

Appendix B

Potential Range and Habitat Distribution Maps

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Appendix B

Potential Range and Habitat Distribution Maps

B.0 Overview

This appendix describes the methodology for developing potential range and habitat distribution maps. It includes maps generated for a subset of the Species of Greatest Conservation Need (SGCN). The maps were built specifically to reflect the following information for each individual species:

- Known occurrences;
- Potential habitat distribution; and
- Areas where conservation actions are being, or could be, applied.

These maps are referred to as “potential” habitat distribution maps because they depict range as areas with documented occurrences, as well as areas with suspected or possible occupancy based on the availability of suitable habitat and the proximity of that suitable habitat to occupied areas.

Since these maps are based on occurrence data, maps were generated only for those species for which sufficient data existed in our database. Species were prioritized for initial map development based in part on WDFW’s immediate need for spatial distribution data. For example, we prioritized map development for the following species:

- Those that will be covered in the Wildlife Areas Habitat Conservation Plan, currently in preparation by WDFW; and
- Those for which the agency is currently, or will soon, develop status assessments.

These maps are identified as “working drafts” because, as we become more familiar with these map products and their utility for conservation planning, and as new data becomes available, we intend to refine these maps and develop additional maps for other SGCN as appropriate. This information is intended to be used in conservation planning, for example to identify and prioritize areas for population surveys or to determine priority areas for restoration.

B.1 Methodology

Species range was defined as the geographic area in which a species regularly occurs within Washington, including areas used for breeding as well as important distinct foraging, wintering, or migration areas where appropriate. Range does not include accidental, infrequent, or peripheral areas that are disconnected from the regularly occurring area or wintering or migration areas that are generally broad and nonspecific. We chose to spatially represent range using watershed boundaries (hydrologic units) at various scales and we used ecological systems¹ as the basis for representing potentially suitable habitat distribution of the species within its range. Each step in the process is described below, using the example of the Washington Ground Squirrel.

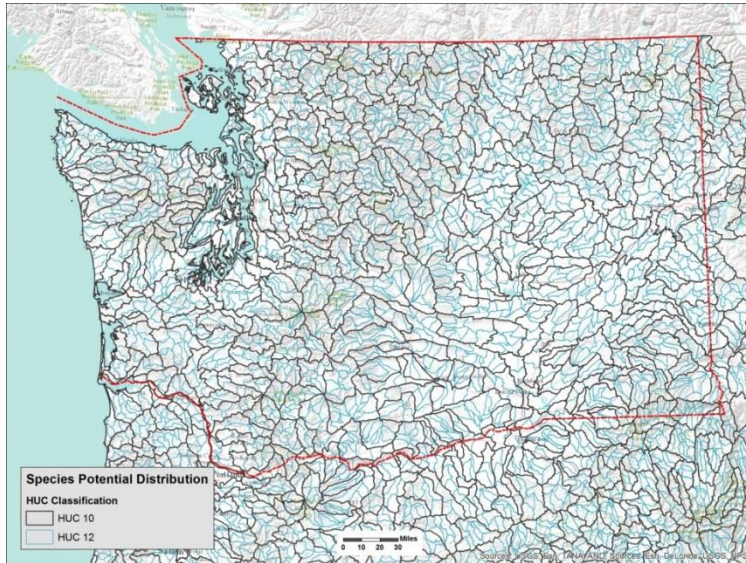
B.1.1 Select Range Units and Scale

We used the United States Geologic Survey (USGS) Hydrologic Unit Code (HUC) national watershed classification system to delineate range. The United States is divided and subdivided into successively smaller hydrologic units which are classified into various levels. The hydrologic units are nested within

¹ Ecological systems are a component of the National Vegetation Classification Scheme (NVCS) and have been used through the State Wildlife Plan Update to describe habitat needs of SGCN.

each other, from the largest geographic area to the smallest. Each hydrologic unit is identified by a unique code (HUC), indicating the relative scale. We selected two units to delineate range; HUC 12 (smaller) and HUC 10 (larger - see figure 1 for the distribution and relative size of HUC 10 and HUC 12 watersheds throughout Washington).

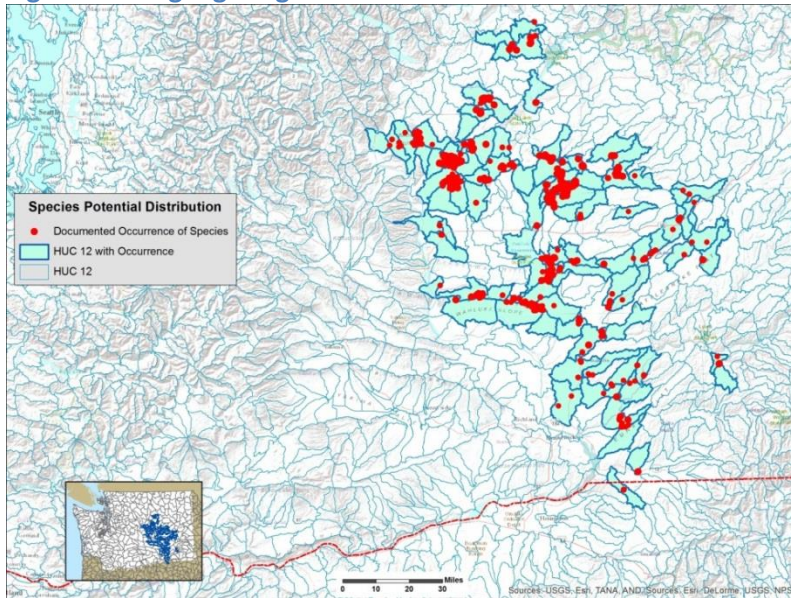
Figure B-1: HUC 10 and HUC 12 Watersheds in Washington



B.1.2 Select HUC 12s

Species occurrence data from the WDFW database was mapped as they occur in HUC 12 watersheds. The data used were considered to have high accuracy and were from 1978 to 2015 (figure 2). HUC 12s were selected based on the presence of species occurrence and used as the core range for the species. This preliminary list was then edited by WDFW biologists who used empirical data and literature to determine extant, incidental, accidental, and infrequent occupancy status for HUC 12s. The resulting HUC 12 selected watersheds represent the highest degree of certainty in depicting the recently occupied species range (Figure 2).

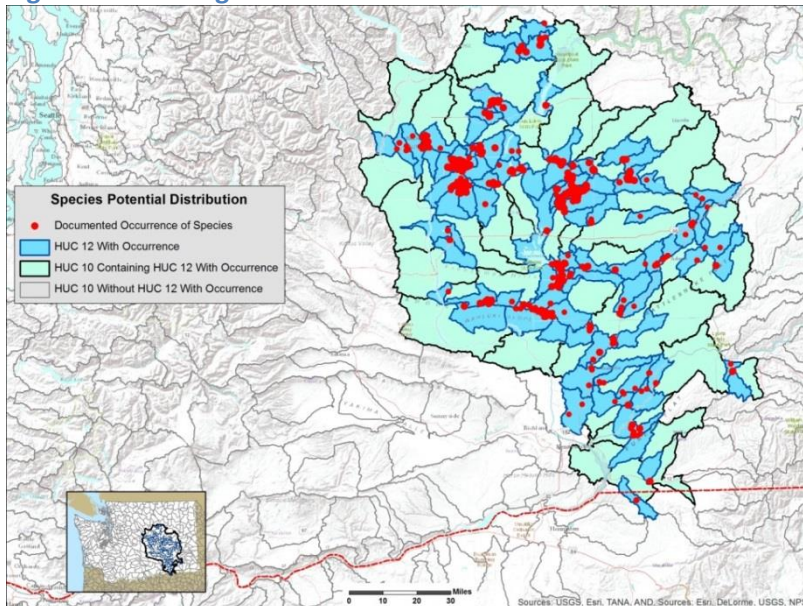
Figure B-2: Highlighting HUC12s with Documented Recent Occurrences of Washington Ground Squirrel



B.1.3 Selectively Highlight Adjacent HUC 10s

The initial set of HUC 12s selected for each species is limited by known occurrence data. However, not every area in the state has been surveyed for all species and, therefore, using only occupied HUC 12s would likely underestimate the range of a species and limit potential conservation action. Since the HUC system is hierarchical, HUC 12s are nested within the larger HUC 10 watershed unit. HUC 10s were then selected based on proximity to HUC 12s that were considered occupied by a species to identify areas that a species has the potential to occur (Figure 4).

Figure B-3: Adding HUC 10s



B.1.4 Identify Potentially Suitable Habitat for Habitat Distribution

We defined habitat distribution as the spatial arrangement of ecological systems² suitable for a species within its predefined range. Ecological systems are a classification unit developed by NatureServe and are defined as a group of existing plant community types that tend to co-occur within landscapes sharing similar ecological processes, substrates, and/or environmental gradients (Rocchio and Crawford 2008). The Ecological System classification provides a meso-scale target that is useful for ecological mapping, assessments, and conservation prioritization. While ecological systems include natural and semi-natural vegetation, cover types, as used by the National Vegetation Classification Standard (NVCS), include non-natural vegetation or cover, such as agriculture, introduced vegetation, and development. Because both ecological systems and cover types are geospatially mapped, comparing their distribution in Washington to occurrence points of SGCN was a useful exercise in determining species associations with these two categories.

1. The draft *Field Guide to Washington's Ecological Systems* (Rocchio and Crawford 2008);
2. Ecological system descriptions, as housed in NatureServe, where there is evidence that the system occurs in Washington State, but does not appear in Rocchio and Crawford (2008); and
3. Cover type descriptions, as used by NVCS.

Species were associated with ecological systems on a species-by-species basis for 98 ecological systems in Washington. Biologists used expert knowledge and published habitat associations (Rocchio and Crawford 2008) and preferences to associate ecological systems to species using four categories, closely associated, generally associated, unsuitable, and unknown (figure 5). It should be noted that associated habitat and habitat distribution refers here to the extent of ecological systems with which a species is associated, representing potential suitable habitat. Some, if not all species, respond to finer scale habitats such as vernal pools or forest stand age or condition that cannot necessarily be mapped but may drive where a species occurs.

1. Closely Associated: The species demonstrates preference for the ecological system, as indicated by greater occurrence, high densities, greater reproductive output, or other indicators of preference, than in other ecological systems. A species that is closely associated to individual ecological systems often rely on one to a few ecological systems for a significant part, or all, of its life history requirements.

2. Generally Associated: The species occurs in, but does not prefer, the ecological system, as indicated by lesser occurrence, lower densities, or other indicators of a general relationship with the ecological system. A species that is generally associated with individual ecological systems can typically rely on numerous ecological systems to meet its life history requirements.

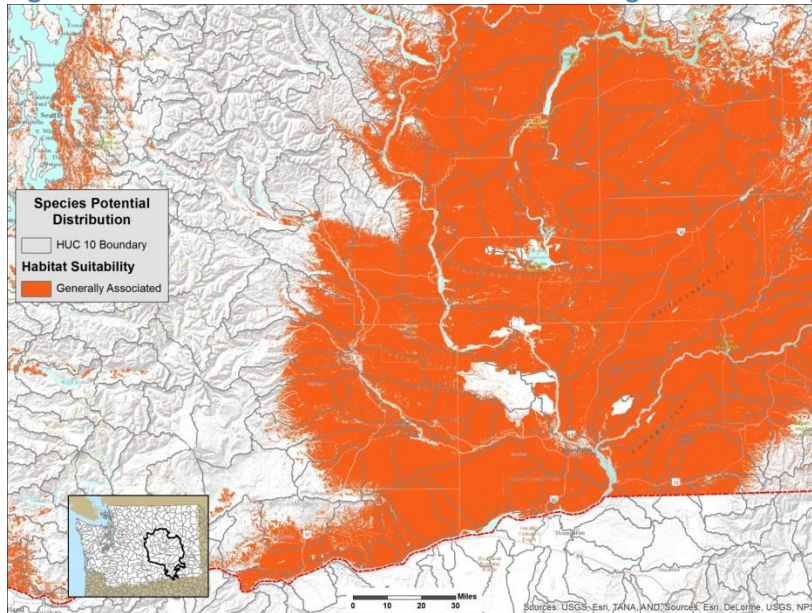
Note: A species can be closely associated with some ecological systems and generally associated with others, given differences in occurrence, densities, reproductive output, or other indicators of preference.

3. Unsuitable: A species demonstrates no use or only occasional use of the ecological system.

4. Unknown: The species' use of the ecological system is unknown. There were questions or uncertainty whether or not a species used an ecological system.

² Ecological systems are a component of the National Vegetation Classification Scheme (NVCS) and have been used through the State Wildlife Plan Update to describe habitat needs of SGCN.

Figure B-4: Associated Suitable Habitat for Washington Ground Squirrel in Washington



B.2 Application

As mentioned in the Overview to this section, these maps are intended to be used to inform conservation planning at fairly broad scales to determine the most effective places to direct conservation actions and potential investment. Such actions may include:

1. Conducting species survey efforts in areas that are thought to contain suitable habitat but for which no occurrence data exist;
2. Working with our conservation partners to further evaluate, within watersheds, where specific actions, such as habitat restoration, might take place; and
3. Implementing conservation measures for SGCN on agency-owned and managed lands.

Over time, these activities are expected to lead to further refinement of species ranges, mapped ecological associations, and associated habitat designations.

The maps provided in this appendix are referred to as “potential” species range and distribution maps because they are based on a combination of the factors that define the content of the maps. WDFW makes no assertion that an individual species currently physically occurs across the mapped area. The maps are not meant to be used in a regulatory environment nor replace existing range maps that may have been adopted for use in species recovery planning. They are also not meant to identify specific places for conservation action but rather guide further evaluation within watersheds as to where the most appropriate conservation actions might take place.

B.2.1 Keeping maps relevant

These map products are intended to be dynamic through links to WDFW cooperatively managed wildlife occurrence datasets. WDFW also has strong data sharing partnerships with U.S. Forest Service, Bureau of Land Management, eBird, and other organizations that will be useful in updating species range and habitat distribution maps. Thus maps will be updated and improved based on:

1. The identification of new species occurrences from directed survey efforts by WDFW and/or partners;
2. A better understanding of species associations with ecological systems through research;

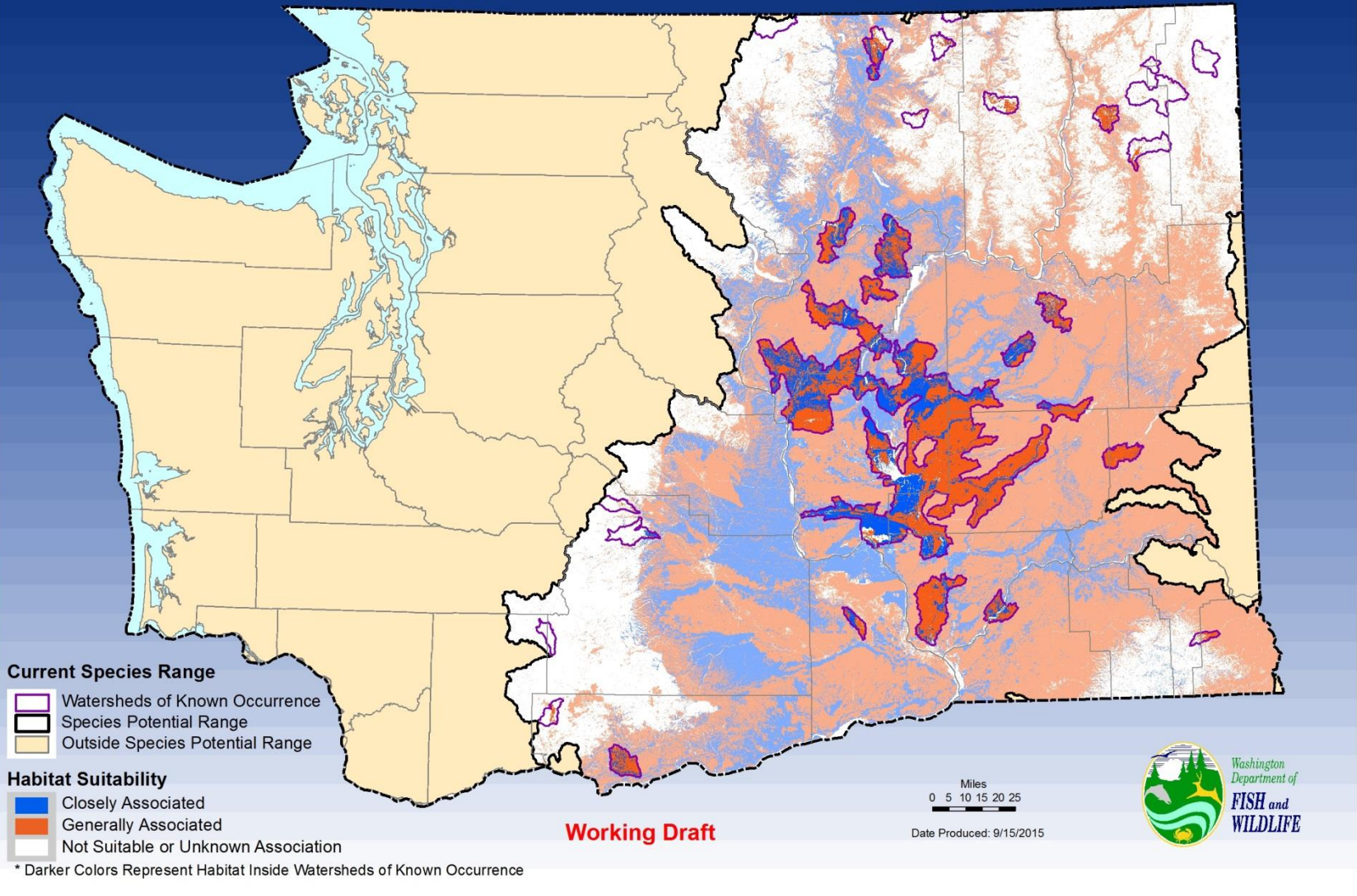
3. Refined mapping of ecological systems.

A specific process to update range map products based on the above factors to keep species maps relevant over time will be developed by WDFW. The process will also identify the frequency of updates and the mechanism by which new maps will be disseminated both within WDFW and to conservation partners.

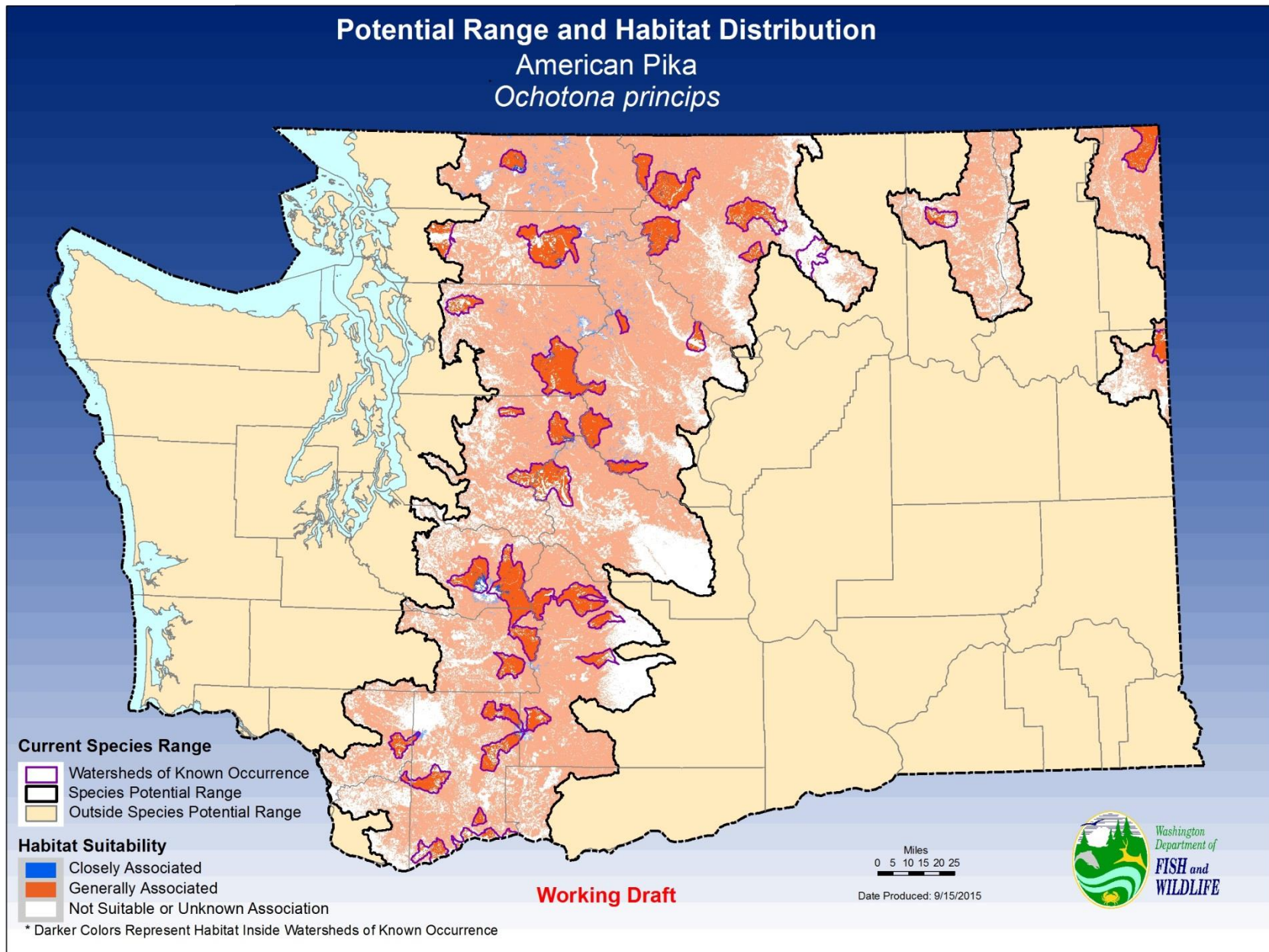
B.3 Range and Potential Habitat Distribution Maps for Selected SGCN

American Badger

Potential Range and Habitat Distribution American Badger *Taxidea taxus*

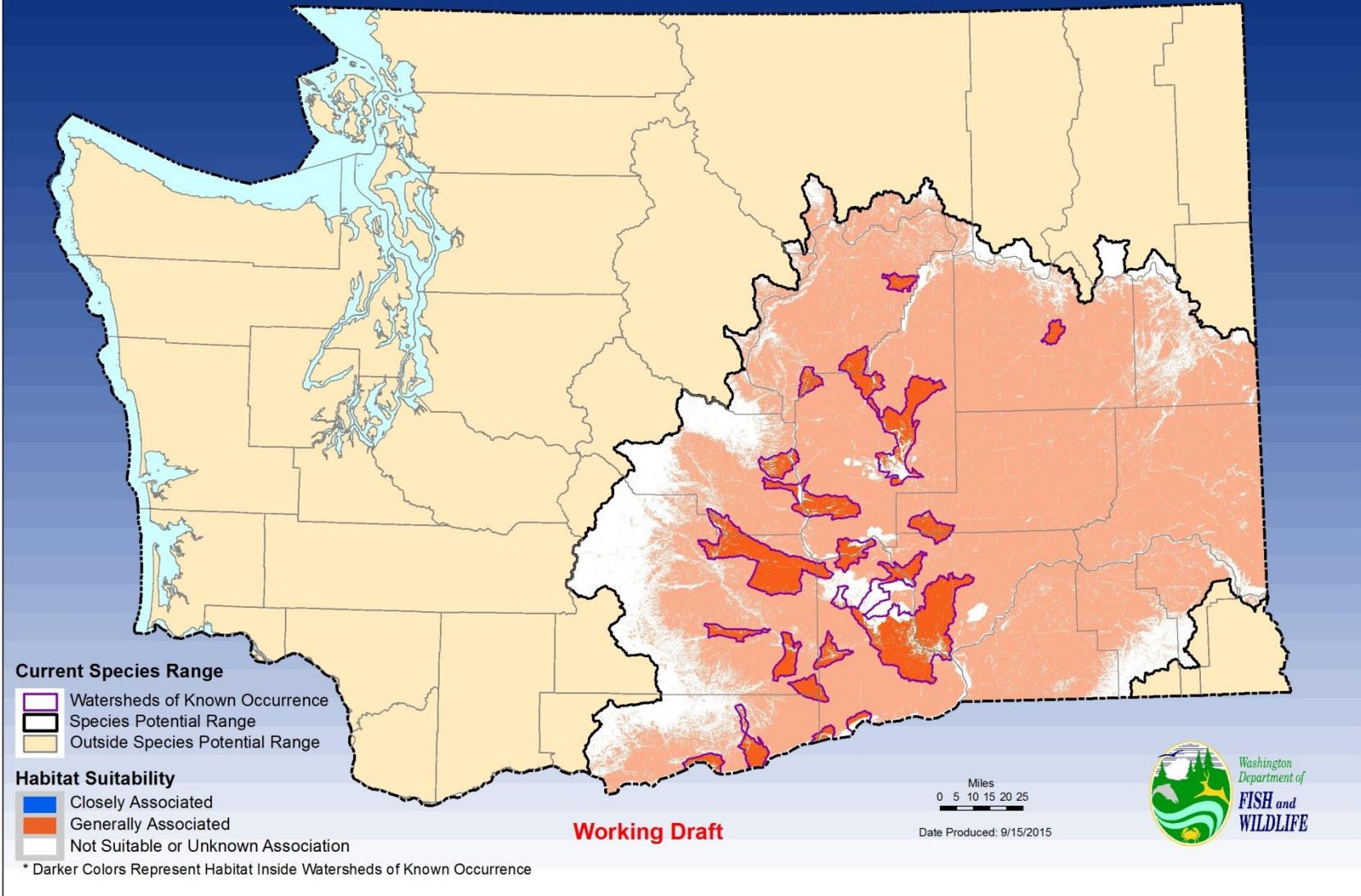


American Pika



Black-tailed Jackrabbit

Potential Range and Habitat Distribution Black-tailed Jackrabbit *Lepus californicus*



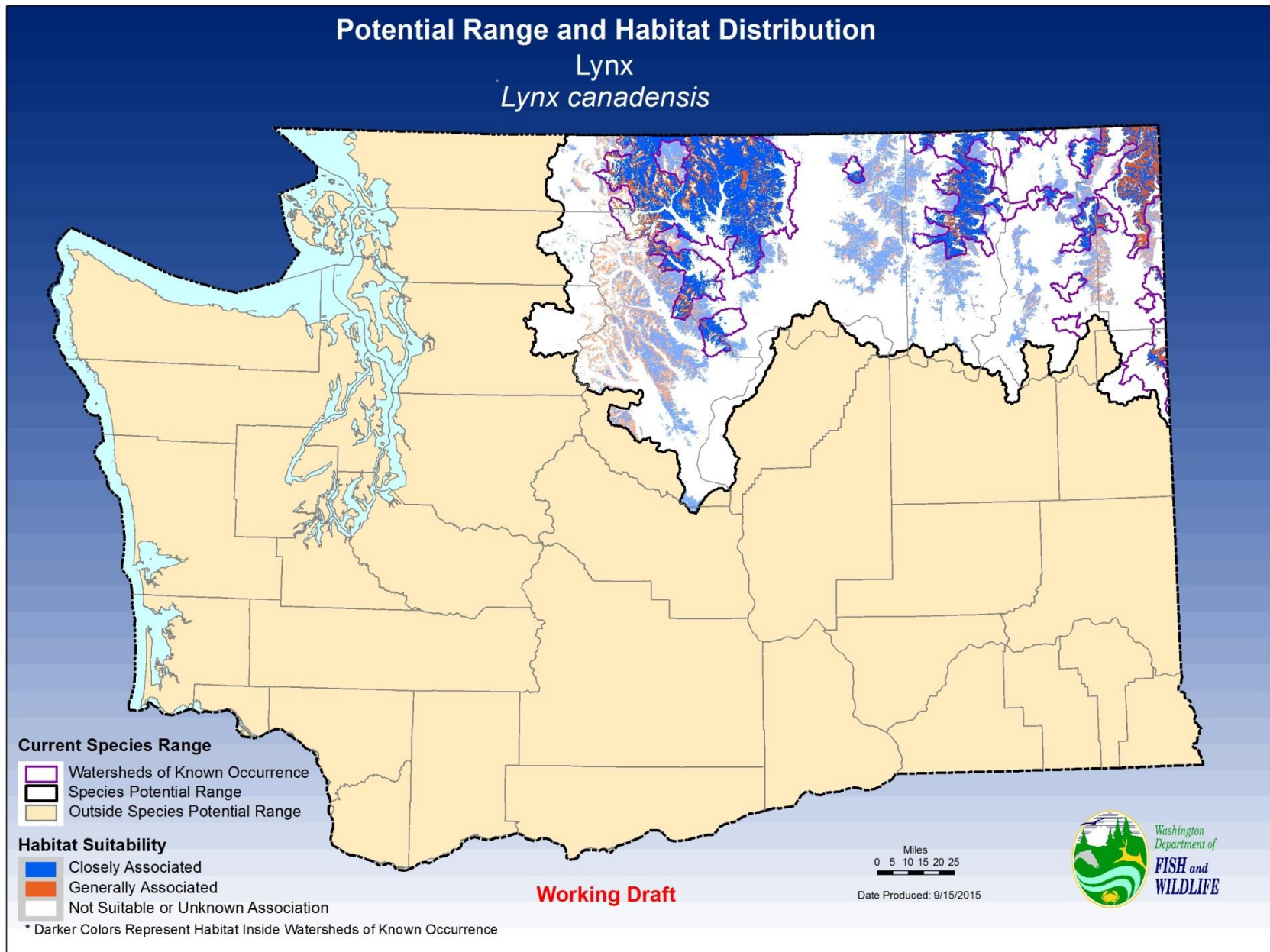
Brush Prairie Pocket Gopher

Potential Range and Habitat Distribution

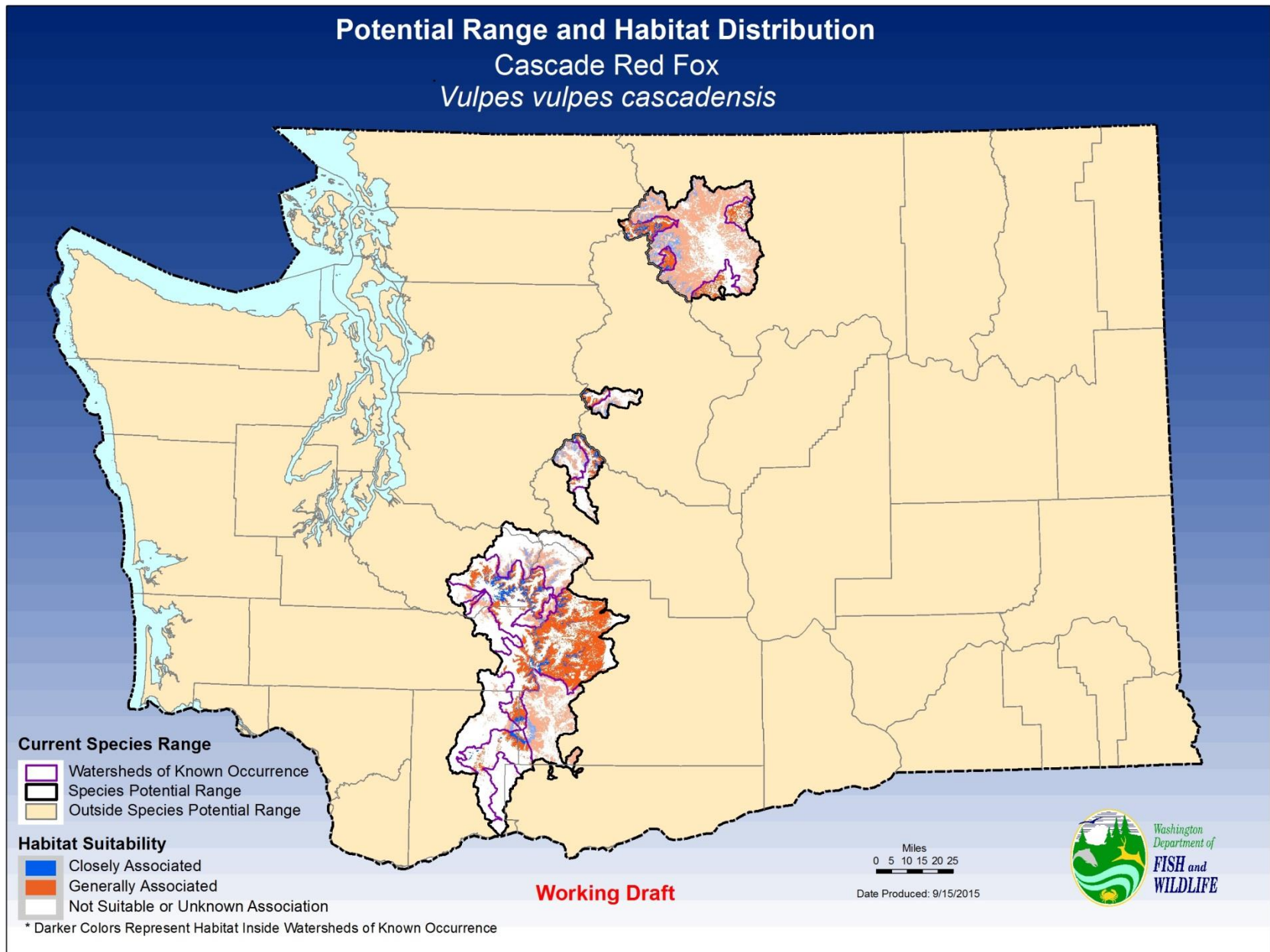
Brush Prairie Pocket Gopher
Thomomys talpoides douglasii



