



## Jean Lafitte National Historical Park and Preserve

### Background

Birds are useful indicators of ecological change because they are highly mobile and generally conspicuous. As climate in a particular place changes, suitability may worsen for some species and improve for others. These changes in climate may create the potential for local extirpation or new colonization. **This brief summarizes projected changes in climate suitability by mid-century for birds at Jean Lafitte National Historical Park and Preserve (hereafter, the Park) under two climate change scenarios (see Wu et al. 2018 for full results, and Langham et al. 2015 for more information regarding how climate suitability is characterized).** The high-emissions pathway (RCP8.5) represents a future in which little action is taken to reduce global emissions of greenhouse gases. The low-emissions pathway (RCP2.6) is a best-case scenario of aggressive efforts to reduce emissions. These emissions pathways are globally standardized and established by the Intergovernmental Panel on Climate Change for projecting future climate change. The findings below are model-based projections of how species distributions may change in response to climate change. A 10-km buffer was applied to each park to match the spatial resolution of the species distribution models (10 x 10 km), and climate suitability was taken as the average of all cells encompassed by the park and buffer.

### Results

**Climate change is expected to alter the bird community at the Park, with greater impacts under the high-emissions pathway than under the low-emissions pathway (Figure 1).** Among the species likely to be found at the Park today, climate suitability in summer under the high-emissions pathway is projected to improve for 27 (e.g., Figure 2), remain stable for 30, and worsen for 15 species. Suitable climate ceases to occur for 8 species in summer, potentially resulting in extirpation of those species from the Park. Climate is projected to become suitable in summer for 18 species not found at the Park today, potentially resulting in local colonization. Climate suitability in winter under the high-emissions pathway is projected to improve for 38, remain stable for 63, and worsen for 37 species. Suitable climate ceases to occur for 11 species in winter, potentially resulting in extirpation from the Park. Climate is projected to become suitable in winter for 31 species not found at the Park today, potentially resulting in local colonization.

#### IMPORTANT

This study focuses exclusively on changing climatic conditions for birds over time. But projected changes in climate suitability are not definitive predictions of future species ranges or abundances. Numerous other factors affect where species occur, including habitat quality, food abundance, species adaptability, and the availability of microclimates (see Caveats). Therefore, managers should consider changes in climate suitability alongside these other important influences.

We report trends in climate suitability for all species identified as currently present at the Park based on both NPS Inventory & Monitoring Program data and eBird observation data (2016), plus those species for which climate at the Park is projected to become suitable in the future (Figure 1 & Table 1). This brief provides park-specific projections whereas Wu et al. (2018), which did not incorporate park-specific species data and thus may differ from this brief, provides system-wide comparison and conclusions.

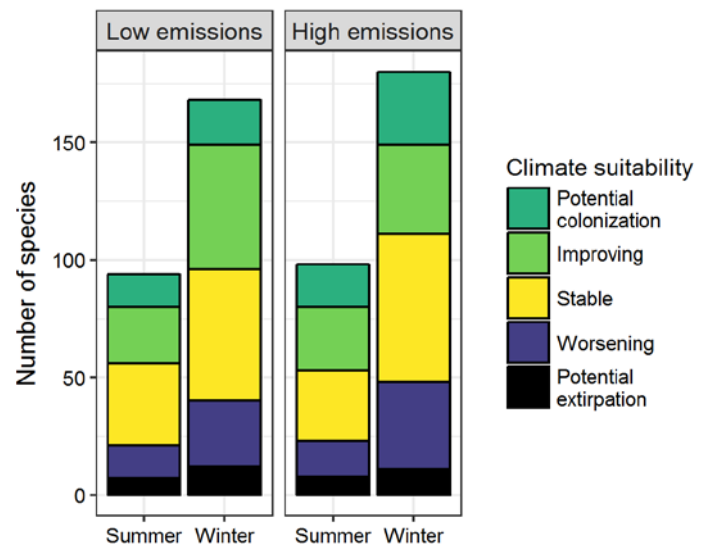


Figure 1. Projected changes in climate suitability for birds at the Park, by emissions pathway and season.

## Results (continued)

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### Potential Turnover Index

**Potential bird species turnover for the Park between the present and 2050 is 0.15 in summer (21<sup>st</sup> percentile across all national parks) and 0.10 in winter (8<sup>th</sup> percentile) under the high-emissions pathway. Potential species turnover declines to 0.12 in summer and 0.09 in winter under the low-emissions pathway.** Turnover index was calculated based on the theoretical proportions of potential extirpations and potential colonizations by 2050 relative to today (as reported in Wu et al. 2018), and therefore assumes that all potential extirpations and colonizations are realized. According to this index, no change would be represented as 0, whereas a complete change in the bird community would be represented as 1.

