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Management Recommendations for Washington's Priority Habitats and Species

Great Blue Heron

Ardea herodias

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FISH AND WILDLIFE

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GENERAL RANGE AND REGIONAL DISTRIBUTION

The Great Blue Heron's North American breeding range runs from southeast Alaska east to Nova Scotia and south to northwestern Mexico, the Yucatan Peninsula in Belize and Mexico, the West Indies, and Galapagos Islands (*7*). Herons overwinter from southern British Columbia, south to Venezuela.

Figure 1. The hatched area is the year-round range of the Great Blue Heron (*Ardea Herodias*) in Washington and British Columbia (*55*).

Herons are a permanent resident in all of Washington except the higher Cascade and Olympic ranges (Figure 1). In British Columbia, they are permanent residents along the entire coast and throughout Vancouver Island and the Haida Gwaii Archipelago[1]. They also are residents in south-central British Columbia. Although herons breed at elevations as high as 1,100 meters (3,600 ft; *14*), they mainly nest at lower elevations.

The region's largest colonies are within the range of the Pacific Great Blue Heron (*A. h. fannini*). This subspecies differs from inland herons and from herons near south-coastal Washington (*A. h. herodias*) in that they are smaller in size. They also generally begin breeding earlier in the spring (*54*). The range of these birds is isolated by the mountains east of Puget Sound and Georgia Basin. Pacific Great Blue Herons mostly occur close to the coast and inland along large rivers from Prince William Sound to Puget Sound (*54*).

RATIONALE

Great Blue Herons are highly vulnerable to human disturbance, predation, and competition for nesting habitat (*40*). Their habit of nesting in large groups makes herons especially susceptible to these types of impacts. A single event involving human disturbance can lead an entire colony to terminate a nesting attempt (*21*, *54*, *55*). Because herons breed in colonies of up to 500 nests (*21*), early termination of even one breeding attempt can lead to a considerable loss of offspring. This is especially a problem in Puget Sound and the Georgia Basin, where half the breeding population is concentrated into four large colonies (*21*). Recently the size of these large colonies in Puget Sound has increased as birds began to move out of smaller colonies (*22*).

Although herons are not a state-listed species in Washington, they are a species of special concern in British Columbia due to a decline in productivity, where the number of fledglings per active nest fell by nearly half since the 1970s (*54*). Although habitat loss and disturbance negatively impact individual colonies, we need more surveys to assess whether these factors are having an impact on regional heron populations.

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[1] This publication was written in cooperation with the Great Blue Heron Working Group. Because the group is a made up of experts from Washington and British Columbia, we present information and guidance relevant to Washington and British Columbia.

HABITAT REQUIREMENTS

Great Blue Heron foraging, breeding, and pre-nesting habitats usually are in close proximity to each other (*24*). Foraging habitat often is adjacent to or within a few kilometers of the nesting colony. Before nesting begins, herons will often congregate close to where they nest. The inter-relationships among these habitats require consideration to effectively protect a nesting colony.

PRE-NESTING HABITAT

Prior to nesting, herons may gather in groups. Surveyors have observed pre-nesting groups close to many of the region's heron colonies (A. Eissinger and I. Moul, personal communications). There is some debate as to how prevalent these groups are in the region. Although birds may not exhibit this behavior at every colony, more survey and research during the pre-nesting period will help us better understand these habitats.

The breeding season begins when adult herons gather at these pre-nesting sites (*21*). Along the coast, herons may occupy these sites while waiting for the tides to descend enough for food to become accessible (I. Moul, personal communication). Although not all of a colony's nesting birds will be found in a pre-nesting congregation area, the number of birds seen at these sites seems to correspond to the size of the nearby colony (A. Eissinger, personal communication).

Herons form pre-nesting congregations in various types of habitats. They congregate in both vegetated areas and on built structures (e.g., rooftops near Stanley Park and in Seattle's Kiwanis Ravine). Although in interior British Columbia and eastern Washington far fewer pre-nesting groups have been reported, Gebauer and Moul (*24*) noted interior-nesting herons gathering at larger lakes, wetlands, and watercourses prior to nesting. In coastal areas, herons often congregate in large estuaries and mudflats (*24*). At one of Washington's largest colonies at Birch Bay, pre-nesting congregations occur in fallow fields adjacent to the colony. Herons also assemble in day roosts near colonies in the pre-nesting period (*21*).

BREEDING AND NESTING HABITAT

Great Blue Herons often assemble in large and conspicuous colonies. Although some will nest as isolated pairs, most form colonies of a few pairs to many hundreds of birds (*10*). Larger and more productive colonies tend to form near large areas of high quality foraging habitat (*5*, *25*, *27*, *31*), and especially near eelgrass beds (*11*, *54*). Although herons sometimes nest on the ground, human-made structures, cliffs, and in shrubs (*7*, *10*, *28*; H. Ferguson, personal communication), nesting mostly occurs in trees like alder, cedar, hemlock, pine, Douglas-fir (*Pseudotsuga menziesii*), spruce, hawthorn, bigleaf maple (*Acer macrophyllum*), and cottonwood (*Populus balsamifera*). A shortage of suitable trees may lead herons to nest in shrubs or near the ground (*28, 54*). In coastal Washington and British Columbia, nesting largely occurs in areas with deciduous trees (M. Tirhi and R. Vennesland, personal communications). In British Columbia's interior Columbia River Basin, herons showed no preference for nesting in conifer or deciduous trees (*35*).

Ideal nesting habitat typically consists of mature forest (*24*). Although most colonies are found in forests free of human disturbance, some nesting occurs in areas of persistent human activity (*10*). An explanation for this may be that some areas lack undisturbed forest close to foraging habitat. In these places herons may be forced to select a disturbed forest because it is close to rich foraging habitat (*31*). In some regions they may select the best available habitat when optimal habitat is altogether lacking. Some herons may also become more acclimated to people (*52*). Although herons nest in disturbed areas, the presence of people has been linked to reduced nesting productivity (*16*, *24*, *49*, *53*). Colony abandonment has also resulted from activities like land development and repeated human intrusions (*43*, *49, 53*).

Breeding Season Foraging Habitat

During the breeding season herons feed in the shallow margins of various coastal and freshwater habitats (*24*). Herons primarily nest near abundant sources of food (*31*). Although most colonies are within 3 kilometers (1.9 mi) of key foraging grounds, herons can nest anywhere within 10 kilometers (6.2 mi) of where they are foraging (*9*).

