Wildlife Habitat

1. Marine habitat

Marine habitats are deepwater areas that extend outward from the upper limit of wave spray on land. In Bellingham, the marine habitat zone extends the complete circumference of Bellingham and Chuckanut Bays. Marine habitats provide critical plant, fish, and wildlife habitat that can be greatly affected by land and water based activities.

The waters of Puget Sound depend on the health of tide flats and the water column for primary production. Eelgrass, kelp, and phytoplankton provide the primary cornerstone for the grazing food chain, and shelter for both invertebrate and vertebrate animal species.

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Beach habitat – near shore habitats, including eelgrass meadows and beaches, are the primary habitats for forage fish – small fish that play a very important role in the marine food chain.

- *Surf smelt* - spawn on Bellingham Bay beaches containing a specific mixture of coarse and fine gravel in the upper tidal zone.
- *Sand lance* - spawn on Bellingham Bay beaches containing sand and sandy-gravel in the upper tidal zone.
- *Pacific Herring* - attach their eggs to eelgrass and kelp, mostly in Chuckanut Bay.

These 3 species comprise over 50% of the diet of adult salmonids, including depleted chinook salmon. All 3 forage fish species have sharply declined in the past few decades.

Nearshore areas provide refuge for juvenile salmonids at the edge of the tide where the water depth prevents passage of larger, predator species. Mobile, attached, and burrowing creatures make their homes on the sea floor from the top of the

tidal influence to the deepest channels. On Bellingham Bay, these include native and introduced species such as littleneck and manila clams. Commercial and/or harvested species include crabs, clams, and kelp. Species that favor Puget Sound's gentler beaches and finer substrates, such as geoduck, tend to be abundant around the north end of Bellingham Bay.

Offshore habitat - the water column and surface provide habitat to marine mammals, fishes, and birds - some of which require special pelagic habitats for refuge, such as eelgrass meadows, kelp forests, and rocky reefs.

In 2007, 15 marine species in Washington were identified as being in steep decline and in need of attention to ensure successful protection or recovery. Those most likely to occur in Bellingham waters are Pacific herring, Harbor porpoise, and the group called unclassified marine invertebrates – which includes all invertebrate species currently not considered as food fish or shellfish by the WDFW.

Species - marine habitats support a variety of seaweed, various species of fish and marine invertebrates, birds, and mammals. Puget Sound and Rosario Strait are components of a very complex and productive ecosystem. These waters are considered to be relatively clean and provide habitat for over 211 species of wildlife.

The open channels, rocky outcrops, islands, and large bays provide wintering and breeding habitat for a variety of marine birds including gulls, loons, grebes, cormorants, and diving birds including auklets, guillemots, murres, puffins, and oyster catchers.

Kelp and eelgrass beds - provide habitat, feeding, and rearing ground for a large number of marine organisms including crabs, fish, and birds. Kelp are the large brown seaweed typically found in rocky inter-tidal areas. Eelgrass is a vascular plant that grows most commonly in inter-tidal and shallow sub-tidal areas.

Kelp beds provide a surface upon which other plants and animals grow. Kelp beds are used as resting areas by birds and mammals including gulls, herons, waterfowl, shorebirds, and otters. Kelp beds also protect environments for inter-tidal plants and animals by reducing current and wave actions, and inshore erosion on sand and gravel beaches. The beds provide a protected beach habitat for marine organisms that would not be present otherwise.

Eelgrass is a highly productive plant that provides trophic functions and nutrient infusions for the entire coastal zone. Eelgrass beds provide an important stopover and wintering area along the Pacific flyway for a variety of migratory birds. The eelgrass beds in Rosario Strait and Hale Passage have been found to be 3 times greater in productivity to diving birds, for example, than non-vegetated nearshore areas.

Kelp and eelgrass beds have declined in number and overall size in Puget Sound in recent years. The decline may be due to changes in water

quality and turbidity resulting from urban development and forest cutting activities - or natural fluctuations due to storms, unusually hot weather, or an increase in the population of grazing species.

