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## Conflicts Abound: How Future Development Along the Wasatch Front Will Replace Critical Migratory Bird Habitat Around Farmington Bay

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# Conflicts Abound



How Future Development Along the Wasatch Front Will Replace Critical Migratory Bird Habitat Around Farmington Bay



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This executive summary is the synthesis of the bioregional planning graduate project: "Identifying and Assessing Conflicts Between Future Development and Current Migratory Bird Habitat Around Farmington Bay, Utah"



A black-crowned night heron in shallow water.  
Photo: Gary Witt

Recommended citation for the full report:

Douglas, Aubin A., "Identifying and Assessing Conflicts Between Future Development and Current Migratory Bird Habitat Around Farmington Bay, Utah" (2018). *All Graduate Plan B and other Reports*. 1322.  
<https://digitalcommons.usu.edu/gradreports/1322>

Every year, the Great Salt Lake (GSL) and its associated wetlands provide critical habitat to over 250 migratory bird species from both the Pacific and Central Flyways. The GSL borders the Wasatch Front, which is the fastest growing and most populous region in Utah. To support the ever-increasing working population, the government of Utah aspires to increase economic growth in the region through more economic incentives and infrastructure development. As this area continues to develop, greater pressure will be placed on the surrounding natural resources, including the GSL, its wetlands, and the open space and agricultural lands that act as buffers from the urbanizing Wasatch Front. The primary objective of this research was to identify and assess possible conflicts between current migratory bird habitat and three proposed future development projects around Farmington Bay of the GSL.

To identify and assess potential conflicts, the first step was to create habitat maps for three migratory bird guilds that use the Farmington Bay area by combining five representative species' habitat distributions for each guild. The next step was to collect and prepare spatial data for three proposed development projects that are slated for development by 2040. Next, the development projects were overlaid onto each guild's and species' habitat map to first identify conflict areas and then assess the spatial impacts on habitat for each species and guild. This report ends with recommendations for future development that promote the conservation of migratory bird habitat within the study area.

Overall, the three proposed development projects examined in this study produce substantial amounts of conflict with the current migratory bird habitat in the region. Based on these findings, recommendations were made for three development initiatives. First, promote 'centered growth' and higher-density housing to reduce the sprawl of single-family home neighborhoods. Second, retain and protect open space and agricultural lands as buffers around Farmington Bay to reduce the effects of habitat fragmentation and urban encroachment. Third, reconsider the construction of a new four-lane highway along the eastern edge of Farmington Bay. If these recommendations are implemented, the region's migratory bird habitat will remain protected from the impending economic expansion and urban development in the coming years.



An American coot running on water for takeoff.  
Photo: Gary Witt

# Study Area



The boundaries of the study area are shown in white. The area includes parts of both Davis and Salt Lake Counties, as well as 14 municipalities, including Salt Lake City. These boundaries were selected to identify potential conflict in a highly contentious area, i.e. the meeting point between two opposing land uses — critical migratory bird habitat and an expanding urban corridor. Utah’s population is expected to double by 2065, with much of that growth occurring along the Wasatch Front. Unfortunately, this means current open space, croplands, and wetlands are at risk of being displaced by development. Since all five of the GSL’s bays have been designated as “globally-significant Important Bird Areas” by BirdLife International and the National Audubon Society, losing any habitat in and around the GSL could prove disastrous for many bird species.

## Issues in the region

### For Migratory Birds

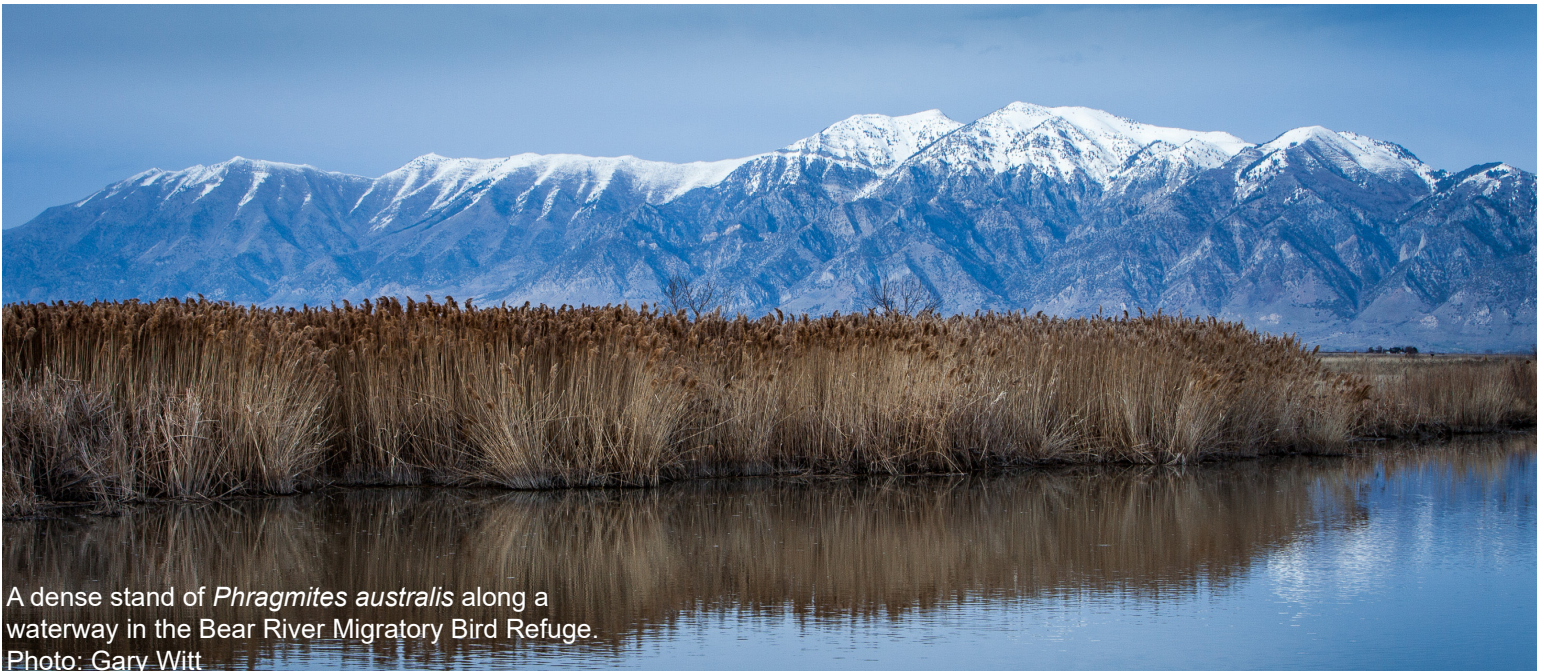
- Loss and degradation of habitat throughout migratory ranges
- Effects of climate change
- Expanding predator distributions (e.g. domestic cats, red fox, raccoons, skunks, etc.)
- Increased stress on water resources
- Reduction of protections through the Migratory Bird Treaty Act
- Invasive plants replacing native habitat (e.g. *Phragmites australis*)
- Avian botulism events

### For People

- Rapidly increasing population (Utah's population is expected to double by 2065)
- Areas of aging housing and infrastructure
- Poor air and water quality (e.g. inversions and harmful algal bloom events)
- Increased traffic congestion
- Increased stress on shared water resources
- Effects of climate change and increased likelihood of extreme weather events
- Land conversion of farmland to development for economic expansion

## Objectives of this study

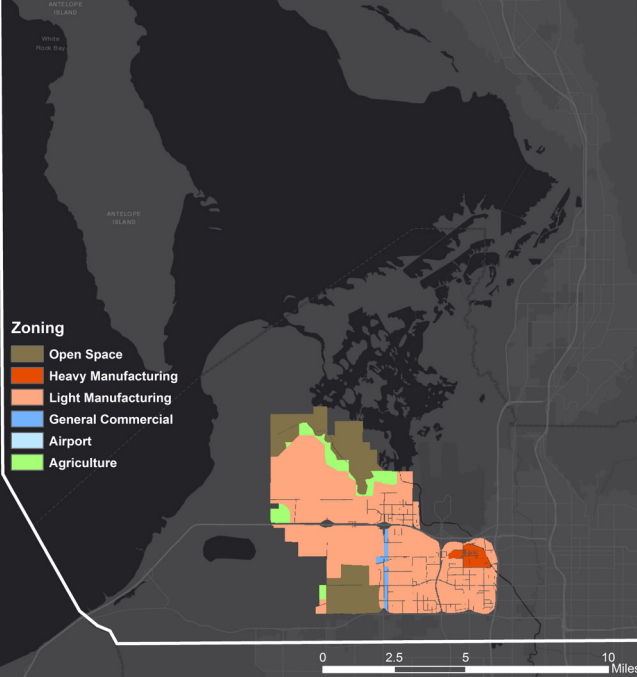
1. Identify and assess conflicts between three proposed future development projects and the current migratory bird habitat for three guilds around Farmington Bay of the Great Salt Lake
2. Provide policy and planning recommendations to accommodate more migratory bird habitat while allowing for the projected development needs in the region



