Target Watersheds for Stormwater Retrofit Planning Projects for NEP Watershed 2015 Grant Solicitation for Improving Land Use

The Department of Ecology used the Puget Sound Watershed Characterization to identify target watersheds for siting stormwater retrofit projects. If proposing a stormwater retrofit planning project for the 2015 Grant Solicitation for Improving Land Use, we recommend siting the proposal in one or more target watersheds.

Purpose of Target Watersheds

The primary purpose of identifying target watersheds for stormwater retrofit planning is to:

1) Select those watersheds within and downstream of urban areas that may currently be, or in the future will be significantly affected by surface flows generated by these urban areas; and
2) Determine which of these watersheds, when stormwater restoration measures are applied, would result in the greatest relative benefit to protecting and restoring biological functions in the downstream and intersecting aquatic ecosystems.

Urban development changes the timing and delivery of flows to streams and wetlands, creating abnormal flow regimes and extremes in water level fluctuations. Studies have repeatedly shown that these flow changes, due to increased volume, frequency, and duration, result in simplification of the physical structure of streams and wetlands, which in turn reduces overall species richness.

In general, watersheds that have a higher degree of forest cover, more area of intact floodplains and wetlands and less impervious cover, are more likely to have or closely approximate normal water flow regimes (e.g. water flow processes). This is particularly true if these characteristics predominate in the upper watershed.

The Puget Sound Characterization assessment for water flow uses all of the above characteristics to develop results that identify individual sub-watersheds (i.e. we call them Assessment Units or AUs) that range from relatively intact but important to those that are significantly impacted and not important to water flow processes. Important watersheds, on a relative basis, have higher precipitation, more recharge, greater area of wetlands and floodplains and more area of groundwater discharge.

Summary of Process of Identifying Target Watersheds

Target stormwater areas were selected by first intersecting AUs of moderate high or high importance for water flow processes with urban growth areas (UGAs), then any urban AUs immediately upstream of these important areas were included. Each of these “groupings” of target stormwater areas were then placed within the corresponding watershed. We call these

"groupings" Watershed Management Units or WMUs and they are a collection of all AUs within that watershed.

Once the WMUs were identified, they were ranked according to the Watershed Integrity Scoring System. This provides context to the type of stormwater measures that may be appropriate, since stormwater planning projects should not be limited only to stormwater measures within urban areas. Based on the proposed design of the analysis element of a retrofit project, modeling may have to be conducted in contributing watersheds outside of urban areas. This in turn may identify planning measures (i.e. protecting open space, changing development patterns) in these contributing watershed areas which are a legitimate part of the watershed based planning for this grant. However, only structural activities that address urban issues should be advanced to the pre-design stage.

Maps of the target watersheds are provided at the end of this document. More detail on the process for selecting target watersheds is available in a separate document at: http://www.ecy.wa.gov/puget_sound/grants_fed_watershed.html.

Watershed Integrity Index

For the overall water flow assessment model, the results are shown as areas of "dark green" for high importance and intact AUs (i.e. more natural cover), "yellow" for high importance but high degradation and "red" for low importance and highly degraded AUs. By examining the spatial arrangement of these AUs within a watershed the degree of relative intactness can be determined (see Figures 1 and 2). Watersheds that have an integrity score of 6 through 9, for example, are more likely to have water flow regimes that approximate normal patterns. This suggests that retrofit actions within these watersheds have a greater probability of contributing to the recovery and stability of a functioning aquatic ecosystem relative to watersheds that are highly degraded and of low importance to water flow processes (integrity score of 1).

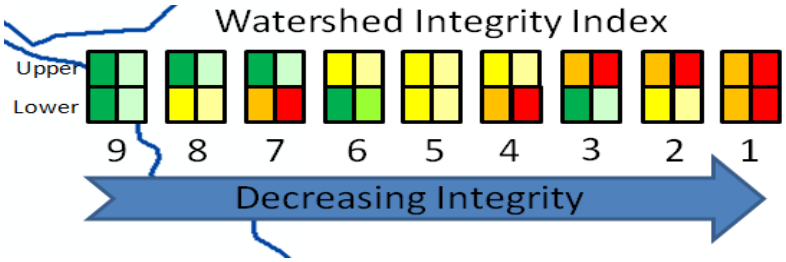


Figure 1. Watershed Integrity Index. Using the overall results of the Puget Sound Characterization, the index evaluates the dominant pattern of "colors" within the upper and lower watershed. Watersheds that have most of the sub-watersheds as a range of green in the upper half are more likely to have intact water flow processes relative to upper watersheds with an orange or red color dominating.