Shellfish - inhabit the mud, sands, and rocky substrata of Puget Sound, Rosario Strait, and Hale Passage in tidelands and inter-tidal areas. Inter-tidal areas support hard shell clams including butter clams, native littleneck, manila clams, cockles, and horse clams. Geoducks typically borrow offshore in sub-tidal areas up to 2 to 3 feet into the mud or soft sand. Shrimp, crab, and oysters also inhabit the shoreline areas. Dungeness crab frequent eelgrass beds, and red rock crab inhabit rocky terrain with less silt content.

Commercial and recreational shellfish harvesting is restricted or prohibited in Bellingham and Chuckanut Bays, and at the mouths of sewage treatment out falls.

Herring and smelt – spawn during the winter and early spring in eelgrass and seaweed in low inter-tidal areas and sometimes in gravelly areas along Rosario Strait and Hale Passage. Surf smelt spawn during the winter in sandy gravel beaches along Bellingham Bay.

2. Estuarine habitat

Estuaries are semi-enclosed bodies of water that are freely connected with the open sea and within which saltwater mixes with freshwater drainage. Estuaries create transitions between marine, freshwater, and terrestrial environments that support a rich and diverse variety of wildlife species.

By definition, estuaries have a salt concentration from 0.5 parts per trillion to 30 parts per thousand. Estuaries include sub-tidal and inter-tidal zones as well as lagoons, sloughs, and channels that meet this salinity definition. Estuaries are typically shallower with warmer water temperatures than marine habitat zones.

In Bellingham, the estuarine zone may extend upland for some distance where the freshwater from Whatcom and Padden Creeks mix with the tidal currents evident within the harbor. Salinity content may be affected by the amount of freshwater flow that enters the harbor, the strength of the tides, and the resulting amount of fresh to saltwater mixing. Salinity varies greatly in such a mixing zone affectd by depth and area of flow. The animals and plants that may be established within the area are often better predictors of the estuary's influence than salinity content alone.

Species - the estuaries within the Bay may support over 40 types of marine organisms including jellyfish, anemones, marine worms, marine snails, limpets, clams, cockles, oysters, mussels, barnacles, crabs, starfish, urchins, sea cucumbers, and sea squirts, among others.

The estuaries may also support over 50 types of fish including dogfish, herring, anchovy, salmon, sea-run trout, and smelt. Priority species that

are supported by estuarine habitat include smelt, herring, and perch, as well as salmon and steelhead.

Prominent birds of the more than 100 types that are possible may include loons, grebes, cormorants, herons, , swans, geese, brant, and a variety of ducks, sandpipers, gulls, murrelets, and puffins. State priority wildlife species that are associated with estuarine habitat include the bald eagle Western Greebe, heron, and osprey

3. Freshwater habitat

Freshwater bodies include lakes, rivers, creeks, wetlands, riparian areas, and all other types of water bodies not included in estuaries or marine habitat that have a low ocean salt content. Freshwater habitats support different wildlife than saltwater systems, particularly species that depend on wetland vegetation. However, 87% of all wildlife and fish species are estimated to depend on streams, wetlands, or other freshwater bodies during some part of their life cycle for drinking water, foraging, nesting, and migratory movements.

Riparian areas - are the wooded or vegetated corridors located along rivers, streams, and springs. Riparian corridors possess free flowing water or moist conditions that support high water tables, certain soil characteristics, and vegetation that are transitional between freshwater and terrestrial habitat zones. The transitional edges are usually defined by a change in plant composition, relative plant abundance, and the end of high soil moisture content.

Riparian corridors transport water, plant seeds, and nutrients to downstream areas - and thereby serve as important migration routes for many wildlife species. Riparian areas, though small in overall size, are one of the most important sources of wildlife bio-diversity in the landscape.

Freshwater wetland habitats are water bodies less than 20 acres in size or less than 6 feet in depth and include marshes, swamps, bogs, seeps, wet meadows, shallow ponds, and lakes. Like riparian areas, wetlands support species in great diversities, densities, and productivity. The wooded areas that are located adjacent to wetlands provide nesting areas, forage, and other cover that is critical to wetland-dependent species, such as most waterfowl or small mammals like beaver.