A dense stand of *Phragmites australis* along a waterway in the Bear River Migratory Bird Refuge.  
Photo: Gary Witt

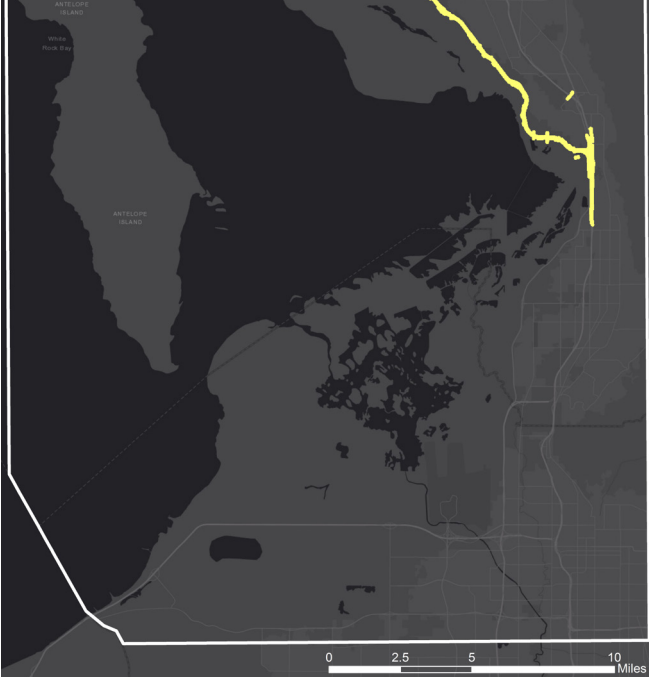
# Development Projects

## Northwest Quadrant (NWQ)



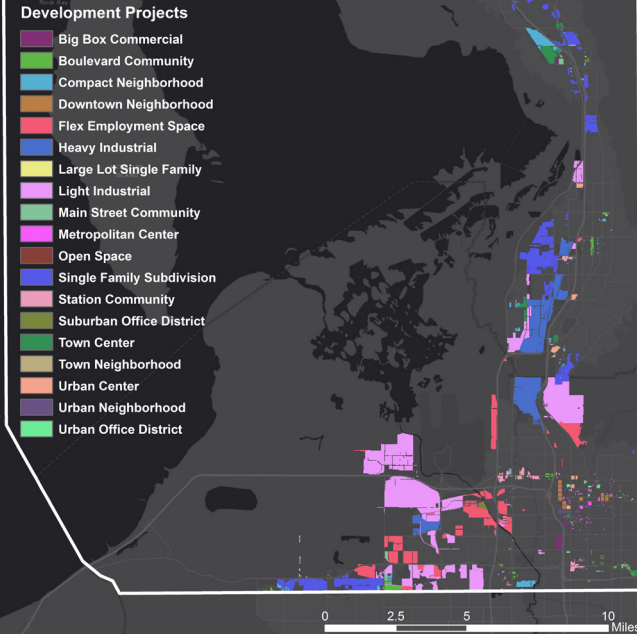
**NWQ:** 28,000 acres of land rezoned predominantly for development by Salt Lake City; in 2018, Utah legislature designated 20,000 acres of the NWQ for the creation of an Inland Port, though the updated data was not yet available.

## West Davis Corridor (WDC)



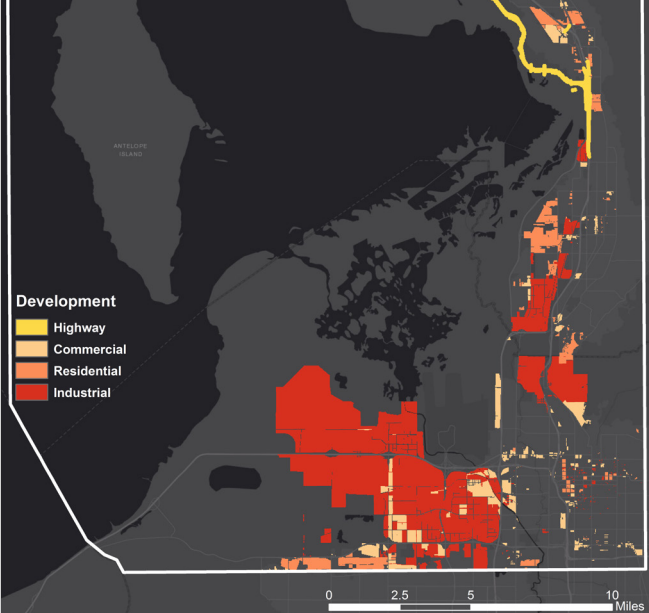
**WDC:** 19 mile long highway along the eastern edge of Farmington Bay; 2 and 4-lane highway; connects to I-15 and Legacy Parkway; record of final decision was published in 2017; construction is slated to begin in 2020.

## Wasatch Choice 2040 Regional Vision (Vision)



**Vision:** a comprehensive regional development plan for the Wasatch Front out to 2040; spearheaded by the Wasatch Front Regional Council, the Mountainland Association of Governments, and Envision Utah; focus on 'centered growth.'

## All Projects Combined (shown in respective development types)



All three projects' spatial data used in this study are shown. The development types for the projects were divided into four categories: highway (**hwy**), commercial (**comm**), residential (**res**), and industrial (**ind**).

# Representative Bird Species & Guilds

## Shorebirds (SB)



American avocet



snowy plover



Wilson's phalarope



willet



long-billed curlew

## Waterbirds (WB)



great blue heron



eared grebe



white-faced ibis



Franklin's gull



black-crowned  
night heron

## Waterfowl (WF)



redhead



gadwall



lesser scaup



northern pintail



cinnamon teal

Habitat distributions of five bird species were selected to represent each of the three guilds that use the GSL and its wetlands during migration. These representative species were selected with the help of local experts (e.g. wetland managers, ornithologists, and conservation planners) and published literature (e.g. bird surveys, reports, presentations, and articles). The GSL is a crucial stopover and/or nesting site for these species, and all species have been confirmed to nest, breed, forage, and/or rest at Farmington Bay.

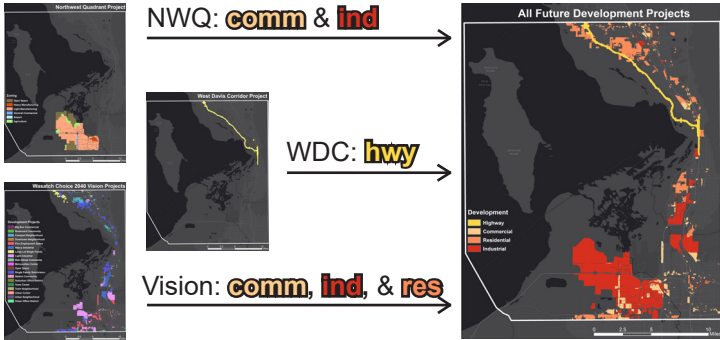
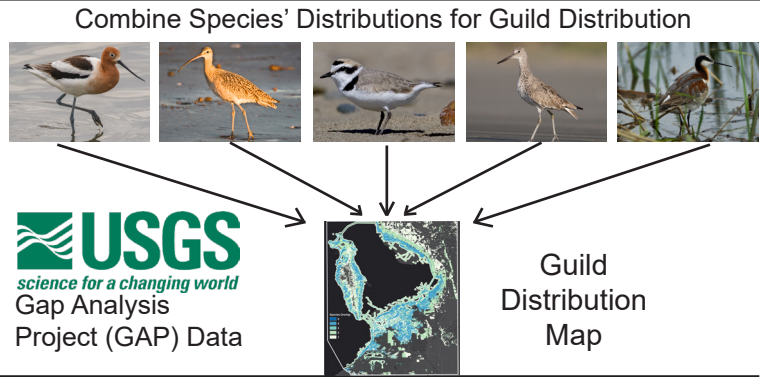
All images were found on Google Images under the "labeled for reuse" section.



