INTERMOUNTAIN WEST JOINT VENTURE

User Guide

For more information about this app or supporting research please contact Patrick Donnelly, IWJV/USFWS Migratory Bird Program <u>patrick donnelly@fws.gov</u> | 406.493.2539 For assistance using the app, contact Teagan Hayes, IWJV Science to Implementation Specialist <u>teagan.hayes@iwjv.org</u>

The sandhill crane app provides a road map to support spatially targeted wetland and riparian conservation across private, public, and tribal lands. Interactive maps identify core sandhill crane breeding areas and key stopover locations used during spring and fall migrations. Management actions that preserve wetland habitats and beneficial agricultural practices in these areas maintain flyway function through focused investments in ecological networks sustaining migratory waterbirds.

Summer Range

The summer ranges of the Central Valley, Lower Colorado River Valley, and Rocky Mountain sandhill crane populations are outlined by dark gray polygons. Summering is defined as the period between spring and fall migration from March to September. It includes the breeding period for birds that are defending traditional territories (20-40 acres), nesting, and raising colts. Summering "non-breeding" sandhill cranes use the same habitats as breeding birds but are not typically associated with a territory, often residing in a relatively small home range of three to 24 square miles, depending on the individual and habitat configuration.

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Shaded areas in the summering range indicate the likelihood of sandhill crane presence, ranging from low (blue) to moderate (green) to high (red). Core sandhill crane summer range is defined by areas of moderate to high occurrence probabilities. The more green or red on the map, the higher the likelihood of sandhill cranes using the area.

Migration Network

Sandhill cranes use a predictable network of <u>stopover</u> <u>sites</u> to rest and refuel during migration. Conservation of these locations has been prioritized by studying the movement ecology of roughly 150 GPS-tagged birds from 2014-2022 to determine which habitats and stopover locations are important to maintaining migratory connectivity. Results show that sandhill cranes make decisions to minimize the energetic demands of flight by consistently following network pathways that minimize travel distance. Stopover locations maintaining the shortest travel distances (i.e., lowest energetic costs) were most important for the conservation of migration connectivity.



Migration Network (continued)

Circles on the map represent stopover sites. Circle size varies by stopover location to encompass wetland, riparian, and agricultural resources tied to observed bird use. Not all areas within stopover circles represent sandhill crane migration habitat. For example, bird use and habitat in the Middle Rio Grande Valley, New Mexico, is concentrated along the Rio Grande (river) floodplain, but the circle also includes adjacent desert grasslands.

Circle colors signify connectivity priority and are ranked as "essential," "high," "moderate," and "low." The size and location of stopover circles can differ between spring and fall migration due to seasonal changes in habitat conditions, as well as sandhill crane nutritional demands. Stopover locations frequently overlap core summer range and may be an indicator of higher landscape value due to cross-seasonal habitat benefits.



Identifying Threats & Informing Conservation Design

Increasing water scarcity driven by warming temperatures and prolonged droughts are impacting wetland and riparian systems supporting sandhill cranes and other wetland-dependent wildlife. Recent research identifies temporary wetlands as the most important habitat for predicting summering sandhill crane distributions. Accelerated drying of these wetland systems is occurring over most of the sandhill crane summer range, raising concerns over the long-term resilience of these habitats (Figure 1).

Identifying solutions to preserve land use practices that maintain the resilience of wetland and riparian systems used by sandhill cranes will be crucial to conserving populations. For example, flood-irrigated grass hay production for livestock ranching provides 60 percent of the temporary wetlands supporting core summering sandhill crane habitats. Further, over 92 percent of grass hay irrigation is concentrated in historical riparian systems linked to ecosystem services sustaining floodplain processes driving wetland hydrology and groundwater recharge. Solutions to offset climate change through adopting more efficient irrigation infrastructure (e.g., pressurized pipes and center pivot sprinklers) frequently view grass hay flood

