

TECHNICAL MEMORANDUM



Date: May 5, 2016
To: Keith Higman, Interim Planning Director
From: Sarah Sandstrom, Clover Muters, and Dan Nickel, The Watershed Company
Project Number: 130420
Project Name: Island County Fish and Wildlife Habitat Conservation Areas

Subject: Western Toad Best Available Science Review

Background

The following memorandum describes the known population trends, distribution, habitat use, stressors, and management strategies regarding the Western toad (*Anaxyrus boreas*, formerly *Bufo boreas*).

In March of 2014 the Island County Fish and Wildlife Habitat Conservation Areas (FWHCA) Technical Advisory Group (TAG) recommended that additional provisions to protect Western toad in Island County were not warranted. Their recommendation was based on the limited documented occurrence of the Western toad in Island County, and existing protection of breeding habitat for the Western toad through wetland and wetland buffer protections under ICC 17.02A. This memo is intended to provide best available science and revisit potential management strategies for the Western toad.

Population Trends

The Western toad is widely distributed in the western United States and Canada including western British Columbia and states as far east as Colorado and Utah (Stebbins 1954, 1985 as cited in Davis 2002). Populations have been documented as far north as southern Alaska, and as far south as northern Mexico (Stebbins 1954, 1985 as cited in Davis 2002). They are found throughout all of Washington State, except some of the more arid counties of the Columbia Basin (WDFW 2008, revised 2014). The Western toad was formerly listed as a federal species of concern and is identified as such in the 2008 Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) list and previous Island County FHWCA memos. However, a review of the current U.S. Fish and Wildlife Service Endangered Species Act (ESA) listings in Washington State indicates that the Western toad is no longer included as a species of

concern (USFWS 2015). The WDFW species of concern website and online PHS data also no longer indicate it has any federal listing (WDFW, electronic reference). However, the Western toad is still a candidate for listing by WDFW and has been given a NatureServe conservation status of S3 (Vulnerable) in Washington State (NatureServe 2015). WDFW PHS data lists the priority areas for the Western toad as “any occurrence.” This designation applies to a priority species “with limiting habitat that is not known or to a species that is so rare that any occurrence is important in a land use decision” (WDFW 2008, revised 2014). As the species is not known to be particularly rare in Washington State, presumably the designation was applied due to the lack of information on its upland, nonbreeding habitat.

The International Union for Conservation of Nature (IUCN) Red List of Threatened Species, assigns the Western toad a red list category of “least concern” due to “the large extent of occurrence, large number of subpopulations and localities, large population size, and use of a wide range of habitats, including those that have been degraded or altered” (IUCN, electronic reference). The total adult population size of the Western toad species is unknown but IUCN reports that it exceeds 100,000 individuals range-wide (IUCN, electronic reference).

There is no documentation of population trends of Western toad on Whidbey Island specifically. Declining populations have been documented in areas across the range for unknown reasons, even in relatively pristine environments (Davis 2002). In particular, declines have been documented in the southern extent of its range (Davis 2002). It is not known whether the local population has experienced declines.

Distribution in Island County

The Western toad is native to Island County. It is known to have a large range in most of Washington and can be common in some areas, but has not been documented as being locally common. Three occurrences have been mapped in Island County by WDFW (WDFW, electronic reference) (Map 1, attached). A previous memo noted only one occurrence (Nickel et al. 2014), presumably either because only one of the three sites is documented as a breeding location, or because two of the sites appear to potentially be within shoreline jurisdiction. The documented breeding site is located east of Crockett Lake, at a site known as Willow Pond. The second mapped occurrence is in Deception Pass State Park and the third near Greenbank (within shoreline jurisdiction). Another potential occurrence was noted by an Island County FWHCA TAG member near Jones Road in north Whidbey. Two additional observations in Deception Pass from 2013 were reported by TAG member, Sarah Schmidt.

The attached map is based on 2014 WDFW PHS data. WDFW area habitat biologist, R. Milner, confirmed the three locations as the only formally documented points by WDFW. WDFW

identified another breeding site at Dugalla Bay based on anecdotal information from a landowner on Jones Road who sees the toadlet out-migration every year (R. Milner pers. comm. March 24, 2016). This potential site has not been mapped, as the specific egg mass location has not been found. WDFW has also received several comments from landowners reporting toads between Jones Road and Troxel Road. We assume these sightings are related to the presence reported by the TAG member noted above. Adult toad sightings have also been reported by landowners between Oak Harbor and Deception Pass State Park, and on Cecil Lane on central Whidbey.

In summary, while comprehensive data on the distribution and breeding sites for Western toads in Island County are lacking, anecdotal evidence suggests they could be more widespread than just the three locations the current mapped data suggest.