Wetlands - an inventory was accomplished of wetland plant communities throughout Whatcom County using a process combining aerial photography and on-site field visits. The inventory determined there were 4 principal wetland types within the Bellingham urban growth area:

- *wet meadows* - with standing water from late fall to early spring characterized by reed canary grass, spike rushes, bulrushes, and sedges,
- *scrub/shrub wetlands* - with seasonal flooding, characterized by hardhack, willow, red alder or red osier dogwood,

- *forested wetlands* - not usually flooded but with saturated soils characterized by large trees of black cottonwood, red alder, and western red cedar with an understory of vine maple, cascara, salmonberry, and devil's club, and
- *shallow marsh* - deep marsh, and open water wetlands.

There are no endangered, threatened or sensitive plant species within the Bellingham urban growth area based on the results of the inventories.

Riparian and wetland vegetation provide significant food and cover for wildlife habitat. Generally, riparian zones and wetlands provide substantially more important wildlife habitat than forested areas. Riparian zones are also passageways for wildlife migrating between or around developed areas. Riparian vegetation also helps maintain optimum fish spawning conditions by providing shade, bank stabilization, a breeding ground for insects, and a source of organic material for the stream.

Riparian zones are located along Little Squalicum, Squalicum, Whatcom, Padden, Connelly, and Chuckanut Creeks, and around Lake Whatcom, Lake Padden, Lake Samish, Toad Lake, Bug Lake, and Sunset Pond. These areas are covered with riparian vegetation and should be considered important wildlife corridors.

Lakes - are water bodies greater than 20 acres in size or more than 6 feet in depth. The deeper waters and larger surface of a lake support fish and wildlife species. However, most species prefer to nest and forage in the shallower ponds rather than lakes, and the wetlands that adjoin larger open water bodies.

Lake Whatcom, Lake Samish, Lake Padden, and Toad Lakes are the largest freshwater lakes and most are routinely stocked by the Washington State Department of Fish & Wildlife (DFW) with game fish.

Most of the other lakes in the Bellingham urban growth area have either been developed for private residential use and/or are too small in size to support public access activities. Nonetheless, the sites are important to the maintenance of freshwater habitat for region wildlife.

Wildlife species - freshwater zones support terrestrial and aquatic insects and resident and migratory fish species. Anadromous fish species include coho, chinook, pink, and chum salmon, and steelhead. Naturally occurring or established species include largemouth bass and bluegill.

Freshwater zones also support a variety of birds, mammals and amphibians including salamanders, frogs, osprey, ducks, river otter, and beaver.

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Conversely, there are wetlands within the Bellingham urban growth area that have been invaded by exotic and invasive plant species. Invasive plant species do not have specific habitat requirements and can usually tolerate disturbed or degraded environments. In large populations, invasive plant species like reed canary grass and purple loosestrife can take over a site, replacing the native vegetation and reducing bio-diversity and habitat value.

Urban and agricultural developments within the Bellingham urban growth area have substantially reduced wildlife habitat through the years. However, valuable habitat qualities still remain in the undeveloped, large native vegetation tracts and around the remaining wetlands and riparian forests along the Whatcom and Padden Creeks valleys.

The wetlands and riparian zones within the Whatcom and Padden Creek and Lake Whatcom, Lake Samish, Lake Padden, and Toad Lake probably support muskrat, mink, river otter, beaver, raccoon, and weasel.

Water bodies, wetlands, and adjacent agricultural fields also provide suitable nesting and feeding habitat for mallard ducks, American widgeons, green-wing teal, common coot, common merganser, blue-wing teals and great blue heron, and lessor and greater Canadian geese.

Portions of the Bellingham urban growth area that overlook Puget Sound provide habitat for bald eagle and osprey. The bald eagle is listed as a threatened species on Washington State's endangered and threatened lists. Peregrine falcon are present within Bellingham and are a State Sensitive species and a federal species of concern.

Fisheries - city streams provide freshwater habitat for various species of anadromous fish, including salmon and sea-run trout that live in saltwater but return to spawn in freshwater. These fish species have evolved over time to fit the specific characteristics of their stream of origin - and are uniquely imprinted compared with other members of the same species.

