Collaborative Conservation for Grassland Birds

The mission of the Habitat and Population Evaluation Team (HAPET) is clearly laid out in its name. HAPET was originally established to support waterfowl conservation in the Prairie Pothole Joint Venture (PPJV). When the PPJV adopted an "all birds" strategy in the late 1990s, HAPET acted quickly with support from the USFWS Migratory Bird Program to build more capacity focused on integrated bird habitat conservation. Whether funded by the Refuges program, Migratory Birds program, or the PPJV, multiple HAPET staff work closely with partners on a variety of projects involving conservation of grassland birds in the Mountain-Prairie Region and beyond.

This booklet provides a broad overview of some of HAPET's projects and partnerships supporting grassland bird conservation. Products from these projects are available to partners and HAPET encourages opportunities to refine tools to meet partners' conservation delivery needs. For more information about HAPET, please refer to the last two pages of this document. The following contacts are available to discuss opportunities to collaborate and how HAPET can support conservation delivery for your program.

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Rick Bohn

THE POWER OF PARTNERSHIPS

Partners are essential to HAPET's mission and success, filling key roles with data collection, analysis, and — most importantly — conservation delivery. Partners have been vital to the widespread adoption of spatial decision-support tools in the Great Plains. When HAPET first started developing spatial models to guide landscape-scale conservation of grassland birds, some people were reluctant to adopt them, having long focused on fine-grained features like grass height, litter depth, and species composition of vegetation for grassland bird conservation.

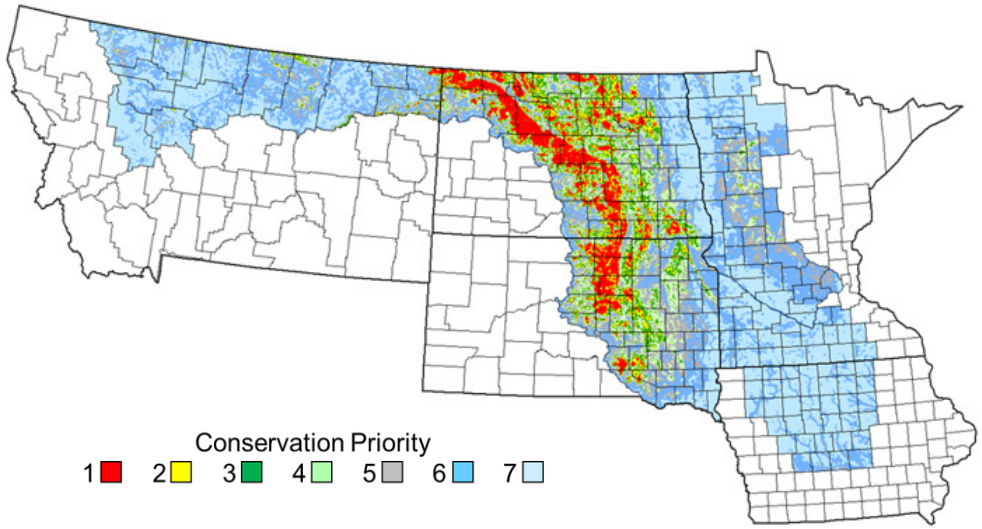
Agencies and groups that adopted use of spatial models have seen the benefits of landscape-level analyses, which have become the standard for conservation planning and delivery. Individuals who might have initially resisted use of spatial models are often now strong supporters of such tools. HAPET commonly receives data requests from developers and consultants who were told by state agency staff that their proposal would not be evaluated unless they used HAPET products. We offer a **huge thank you to our partners**!

THE WATERFOWL FOUNDATION

HAPET began with ducks, and many people think HAPET only works with waterfowl. In reality, HAPET staff have been working with non-waterfowl species for more than 20 years and have developed models and decision-support tools for dozens of non-waterfowl species. Nevertheless, ducks are the foundation of grassland conservation in the PPJV, as they are the primary source of conservation funding in the region.

Waterfowl conservation planning efforts provide data, processing power, and examples that have aided model development for many other species, including grassland birds. HAPET gained extensive experience supporting programs that deliver on-the-ground grassland conservation for waterfowl, which translates into increased expertise and efficiency for conservation of non-waterfowl grassland birds.

HAPET's best-known product is the Thunderstorm Map, named for its resemblance to a radar image of a thunderstorm crossing the region. Even though it was developed for waterfowl, the Thunderstorm Map depicts numbers of duck pairs accessible to upland parcels and is used to target grassland conservation and restoration.



Ducks are grassland birds. Survey data indicate that **more than 90% of breeding waterfowl in the PPJV nest in uplands**. Nesting success is higher where there is more grass, and wetlands embedded in grasslands have higher invertebrate numbers than wetlands in croplands, which benefits egg-laying hens and ducklings by providing protein and energy.

Pertinent HAPET Publications

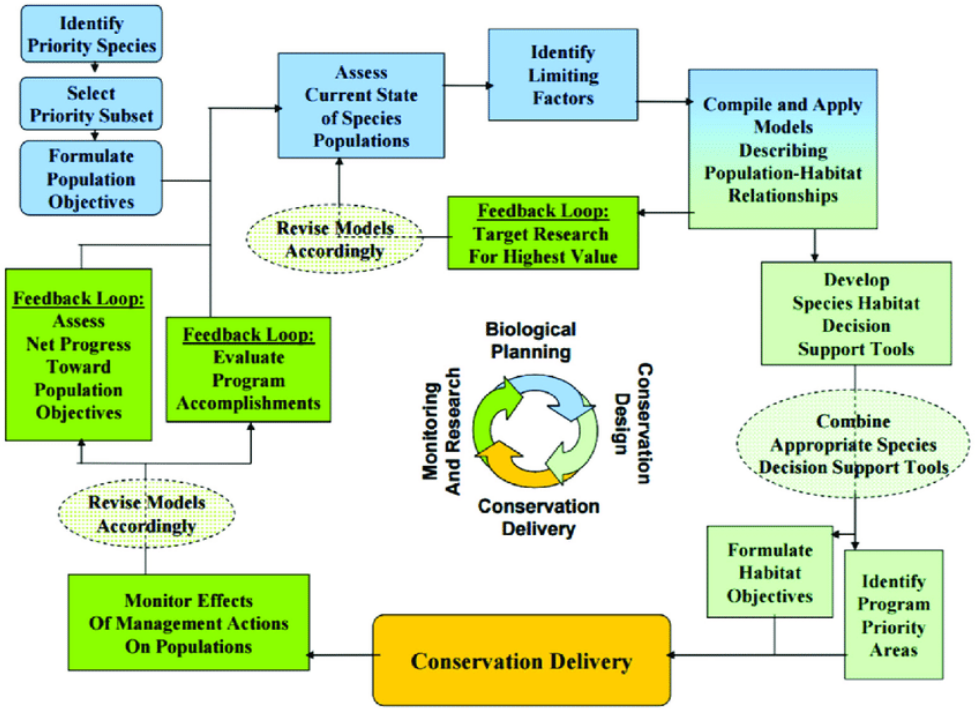
Reynolds, R.E., T.L. Shaffer, R.W. Renner, W.E. Newton, & B.D.J. Batt. 2001. Impact of the Conservation Reserve Program on duck recruitment in the U.S. Prairie Pothole Region. The Journal of Wildlife Management 65:765–780.

Reynolds, R.E., T.L. Shaffer, C.R. Loesch, & R.R. Cox, Jr. 2006. The Farm Bill and duck production in the Prairie Pothole Region: Increasing the benefits. Wildlife Society Bulletin 34:963-974.

STRATEGIC HABITAT CONSERVATION

The SHC framework remains core to everything HAPET does. The foundations of SHC and landscape-scale conservation planning used by the U.S. Fish and Wildlife Service are greatly informed by HAPET. For example, HAPET staff assisted with development of the National Ecological Assessment Team report and the final SHC report. Numerous HAPET products were used to inform and illustrate concepts for Service publications about SHC.

HAPET's extensive experience and application of SHC through partnerships enables HAPET to guide conservation actions within and beyond the U.S. Fish and Wildlife Service. Strategic planning and analysis are at the center of all HAPET efforts to inform programs and conservation delivery. HAPET continually strives to produce science and tools with partners that increase efficiency by enabling surgical placement of conservation treatments, ensuring efficient, transparent, and defensible use of conservation dollars through federal, state, and partner programs.



By being embedded in the field and working with refuge managers, Joint Ventures, external partners, and the Realty and Partners for Fish and Wildlife programs, HAPET is uniquely positioned to leverage the SHC cycle of monitoring and research, biological planning, conservation design, and conservation delivery.

Pertinent HAPET Publications

National Ecological Assessment Team. 2006. Strategic Habitat Conservation: Final Report of the National Ecological Assessment Team. U.S. Fish and Wildlife Service, Washington, D.C.