Habitat Use

Western toads can occupy a variety of upland habitats, but rely on open water for breeding and egg development. They are known to use desert springs and streams, meadows and woodlands, wetlands, beaver ponds, ditches, and backwater channels of rivers where they prefer shallow areas with mud bottoms (Montana Natural Heritage Program). Egg laying sites include shallow areas of ponds, lakes, or reservoirs, or pools of slow-moving streams (NatureServe 2015).

Aquatic habitats are required for tadpole development through metamorphosis, which takes approximately two months, depending on temperature and food availability. Following metamorphosis, thousands of toadlets disperse from the aquatic habitat into the adjacent upland terrestrial habitat. They generally remain close to aquatic areas during the day, but may range more widely at night (Montana Natural Heritage Program). They have also been found to occur in urban settings, and have been noted feeding on insects under streetlights at night (Hammerson 1999 as cited in Montana Natural Heritage Program). For shelter, juveniles and adults dig their own burrows in loose soil, use the burrows of small mammals, or shelter under logs or rocks (NatureShare 2015).

While it is known that toads migrate seasonally between aquatic breeding sites and terrestrial nonbreeding habitat, it is not clear exactly how far they disperse, or which specific terrestrial habitats are used in Island County.

In 2014, Richter suggested the following terrestrial areas to prioritize for assessment and protection:

- “Mixed undeveloped upland habitat associated with aquatic breeding sites, preferably some open area e.g., prairie habitat, mixed with forest (or if riparian-open sand bars mixed with forest),”
- “Good overwintering habitat, meaning large hollow log refuges, rocky talus slopes or areas with substantial burrows created by another animal that are large enough to use by overwintering Western toads,”
- “Habitat that is not bisected by roads or other development between aquatic and non-breeding or overwintering upland habitat, or if there is bisection, create some kind of safe useable pathway between both.”

The distance that adult toads may travel from breeding ponds varies widely, and the specific factors driving migrations are not well understood (Davis 2002). The inferred minimum extent of habitat use is 0.5 km from breeding sites (NatureServe 2015). NatureServe notes a separation distance for unsuitable habitat of 1 km. This is defined as the distance that is great enough to restrict movement or dispersal of individuals among suitable habitats. In most cases, unsuitable habitat is habitat through which individuals may move, but that does not support reproduction or long-term survival. As noted above, upland dispersal and upland habitat use are aspects of the ecology of Western toad that are not well understood.

Habitats with which Western toads have a known primary association are wetlands, which support breeding and tadpole development. These areas are protected as critical areas under Island County’s critical areas ordinance, and they are required to have a protective buffer area, the width of which is based on providing appropriate protection for the quality of habitat the wetland provides. Aquatic areas including wetlands, streams and other waters of the state, and their buffers, are designated as critical areas and regulated under Chapter 17.02 of the Island County Code.

Known Stressors

WDFW’s PHS List references the NatureServe Species Report for information and guidelines for management of the Western toad. The following excerpt from the NatureServe report summarizes known population stressors that may contribute to species decline:

The extent of threats range-wide is not known with certainty, but there appear to be multiple causes contributing to the range-wide trend.

Disease and parasites appear to be contributing factors leading to population declines. Carey (1993) hypothesized that some environmental factor or

synergistic effects of more than one factor may stress toads, causing suppression of the immune system or indirectly causing immunosuppression by effecting elevated secretion of adrenal cortical hormones.

Immunosuppression, coupled with the apparent effect of cold body temperatures on the ability of the immune system to fight disease, may lead to infection by *Aeromonas hydrophila* bacteria (which causes "red-leg") or other infectious agents and subsequently to death of individuals and extirpation of populations. Die-offs in the Southern Rockies have been associated with chytrid fungus (*Batrachochytrium dendrobatidis*) infections (Daszak et al. 2000), which attacks keratinized tissue and is especially detrimental to recently metamorphosed toadlets. Also, toad eggs are highly susceptible to the pathogenic fungus *Saprolegnia ferax* (which may be introduced during fish stocking), and mortality of eggs due to this fungus has been documented in Oregon (Blaustein et al. 1994; Kiesecker and Blaustein 1997; Kiesecker et al. 2001). Kiesecker et al. (2001) observed catastrophic embryo mortality from *S. ferax* infection in shallow water that was [exposed to] UV-B, but not in water protected from UV-B.

Limb malformations in toads have been linked directly to trematode infections by *Ribeiroia ondatrae* (Johnson et al. 2001; Johnson et al. 2002), although the impacts of these infections on reproduction, and the magnitude of the infections across the breeding range, require further study. Preliminary analysis suggests that limb malformations may increase mortality in larval amphibians prior to and during metamorphosis.