The presence of a nearby food source influences a colony in various ways. Food accessibility influences when a heron colony will begin breeding each year (*8*). Food also influences the size of nesting bird's clutch and brood (*41*, *42*, *47*). Although few have studied the relationship between food abundance and nesting, numbers of breeding herons likely decline with waning food supplies. A reliable food source also seems to affect reproductive performance (*10*, *31*).

Along the coast, eelgrass meadows and other estuarine ecosystems supply most of the food that adult and juvenile herons require during the breeding season (*10, 20*). These herons feed on various small fish and marine invertebrates (*10*) such as gunnels, sculpin, shiner perch, mud shrimp, isopods, and crabs. Butler (*9*) concluded that coastal-nesting herons forage most efficiently in late spring when the tides are at their lowest levels and when prey tends to be abundant (*10*). This timing also corresponds to when the energy demands of juvenile herons hit their peak (*1*). Although coastal herons rely mainly on marine and estuarine waters for foraging, freshwater habitats also serve as an important source of food (*24*).

In contrast to coastal herons, interior herons feed alone and in small groups. This may be a result of foraging in areas of less abundant food. In southeast British Columbia and eastern Washington, breeding herons feed in wetland complexes, large rivers and creeks, and small lakes (*35;* H. Ferguson, personal communication). In southeast British Columbia, palustrine wetland complexes comprise 40% of the waters near colonies, while rivers, small lakes, and reservoirs made up another 50% (*35*). Given the proximity, herons may have an affinity for feeding in these waters.

Non-breeding Season Foraging Habitat

Although breeding season foraging more directly influences heron nesting, areas used for foraging outside the breeding period are also important. In fall and early winter, adult and juvenile herons often prey on small mammals in fallow, freshly plowed, or mowed fields and in grasslands (*9*, *24*; H. Ferguson and S. Pinnock, personal communications). Close to the coast, herons feed in ditches, old fields, marshes, and wetlands just following their dispersal from breeding areas (*10*). In October and November adults closer to the coast feed in marshes while juveniles feed in oldfields (*5*). These coastal herons later move back to tidal areas beginning in February and March. Great Blue Herons in interior areas forage along ice-free waters like creeks and lake shorelines. Non-breeding season foraging habitat may be a limiting resource for interior herons when frozen waterbodies or snow-covered fields restrict their access to prey (*24*).

LIMITING FACTORS

Activities like forestry and development have lead to the loss and degradation of heron habitat, disturbance to nesting and foraging grounds, and to direct mortality (*10*, *40*, *49*). Forest removal and urban and industrial development are the chief causes of habitat loss in the Pacific Northwest (*24*, *51, 60*). Increased human disturbance at breeding and foraging sites can lead to increased predation, lower breeding success, nest failure, and less efficient foraging (*10*, *24*, *53*). Although herons can nest in disturbed urban areas, disturbance can lead birds to terminate breeding attempts, especially when a disturbance occurs early in the nesting period or when it is a large or novel event (*37*, *52*).

Avian predators also kill herons and compete for habitat. Bald Eagles are the heron's primary predator (*10*, *24*, *53*). A sharp increase in eagle populations has lead to more colony incursions (*55*). In some areas, eagle predation and disturbance has lead to an increase in nest and colony failure (*13*, *53*). Depredation in particular appears on the rise in coastal heron colonies (*50*, *53*) and attacks on adult herons may be leading to the temporary or permanent colony abandonment (*21*). Annual monitoring of colonies in interior British Columbia has shown eagles to be a cause of mortality and depredation (*35*). Eagles may also affect colony size further from the coast (H. Ferguson, personal communication). Although the recent rise in Bald Eagle abundance following their recovery has apparently exacerbated impacts at heron colonies, historically herons persisted when eagles were more common than they are today (*46*). But because interactions now occur in an altered landscape, there is uncertainty as to how herons will respond to the increased influence of eagles.

Other birds also seem to impact herons. The considerable ecological overlap of Double-crested Cormorants (*Phalacrocorax auritus*) and herons in interior British Columbia and eastern Washington suggests they potentially compete for limited nesting habitat (*35*; D. Norman, personal communication). Crows and ravens also prey on heron eggs and young (*45*).

Climate change will likely influence heron nesting and distribution. While we still do not know how severe the impacts will be, rising sea level and sea temperatures could affect nesting and foraging resources. A rise in sea level could inundate shallow coastal marshes (*12*), displacing herons from rich foraging grounds. Changing weather may also alter wading bird distributions (*33*).

MANAGEMENT RECOMMENDATIONS

HERON MANAGEMENT AREA

These recommendations are intended for use in what we have termed the Heron Management Area (HMA). An HMA consists of the nesting colony, year-round and seasonal buffer, and foraging habitat (Figure 2). The HMA core zone consists of the colony and year-round buffer. Pre-nesting congregation areas are also part of the HMA. You should protect all these areas as disturbance to any part of an HMA can harm a colony.

The following guidelines will help you identify, map, and manage an entire HMA. We suggest you use the guidelines to protect any colony, no matter its size or status. Although you should not underestimate the value of smaller colonies, larger colonies generally merit highest priority. Give colonies with at least 20 nests close to coastal and estuarine habitat or along large rivers that drain into an estuary high priority (*30*). Since colonies inland tend to be smaller, regard all inland nesting aggregations as high priority.

Figure 2. Depiction of all the components of a HMA.

Core Zone Identification and Mapping

You should gather baseline information when planning a project near a heron colony. Because gathering data can lead to serious disturbance including failed nesting attempts (*49*, *56*), you should only collect data in the core zone during the non-breeding season (Figure 3) when herons are absent. Although the non-breeding period generally runs from the beginning of September to mid-February, breeding activity can begin in late January and can conclude as late as mid-September (*21*; K. Stenberg, personal communication). Also, specific stages within the breeding season can vary geographically as well as from one colony to the next. For example, young in colonies south of Seattle often hatch in late March and fledge in June (*38*; K. Stenberg, personal communication). The fledging period in some colonies can also run for longer durations than the range shown in Figure 3 (K. Stenberg, personal communication). Because of this variability, draw on local knowledge of a colony to determine its true breeding period.

