

Black-necked Stilts commonly forage in salt ponds, sewage lagoons and evaporation ponds, as well as shallow wetlands with emergent vegetation.

Nesting Black-necked Stilts were formerly dependent on spring flooding of wetland areas, but this process has been significantly altered in many areas by diversion of water for agricultural and residential uses.



Photo: Maina Handmaker

# BLACK-NECKED STILT

## *Himantopus mexicanus*

### Management Recommendations

- » Maintain nesting islands.
- » Maintain water depths of 0-13 cm.
- » Create contaminant-free impoundments and limit access to contaminated sites.
- » Manage for moderate grazing, but could be negatively impacted by heavy grazing if vegetation near nesting sites is significantly reduced as nests are subject to trampling by cattle.
- » Protect nests from disturbance or destruction, especially those adjacent to impoundment dikes.

### Habitat Class

Ponds, lagoons, wetland complex, agricultural fields, and pastures

### Size

Length: 35-39 cm  
Weight: 150-176 g



Prepared by:



# HABITAT ATTRIBUTES



## Water

**Depth:** Up to 13cm

**Salinity:** Variety of salinities, but often choose lower salinity

**Quality:** Selenium and mercury a concern esp. in impoundments



## Vegetation

Open water, sparse emergent vegetation

Foraging: wide range - none to



## Nesting

Nest in emergent stubble to reed beds, floating vegetation mats, impoundments and managed wetlands



## Landscape

Move among multiple habitat types during the nesting season



## Timing

Early March to mid-November



## Soil

Forage in the water column



## Diet

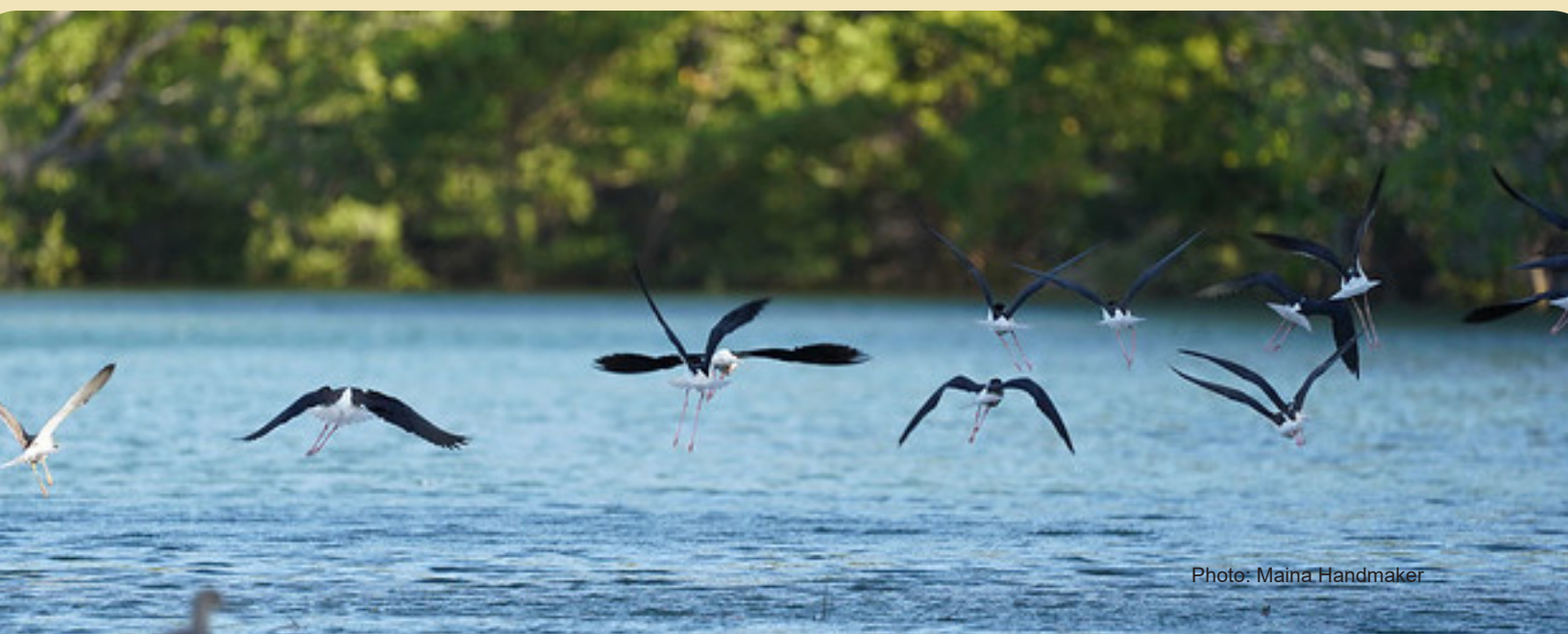
Brine shrimp and flies, fresh-water inverts