### Climate Sensitive Species

The Park is or may become home to 19 species that are highly sensitive to climate change across their range (i.e., they are projected to lose climate suitability in over 50% of their current range in North America in summer and/or winter by 2050; Table 1; Langham et al. 2015). While the

### Management Implications

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Parks differ in potential colonization and extirpation rates, and therefore different climate change adaptation strategies may apply. **Under the high-emissions pathway, Jean Lafitte National Historical Park and Preserve falls within the high potential colonization group.** Parks anticipating high potential colonization can focus on actions that increase species' ability to respond to environmental change, such as increasing the amount of potential habitat, working with cooperating agencies and landowners to improve habitat

### Caveats

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The species distribution models included in this study are based solely on climate variables (i.e., a combination of annual and seasonal measures of temperature and precipitation), which means there are limits on their interpretation. Significant changes in climate suitability, as measured here, will not always result in a species response, and all projections should be interpreted as potential trends. Multiple other factors mediate responses to climate change, including habitat availability, ecological processes

Park may serve as an important refuge for 17 of these climate-sensitive species, 2 might be extirpated from the Park in at least one season by 2050.



**Figure 2. Climate at the Park in summer is projected to remain suitable for the Red-winged Blackbird (*Agelaius phoeniceus*) through 2050.** Photo by Andy Reago & Chrissy McClarren/Flickr (CC BY 2.0).

connectivity for birds across boundaries, managing the disturbance regime, and possibly more intensive management actions. Furthermore, park managers have an opportunity to focus on supporting the 17 species that are highly sensitive to climate change across their range (Table 1; Langham et al. 2015) but for which the park is a potential refuge. Monitoring to identify changes in bird communities will inform the selection of appropriate management responses.

that affect demography, biotic interactions that inhibit and facilitate species' colonization or extirpation, dispersal capacity, species' evolutionary adaptive capacity, and phenotypic plasticity (e.g., behavioral adjustments). Ultimately, models can tell us where to focus our concern and which species are most likely to be affected, but monitoring is the only way to validate these projections and should inform any on-the-ground conservation action.

## More Information

For more information, including details on the methods, please see the scientific publication ([Wu et al. 2018](#)) and the [project overview brief](#), and visit the [NPS Climate Change Response Program website](#).

### References

eBird Basic Dataset (2016) Version: ebd\_relAug-2016. Cornell Lab of Ornithology, Ithaca, New York.

Langham et al. (2015) Conservation Status of North American Birds in the Face of Future Climate Change. PLOS ONE.

Wu et al. (2018) Projected avifaunal responses to climate change across the U.S. National Park System. PLOS ONE.

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## Species Projections

**Table 1. Climate suitability projections by 2050 under the high-emissions pathway for all birds currently present at the Park based on both NPS Inventory & Monitoring Program data and eBird observation data, plus those species for which climate at the Park is projected to become suitable in the future. "Potential colonization" indicates that climate is projected to become suitable for the species, whereas "potential extirpation" indicates that climate is suitable today but projected to become unsuitable. Omitted species were either not modeled due to data deficiency or were absent from the I&M and eBird datasets. Observations of late-season migrants may result in these species appearing as present in the park when they may only migrate through. Species are ordered according to taxonomic groups, denoted by alternating background shading.**

\* Species in top and bottom 10th percentile of absolute change

^ Species that are highly climate sensitive

- Species not found or found only occasionally, and not projected to colonize by 2050

x Species not modeled in this season

Common Name	Summer Trend	Winter Trend
Black-bellied Whistling-Duck	Improving*	x
Mute Swan	-	Stable
Wood Duck	x	Worsening
Gadwall	-	Improving
American Wigeon	-	Stable
Mallard	Improving^	Stable
Mottled Duck	Improving*	Improving*
Blue-winged Teal	Improving	Improving
Cinnamon Teal	-	Potential colonization
Northern Shoveler	-	Improving
Green-winged Teal	-	Stable
Canvasback	-	Improving*
Ring-necked Duck	-	Stable
Greater Scaup	-	Stable^
Lesser Scaup	-	Stable
Surf Scoter	-	Potential colonization