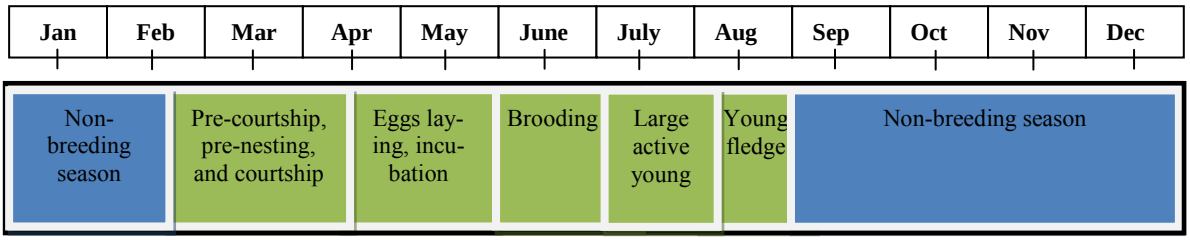

Figure 3. Chronology of the Great Blue Heron breeding and non-breeding periods (*6*, *10*, *20*, *21*).

Just after the breeding season is the ideal time for nest counts and collecting habitat data. When a non-breeding season survey is impossible, you should not collect data in the core zone before the brooding period because colonies are more sensitive at that time (*52*). Conduct breeding season surveys late in the day when birds are less likely to leave their nests (*56*).

Begin your survey by locating all trees and structures with nests. Mark all nest trees at the colony's outer perimeter with flagging. Then mark their location on a map. Also flag and map trees with canopies overlapping a nest tree. You will use the marked trees to identify the colony's boundary. Knowing the location of the boundary will also help with post-project monitoring.

Because some nests occur in trees with canopies that overlap with other trees, locate which of the overlapping trees are furthest from the center of the colony for each outer perimeter nest. Using these peripheral trees as your guide, delineate the colony's outer boundary (Figure 4). Although there will be some subjectivity as you map this boundary, these nests will serve as your primary guide.

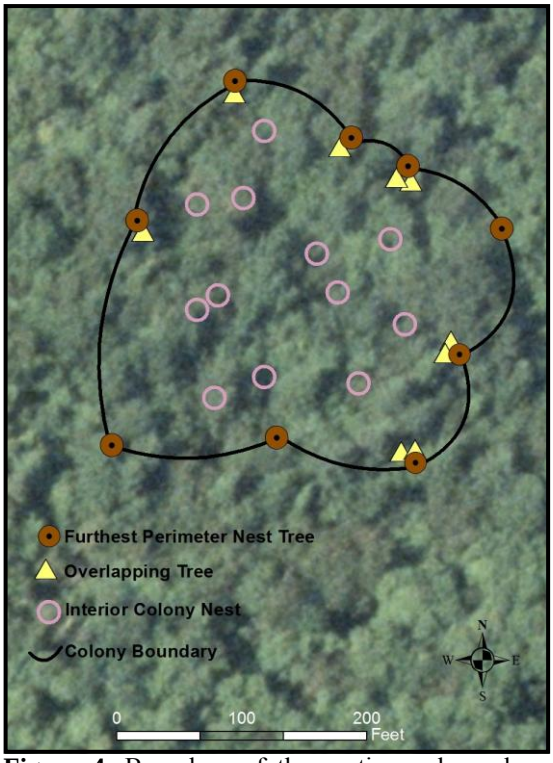

Figure 4. Boundary of the nesting colony demarcated using outer perimeter nests as a guide.

In some heron colonies outlying nests can be found in locations distant from where most of the colony's nests are concentrated. These satellite

nests are typically represented by no more than a small handful of active or inactive nests located far[1] from the nearest neighboring nest in the heart of the colony. Although satellite nests are considered a part of the larger nesting colony, they usually will not be used to map the colony's outer boundary. But they should be protected. The best way to do this is by using them to identify the location of an alternate nesting stands. Alternate nesting stands serve important functions. We later discuss how to use satellite nests to identify a suitable location for an alternate nesting stand.

Buffers protect colonies by putting some distance between a colony and a potentially harmful activity (*3*, *7*, *43*, *51*, *57*). Some heron colonies require a relatively wide buffer given people as far as 250 meters (820 ft) away can cause birds to flush, and in some instances terminate a nesting attempt (*3*). Consequently, anyone working on a project near an existing colony should designate a buffer area to protect the colony.

Because colonies closer to human activity may tolerate more disturbance than colonies in a more undisturbed area (*2, 52, 59*), our recommended buffer widths vary with the surrounding levels of development. To delineate the year-round buffer, draw a circle around each outer nest tree using the buffer distances in Table 1. The outermost edge of each circle forms the outer limit of the year-round buffer (Figure 5)[2].

Table 1. Recommended buffers for nesting colonies

Year-round Buffers [a]			
Meters	**Feet**	**Setting**	**Percent built within a ¼ mile of the nest colony** [c]
300	984	Undeveloped	0 - 2%
200	656	Suburban/Rural	2 - 50%
60 [d]	197	Urban	≥ 50%
Seasonal Buffers [e]			
Meters	**Feet**	**Land Use Activity**	**Time of Year**
200	656	Unusually loud activities [f]	February to September
400	1,320	Extreme loud activities like blasting	

a Buffer guidelines based on *3*, *4*, *7*, *15*.
b Rationale for setting-specific buffers based on observed heron tolerance variations associated with land use levels (*49*, *52*)
c Cutoff percentages among undeveloped, urban, and suburban/rural as defined in *36*, *49*.
d When birds in an urban area exhibit behavior indicative of a low tolerance to people, assign the 300 meter buffer regardless of setting.
e Seasonal buffer begins at the outer edge of the year-round buffer when specified land uses occur near a colony in the breeding season.
f These activities generates sounds exceeding 92 decibels when the sound reaches the outer boundary of the nesting colony (*58*).

CORE ZONE MANAGEMENT

A colony with an adequate buffer and with room to move or expand increases its longevity and productivity (*16*, *21*). A buffer acts as a physical and visual barrier to potentially intrusive activities. Buffers can also protect nest trees from being blown down (*34*). The buffer area also provides habitat that birds can use when they need to move from one nest tree to another.

For the greatest protection, certain actions should not occur near a colony. Specifically, clearing vegetation, grading, and construction should never occur in the core zone (*24*, *49*, *51*). Trails should also be directed away from the core zone or be closed off to access in the breeding season.

[1] For the purpose of this publication, a satellite nest is any nest located a distance of no less than twice the length of the colony's year-round buffer from its nearest neighboring nest.

[2] Mapping needs periodic updating since colonies are dynamic and the outer boundary of a colony can move over time.