## Predators

Adult: Peregrine Falcons and Great Horned Owls, other raptors, and foxes

Nests: Raptors, foxes, mink, snakes, ravens, magpies



# AMERICAN AVOCET

*Recurvirostra americana*

American Avocets are found at WHSRN sites throughout North America. Nesting Avocets, like other Great Basin shorebirds, were formerly dependent on spring flooding of wetland areas, but this process has been significantly altered in many areas by diversion of water for agricultural and residential uses.



## Management Recommendations

- » Create predator-safe islands for nesting.
- » Ensure water depths of 0-20 cm for foraging.
- » Protect from disturbance or destruction of nests, especially those adjacent to impoundment dikes.
- » Manage contaminants and saline levels with water management regimes.
- » Reduce of the availability and attractiveness of heavily contaminated impoundments while creating adjacent uncontaminated nesting and foraging habitat.

## Habitat Class

Ponds, lagoons, wetland complex, impoundments

## Size

Length: 43-47 cm  
Weight: 275-350 g

Prepared by:



# HABITAT ATTRIBUTES



## Water

**Depth:** Forage up to 20 cm and will swim in deeper water

**Salinity:** Adults adapted to saline and hypersaline habitats. Avocet chicks can be challenged by highly saline environments

**Quality:** Selenium and mercury concentrations in saline lakes



## Timing

Late March to early October



## Soil

Fine silt

Avoid sandy and rocky sites



## Diet

**Inland sites:** Brine shrimp, brine flies, other freshwater invertebrates

**Chicks:** Flies and other small invertebrates



## Predators

**Adult birds:** Great Horned Owls, Peregrine Falcons, Northern Harrier, and red foxes

**Nests:** Northern Harriers, mink, Common Ravens, California Gulls, red foxes, coyotes, Gopher Snakes



## Vegetation

Use wetlands with emergent vegetation, but forage in open water, avoid thicker vegetation



## Nesting

Nest along shorelines and in or near salt grass away from the water's edge

Sparsely vegetated dikes, and islands, including artificial islands

## GREAT BASIN

During the winter months, Avocets that remain in the Great Basin continue to use sites with fine sediment and open water, including lakes, mudflats, and evaporation ponds.



Photo: Mike Malmquist

# SNOWY PLOVER

## *Charadrius nivosus*

In the Great Basin, Snowy Plovers nest on open flats near alkaline or saline lakes as well as bare or sparsely vegetated flats near ponds, sand bars, and salt-evaporation ponds. Surface water availability; extent of unvegetated flats; and predator-associated features such as gull colonies, human development, and wetland edges are landscape features that influence the quality and use of a site by Snowy Plovers.

### Management Recommendations

- » Maintain light to moderate grazing.
- » Manage predators directly and reduce invasive species which can provide cover for predators.
- » Consider predator exclusion fences to protect eggs, but may lead to increased mortality of adult birds.
- » Manage encroaching stands of invasive species such as common reed and salt cedar to maintain open nesting flats for Snowy Plovers.



Photo: Brad Winn

### Habitat Class

Open flats near alkaline and saline lakes

### Size

Length: 15-17 cm

Weight: 33-58 g

Prepared by:



Photo: Maina Handmaker

# HABITAT ATTRIBUTES



## Water

**Depth:** 1-2 cm

**Salinity:** Saline and alkaline flats, need freshwater for bathing

**Quality:** Selenium and mercury a concern



## Timing

Late March to September

Nesting season: Mid to late May to July



## Vegetation

Prefer little to no vegetation

Require vegetated wetland edges and some water on the landscape



## Soil

Crusted alkali flats, wet pond and lake edges



## Diet

Forage by sight

**Adults:** flies, beetles, grasshoppers, butterflies, and other



## Nesting

Require undisturbed nesting areas that are not flooded during nesting season

Avoid nesting in areas with encroaching vegetation



## Predators

**Adults:** raptors, feral cats

**Chicks:** Loggerhead Shrike, Common Raven, American Crow, gulls, raptors, Great Blue Heron, Cattle Egret, various mammals, Whimbrel, and trapdoor spiders

## GREAT BASIN

Habitat loss, water availability, and increasing predator populations are three major threats to snowy plovers at interior nesting sites.