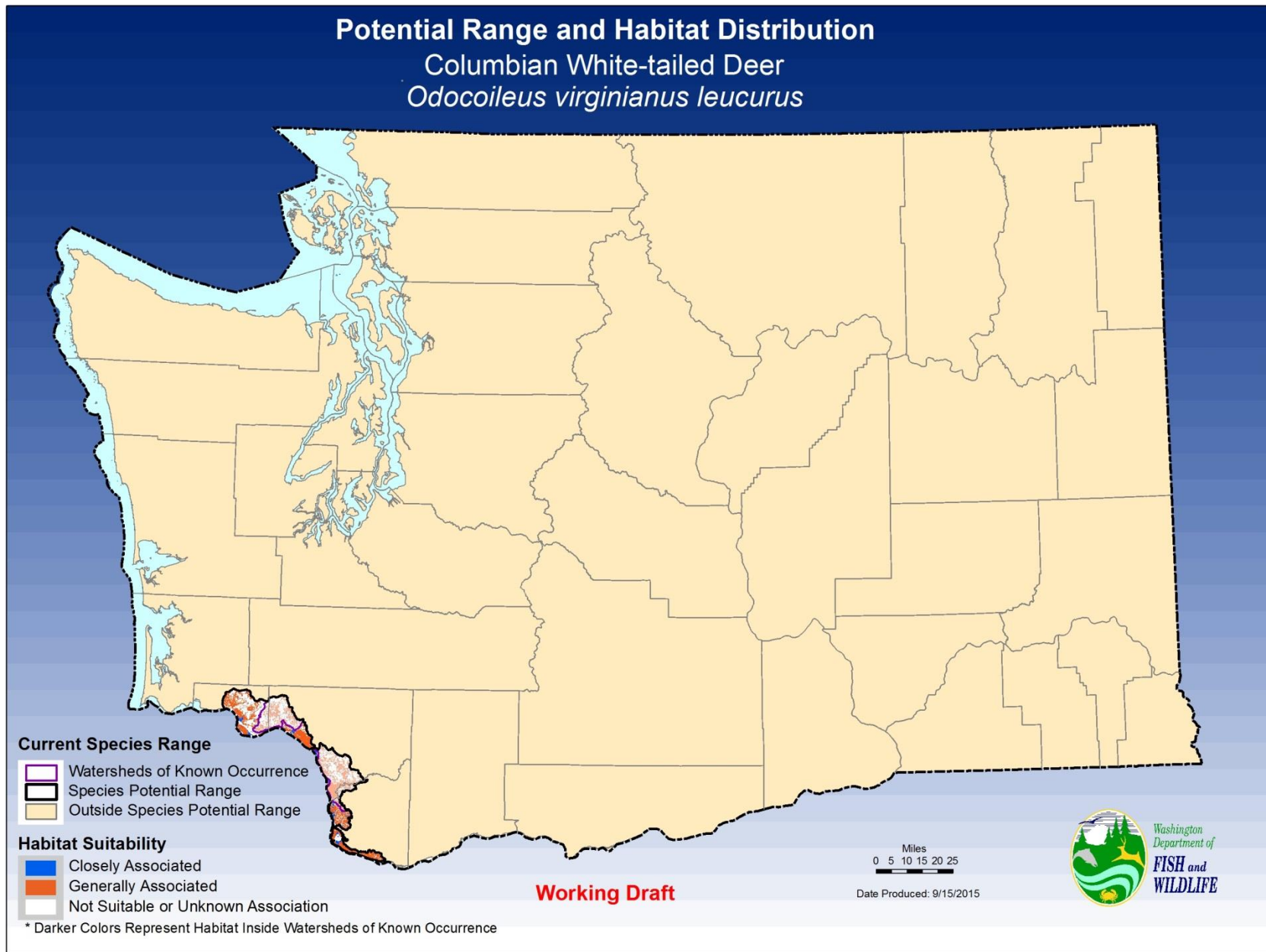
Canada Lynx



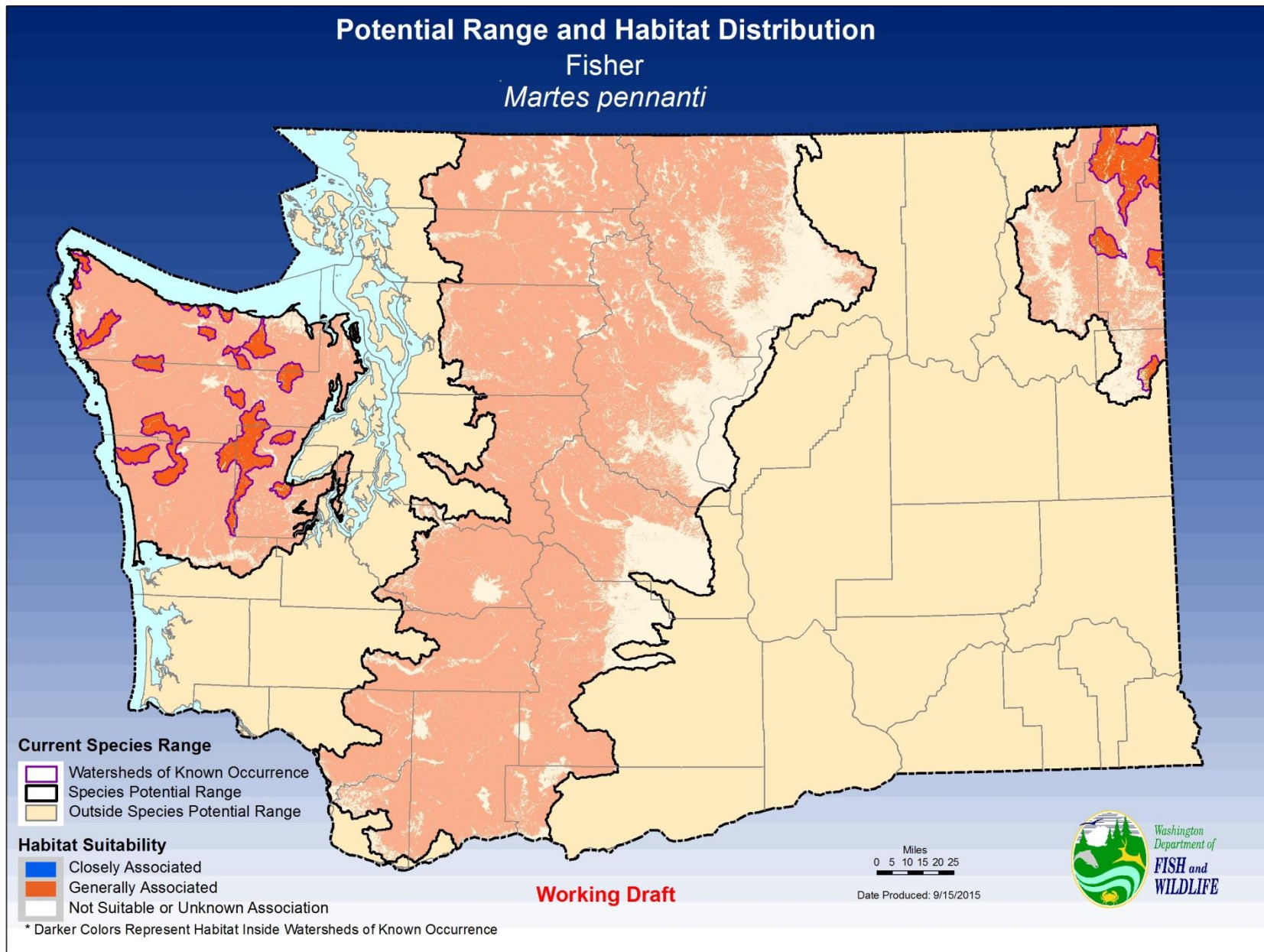
Cascade Red Fox



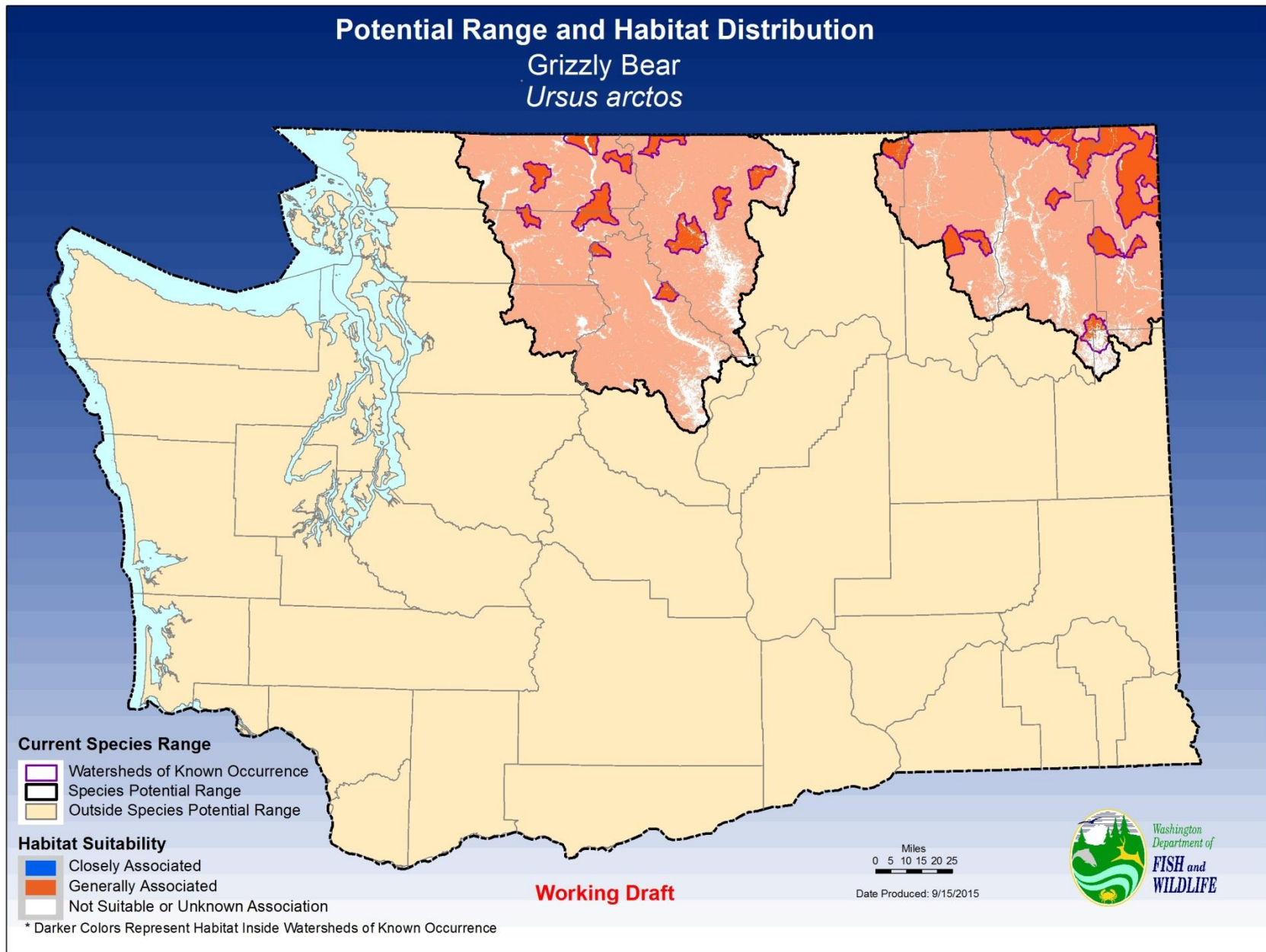
Columbian White-tailed Deer



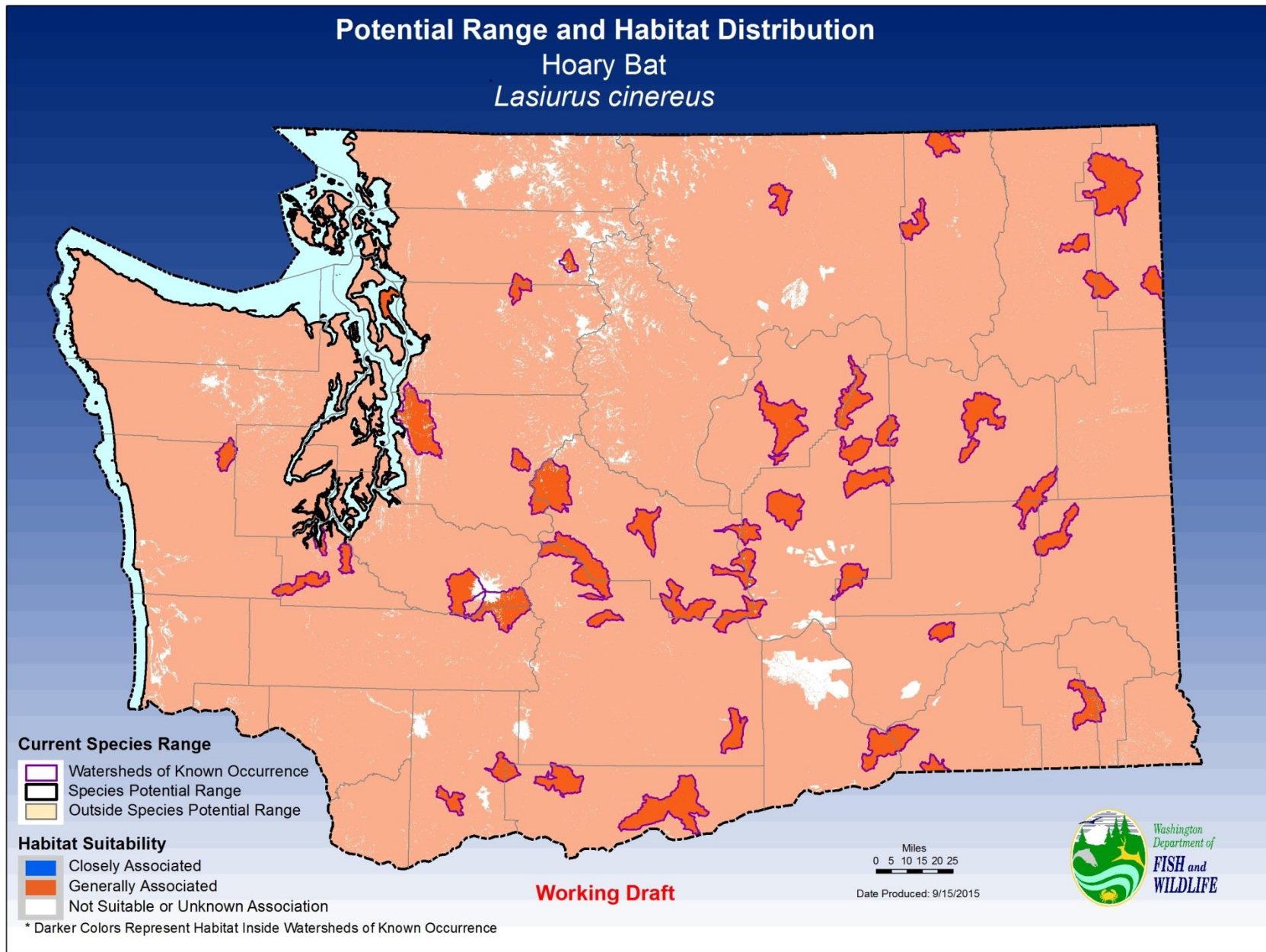
Fisher



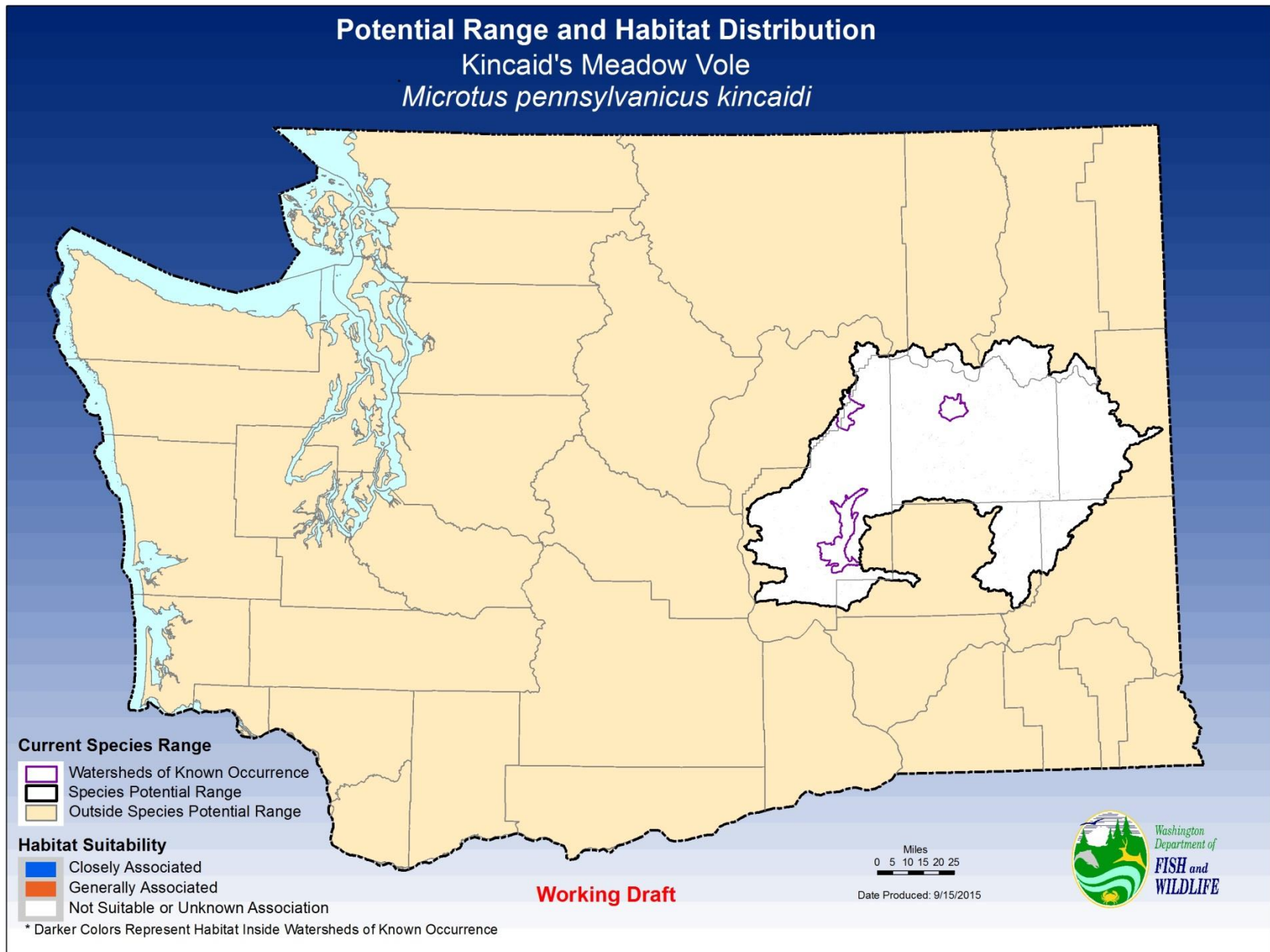
Grizzly Bear



Hoary Bat

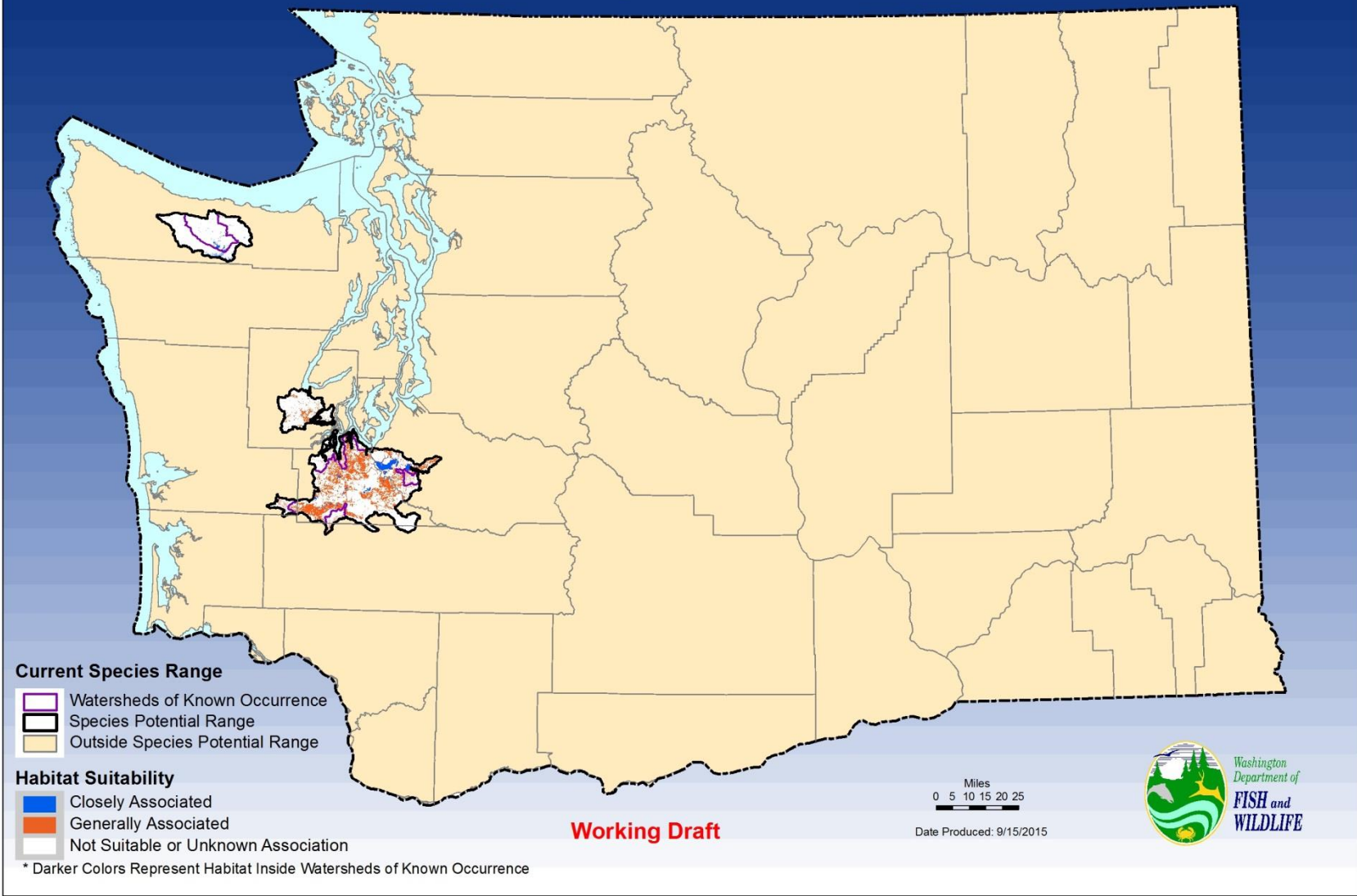


Kincaid's Meadow Vole

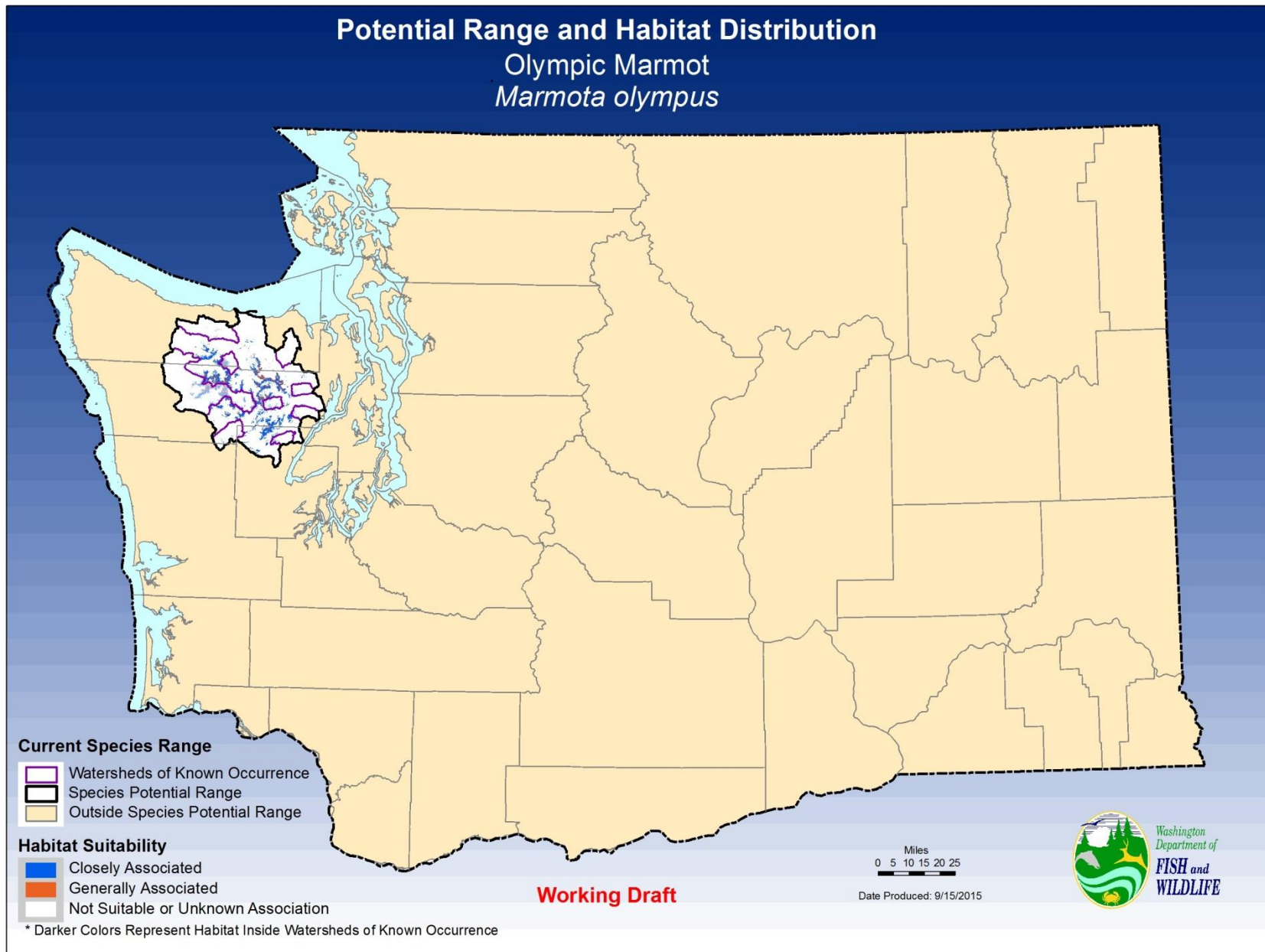


Mazama Pocket Gopher

Potential Range and Habitat Distribution Western Pocket Gopher *Thomomys mazama*

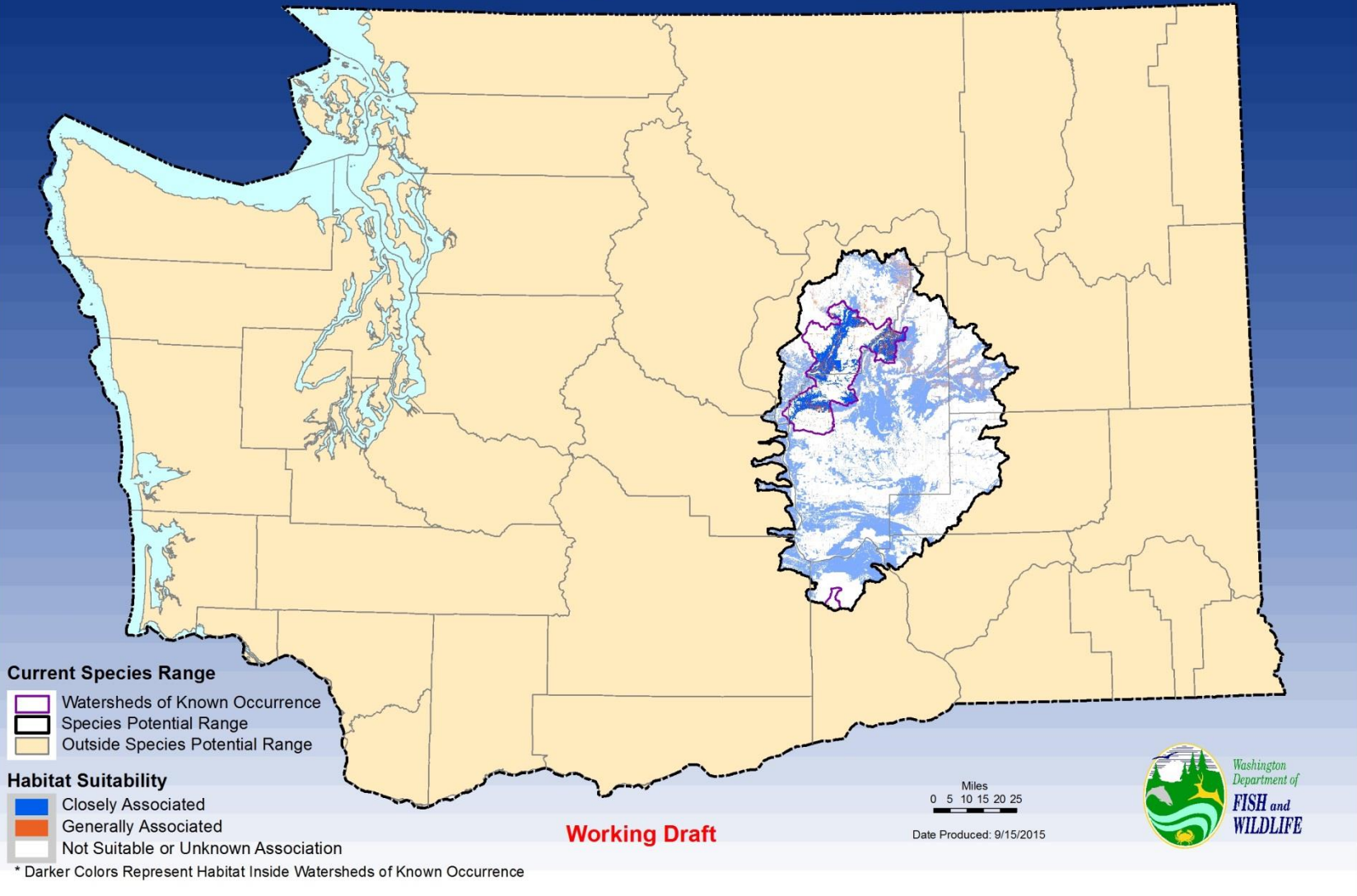


Olympic Marmot

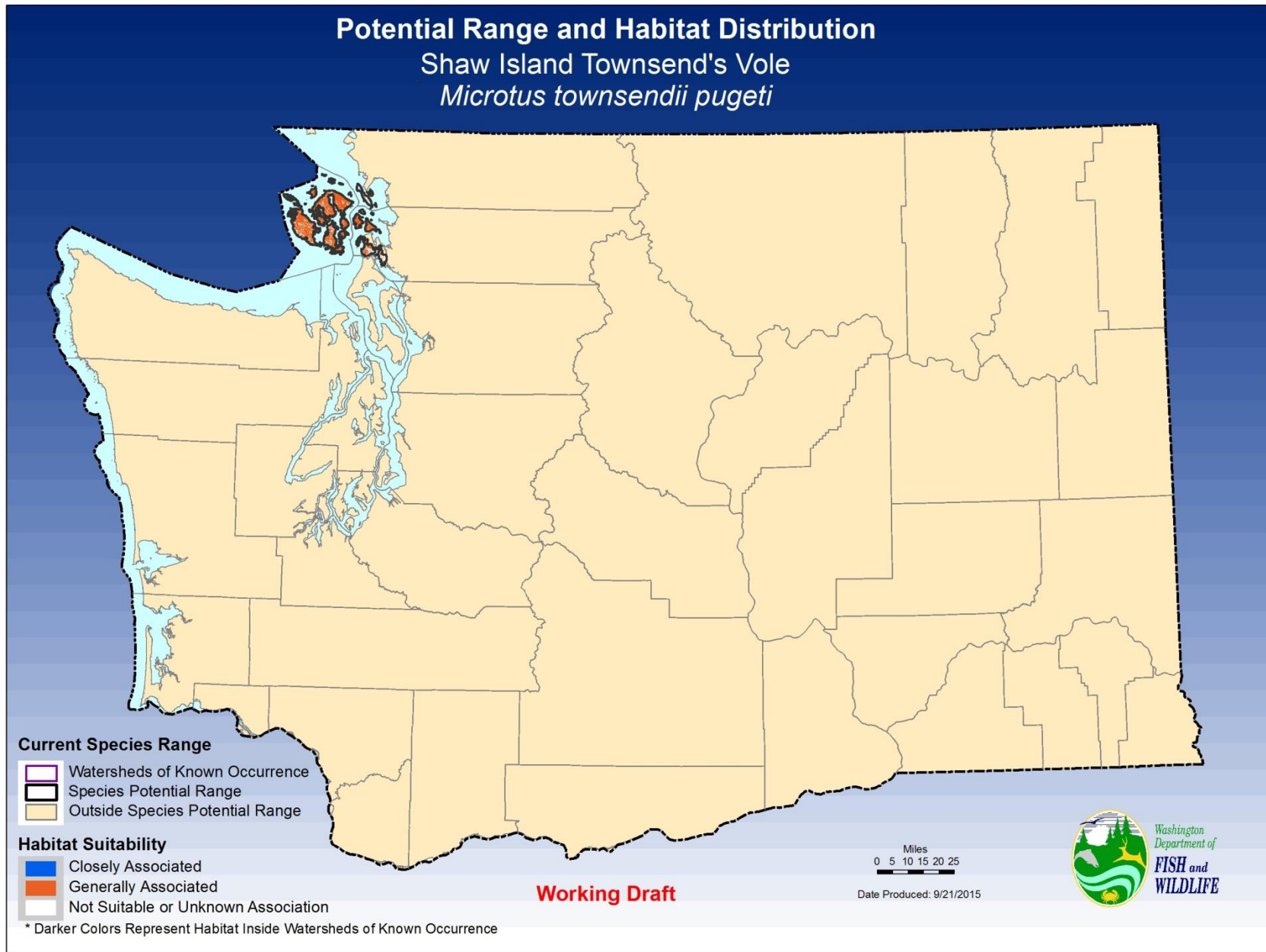


Pygmy Rabbit

Potential Range and Habitat Distribution Pygmy Rabbit *Brachylagus idahoensis*

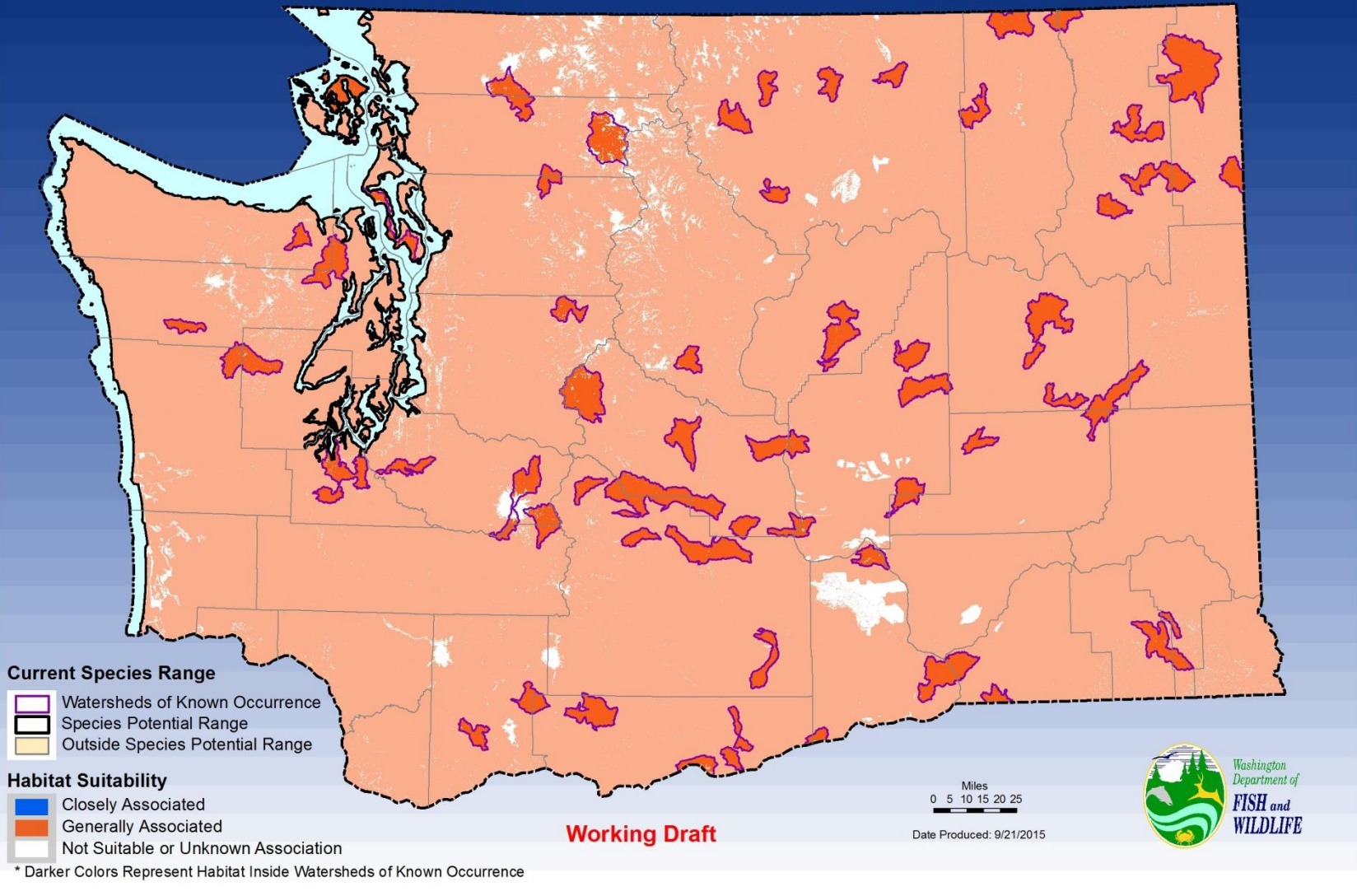


Shaw Island Townsend's Vole

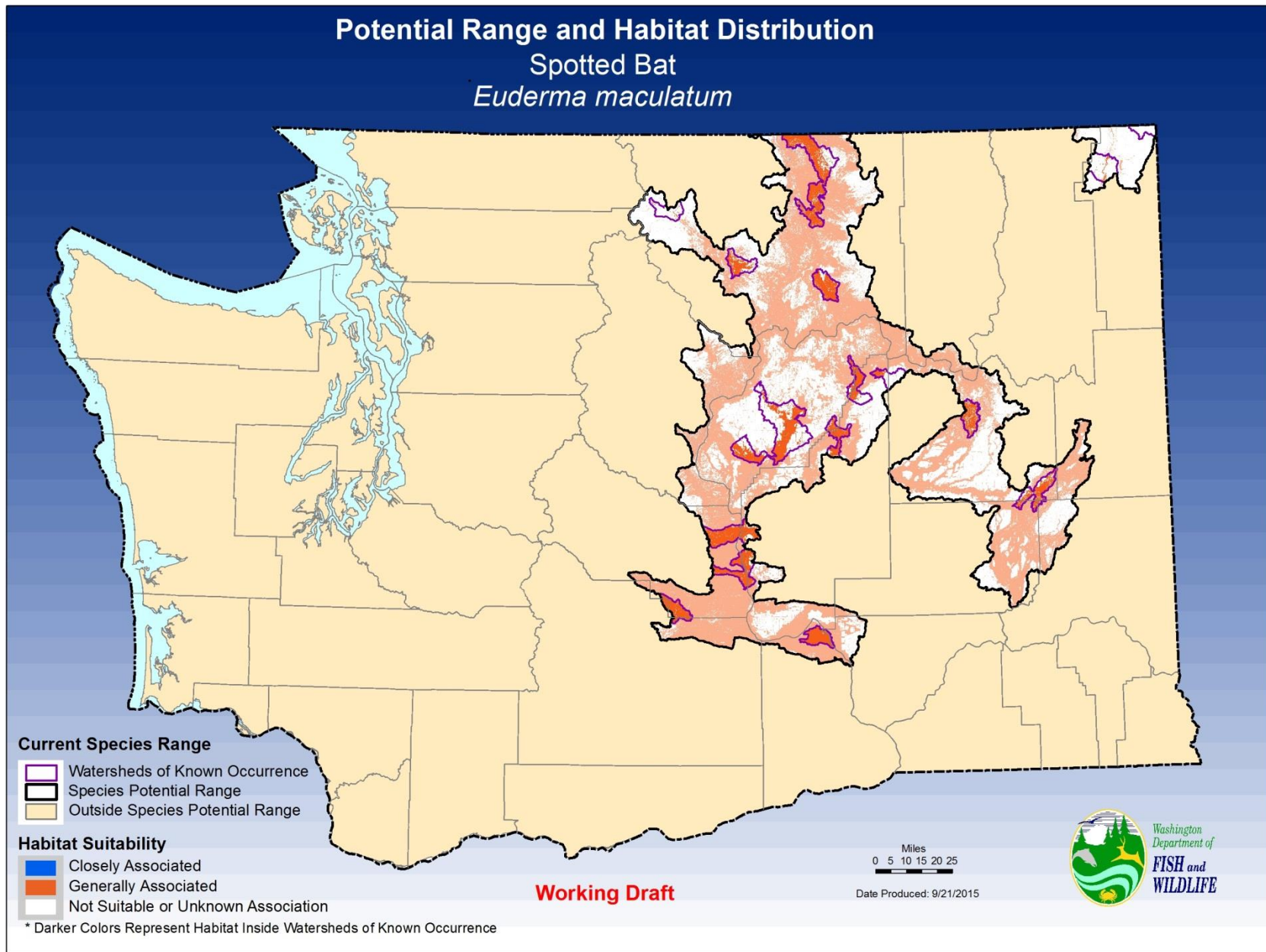


Silver Haired Bat

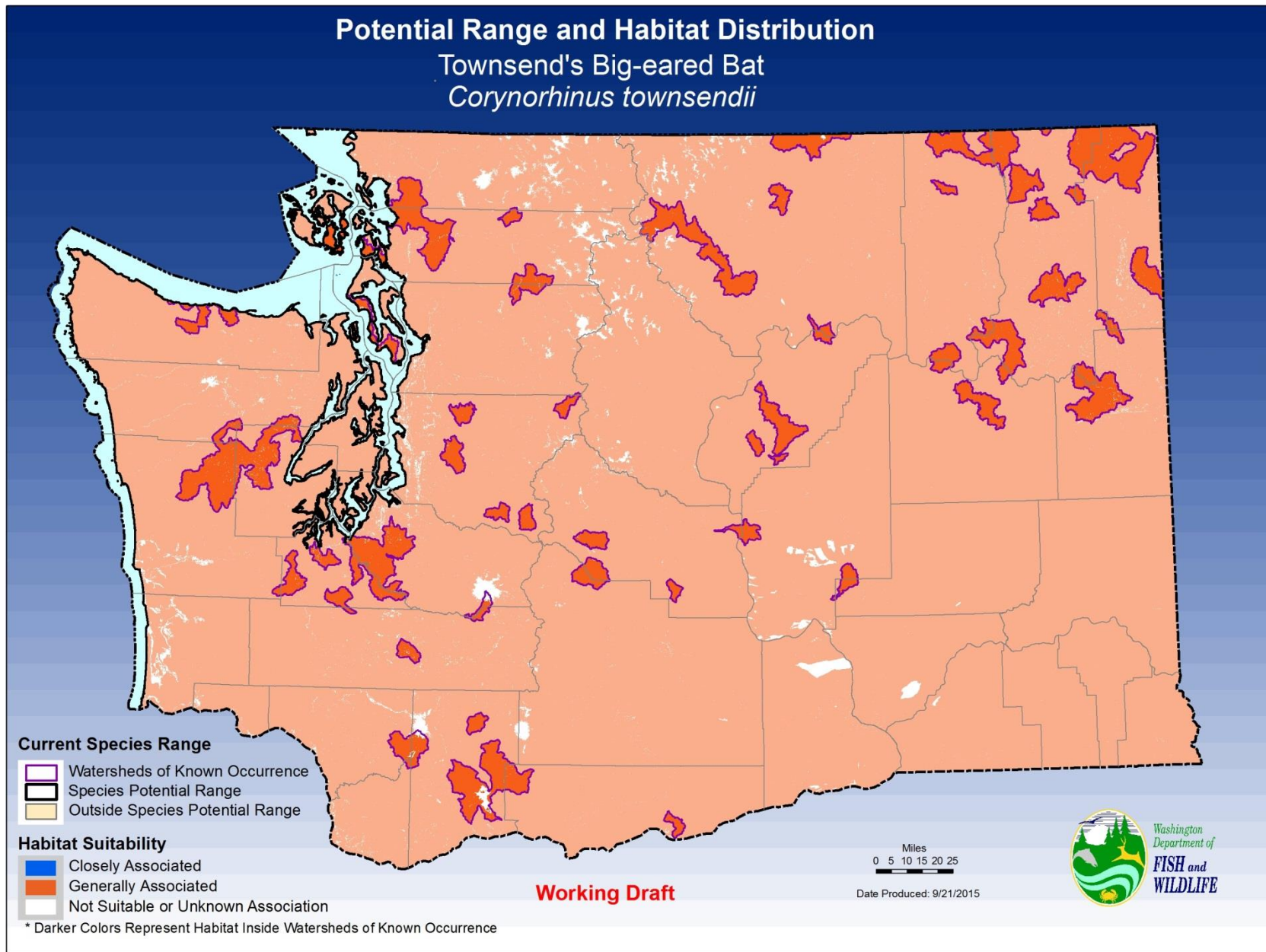
Potential Range and Habitat Distribution Silver Haired Bat *Lasionycteris noctivagans*