Although these activities are not recommended in the year-round buffer, when you have exhaustedall options we strongly recommend you do the following when situating your project in a colony's core zone. First, you should site your project as far as possible from nests. You should also find a location where the nests will receive the greatest visual screening possible from all project distur-bances. Screeing is important as it helps ensure disturbance is minimized by removing visual cues (R. Vennesland, personal communication). Because disturbance is linked to reduced nesting prod- uctivity (*16, 24, 49, 53*), screening should provide some added protection. You should also carry out your project during the non-breeding season and mitigate for your project's infringement into the core zone.

Limited low impact recreation such as hiking, trail biking, or dog walking can occur in a core zone. However, these activities should only occur in the non-breeding season when no herons are present. Although we do not encourage any vegetation removal in the core zone, limited vegetation removal may be acceptable so long as it is part of a project primarily intended to enhance wildlife habitat (e.g., eradicating invasive understory vegetation) or to treat a fire-prone stand. Although vegetation removal may be okay in these limited instances, avoid these activities during the breeding season. Forest enhancement should also be done under the careful supervision of a wildlife biologist who understands heron behavior and ecology. When treating an overstocked or densely vegetated fire-prone stand, aim to avoid noticeable loss of visual screening to the nests.

We recommend using fences to exclude human entry into the colony's core zone (*16*, *51*). But with that in mind make sure the fence will not cut off access to other wildlife (see Fencing with Wildlife in Mind). Construct your fence in the non-breeding season and with minimal disturbance to vegetation. You can also plant of dense thickets of vegetation to keep people out of a colony's core zone (see Appendix 1 for thicket-forming plants). Place signs around the outer edge of the year-round buffer explaining why entry is discouraged. Although we encourage the use of fencing or a vegetation barrier, we recognize these may not be feasible options for colonies surrounded by multiple small landowners.

Great Blue Herons are less tolerant of disturbance in the pre-courtship and courtship periods (mid-February to mid-April). They progressively becoming less likely to leave or abandon a nesting attempt after their eggs hatch (*2*, *32*, *43*, *52*). Consequently, we discourage disturbance early in the breeding period. Where a core zone contains pre-existing structures like a home or a road, the type and level of use should not exceed intensities that customarily have occurred in the breeding period (*51*).

Any activity situated between the outer edges of the year-round and breeding season buffers should begin with a plan to identify where it will cause the least disturbance. Because herons seem most sensitive to actions in their line of sight, keep any work that will increase the presence of people, domestic animals, or vehicles out of view of the colony. To accomplish this, you should site your project where it will receive the greatest screening by way of vegetation or topography. Screening is especially vital when you have sited your project near the outer perimeter of the year-round buffer area. The best trees for screening will be at least as tall as a colony's tallest nesting tree. Whenever possible, these trees should also be of the same species as the dominant nesting trees. This way they will not only serve as a screen, but will provide the secondary benefit of being potential nesting trees.

Seasonal Buffer, Pre-nesting Areas, and Alternate Nest Sites

Other components of the HMA are the seasonal buffer, pre-nesting habitat, and alternate nesting stands. Identify these important areas whenever planning for a project in the vicinity of a colony. Because WDFW has not mapped pre-nesting congregation areas and alternate nesting stands in our Priority Habitat and Species database, you should identify these sites during the development of a habitat management plan (HMP).

Demarcate a seasonal "quiet" buffer of 200 meters (656 ft) if any unusual or loud activity will occur in the breeding season (Table 1; *3*). This seasonal buffer begins at the outer edge of the year-round buffer. If blasting (or any similarly loud activity) will occur in the breeding season, we recommend you designate a 400 meter buffer (1,320 ft; *48*).

The presence of a pre-nesting congregation of herons often signals the start to the breeding season. These congregations generally are close to the nesting colony (≤ 1 km) and are discernable by a concentration of birds outside the nesting colony between February and March, and as early as January. You should map any known pre-nesting use area. Because we know little as to how pre-nesting habitat disturbance affects a colony, you should take a precautionary approach to managing these areas. We recommend minimal disturbance of any area where herons congregate prior to nesting due to their greater sensitivity early in the breeding season (*2*, *52*, *57*).

Although our recommendations focus on protecting the active colony, you also should identify and conserve potential nesting stands to preserve active nesting colonies in an area. Nesting herons periodically relocate their colonies and alternate nesting stands provide places to relocate (*51*). We recommend retaining several forested alternate nesting stands of at least 4 hectares (10 ac) with dominant trees at least 17 meters (56 ft) high near breeding colonies (*29, 39*).

There are several strategies for finding the ideal places for an alternate nesting stand. Because herons sometimes nest in outlying trees away from where most nesting birds are concentrated, alternate nesting stands can be centered on these remote satellite nests. The satellite nest typically is represented by one, two, or several active or inactive nests located well beyond the nearest neighboring nest. We recommend using satellite nests to site an alternate nesting stand when they are located at least twice the year-round buffer distance from the nearest neighboring nest.

Another strategy is using former heron colony sites. When these sites are near an active colony, they may be designated as alternate nesting stands. But before choosing a former nesting site, consider the circumstances of the former colony site's demise. Above all, it probably is not suitable to designate a former nesting site if the site was likely vacated because of a nearby disturbance with permanent (e.g., housing development) or long-term (e.g., clear cut) effects.

If you cannot find a former nesting site or satellite nest, identify all nearby forest stands where structure and tree species composition is similar to the active nesting stand. The alternate nesting stand should be within a kilometer of the active colony and within 3 kilometers (1.9 mi) of foraging habitat. Preferably this should be the same foraging habitat used by the active colony.

Foraging Habitat

Because breeding herons need nearby foraging habitat, conserving potential foraging habitat is key. Similar to pre-nesting concentration areas and alternate nesting habitat, identify foraging habitat when developing your HMP. Although some herons forage further away, most herons feed within 3 kilometers (1.9 mi) of their colony.

Map all bodies of water within a 3 kilometer (1.9 mi) radius of a nesting colony (up to 10 km from colonies with ≥100 nests) as an initial step to identify potential foraging habitat. The perimeter and shallow portion of waterbodies are especially important for foraging. Although herons will not feed along every nearby waterbody, these waters will likely include foraging habitat. For colonies in the outer coast, Puget Sound, and Georgia Basin, publicly available data can help you pinpoint potential marine nearshore foraging habitat (Table 2). WDFW's multiyear heron foraging count in Puget Sound gives a snapshot of foraging during the 2003-04 breeding season. This is the region's only survey specifically of nearshore marine and estuarine foraging habitat.