# Methods

## 1) Build Habitat Maps

- Download USGS GAP habitat distribution data for 15 representative species + clip to boundary
- Combine species distributions to make guild habitat maps
- Combine all species' distributions for hotspot assessment

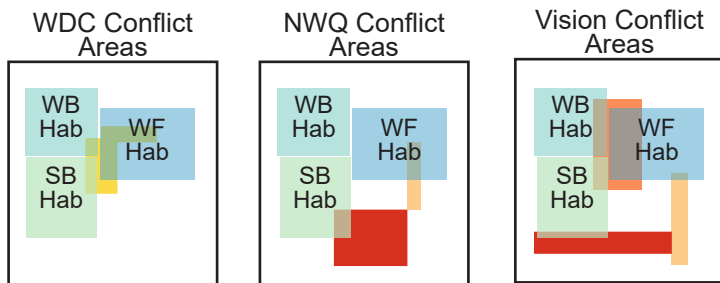
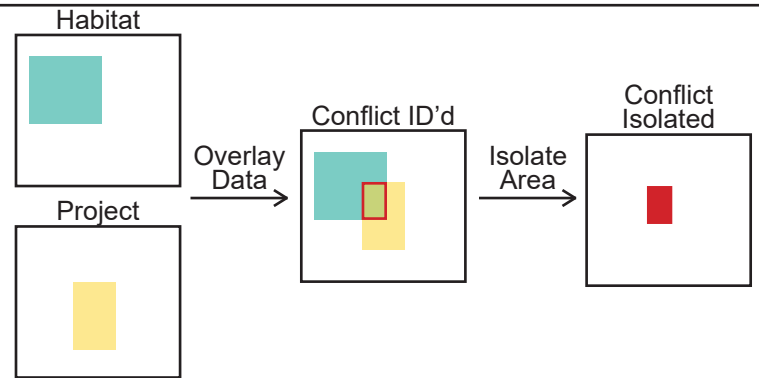


## 2) Map Development Projects

- Gather spatial data for three proposed projects + clip to boundary
- Reclassify project spatial data into four relevant development categories: highway (**hwy**), commercial (**comm**), residential (**res**), and industrial (**Ind**)

## 3a) Identify Conflict Areas

- Overlap Habitat and Development Project Maps
- Isolate areas of overlap (current areas of bird habitat slated for new development in the future)



Each project (and development type) has different spatial conflicts with the current migratory bird habitat in the area.

## 3b) Assess Project Impacts

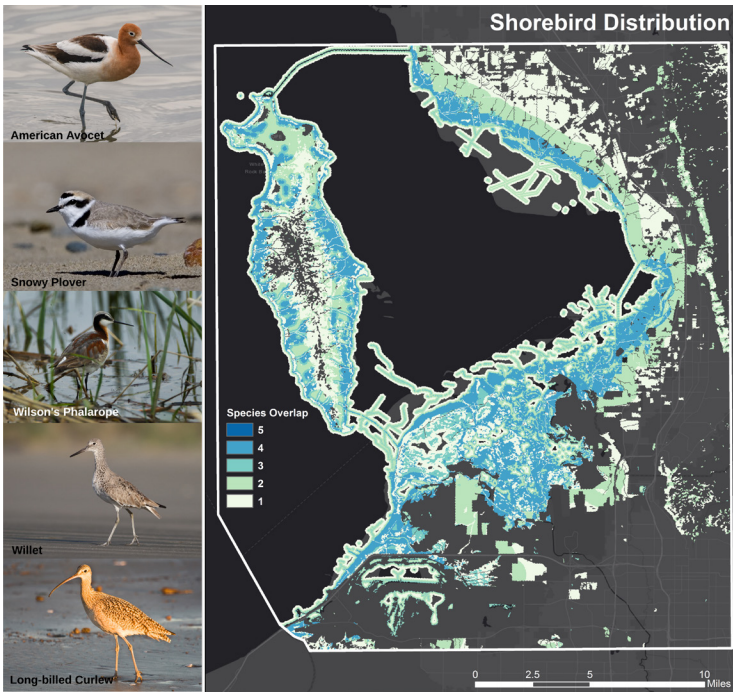
- Identify areas, projects, and development types that show the greatest conflict with bird habitat
- Assess impacts on each species and guild from each project and development type

## 4) Generate Recommendations

- Make data-based recommendations for future development and conservation to accommodate both economic growth and critical migratory bird habitat

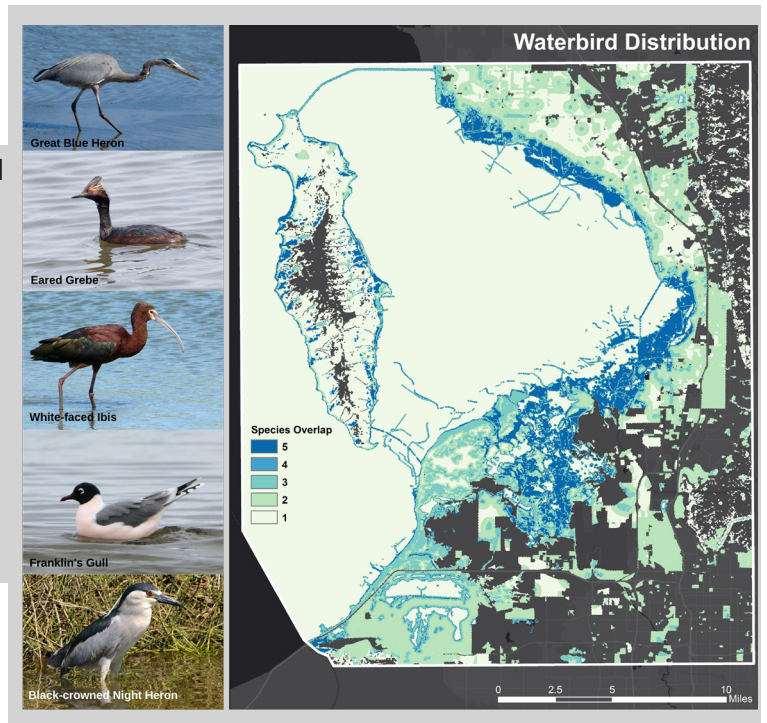


# Habitat Distributions

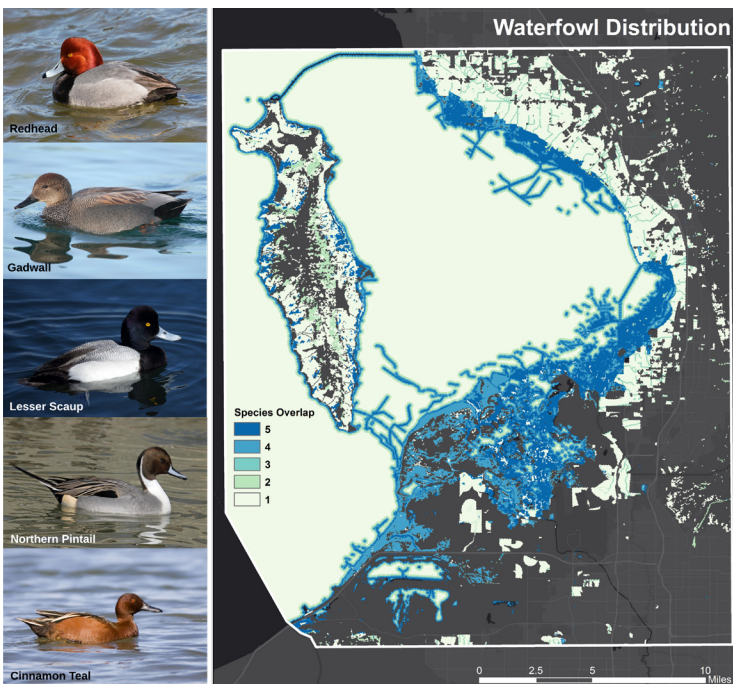


The overall shorebird (**SB**) distribution encompasses 115,907 acres, which is about 31% of the entire study area. There was no area where all five shorebird species' habitats overlapped. Four species' habitats overlapped for 7% of the study area; three species' habitats overlapped for about 3% of the study area; two species' habitats overlapped for 9% of the study area; and areas with one shorebird species' habitat comprised 12% of the area. These species prefer open, non-vegetated shorelines near shallow, open water, with some nearby structure, such as rocks or pickleweed; some species within this guild also use irrigated cropland, wet meadows, and open fields for foraging.

The waterbird (**WB**) habitat is located predominantly around the edges of the lake and in wetlands and agricultural land. The overall waterbird distribution is the largest of all three guilds and encompasses 283,422 acres, which is about 76% of the entire study area. There was no habitat in 24% of the study area. Five species' habitats overlapped for 5% of the study area; four species' habitats overlapped for nearly 1% of the study area; three species' habitats overlapped for 5% of the study area; two species' habitats overlapped for 14% of the study area; and areas with one waterbird species' habitat comprised 51% of the area.