This does not mean that watersheds with lower integrity indices (e.g. less than 5) should be disqualified from consideration for stormwater retrofit projects. Rather, the indices help direct the potential grantee towards the appropriate type of retrofit project. The following questions should be addressed by the grantee when evaluating stormwater retrofit planning projects within the proposed areas:

- Integrity Index of 5 or greater: Will the retrofit planning program proposed contribute to the protection and restoration of biological functions of downstream aquatic ecosystems? For example, a retrofit program could include measures that reduce high flows through LID measures within existing development. Proposals within these WMUs should also address water quality problems as appropriate, but this need not be the primary stated goal of the retrofit planning project. These watersheds will typically have a B-IBI score of 28 or greater (fair to excellent).
- Integrity Index of 5 or less: Will the proposed retrofit planning program address and have a high likelihood of correcting a significant water quality problem that is affecting an important downstream aquatic area? For example, if an area has a low integrity score related to flow but is contributing pathogens that are impacting important downstream shellfish beds (must be documented) a retrofit project that addresses this is appropriate. These watersheds will typically have a fair/poor to very poor B-IBI score.

Points for Stormwater Retrofit Planning Projects in Target Watersheds:

Reviewers of the grant proposals will reserve eight of the available 16 points under the Purpose section of the application for strategically located stormwater retrofit planning projects. Proposals that are located in one of the target watersheds with a Watershed Integrity Index of 5 or greater will be awarded eight points. Planning assessments may address the entire Watershed Management Unit (WMU), but specific retrofit projects that are identified should be located within the target watersheds to receive these bonus points.

Reviewers will award four points under the Purpose section for proposals that address one of the target watersheds with a Watershed Integrity Index of less than 5. Again, planning assessments may address the entire WMU, but specific retrofit projects should be located within the target watersheds.

Proposals that do not address target watersheds and that locate specific retrofit projects outside of target watersheds are eligible for this grant solicitation, but will not receive any of the available eight points. Applicants that do not select a target watershed should explain their reasoning for selecting the location of their projects, explain how they used a watershed approach to site the projects, and clearly demonstrate how the projects would contribute to the recovery and stability of a functioning aquatic ecosystem in the selected watershed.

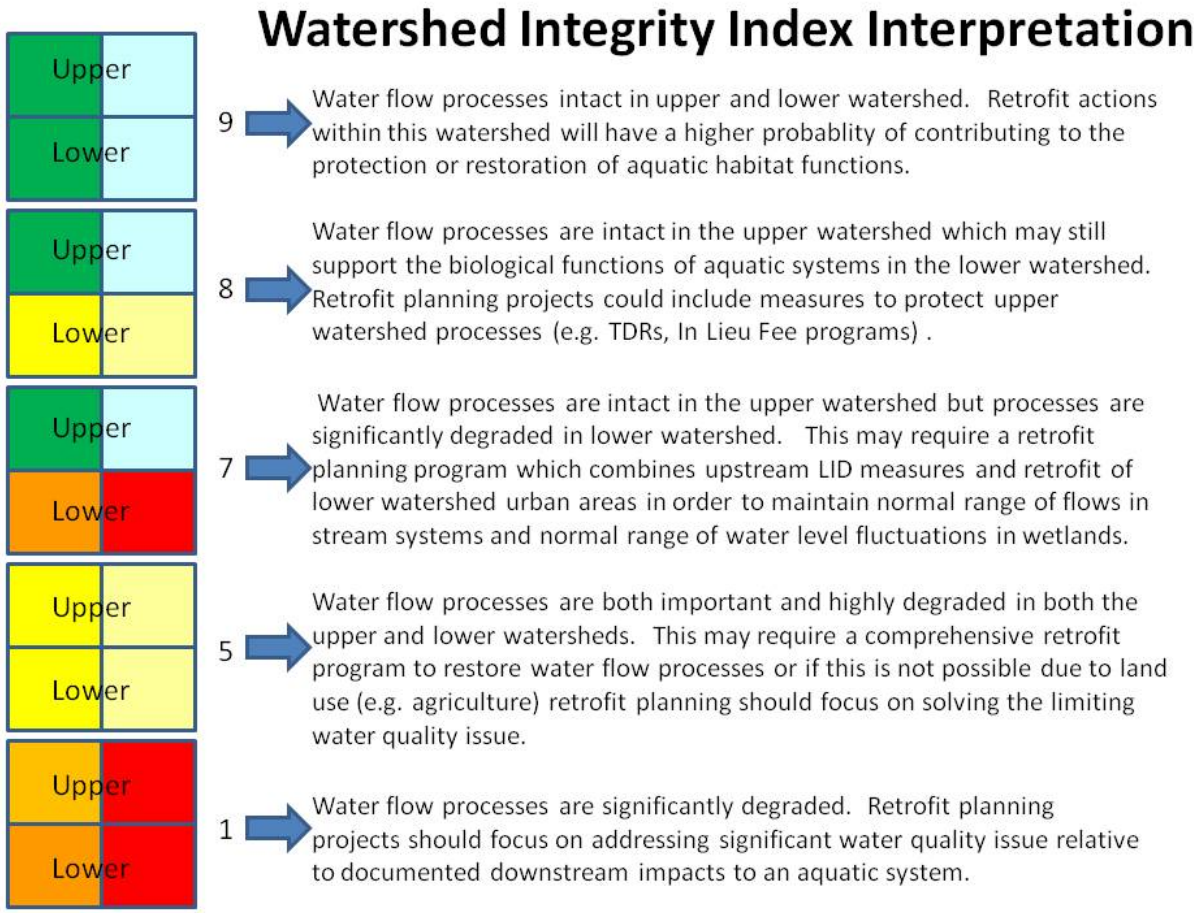


Figure 2. Watershed Integrity Index Interpretation. In conjunction with the questions above, the description of the integrity index conditions relative to the associated score should be used to help guide a grantee towards the appropriate type of stormwater planning project.