Land use activities along the nearshore can adversely affect habitat where herons feed in concentrations. These habitats include eelgrass and kelp beds, shorelines, and wetlands (*23*). Dredging, filling, grading, or otherwise altering nearshore and riparian habitat can interrupt feeding and harm food supplies (*23*). Therefore, we recommend you not disturb key foraging habitat between March and September (R. Butler, personal communication). To protect foraging habitat, establish adequate riparian buffers such as those recommended by Knutson and Naef (*34*). You should also minimize certain activities where herons feed:

- removal of aquatic vegetation, especially native eelgrass.
- use of all watercraft within 180 meters (590 ft) of shallow waters where herons forage (*44*).
- logging mature forest close to nearshore foraging habitat (*24*).
- removing perch trees adjacent to foraging areas (*51*).
- draining, filling, or dredging wetlands or marshes (*3*).
- building close to riparian shorelines (*34*).

In addition to these measures, the Aquatic Habitat Guidelines Working Group's recommendations offer ways of limiting nearshore disturbances from overwater structures, shoreline armoring, and riparian alterations in Puget Sound (see Envirovision et al. 2010). Because these activities affect the species that herons feed on, you should review this publication before beginning one of these activities within 3 kilometers of any Puget Sound heron colony.

Because inland herons tend to feed in a dispersed manner, their foraging habitat often is not as obvious as in coastal areas. Although inland breeding herons do not restrict their foraging at one or two areas of concentrated feeding, the shallow margins of lakes, rivers, and wetlands that they do use are still vital. In fact, these habitats not only are important to herons, but to most of the region's other species as well (*34*). Consequently, we recommend using WDFW's PHS Riparian management recommendations and Washington Department of Ecology's Wetland's Guidance Manual to protect riparian habitats along lakes, rivers, and wetlands.

Table 2. Sources of GIS data that can aid in locating potential nearshore Great Blue Heron foraging habitat.

Database [a]	Description	Data Limitations [b]	Acquiring Data
Washington			
Priority Habitat and Species database	Documented locations of eelgrass beds and other nearshore habitats.	• Database only includes a small subset of the locations of nearshore priority habitats in Washington.	PHS on the Web
Shorezone Washington	Inventory of Washington's saltwater shorelines from 1994-2000. Information was collected by helicopter at low tide.	• Not designed to capture small features. • Shoreline units divided based on geology, not biology. Thus, biotic elements (e.g., eelgrass) may occur in the middle of a unit, or span several units. • If biota is recorded as present, a user can be confident the feature was present during the flight. If a feature is *not* recorded, it is not necessarily absent.	Washington Department of Natural Resource Data Web Portal
WDFW Puget Sound Heron Foraging Count	Aerial foraging count carried out in Puget Sound from 2003-2004.	• A static dataset with no confirmed timeline for an update.	Contact Data Steward for WDFW's Washington Survey Data Management (WSDM) system
Skagit and Whatcom county Intertidal Habitat Inventories	Vegetation classified using multispectral imagery from 1995-1997: eelgrass, brown algae, kelp, green algae, mixed algae, salt marsh, spit and berm vegetation, and red algae.	• Vegetation type was classified using dominant vegetation. Other vegetation types may be present in abundances <30%. • Low density vegetative cover (<25%) likely escaped detection. • Subtidal vegetation that does not form a canopy may not be distinguished and conclusions regarding the presence or absence of this vegetation should not be drawn based on this data set. • Vegetation patches < 16 m^2 are likely not detected.	Washington Department of Natural Resource Data Web Portal
National Wetland Inventory	Information on the extent and status of wetlands in the United States.	• Prepared from analysis of high altitude imagery. • Accuracy of interpretation depends on image qualty, experience of image analyst, and amount of ground-truthing conducted.	Wetlands Mapper
British Columbia			
Shorezone British Columbia	Tool for identifying coastal biological communities in BC	• Similar to Shorezone Washington data limitations.	ess.info@gov.bc.ca
Coastal Resource Information System	Locations of kelp and eelgrass beds in BC		British Columbia CRIS Web Portal
Eelgrass Bed Mapping Application	Locations of kelp and eelgrass beds in BC	• Details at www.cmnbc.ca/atlas_gallery/eelgrass-bed-mapping	Community Mapping Network
Eelgrass mapping review: eelgrass mapping initiatives in coastal BC	A report of known eelgrass mapping and monitoring projects in BC	• Surveys and mapping carried out after 2003 are not identified in the report. • Report likely to have inadvertently left out some pre-2003 eelgrass mapping efforts.	Dunster 2003

[a] These inventories should be used only as screening tools. They are not site-specific, and should not replace site-specific surveys. However, they can all complement site-specific surveys by providing regional context.

[b] Each of these databases represent a snapshot over a given time period and do not show changes in condition or status over time.

Former Nesting Colonies

Because herons occasionally move back to seemingly abandoned nesting sites, we recommend you protect these sites. In Washington, documented re-nesting has occurred in sites over 10 years after being "abandoned" (C. Anderson, personal communication). Although entry for uses that will not alter the look of the habitat like hiking and dog walking is okay when no nesting herons are present, all other recommendations applying to an active colony should remain in effect for at least 10 years after nesting has ceased at the site of any former colony.

Management of Urban Colonies

Although herons mostly nest away of urban settings, colonies occur in urban areas in Washington, British Columbia, and throughout the species' North American range. Herons may tolerate everyday human activities, but in general birds often suspend nesting when they perceive the activity is a threat (*17, 49*). Although we do not know the threshold for what constitutes a threat, a seemingly benign stimulus like a pedestrian can lead a colony to terminate a nesting attempt (*53*).

In this update to the Great Blue Heron management recommendations we have further recognized differences in managing urban versus non-urban colonies. The primary approach is the tiered set of buffers (Table 1). In urban and suburban landscapes project planners should learn of any existing disturbances before beginning a project near a heron colony. That way a planner can identify an appropriate size and scope for a project. As a rule of thumb, new activities should not add to the intensity of disturbance a colony has historically tolerated and adapted to.