National Technical Assistance Team. 2008. Strategic Habitat Conservation Handbook: A Guide to Implementing the Technical Elements of Strategic Habitat Conservation (Version 1.0). U.S. Fish and Wildlife Service, Washington, D.C

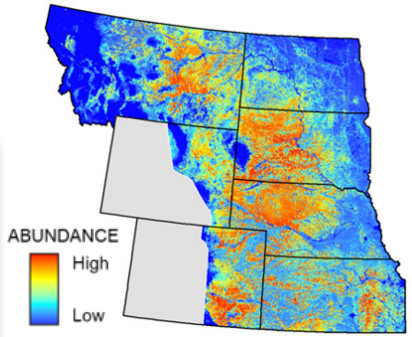
Niemuth, N.D., R.E. Reynolds, D.A. Granfors, R.R. Johnson, B. Wangler, & M.E. Estey. 2008. Landscape-level planning for conservation of wetland birds in the U.S. Prairie Pothole Region. Pages 533-560 in Models for Planning Wildlife Conservation in Large Landscapes, J.J. Millspaugh & F.R. Thompson, III, eds. Elsevier Science

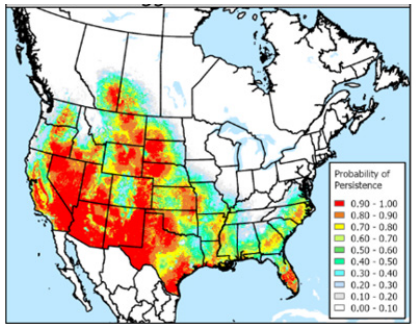
Niemuth, N.D., M.E. Estey, & R.E. Reynolds. 2009. Data for developing spatial models: criteria for effective conservation. Pages 396-411 in Proceedings of the Fourth International Partners in Flight Conference 2008, T.D. Rich, C.D. Thompson, D. Demarest, & C. Arizmendi, eds.

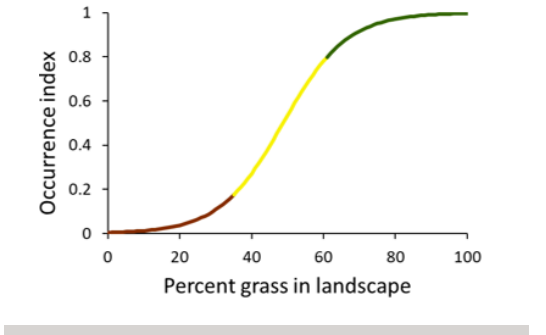
TARGETING CONSERVATION
FOR GRASSLANDS AND GRASSLAND BIRDS

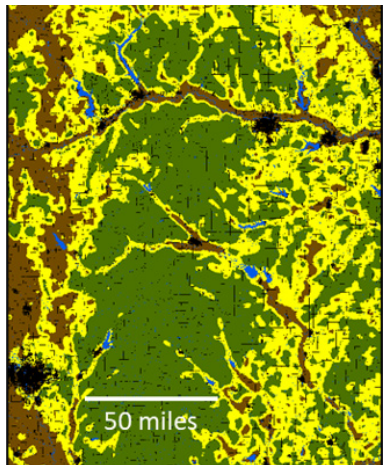
HAPET has developed spatial targeting tools depicting species occurrence, density, reproductive success, or population persistence for dozens of grassland species. These tools consider many conservation treatments including grassland preservation, restoration, enhancement, and tree removal. HAPET's geographic coverage has grown with its taxonomic coverage, and many spatial models and decision-support tools now cover the lower 48 states and southern Canada.

Models depicting occurrence and abundance of Grasshopper Sparrow (left) and predicted long-term persistence of Loggerhead Shrike (right) provide guidance for habitat protection, enhancement, and restoration to conserve populations of declining grassland birds. Models can also be used to help site development to reduce impacts to wildlife. HAPET has empirical models for more than 50 species of grassland birds and is developing more.









UPLAND TREATMENT
Protect and enhance
Restore
Water
Developed
Extensive restoration required

Spatial models like those above are the main focus in conservation planning, but relationships associated with models provide the foundation for conservation delivery. Plotted relationship (far left) quantifies biological values associated with grass that are used to identify conservation treatments in the Flint Hills of Kansas (left).

Pertinent HAPET Publications

Niemuth, N.D., M.E. Estey, & C.R. Loesch. 2005. Developing spatially explicit habitat models for grassland bird conservation planning in the Prairie Pothole Region of North Dakota. Pages 469-477 in Proceedings of the Third International Partners in Flight Conference 2002, C.J. Ralph & T.D. Rich, eds. USDA Forest Service PSW-GTR-191, Albany, CA.

Ribic, C.A., R.R. Koford, J.R. Herkert, et al. 2009. Area sensitivity in North American grassland birds: patterns, processes, and research needs. Auk 126:233-244.

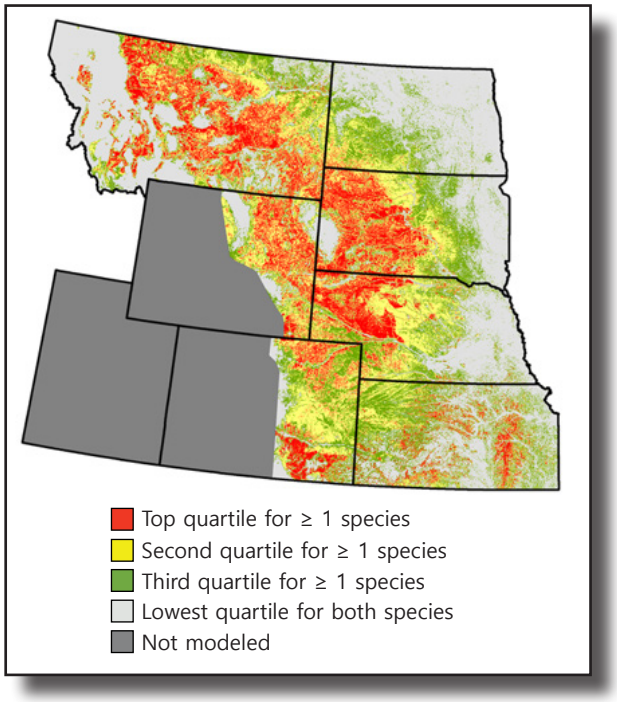
Herse, M.R., M.E. Estey, P.J. Moore, et al. 2017. Landscape context drives breeding habitat selection by an enigmatic grassland songbird. Landscape Ecology 32:2351-2364.

Niemuth, N.D., M.E. Estey, S.P. Fields, et al. 2017. Developing spatial models to guide conservation of grassland birds in the U.S. Northern Great Plains. Northern Great Plains. The Condor 119:506-525. (This publication and the process it documents was the basis for a USFWS Superior Service Award)

Niemuth, N.D., K.W. Barnes, & R. Iovanna et al. In prep. Landscape, climate, and population characteristics predict local extirpation of North American temperate-breeding grassland birds.

INFORMING A WELL-OILED MACHINE

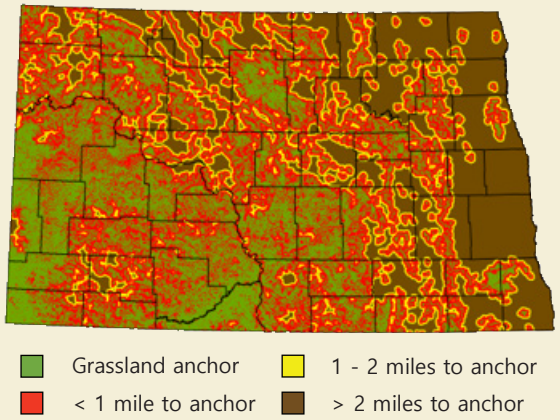
HAPET tools are of limited value unless they are used to improve conservation delivery. Fortunately, the FWS Realty and Partners for Fish and Wildlife programs, along with refuge managers and many external partners, have great people and processes in place to protect, enhance, and restore grassland bird habitat. HAPET works closely with these groups, often tailoring tools to meet partner objectives. Partner resources and relationships are critical to quickly and efficiently turning funding into effective on-the-ground conservation.



Declining populations of grassland birds prompted Pheasants Forever and the South Dakota Partners for Fish and Wildlife program to apply for a conservation grant from the National Fish and Wildlife Foundation, focusing on Western Meadowlark and Grasshopper Sparrow. Following our modular or "tool kit" approach to conservation planning, HAPET staff combined species-specific models we had previously developed to evaluate a multi-state region and prioritize areas where the target species were most likely to occur.

To date, conservation efforts in the area have enhanced 44,500 acres (more than 69 square miles!) of private rangeland, improving habitat quality for grassland birds. Equally important, these actions enhance profitability for ranchers, thereby helping ensure the long-term viability of ranching operations and continued presence of the grasslands on which grassland bird species depend.

HAPET staff worked with the North Dakota Game and Fish Department to develop a spatial targeting tool for the Meadowlark Initiative, a $20-million, 14-partner grassland conservation effort anchored by a $7-million grant from the Natural Resource Conservation Service's Regional Conservation Partnership Program. The final model optimizes biological value, risk of conversion, and landowner opportunity to benefit 48 state-priority, grassland-dependent wildlife species.