Anadromous fish require cool, uncontaminated water with healthy streambeds and insect populations. Vegetated riparian areas maintain stream habitats by stabilizing water temperature, producing an insect supply, controlling erosion, and providing woody debris.

Game fish that have been identified in the area include rainbow trout, cutthroat, Dolly Varden, eastern brook trout, whitefish, largemouth bass, perch, crappie, and catfish. These species spawn and rear in medium

sized gravel beds that are provided with a medium velocity water flow along the creek channels, perennial and seasonal streams.

A number of fish runs are considered endangered or threatened in Whatcom County including spring chinook, fall chinook, and the sea-run cutthroat trout. Chinook salmon (Puget Sound), bull trout, and steelhead also are indicated for this area. Chinook and bull trout are (?) state candidates and federally threatened species. Washington Department of Fisheries & Wildlife and various Tribal Governments supplement the original stocks of most of these species with hatchery-raised fish.

Factors that have contributed to the decline of the wild runs include:

- *habitat destruction resulting from forest clear-cutting and land developments* that create sediment loads increasing water turbidity silting in gravel spawning beds, increase temperatures, loss of food sources and shelter;
- *water diversions and blockades* that restrict access to the upper reaches and spawning areas of stream and river runs.
- *over harvesting that reduces spawning populations*

4. Terrestrial habitat

Terrestrial areas are the upland areas located above freshwater, estuarine, and marine water zones. The zones may extend from the level lowlands that border wetland or creek banks to the tops of the bluffs, hills, or foothills located around Bellingham Bay, Lake Whatcom, Lake Samish, and Lake Padden.

Plants - natural plant communities are described in terms of broad plant patterns called vegetation zones. Washington plant communities are divided into 3 major vegetation groupings including:

- forests,
- grasslands and shrub/grass communities, and
- timberline and alpine areas.

Whatcom County includes 3 primary forested vegetation zones including the western hemlock, Pacific silver fir, and the mountain hemlock zone. The zones are defined by the different climates that are created by different elevations and the distinctive vegetation type that becomes dominant in a climax forest after the forest has progressed through successive stages of natural development. The dominant species defined by the zone usually reproduces to maintain dominance until some disturbance, such as fire, alters the zone's environment.

Bellingham and its urban growth area are located within the western hemlock (Tsuga heterophylla) vegetation zone. The western hemlock zone is the most extensive vegetation zone in western Washington extending from the Pacific coast to about the 2,500 foot elevation on the slopes of the Cascade Mountains where the climate is mild and generally wet.

The western hemlock zone is the major source of commercial harvested coniferous trees including the western hemlock, Douglas fir (Pseudotsuga menziesii), and western red cedar (Thuja plicata). Grand fir, western white pine, and lodgepole pine also occur within this zone although on a sporadic basis.

Deciduous tree species such as red alder (Alnus rubra) or big leaf maple (Acer macrophyllum) are generally dominant on the lands that have been cleared for urban and agriculture uses within the Bellingham urban growth area. Black cottonwood along with red alder and big-leaf maple, tend to grow along major water courses.

Vegetation inventories have recently been completed for portions of the state and Whatcom County using a variety of aerial photos, landstat or infrared satellite photo imagery, and field reconnaissance. The inventories have distinguished a wide variety of vegetation types at a greater level of detail than the vegetation zones described above. For example, forest areas were further divided into lowland and mountain forests, deciduous and coniferous forests, and second growth and old growth forests.

These inventories determined that portions of the Bellingham urban growth area include several second growth lowland forested cover types including coniferous, deciduous, and mixed coniferous/deciduous forests. This forest type has marginal value as commercial timber or as unique vegetation. The majority of commercially important timber resources have been harvested, usually along with associated residential land development.

Under-story vegetation in the western hemlock zone varies substantially depending upon soils, wetness, and other environmental factors. Typical vegetation associations include:

- *Douglas-fir/oceanspray association* - on the driest sites with a typical shrub layer including oceanspray, hazel, snowberry, and salal;
- *western hemlock/Oregon grape association* - in climax stands with a typical shrub layer including vine maple, red huckleberry, trailing blackberry, and
- *western hemlock/sword fern and/or western red cedar/lady fern association* - on moist habitats with the understory dominated by sword fern and many species of herbs. A better descriptor here would be Western Red Cedar/ lady fern.