To see if a project will increase the level of disturbance from historical levels, we recommend you begin by documenting the intensity of all existing disturbances. We do not recommend any new activities that will lead to an increase in the intensity of disturbance. An increase in intensity can occur when a new activity is sited closer to a colony than that of existing activities. Increased intensity can also happen when the magnitude of a proposed disturbance is out of pro-portion to all existing disturbances located the same distance from a colony. To illustrate this point, consider a colony where herons have historically persisted where the footprint of the closest home is 60 meters from the colony. If a new home is sited 30 meters away, this would constitute an increase in intensity because the new home's influence on the colony would be greater than that of the existing home. Other ways of increasing the intensity of disturbance include upzoning or changing or converting to a more intensive land use practice.

Where development already exists within our recommended year-round buffer zone (Table 1), we do not recommend any further infringement within this zone. Where further infringement will occur, new disturbances should not take place in the breeding season and we do not recommend large or novel events occurring at any time (*52*). Any further infringement should not happen without first developing a plan to mitigate for the loss of habitat.

Carrying out the Heron Recommendations

These guidelines are to be applied wherever herons nest in Washington. They may also be applicable throughout the heron's North American breeding range. To protect heron colonies, these guidelines should be incorporated into the regulatory and non-regulatory framework of local communities throughout the region. Another for way of protecting habitat is through land acquisition by organizations (e.g., land trusts) whose mission includes wildlife habitat conservation.

Two of Washington's laws most influential to regulating Great Blue Heron habitat at the local level are the Shoreline Management Act and the Growth Management Act. Counties and cities

are encouraged to designate Great Blue Heron as a species of local importance and to adopt these management recommendations to support protection of this priority species.

Although effective heron conservation requires regulatory protections, non-regulatory incentives should also be put in place to protect herons. Some non-regulatory options in Washington include transfer of development rights[1] (TDR), current use taxation (via the development of a Public Benefit Rating System), and Conservation Futures. Local land trusts[2] can also help property owners protect heron habitat through incentives such as conservation easements.

Each of these options can protect herons by giving landowners monetary or other incentives to avoid harmful activities. Communities with TDR programs allow certain landowners to transfer their right to develop in exchange for monetary compensations. In this program landowners with important wildlife habitat could receive eligibility to transfer their development rights to a less environmentally sensitive location. Participants in a PBRS program could also receive an economic incentive for limiting certain land use activities for the purpose of protecting a colony. Conservation Futures or other conservation funding or easement programs may also be designed to give preference points to properties with nesting herons. Counties and cities should adopt some or all of these options as a way to balance regulatory with non-regulatory protections for the Great Blue Heron and other sensitive species.

While many local governments protect the nesting colony, habitats that indirectly benefit a colony sometimes go unprotected. To protect pre-nesting habitat, alternate nesting stands, and foraging habitat, incentives can provide a set of useful tools. Local governments should offer incentives to landowners who want to permanently protect any type of breeding season habitat. Specifically, proposals near breeding season habitat deserve high priority when choosing between candidates for new Conservation Futures sites. Land trusts should also consider these areas when developing their conservation portfolios.

Habitat Management Plans. – A habitat management plan (HMP) should be developed whenever a land use proposal is submitted for an area in or near the core zone of an HMA. An HMP is a detailed report that outlines and documents where there is habitat, any planned incursions or habitat impacts, and a strategy for limiting impacts. Using our management recommendations as a guide, an HMP should describe the:

- resources, including active or historical nesting sites, pre-nesting congregation areas, and potential foraging sites.
- past, present, and future land uses.
- habitat features and processes potentially impacted by the proposal.
- habitat enhancement or mitigation measures, including quantitative goals and objectives.
- objectives that carefully balance the needs of the species with that of the landowner.
- implementation plan with maps, as-built drawings, and operation and maintenance plan.
- specific prescriptions and project timing to best meet the species' needs and to promote the health of their habitat.
- a schedule for periodic monitoring, and a contingency plan with corrective actions if conservation or mitigation actions do not lead to a desired outcome.

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[1] In Canada TDRs are more commonly referred to as Transfer of Development Credits.

[2] A list of land trusts in British Columbia can be found at http://landtrustalliance.bc.ca/members.html.

REFERENCES

1. Bennett, D. C., P. E. Whitehead, and L. E. Hart. 1995. Growth and energy requirements of hand-reared Great Blue Heron (*Ardea herodias*) chicks. Auk 112:201-209.

2. Bowman, I., and J. Siderius. 1984. Management guidelines for the protection of heronries in Ontario. Ontario Ministry of Natural Resources, Wildlife Branch, Toronto, Ontario.

3. B. C. Ministry of Environment. 2006. Develop with care: environmental guidelines for urban and rural land development in British Columbia. Victoria, British Columbia.

4. _____. 2008. Develop with care: Great Blue Heron fact sheet. Fact sheet number 11. Victoria, Victoria, British Columbia.

5. Butler, R. W. 1991a. Habitat selection and time of breeding in the Great Blue Heron (*Ardea herodias*). Ph.D. Dissertation. University of British Columbia, Vancouver, British Columbia.

6. _____. 1991b. A review of the biology and conservation of the Great Blue Heron (*Ardea herodias*) in British Columbia. Technical Report Series, Number 154. Canadian Wildlife Service, Delta, British Columbia.

7. _____. 1992. Great Blue Heron (*Ardea Herodias*). Number 25 *in* A. Poole, P. Stettenheim, and F. Gill, editors. The Birds of North America. American Ornithologists Union and Academy of Natural Science, Philadelphia, Pennsylvania.

8. _____. 1993. Time of breeding in relation to food availability of female Great Blue Herons (*Ardea herodias*). Auk 110:693-701.

9. _____. 1995. The patient predator: foraging and population ecology of the Great Blue Heron (*Ardea herodias*) in British Columbia. Occasional Paper Number 86. Canadian Wildlife Service, Ottawa, Ontario.

10. _____. 1997. The Great Blue Heron. University of British Columbia Press, Vancouver, British Columbia.

11. _____, and P. D. Baudin. 2000. Status and conservation stewardship of the Pacific Great Blue Heron in Canada. Proceedings of a Conference on the Biology and Management of Species and Habitats at Risk 1:247-250.

12. _____, and R. G. Vennesland. 2000. Integrating climate change and predation risk with wading bird conservation research in North America. Waterbirds 23:535-540.

13. _____, P. E. Whitehead, A. M. Breault, and I. E. Moul. 1995 Colony effects on fledging success of Great Blue Herons (*Ardea herodias*) in British Columbia . Colonial Waterbirds 18: 159-65.