Because integrity scores are relative to conditions within their WRIA, they cannot be compared across different WRIAs. For this reason, we encourage grant applicants to use other finer scale information to document the integrity of their watersheds. For example, the Benthic Index of Biological Integrity (B-IBI) is based on a methodology that allows comparison of watersheds across WRIAs and is a more accurate measure of the actual integrity of a watershed relative to its physical processes and biological functions. If an integrity score is a "4" but the B-IBI score shows a much higher level of integrity (30), then the applicant should proceed to plan within the 5 or greater category. As a general rule we consider streams with a "fair" score of 28 or greater to be approximately equivalent to a watershed integrity index of 5 or greater. B-IBI scores are not available for all watersheds in Puget Sound. The Puget Sound Stream Benthos program provides data and maps for selected streams at: http://pugetsoundstreambenthos.org/default.aspx.

Figure 3 shows an example map of target watersheds with their assigned Watershed Integrity Index scores. .

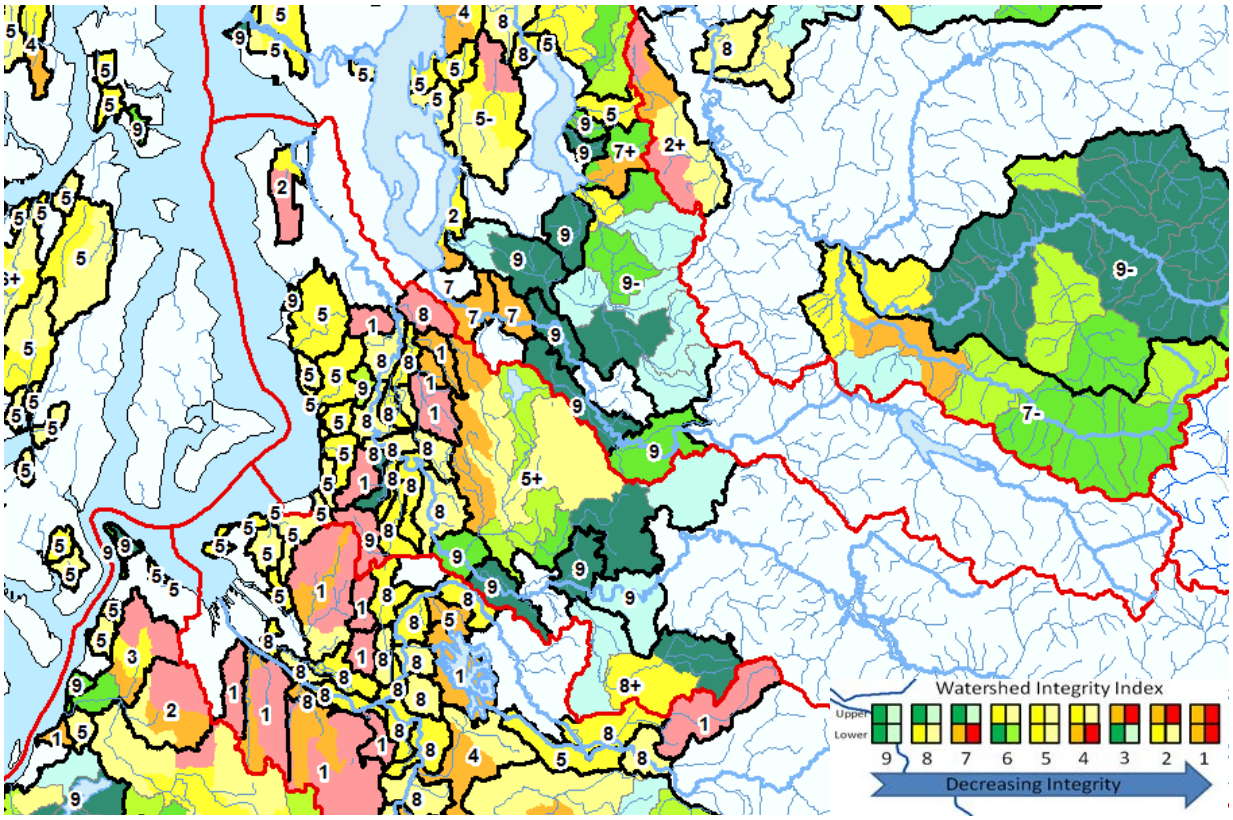


Figure 3. Example Map of WRIAs 8, 9 and 10. The WMUs are the "black" outlined groupings of smaller subwatersheds known as Assessment Units. The Watershed Integrity Index was applied to each of the WMUs that intersect target stormwater areas.