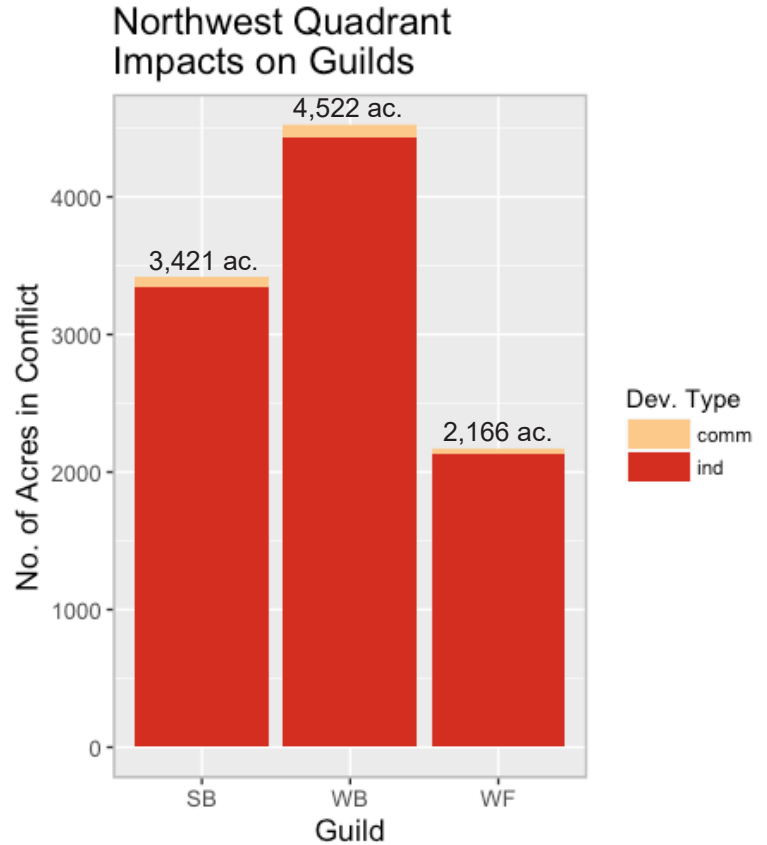
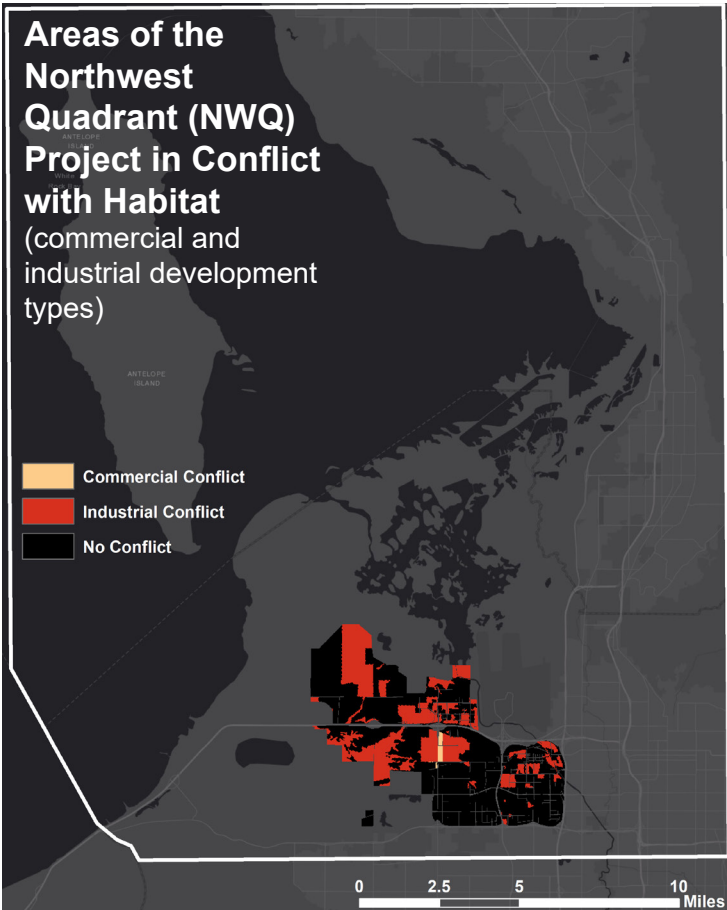


The waterfowl (**WF**) habitat is located predominantly around the eastern and southern edges of the Bay. The overall waterfowl distribution encompasses 235,006 acres, which is about 63% of the entire study area. There was no habitat in 37% of the study area. Five species' habitats overlapped for about 6% of the study area; four species' habitats overlapped for less than 6% of the study area; three species' habitats overlapped in less than 1% of the study area; two species' habitats overlapped for 5% of the study area; and areas with one waterfowl species' habitat comprised 46% of the area.



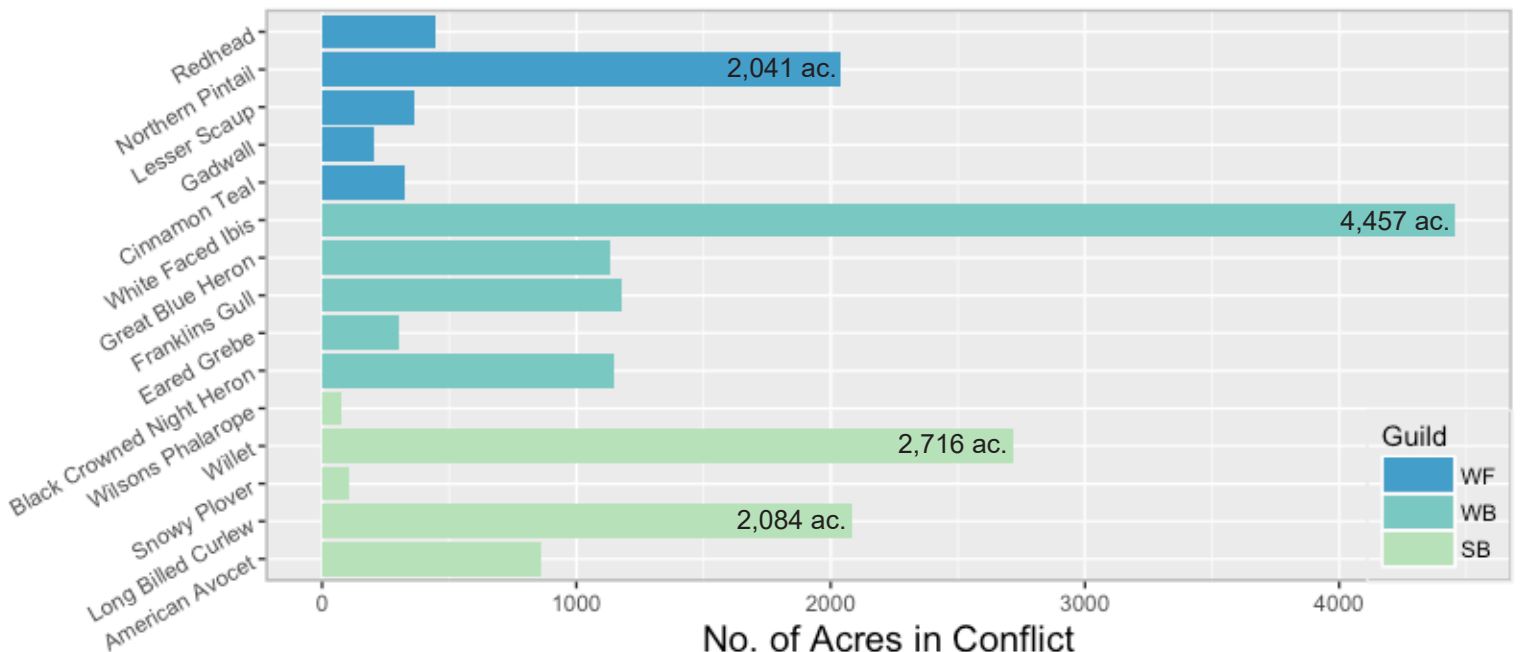
Individual species' distributions and the breakdown of coverage for each species is available in the full-length document.