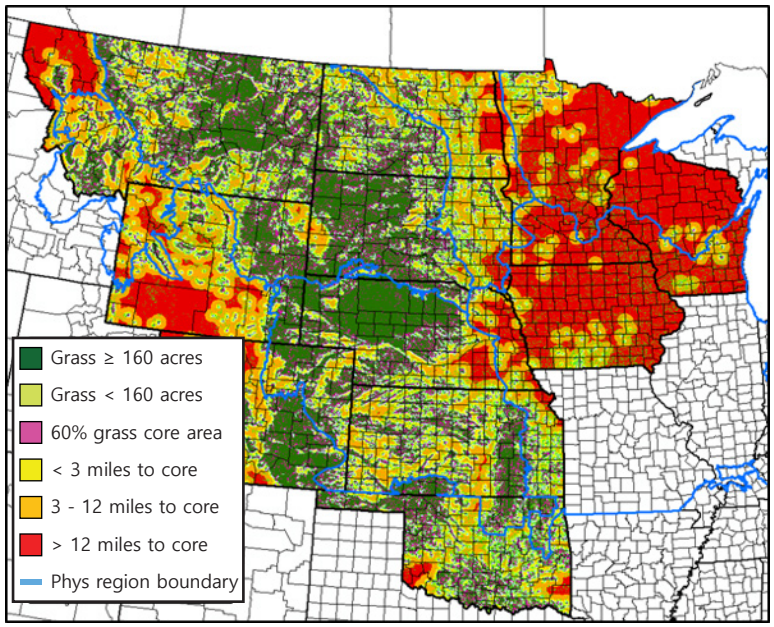


Green indicates large, anchor grasslands where grassland enhancement can be implemented. Red and yellow indicate areas within 1 or 2 miles, respectively, of anchor grasslands; these zones can be targeted for enhancement of existing grasslands or re-creation of grasslands to increase patch size and connectivity. Areas in brown are lower priority because of their distance from anchor grasslands.

NON-MIGRATORY GRASSLAND BIRDS

As non-migratory species, upland gamebirds generally do not fall under the jurisdiction of the USFWS. However, the economic importance, social importance, and area sensitivity of prairie grouse make them priorities for many conservation plans and valuable flagships for grassland conservation. Upland game birds are also valuable for advancing partnerships with state agencies, NGOs, and the public. HAPET is partnering with state agencies and other groups to assist with monitoring, research, and conservation design that informs programs to conserve multiple species of upland gamebirds.


Greg Kramos



Prairie grouse such as the Greater Prairie Chicken (left) are area-sensitive species that exhibit a strong metapopulation structure, making them excellent candidates for spatially explicit conservation planning, habitat protection, and habitat restoration. HAPET habitat summaries (above) portray status and guide options for management treatments. The large blocks of structurally diverse habitat that prairie grouse require support many other species of grassland wildlife.

Pertinent HAPET Publications

Niemuth, N.D. 2000. Land use and vegetation associated with greater prairie chickens in an agricultural landscape. Journal of Wildlife Management 64:278-286.

Niemuth, N.D. 2003. Identifying landscapes for greater prairie chicken translocation using habitat models and GIS: a case study. Wildlife Society Bulletin 31:145-155.

Niemuth, N.D. & M.S. Boyce. 2004. Influence of landscape composition on sharp-tailed grouse lek location and attendance in Wisconsin pine barrens. Ecoscience 11:209-217.

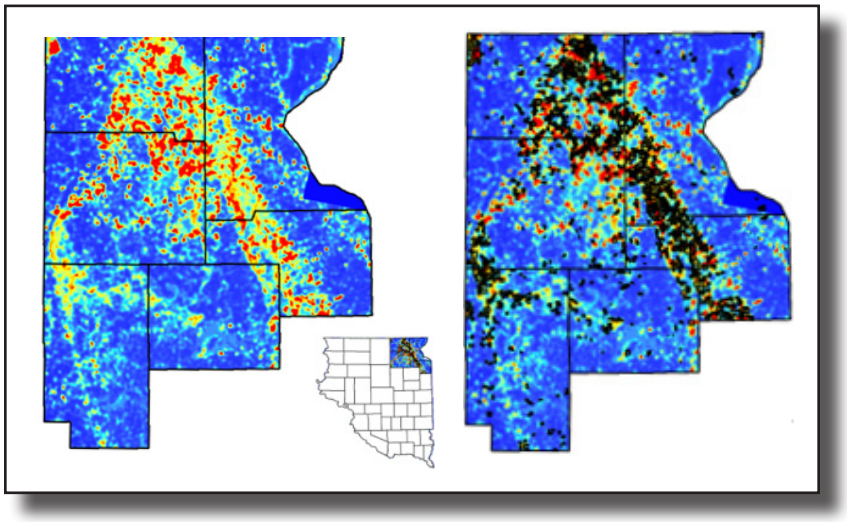
Niemuth, N.D. 2005. Landscape composition and greater prairie-chicken lek attendance: implications for management. Prairie Naturalist 37:127-142.

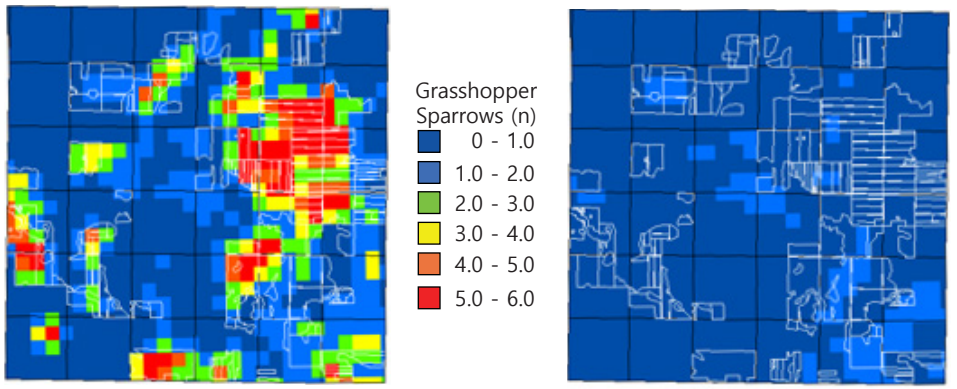
Niemuth, N.D. 2011. The development and application of spatially explicit habitat models to guide conservation of prairie grouse. Studies in Avian Biology 39:3-20.

Runia, T.J., A.J. Solem, N.D. Niemuth, & K.W. Barnes. 2021. Spatially explicit habitat models for prairie grouse: implications for targeted conservation and improved population monitoring. Wildlife Society Bulletin 45:36-54. (Recipient of The Wildlife Society's 2022 Wildlife Restoration Award—Wildlife Research and Surveys)

EVALUATING CONSERVATION

Determining the biological benefits resulting from conservation efforts is important for demonstrating the value of programs, engaging partners, and garnering support, both internally and externally. Many program assessments take place at local scales, which provide accurate results but are difficult to implement across the broad geographies associated with landscape-level conservation. By using spatial models, HAPET can evaluate conservation efforts across broad geographies, quantify benefits, and identify opportunities for improvement.





HAPET analysis shows that the predicted number of Grasshopper Sparrows in a civil township in McLean County, North Dakota, was much greater with CRP grasslands (left) than without CRP grasslands (right). White lines are boundaries of CRP fields; black lines are section lines at 1-mile intervals. Models indicate that during peak enrollment, planted CRP grasslands harbored >25% of North Dakota's Grasshopper Sparrows.

Warm colors show areas most likely to be used by Bobolinks in northeastern South Dakota (left); black hatching (right) shows grass easements and PFW grazing treatments for the same geography. Bobolinks reach some of their highest continental densities in the Dakotas.

Pertinent HAPET Publications

Reynolds, R.E., C.R. Loesch, B. Wangler, & T.L. Shaffer. 2007. Waterfowl Response to the Conservation Reserve Program and Swampbuster provision in the Prairie Pothole Region, 1992–2004. Report prepared for the United States Department of Agriculture Farm Service Agency, Reimbursable Funds Agreement 05-IA-04000000-N34.

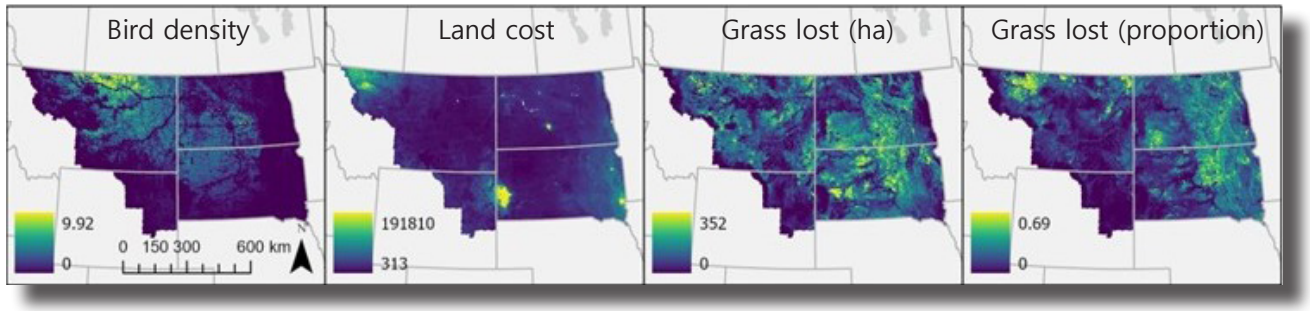
Niemuth, N.D., F.R. Quamen, D.E. Naugle, et al. 2007. Benefits of the Conservation Reserve Program to grassland bird populations in the Prairie Pothole Region of North Dakota and South Dakota. Report prepared for the US Department of Agriculture Farm Service Agency. RFA OS-IA-04000000-N34.