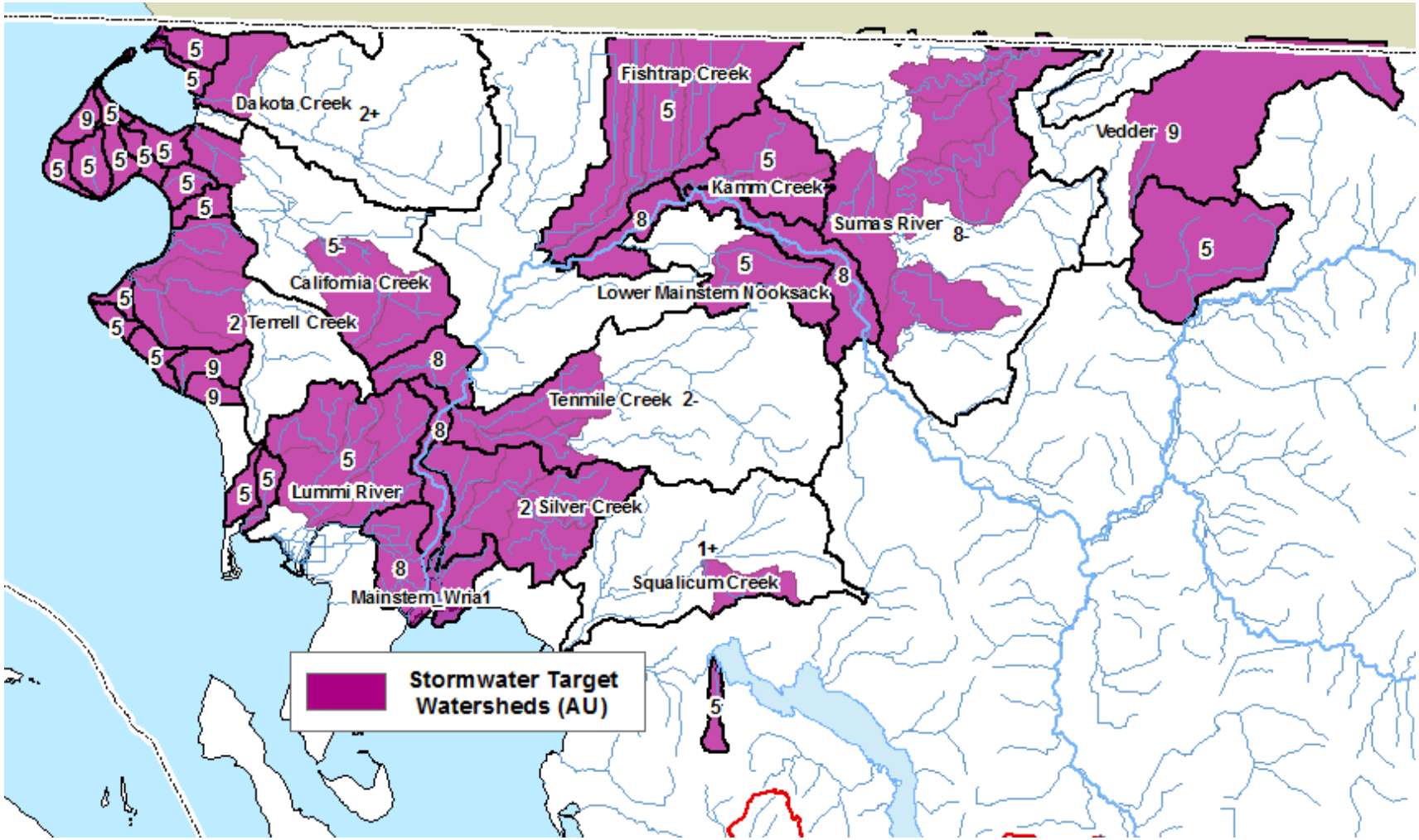
Stormwater Retrofit Target Watershed Maps