14. Campbell, R. W., N. K. Dawe, I. McTaggart-Cowan, J. M. Cooper, G. W. Kaiser, and M. C. E. McNall. 1990. The birds of British Columbia, Volume 1. Royal British Columbia Museum, Victoria, British Columbia.

15. Carney, K. M., and W. J. Sydeman. 1999. A review of human disturbance effects on nesting colonial waterbirds. Waterbirds 22:68-79.

16. Carlson, B. A., and E. B. McLean. 1996. Buffer zone and disturbance types as predictors of fledging success in Great Blue Herons, *Ardea herodias*. Colonial Waterbirds 19:124–127.

17. City of Vancouver Parks and Recreation. 2006. Stanley Park heronry management plan. Vancouver, British Columbia.

18. del Hoyo, J., A. Elliott, and J. Sargatal. 1992. Handbook of the birds of the world. Volume 1. Lynx Edicions, Barcelona, Spain.

19. Dunster, K. 2003. Eelgrass mapping review: eelgrass mapping initiatives in coastal British Columbia. Report prepared for the Canadian Wildlife Service, Delta, British Columbia.

20. Eissinger, A.M. 1996. Great Blue Herons of the Salish Sea: a model plan for the conservation and stewardship of coastal heron colonies. Nahkeeta Northwest Wildlife Services, Bow, Washington.

21. _____. 2007a. Great Blue Herons in Puget Sound. Puget Sound Nearshore Partnership Report Number 2007-06. Seattle District, U.S. Army Corps of Engineers, Seattle, Washington.

22. _____. 2007b. Status and trends of Puget Sound Great Blue Heron breeding colonies. Proceedings of the 2007 Georgia Basin Puget Sound research conference, Vancouver, British Columbia.

23. Envirovision, Herrera, and AHG. 2010. Protecting nearshore habitat and functions in Puget Sound, an interim guide, Washington departments of Fish and Wildlife, Ecology, Natural Resources, Transportation, Community Trade and Economic Development, the Recreation and Conservation Office, and the Puget Sound Partnership.

24. Gebauer, M. B., and I. E. Moul. 2001. Status of the Great Blue Heron in British Columbia, Wildlife Working Report No. WR-102. Ministry of Environment, Lands and Parks - Wildlife Branch, Victoria, British Columbia.

25. Gibbs, J. P. 1991. Spatial relationships between nesting colonies and foraging areas of Great Blue Herons. Auk 108:764-770.

26. _____, and L. K. Kinkel. 1997. Determinants of the size and location of Great Blue Heron colonies. Colonial Waterbirds 20:1-7.

27. _____, S. Woodward, M. L. Hunter, and A. E. Hutchinson. 1987. Determinants of Great Blue Heron colony distribution in coastal Maine. Auk 104:38-47.

28. Henny, C. J. 1978. Great Blue Herons respond to nesting habitat loss. Wildlife Society Bulletin 6:35-37.

29. Jensen, K. E., and P. D. Boersma. 1993. Land development and human disturbance as factors in determining Great Blue Heron (*Ardea herodias*) colony size and location in the Puget Sound Region. Unpublished Report, University of Washington, Seattle, Washington.

30. Kelly, J. P. K. Etienne, C. Strong, M. McCaustland, and M. L. Parkes. 2007. Status, trends, and implications for the conservation of heron and egret nesting colonies in the San Francisco Bay Area. Waterbirds 455-478.

31. _____, D. Stralberg, K. Etienne, and M. McCaustland. 2008. Landscape influence on the quality of heron and egret colony sites. Wetlands 28: 257–275.

32. Kelsall, J. P. 1989. The Great Blue Herons of Point Roberts: history, biology, and management. Point Roberts Heron Preservation Committee, Points Roberts, Washington.

33. Kendall, M. A., M. T. Burrows, A. J. Southward, and S. J. Hawkins. 2004. Predicting the effect of marine climate change on the invertebrate prey of the birds of rocky shores. Ibis 146:40-47.

34. Knutson, K. L., and Naef, V. L. 1997. Management recommendations for Washington's priority habitats: Riparian. Washington Department of Fish and Wildlife, Olympia, Washington.

35. Machmer, M. M. 2009. Great Blue Heron and Bald Eagle inventory and stewardship in the Columbia Basin (2008-2009), Fish and Wildlife Compensation Program, Nelson, British Columbia.

36. Marzluff, J. M., R. Bowman, and R. Donnelly. 2001. A historical perspective on urban bird research: trends topics, and definitions. Pages 1-17 *in* J. M. Marzluff, R. Bowman, and R. Donnelly, Editors. Avian ecology and conservation in an urbanizing world. Kluwer Academic Press, Norwell, Massachusetts.

37. Moul, I. E. 1990. Environmental contaminants, disturbance and breeding failure at a Great Blue Heron colony on Vancouver Island. Master's Thesis, University of British Columbia, Vancouver, British Columbia.

38. Norman, D. M. 2001. The big sit: monitoring Great Blue Heron foraging sites, Everett to Point Roberts. Puget Sound Action Team, Olympia, Washington.

39. Parker, J. 1980. Great Blue Herons (*Ardea herodias*) in northwestern Montana: nesting habitat use and the effects of human disturbance. Master's Thesis, University of Montana, Missoula, Montana.

40. Parnell, J. F., D. G. Ainley, H. Blokpoel, B. Cain, T. W. Custer, J. L. Dusi, S. Kress, J. A. Kushlan, W. E. Southern, L. E. Stenzel, and B. C. Thompson. 1988. Colonial waterbird management in North America. Colonial Waterbirds 11:129-169.

41. Powell, G. V. N. 1983. Food availability and reproduction by Great White Herons (*Ardea herodias*): A food addition study. Colonial Waterbirds 6:138-147.

42. _____, and A. H. Powell. 1986. Reproduction by Great White Herons (*Ardea herodias*) in Florida Bay as an indicator of habitat quality. Biological Conservation 36:101-113.

43. Rogers J. A. Jr., and H. T. Smith. 1995. Set-back distances to protect nesting bird colonies from human disturbance in Florida. Conservation Biology 9:89-99.

44. _____, and S. T. Schwikert. 2002. Buffer-zone distances to protect foraging and loafing waterbirds from disturbance by personal watercraft and outboard-powered boats. Conservation Biology 16: 216-224.

45. Simpson, K. 1984. Factors affecting reproduction in Great Blue Heron (*Ardea herodias*). Master's Thesis, University of British Columbia, Vancouver, British Columbia.