Fields, S.P., K.W. Barnes, N.D. Niemuth, et al. 2017. Developing decision-support tools for optimizing retention and placement of Conservation Reserve Program grasslands in the Northern Great Plains for grassland birds. Report prepared for the United States Department of Agriculture Farm Service Agency, Reimbursable Fund Agreement 16-IA-MRE CRP TA 5.

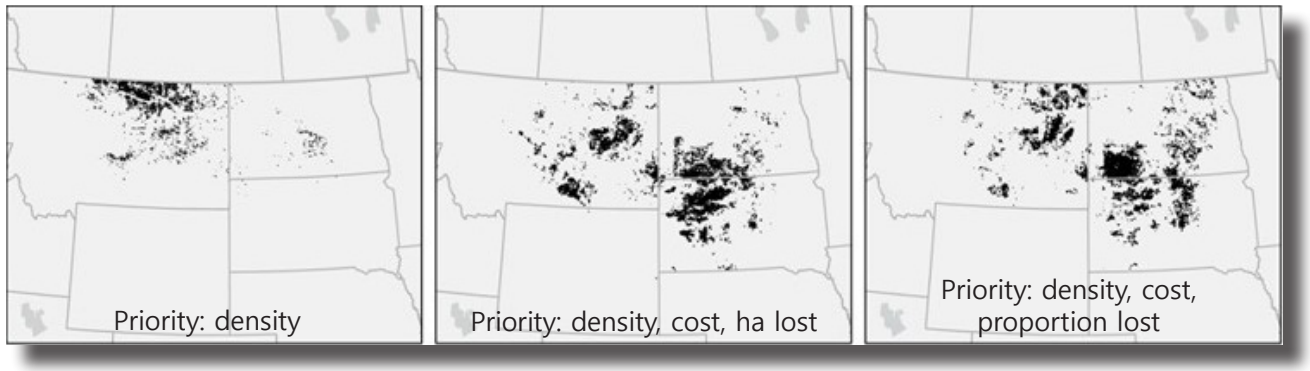
MAKING SHC MORE STRATEGIC

Many people think Strategic Habitat Conservation (SHC) is a simple matter of using spatial models to identify areas of high density (the "core" or "best" places), then implementing conservation in those areas. In reality, SHC considers many additional factors, including conservation treatments, population status, risk of habitat loss, cost of conservation treatments, and opportunity for implementing conservation.

HAPET is working on multiple projects to optimize conservation actions to increase the effectiveness and efficiency of conservation efforts. Although there are many good reasons for focusing on species' cores, consideration of cost, risk, and options for implementation can dramatically change areas identified as priorities for conservation and better inform conservation decisions. HAPET works closely with program managers to tailor decision-support tools for individual program needs and priorities to effect desired outcomes.



Density of Chestnut-collared Longspur varies spatially (left), as do land costs, predicted future grassland lost, and predicted proportion lost from 2019-2038.



Priority areas for Chestnut-collared Longspur conservation change dramatically from a bird density-only strategy (left) when cost and risk of conversion are considered (middle and right).

Pertinent HAPET Publications

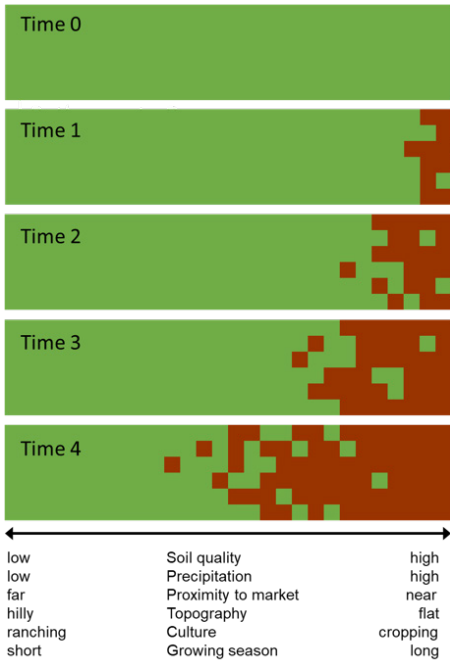
Niemuth, N.D., M.E. Estey, & R.D. Pritchert. 2021. Developing useful spatially explicit habitat models and decision-support tools for wildlife management. Pages 173-193 in Wildlife management and landscapes: principles and applications, W.F. Porter, C.J. Parent, R.A. Stewart, & D.M. Williams, editors. Johns Hopkins University Press in affiliation with The Wildlife Society, Baltimore, MD, USA.

Niemuth, N.D., K.W. Barnes, T.J. Runia, et al. In prep. Conservation of declining grassland birds: why protecting the "best of the best" might not be best.

Barnes, K.W., N.D. Niemuth, et al. In prep. Consideration of cost and conversion risk alters landscape priorities for conservation of declining grassland birds.

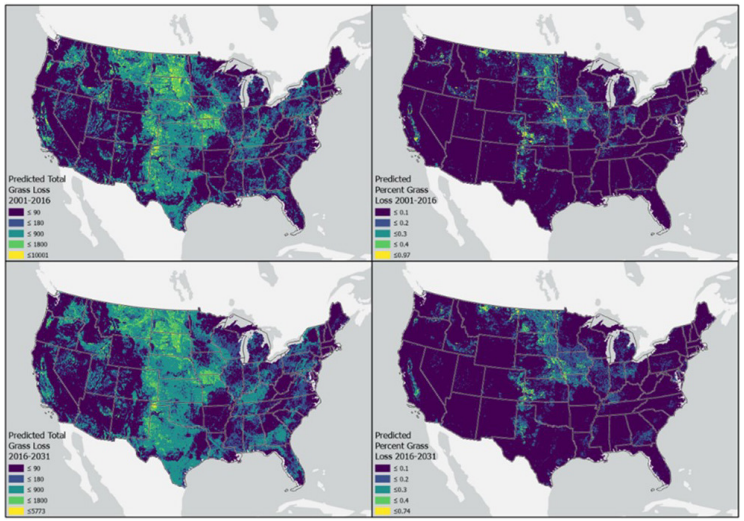
EVALUATING LOSS & RISK

Understanding factors influencing grassland loss and being able to predict risk of future loss are critical to effective and efficient conservation of grassland birds. HAPET is working on multiple projects – several in conjunction with the USDA – that assess grassland conversion. Tools we develop can be used to guide placement of CRP, project future landscape conditions, and optimize conservation actions to benefit populations of declining grassland wildlife species.



HAPET's research into grassland loss uses landscape patterns that emerge from grassland conversion to make inferences about status, conversion rates, and wildlife populations across broad regions.

These patterns and relationships form the foundation of multiple conservation planning tools and provide a basis for landscape prioritization, resource allocation, and conservation targeting.



HAPET'S mechanistic model of grassland conversion uses patterns shown on the left in conjunction with environmental predictors to characterize total and proportion grass loss for past and future time frames across the contiguous United States.

Pertinent HAPET Publications

Arora, G., H. Feng, D.A. Hennessy, C.R. Loesch, & S. Kvas. 2021. The impact of production network economies on spatially-contiguous conservation – theoretical model with evidence from the U.S. Prairie Pothole Region. Journal of Environmental Economics and Management 107:102442.

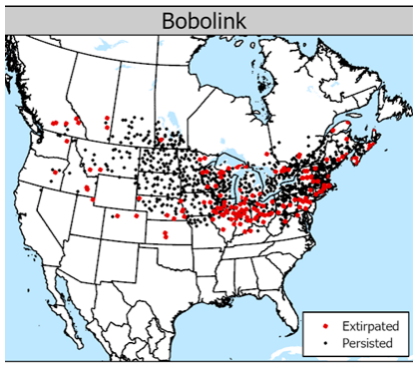
Niemuth, N.D., K.W. Barnes, J.D. Tack, and R. Iovanna. 2022. Past is prologue: historic landcover patterns predict contemporary grassland loss in the U.S. Northern Great Plains. Landscape Ecology 37:30113027.

Barnes, K.W., N.D. Niemuth, & R. Iovanna. In prep. Existing land use and socioeconomic factors drive landscape-scale grassland conversion in the contiguous United States.

Niemuth, N.D., K.W. Barnes, & R. Iovanna. In prep. Directional land-use change in the U.S. Great Plains: margins, thresholds, and implications for conservation of grassland birds.