Deciduous hardwood trees including red alder, cottonwood (Populus trichocarpa), willow (Salix sp.), and associated under-story species are dominant within the wetland areas.

Species - terrestrial zones support a variety of insects, amphibians, reptiles, lowland and upland birds, large and small mammals. Some species, such as eagles, osprey, and murrelets, forage in other habitats but nest in upland locations in wooded areas in or near riparian zones.

Other species may forage in all of the zones, particularly during the winter months, but retreat for night and seasonal cover into the upland wooded

areas. Examples include a variety of game species such as pigeon, grouse, rabbit, deer, and cougar.

Mature forested areas provide thermal cover during winter months allowing larger game mammals to forage up to 3,000 feet in elevation during normal seasons, or 2,000 feet during especially harsh winters in areas beyond the city's urban growth area.

Animals - urban and agricultural developments within the Bellingham urban growth area have substantially reduced wildlife habitat through the years. However, valuable habitat qualities still remain in the undeveloped, large native vegetation tracts and around the remaining wetlands and riparian (streamside) forests along Squalicum, Padden, and Chuckanut Creeks.

The wooded areas support a wide variety of large and small mammals, birds, reptiles, and amphibians. The most common mammals within the wooded areas include Douglas squirrels, introduced eastern gray squirrels, introduced cottontail rabbits, opossums, skunks, and raccoons. Surprisingly large populations of larger mammals including black-tailed deer and coyote occur in Bellingham and urban growth area.

Crows, jays, nuthatches, woodpeckers, sparrows, winter wrens, ruffed grouse, band-tailed pigeon, owls, hawks, osprey, and eagles can find suitable habitat for feeding and nesting in the upland forest areas and stream valleys. Many of these species can tolerate adjacent urban developments so long as some habitat and connecting migration corridors remain undisturbed.

The bald eagle, peregrine falcon, merlin, blue heron, and pileated woodpecker are Washington State Species of concern that are known to still be located within the city and urban growth area.

Other species of special concern under Washington State's Department of Wildlife endangered, threatened, sensitive, candidate, and monitor species programs in the Bellingham urban growth area may include the purple martin, Vaux's swift, and western bluebird. Many of these remaining species can be found in close proximity to urbanized areas, although most need undisturbed vegetated areas large enough to maintain viable habitat.

Some remaining portions of the Nooksack River valley floor and other low-lying areas are now devoted to pastures and meadows with some agricultural crops, woody vegetation, grasses, and weeds. These materials provide food for migratory waterfowl and deer, habitat for rodents and other small animals, and prey for predators like garter snakes, barn owls, red-tailed hawks, and foxes.

Large and rural contiguous parcels of mature forest land provide habitat for wildlife that compete successfully with other species in deeper cover, like birds and larger mammals including deer, bobcat, and cougar at the outer edges of the urban areas.

Important terrestrial habitat elements for these species include tall trees along the shoreline, mature forests with snags and fallen trees, and undisturbed mature forest near or surrounding wetlands. These habitat elements are primarily important to bird species that nest and perch in the trees, and to small mammals like beaver and river otter that rely upon an interface between the undisturbed terrestrial and aquatic areas. Some of these priority habitat characteristics have been mapped in the city.

Other important habitats – bobcat, cougar, and black bear rely on large areas of continuous, undeveloped land that is relatively free of human activity and contact. A black bear's range, for example, may reach 10 miles in radius.

Migratory songbirds also rely on the habitat provided by large wooded areas. These species do not adapt well where clear-cutting forest practices or urban land developments have fragmented the forest habitat.

Smaller wooded tracts are suitable for many plant and animal communities and may provide temporary cover for some species for foraging or migratory movement. Large parks and open spaces can serve as wildlife refuges in urban areas. However, the number and diversity of species declines in direct relation to the size, quality and proximity to other natural areas.