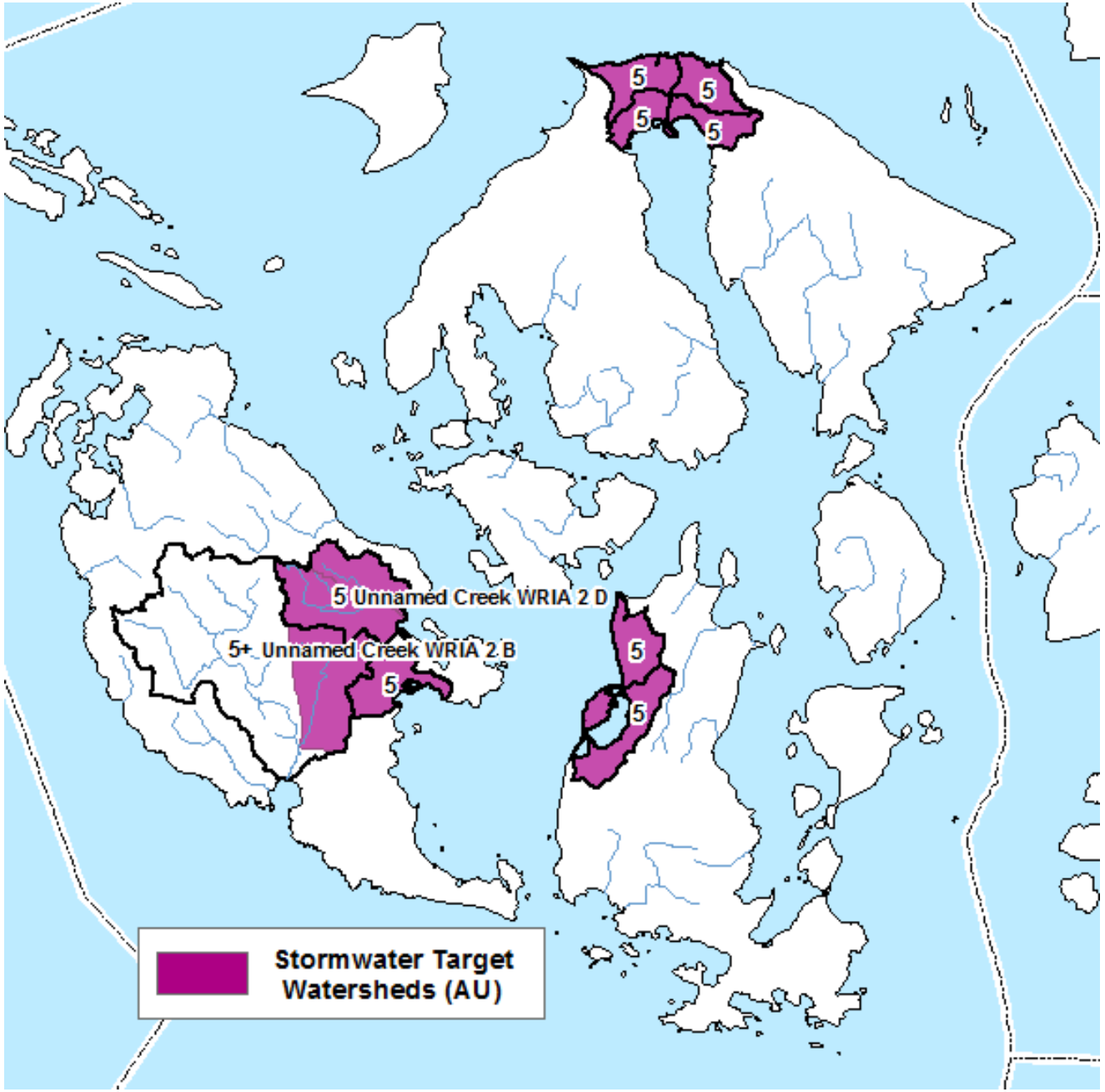
DEPARTMENT OF
ECOLOGY
State of Washington

Stormwater Retrofit Target Watersheds

With Watershed Integrity Index (1-9)
for the
Watershed Management Unit (Black boundary)