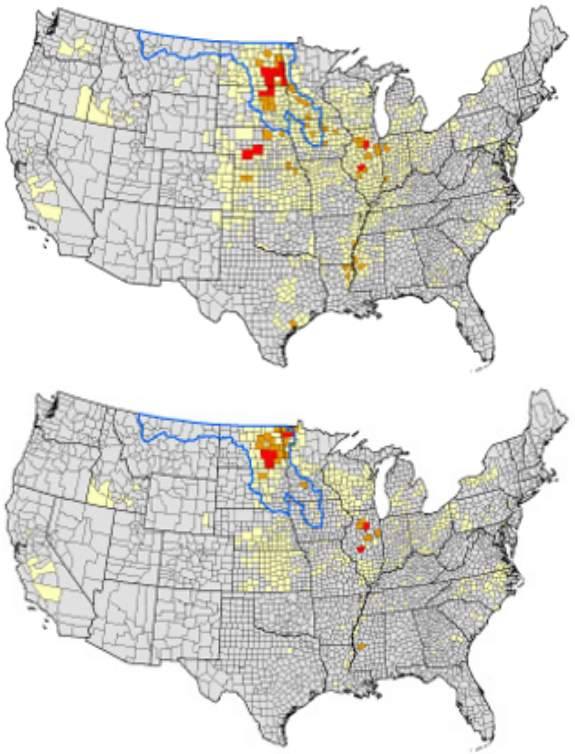
GRASSLAND CONSERVATION
UNDER A CHANGING CLIMATE

The specter of climate change looms large across the globe, but especially in the Great Plains, where already tenuous moisture conditions, intensifying land use, and availability of drought-resistant crops are greatly affecting grasslands and grassland-dependent wildlife. HAPET is working on multiple analyses and cooperative projects investigating how climate change might affect grassland wildlife, along with possible solutions to limit negative consequences of climate change on priority species.



Climate and land use were strong predictors of the extirpation (red) of local populations of grassland birds in a recent HAPET analysis.

Large numbers of extirpations on the southern edge of Bobolink range support other research indicating that Bobolinks are strongly influenced by climate change.



HAPET research suggests that climate change effects are interwoven with many other stressors, like cropland expansion, and that climate-related land-use change will likely be more problematic than direct effects such as increased temperatures and altered precipitation regimes. For example, county-level increases in corn (upper) and soybean acreage (lower) from 1997-2007 were greatest in the Great Plains, particularly the Prairie Pothole Joint Venture (blue outline).

Pertinent HAPET Publications

Loesch, C.R., R.E. Reynolds, and L.T. Hansen. 2012. An assessment of re-directing breeding waterfowl conservation relative to predictions of climate change. Journal of Fish and Wildlife Management 3:1–22.

Czech, B., S. Covington, T.M. Crimmins, et al. 2014. Planning for Climate Change on the National Wildlife Refuge System. Washington, DC. 132 pp.

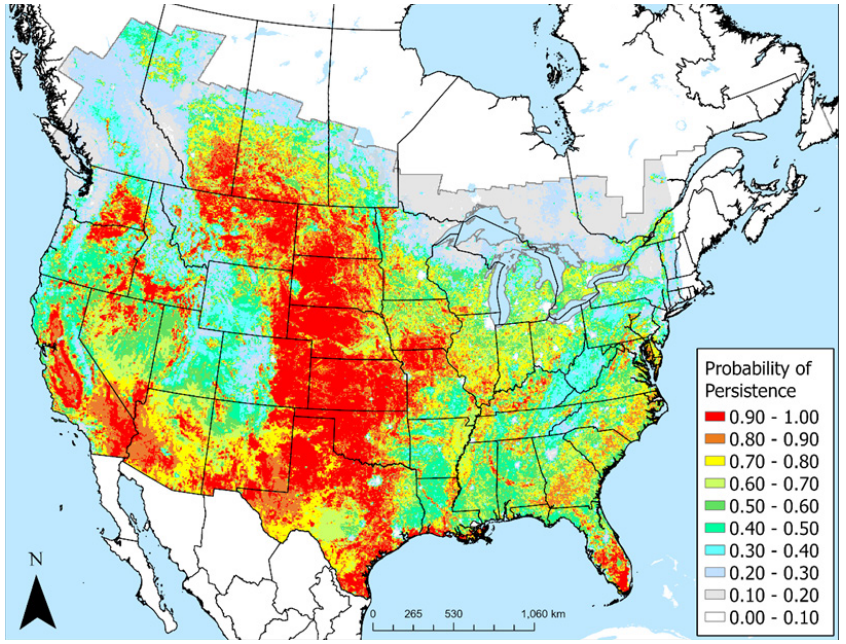
Niemuth, N.D., K.L. Fleming, & R.R. Reynolds. 2014. Waterfowl conservation in the U.S. Prairie Pothole Region: confronting the complexities of climate change. Public Library of Science One 9(6):e100034.

Maresh Nelson, S.B., C.A. Ribic, N.D. Niemuth, J. Bernath-Plaisted, & B. Zuckerberg. In review. Responses of grassland birds to climate variability in North America: Implications for climate-change impacts.

BETTER UNDERSTANDING BIRD POPULATIONS

Collecting and analyzing bird survey data are not only critical to understanding population status and trends but also to effective conservation planning and management as well as development of species distribution models and spatially explicit decision-support tools. HAPET is involved with a variety of survey efforts related to grassland birds, ranging from the North American Breeding Bird Survey (BBS) to regional and local efforts that assess trends, habitat use, potential stressors, and effects of roads and survey timing on detection.

HAPET makes extensive use of data from the BBS. The BBS is a rigorous, long-term survey that supports a multitude of analyses and enables insights across broad geographies. HAPET pioneered the development of spatial models using stop-level BBS data; such models are increasingly being used for conservation planning across the U.S. and Canada.



HAPET is working on multiple projects to evaluate factors influencing grassland bird population trends at local, state, national, and international scales. Results will be used to identify conservation treatments that may help stabilize declining populations of grassland birds. This persistence model for Grasshopper Sparrow indicates low risk of population loss in red zones with conservation need in other zones varying with geography.

Pertinent HAPET Publications

Niemuth, N.D., A.L. Dahl, M.E. Estey, & C.R. Loesch. 2007. Representation of landcover along Breeding Bird Survey routes in the northern plains. Journal of Wildlife Management 71:2258-2265.

U.S. Geological Survey. 2007. Strategic Plan for the North American Breeding Bird Survey: 2006-2010. U.S. Geological Survey Circular 1307. 19 pp.

Niemuth, N.D., J.W. Solberg, & T.L. Shaffer. 2008. Influence of moisture on density and distribution of grassland birds in North Dakota. Condor 110:211-222.

Niemuth, N.D., M.E. Estey, & R.E. Reynolds. 2012. Factors influencing presence and detection of breeding shorebirds in the Prairie Pothole Region of North Dakota, South Dakota, and Montana. Wader Study Group Bulletin 119:37-45.

U.S. Geological Survey and Canadian Wildlife Service. 2021. Strategic Plan for the North American Breeding Bird Survey, 2020–30. U.S. Geological Survey Circular 1466. 10 pp.

Shaffer, T.L., E.A. Roche, T.K, Buhl, & N.D. Niemuth. In prep. Patterns of detection and roadside bias in surveys of grassland birds in the northern Great Plains.

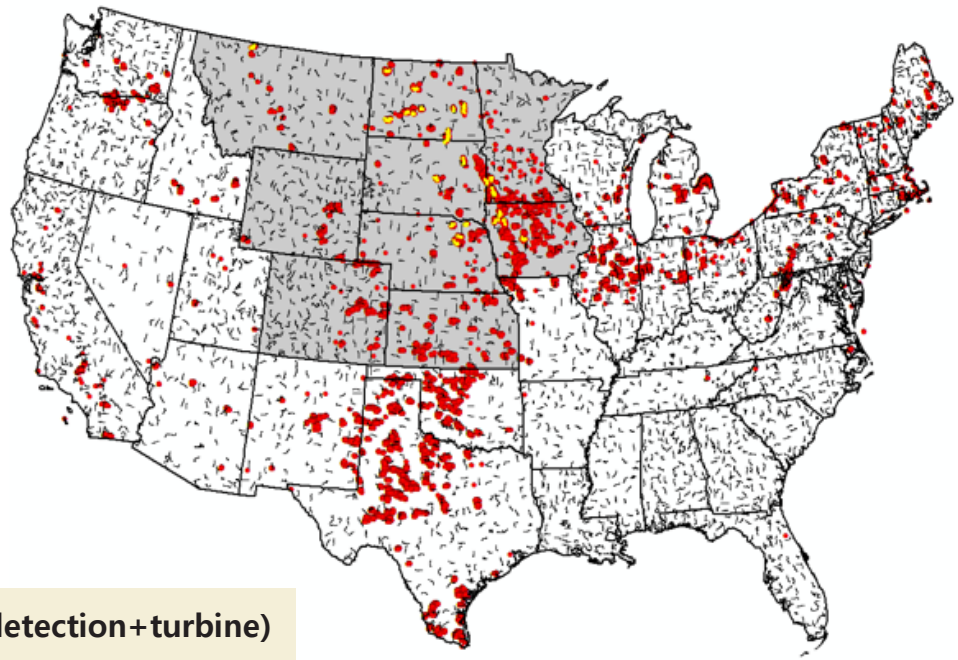
EVALUATING STRESSORS

Most grassland bird species evolved in open environments free from trees or human infrastructure. Many local studies suggest that grassland birds avoid tall anthropogenic structures such as wind turbines and radio towers, as well as areas of human activity such as urban areas, roads, and well pads for extracting oil and gas. Broad-scale effects of infrastructure on grassland birds are poorly known, but HAPET staff and partners are working to better understand how roads, oil extraction, and wind turbines affect bird populations, as well as how to best use HAPET models to avoid, minimize, and offset any negative effects of these stressors.