# Northwest Quadrant (NWQ)

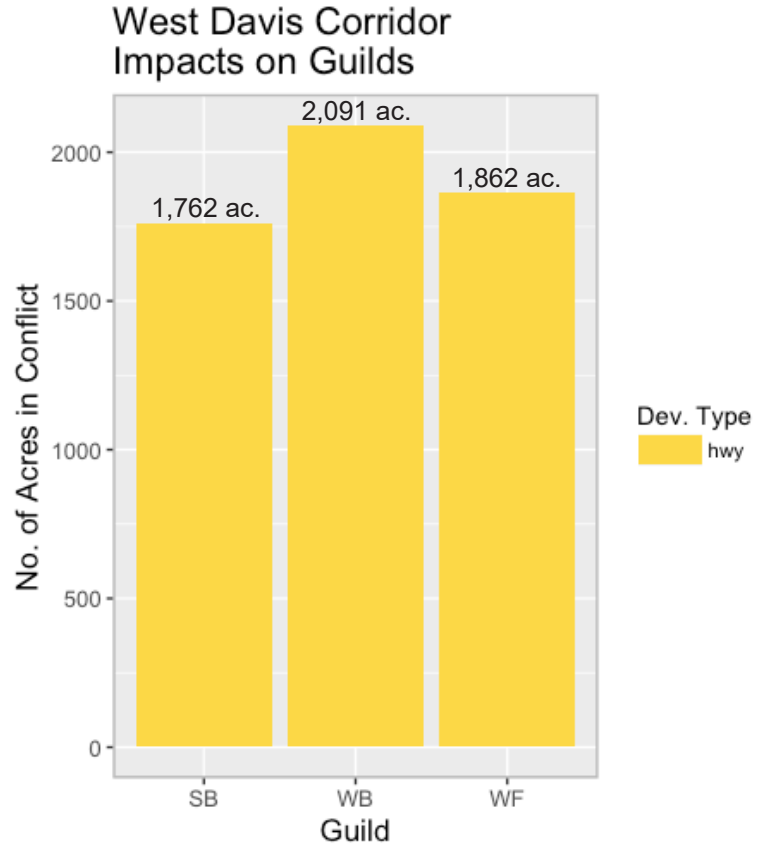
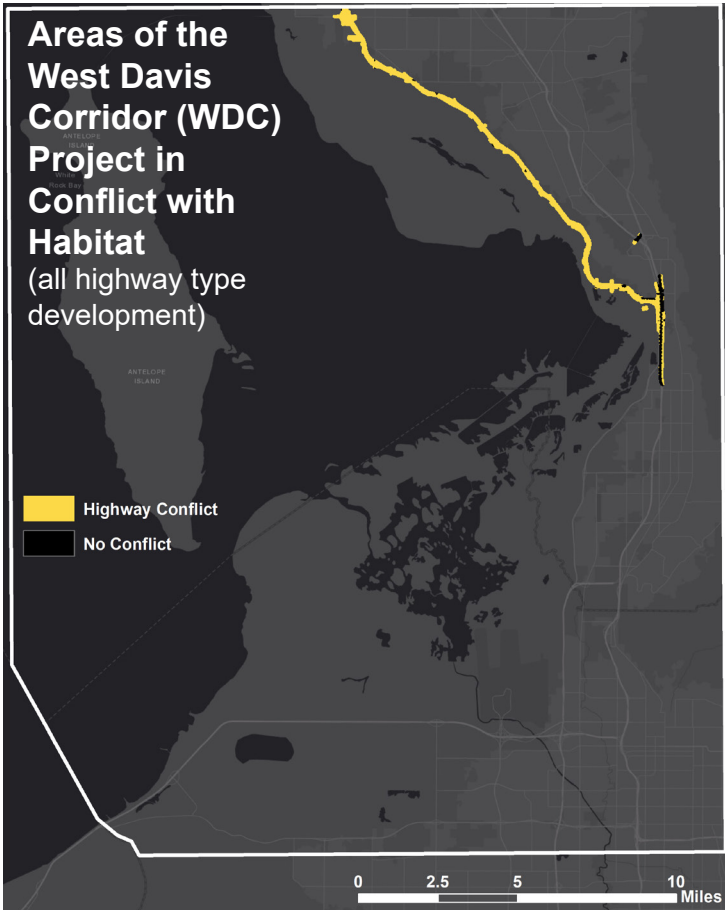


The NWQ is expected to generate 4,526.85 acres of total conflict for the three guilds included in this assessment. Nearly **30%** of this planned project is in conflict with the current migratory bird habitat, based on the USGS's GAP datasets. Industrial development (red) from this project was far more conflicting than commercial development (tan). The WB guild shows the most conflict with this project, though one species from each guild was disproportionately impacted by this project (i.e. white-faced ibis (WB), willet (SB), and northern pintail (WF)).

## Northwest Quadrant Impacts on Species per Guild

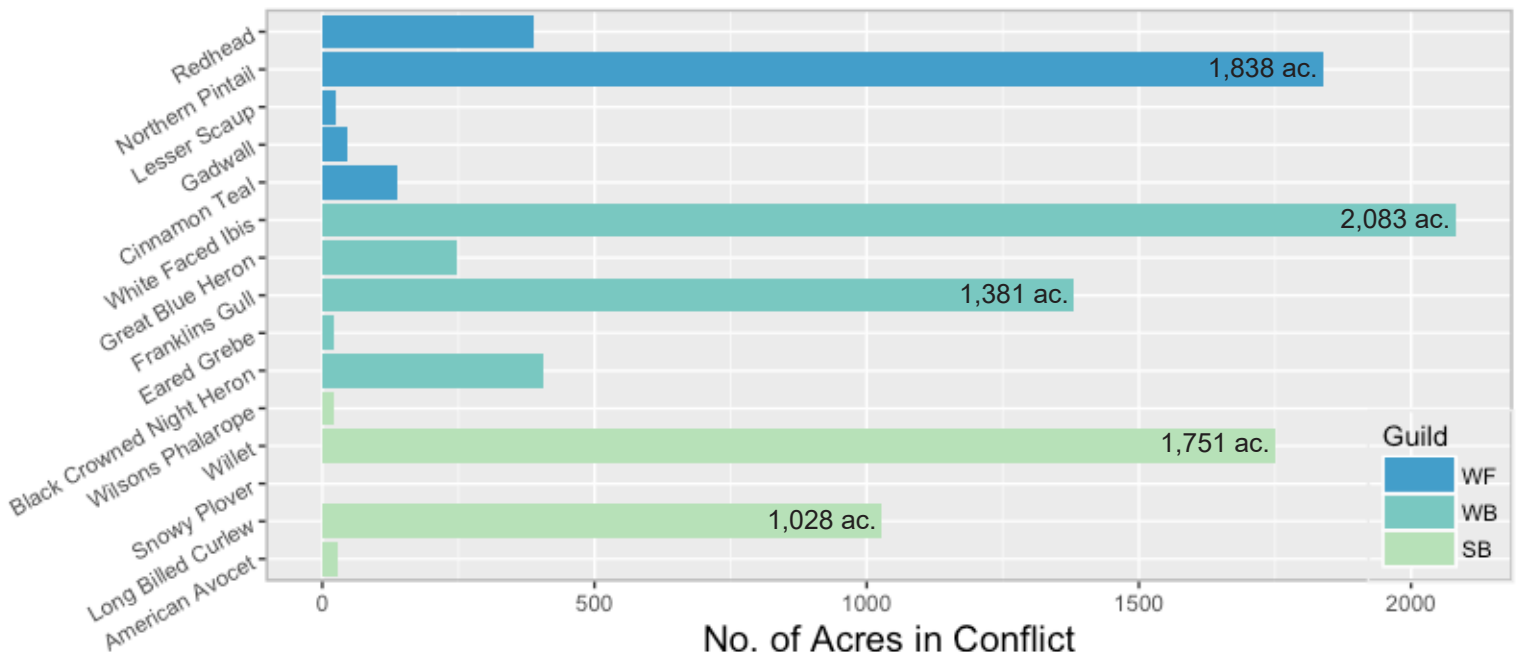


# West Davis Corridor (WDC)

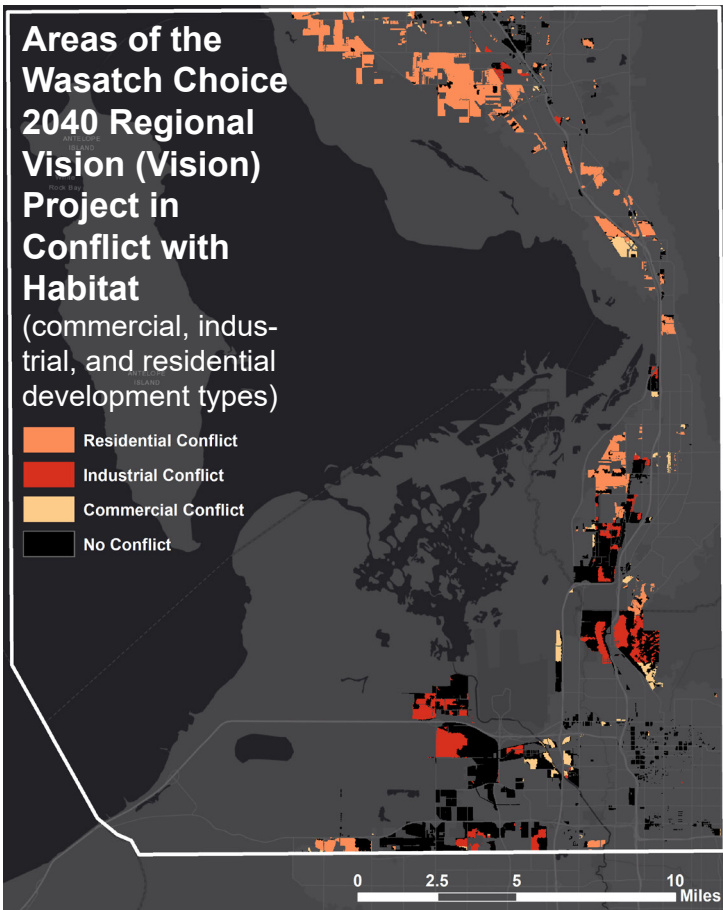


The WDC is expected to generate 2,090.74 acres of total conflict for the three migratory bird guilds included in this assessment. Altogether, nearly **88%** of this planned project is in conflict with the current migratory bird habitat, based on the USGS's GAP datasets. All conflict came from the highway development type. The WB guild shows the most conflict with this project, though at least one species from each guild was disproportionately impacted by this project (i.e. white-faced ibis (WB), northern pintail (WF), willet (SB)).