Experimental results show that Snowy Plovers do not have any internal mechanisms for managing osmotic stress from saline environments. Instead, Snowy Plovers rely on their insect prey to provide most of their water needs and will drink from freshwater sources when available.



Photo: Max Malmquist



In the Great Basin, Long-billed Dowitchers use wetland complexes, saline lakes, and flooded playas. They can occur in flocks of thousands in both spring and fall migration in the Intermountain West. Water diversion from wetlands is a significant threat to habitat.

# LONG-BILLED DOWITCHER

*Limnodromus scolopaceus*

## Management Recommendations

- » Utilize high-quality water sources and restore natural hydrologic processes to minimize contaminant exposure and optimize foraging opportunities.
- » Ensure wetland complexes receive water prior to migrating birds arriving and then maintaining expanses of wet mud and water up to 16 cm deep on the landscape.
- » Maintain light to moderate grazing in pastures.

## Habitat Class

Wetland complexes, saline lakes, flooded playas, impoundments

## Size

Length: 29 cm  
Weight: 88-131 g

Prepared by:



Photo: Maina Handmaker

# HABITAT ATTRIBUTES



## Water

**Depth:** 0-16 cm

**Salinity:** Freshwater to moderate saline sites

**Quality:** Selenium and mercury a concern



## Timing

**Spring:** March to May

**Fall:** July to October

## Soil

**Inland sites:** Fine mud

**Coastal sites:** Fine-grain sand



## Diet

Aquatic and benthic invertebrates like Polychaetes, Cumacea, Chironomidae, and Planorbidae



## Predators

Peregrine Falcons, Merlin, and Short-eared Owls



## Vegetation

Wide range. Open flats, flooded fields, roost in thick vegetation

**Height:** Short, up to breast height for feeding. May roost in taller vegetation



## Landscape

Move between foraging and roosting sites in wetland complexes

Tracking data showing landscape-level movements of Long-billed Dowitchers indicates that landscape use varies depending on the amount and distribution of habitat. For example, they use freshwater wetlands as well as coastal saltmarsh during migration.



Photo: Max Malmquist





Photo: Kim Stark

Inhabiting a variety of vegetated wetlands on their prairie breeding grounds, Marbled Godwits forage on the shores of receding ponds and saline lakes while migrating through the Great Basin. Elsewhere in migration this species sometimes uses flooded fields and pastures

# MARBLED GODWIT

## *Limosa Fedora*

### Management Recommendations

- » Maintain shallow water in wetland complexes in spring and fall, 5-13cm water depth.
- » Ensure wetlands receive water prior to the arrival of migrating Godwits, and then maintaining complexes with a variety of water levels during the migratory windows of April and July to September.
- » Monitor cattle grazing which can be beneficial in limiting vegetation and open areas to the benefit of Marbled Godwits, but cattle waste may impact nutrient loads in foraging areas.
- » Minimize wind turbines and power lines as they do not avoid areas with these structures and thus may be susceptible to collisions.
- » Utilize high-quality water sources and manage wetlands to restore natural hydrologic processes to minimize contaminant exposure and optimize foraging opportunities.

Prepared by:



Photo: Kim Stark

# HABITAT ATTRIBUTES



## Water

**Depth:** 5-13 cm

**Salinity:** Freshwater to moderate saline sites

**Quality:** Accumulated heavy metals and salts sometimes found in agricultural runoff



## Timing

March to May and July to October

**Spring:** Peaks in April

**Fall:** July to early September.



## Soil

Sandy, large grain size



## Vegetation

Open flats and occasionally flooded pastures

0 cm on flats, up to 20 cm in pastures



## Diet

Sago pondweed tubers, invertebrates, small fish



## Landscape

Move between foraging and roosting sites in wetland complexes



## Predators

Peregrine Falcons, Merlin, Northern Harriers, Marbled Godwits, Prairie Falcons, Great Horned Owls, and Short-eared Owls

## GREAT BASIN

The shallow saline lakes and freshwater wetland complexes of the Intermountain West are critical migratory habitat for the Arctic-nesting Marbled Godwits. However, Godwits prefer lower saline habitats and reduced freshwater inputs to saline lakes in the region can create hypersaline environments which reduces prey diversity and availability.