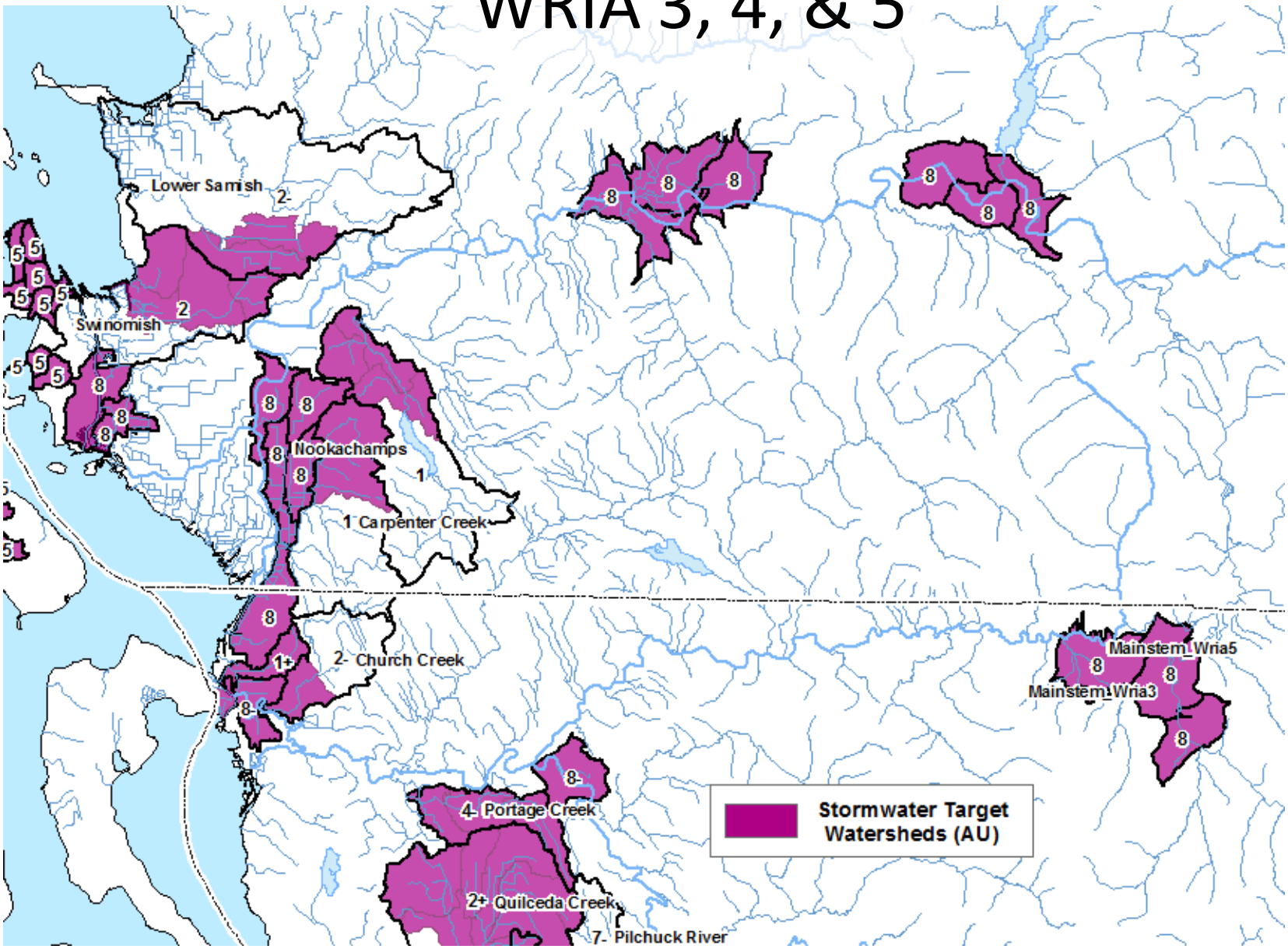
WRIA 1


Dakota Creek
Fishtrap Creek
Vedder
Kamm Creek
Sumas River
California Creek
Lower Mainstem Nooksack
Terrell Creek
Tenmile Creek
Lummi River
Silver Creek
Squalicum Creek
Mainstem Wria1
Stormwater Target Watersheds (AU)