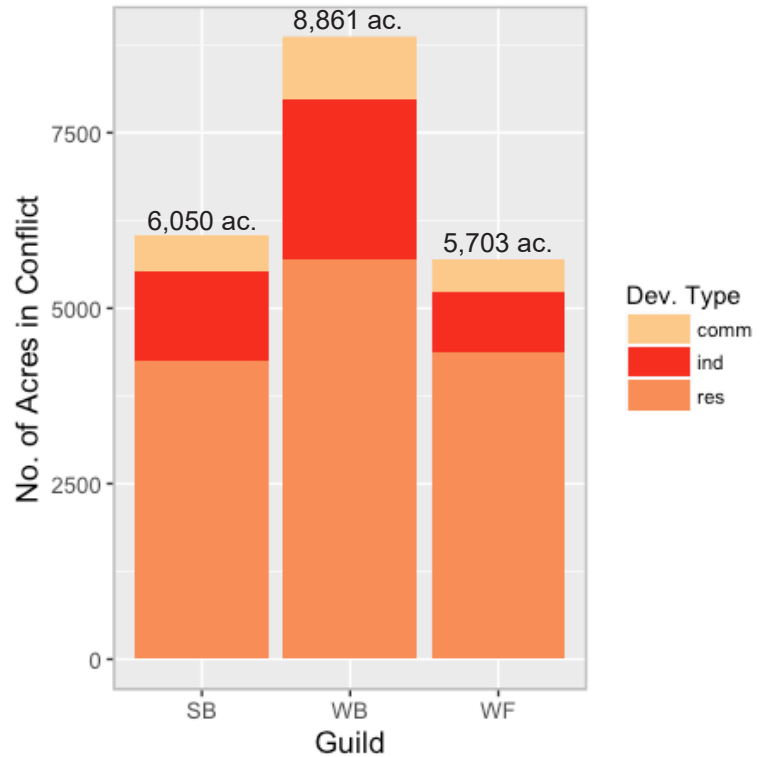
## West Davis Corridor Impacts on Species per Guild



# Wasatch Choice 2040 Regional Vision (Vision)

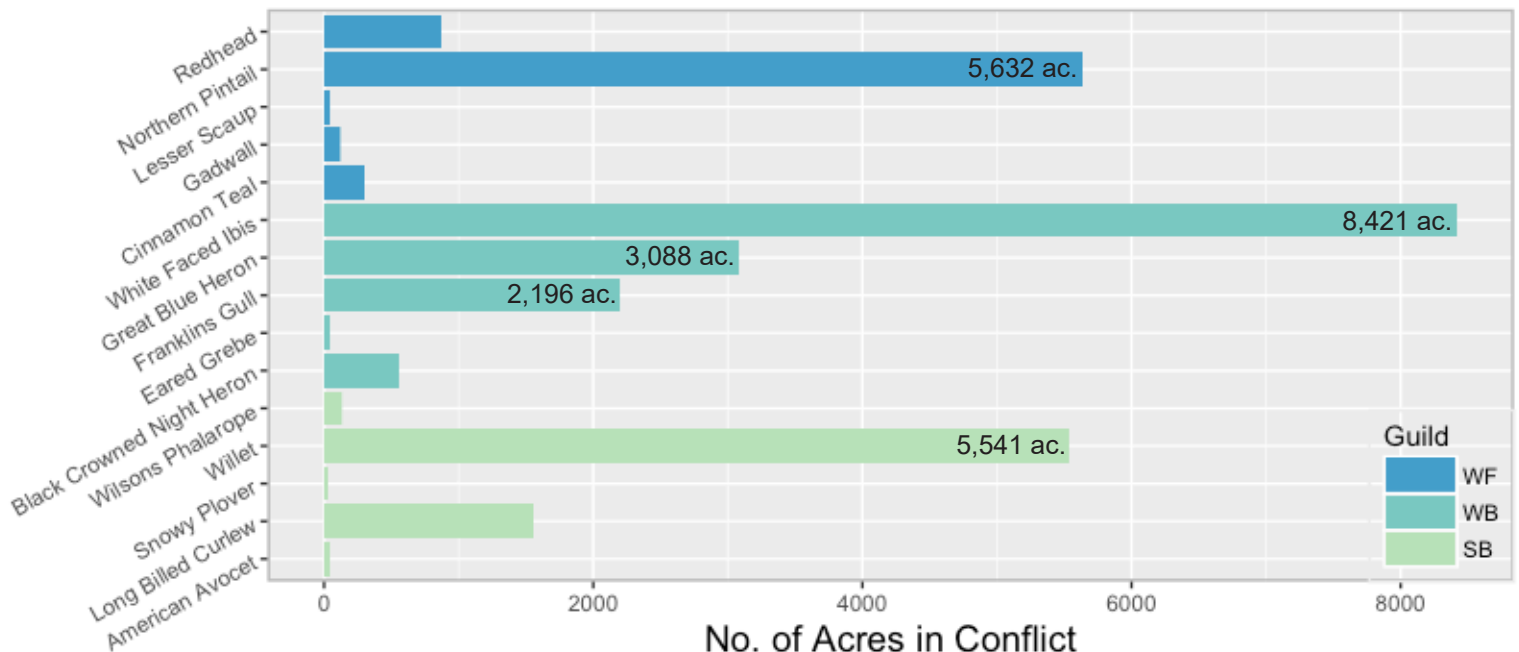


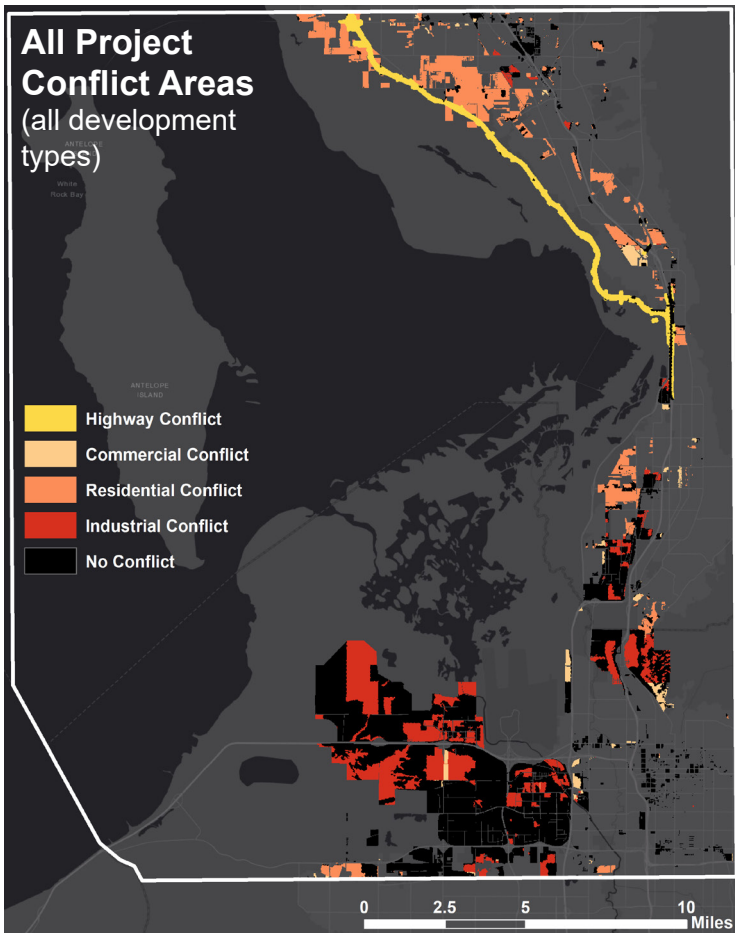
### Wasatch Choice 2040 Vision Impacts on Guilds



The Vision is expected to generate 8,980.31 acres of total conflict for the three guilds included in this assessment. Nearly **50%** of this planned project is in conflict with the current migratory bird habitat, based on the USGS's GAP datasets. Of all three development types, residential development (orange) generated the most conflict for this project. The WB guild shows the most conflict with this project, though one species from each guild was disproportionately impacted by this project (i.e. white-faced ibis (WB), willet (SB), and northern pintail (WF)).