A network of multiple sites and habitats on the landscape is important to maintain high-quality migration sites for this species.



Photo: Kim Stark

# LONG-BILLED CURLEW

## *Numenius americanus*



Photo: Max Malmquist

Long-billed Curlews are a true grassland shorebird during the breeding season. They require multiple habitat types on the landscape including short-grass prairie and rangeland for nesting; taller, dense vegetation for hiding chicks; and adjacent wetlands, alkali lakes, and playas for foraging.

### Management Recommendations

- » Graze grasslands in early spring to reduce vegetation height and density prior to the start of nesting.
- » Avoid continuous year-long grazing, and rotational grazing (grazing twice per season with a 2-month break) to allow an extended grazing-free time to incubate and raise young.
- » Monitor cattle waste and nutrient loads in foraging areas.
- » Restore agricultural lands to native grassland.
- » Utilize managed fire to discourage encroachment of woody vegetation.
- » Pesticide spraying on the breeding grounds has not been shown to have a direct impact, but does indirectly impact adults and chicks by substantially reducing invertebrate abundance and availability



Photo: Kim Stark

### Habitat Class

alkali flats, shrubsteppe pasture, and short-grass and mixed prairies

### Size

Length: 14 in

Weight: 29 in

Prepared by:



# HABITAT ATTRIBUTES



## Water

**Depth:** 0-16 cm (migration and wintering)

**Salinity:** Freshwater (breeding), alkali lakes and playas (migration)

**Quality:** Less susceptible to selenium and mercury when feeding on grasslands, but do use alkali lakes and playas



## Timing

**Arrive:** Mid-March to Mid-April

**Nesting season:** Mid-April to Mid-August

**Depart:** August, some may not leave until October



## Soil

Saltmarsh, alkali lake edges in migration



## Vegetation

**Height:** 0-24 cm

**Forage:** Short-grass prairies, agricultural lands and wet pastures

Prefer vegetation < 10cm for foraging and taller, thick grass to hide chicks



## Diet

Invertebrates such as beetles, and grasshoppers; eggs and nestlings of other grassland nesting species



## Predators

**Adult birds:** Uncommon, but foxes and coyotes possible

**Chicks:** Raptors, weasels, foxes, and coyotes



## Nesting

Select sites with shorter vegetation: (0-24 cm)

## GREAT BASIN

In the Great Basin, Long-billed Curlews need habitat that has proximity to water. Long-billed Curlews primarily use small freshwater wetlands during the breeding season, but during pre-migration staging and in migration will use alkali lakes and playas.

Although Curlews do nest in cultivated land, they use these areas in lower proportion and prefer shortgrass and mixed-grass prairies.



Photo: Max Malmquist

# WILLET

*Tringa semiplmata*

Willetts require a variety of habitats on the landscape to be successful. Sparse, short-grass prairie and rangeland, and wetland complexes with a range of salinity from fresh to saline are all necessary. At inland sites, Willetts usually forage along ponds and lakeshores, capturing prey by sight on the surface of the mud.



Photo: Maina Handmaker

## Management Recommendations

- » Maintain moderate rotational grazing with grazing twice per season with a 2-month break. Avoid grasslands with continuous season-long grazing.
- » Protect areas of native grassland >1 km<sup>2</sup> with associated wetland complexes.
- » Draw down impoundments to maintain shallow-water ponds with minimal emergent vegetation and low-angle slopes in post-breeding and migratory stages.