Spotted Bat



Townsend's Big-eared Bat

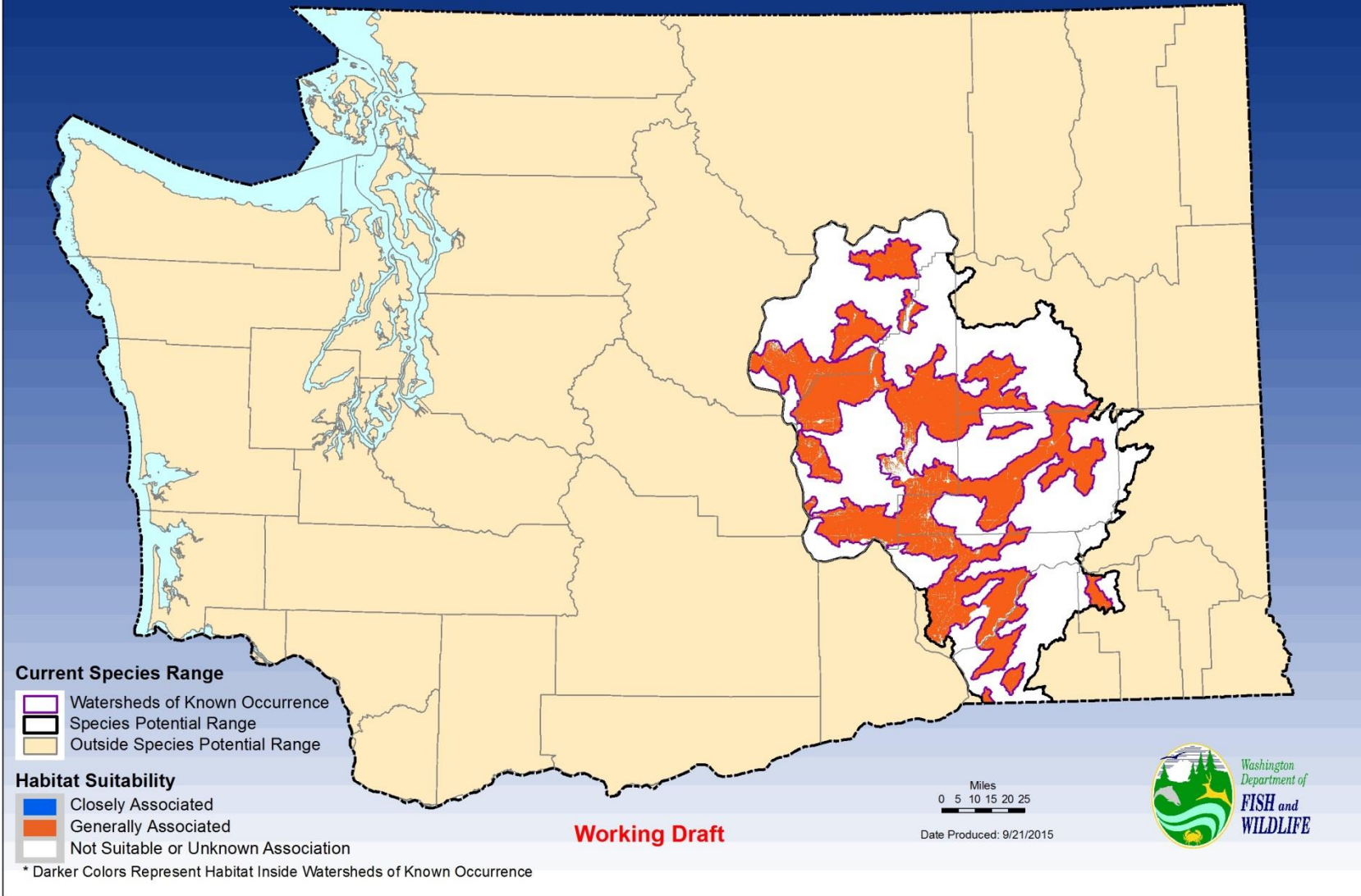


Washington Ground Squirrel

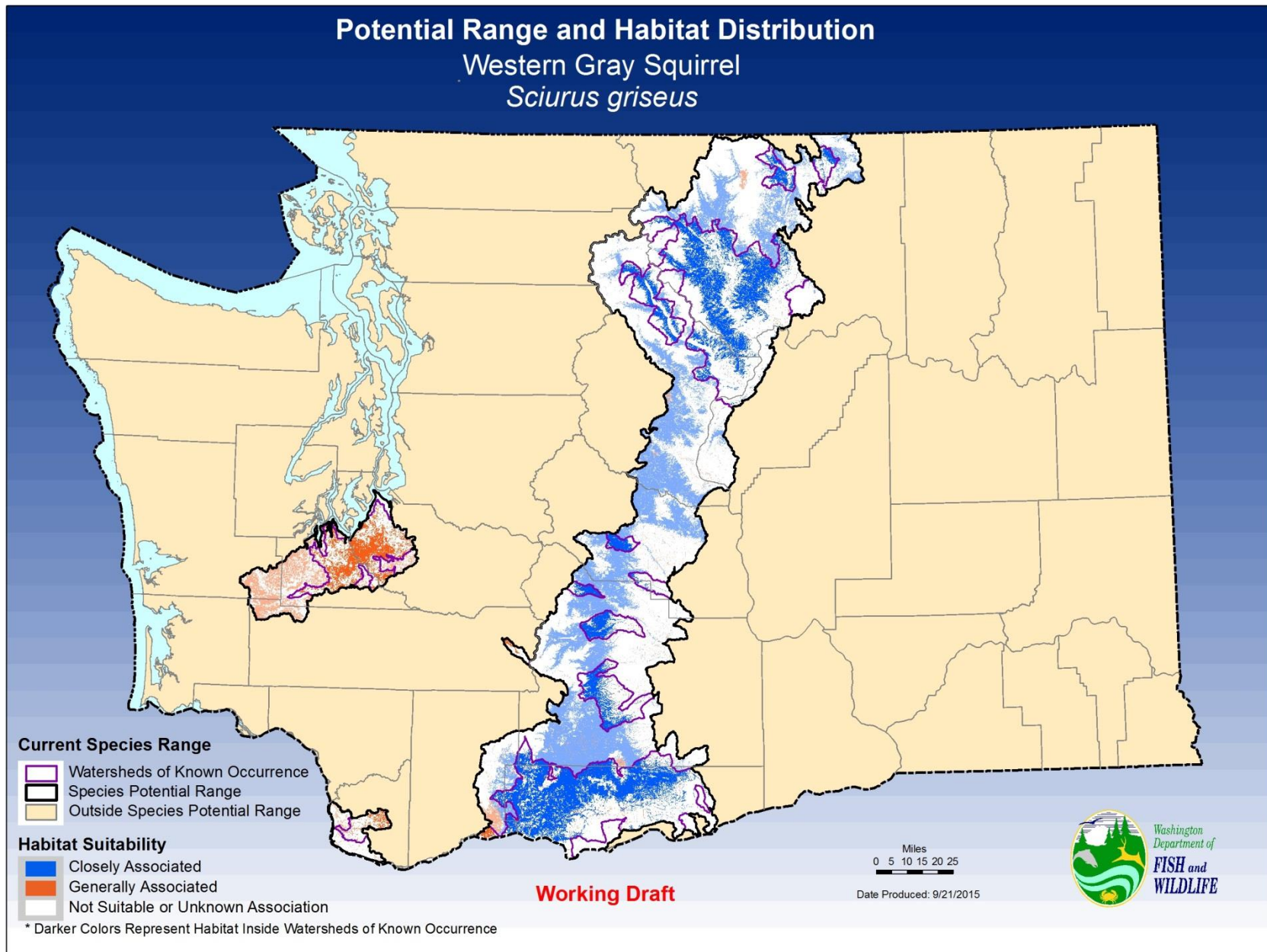
Potential Range and Habitat Distribution

Washington Ground Squirrel

Urocitellus washingtoni

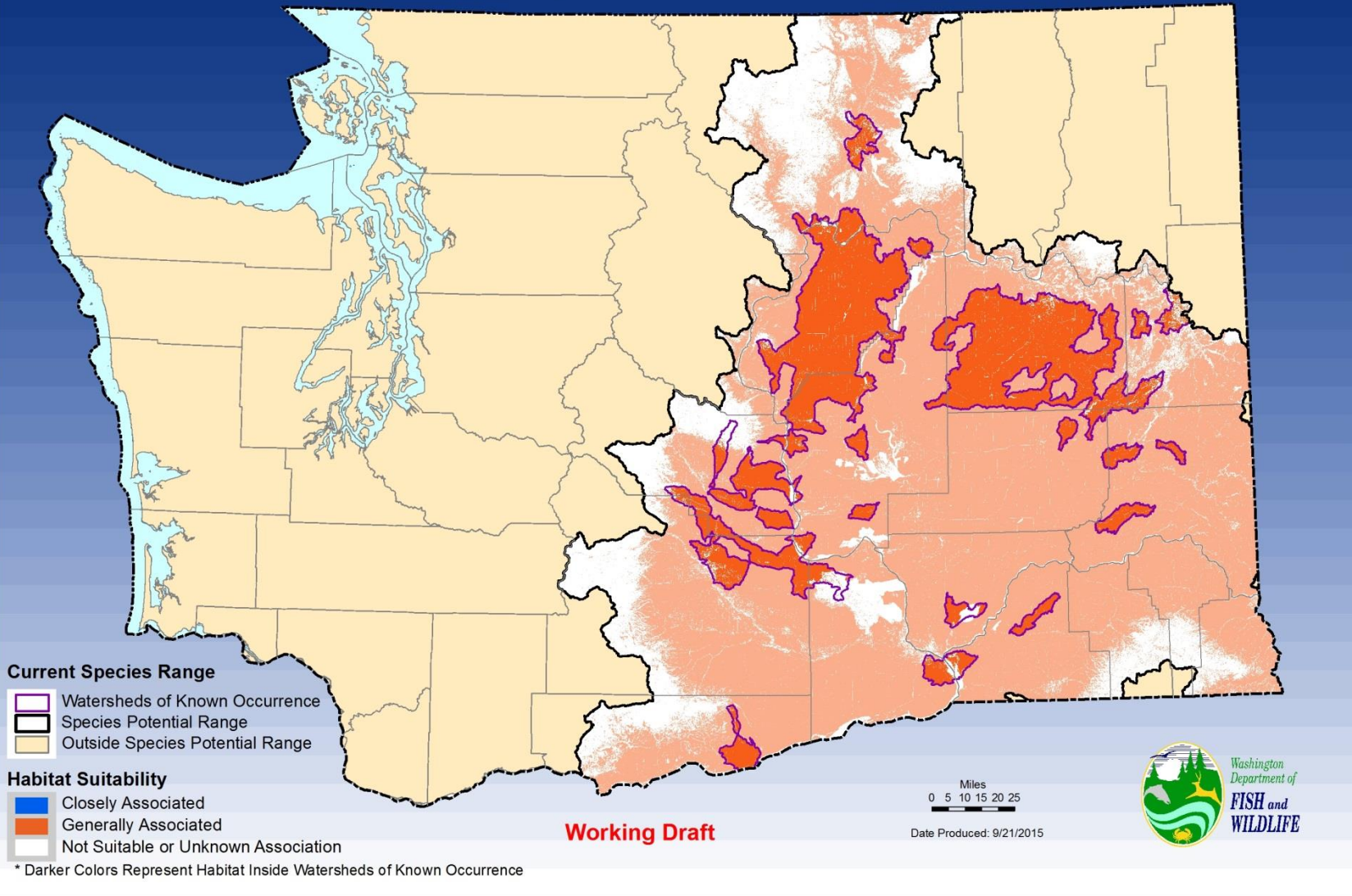


Western Gray Squirrel

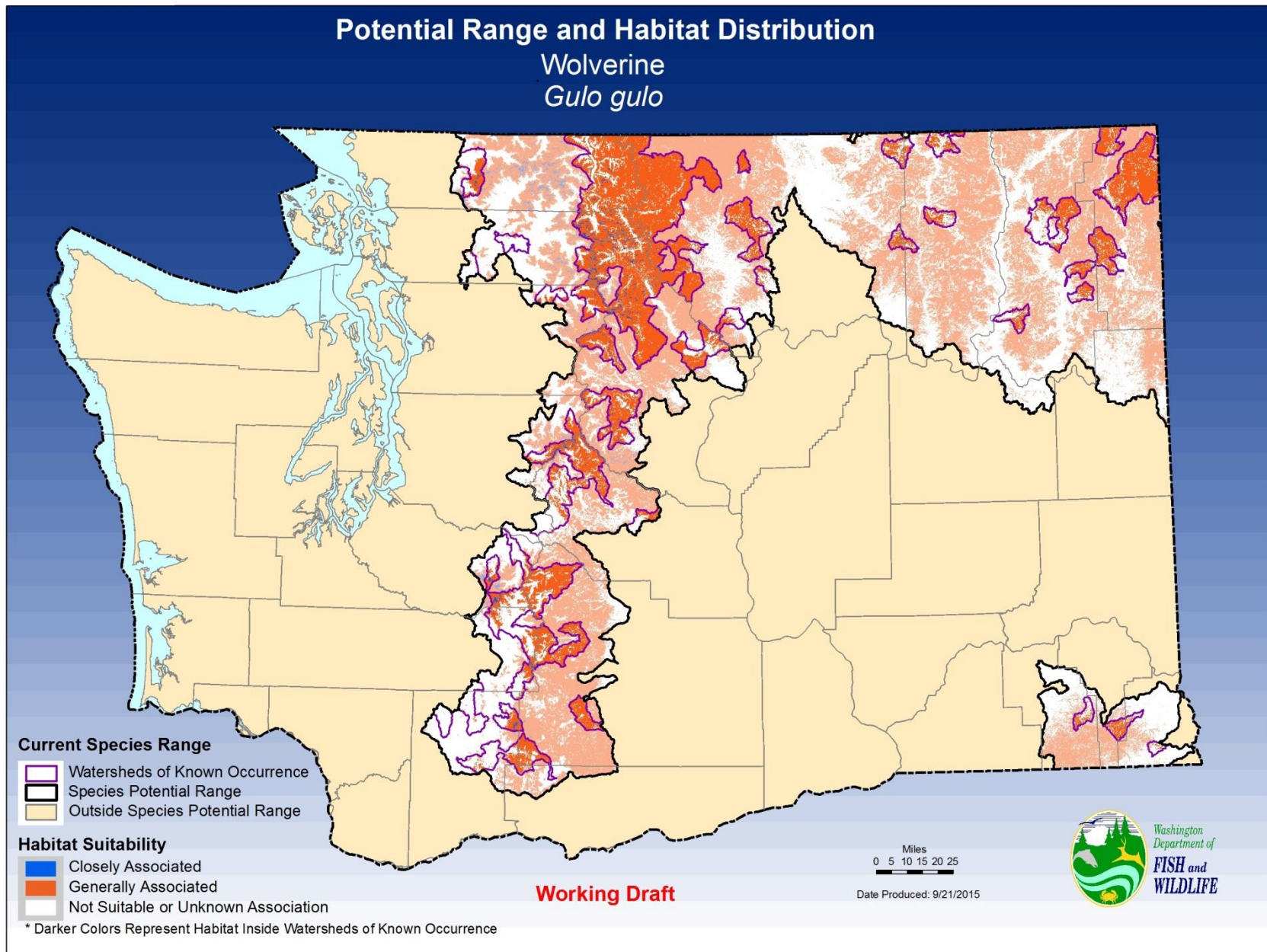


White-tailed Jackrabbit

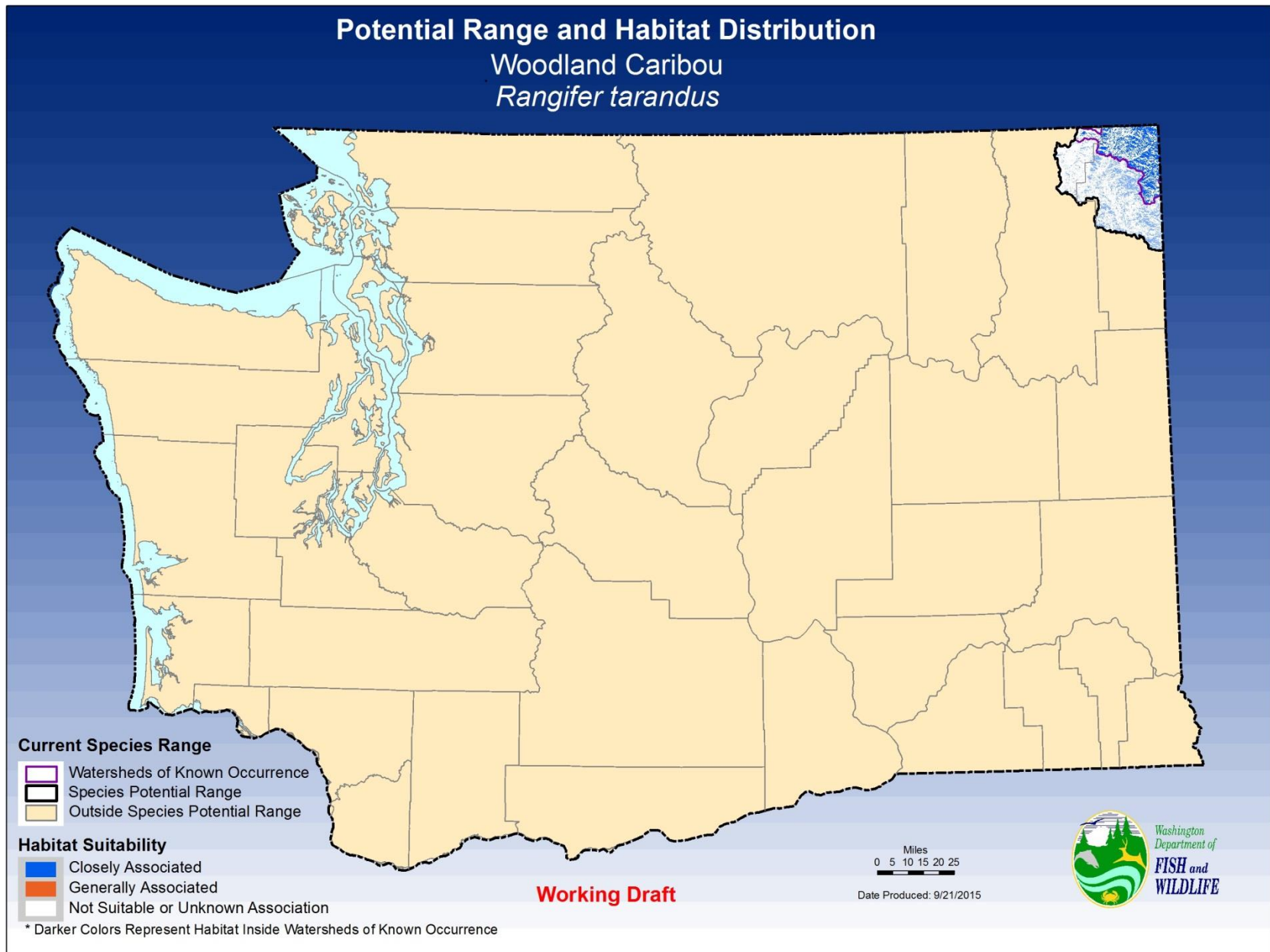
Potential Range and Habitat Distribution White-tailed Jackrabbit *Lepus townsendii*



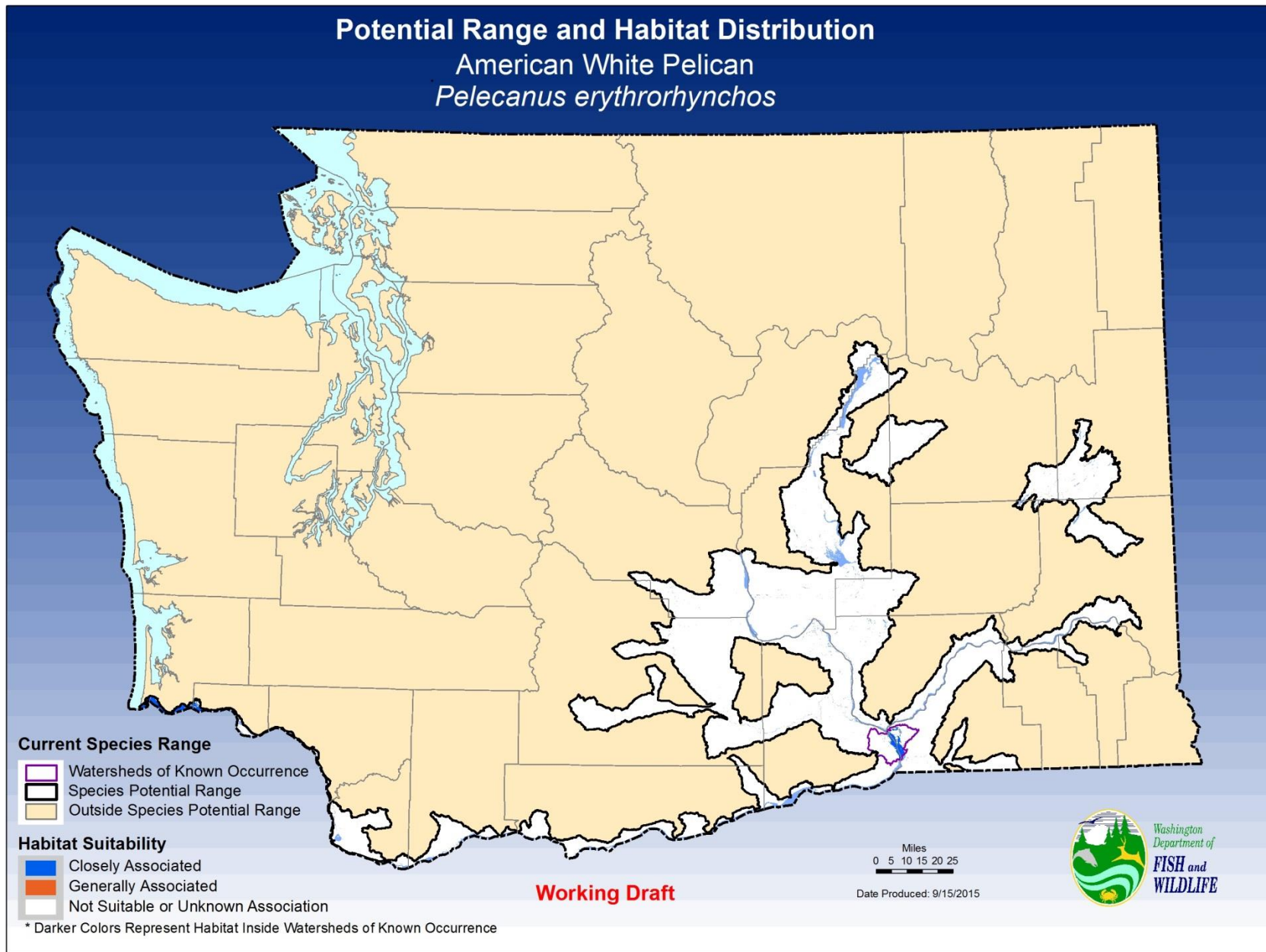
Wolverine



Woodland Caribou

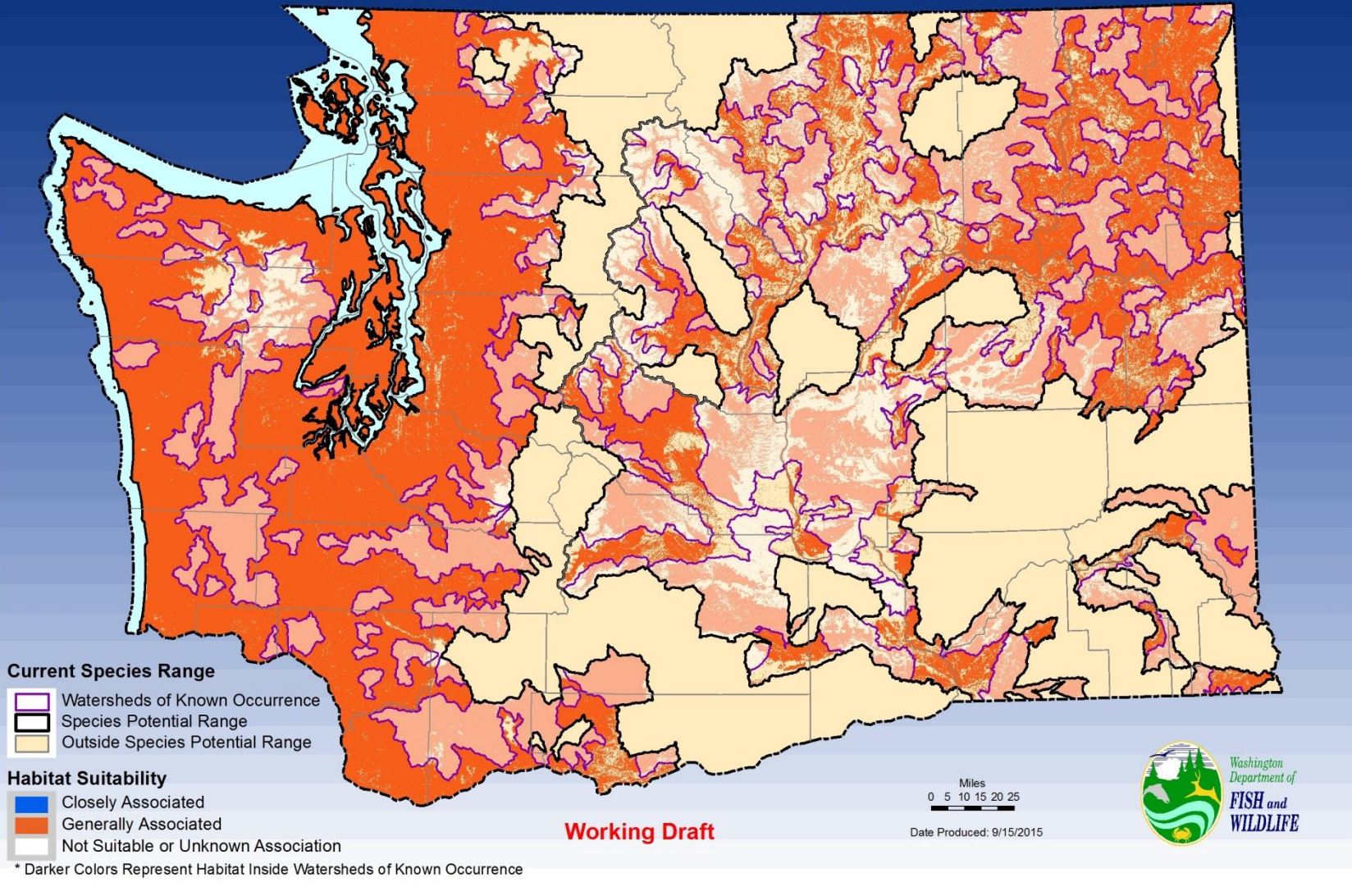


American White Pelican



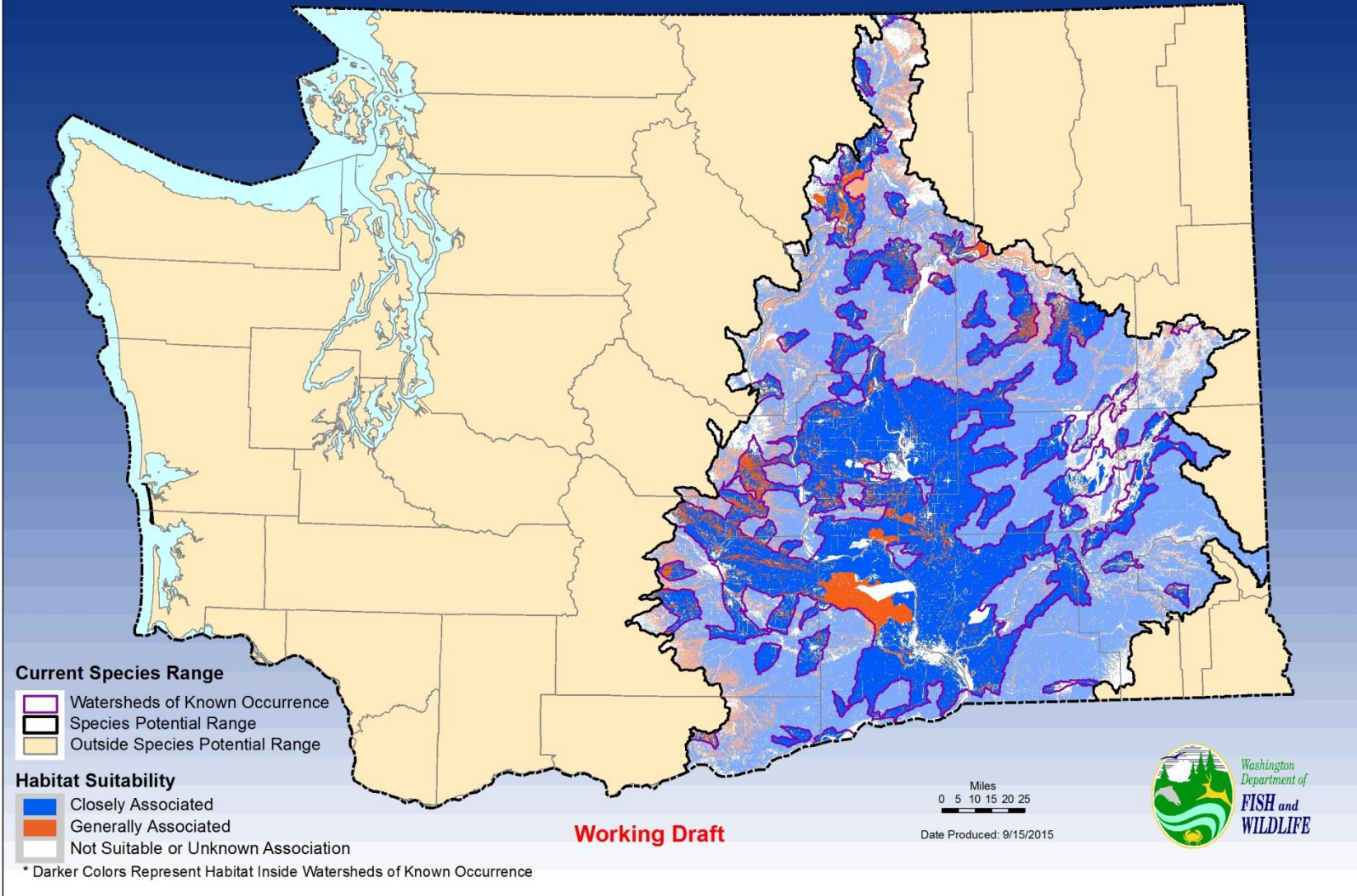
Bald Eagle

Potential Range and Habitat Distribution Bald Eagle *Haliaeetus leucocephalus*

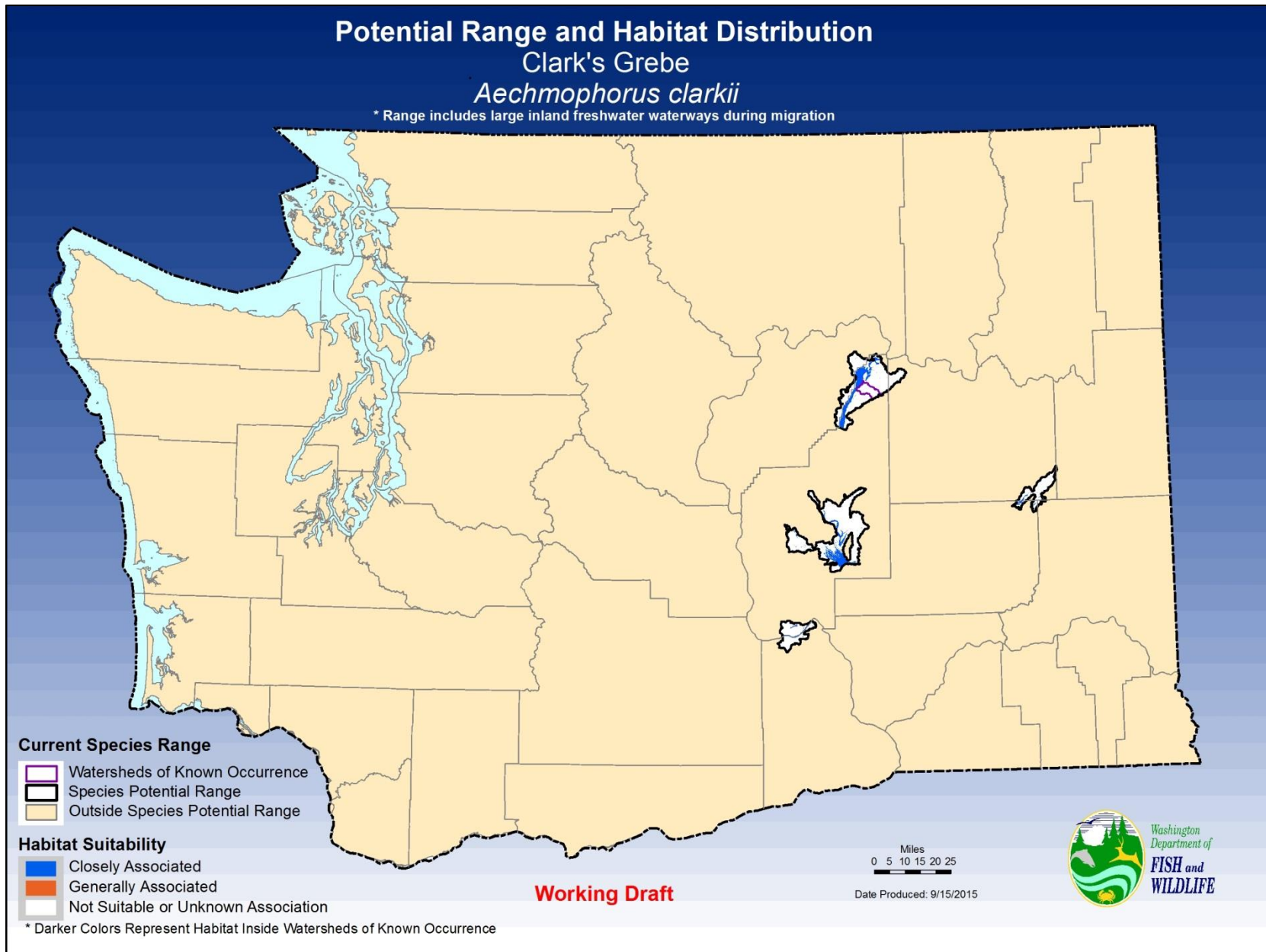


Burrowing Owl

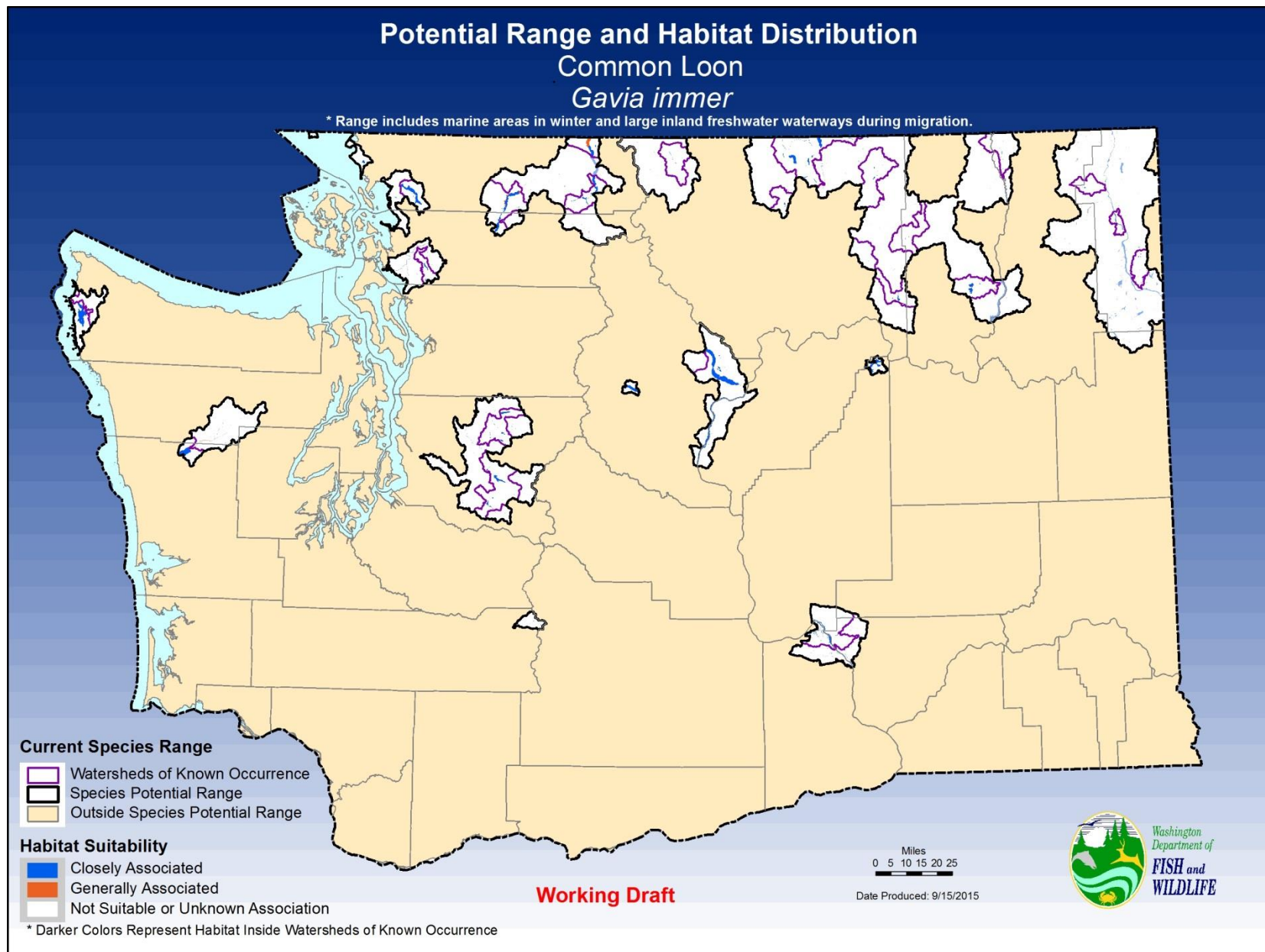
Potential Range and Habitat Distribution Burrowing Owl *Athene cunicularia*