### Wasatch Choice 2040 Vision Impacts on Species per Guild





Overall, the WDC project shows the greatest potential for conflict in terms of the percentage of the project that would affect migratory bird habitat (88% of the project is in conflict). However, the WDC (2,091 acres) and NWQ (4,527 acres) projects show less conflict than the Vision project (8,980 acres) in terms of the total number of acres affected for all guilds. The greatest impacts from each project were shown to be particularly poignant for four to five species spanning all three guilds, meaning none of the guilds escape impacts to their current habitat distributions.

The waterbird (WB) guild is the most impacted guild for all of the development types and projects. Shorebirds (SB) are the next most impacted guild for all development types and projects, with the exception of the WDC project and the Vision's residential development type, where waterfowl (WF) show a greater amount of conflict than shorebirds. The white-faced ibis (WB) shows the greatest amount of conflict of any species for all development types and projects. The snowy plover (SB) shows the least amount of conflict with all development types and projects. Eight of the species show no conflict with commercial development for the NWQ project, and four of those same species do not show conflict with commercial development for the Vision project (see table below). This makes commercial development the least conflicting of the four development types, despite occurring in two projects. Industrial and residential development types show the greatest amount of conflict with current migratory bird habitat. The spatial data for these projects showed 4,113 acres of overlap, so it was impossible to assess the impacts to guilds and species from all projects together.

The map above shows areas of conflict for all three projects. Industrial development (red) conflict is primarily in the southern half of the study area, just to the west of Salt Lake City International Airport. Residential development (orange) conflict spans the entirety of the Wasatch Front, though a large portion of it occurs in the northern half of the area, just to the east of Farmington Bay. Commercial development (tan) conflict is dotted throughout the Wasatch Front corridor in urban areas. Highway development (yellow) conflict is all located on the northeast side of Farmington Bay. Project areas with no conflict with habitat are shown in black. Ultimately, the Vision project generates triple the amount of conflict that the WDC project generates, and nearly double the amount of conflict that the NWQ project generates.

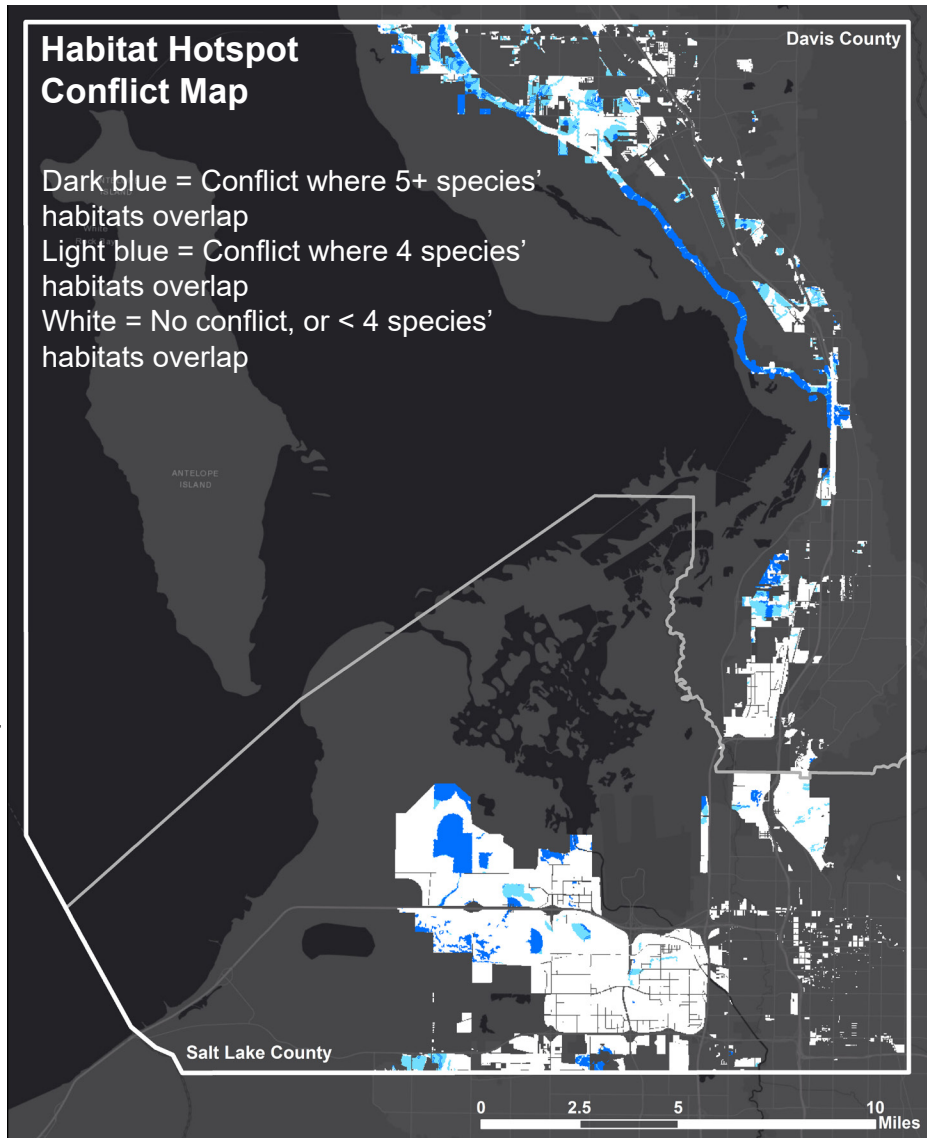
The Number of Conflict Acres Broken Down by Guild/Species and Project/Development Type		West Davis Corridor	Northwest Quadrant		Wasatch Choice 2040 Vision		
		Highway	Commercial	Industrial	Commercial	Industrial	Residential
Shorebirds	American Avocet	26.7	0	860	0	43.1	0.22
	Long-billed Curlew	1028	27.6	2056	176	496	880
	Snowy Plover	0	0	105	0	23.1	0
	Willet	1751	78.7	2638	458	893	4190
	Wilson's Phalarope	20.7	0	77.6	15.8	107	4
Waterbirds	Black-crowned Night Heron	405	0	1151	15.8	190	357
	Eared Grebe	20.9	0	300	0	43.8	0.22
	Franklin's Gull	1381	0	1181	62.7	253	1880
	Great Blue Heron	249	4.9	1128	442	1367	1279
	White-faced Ibis	2083	83.9	4373	803	2006	5611
Waterfowl	Cinnamon Teal	139	0.22	327	19.8	45.1	232
	Gadwall	44.7	0	205	0.22	113	6
	Lesser Scaup	24	0	361	0	43.1	0.22
	Northern Pintail	1838	29.4	2012	470	778	4383
	Redhead	388	1.11	448	56.7	114	701

# Recommendations

Ultimately, as the study area includes both critical bird habitat and urbanizing areas important to the continued economic prosperity in the region, it would be infeasible to protect all conflict areas for bird habitat. The region is going to continue developing infrastructure to support the economy and local human population, so it is prudent to protect the most important habitat. This way, the overall impact to migratory birds can be considerably lessened through the protection and conservation of strategic habitat hotspots in the region while allowing for necessary development.

To avoid displacing the most crucial habitat, the research team recommends to amend proposed projects that conflict with areas where four or more of the species' habitats overlap (any blue area on the map to the right). If over 25% of the representative species from this research have habitat in the area, the area likely transcends use by singular guilds and could be used by many different types of birds and other wildlife.

The table below shows the numerical difference between acres that would be protected under the four or more species protection scenario, and the five or more species protection scenario for each respective project. When avoiding areas where four or more species' habitats overlap, the Vision project has the most acreage to avoid (3,321.2 acres). When avoiding areas where just five or more species' habitats overlap, the Vision project has the least amount of acreage to avoid (1,041 acres). This is due to the large amount of conflict with the Vision's residential development in the northern part of the study area (see light blue areas north and east of the WDC project).



Much of the dark blue conflict areas (i.e. where five or more species' habitats overlap) in the north are caused by the WDC highway development, especially the southern half of the project. Residential and highway developments show the greatest amount of conflict with these hotspots of bird habitat, and are thus the most impacted in terms of mitigation and avoidance measures needed. The next logical steps for this research would include analyzing impacts on habitat for different life-stages of migratory birds (e.g. from chick to breeding adult) as animals use habitats differently depending on their current life-stage. Presence-absence phenological data (i.e. where species are found and not found in the area throughout the year) should be updated based on habitat use by species for each season and life-stage to gain a comprehensive assessment of how different species and guilds are using habitat in the area.