Some have proposed that declines are related to sensitivity of eggs to increased levels of ultraviolet radiation (Blaustein et al. 1994), but studies by Corn (1998) yielded no support for UV-B alone as the cause of declines. Also, spectral characteristics of natural waters likely shield eggs from detrimental physiological effects in all but the clearest waters (Palen et al. 2002). Corn and Muths (2002) proposed that temperature stress is as plausible a hypothesis as increased UV-B to explain episodes of high mortality observed in Oregon (Kiesecker et al. 2001).

In the Cascade Range of Oregon, persistent predation on adult toads by Common Ravens during the breeding season appears to have contributed significantly to declines of some populations (Olson 1992). Possible significant predation by birds also has been observed in Colorado and Idaho (Hammerson 1999).

Declines may be related at least in part to habitat destruction and degradation, water retention projects, predation by and competition with native and non-native species, fishery management activities, or other factors, but these factors have not been adequately assessed. In Idaho, several hundred toadlets were

trampled when domestic sheep were herded through the dried breeding pond (Bartelt 1998).

The Washington Herp Atlas, a cooperative project of the Washington Department of Natural Resources (DNR), Bureau of Land Management (BLM), WDFW, and US Forest Service (USFS), notes the following about Western toads:

This species is especially vulnerable to road traffic during adult movements to and from breeding sites in the spring, and dispersal of newly metamorphosed toads away from breeding sites in the summer and fall. Anecdotal observations suggest that many populations return to the same egg laying location every year. Alteration of these sites may lead to population declines or population extirpation. Because population declines have been rapid, Western toad breeding sites should be monitored every five to ten years to confirm presence.

Breeding sites, especially in western Washington, appear to be vulnerable to successional changes in vegetation, i.e., a tendency for more open wetlands to succeed into shrub-scrub wetlands that provide unsuitable breeding habitat. The basis of these changes is unclear; hydrological alteration and modification of the grazer assemblage are suspected. This is a critical study need (Hallock and McAllister 2005).

As noted above, it appears that disease and predation may be significant causes of population decline, particularly in the Southern Rocky mountain population which has seen some of the most drastic declines since the 1970s (NatureServe 2015). There is an intuitive connection between habitat loss from development and population stresses; however, scientific validation of the relationship is relatively limited. Also, given the broad range of upland habitats known to be used by Western toad, and the predominantly rural and undeveloped nature of unincorporated Island County, upland habitat for Western toad is not known to be limiting in the County.

Management Strategies

There is much that is not understood regarding local/regional population trends, stressors, and significant upland habitat features for the Western toad. Additional research would help to understand Western toad population dynamics and to identify potential stressors and key upland habitat features. This understanding is important to inform the management of the Western toad in Island County, as it assesses 1) the vulnerability of the Western toad population in the County, and 2) potential anthropogenic stressors and remedies. Because the population and population trends are unknown, and local stressors remain unidentified, it is difficult to link regulatory actions to recovery objectives.

As mentioned above, Western toad breeding habitat is already protected by the County's existing wetland and wetland buffer protections. The wetland regulations under Island County Code Chapter 17.02A are likely sufficient to continue to protect potential breeding locations. Upland habitats outside of wetland or stream buffers may also be protected through the County's critical areas ordinance (CAO), depending on their location and characteristics (e.g., steep slopes and designated high-quality terrestrial habitats). Upland development is also regulated by the County's rural development zoning restrictions through maximum density, maximum impervious surface coverage, and minimum open space ratio standards.

Based on this review of the best available science, local Western toad population dynamics are not understood, and upland habitat is not necessarily a constraining factor locally. However, the following regulatory approach could be considered.

Optional Regulatory Strategies

Protect aquatic areas used for breeding. This can be achieved through implementation of the existing CAO regulations for wetlands, streams, and buffers.

Another strategy could be to establish a review area for areas within a specific proximity from documented breeding locations. Within this review area, there may be opportunities for conservation of migratory corridors and upland habitat features, including the following.

- Avoiding and/or minimizing road development.
- Preserving cover where it exists and restoring cover where it has been degraded. Davis 2002 notes, "adult toads are highly adaptable and utilize any habitat that has at least some accessible water and cover throughout the summer. Cover is probably important for maintaining a favorable water balance, behavioral thermoregulation, and protection from vertebrate predators."