## Habitat Class

Open sparse grasslands and semi-arid plains that are adjacent to wetland complexes

## Size

Length: 34-41 cm

Weight: 203-339 g

Prepared by:



Photo: Brad Winn

# HABITAT ATTRIBUTES



## Water

**Depth:** Typically capture prey on the surface of mud, 0-7 cm

**Salinity:** Freshwater to moderate salinity

**Quality:** Selenium and mercury a concern. Heavy metals and salts sometimes found in agricultural runoff



## Vegetation

**Nesting:** lightly vegetated short grass; alkali flats, wetland complexes with emergent vegetation; <15 cm

**Migration:** Shallow-water ponds with minimal emergent vegetation; 0 cm



## Nesting

Large breeding territories, need large blocks of grassland

Broods are moved to nearby wetland complexes after hatching



## Timing

**Arrive:** Mid-March to September

**Nesting season:** End of June

**Depart:** September to November



## Soil

**Breeding season:** Wet pond and lake edges

**Migration:** Edges of saline lakes



## Diet

**Adults:** Beetles (Coleoptera, Hydrophilia, Dytiscidae, and Curculionidae), other invertebrates.

**Chicks:** Flies and small invertebrates on surface of mud



## Predators

**Adult birds:** raptors

**Chicks:** raptors, Common Ravens, red foxes, coyotes, gray rat snakes, and feral dogs.

## GREAT BASIN

In the Great Basin, Willets use both freshwater wetlands and saline lakes. However, Willets prefer moderately saline habitats and reduced freshwater inputs to saline lakes in the region can create hypersaline environments which reduces prey diversity and availability.



Photo: Kim Stark

# WESTERN SANDPIPER

*Calidris mauri*



Photo: Max Malmquist

Western Sandpipers are one of the most numerous shorebird species in North America and use a wide array of habitats throughout the year. The presence of water on the landscape is the major driver of Western Sandpiper use of a site and water diversion is a major threat in the area.

## Management Recommendations

- » Utilize high-quality water sources and manage wetlands to restore natural hydrologic processes.
- » Distribute water to wetlands in spring prior to birds arriving in mid-April.
- » Maintain expanses of wet mud and water up to 4cm deep on the landscape.
- » Maintain shallow water in wetland complexes in spring and fall.
- » Cattle grazing may limit vegetation and open areas, but large amounts of cattle waste may impact nutrient loads in foraging areas.

## Habitat Class

Ponds, lagoons, wetland complex, impoundments

## Size

Length: 14-17 cm

Weight: 22-35 g

Prepared by:



Photo: Pete Davidson

# HABITAT ATTRIBUTES



## Water

**Depth:** Up to 10cm, usually 0-4cm

**Salinity:** Freshwater to moderate saline sites

**Quality:** Unknown



## Vegetation

Open, except will roost near vegetation cover

None or short vegetation



## Landscape

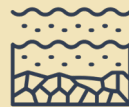
Move between foraging and roosting sites



## Timing

**Spring:** Mid-April to mid-May

**Fall:** Late June to October



## Soil

High silt content, or mix of silt and sand



## Diet

**Inland sites:** Benthic invertebrates, brine shrimp, spiders

**Coastal:** Polychaete worms, mollusks, biofilm



## Predators

Raptors

When predators are present will form larger flock sizes and engage in more alert behavior

Western Sandpipers at some coastal sites range among approximately 22 square kilometers of foraging and resting sites within a larger habitat complex, and on average only 2 kilometers separates foraging and roosting sites.



Photo: Max Malmquist



Least Sandpipers can be found in the Great Basin in every month of the year. They regularly use inland habitats during migration. They are most commonly found in lakes, ponds, impoundments, ditches, marshes, flooded pasture, and flooded playas.



Photo: Brad Winn

# Least Sandpiper

## *Limosa Fedora*

### Management Recommendations

- » Maintain shallow water in wetland complexes, impoundments, and ponds in spring and fall, 0-4 cm water depth.
- » Utilize high-quality water sources and manage wetlands to restore natural hydrologic processes to minimize contaminant exposure and optimize foraging opportunities.
- » Maintain light to moderate cattle grazing to reduce vegetation height. Avoid heavy grazing that could degrade vegetation and increase nutrient loads.