I also recommend expanding the conflict assessment area to the entire Great Salt Lake watershed, as there are likely other large development projects proposed throughout the region that could negatively impact habitat hotspots. Since these birds are migratory, they depend on a network of habitats throughout their migratory routes, including other areas around the GSL.

Project	Acres to Avoid for Areas of 4 or More Species	Acres to Avoid for Areas of 5 or More Species
WDC	1608.1	1154.9
NWQ	1831.8	1499.2
Vision	3321.2	1041
<b>All Projects</b>	<b>6383.6</b>	<b>3573.4</b>

## For Current Development

There are three major recommendations concerning the three proposed projects assessed in this research:

- 1. Lean into ‘centered growth’:** One of the Wasatch Choice 2040 Regional Vision’s goals is for the Wasatch Front to develop in a sustainable way with development centers located in convenient areas throughout the region. Supporting growth via changes in already developed areas will lessen the impacts to migratory birds by decreasing the conversion of open space or farmland to development. The research team also cautions delegating large areas to the development of single-family home neighborhoods — a large portion of conflict in the north section of the study area is due to this kind of residential development from the Vision project. Research shows increasing housing density in already developed areas, and practicing “land-recycling” in developed areas not only saves municipalities money and prevents habitat loss, but increasing density also decreases the amount of new infrastructure that needs to be built, such as roads, and helps protect natural resources, such as water and air quality, both of which require more attention along the Wasatch Front.
- 2. Maintain and protect ‘the fringe’:** Protect agricultural and open space land around the Great Salt Lake wetlands, as these are frequently used “spillover” habitats, and provide forage and resting habitat for waterbirds and some species of shorebirds and waterfowl. Much of the NWQ project is expected to displace open space and agricultural land that borders protected bird habitat, and so hotspot areas located within the project zone should be protected and include interconnecting corridors to each other and to other protected habitat areas (e.g. duck club land and mitigation wetlands). The team also strongly recommends that developers in the NWQ area follow the more environmentally conscious construction plans and policies that Salt Lake City laid out in their Northwest Quadrant Master Plan. Avoiding all development just west of the proposed WDC project is ideal, as there are large sections of habitat hotspots located in the vicinity. Counties, cities, organizations, and other agencies (such as The Nature Conservancy) should acquire conservation easements for these areas so they remain as open space and agricultural land, and be made unavailable for future development.
- 3. Reconsider the West Davis Corridor:** The WDC project, although smaller in scope than the other two projects, creates a disproportionate amount of conflict (about 3/4 of the project footprint is in conflict with habitat hotspots). Studies show the construction of a major highway has impacts beyond habitat fragmentation. A lot of time and effort has gone into this project, and the need for better transportation management and infrastructure is imperative. However, as conservation planners, the team recommends that this project either be moved to a less contentious area (likely closer to the Wasatch Mountains), or be dismissed altogether in favor of focusing resources and efforts on improving and promoting public transportation and creating more opportunities for non-vehicular travel.

## For Stakeholders and Planners

Going forward, there are several recommendations for land managers, planners, and decision-makers to help accommodate sensitive migratory bird habitat:

- 1. Communicate & collaborate:** There are many types of landowners, policy-makers, and agencies in this region who would benefit from communicating with each other. Not to say some organizations are not already doing this, but greater interdisciplinary cooperation will strengthen the region as a whole and provide opportunities to build relationships across municipal and political boundaries. The environment and wildlife are not concerned with these boundaries, and so management and conservation objectives should transcend these boundaries as well. Look to regional collaborations, such as the Wasatch Front Regional Council or the Intermountain West Joint Venture, as leading examples of associations that have used collaboration as a tool to generate a greater impact.
- 2. Collect, update, and share regional data:** While the USGS GAP data were the best available data for this project, new presence and absence data should be collected for the entire Wasatch Front region, including the area to the south around Utah Lake. The 1997-2001 Great Salt Lake Waterbird Survey sampling methods could be used as an example, and should be expanded upon to include the entire region, not just areas directly bordering the Lake. This will be a necessary feat every decade (or as often as funding permits) to assess how changes in climate, land use, and lake levels impact migratory bird populations and habitats. Conservation and regional plans should be amended as new data becomes available, and data should be advertised and shared with other interested parties.
- 3. See the forest for the trees:** Impacts from local land use and land cover changes are just one of the issues that migratory birds face. Though the total amount of conflict acres identified in this research are comparatively small in terms of the entire habitat area for these species (being migratory animals), it is important to understand that any impacts to a major migratory hub, such as the Great Salt Lake ecosystem, have far-reaching effects on the hundreds of bird species that use this habitat. Losing habitat at a crucial migration stopover is but one tree in a forest of issues, which is why fostering collaboration, cooperation, and implementing a large-scale management approach is a must for maintaining healthy migratory bird populations.
- 4. Update and perform conflict assessments as new projects are proposed:** Use this conflict assessment as a guide for identifying areas suitable for either new development (no or low conflict areas) or conservation (high conflict areas). Include distribution data for other flora and fauna to identify and assess potential conflicts for multiple types of ecosystems and wildlife. This project shows conflict assessments can be performed without requiring the collection of new data — there are other free options available (e.g. the U.S. Geological Survey, Wild Utah Project, etc.). This is one reason why connecting with other organizations and stakeholders is so beneficial.



The Wasatch Front is a narrow North-to-South corridor running between the Wasatch Mountain Range to the east and the Great Salt Lake to the west. The opportunity for the expansion of development is severely constrained by these two natural features. Even so, development is occurring farther east into the mountains and farther west into floodplains and wetlands, displacing much of the agricultural land and open space that buffers the Great Salt Lake. The Wasatch Front is the most densely populated and fastest-growing area in Utah. To support the ever-increasing working population, the government of Utah is striving to increase the robust economic growth of the region through economic incentives and infrastructure development. One of Governor Herbert's goals is to make Utah a leading economy in not only the U.S., but in the world. Much of the State's growth in both population and economics are expected to occur predominantly along the Wasatch Front, which will require new and improved development strategies to accommodate the projected expansion.

While the area is vital for socio-economic development, the area also provides crucial habitat to millions of migratory birds, which has a positive impact on Utah's tourism and recreation industries. Over 250 bird species from both the Pacific and Central Flyways use the GSL area during annual migrations, which provide unique recreational opportunities for birders and hunters. The Lake acts as an oasis in the desert for birds that migrate thousands of miles across the arid Great Basin region, making this area so important that the National Audubon Society considers it "North America's single most important interior wetland for birds." Research shows that Utahans wish to maintain the region's sensitive lands, which would also help maintain the area's hemispherical importance to migratory birds. Therefore, it is crucial for land managers, planners, and decision-makers to consider the full impacts of future development projects on critical migratory bird habitat when making plans and designs to accommodate future growth.

To alleviate conflict and maintain the region's sensitive lands, the research team put forth three primary recommendations concerning these projects. First, promote the Wasatch Choice 2040 Regional Vision's goal of creating 'centered growth,' thereby reducing sprawl, increasing mixed-use development areas, increasing housing density, and making communities more amenable to walking and biking as main modes of transportation. Second, maintain the sensitive lands (such as wetlands and croplands) that surround Farmington Bay. If development must displace some of these areas, then mitigate for protection of other sensitive lands and maintain habitat connectivity between habitat areas. Third, reconsider the West Davis Corridor project along the eastern edge of Farmington Bay, and instead use the monetary resources dog-eared for this project to promote and develop public transit, and more walkable communities. This would help the region attain the EPA standards for air quality to the betterment of Utahans along the Wasatch Front. By following these recommendations, the conflict generated by the three projects assessed in this study would be considerably lessened, and current migratory bird habitat would continue to exist alongside this developing region for future generations of both birds and people.



A white-faced ibis landing in a stand of bulrush.  
Photo: Gary Witt

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The full report is available for download on the USU Digital Commons website:  
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<https://digitalcommons.usu.edu/gradreports/1322>

# Organizations & Stakeholders

The following is a non-exhaustive list of organizations and stakeholders who would benefit from collaborating and sharing ideas and data to the betterment of the people and wildlife along the Wasatch Front:

**Envision Utah**

**Wasatch Front Regional Council**

**Mountainland Association of Governments**

**Utah Department of Environmental Quality**

**Utah Department of Natural Resources**

**U.S. Geological Survey**

**U.S. Fish and Wildlife Service**

**Utah Governor's Office of Economic Development**

**Kem C. Gardner Policy Institute**

**Utah Chapter of the American Planning Association**

**Utah State University**

**Weber State University**

**University of Utah**

**The Nature Conservancy**

**National Audubon Society**

**Utah Farm Bureau**

**Wild Utah Project**

**Utah Inland Port Authority**

**Utah Department of Transportation**

**Utah Department of Health**

**Local Counties and Municipalities**

**Utah Ducks Unlimited**

**Intermountain West Joint Venture**