Wetland Drying



Figure 1. Sandhill crane summer range showing stable (blue) and drying (brown) temporary wetland trends from 1984-2022. Measurements represent conditions during sandhill crane breeding period (Apr-Jun). Local trends may vary.

irrigation as wasteful. Increased awareness of ecosystem services tied to grass hay production can prevent unintended consequences of improved irrigation efficiency. *Grass hay-supported wetlands can be viewed interactively in the app by selecting a wetland layer to view under the "WETLAND USE" section and using the dropdown to filter by "flood-irrigated grass hay."*

When, Where, and What Habitats to Conserve

Awareness of sandhill crane space use is essential to conservation design when aligning habitat restoration and protection outcomes with bird needs.

Wetlands

Wetland use differs significantly between sandhill crane migration and summering periods. Fall migration (Sep-Nov) occurs when most temporary and seasonal wetlands are dry, and foraging is focused primarily on agricultural waste grain. During this time, birds largely depend on semi-permanent wetlands as a water source and for roosting. Wetland foraging increases significantly during spring migration (Feb-Apr), with nearly 90 percent of crane use focused in seasonal wetland habitat.



Wetland layers can be set to view spring migration periods to provide important information for quantifying, monitoring, and prioritizing the protection or restoration of seasonal wetland habitats important to sandhill cranes.

Agriculture

Sandhill cranes prioritize migration strategies that minimize movement and reduce energetic costs by selecting roost locations approximately two miles from foraging sites. Understanding these behaviors provides important markers for spatial targeting to ensure conservation actions align with landscape configurations supporting birds. In the San Luis Valley, Colorado, for example, limited availability of roost sites with access to agricultural waste grain concentrates birds in a small portion of the landscape during fall migration. In contrast, a widespread abundance of preferred seasonal wetland habitats disperses birds throughout the San Luis Valley in the spring.

The 2022 distribution of small grain (barley, corn, oats, rice, triticale, and wheat) extent is provided for the western U.S. and portions of Alberta, Canada. The information may be used interactively with wetland



layers to inform spatial targeting of conservation actions relative to local space use, particularly in stopover locations where birds are focused on agricultural waste grain in harvested fields during spring (Mar-Apr) and fall (Sep-Nov) migration. Because cropping patterns can shift annually, small grain distributions should only be used as a guide for interpreting broader agricultural patterns.

When, Where, and What Habitats to Conserve (continued)

Land Ownership

Private lands make up 78 percent of core sandhill crane summer range. During migration birds occupy private lands approximately 80 percent of the time. Although public land use is limited, wildlife refuges (managed by the U.S. Fish and Wildlife Service and state wildlife agencies) play an essential role in supporting cranes in key landscapes, particularly in breeding and stopover locations that host large numbers of birds, like Grays Lake and Monte Vista National Wildlife Refuges. Public lands administered by the U.S. Forest Service and the Bureau of Land Management also support breeding cranes. Areas outside (all) public land designations are assumed private. Easement locations are provided through the National Conservation Easement Database. Only non-sensitive easement locations are shown to avoid concerns over landowner privacy.



Land ownership is depicted on the map in multiple colors: Dark green is U.S. Forest Service, yellow is Bureau of Land Management, purple is National Park Service, lime green is National Wildlife Refuges, blue is state land, and red is private land conservation easements.

References & Associated Research



Findings and data from three related studies are presented in this app:

<u>Migration efficiency sustains connectivity across agroecological networks</u> <u>supporting sandhill crane migration</u>

<u>Flood-irrigated agriculture mediates climate-induced wetland scarcity for</u> <u>summering sandhill cranes in western North America</u>

<u>Beneficial inefficiencies of western ranching: Flood-irrigated hay</u> production sustains wetland systems by mimicking historic hydrologic processes

Wetland Layers

Wetland data can also be viewed through the <u>Wetland Evaluation Tool</u> (WET). WET offers higher spatial and temporal resolution surface water layers and includes user guides useful for interpreting data.

Contacts

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