46. Suckley, G., and J. G. Cooper. 1860. The natural history of Washington Territory and Oregon. Bailliere Brothers, New York, New York.

47. Sullivan, J. P. 1988. Effects of provisioning rates and number fledged on nestling aggression in great blue herons. Colonial Waterbirds 11:220-226.

48. USDI. 2003. Biological opinion and letter of concurrence for effects to Bald Eagles, Marbled Murrelets, Northern Spotted Owls, Bull Trout, and designated critical habitat for Marbled Murrelets and Northern Spotted Owls from Olympic National Forest Program of activities for August 5, 2003, to December 31, 2008. FWS Reference Number 1-3-03-F-0833. Lacey, Washington.

49. Vennesland, R. G. 2000. The effects of disturbance from humans and predators on the breeding decisions and productivity of the Great Blue Heron. M.Sc. Thesis, Simon Fraser University, Burnaby, British Columbia.

50. _____. 2003. Coastal Great Blue Heron (*Ardea herodias fannini*) inventory and monitoring project: 2002 breeding season report and historical analysis. British Columbia Ministry of Water, Land and Air Protection, Nanaimo, British Columbia.

51. _____. 2004. Great Blue Heron (*Ardea herodias*). British Columbia Ministry of Water, Land and Air Protection, Victoria, British Columbia.

52. _____. 2010. Risk perception of nesting Great Blue Herons: experimental evidence of habituation. Canadian Journal of Zoology 88:81-89.

53. _____, and R. W. Butler. 2004. Factors influencing Great Blue Heron nesting productivity on the Pacific coast of Canada from 1998 to 1999. Waterbirds 27: 289-296.

54. _____, and _____. 2008. COSEWIC Assessment and update status report on the Great Blue Heron (*Ardea herodias fannini*) in Canada. Committee on the Status of Endangered Wildlife in Canada , Ottawa, Ontario.

55. _____, and _____. 2011. Great Blue Heron (*Ardea herodias*). Number 25 *in* A. Poole, Editor. The Birds of North America. Available at http://bna.birds.cornell.edu/bna/ (accessed 17 February 2012). Cornell Lab of Ornithology, Ithaca, New York.

56. _____, and D. M. Norman. 2006. Survey protocol: for measurement of nesting productivity at Pacific Great Blue Heron nesting colonies. Available at www.heronworkinggroup.org (accessed 27 December 2011).

57. Vos, K. K., R. A. Ryder, and W. D. Graul. 1985. Response of breeding Great Blue Herons to human disturbance in north central Colorado. Colonial Waterbirds 8:13-22.

58. Washington Department of Transportation. 2011. Biological assessment preparation for transportation projects: advanced training manual. Available at http://www.wsdot.wa.gov/Environment/Biology/BA/BAguidance.htm#Manual (accessed 9 March 2012). Olympia, Washington.

59. Webb, R. S., and L. S. Forbes. 1982. Colony establishment in an urban site by Great Blue Herons. Murrelet 63:91-92.

60. Werschkul, D. F., E. McMahon, and M. Leitschuh. 1976. Some effects of human activities on the Great Blue Heron in Oregon. Wilson Bulletin 88:660-662.

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GLOSSARY

Breeding Season	This is the period when herons begin gathering in pre-nesting aggregations near the colony and concludes when young of the year have fledged.
Brood	A collective term for the offspring produced by an individual breeding female.
Brooding Period	The first days of a juvenile bird's life.
Clutch	Collection of eggs in a single nest.
Core Zone	This encompasses the area where herons are nesting as well as the adjacent year-round buffer zone.
Habitat Management Plan	A detailed report that outlines and documents the location of the important habitat area, any incursions or impacts into the habitat by a proposed land use action, and ways to limit any impacts to the habitat and to associated species.
Heron Management Area	This is the area that includes all key elements needed to sustain a colony of nesting Great Blue Herons. This includes the area where herons are nesting, year-round and seasonal buffer areas, the pre-nesting concentration area(s), and the foraging habitat that nesting herons are using during the breeding season.
Nesting Colony	The area where a group of heron nests are located.
Seasonal "Quiet" Buffer	An area just adjacent to the outer edge of the year-round buffer. Within this area certain loud activities such as blasting or the use of chain saws is not recommended.
Pre-nesting Habitat	Where herons gather in groups prior to initiating nesting. Pre-nesting often occurs along larger lakes, wetlands, watercourses, and fallow fields.
Year-round Buffer	An area set between the outer edge of the nesting colony and the inner perimeter of the seasonal buffer. Within this area most land use activities are not recommended at any time of the year.

Appendix 1. Native plants suitable for a thicket-like visual barrier around a heron colony.

Scientific Name	Common Name [a]	Comments
Cornus sericea	red-osier dogwood	• Wet and moist soils • Full sun • Native throughout Washington and British Columbia.
Crataegus douglasii	black hawthorn	• Moist soils • Partial shade • Thorny • Ensure you know the variety and care necessary to encourage growth as a shrub rather than a tree • Native throughout Washington and British Columbia
Crataegus suksdorfii	Suksdorf's hawthorn	• Moist soils • Partial shade • Thorny • Ensure you know the variety and care necessary to encourage growth as a shrub rather than a tree • Native to areas west of the Cascades
Malus fusca	western crabapple	• Wet and moist soils • Full to some shade • Thorny • Native to areas west of the Cascades
Prunus emarginata	bitter cherry	• Moist soils • Full sun • Native to coastal and interior Washington and British Columbia • For creating a barrier, plant the shrub variety (*Prunus emarginata* var. *emarginata*)
Ribes divaricatum	straggly gooseberry	• Dryer soils • Full to partial sun • Thorny • Native to areas west of the Cascades
Rosa spp.	native rose	• Native species include nootka rose, bald hip rose, and clustered rose.
Rubus parviflorus	thimbleberry	• Dryer soils • Mostly sunny • Native to areas west of the Cascades
Rubus spectabilis	salmonberry	• Wet and moist soils • Full to partial sun • Native from the East Cascades to the coast
Spiraea douglasii	hardhack	• Wet and moist soils • Full to mostly sunny • Native throughout region, except for in the Columbia Basin
Symphoricarpos albus	common snowberry	• Moist and dry soils • Mostly to part sun • Native throughout Washington and British Columbia

[a] Click on common names for more information about requirements of each plant species.