Common Name	Summer Trend	Winter Trend
Bufflehead	-	Potential extirpation
Common Goldeneye	-	Stable
Hooded Merganser	-	Potential extirpation^
Red-breasted Merganser	-	Worsening*^
Ruddy Duck	-	Stable
Plain Chachalaca	-	Potential colonization
Scaled Quail	Potential colonization	Potential colonization
Pacific Loon	-	Potential colonization
Common Loon	-	Worsening*^
Pied-billed Grebe	-	Worsening
Horned Grebe	-	Potential extirpation
Neotropic Cormorant	-	Improving
Double-crested Cormorant	x	Stable
Anhinga	Improving^	Improving*

Common Name	Summer Trend	Winter Trend
American White Pelican	-	Improving
Brown Pelican	Worsening	Stable^
Great Blue Heron	Worsening	Stable
Great Egret	Stable	Stable
Snowy Egret	x	Improving
Little Blue Heron	Stable	Improving
Tricolored Heron	Worsening^	Stable
Cattle Egret	Improving	Improving*
Green Heron	Stable	Stable
Black-crowned Night-Heron	x	Improving
Yellow-crowned Night-Heron	Worsening	Improving
White Ibis	Stable	Improving
Glossy Ibis	x	Improving*
White-faced Ibis	x	Improving^
Black Vulture	Stable	Improving
Turkey Vulture	x	Improving
Osprey	x	Stable
Mississippi Kite	Stable	-
Northern Harrier	-	Stable
Sharp-shinned Hawk	-	Stable
Cooper's Hawk	x	Improving
Bald Eagle	-	Stable
Harris's Hawk	Potential colonization	Potential colonization
Red-shouldered Hawk	Stable	Improving
Red-tailed Hawk	Stable	Stable
Ferruginous Hawk	-	Potential colonization
King Rail	x	Worsening^
Virginia Rail	-	Worsening
Sora	-	Stable
Common Gallinule	x	Stable
American Coot	x	Stable
Limpkin	-	Potential

Common Name	Summer Trend	Winter Trend
		colonization
Black-necked Stilt	x	Improving*
Black-bellied Plover	-	Worsening*
Semipalmated Plover	-	Stable^
Killdeer	Stable	Worsening
Spotted Sandpiper	-	Improving
Greater Yellowlegs	-	Stable
Lesser Yellowlegs	-	Improving*
Wilson's Snipe	-	Stable
American Woodcock	x	Improving
Bonaparte's Gull	-	Stable
Laughing Gull	Worsening*^	Stable
Ring-billed Gull	-	Worsening
Yellow-footed Gull	-	Potential colonization
Herring Gull	-	Potential extirpation^
Caspian Tern	x	Stable
Forster's Tern	x	Stable
Royal Tern	x	Worsening*^
Black Skimmer	x	Stable^
Rock Pigeon	Improving*	Stable
Eurasian Collared-Dove	x	Stable
White-winged Dove	Improving*	Stable
Mourning Dove	Stable	Improving
Inca Dove	-	Improving*
Common Ground-Dove	-	Improving*
White-tipped Dove	Potential colonization	Potential colonization
Yellow-billed Cuckoo	Stable	-
Barn Owl	-	Improving*
Eastern Screech-Owl	x	Improving
Great Horned Owl	x	Potential extirpation
Burrowing Owl	-	Potential colonization

Common Name	Summer Trend	Winter Trend
Barred Owl	x	Stable
Lesser Nighthawk	Potential colonization	-
Common Nighthawk	Stable	-
Common Pauraque	-	Potential colonization
Chimney Swift	Worsening	-
Ruby-throated Hummingbird	Improving*	-
Belted Kingfisher	Improving	Worsening
Red-headed Woodpecker	-	Worsening
Red-bellied Woodpecker	Improving	Worsening
Yellow-bellied Sapsucker	-	Stable
Ladder-backed Woodpecker	-	Potential colonization
Downy Woodpecker	Worsening	Potential extirpation
Hairy Woodpecker	Improving	Stable
American Three-toed Woodpecker	-	Potential colonization ^
Northern Flicker	Improving	Potential extirpation
Gilded Flicker	Potential colonization	Potential colonization
Pileated Woodpecker	Improving	Stable
American Kestrel	x	Worsening
Merlin	-	Stable ^
Peregrine Falcon	-	Improving*
Northern Beardless-Tyrannulet	Potential colonization	-
Acadian Flycatcher	Stable	-
Eastern Phoebe	-	Improving
Say's Phoebe	-	Improving
Vermilion Flycatcher	-	Improving*
Great Crested Flycatcher	Stable	Potential colonization
Great Kiskadee	Potential colonization	Potential colonization
Couch's Kingbird	Potential	-