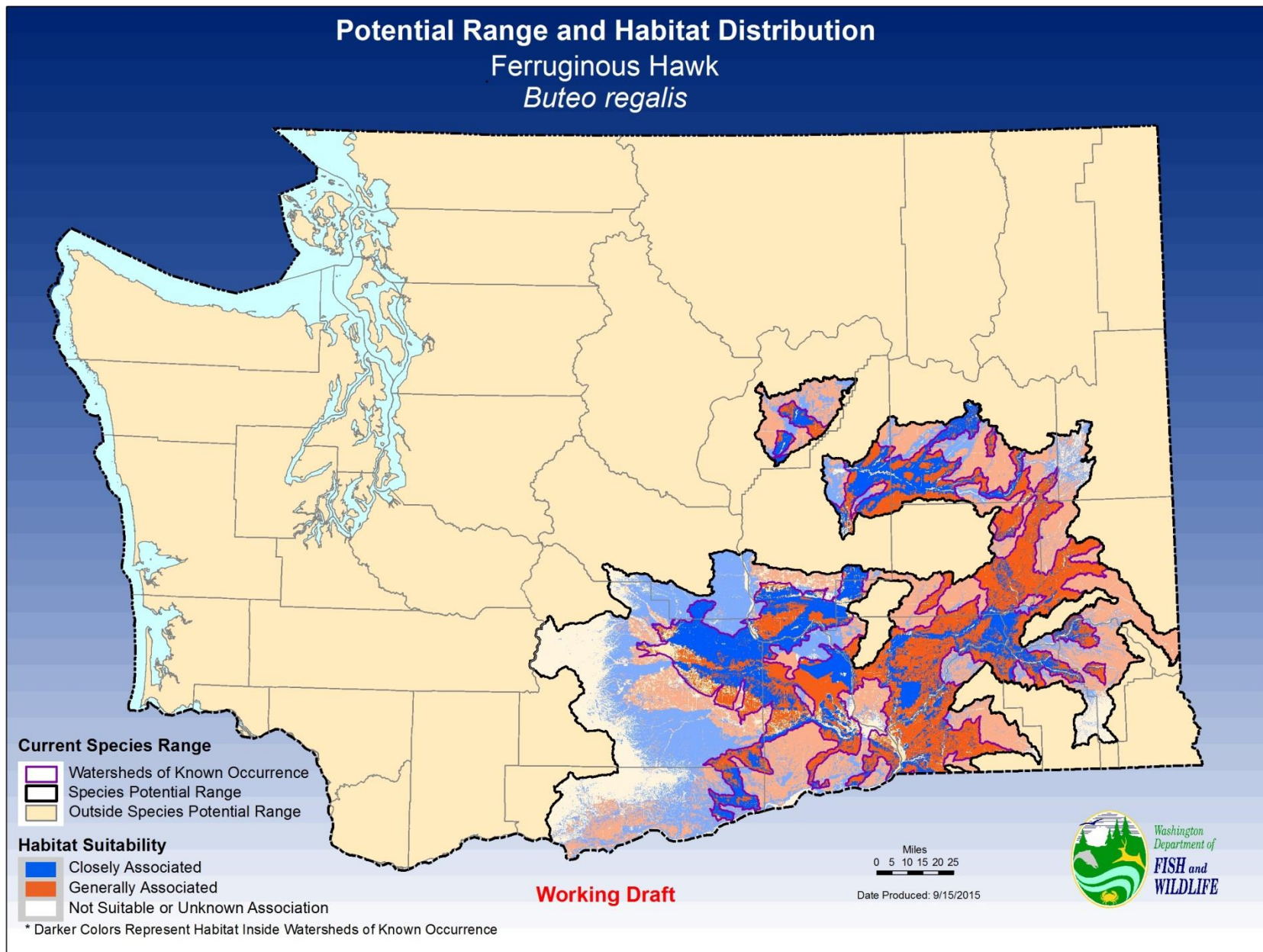
Clark's Grebe



Common Loon

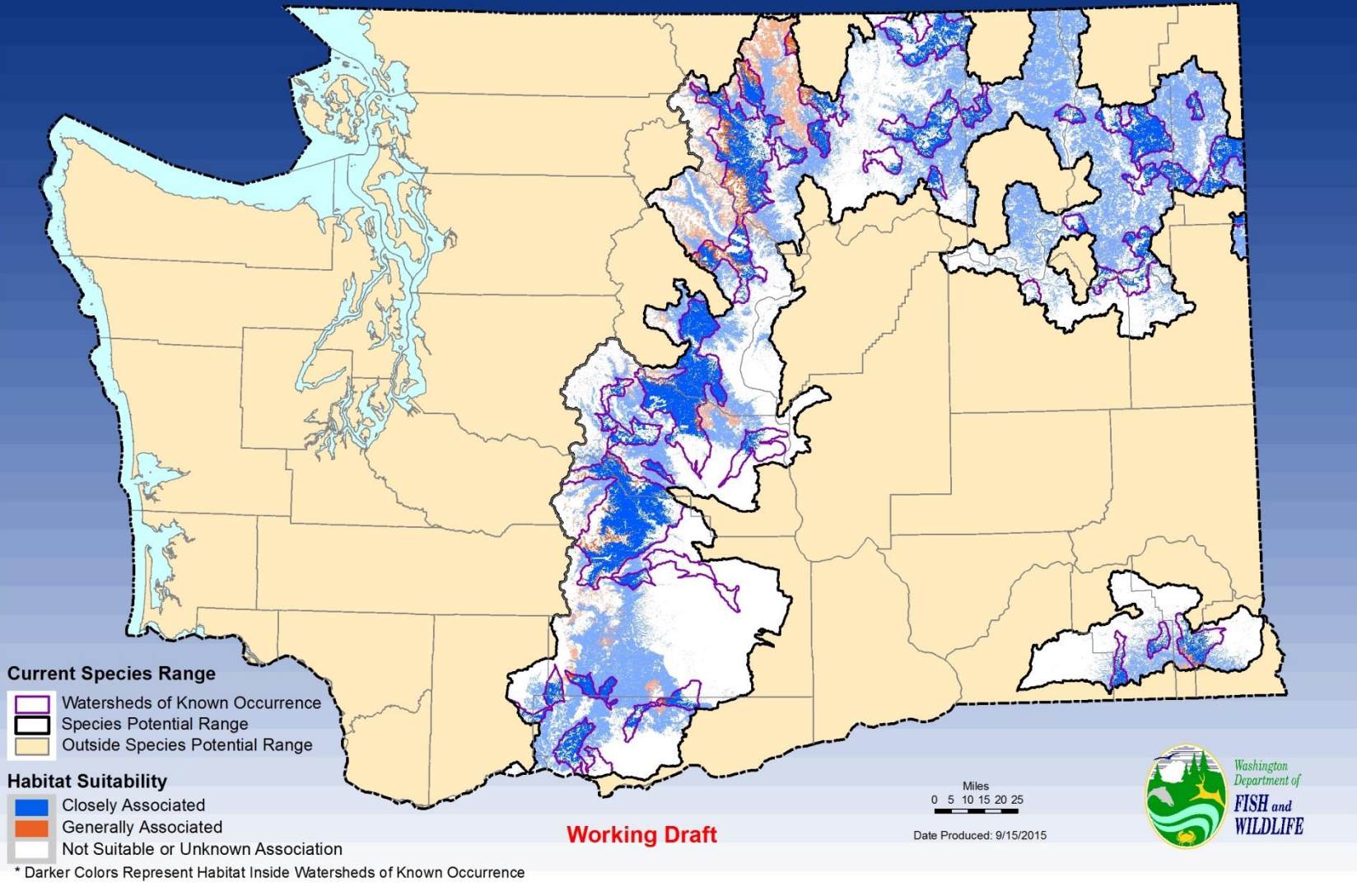


Ferruginous Hawk



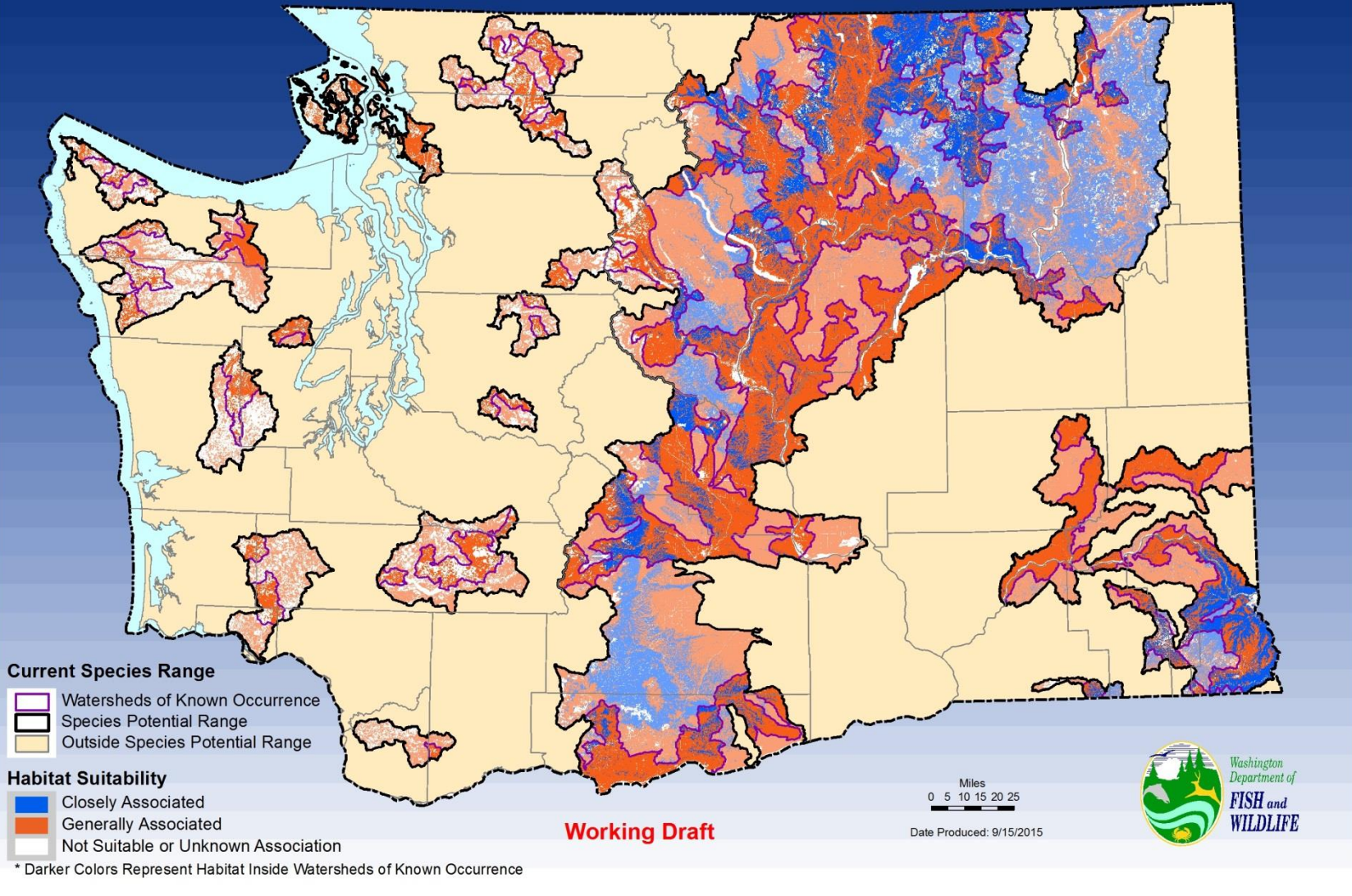
Flammulated Owl

Potential Range and Habitat Distribution Flammulated Owl *Otus flammeolus*

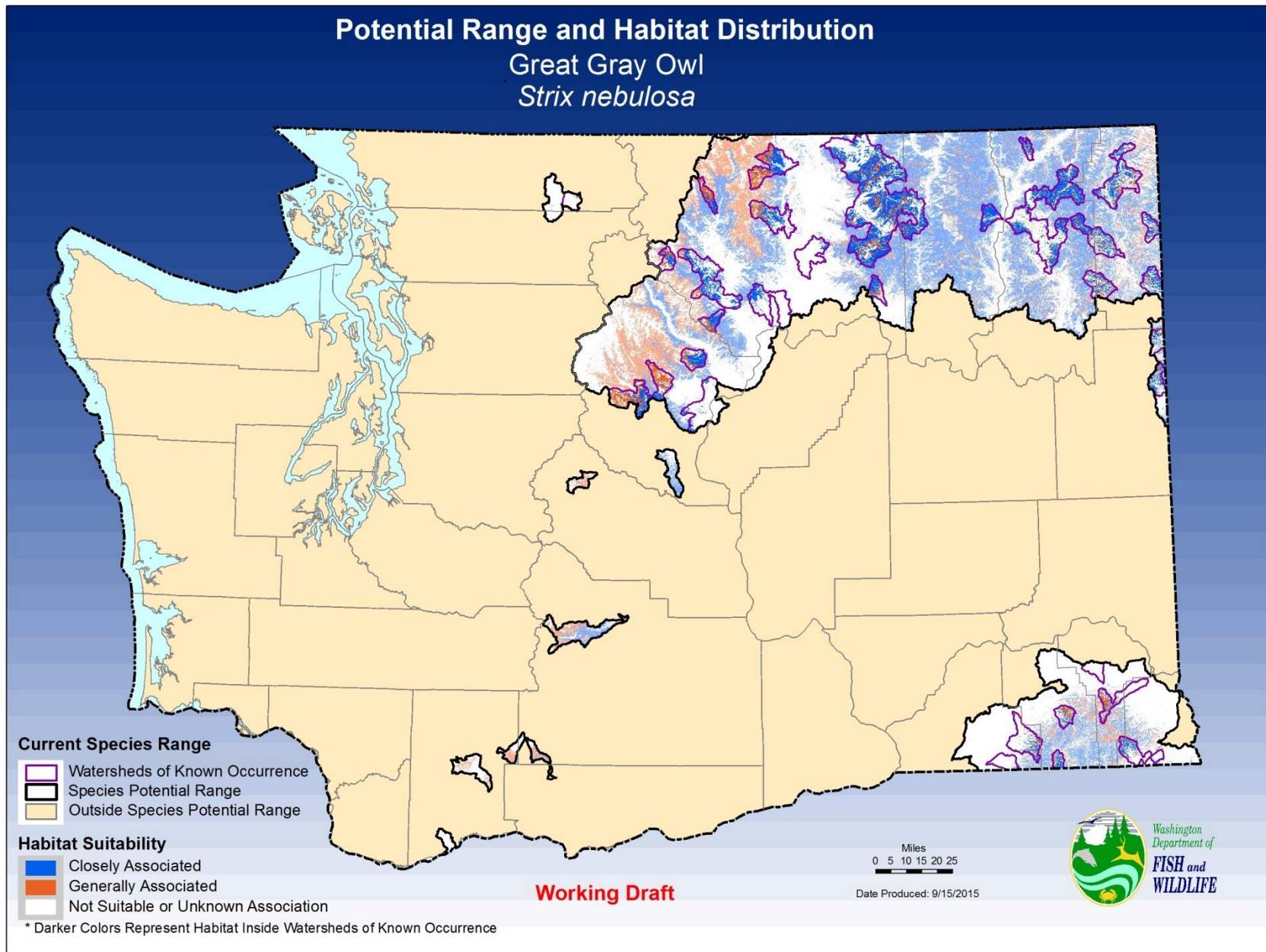


Golden Eagle

Potential Range and Habitat Distribution Golden Eagle *Aquila chrysaetos*

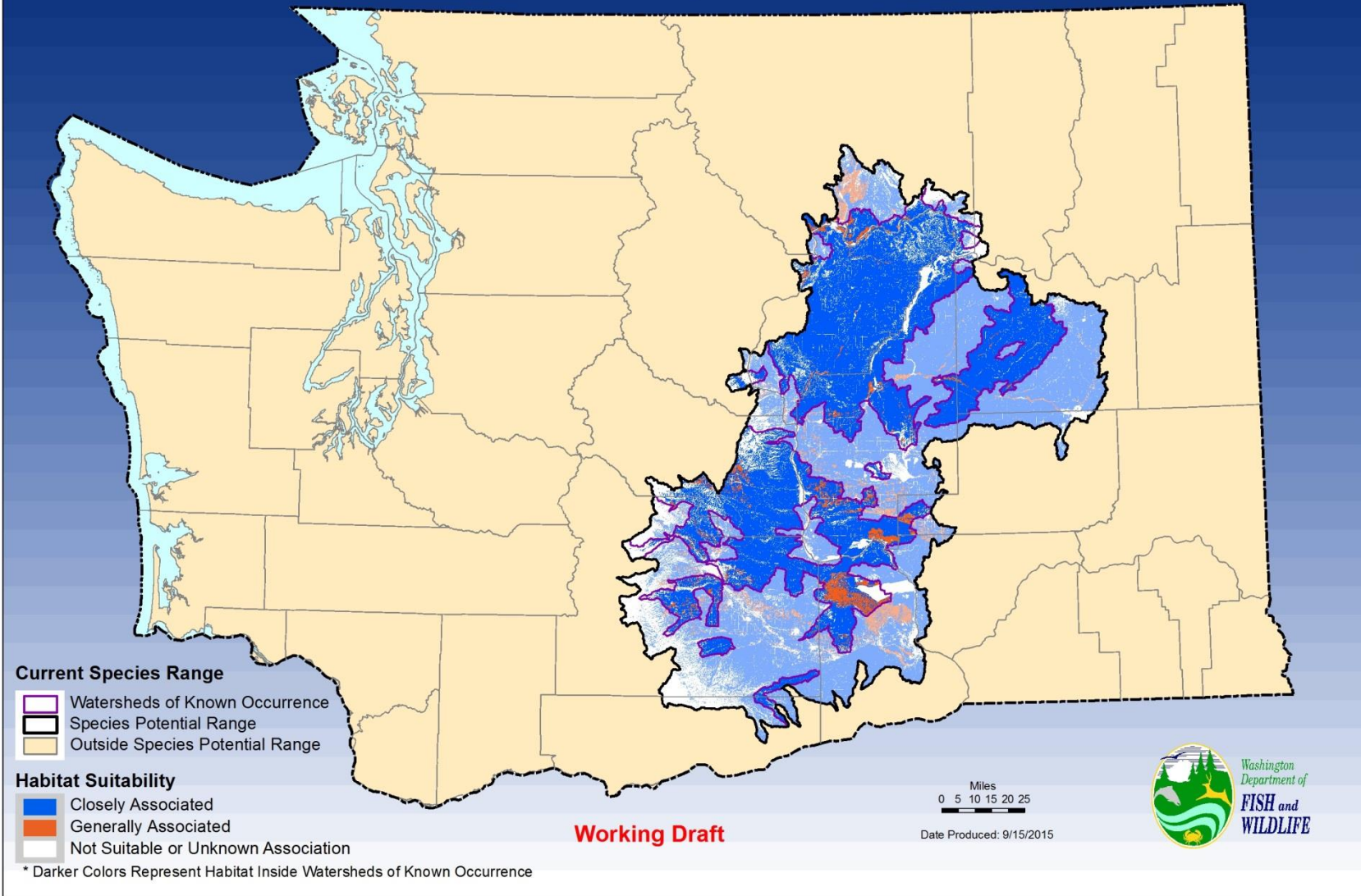


Great Gray Owl

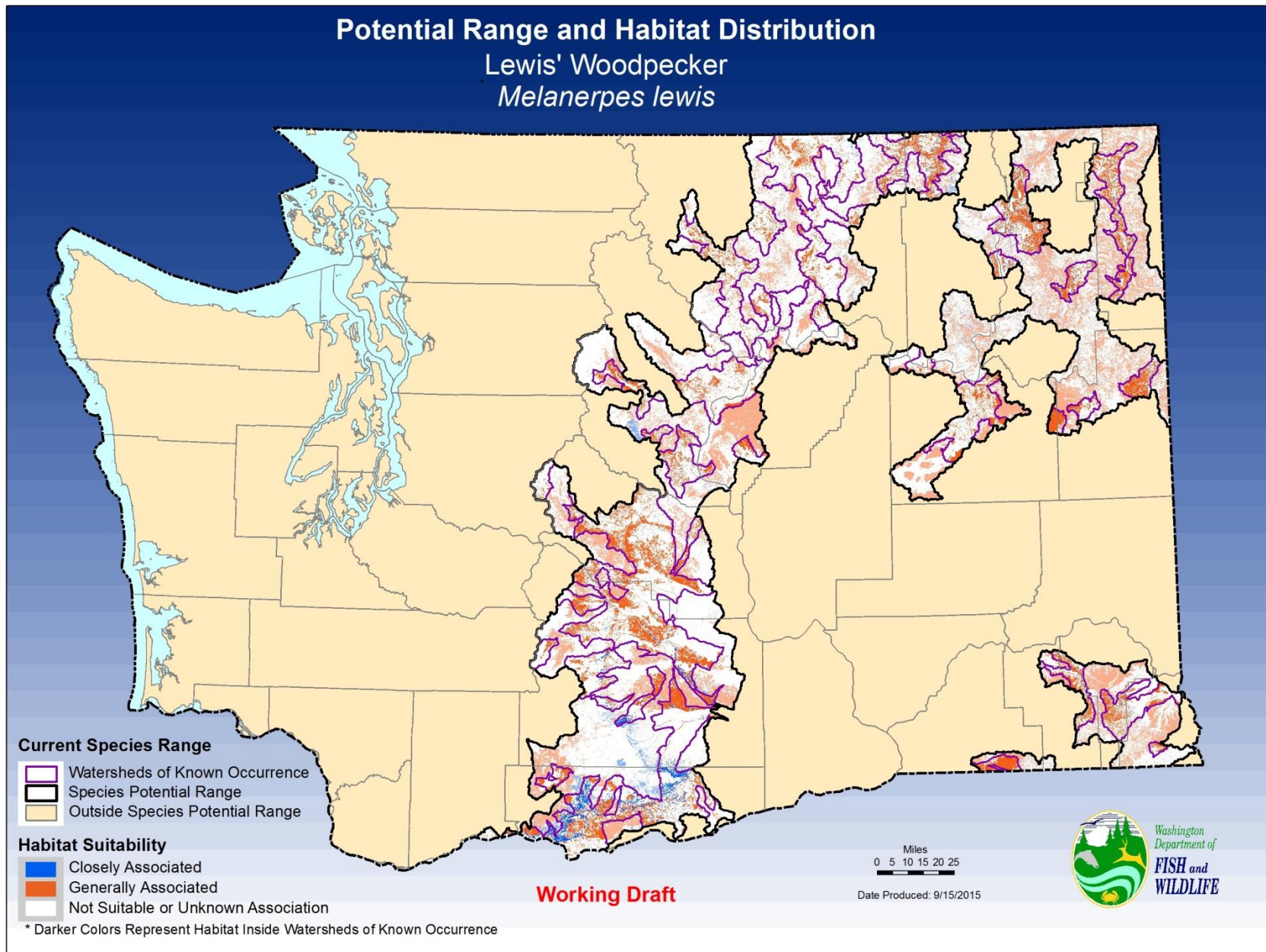


Greater Sage Grouse

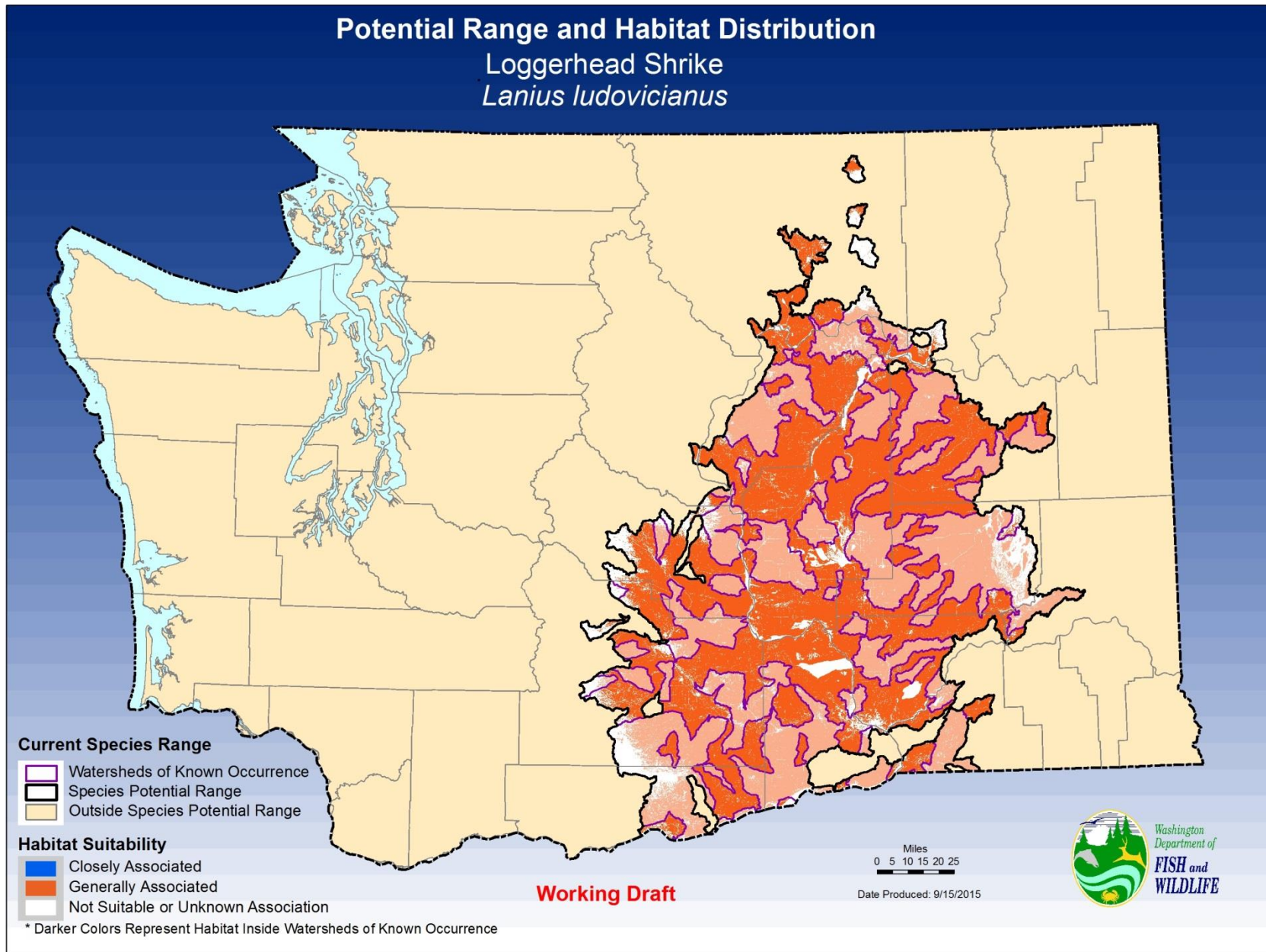
Potential Range and Habitat Distribution Sage Grouse *Centrocercus urophasianus*



Lewis' Woodpecker

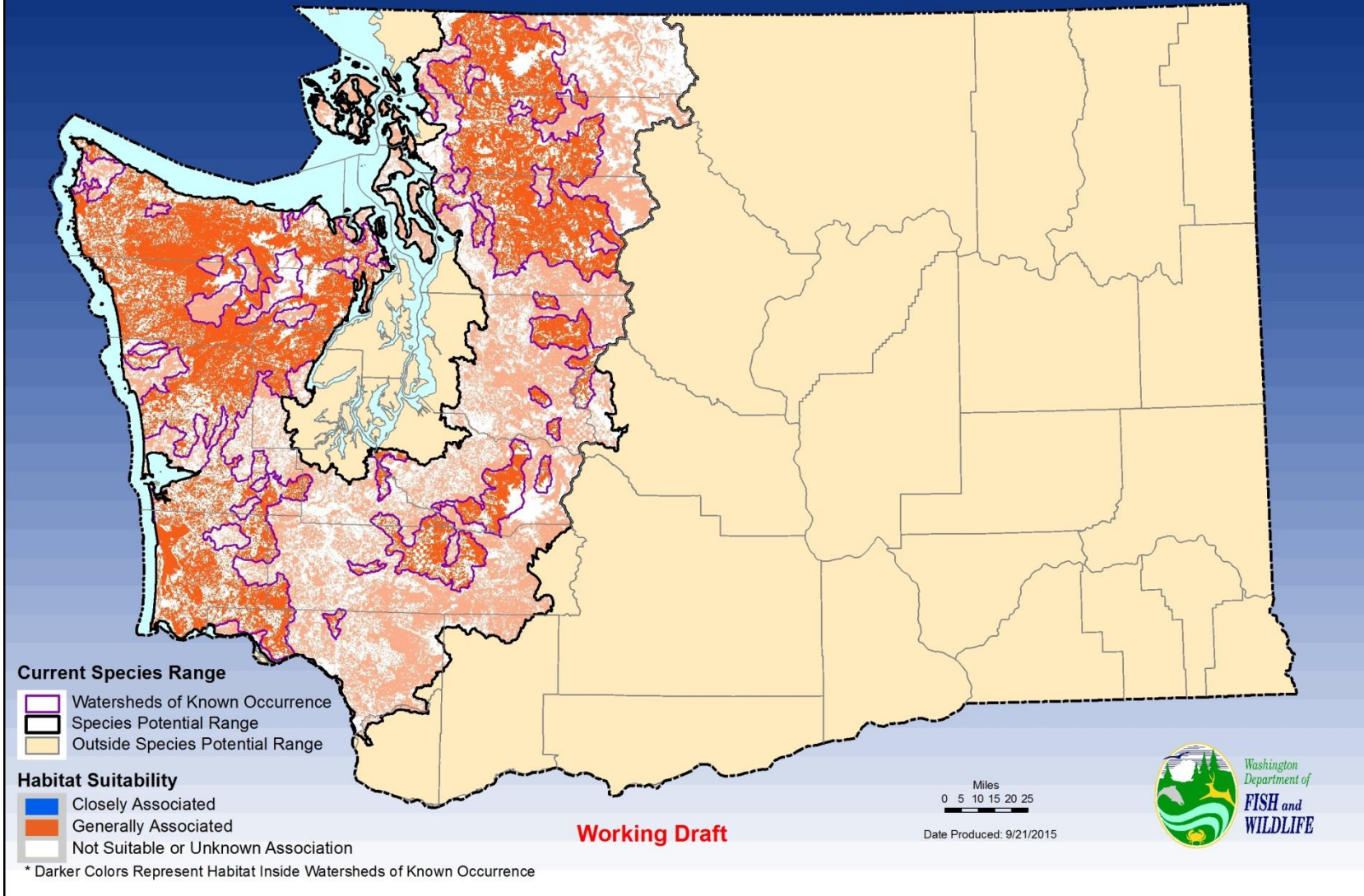


Loggerhead Shrike



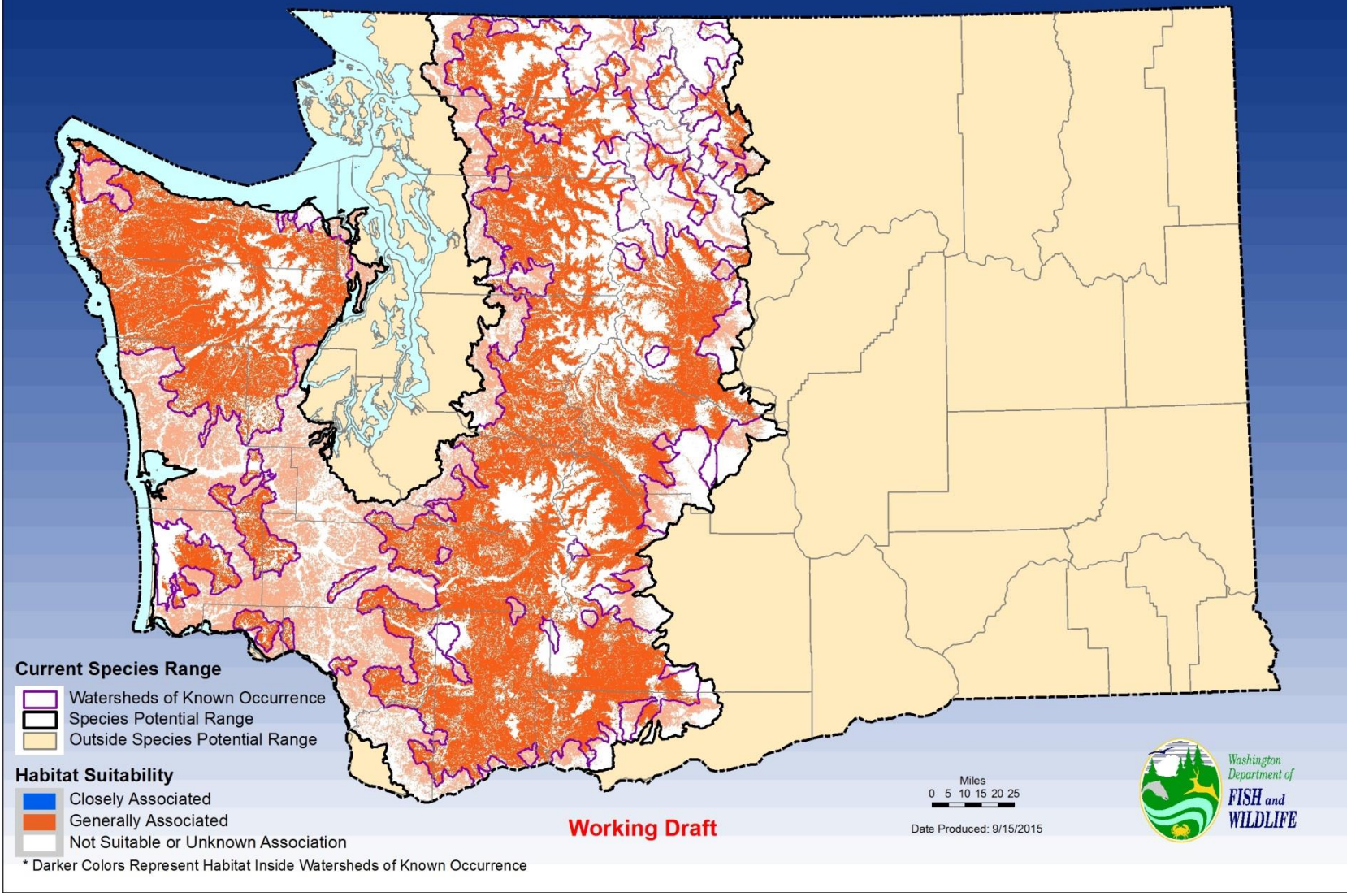
Marbled Murrelet

Potential Range and Habitat Distribution Marbled Murrelet *Brachyramphas Marmoratus*