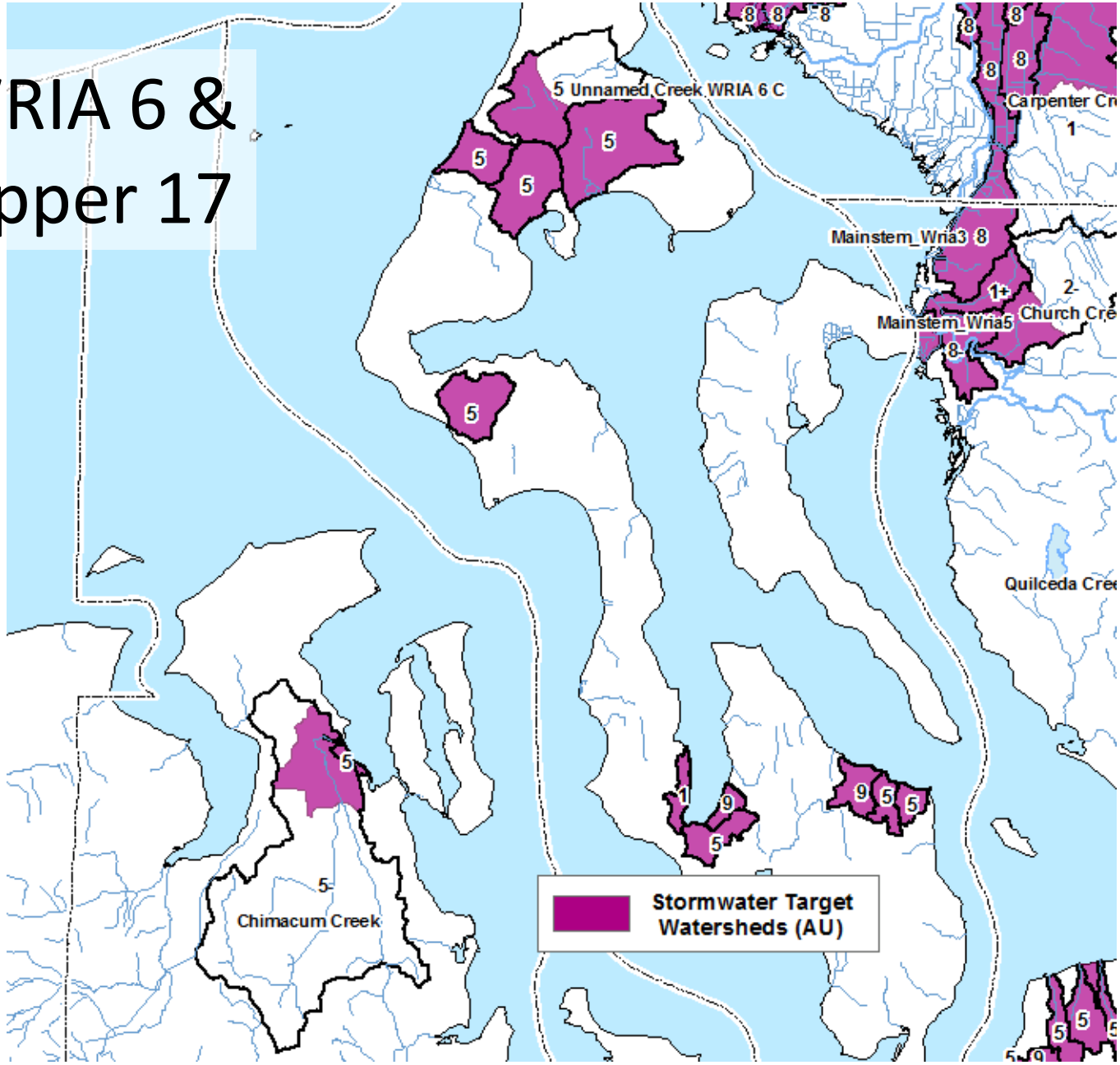

5
5
5
5
5 Unnamed Creek WRIA 2 D
5+ Unnamed Creek WRIA 2 B
5
5
5
Stormwater Target Watersheds (AU)