Bird occurrence and density as a function of environmental predictors and turbines will be evaluated using generalized linear mixed models and multiple years of data. This approach can easily be expanded into additional states or for other stressors.

Bird = f (landscape+climate+weather+topography+detection+turbine)

A project that HAPET is leading will use data from Breeding Bird Survey (BBS) routes (thin black lines) to evaluate effects of wind turbines (red dots) on birds across nine states (gray). Data from regular BBS routes will be supplemented with data from HAPET wind routes (yellow), which follow BBS protocol and will provide a larger sample of stops close to turbines.



Pertinent HAPET Publications

Kiesecker, J.M., J.S. Evans, J. Fargione, et al. 2011. Win-win for wind and wildlife: a vision to facilitate sustainable development. PLoS ONE 6(4):e17566.

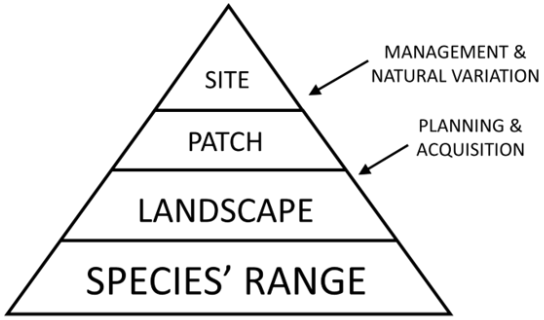
Thompson, S.J., D.H. Johnson, N.D. Niemuth, & C.A. Ribic. 2015. Avoidance of unconventional oil wells and roads exacerbates habitat loss for grassland birds in the North American Great Plains. Biological Conservation 192:82–90.

Shaffer, J.A., C.R. Loesch, & D.A. Buhl. 2019. Estimating offsets for avian displacement effects of anthropogenic impacts. Ecological Applications 29(8):e01983.

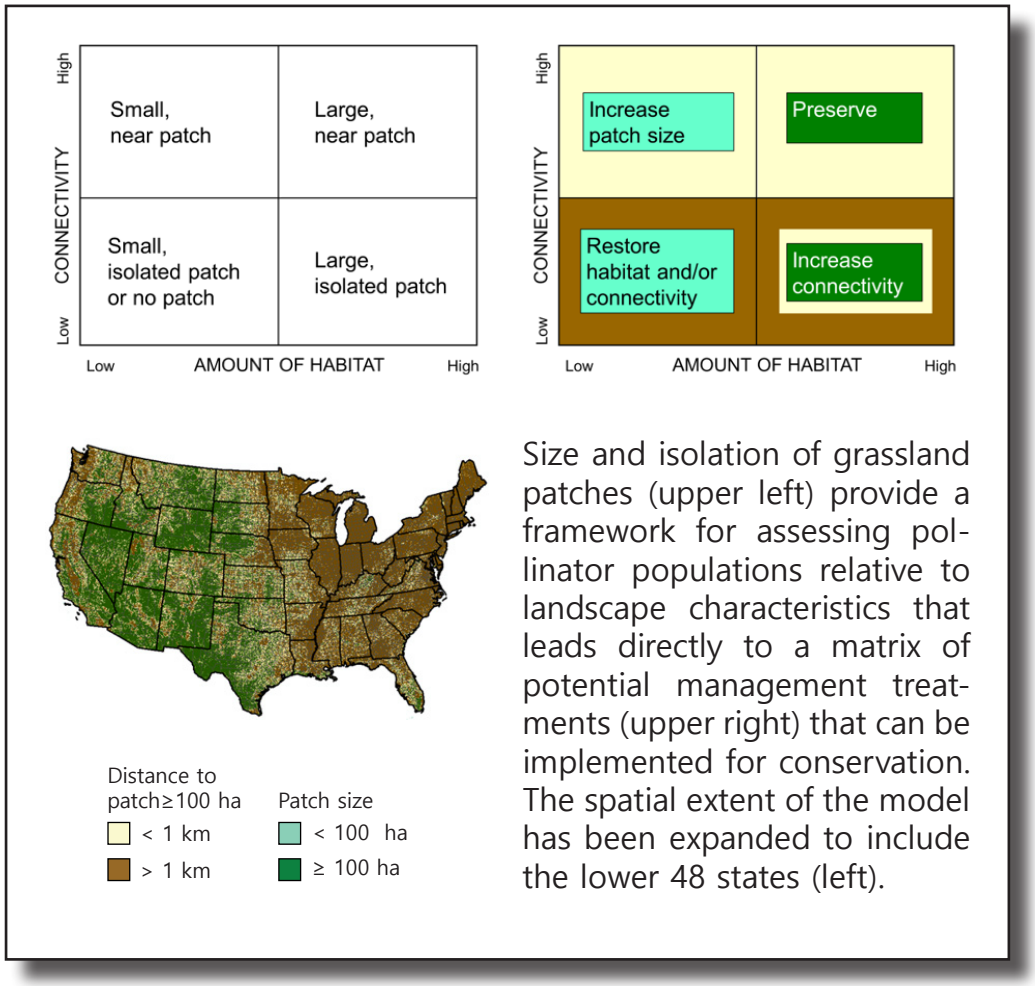
Shaffer, J.A., N.D. Niemuth, C.R. Loesch, et al. 2022. Limited land base and competing land uses force societal tradeoffs when siting energy development. Journal of Fish and Wildlife Management 13:106–123.

MAKING CONNECTIONS FOR POLLINATORS

Populations of many species of pollinators across North America are experiencing steep declines due to habitat loss and degradation. What is less clear, though, is how to best implement conservation to address these declines. In response to requests from multiple partners, HAPET worked with staff from the USDA Natural Resources Conservation Service and Farm Production and Conservation to develop a mechanistic spatial model to guide pollinator conservation efforts. Unlike most bird species HAPET is involved with, insect pollinators are generally non-migratory, hence the importance of connectivity.



The HAPET pollinator model increases benefits of landscape-level planning and local action by recognizing the hierarchical nature of habitat selection and how it influences conservation outcomes. The model also explicitly considers a suite of twelve local conservation actions that can be applied under the umbrella of landscape-level conservation planning.



Size and isolation of grassland patches (upper left) provide a framework for assessing pollinator populations relative to landscape characteristics that leads directly to a matrix of potential management treatments (upper right) that can be implemented for conservation. The spatial extent of the model has been expanded to include the lower 48 states (left).

Pertinent HAPET Publications

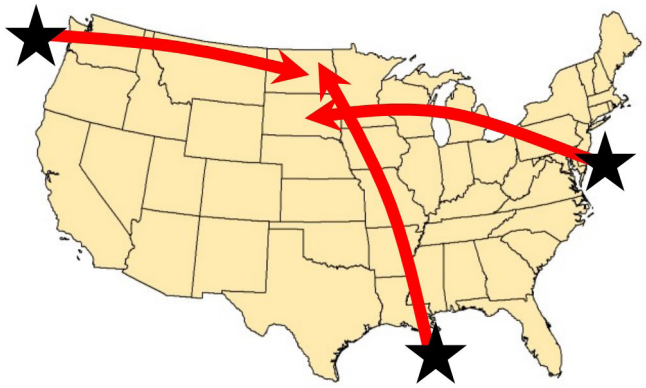
Niemuth, N.D., B. Wangler, J.J. LeBrun, et al. 2021. Conservation planning for pollinators in the U.S. Great Plains: considerations of context, treatments, and scale. Ecosphere 12(7):e03556. 10.1002/ecs2.3556.

LeBrun, J.J., N.D. Niemuth, & R.D. Pritchert. 2021. Assessing pollinator populations across North Dakota. Final report prepared for the Natural Resources Conservation Service Reimbursable Fund Agreement IAA 67-6633-16-509: Pollinators.

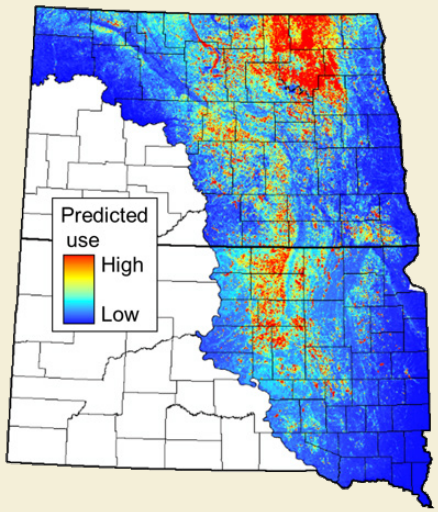
ATTRACTING MONEY FOR GRASSLAND CONSERVATION

HAPET models and decision-support tools for waterfowl, other grassland birds, and pollinators are widely used by internal and external partners to inform conservation and support competitive grant applications. But many people don't know that millions of dollars conserving hundreds of thousands of acres of grasslands have been brought to Region 6 based on the strength of HAPET models, decision-support tools, and partnerships.