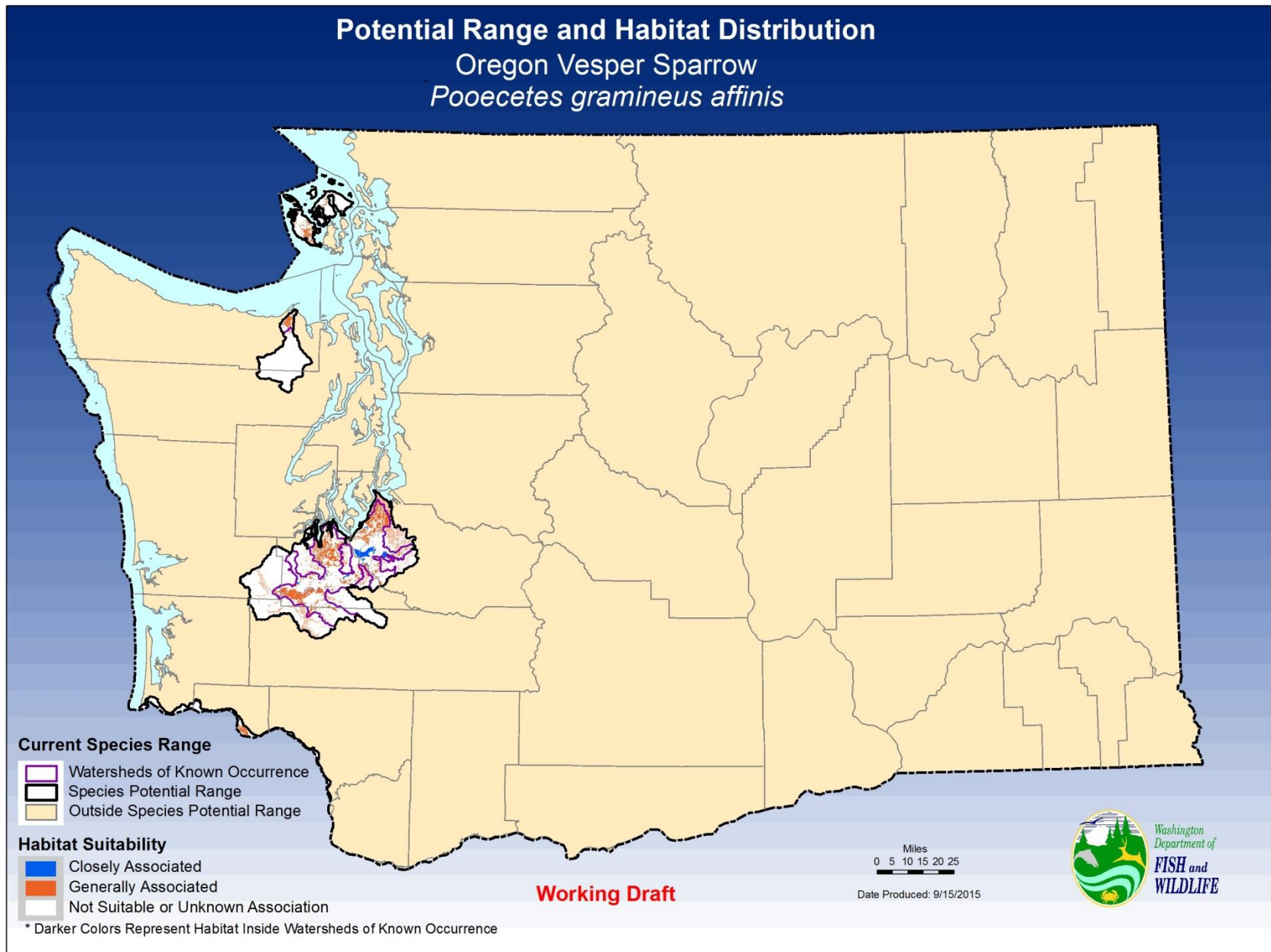


Northern Spotted Owl

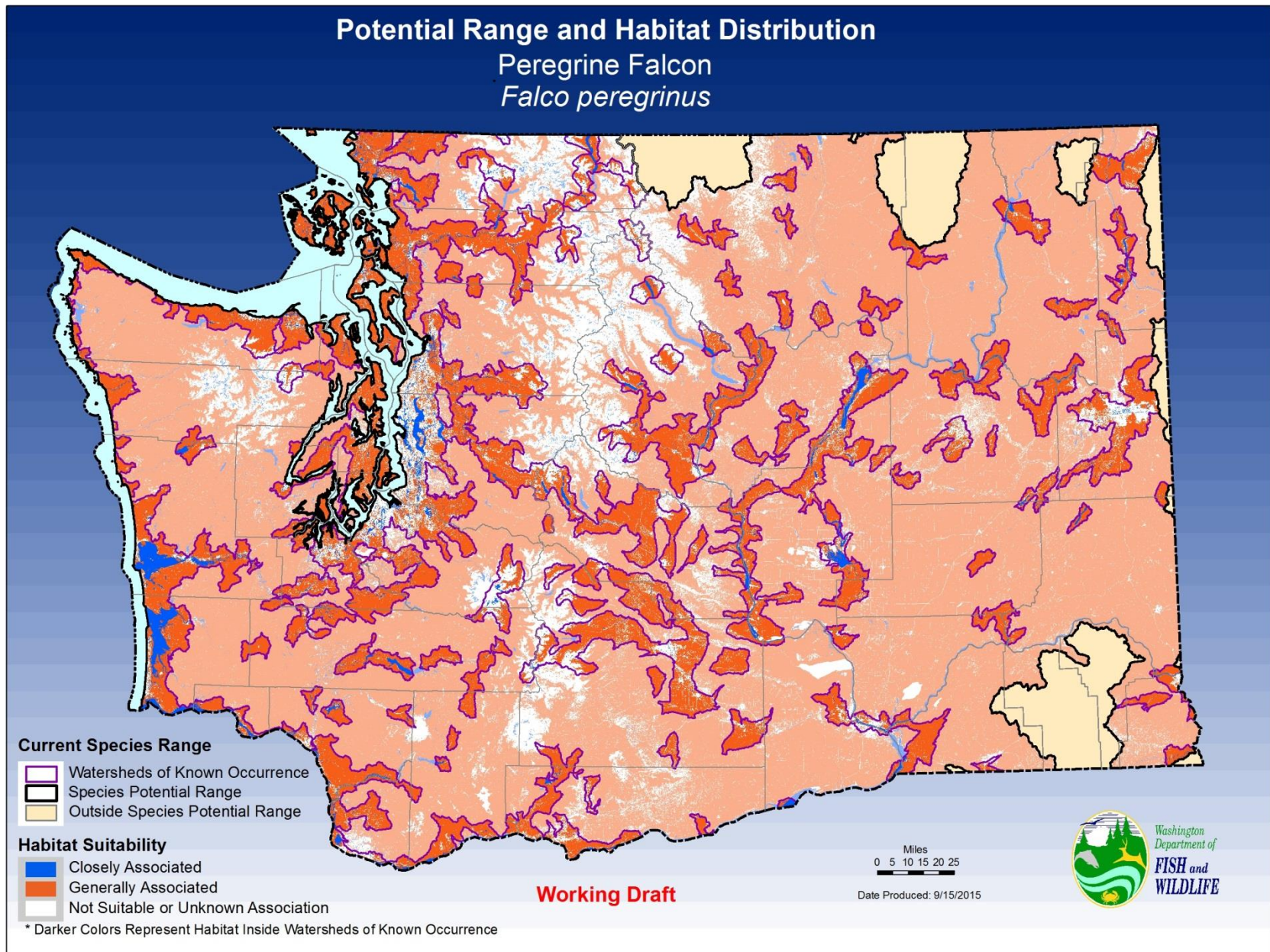
Potential Range and Habitat Distribution Spotted Owl *Strix occidentalis*



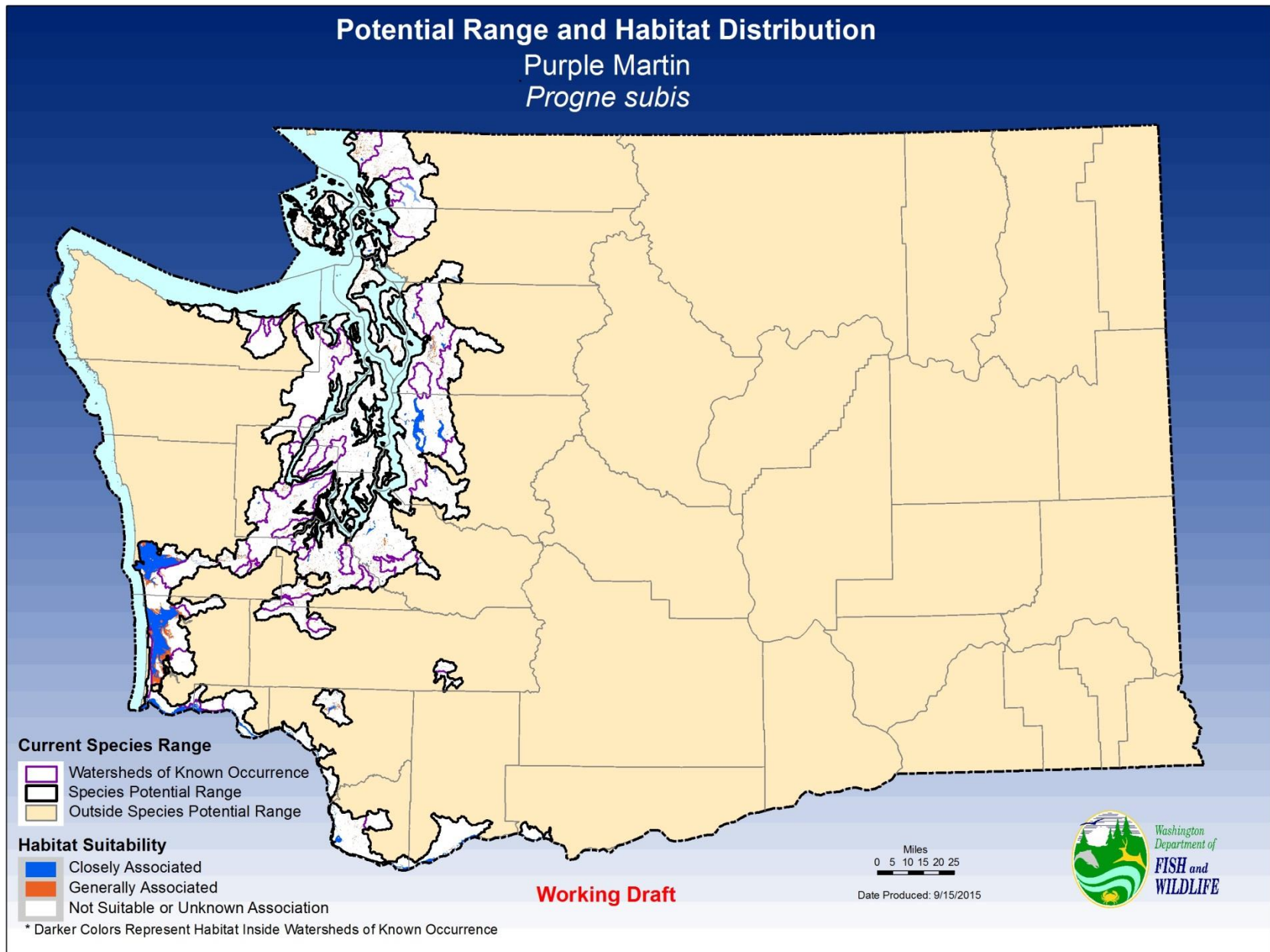
Oregon Vesper Sparrow



Peregrine Falcon

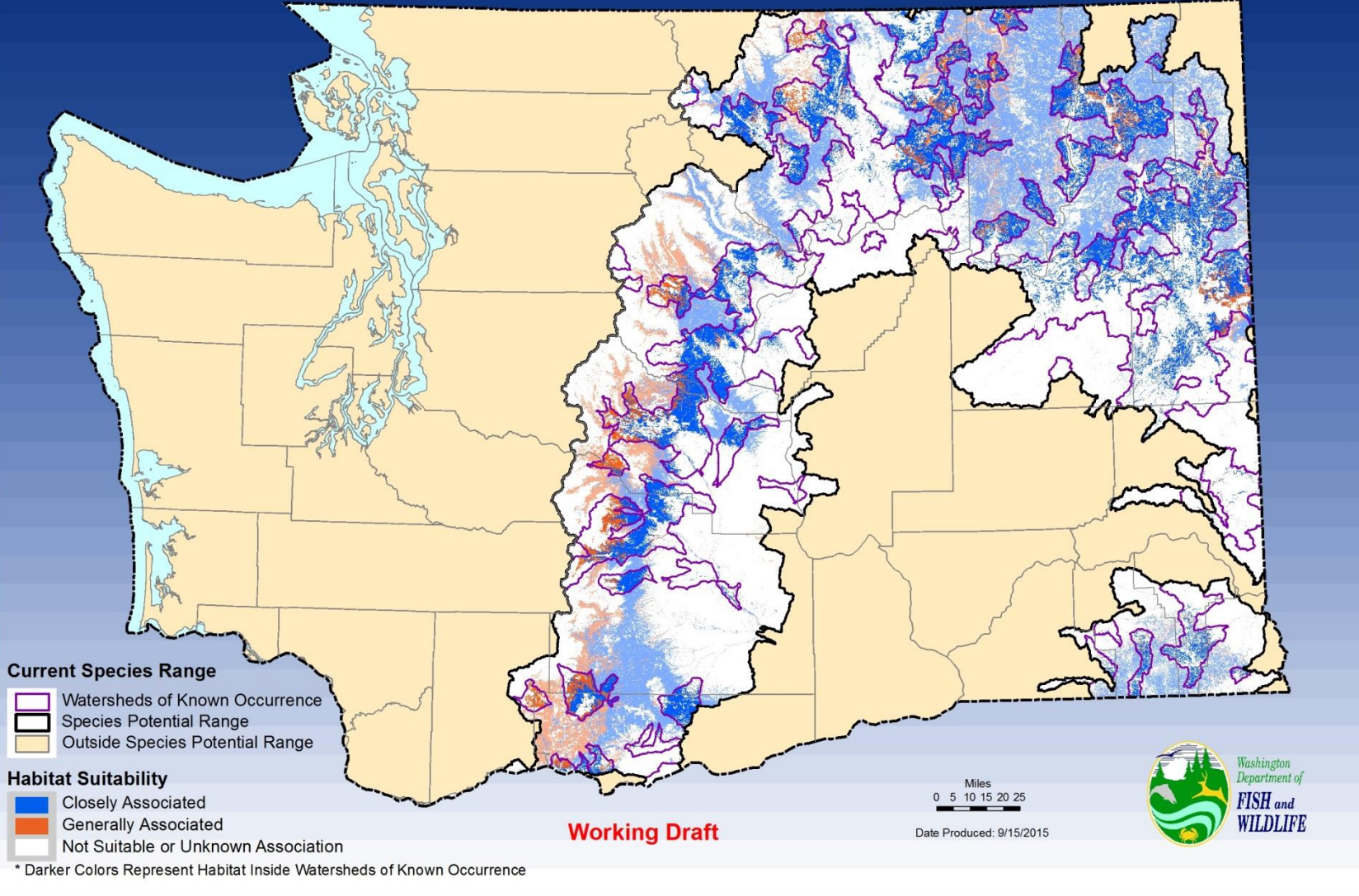


Purple Martin

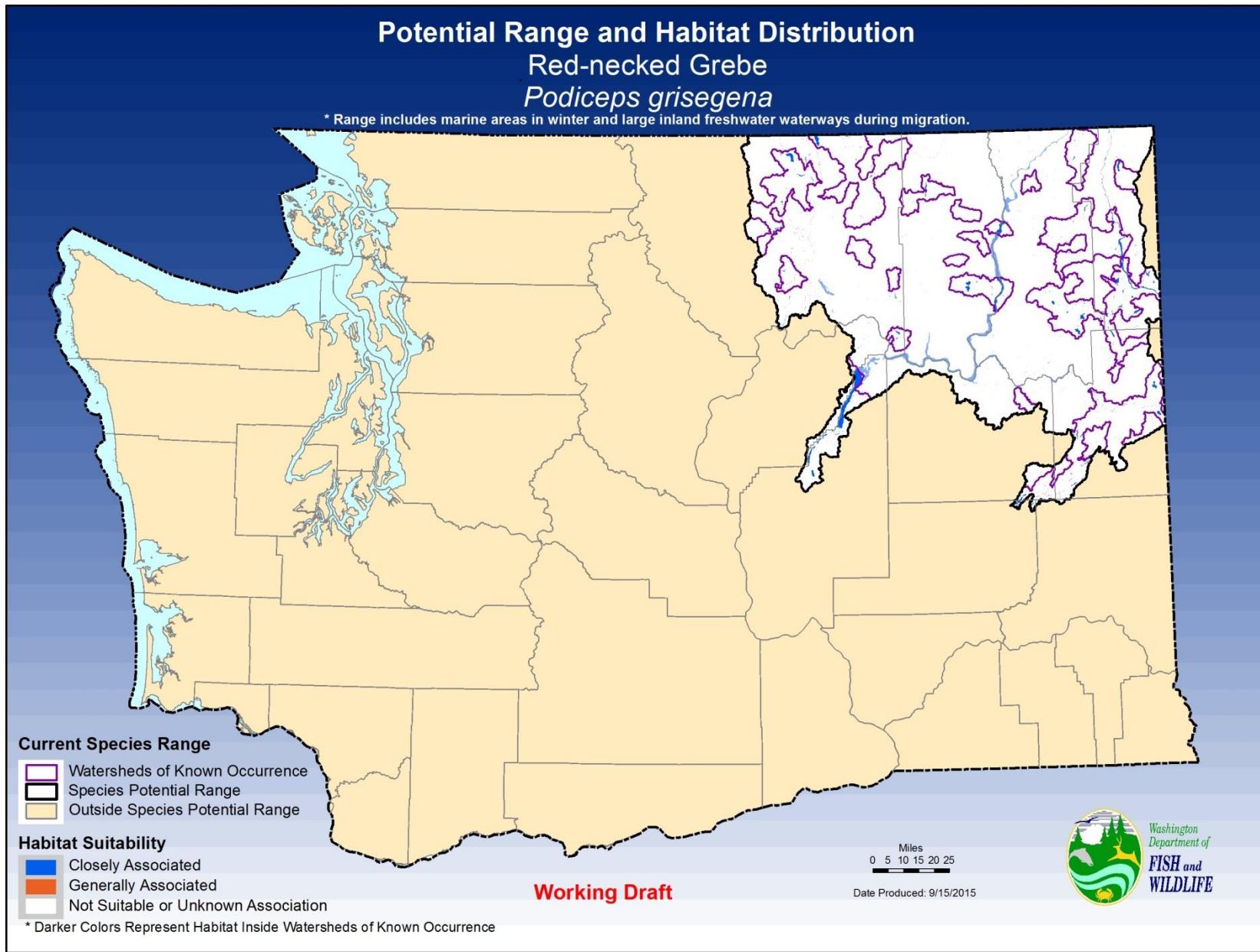


Pygmy Nuthatch

Potential Range and Habitat Distribution Pygmy Nuthatch *Sitta pygmaea*

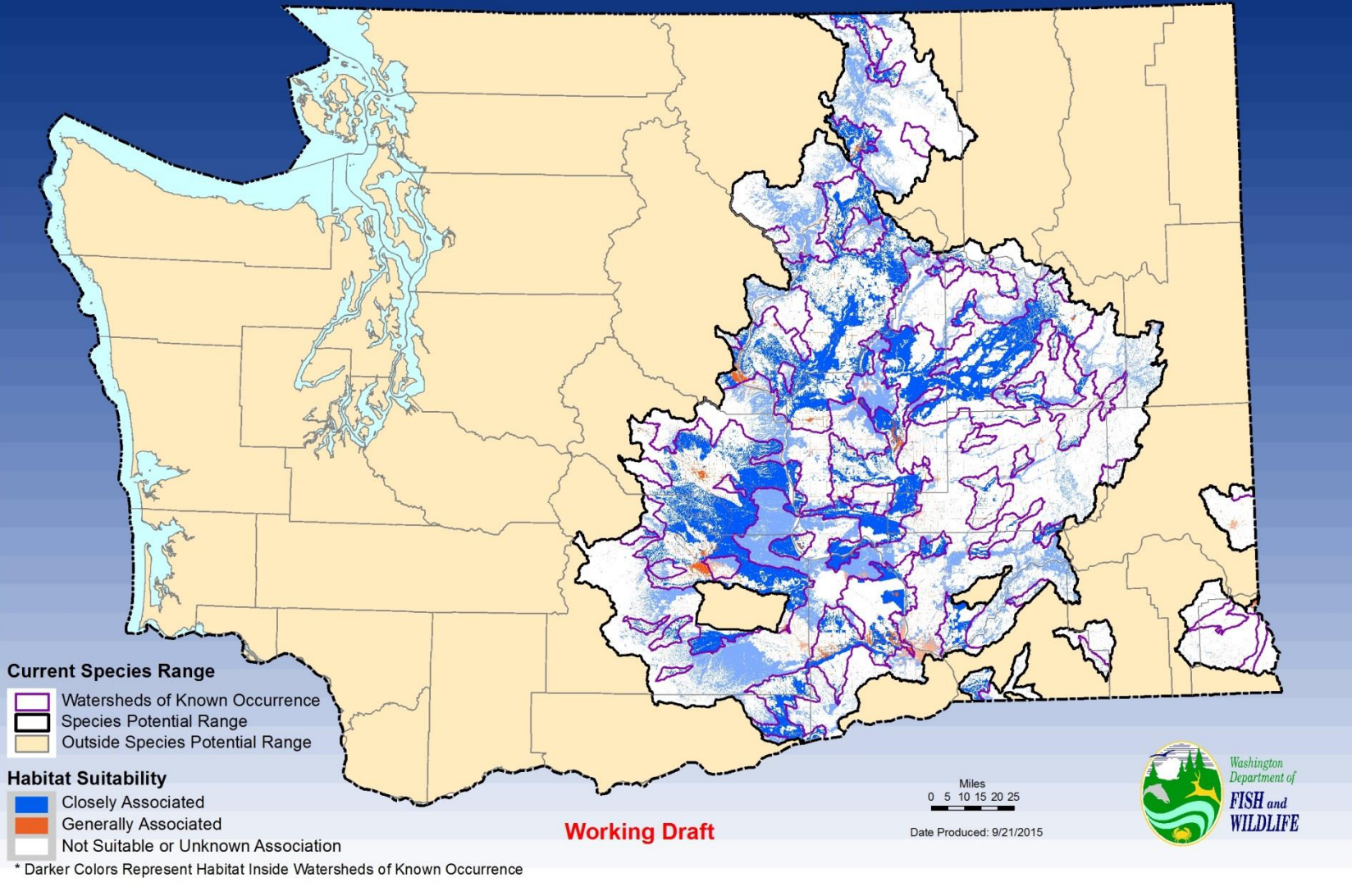


Red-necked Grebe



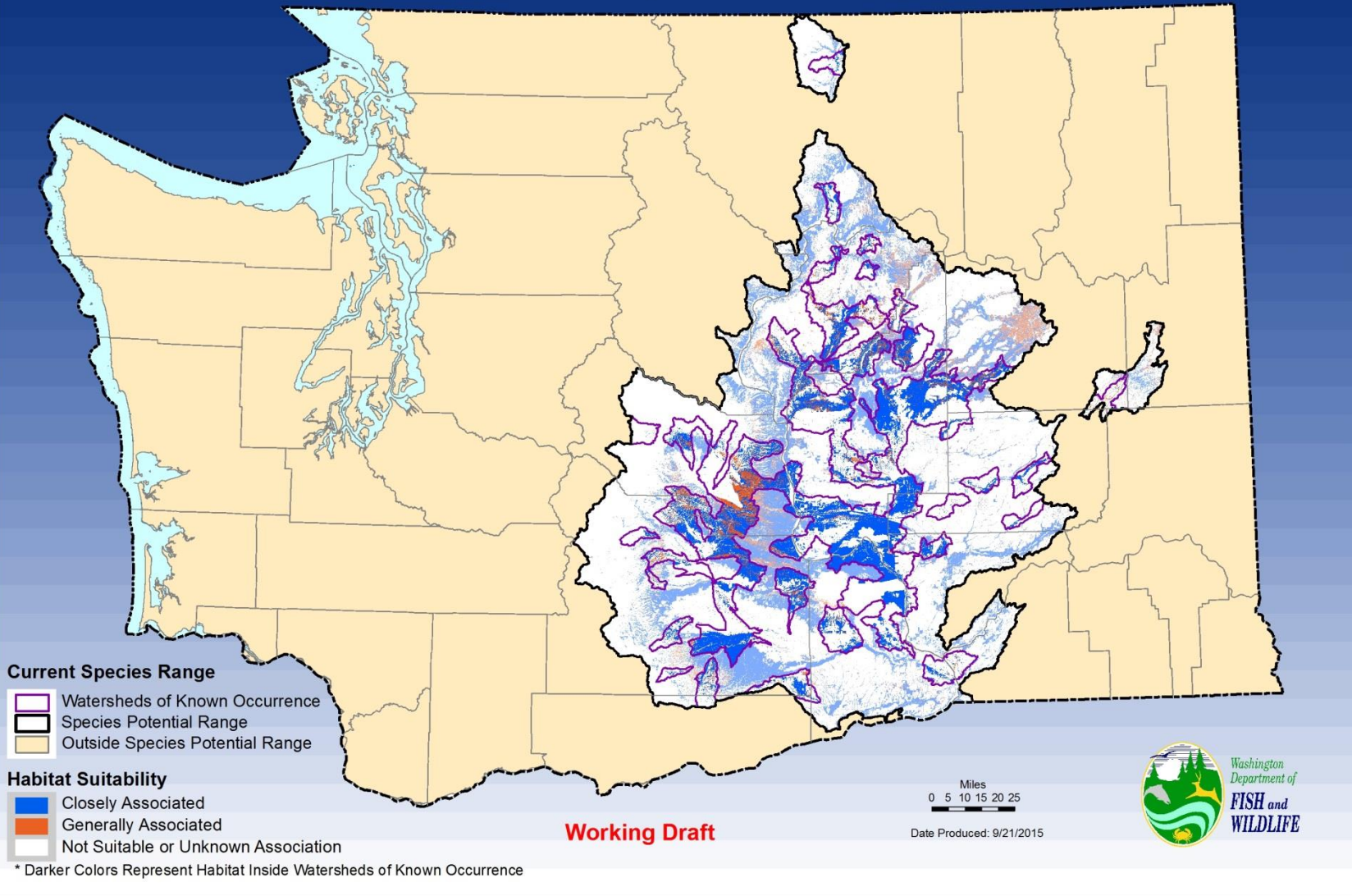
Sage Thrasher

Potential Range and Habitat Distribution Sage Thrasher *Oreoscoptes montanus*

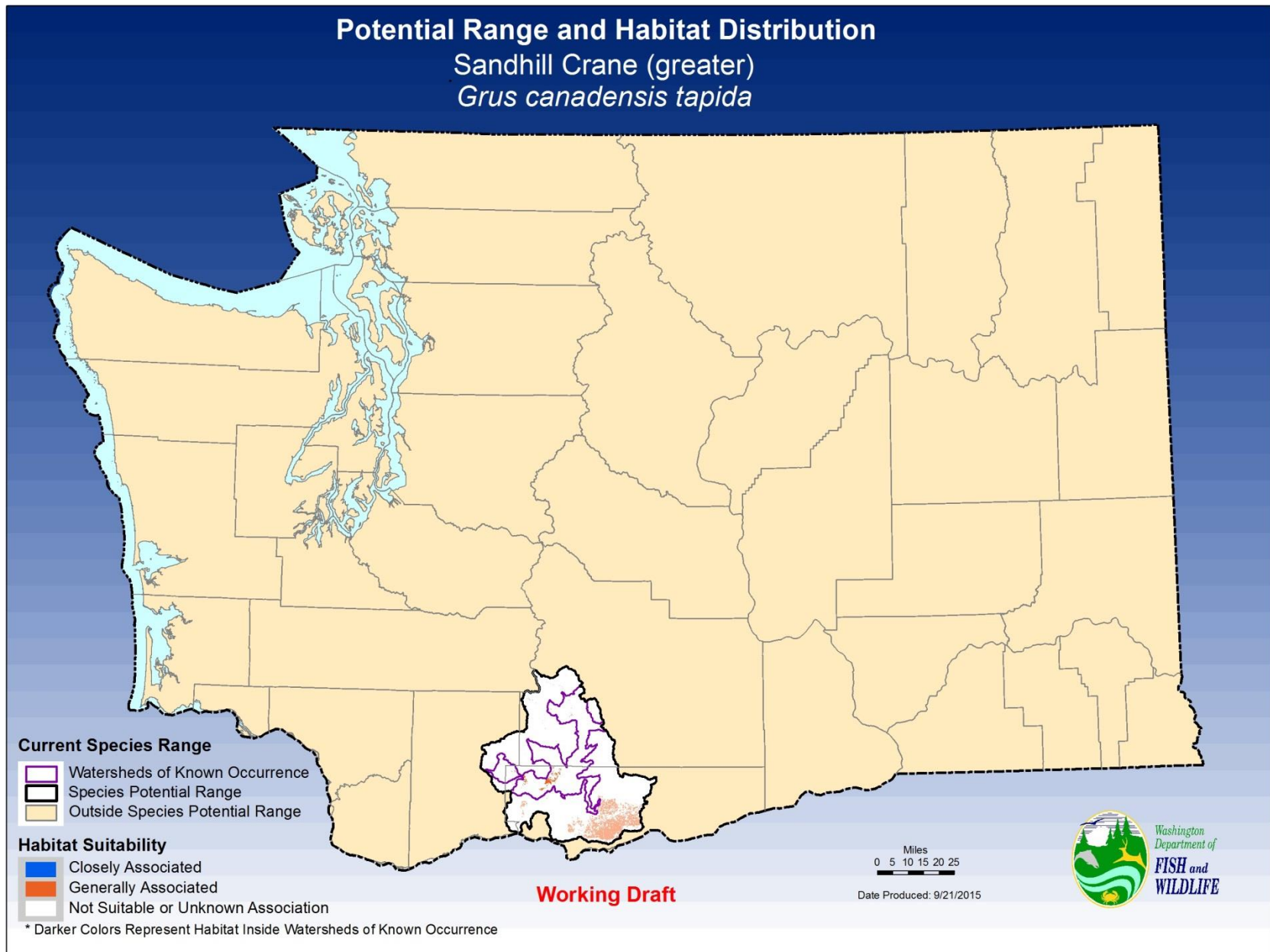


Sagebrush Sparrow

Potential Range and Habitat Distribution Sagebrush Sparrow *Artemisiospiza belli*

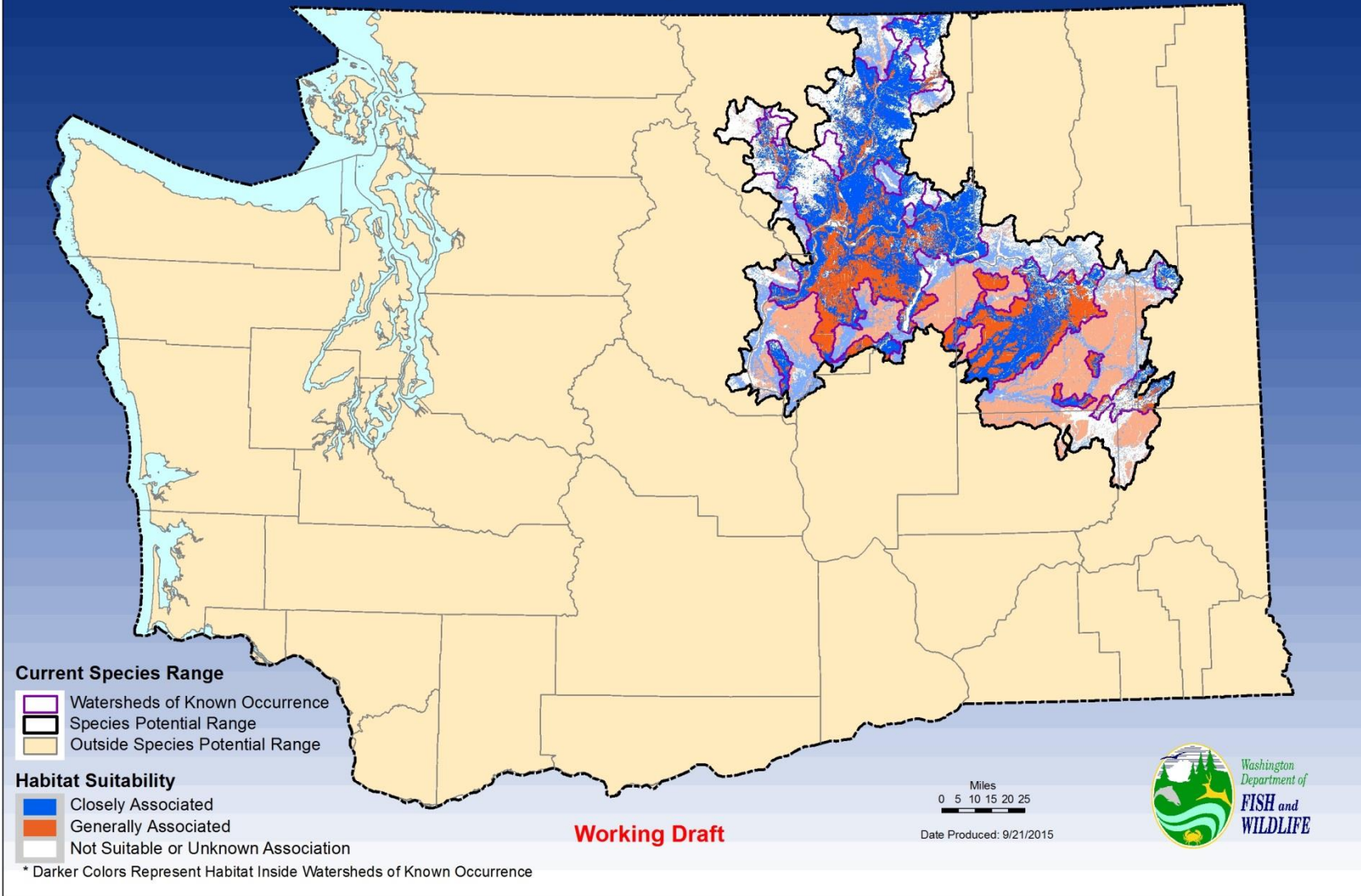


Sandhill Crane (Greater)



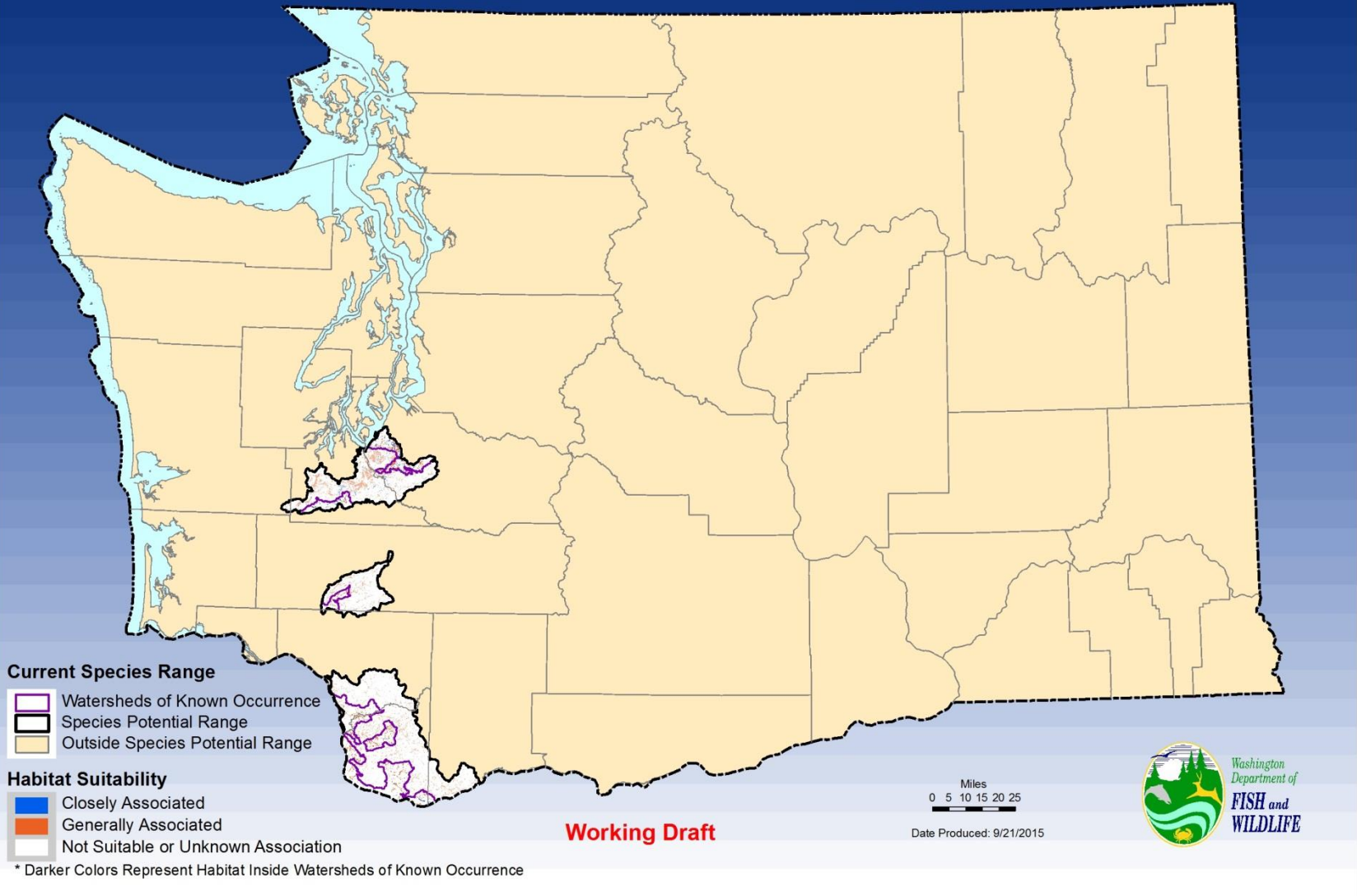
Sharp-tailed Grouse

Potential Range and Habitat Distribution Sharp-tailed Grouse *Tympanuchus phasianellus*