The size and extent of the terrestrial habitat can be improved where natural migration corridors connect small tracts and large reserves. The natural migratory corridors enable species to colonize new areas, forage for food, find mates, and exchange genes with neighboring populations. Ideally, according to studies conducted in King County, successful wildlife migratory corridors should be at least 100 feet wide along streams with additional buffers above severe slopes and along extensive wetland areas.

5. Unique and threatened species

Unique species

The Washington Department of Natural Resources has listed a number of sensitive species (see detailed listing in the Appendix) in danger of becoming extinct within the marine, estuarine, freshwater, and terrestrial habitats including:

Marine and estuarine habitat

- *Alaska alkaligrass* - that grows in salt marshes, mudflats, and gravelly areas near beaches and rock outcrops in sea spray, and
- *pink sand verbena* - that grow along sandy beaches near saltwater.

Freshwater habitat

- *bog clubmoss* - that grows in wetlands adjacent to low elevation lakes,
- *chain-fern* - that grows along stream banks and moist seep areas, mostly near saltwater.
- *bristly sedge* - that grows in marshes and wet meadows,

- *water lobelia* (Lobellia dortmanina) - that grows in emergent freshwater wetlands,
- *white meconella (Meconella oregana)* - that grows on open ground where wet in the spring, and
- *woolgrass (Scirpus cyperinus)* - that grows in wet low ground.

There are four threatened or endangered plants that could occur including:
- *flowered sedge* - found in and near sphagnum bogs,
- *choriso bog orchid* - found in wet meadows and bogs,
- *fringed pinesap* - found in deep shady woods at moderate to low elevations especially in old forest, and
- *golden Indian paintbrush* - found in moist lowland meadows and prairies.

Freshwater and terrestrial habitat
- *western yellow oxalis* - that grows in moist coastal woods and dry open slopes.

Terrestrial habitat
- *fringed pinesap* – that grows in duff and humus of shaded, low-elevation coniferous forest,
- *gnome plant* - that grows in deep humus in coniferous forest,
- *chick lupine (Lupinus micropcarpus)* - that grows in dry to moist soils, and
- *great polemonium (Polemonium carneum)* - that grows in thickets, woodlands, and forest openings.

Priority habitat
The Washington Department of Fisheries & Wildlife has listed the following species as being species of concern, threatened, or endangered:

Marine, estuarine, freshwater, and terrestrial habitat
- *bald eagle* - a threatened species that depend on coniferous, uneven-aged forests near rivers, lakes, marine, and estuarine zones for nesting and foraging food,
- *great blue heron* - that depend on undisturbed stands of tall trees near fresh and saltwater wetlands, streams, and water bodies,
- *osprey* - a species of concern that depend on tall trees or dead snags near large bodies of water,
- *river otter* - a threatened species that depend on wooded streams and estuaries for food, forage, and cover.
- *harlequin duck* – that depend on trees and shrub streams, banks, boulder and gravel shorelines, and kelp beds,

Marine, estuarine, and freshwater habitat
- *black brant* - a threatened species that depend on eelgrass beds, and
- *harbor seal* – that depend on marine environments for food and shorelines for mating and rearing activities.

Estuarine, freshwater, and terrestrial habitat
- *cavity nesting ducks* - (Barrow's goldeneye, bufflehead, wood duck, hooded merganser) that depend on tree cavities adjacent to sloughs, lakes, beaver ponds, and other open water wetlands,

Freshwater and terrestrial habitat

- *blue goose* - that depend on open foothills created by fire or small clear-cuts with streams, springs, and other water features,
- *band-tailed pigeon* - that depend on coastal forests with diverse tree ages, and farmland, mineral springs, and streams with gravel deposits,
- *sea-run and coastal cutthroat, and chinook salmon* - that depend on wetlands and riparian corridors for spawning and rearing,
- *steelhead* - that depend on wetlands and riparian corridors for spawning and rearing,
- *green heron* - that depend on wooded ponds,
- *beaver* - that depend on wetlands and streams for food, forage, and cover,

Terrestrial habitat

- *purple martin* - a species of concern that depend on tree cavities in low lying forests,
- *pileated woodpecker* - that depend on mature second growth coniferous forests with snags and fallen trees,
- *Columbian black-tailed deer* - that depend on deep forest for cover.