution of waterfowl habitats and populations.

Climate Impacts Addressed: impacts on species and habitat

Status of Project Implementation (Timeline, Milestones, Next Steps): Ongoing. Models have been developed to link waterfowl population dynamics to wetland (pond) availability, which is driven by key climate factors (precipitation and temperature). These models have been used to forecast waterfowl distributions under predicted scenarios of climate change. The performance of the models has been evaluated, suggesting that model predictions will be useful for the development of adjustments to current adaptive harvest management decision making frameworks. Climate, wetland, and waterfowl population data are organized in data sets ready for further analyses that include finer spatial scales and formally account for inter- and intra- species relationships. The next step is to incorporate these linkages into models predicting waterfowl recruitment and survival to evaluate the implications of climate change on long-term waterfowl monitoring programs and adaptive harvest management performance.

Project Outcomes: (1) North American waterfowl population management is based on a long-term monitoring program and related population estimates. The database of the North American Waterfowl Breeding Population and Habitat Survey has been updated and organized in a form that is ready for analysis. In addition, climate information has been acquired and related to the waterfowl data. (2) Models have been developed to relate waterfowl population dynamics to wetland habitats (ponds) and climate information. These models can be used to explain and forecast the spatial and temporal patterns of waterfowl population dynamics under various scenarios of climate change. (3) A manuscript describing these methods and results is currently under review.

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