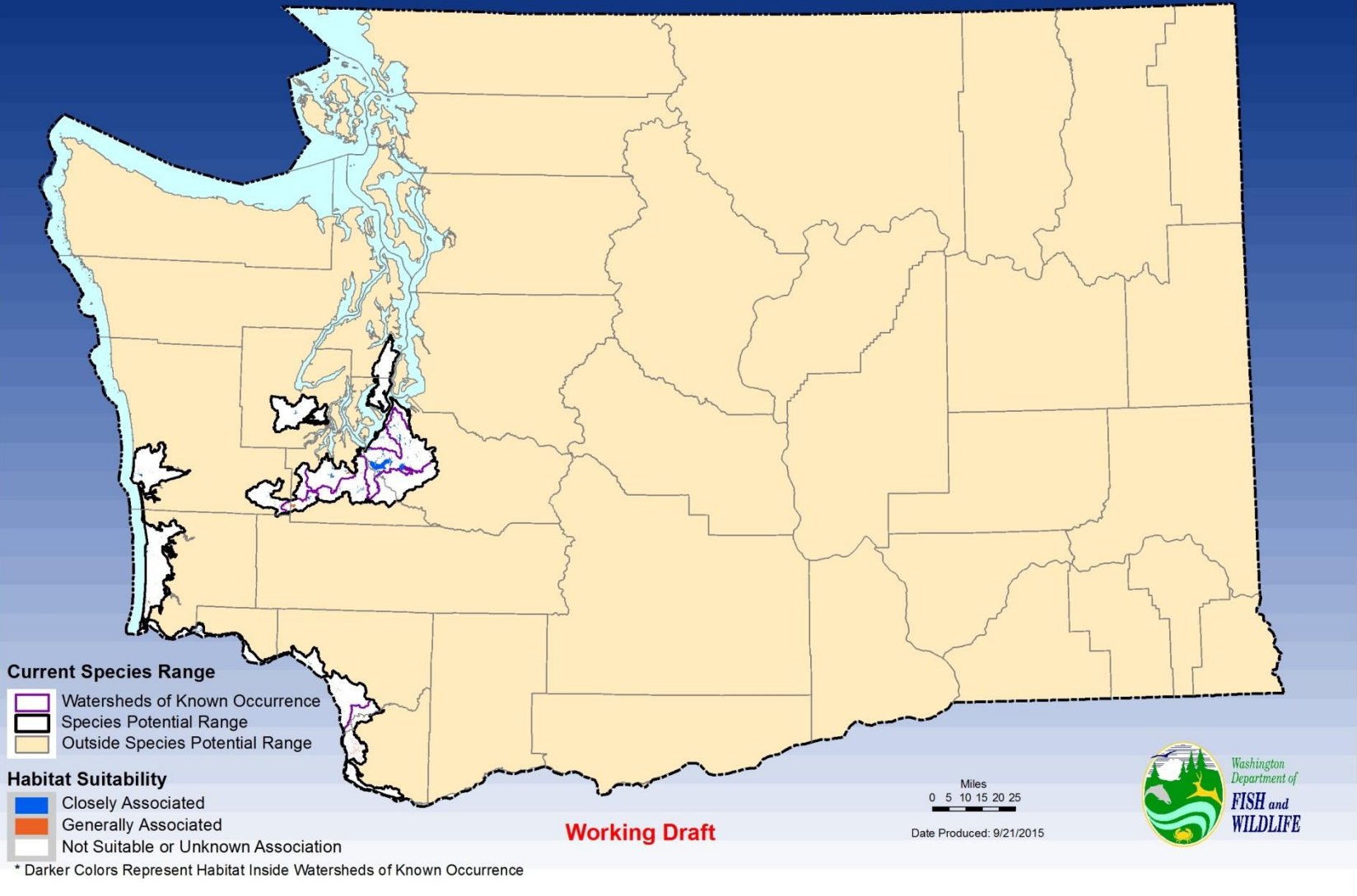
Slender-billed White-breasted Nuthatch

Potential Range and Habitat Distribution Slender-billed White-breasted Nuthatch *Sitta carolinensis aculeata*

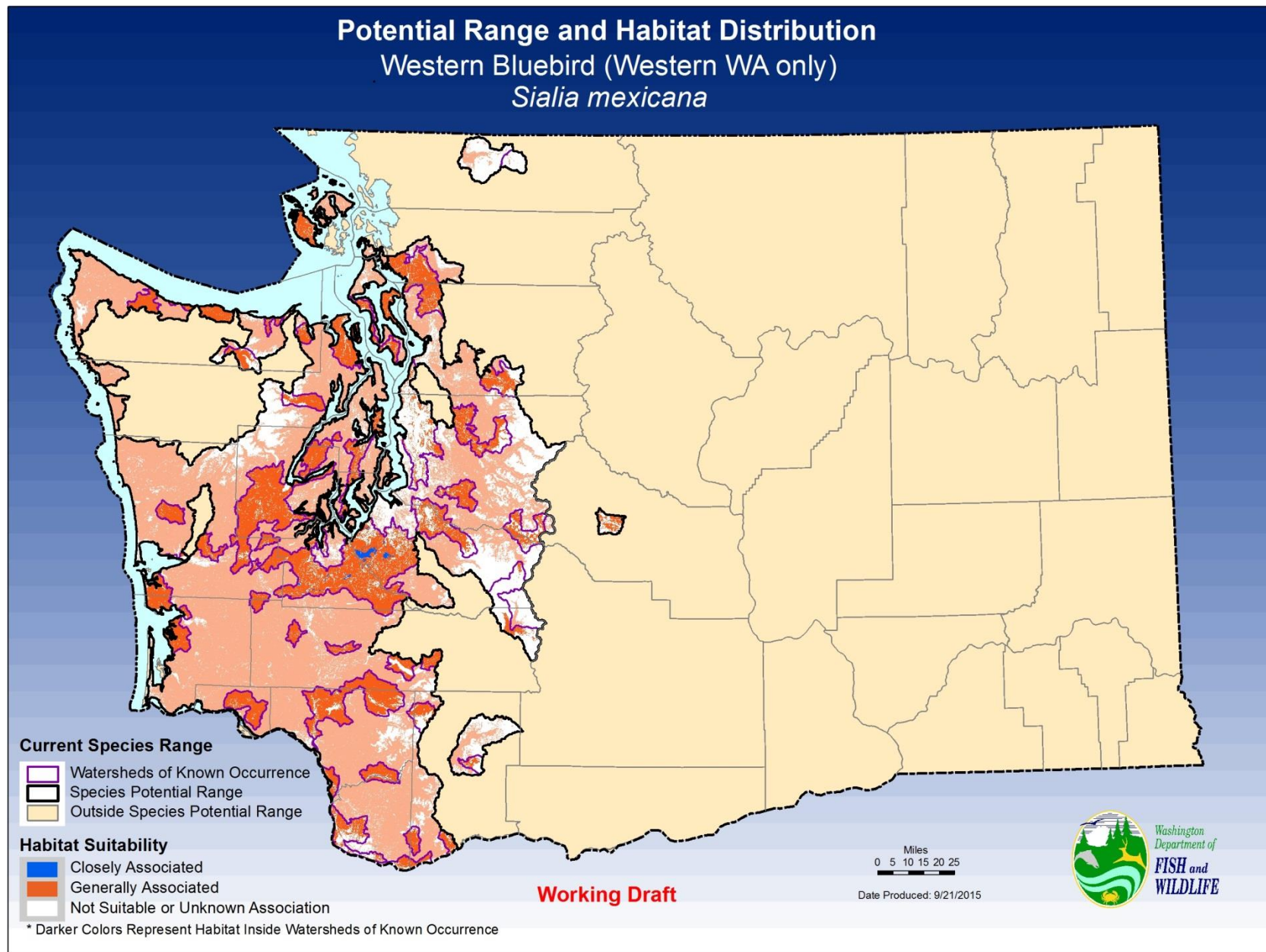


Streaked Horned Lark

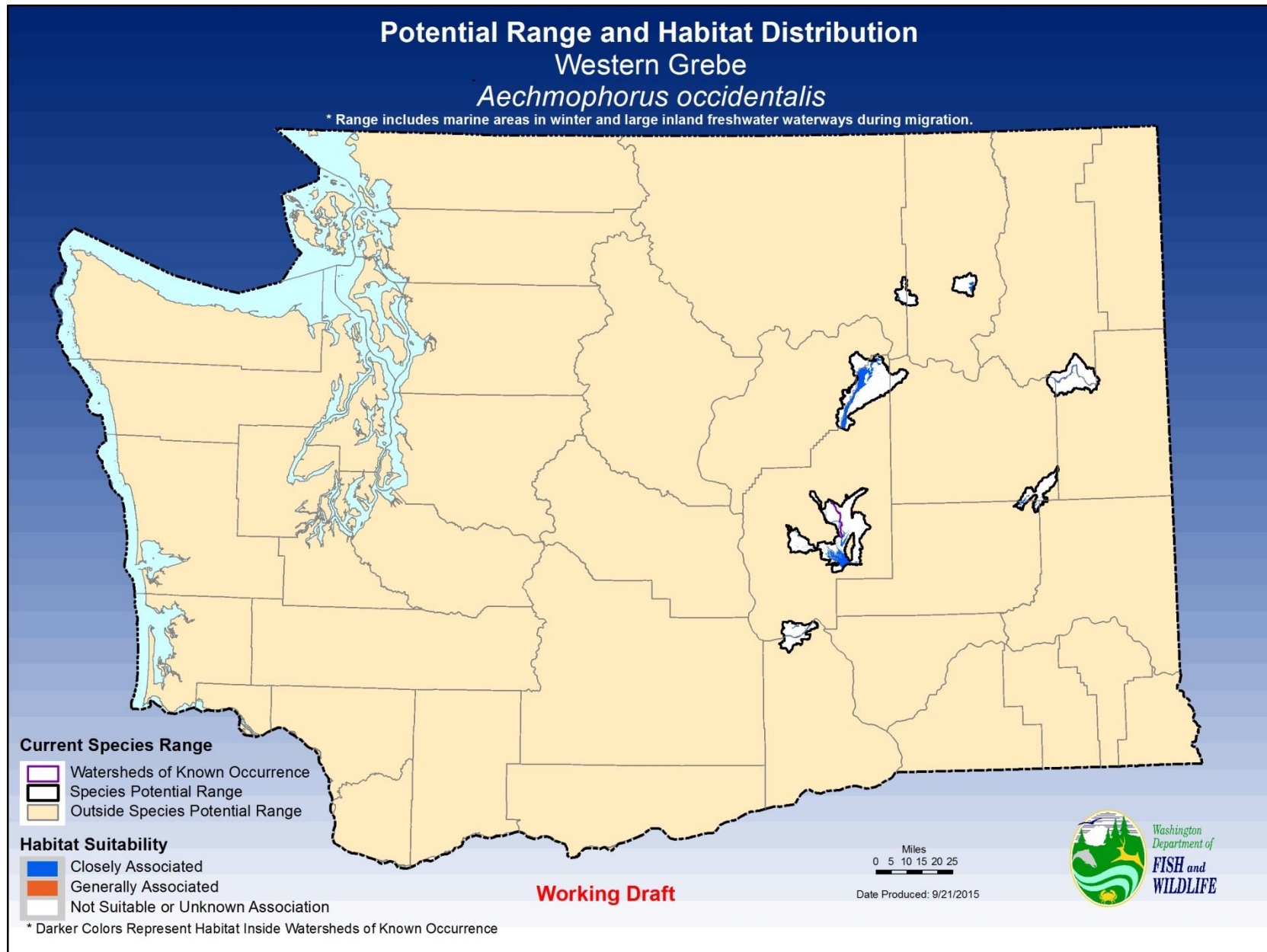
Potential Range and Habitat Distribution Streaked Horned Lark *Eremophila alpestris strigata*



Western Bluebird (Western WA only)

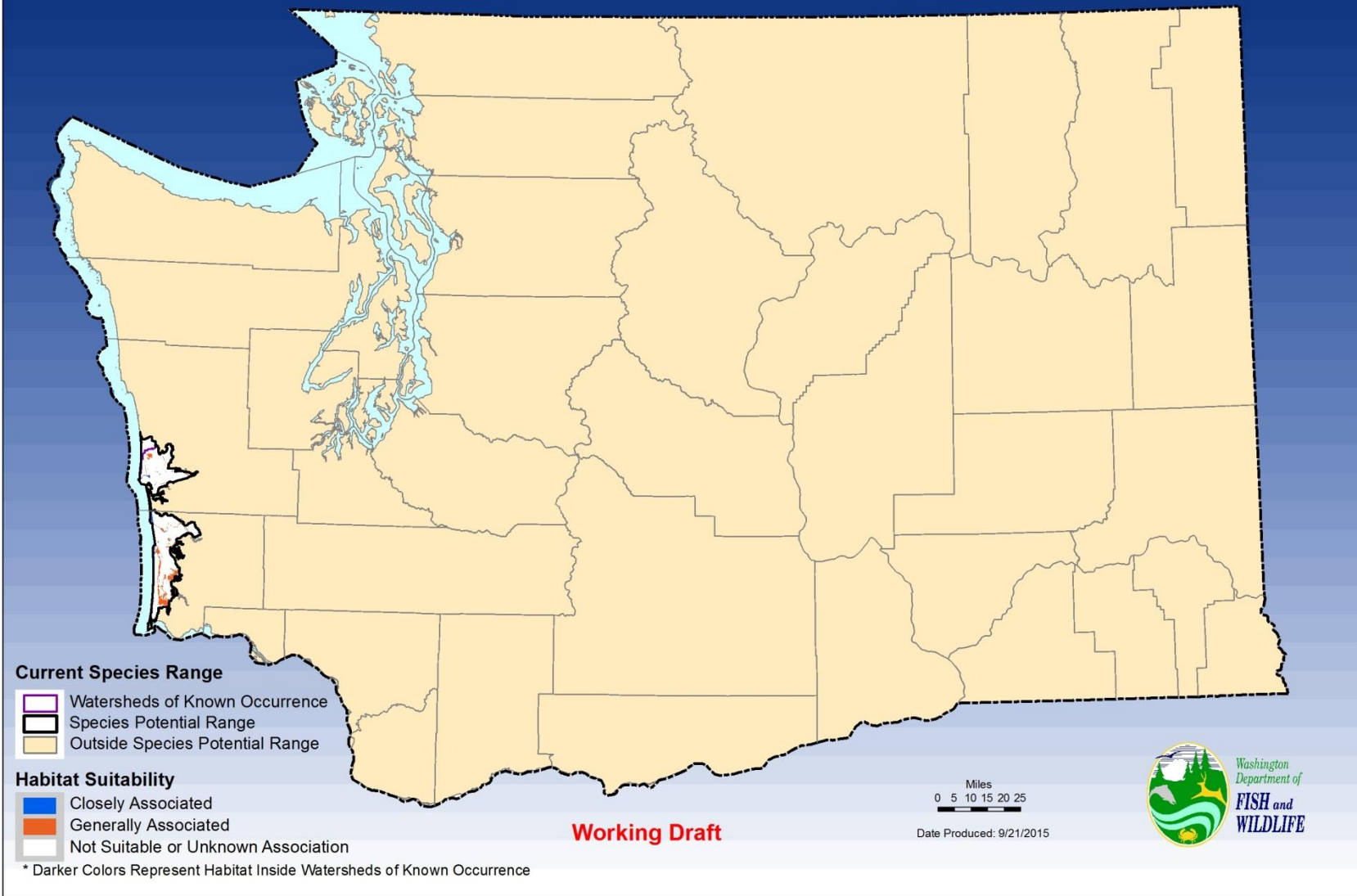


Western Grebe

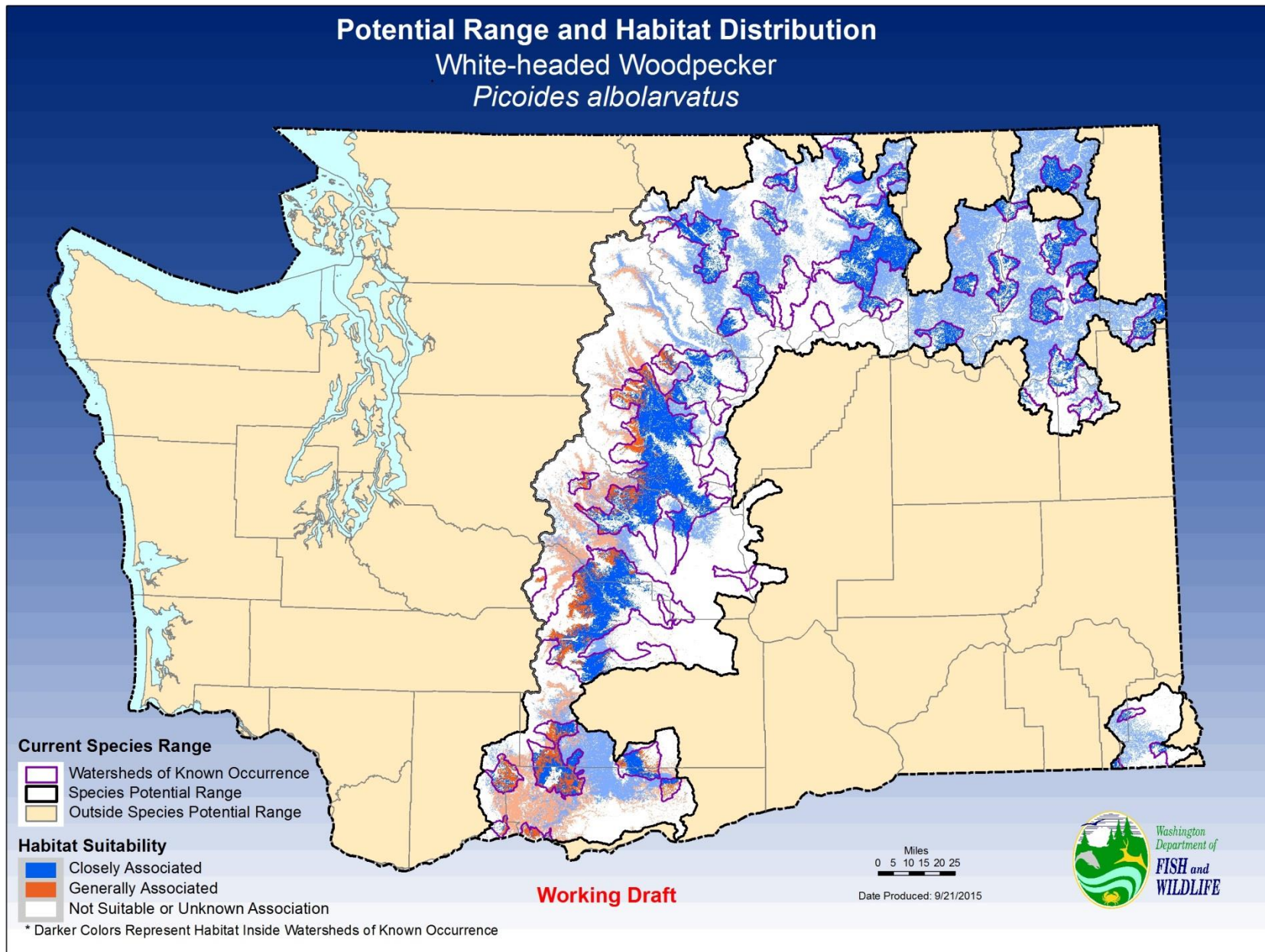


Western Snowy Plover

Potential Range and Habitat Distribution Snowy Plover *Charadrius alexandriunus*

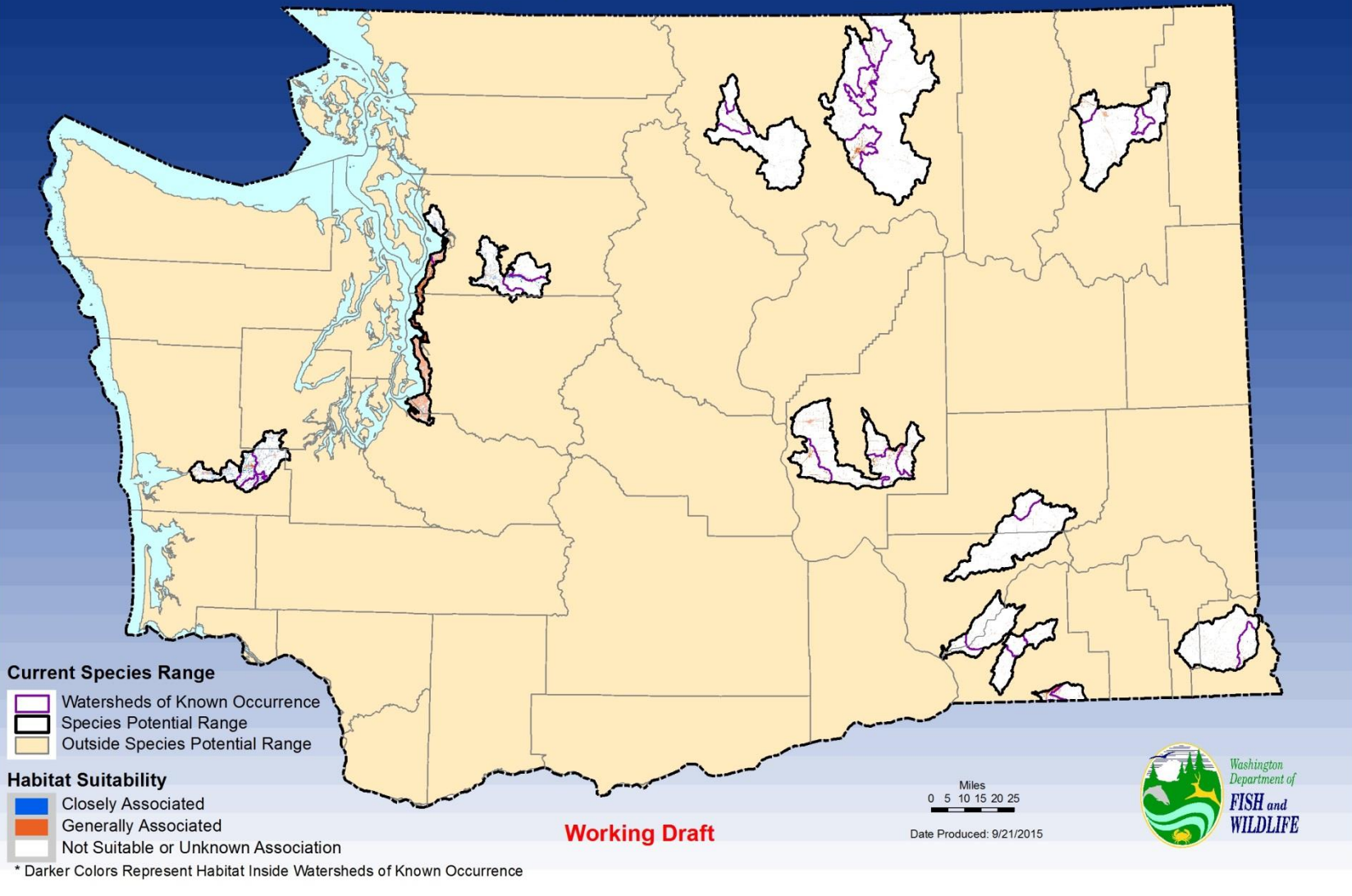


White-headed Woodpecker

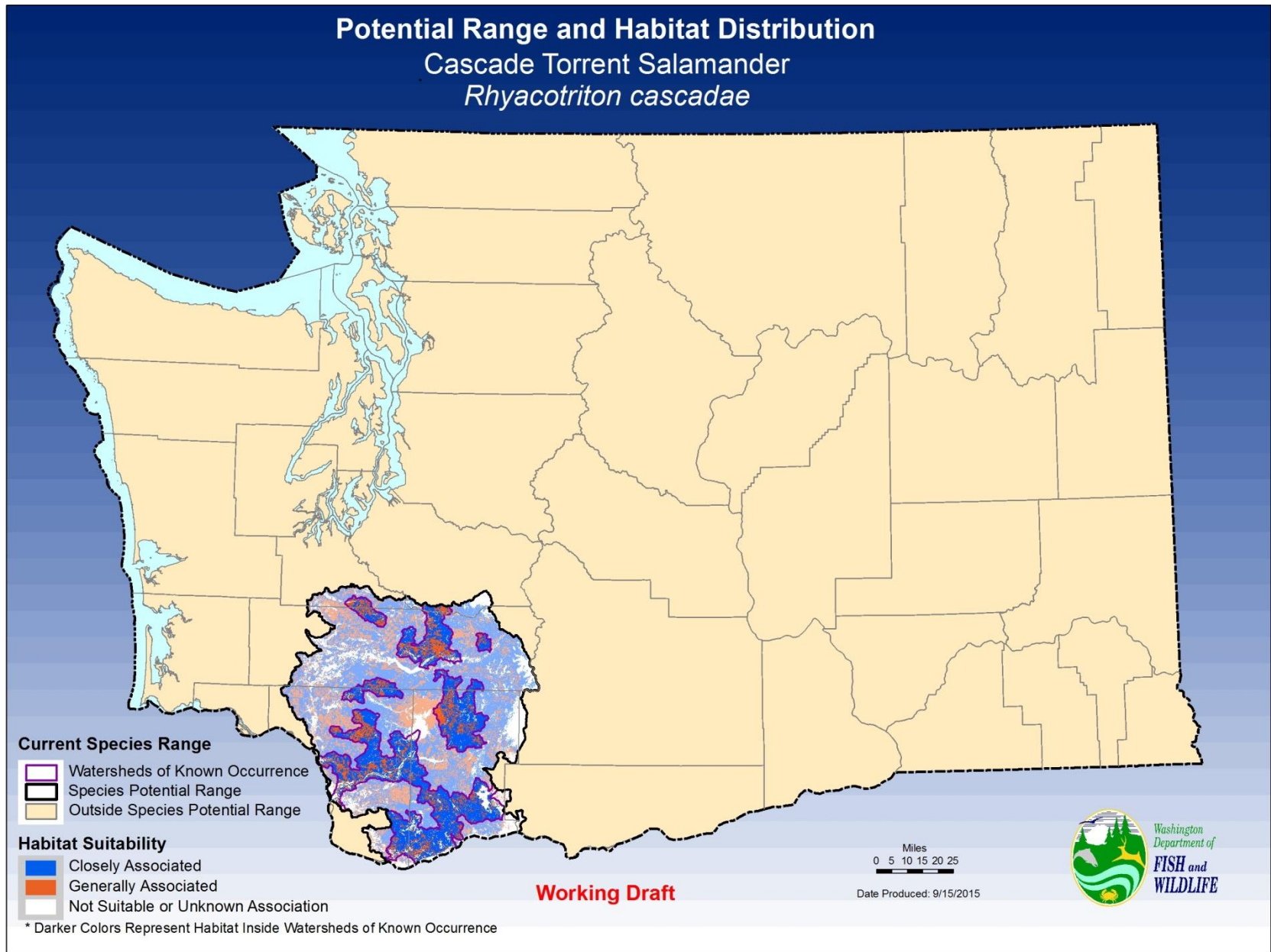


Yellow-billed Cuckoo

Potential Range and Habitat Distribution Yellow-billed Cuckoo *Coccyzus americanus*

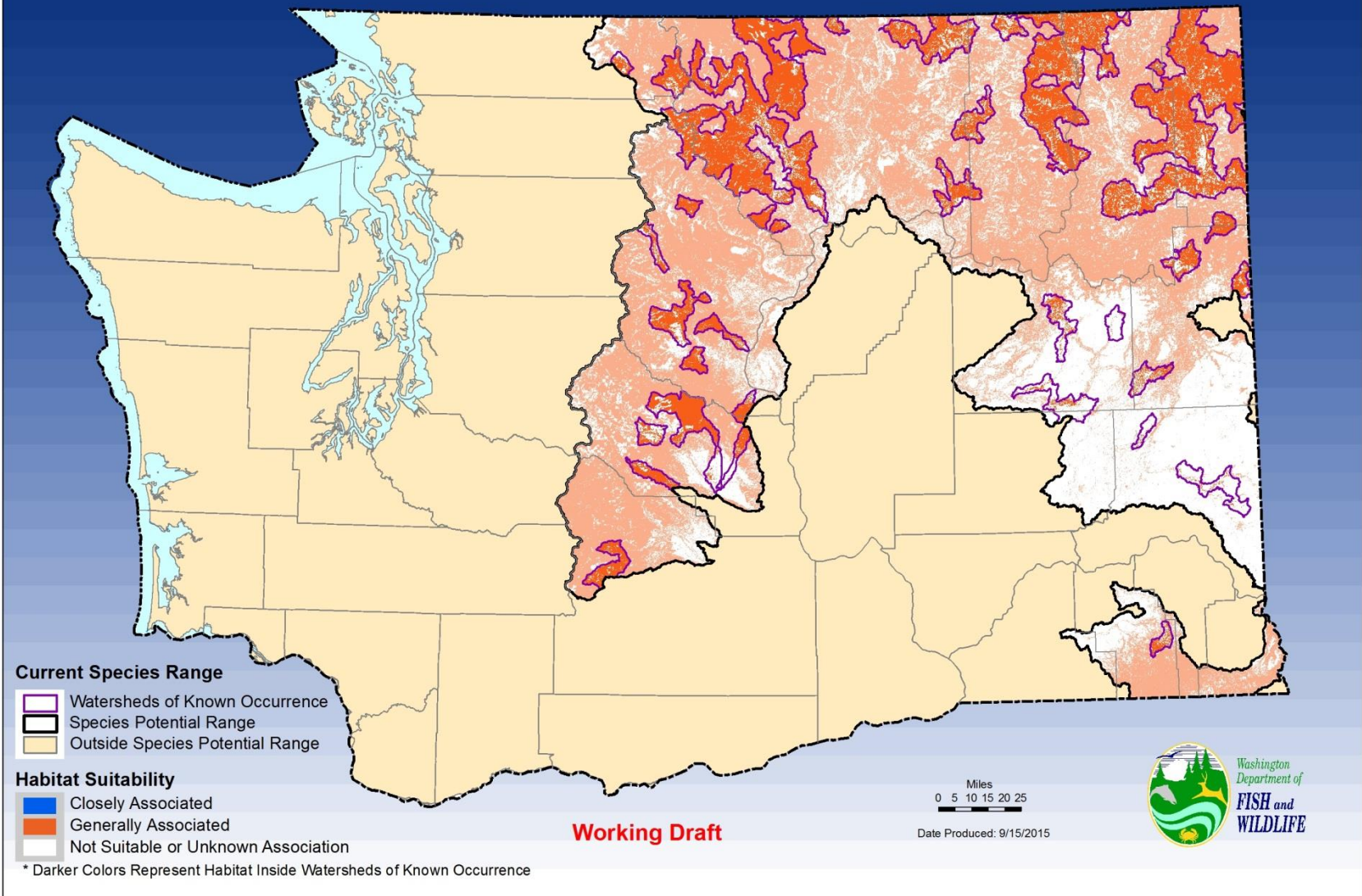


Cascade Torrent Salamander

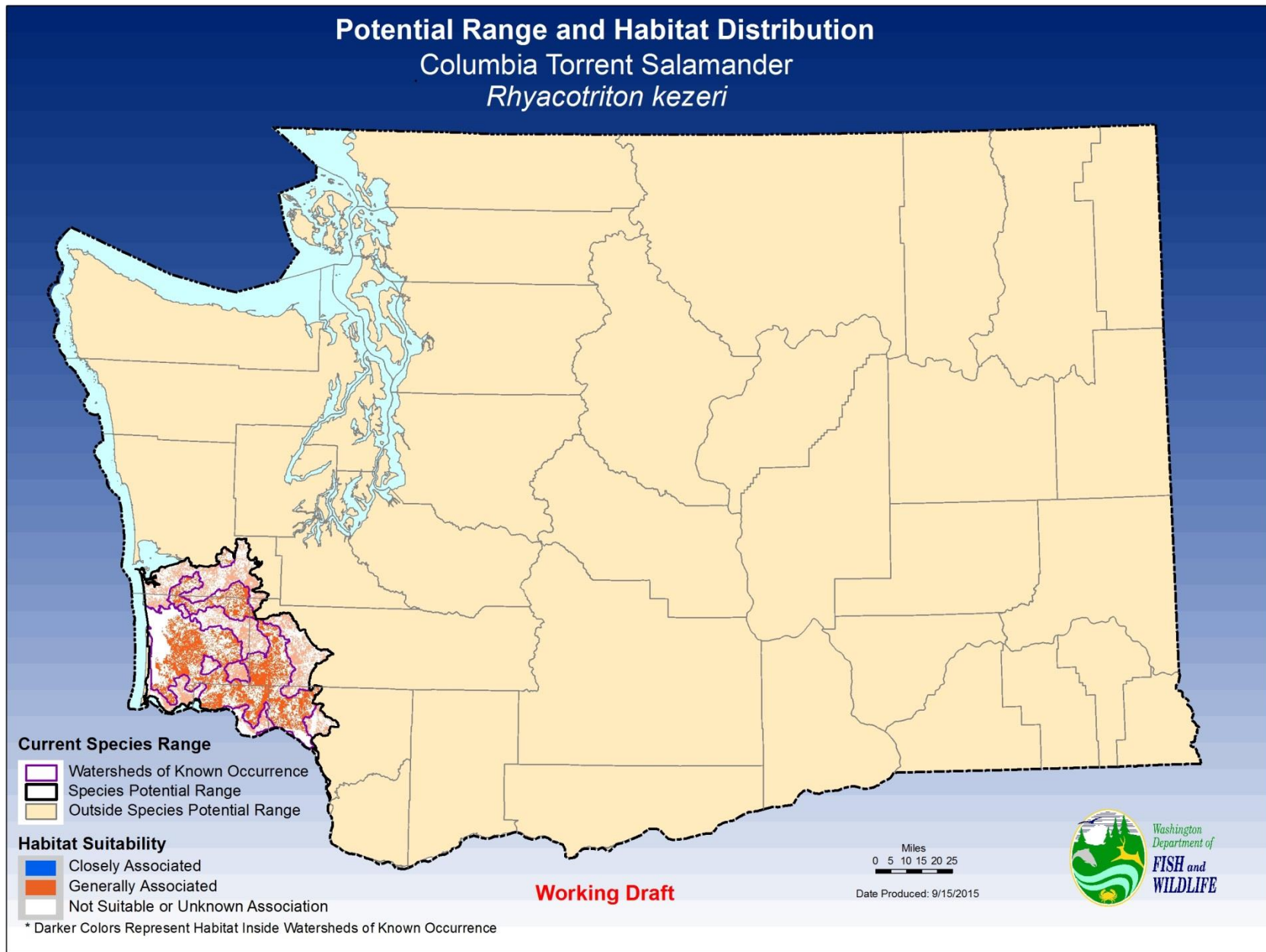


Columbia Spotted Frog

Potential Range and Habitat Distribution Columbia Spotted Frog *Rana luteiventris*

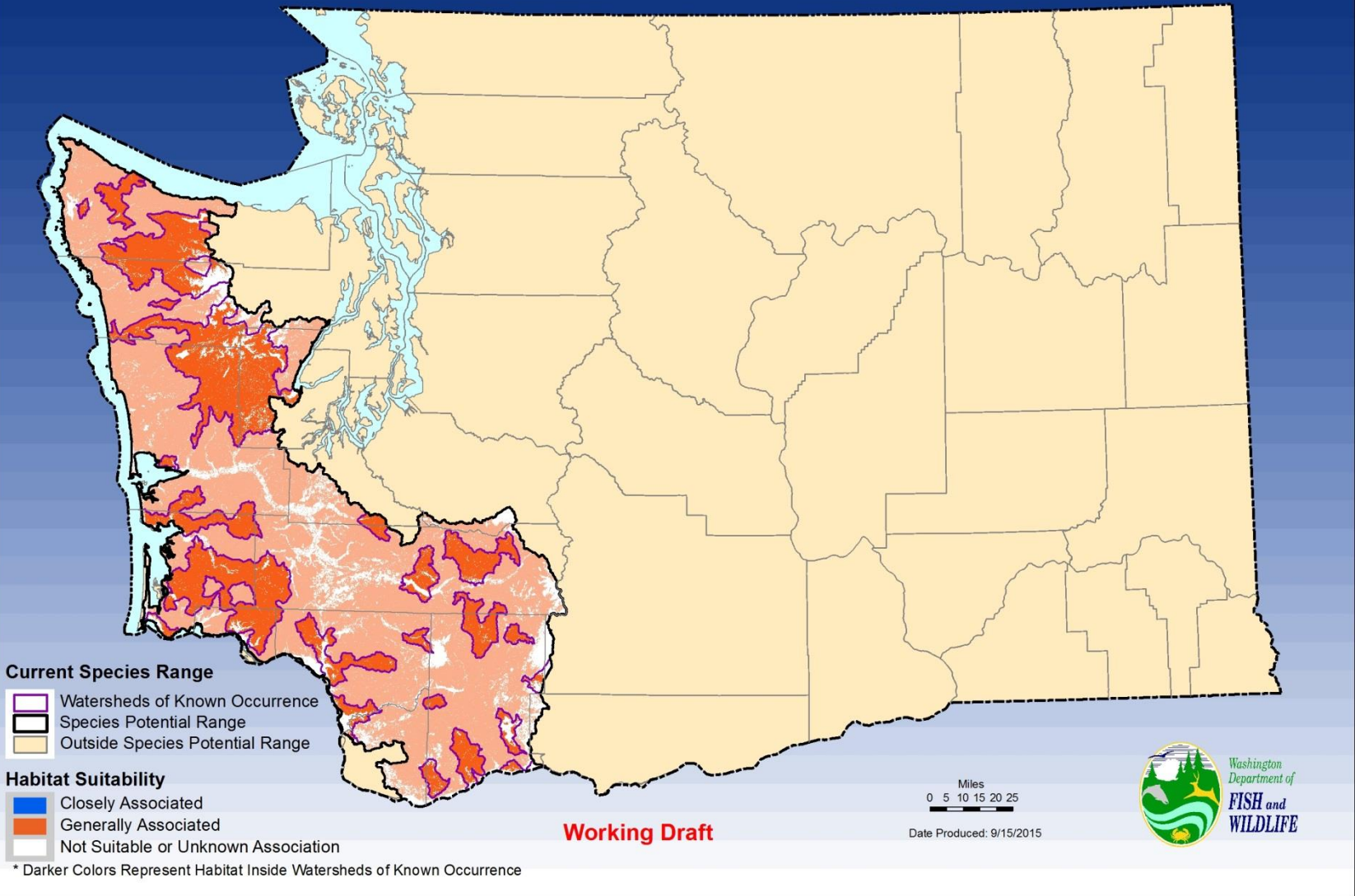


Columbia Torrent Salamander



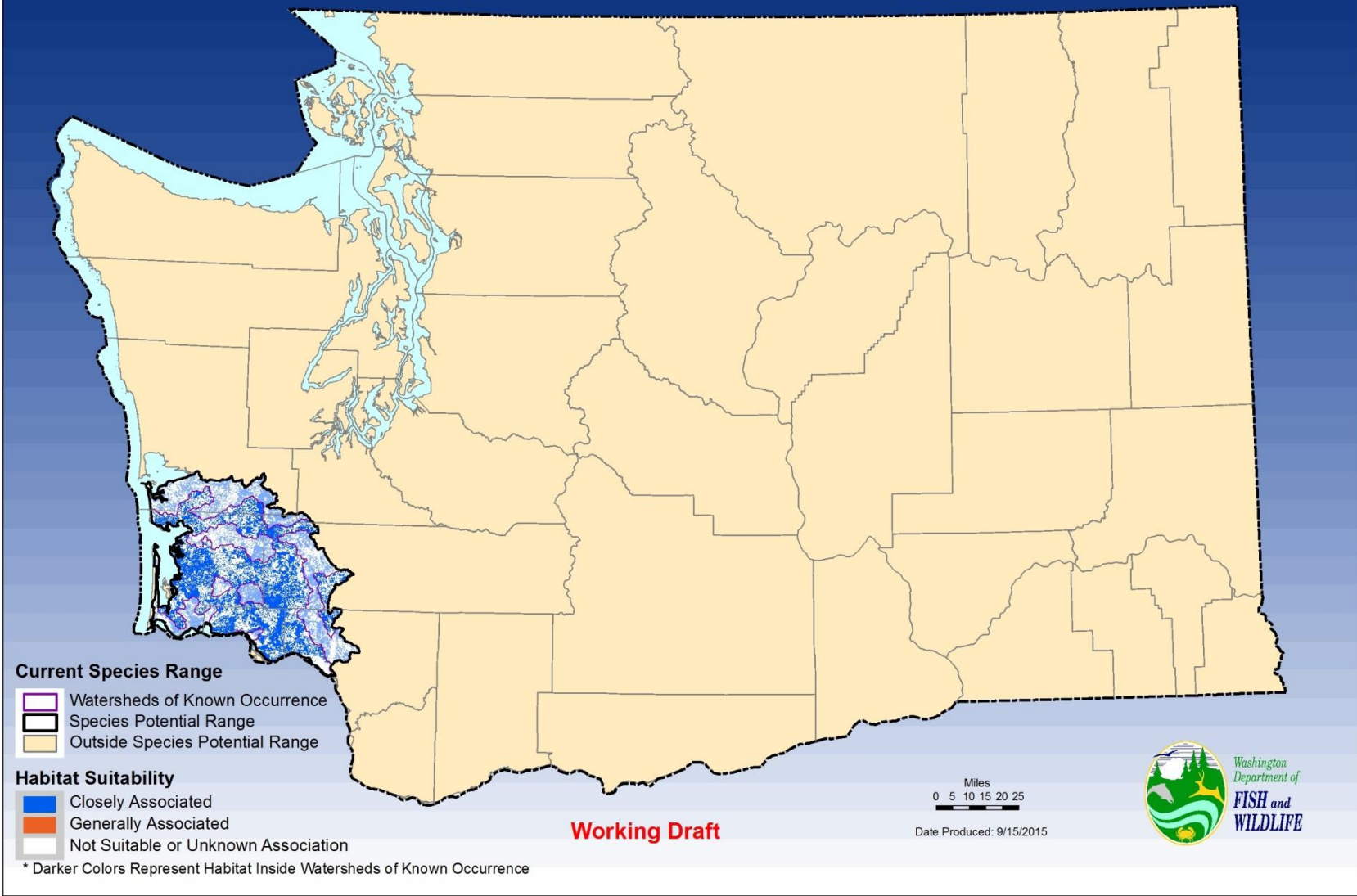
Cope's Giant Salamander

Potential Range and Habitat Distribution Cope's Giant Salamander *Dicamptodon copei*