Common Name	Summer Trend	Winter Trend
	colonization	
Western Kingbird	Potential colonization	-
Eastern Kingbird	Stable	-
Loggerhead Shrike	Stable	Stable
White-eyed Vireo	Improving*	Improving
Yellow-throated Vireo	Stable	-
Red-eyed Vireo	Improving	-
Green Jay	Potential colonization	Potential colonization
Blue Jay	Worsening	Worsening
American Crow	Improving	Potential extirpation
Fish Crow	Stable	Stable
Chihuahuan Raven	Potential colonization	-
Northern Rough-winged Swallow	Improving	Improving*
Purple Martin	Worsening*	x
Tree Swallow	-	Worsening*
Violet-green Swallow	-	Potential colonization
Barn Swallow	Potential extirpation	-
Cliff Swallow	Stable	-
Carolina Chickadee	Worsening*	Worsening*
Tufted Titmouse	Stable	Stable
Verdin	Potential colonization	Potential colonization
Brown Creeper	-	Stable
House Wren	-	Worsening
Pacific/Winter Wren	-	Stable
Sedge Wren	-	Worsening
Marsh Wren	-	Worsening*
Carolina Wren	Stable	Worsening
Cactus Wren	Potential colonization	Potential colonization
Blue-gray Gnatcatcher	Improving*	Stable

<b>Common Name</b>	<b>Summer Trend</b>	<b>Winter Trend</b>
Black-tailed Gnatcatcher	Potential colonization	Potential colonization
Golden-crowned Kinglet	-	Stable
Ruby-crowned Kinglet	-	Worsening
Eastern Bluebird	Potential extirpation	Worsening
Hermit Thrush	-	Worsening
Wood Thrush	Improving	-
American Robin	Improving	Worsening
Gray Catbird	Stable	Worsening
Curve-billed Thrasher	Potential colonization	Potential colonization
Brown Thrasher	Potential extirpation	Worsening
Bendire's Thrasher	-	Potential colonization
Sage Thrasher	-	Potential colonization
Northern Mockingbird	Worsening	Stable
European Starling	Worsening	Stable
American Pipit	-	Improving
Cedar Waxwing	-	Potential extirpation
Black-and-white Warbler	Improving	Stable
Prothonotary Warbler	Worsening*	x
Orange-crowned Warbler	-	Worsening
Kentucky Warbler	Improving*	-
Common Yellowthroat	Potential extirpation	Stable
Hooded Warbler	Stable	-
American Redstart	Improving	-
Northern Parula	Stable	-
Palm Warbler	-	Stable^
Pine Warbler	-	Worsening
Yellow-rumped Warbler	-	Stable
Yellow-throated Warbler	Stable	Stable
Black-throated Gray Warbler	-	Potential colonization

<b>Common Name</b>	<b>Summer Trend</b>	<b>Winter Trend</b>
Wilson's Warbler	-	Stable
Yellow-breasted Chat	Stable	-
Olive Sparrow	-	Potential colonization
Green-tailed Towhee	-	Potential colonization
Eastern Towhee	Potential extirpation	x
Rufous-winged Sparrow	-	Potential colonization
Chipping Sparrow	-	Worsening
Field Sparrow	-	Stable
Vesper Sparrow	-	Stable
Lark Sparrow	Potential colonization	Improving*
Lark Bunting	-	Potential colonization
Savannah Sparrow	-	Worsening
Song Sparrow	-	Potential extirpation
Swamp Sparrow	-	Worsening
White-throated Sparrow	-	Worsening
White-crowned Sparrow	-	Stable
Dark-eyed Junco	-	Stable
Summer Tanager	Potential extirpation	-
Western Tanager	-	Stable
Northern Cardinal	Stable	Stable
Pyrrhuloxia	Potential colonization	-
Indigo Bunting	Stable	-
Painted Bunting	Improving*	-
Red-winged Blackbird	Improving	Stable
Eastern Meadowlark	Improving*	Worsening
Western Meadowlark	-	Potential colonization
Common Grackle	Worsening*	Worsening
Boat-tailed Grackle	Worsening*^	Worsening*^

<b>Common Name</b>	<b>Summer Trend</b>	<b>Winter Trend</b>
Bronzed Cowbird	Stable	Stable
Brown-headed Cowbird	Stable	Improving
Orchard Oriole	Potential extirpation	-
Hooded Oriole	Potential	-

<b>Common Name</b>	<b>Summer Trend</b>	<b>Winter Trend</b>
	colonization	
House Finch	Potential extirpation	Potential extirpation
American Goldfinch	-	Worsening
House Sparrow	x	Stable