### Habitat Class

lakes, impoundments, ponds, ditches, marshes, flooded pasture

### Size

Length: 13-15 cm  
Weight: 29-30 g

Prepared by:



Photo: Shiloh Schulte

# Habitat Attributes



## Water

**Depth:** 0-4 cm

**Salinity:** Freshwater to moderate saline sites

**Quality:** Selenium and mercury a concern



## Timing

Mid March to mid May and late June to early September

Peak spring migration: Late April



## Vegetation

**Height:** Short and up to breast height

**Cover:** Open, but near thick vegetation

Will forage on flats, but tend to remain closer to vegetation and



## Soil

Fine mud near thick vegetation



## Diet

Chironomid larvae, other invertebrates such as dipterans and coleoptera, as well as seeds and worms



## Landscape

A network of multiple sites and habitats on the landscape



## Predators

Raptors

Behavior changes in the presence of threats with larger flock sizes and more alert behavior in areas with greater threat level

Photo: Maina Handmaker



# WILSON'S PHALAROPE

*Phalaropus tricolor*



Photo: Maina Handmaker

Wilson's phalaropes are open-water specialists, and unlike most other shorebirds, swim on the surface of the water and actively feed on aquatic invertebrates. In migration, this species congregates in large numbers on open shallow-water hypersaline lakes. As lakes in the Great Basin are threatened with loss of freshwater inputs, it will become increasingly important to maintain a network of high-value saline wetlands to support this and many other western shorebird species.

## Management Recommendations

- » Monitor water diversions from saline lakes that reduce water levels or change salinity enough that the habitat becomes unsuitable for the brine flies and brine shrimp.
- » Minimize structures with lights at night during migration as they can be a threat.
- » Minimize presence of wind turbines as they may present a risk.
- » Monitor grazing, moderate grazing may be beneficial, but could be negatively impacted by heavy grazing if turbidity or nutrient loads increase significantly.

## Habitat Class

Saline and hypersaline lakes

Sometimes flooded meadows, alkaline ponds, coastal estuarine marshes, and sewage pond

## Size

Length: 22-24 cm

Weight: 38-110 g

Prepared by:



Photo: Max Malmquist

# HABITAT ATTRIBUTES



## Water

**Depth:** 0-30 cm

**Salinity:** Saline and hypersaline lakes – within a certain range of salinity that sustain brine flies and shrimp

**Quality:** Selenium and mercury are a concern



## Landscape

Open-water specialist, rarely found on land in migration

Require a network of saline lakes



## Vegetation

Feed and roost in open water and avoid areas with thicker vegetation



## Timing

**Spring:** April to May

**Fall:** Mid-June to September



## Diet

Brine fly, other invertebrates

Birds spin to create a vortex that draws invertebrates to the surface



## Predators

Peregrine Falcons, Prairie Falcons, Northern Harriers, Merlin and Short-eared Owls



## Soil

Open water, drying mud



Photo: Max Malmquist

# RED-NECKED PHALAROPE

## *Phalaropus lobatus*



Photo: Max Malmquist

Red-necked Phalaropes spend much of the year either on their nesting grounds in the Arctic, or on open pelagic waters during the winter. In migration, this species makes extensive use of interior saline lakes of the Great Basin. Red-necked Phalaropes swim and feed on the surface of open water and congregate on saline lakes.

### Management Recommendations

- » Maintain water levels and salinity needed for brine shrimp and flies.
- » Minimize structures with lights at night which are a threat during migration.
- » Avoid heavy grazing which may increase turbidity or nutrient loads.
- » Wind turbines on the landscape may represent a threat to these birds at interior locations, in the same way that they present a potential risk at offshore sites.

### Habitat Class

Saline and hypersaline lakes

### Size

Length: 18-19 cm  
Weight: 27-40 g

Prepared by:



# HABITAT ATTRIBUTES



## Water

**Depth:** Wide range, prefer <1m

**Salinity:** Saline and hypersaline lakes– within a certain range of salinity that sustain brine flies and shrimp. Use freshwater ponds for bathing and drinking.

**Quality:** Selenium and mercury are concerns



## Timing

**Spring:** April to May

**Fall:** July to October



## Diet

Feed by spinning rapidly on the surface of the water to create a vortex to concentrate prey items

Brine fly, other invertebrates



## Landscape

Open-water specialist and is rarely found on land in migration.

Require a network of saline lakes

Submerged vegetation beds are important for prey species



## Predators

Peregrine Falcons and Sharp-shinned Hawks, Jaegers, Merlin, Northern Harriers, and Short-eared Owls



## Soil

Open water