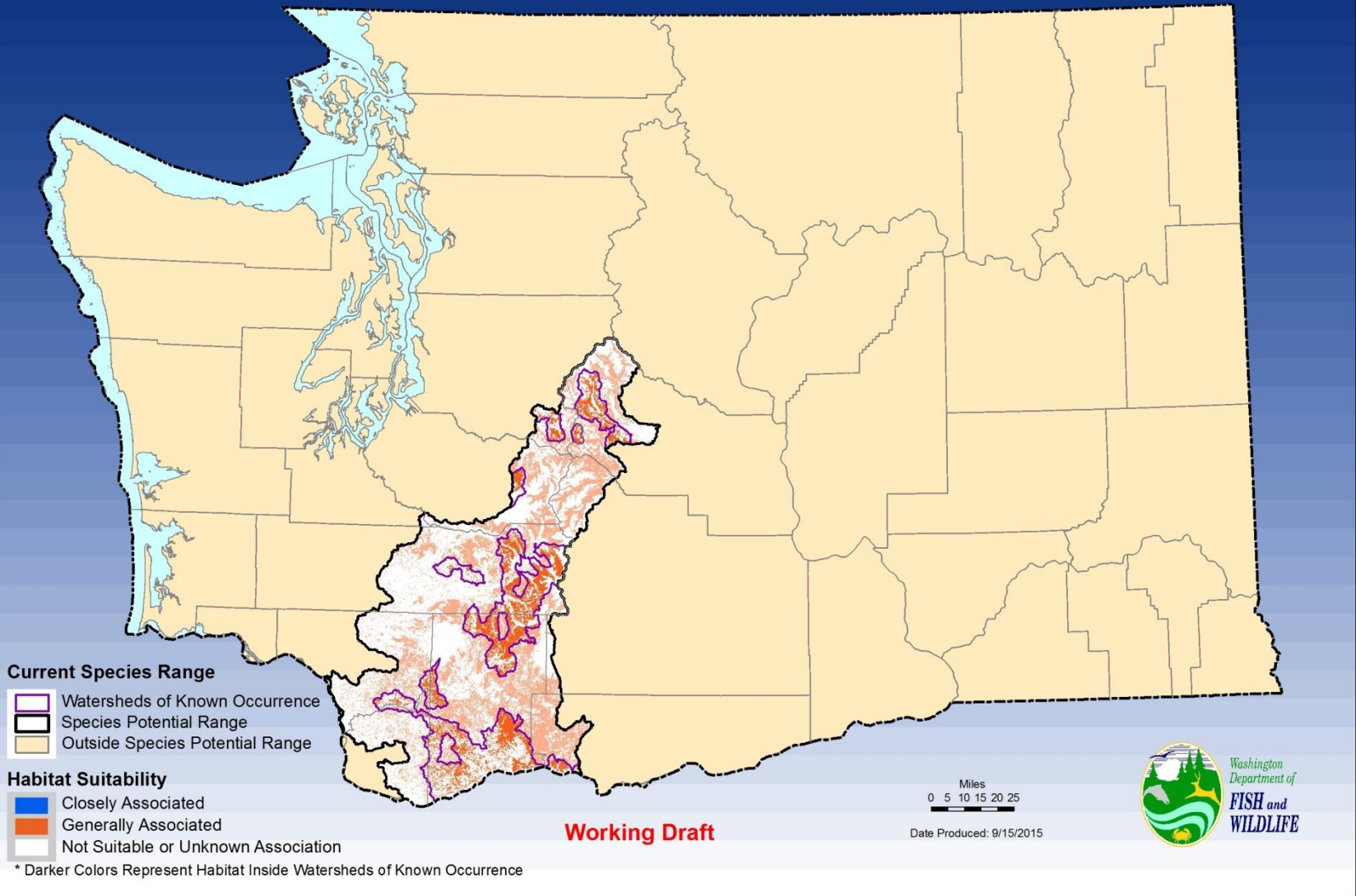
Dunn's Salamander

Potential Range and Habitat Distribution Dunn's Salamander *Plethodon dunni*



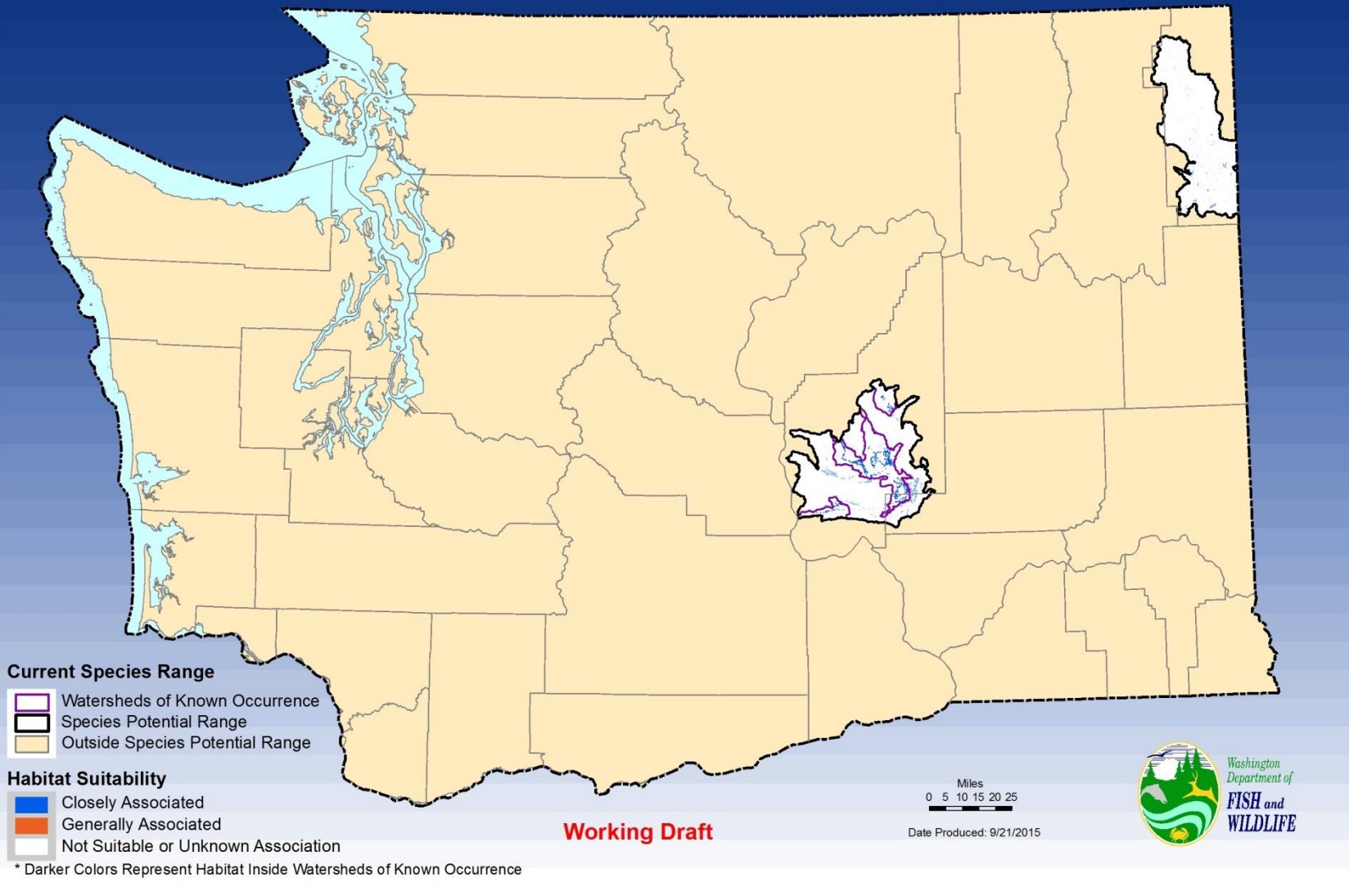
Larch Mountain Salamander

Potential Range and Habitat Distribution Larch Mountain Salamander *Plethodon larselli*

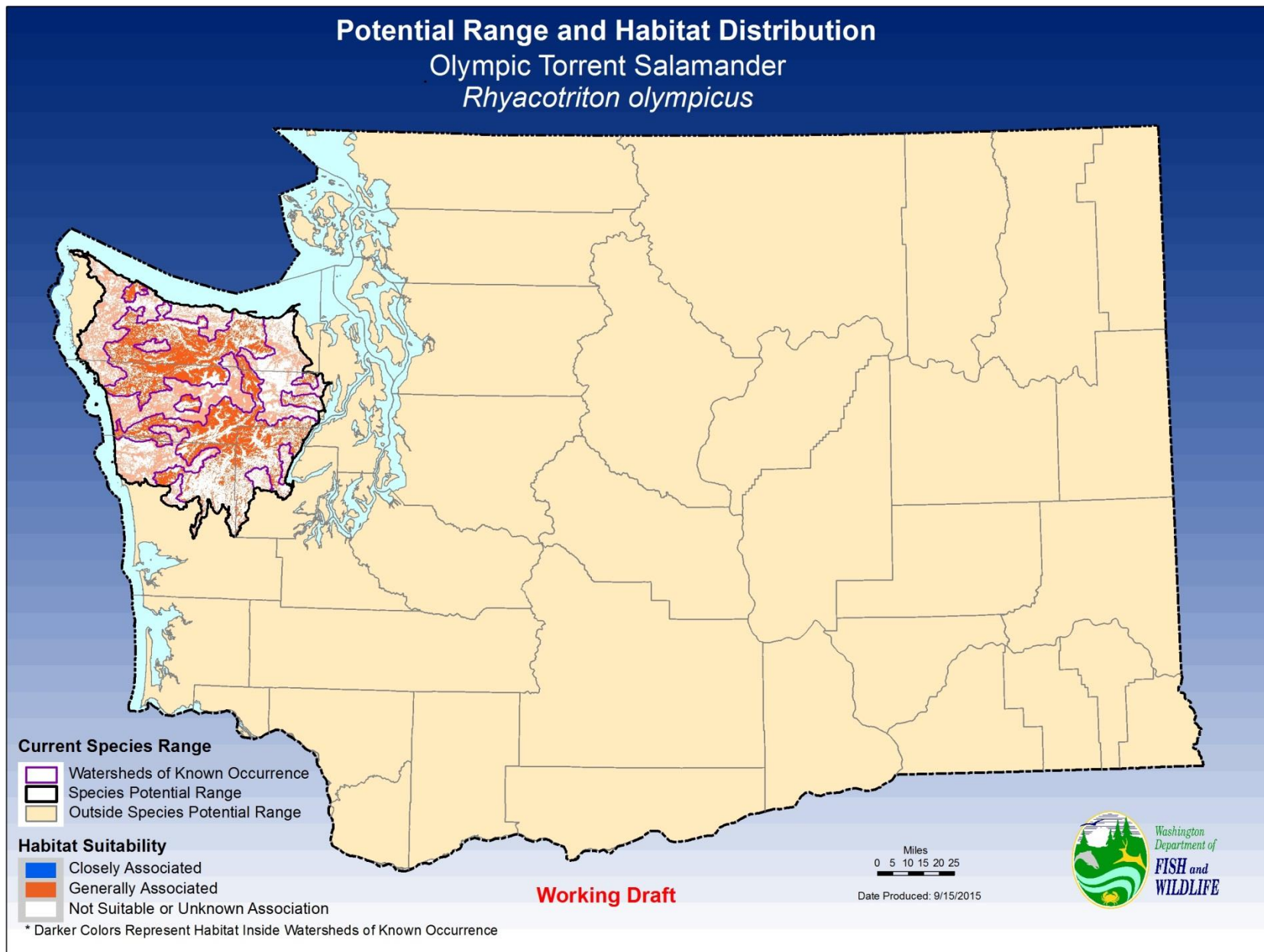


Northern Leopard Frog

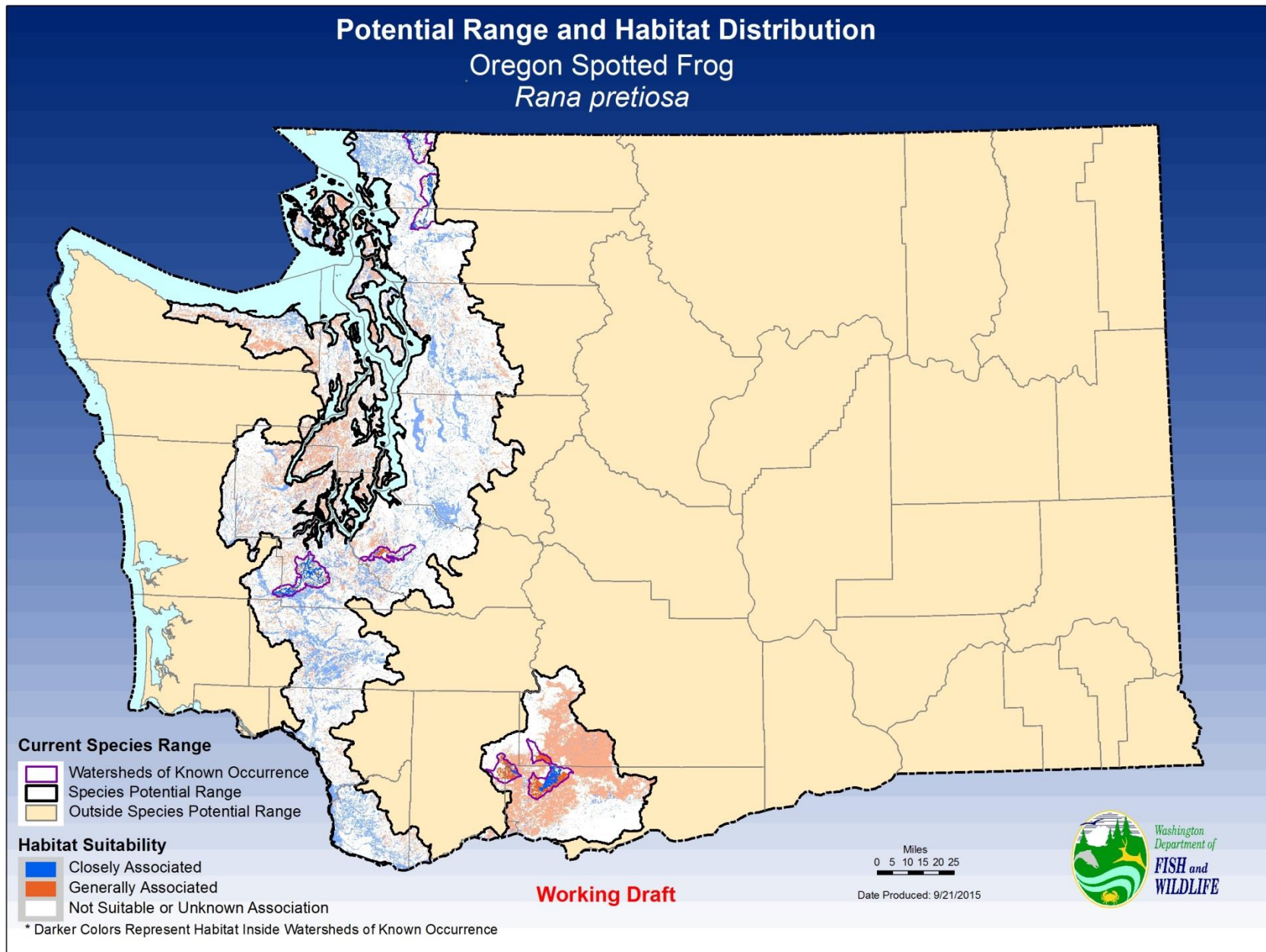
Potential Range and Habitat Distribution Northern Leopard Frog *Rana pipiens*



Olympic Torrent Salamander



Oregon Spotted Frog



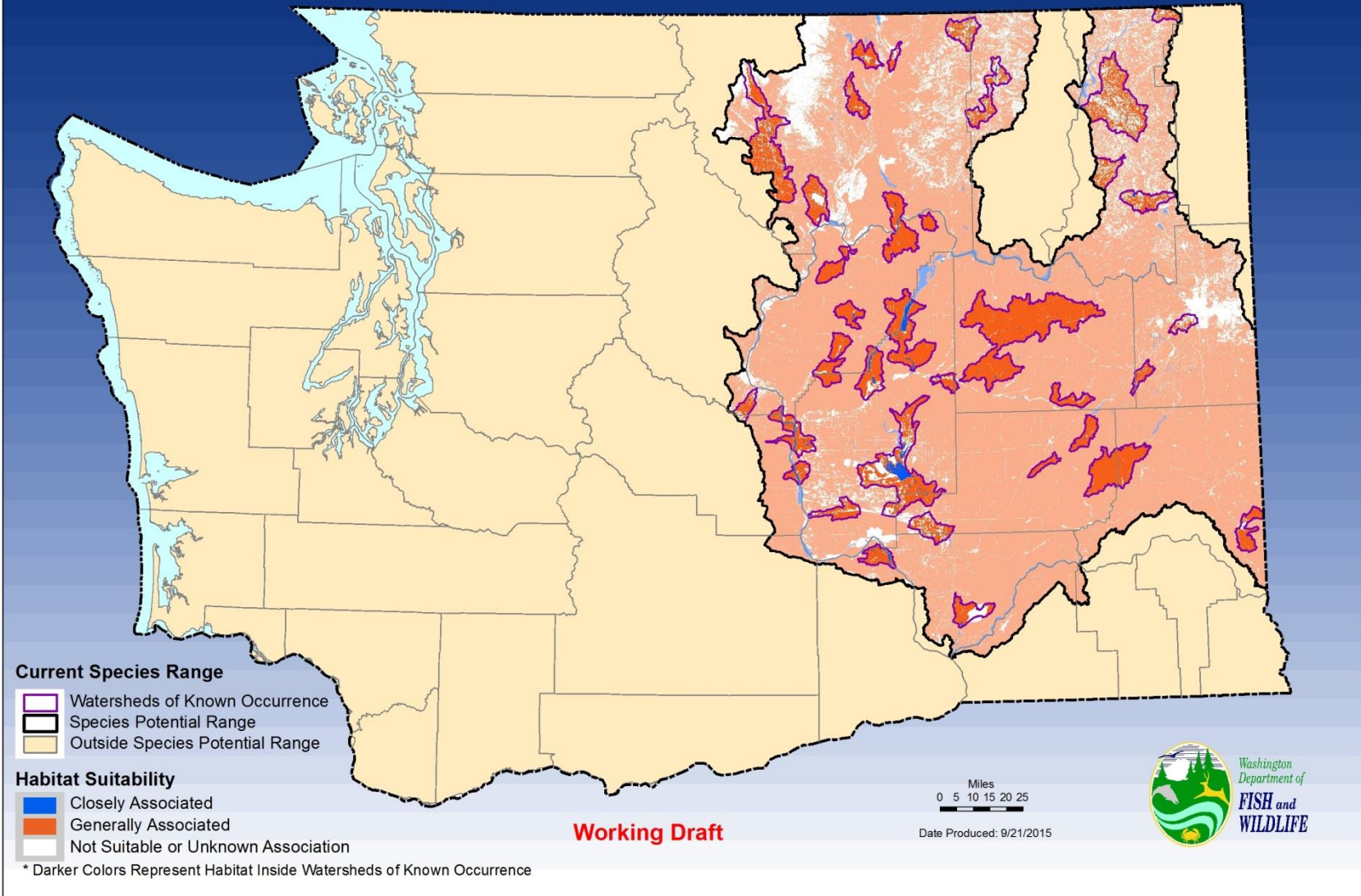
Rocky Mountain Tailed Frog

Potential Range and Habitat Distribution Rocky Mountain Tailed Frog *Ascaphus montanus*

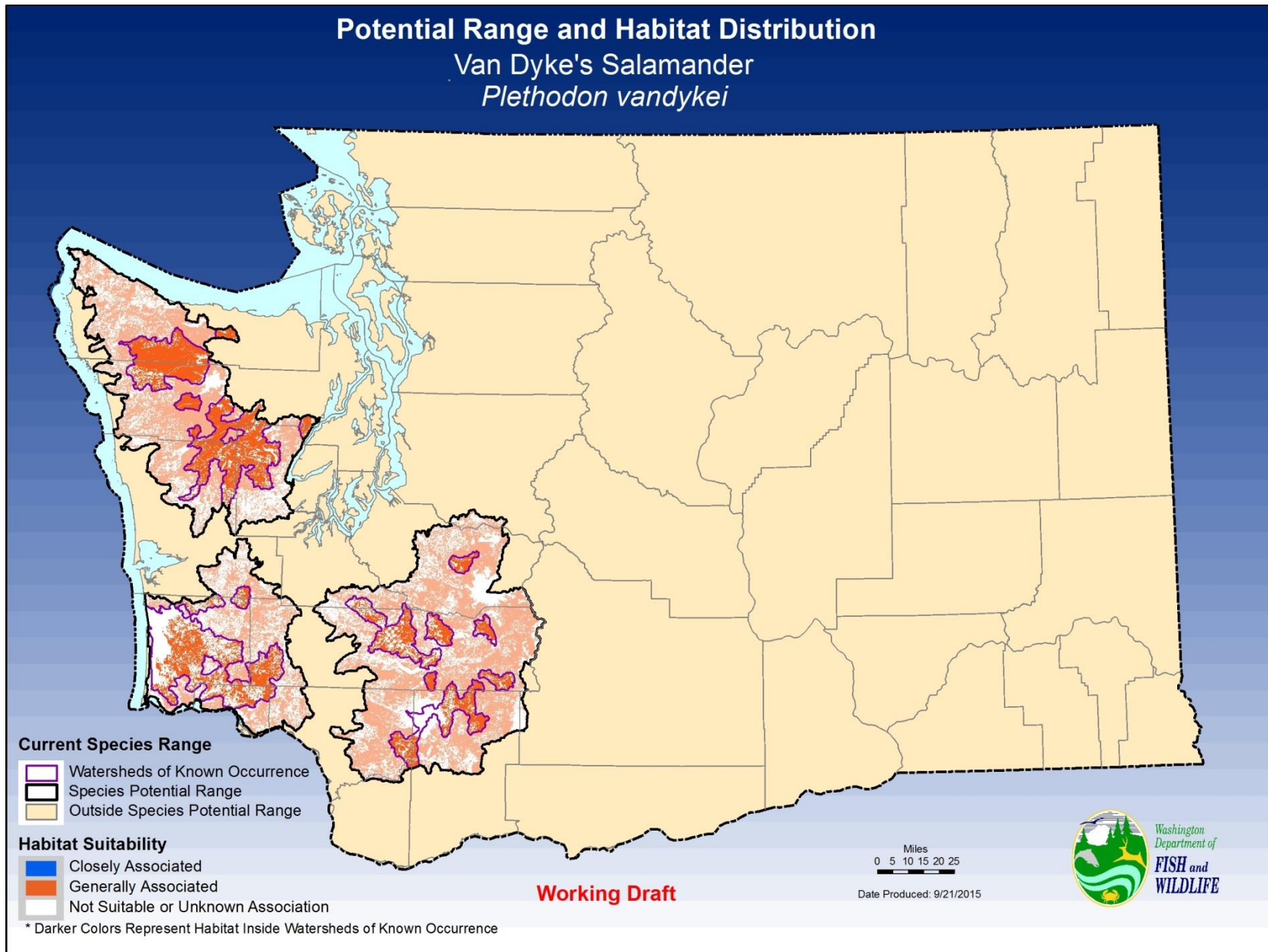


Tiger Salamander

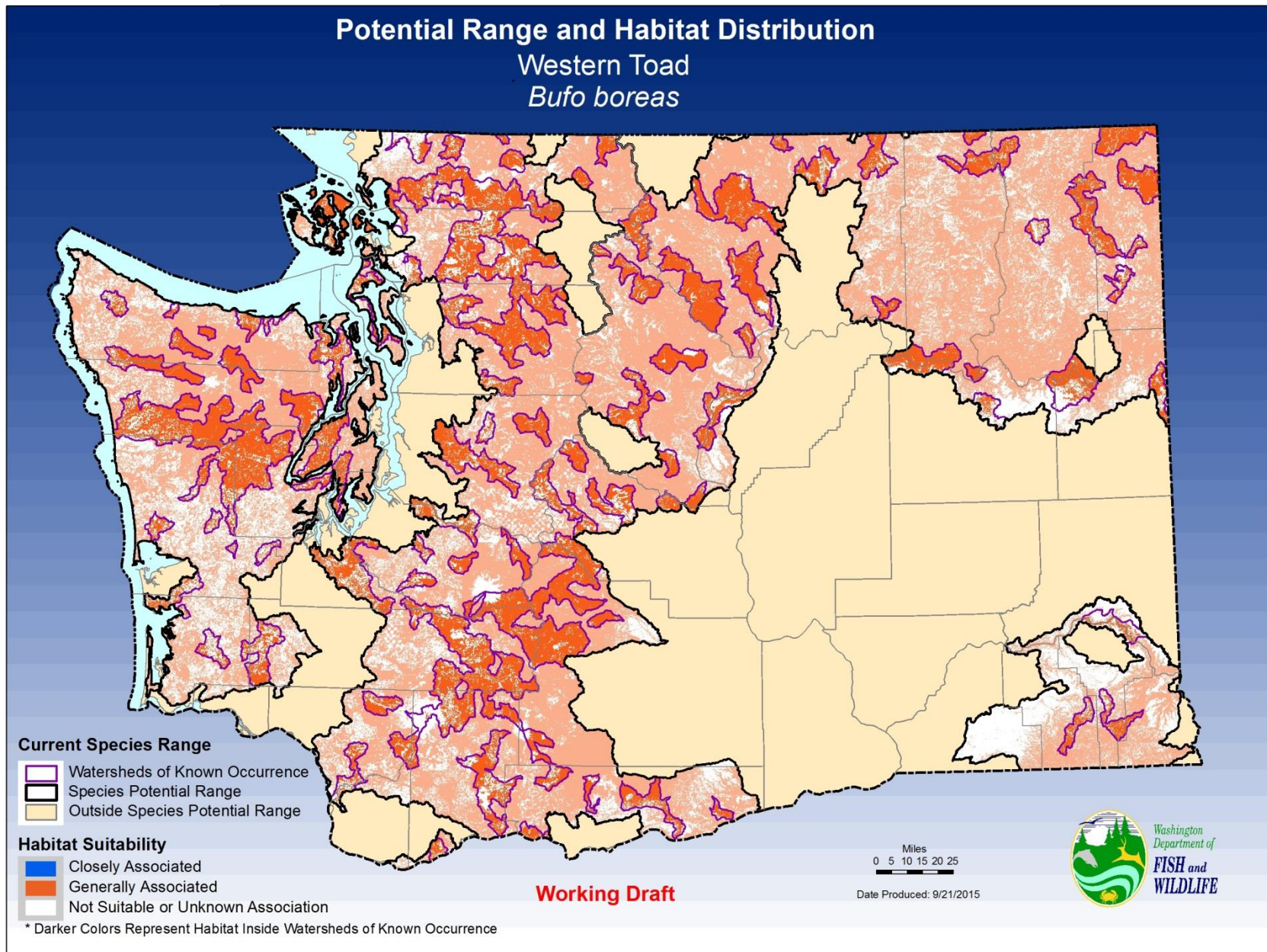
Potential Range and Habitat Distribution Tiger Salamander *Ambystoma tigrinum*



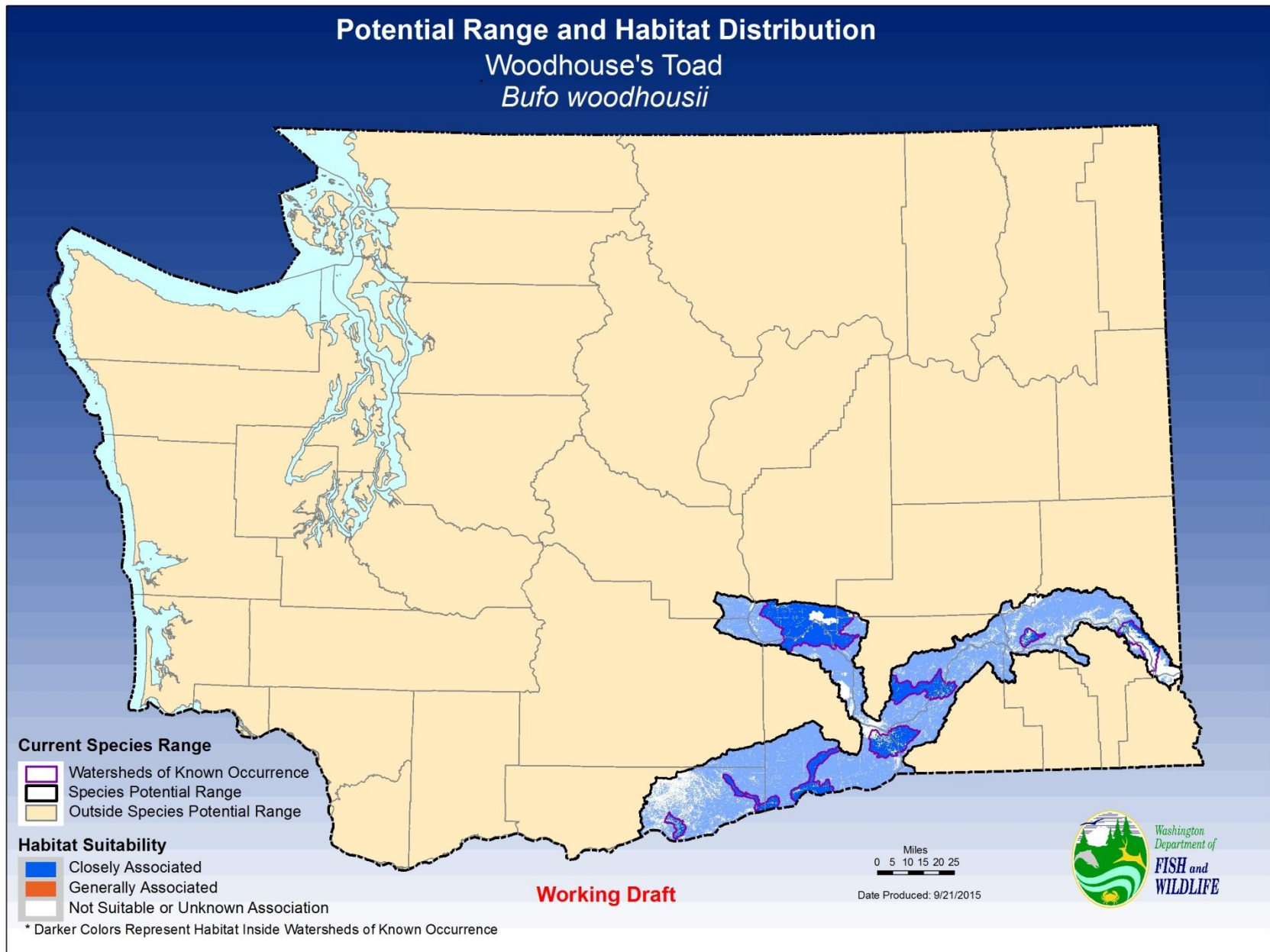
Van Dyke's Salamander



Western Toad

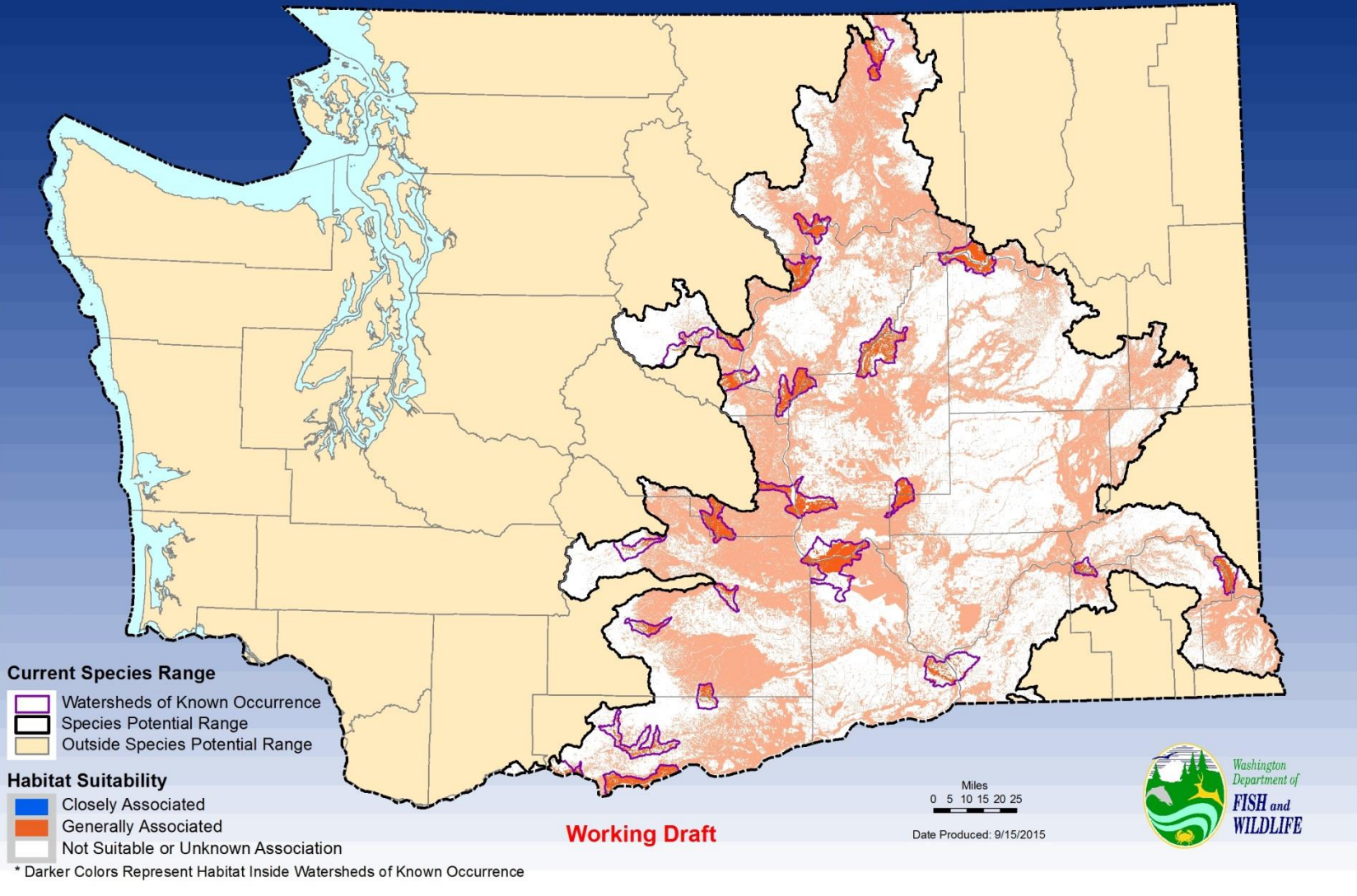


Woodhouse's Toad



Night Snake

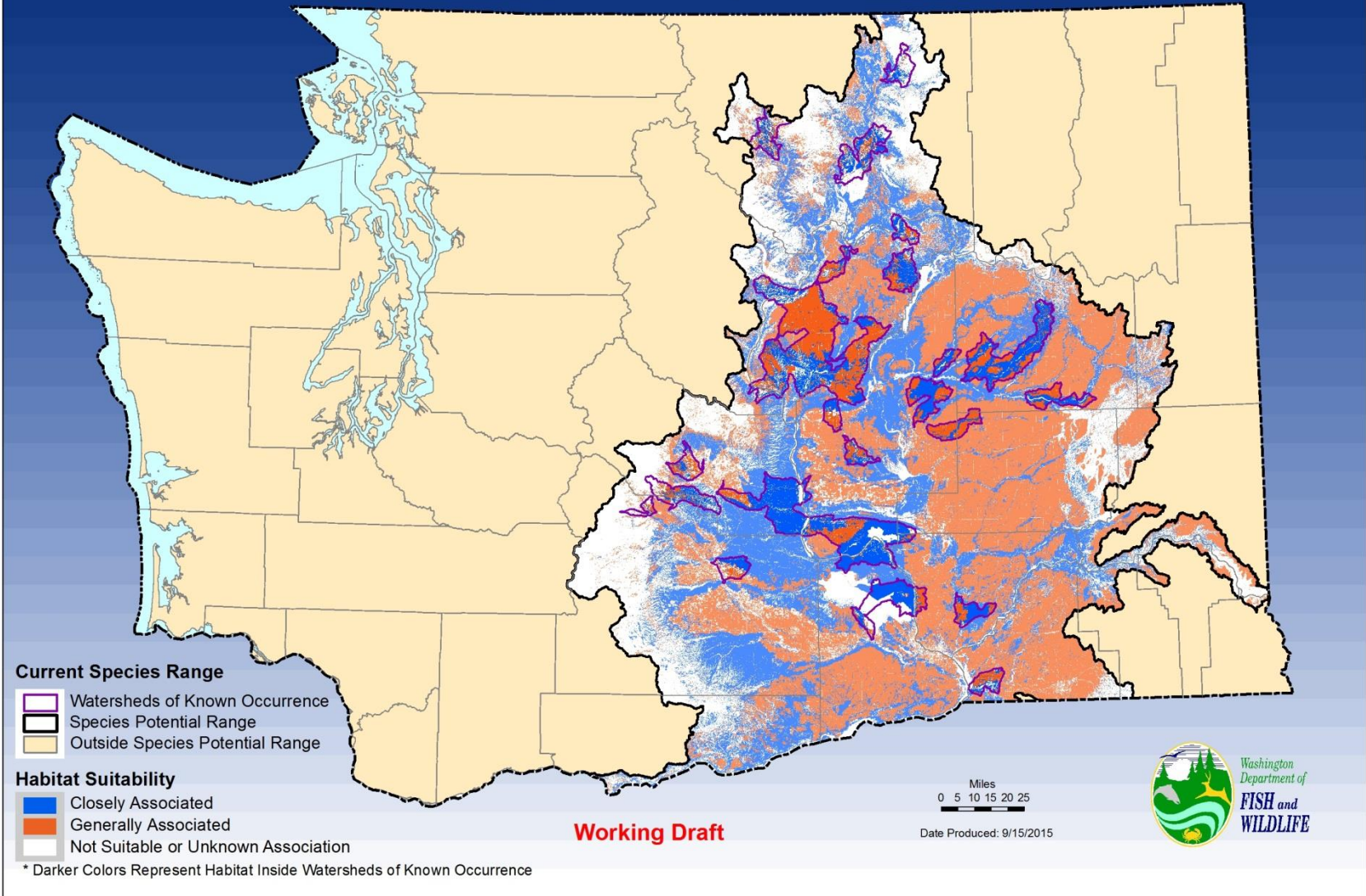
Potential Range and Habitat Distribution Night Snake *Hypsiglena torquata*