For example, HAPET's waterfowl thunderstorm map prompted the USDA to create a Duck Nesting Habitat conservation practice as part of the Conservation Reserve Program, which restored more than 450,000 acres of grasslands (>700 square miles!) across five states. Resulting wetland and grassland complexes improve habitat quality and reproductive success for wetland-nesting species and provide habitat for upland-nesting species, particularly those preferring moist sites such as Bobolink, Nelson's Sparrow, Le Conte's Sparrow, and Sedge Wren.



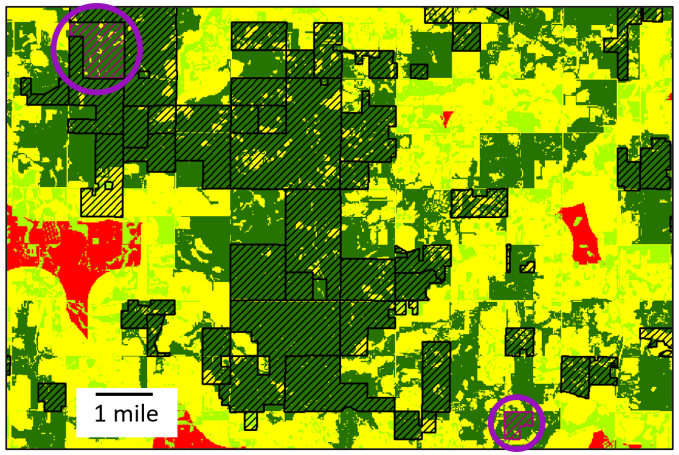
Mitigation for offshore oil spills brings millions of conservation dollars to locations in the Great Plains with some of the highest rates of grassland conversion in the nation. Wetland species were the primary focus of each restoration effort, but in all three cases, adjacent grasslands are also being protected or restored.



More than $6 million is coming to the Dakotas as mitigation for black terns killed by the 2010 Deepwater Horizon oil spill. HAPET models (left) are used to target acquisition of wetland and grassland easements for this effort. Black terns nest only an inch or two above water level, so their nests are extremely susceptible to loss caused by changes in water level. Grasslands surrounding wetlands are being protected to help stabilize wetland water levels and increase black tern nesting success.

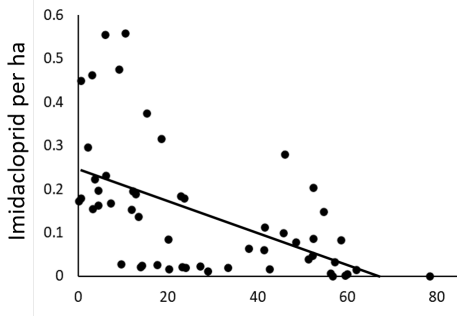
COLLATERAL BENEFITS OF GRASSLAND EASEMENTS

The USFWS Refuges program has the largest permanent grassland conservation program in the Northern Great Plains and has perpetually conserved 1.5 million acres through acquisition of grassland easements. These easements are funded primarily through migratory bird dollars and remain in private ownership, assuring continued tax revenue and agricultural production. In collaboration with the Refuges Division of Realty, the HAPET office created and maintains a spatial easement database to demonstrate the many ecological, societal, and economic benefits provided by easements.

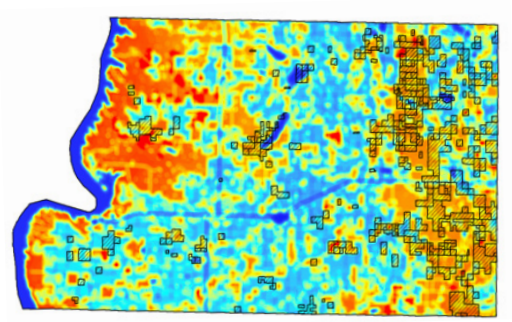


Grassland easements in eastern South Dakota (black hatching) provide habitat and connectivity between parcels of critical habitat (purple) for the Dakota skipper butterfly. Dark green represents patches of mostly native grassland >100 ha; light green represents grasslands <100 ha, yellow represents non-grasslands within 1 km of a patch >100 ha, and red represents non-grasslands >1 km from a patch of grassland >100 ha. About 74% of the grassland easements protected using MBCF funding 2012-2021 were within the top pollinator priority zone identified by a published pollinator metapopulation habitat model.

Grazing is highly compatible with grassland bird conservation, but pasture is in short supply in many locales. Easements and other conservation lands provide benefits for animal-based agriculture as well as wildlife. HAPET is documenting population-level benefits of grazing to grassland birds.



HAPET analysis shows that county-wide neonicotinoid use declines with amount of grass in the county. Easements constitute a large proportion of the grasslands in some counties, contributing to reduced pesticide use and increased pollinator health.



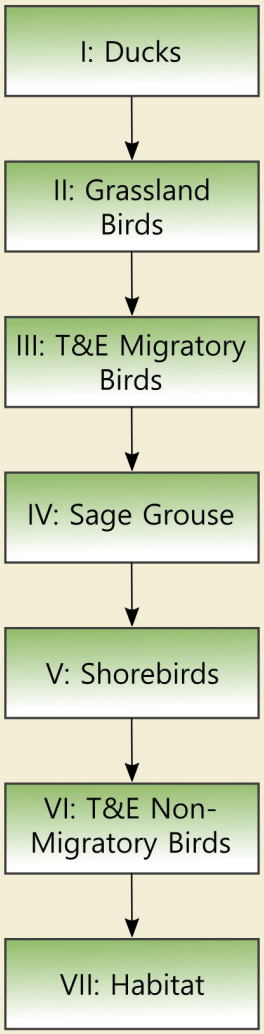
Grassland easements (black hatching) acquired with Duck Stamp dollars protect much Grasshopper Sparrow habitat in eastern Potter County, South Dakota, but little in the western part, where there are few ducks and less waterfowl conservation.

PUTTING THE PIECES TOGETHER

HAPET is justifiably associated with GIS analyses and development of spatial models, but offers many additional tools that make it a comprehensive provider of conservation strategies. HAPET staff work with partners and others to design studies, collect and analyze data, develop proposals, provide technical support, and contribute to various teams and committees. By being stationed in the field, working on projects from conception to application, and receiving continuous feedback from conservation delivery personnel, HAPET is uniquely positioned to develop useful and comprehensive decision-support tools to inform conservation.

HAPET recognizes that conservation actions vary depending on species, available treatments, funding, landowner desires, cost, risk, and landscape context. Consequently, there is no single map or "best place" for conservation. HAPET has adopted a modular or "tool kit" approach to conservation planning, where foundational models and decision-support tools can easily be modified to best meet the needs of specific situations, whether at local, regional, national, or international scales.

Of course, sorting through multiple conservation options can be confusing. To address these concerns, HAPET has developed a hierarchical prioritization process (right) that provides a structured framework for using spatial decision-support tools that is flexible, transparent, and avoids the problems associated with point-based scoring systems. HAPET models and decision-support tools help ensure that conservation practitioners can identify the best place for each treatment and the best treatment for each place in a strategic and comprehensive manner.



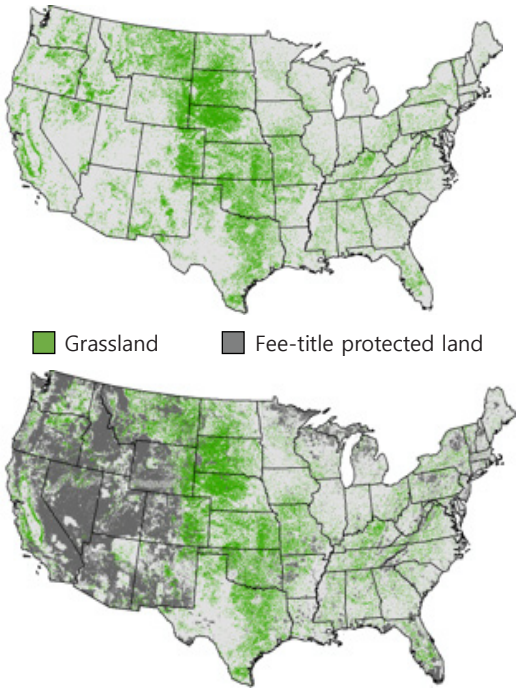
In this example of land parcel prioritization for acquisition of perpetual grassland easements using Migratory Bird Conservation Fund money in the western PPJV, waterfowl are assigned top priority because Duck Stamps are the primary source of funding.

These priorities were developed in consultation with conservation delivery partners and can easily be re-ordered to reflect different funding sources, changes in species status, or priorities of different partners.