Conclusion

There are options for protecting the Western toad, such as utilizing the County's existing regulatory structure to protect documented breeding sites and avoiding interference with travel corridors during migrations to upland habitat. The primary challenge with tailoring regulations to achieve recovery objectives is a lack of data on population levels, local stressors, upland habitat features, and breeding locations.

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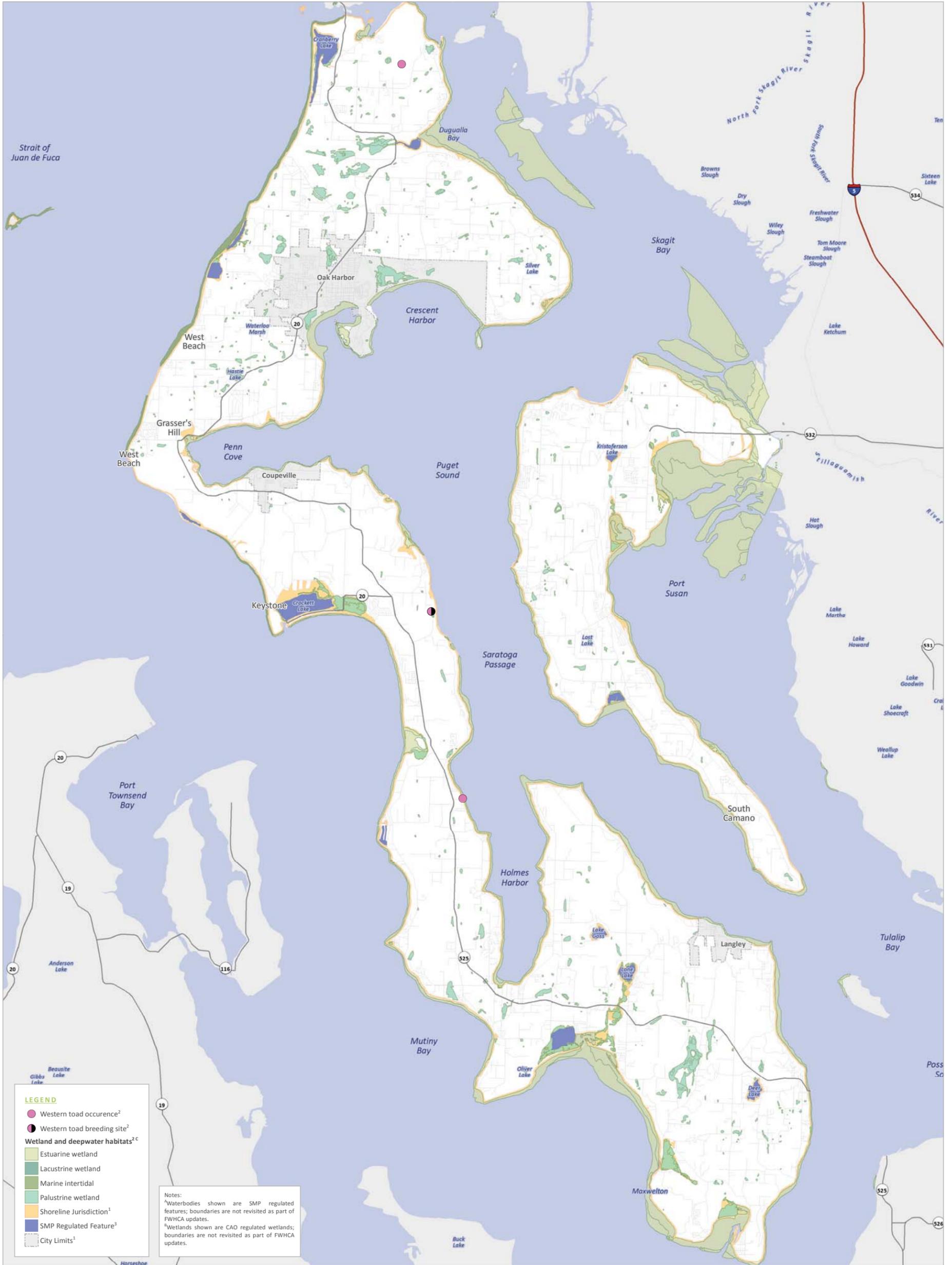
Prepared for the Island County Planning and Community Development Department,
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Attachments

Map 1. Documented Occurrences of Western Toad in Island County



Map 1. Documented Occurrences of Western Toad in Island County



Sources:
¹Island County Planning and Development, ²WA Department of Fish and Wildlife, ³The Watershed Company

Disclaimer:
 All features depicted on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be needed to confirm/verify information shown on this map.

Date: 4/19/2016
 Name: Map01_WesternToad

Original Scale = 1:83,000 @ 22" x 34" layout.