Pygmy Horned Lizard

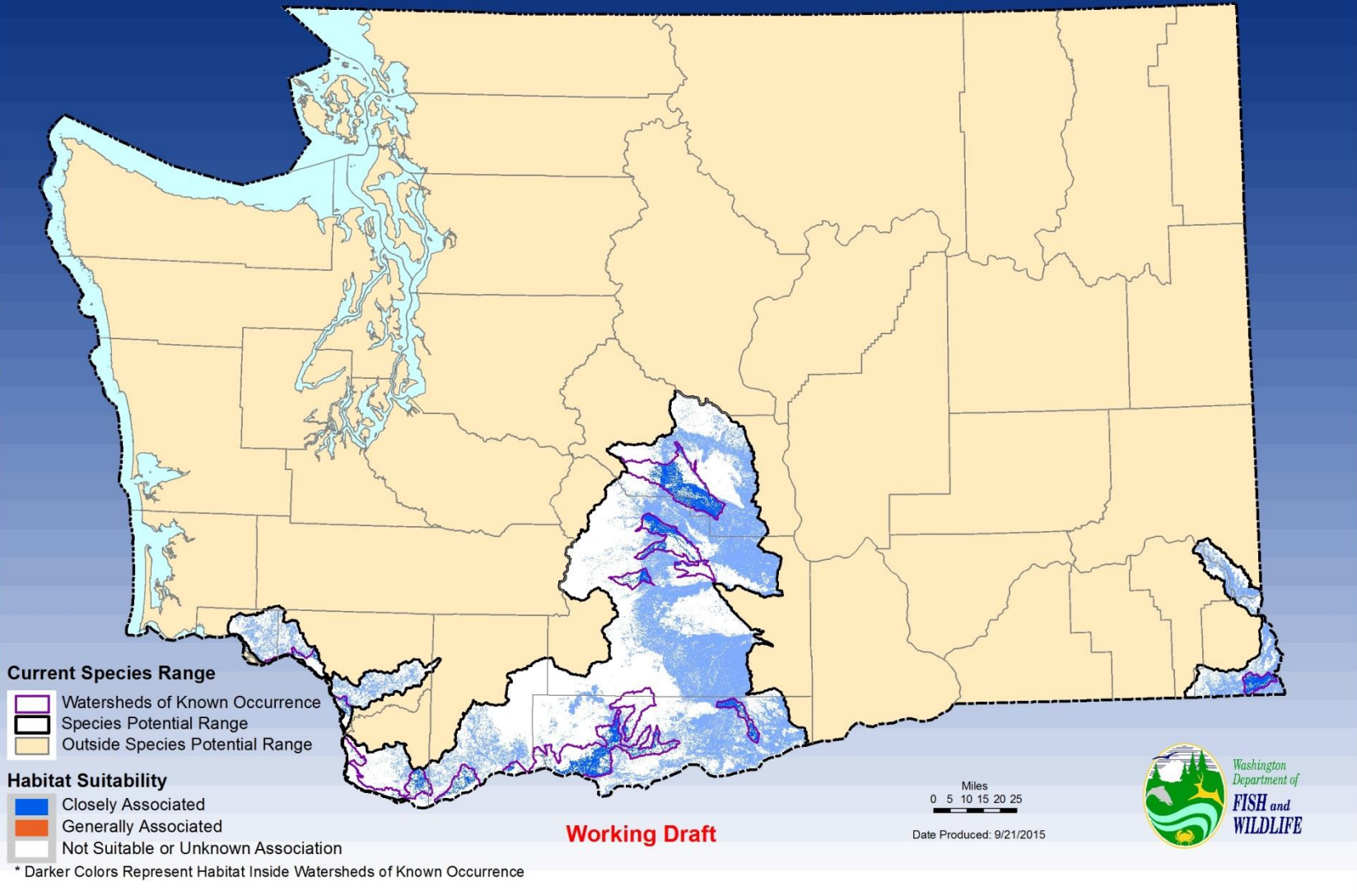
Potential Range and Habitat Distribution

Pygmy Horned Lizard
Phrynosoma douglasii



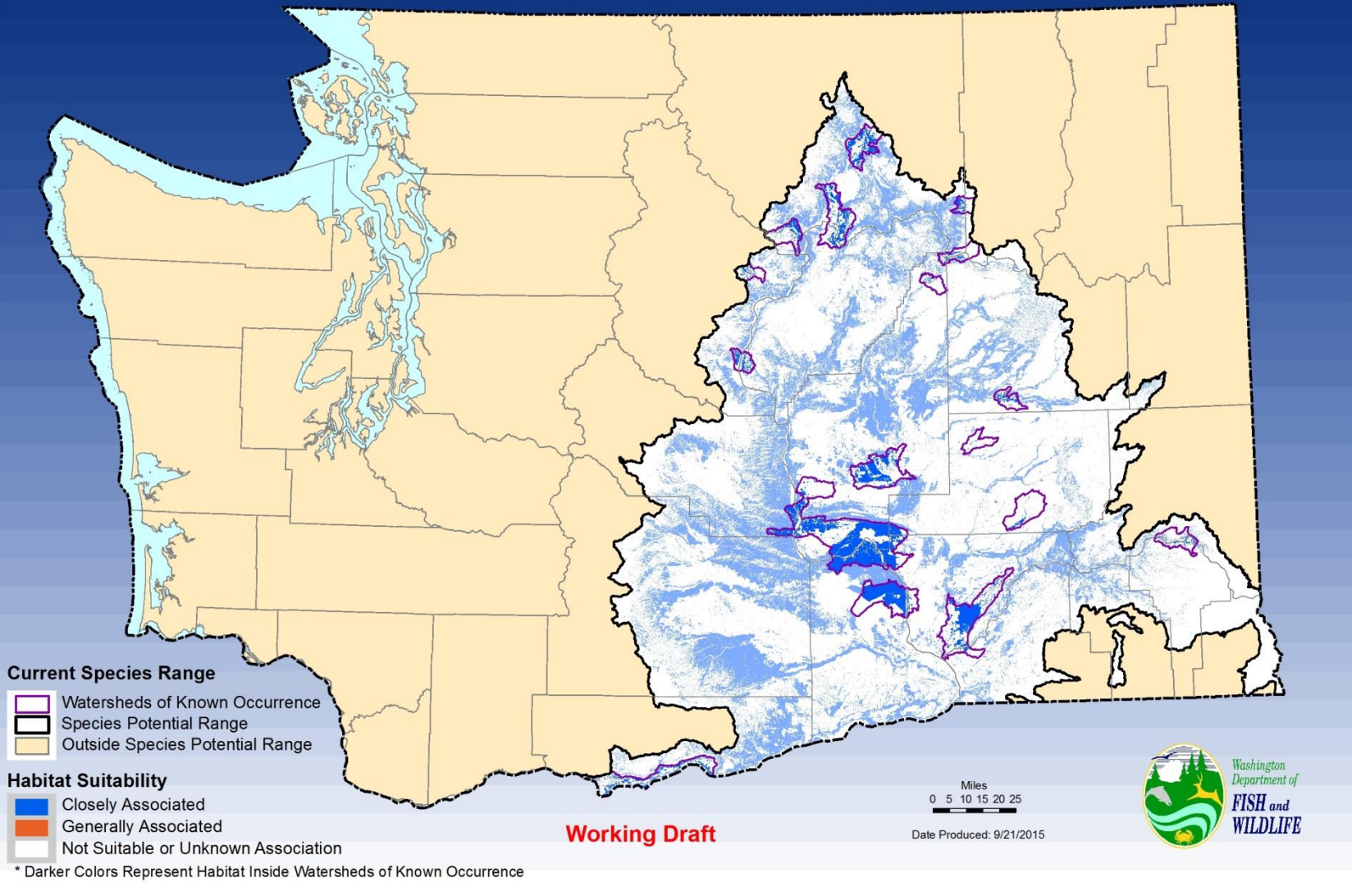
Ringneck Snake

Potential Range and Habitat Distribution Ringneck Snake *Diadophis punctatus*



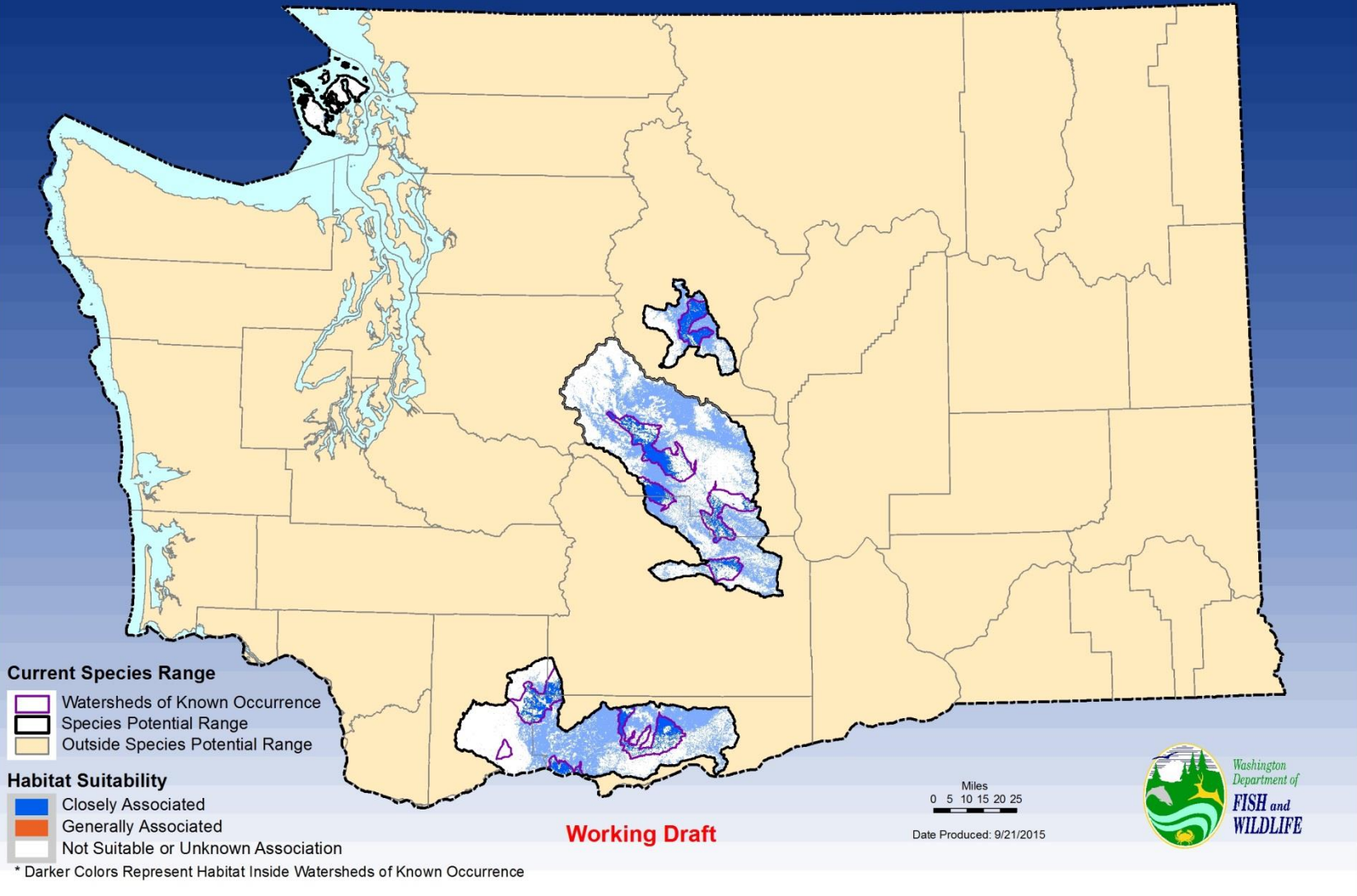
Sagebrush Lizard

Potential Range and Habitat Distribution Sagebrush Lizard *Sceloporus graciosus*



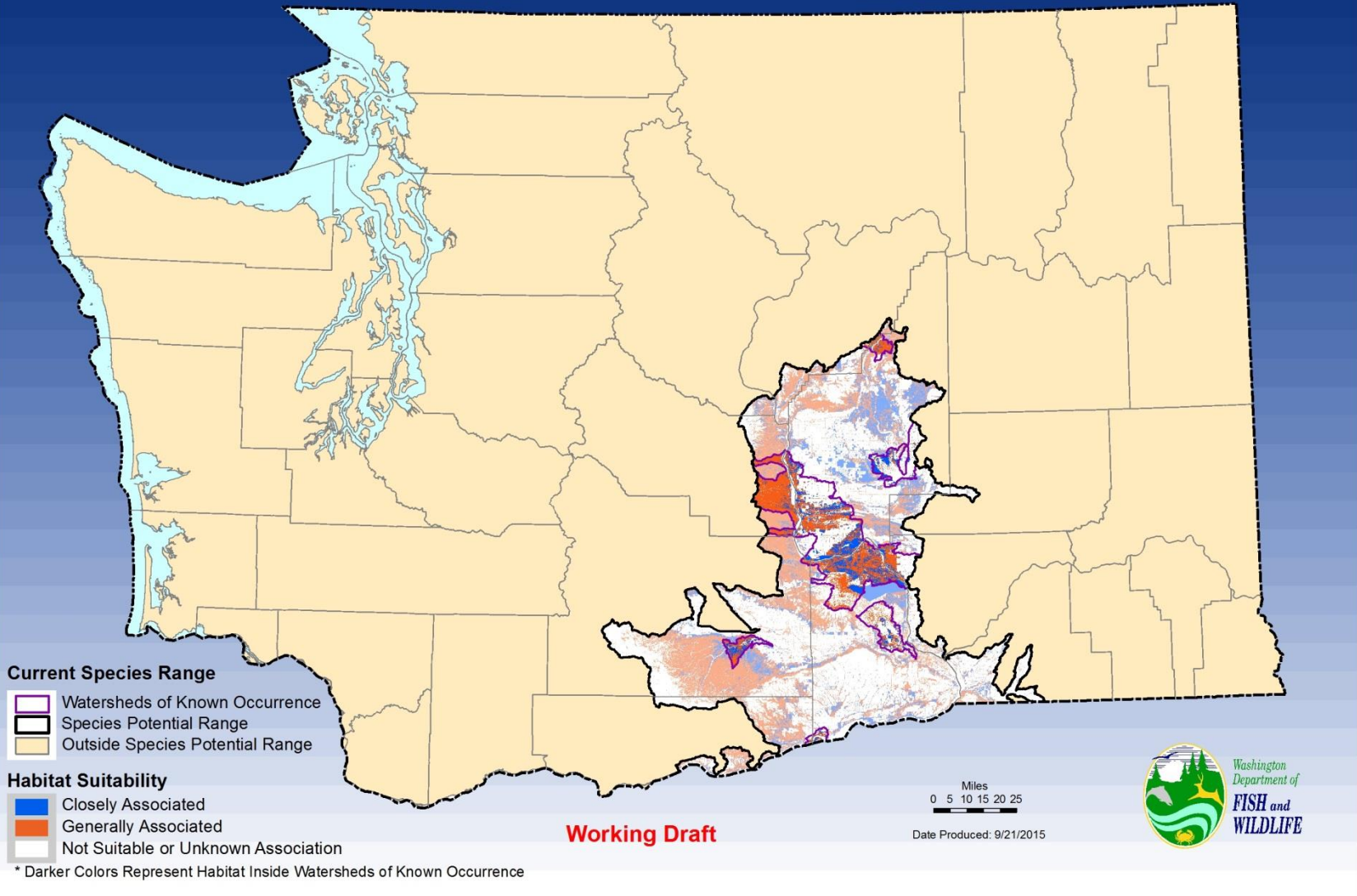
Sharp-tailed Snake

Potential Range and Habitat Distribution Sharp-tailed Snake *Contia tenuis*



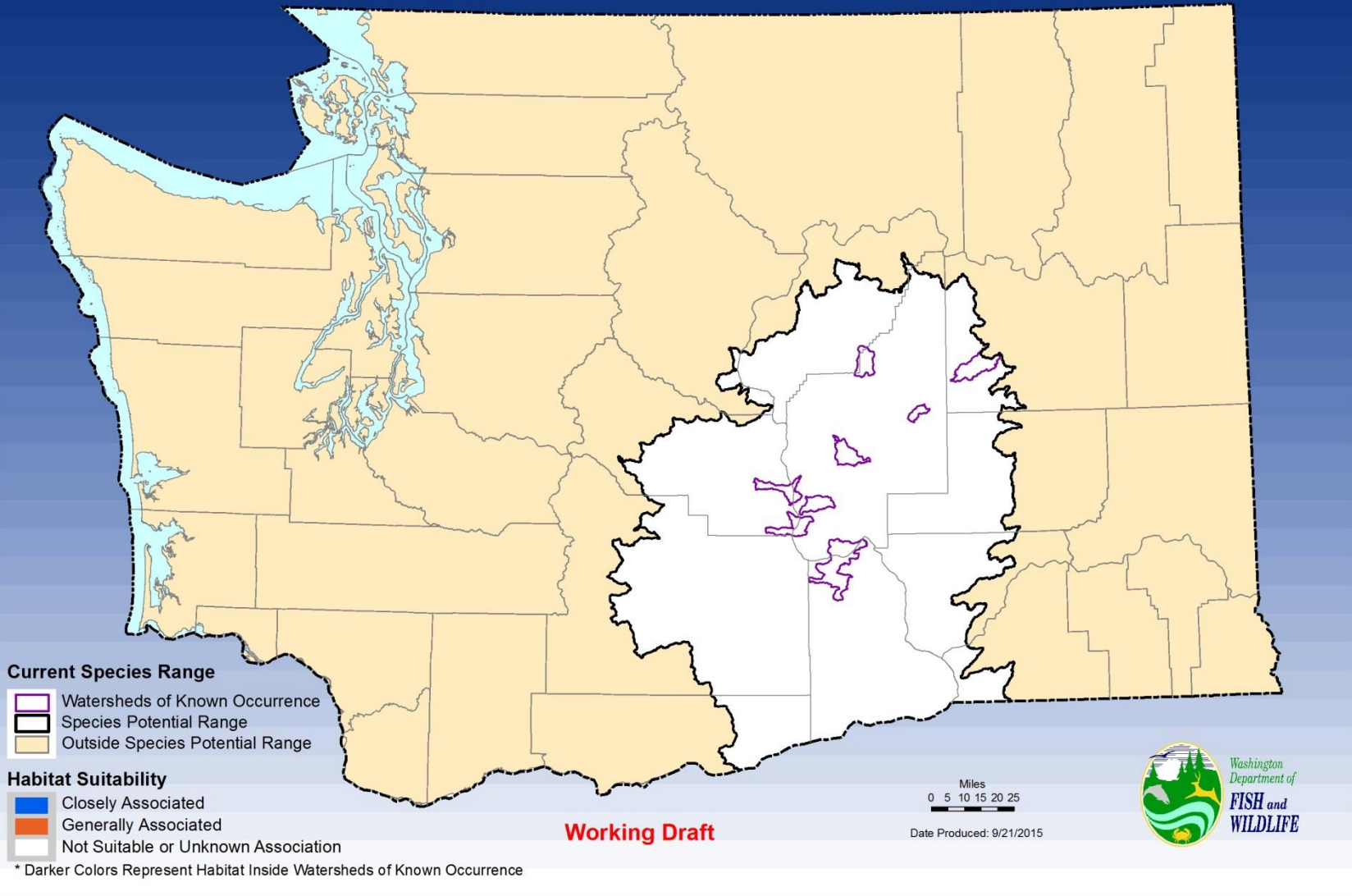
Side-blotched Lizard

Potential Range and Habitat Distribution Side-blotched Lizard *Uta stansburiana*

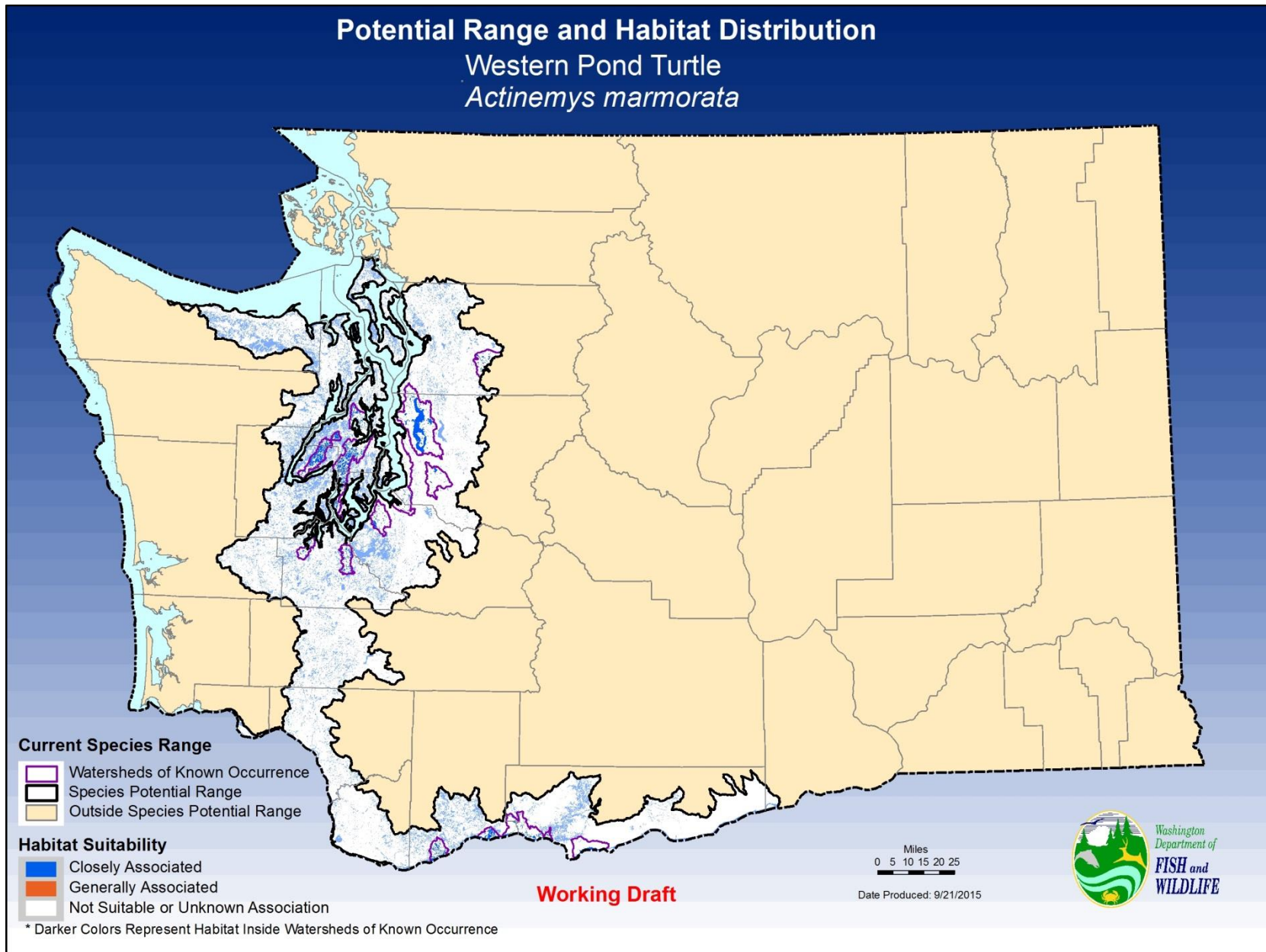


Striped Whipsnake

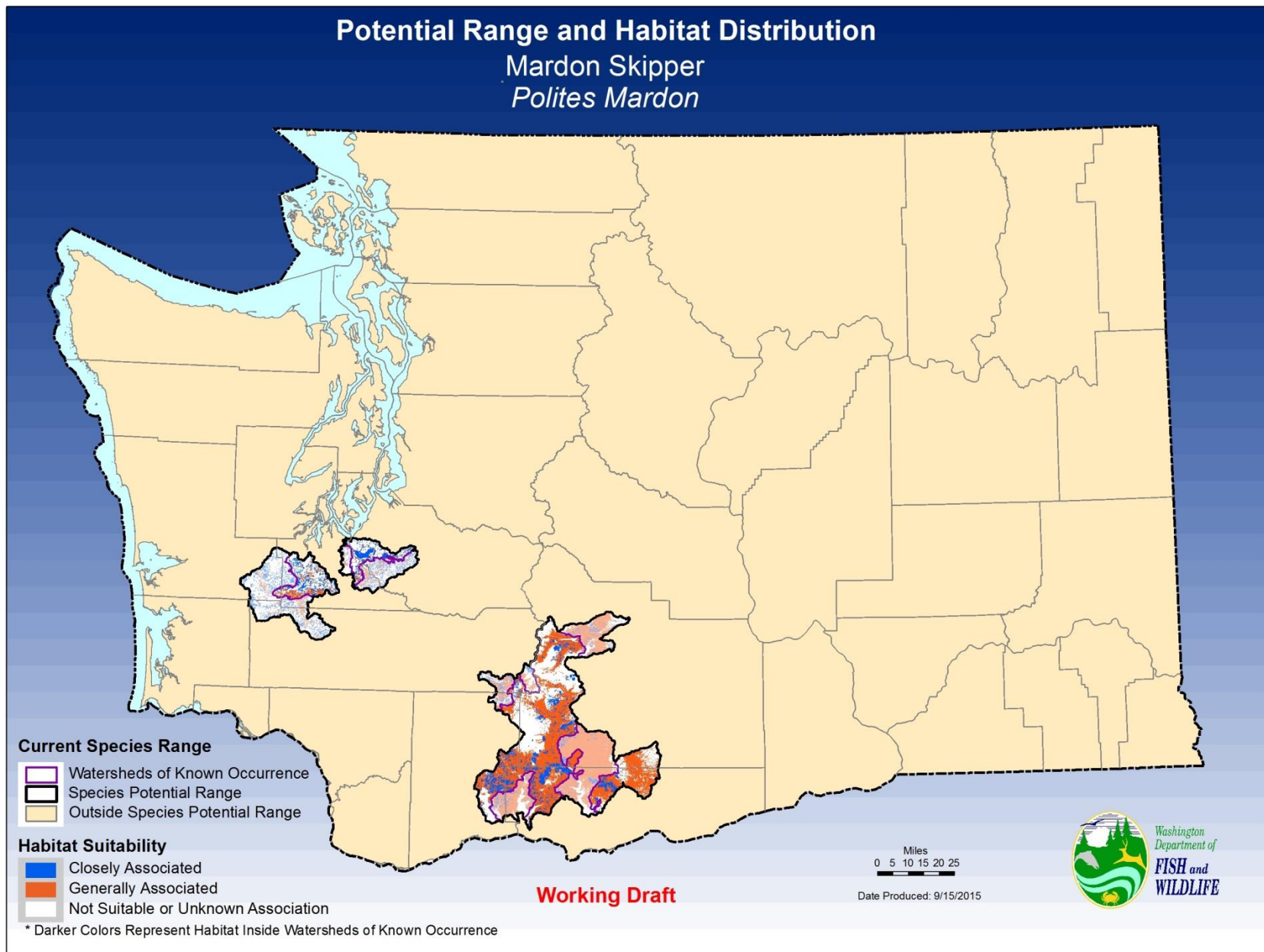
Potential Range and Habitat Distribution Striped Whipsnake *Masticophis taeniatus*



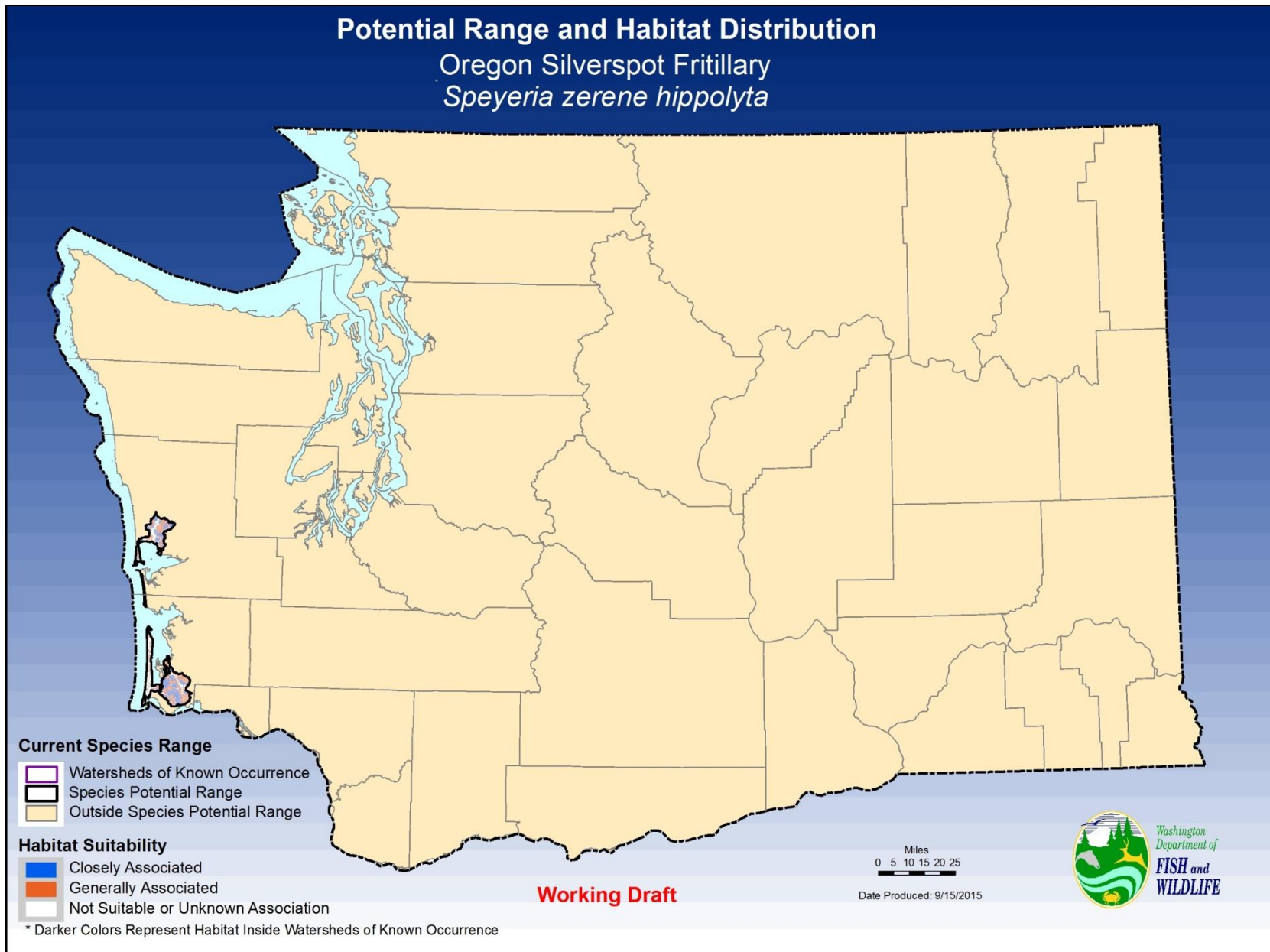
Western Pond Turtle



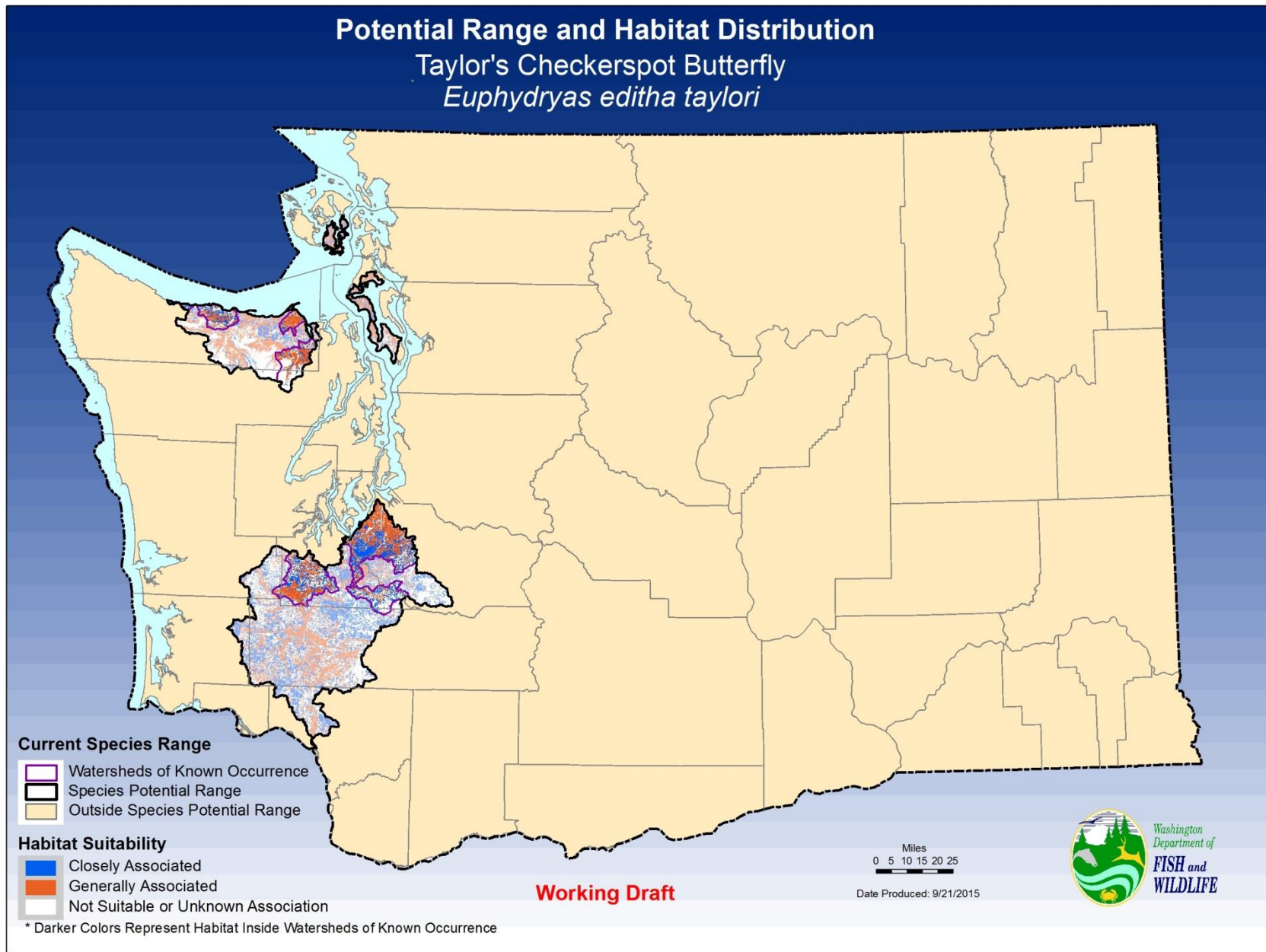
Mardon Skipper



Oregon Silverspot



Taylor's Checkerspot Butterfly



Valley Silverspot

Potential Range and Habitat Distribution Valley Silverspot *Speyeria zerene bremnerii*