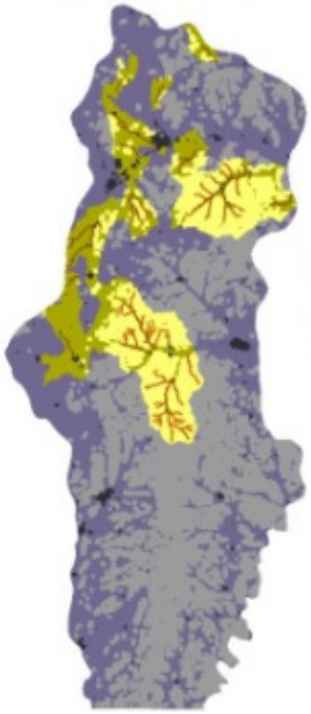
The categories used in this example are just one portion of the hierarchy; other factors include (but are not limited to) treatment type, funding source, program support, cost, risk, state priorities, management practices, and grassland type (native prairie, reconstructed prairie, or other).

LOOKING TO THE FUTURE

HAPET will continue to work with long-term partners such as the PPJV to provide comprehensive, integrated strategies for conservation of grassland birds and other species. Given interest in our products from additional partners across North America, HAPET is expanding its toolkit of models and insights to guide resource allocation and conservation at regional and continental levels, with many more projects than those described here.



Most grasslands in the contiguous U.S. have little fee-title protection relative to other parts of the country, particularly the Intermountain West, underscoring the importance of private-lands conservation in the Great Plains. Declines of grasslands and grassland wildlife are caused by an interplay of social, economic, and ecological factors that vary geographically and among species. HAPET is developing tools to help deliver effective conservation for many species in a variety of settings and conditions.



Topeka Shiner Priority

- A (Stream Segment within FHLCA)
- B (Critical Habitat within FHLCA)
- C (HUC12 within FHLCA)

Even with an expanded geography, HAPET will continue to provide useful tools that evaluate landscape context, risk, cost, and potential on-the-ground actions to optimize conservation efficiency. New remote-sensing technologies, increased computing power, and improved analytical techniques all contribute to increased resolution and power of HAPET's spatial tools. The taxonomic coverage of HAPET tools is also expanding, as evidenced by a model of grassland prority conservation areas for the Topeka Shiner in the Flint Hills Legacy Conservation Area of Kansas.

Pertinent HAPET Publications

Prairie Pothole Joint Venture. 2005. Prairie Pothole Joint Venture 2005 Implementation Plan. Prairie Pothole Joint Venture, Denver, Colorado.

Doherty, K.E., A.J. Ryba, C.L. Stemler, N.D. Niemuth, & W.A. Meeks. 2013. Conservation planning in an era of change: state of the U.S. Prairie Pothole Region. Wildlife Society Bulletin 37:546-563.

Fields, S.P., & N.D. Niemuth. 2018. Landbird Plan. Prairie Pothole Joint Venture Implementation Plan, Pages 5.1-5.27. Prairie Pothole Joint Venture, Denver, Colorado.

Somershoe, S.G. (editor). 2018. A full annual-cycle conservation strategy for Sprague's Pipit, Chestnut-collared and McCown's Longspurs, and Baird's Sparrow. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Niemuth, N.D., & K.W. Barnes. In Prep. Grassland bird population trends vary with geography, taxonomy, and response to human development.

HAPET - PAST & PRESENT

PROGRAM & IMPACTS

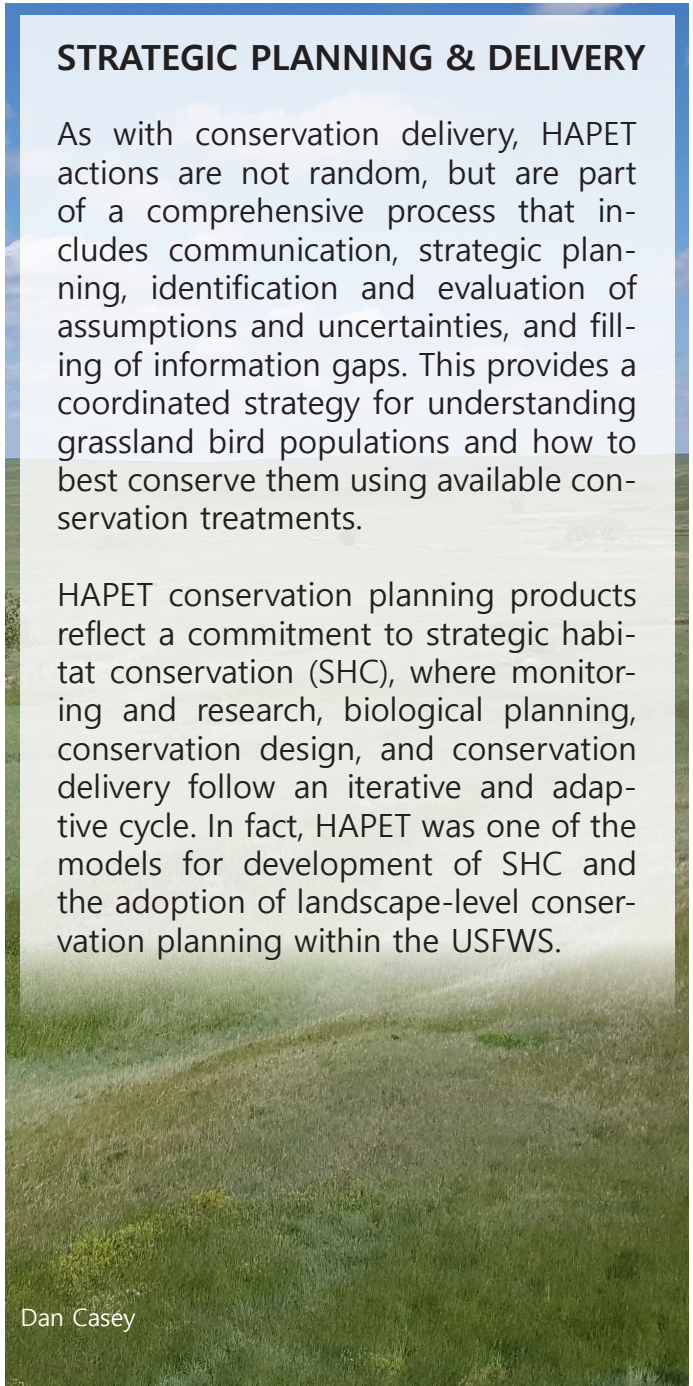
HAPET's chief activity is the development of tools to guide the USFWS Refuges program's expenditure of Migratory Bird Conservation Fund ("Duck Stamp") dollars to acquire perpetual wetland and grassland easements in the Prairie Pothole Joint Venture. The USFWS Refuges program has the largest perpetual grassland conservation program in the Great Plains, dwarfing delivery by any other program. The Region 6 and Region 3 Refuges Realty programs acquired more than 111,000 acres (>170 square miles!) of perpetual grassland easements in FY2022 and expect to acquire an equal or larger number of acres in FY2023.

Similarly, the USFWS Partners for Fish and Wildlife program restores grasslands and implements term conservation agreements with private landowners across millions of acres in the Great Plains. Whether easements, restoration projects, or grazing systems, none of these acts of conservation are random, but rely on strategic goals and tactics along with HAPET models and decision-support tools to increase efficiency and effectiveness of conservation actions.

STRATEGIC PLANNING & DELIVERY

As with conservation delivery, HAPET actions are not random, but are part of a comprehensive process that includes communication, strategic planning, identification and evaluation of assumptions and uncertainties, and filling of information gaps. This provides a coordinated strategy for understanding grassland bird populations and how to best conserve them using available conservation treatments.

HAPET conservation planning products reflect a commitment to strategic habitat conservation (SHC), where monitoring and research, biological planning, conservation design, and conservation delivery follow an iterative and adaptive cycle. In fact, HAPET was one of the models for development of SHC and the adoption of landscape-level conservation planning within the USFWS.



Dan Casey

SCIENCE & ORGANIZATION

Even though our primary focus is conservation delivery, HAPET products are generally published in the peer-reviewed literature. Review provides useful insights that improve our products, while publication increases awareness of HAPET efforts and frequently leads to collaboration with conservation professionals across North America. Most sections in this document are followed by a chronological list of pertinent publications involving HAPET staff, including some that represent current projects and are still in preparation. Each publication is listed once, in the section most relevant to its content, but most publications are pertinent to multiple topics related to grassland conservation.

HAPET is funded by the USFWS Region 6 and Region 3 Refuges and Migratory Bird programs and the Prairie Pothole Joint Venture. HAPET staff are located in Fergus Falls, Minnesota; Bismarck, North Dakota; Missoula, Montana; and Hadley, Massachusetts. HAPET also receives support from refuge and wetland management district staff as well as staff from other Service and external programs.

LEARN MORE

Staff from HAPET and the PPJV are always happy to discuss conservation planning and delivery. If you or your group would like to learn more about the work described in this document or other projects that HAPET is involved with, please contact any of the people at right or visit the HAPET web page or PPJV website. USFWS personnel can also visit the HAPET Sharepoint site.

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