WRIA 2

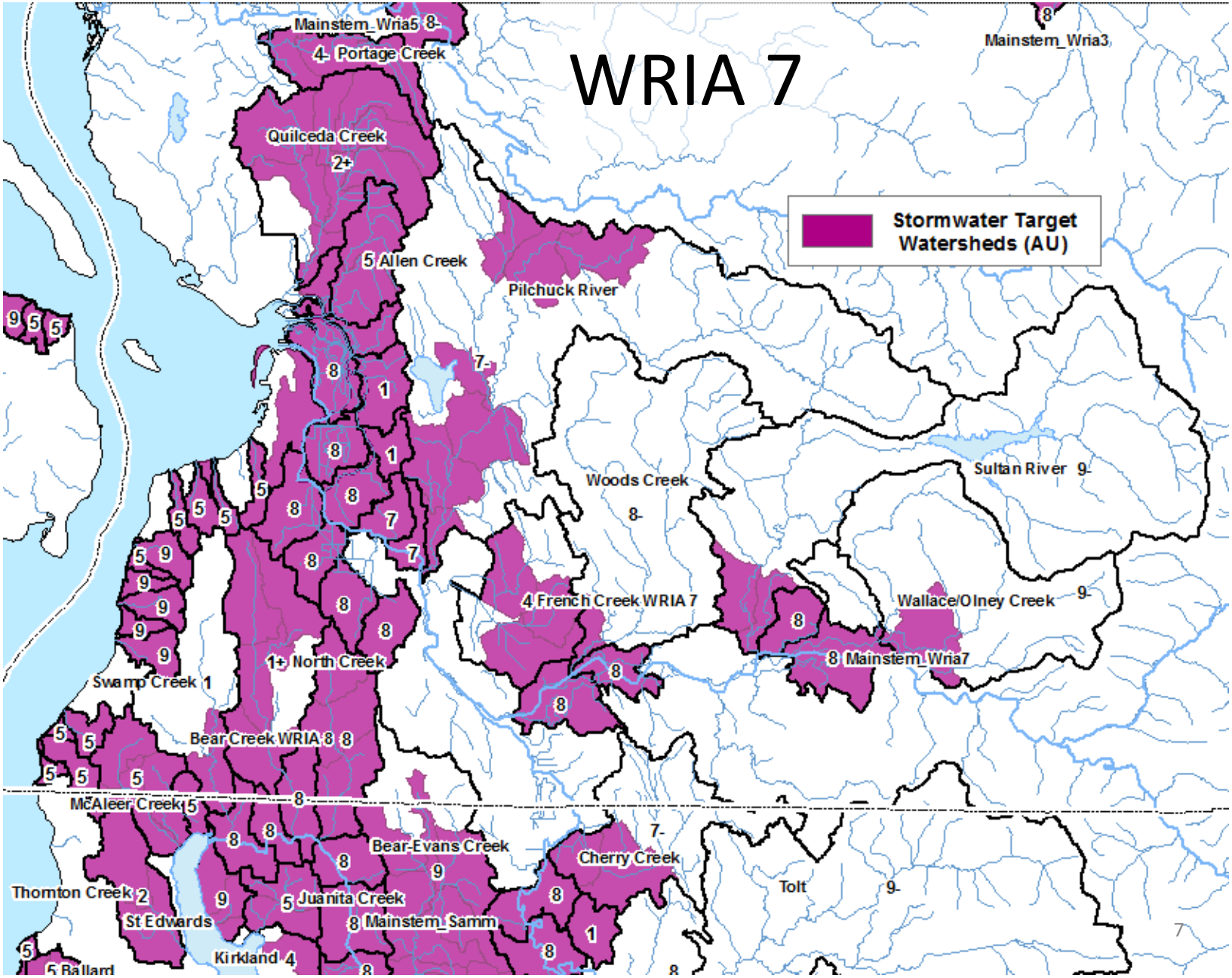
WRIA 3, 4, & 5

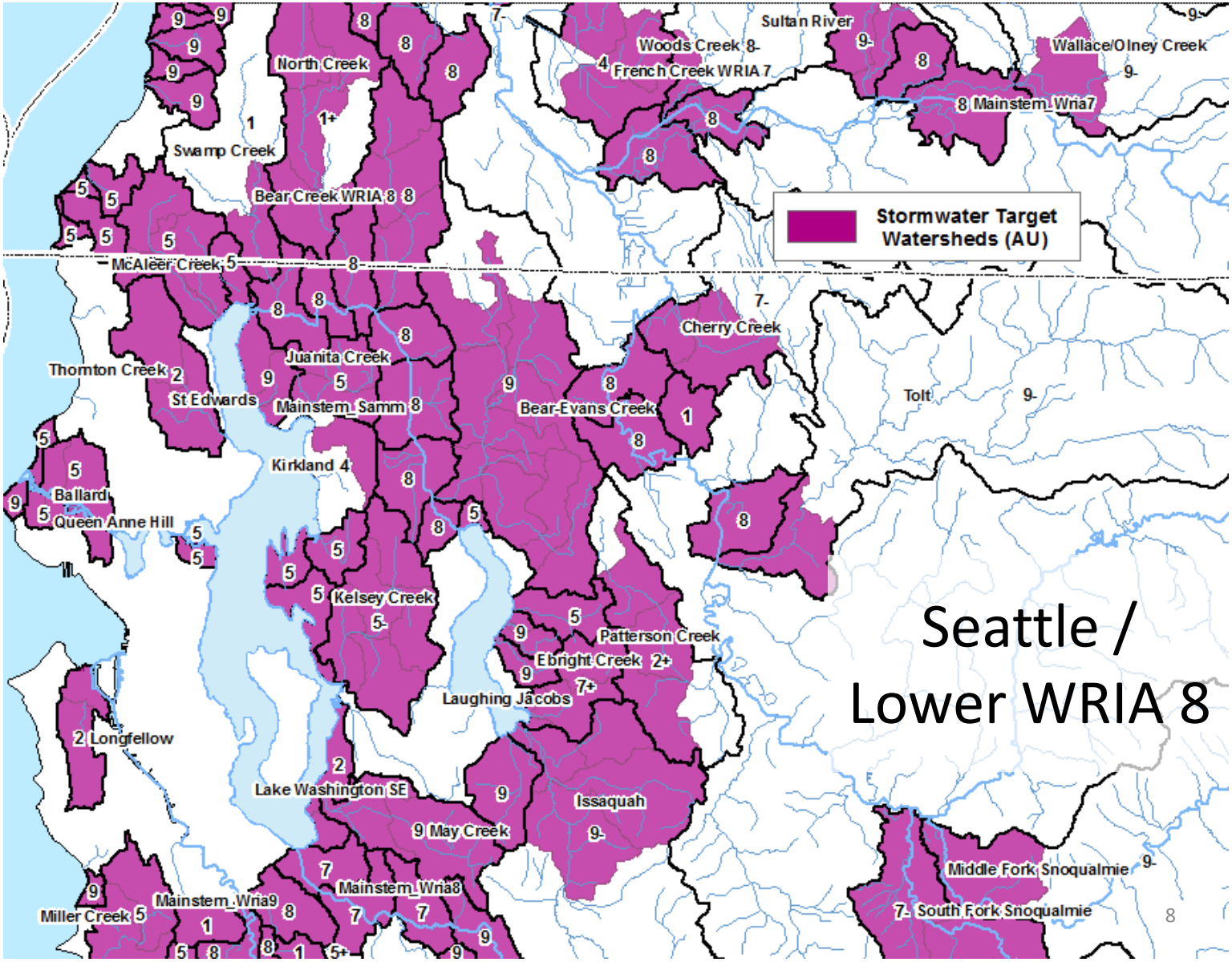

Lower Samish
2-
Swinomish
Nookachamps
1
1 Carpenter Creek
2- Church Creek
1+
8-
4- Portage Creek
2+ Quilceda Creek
7- Pilchuck River
Mainstem_Wria5
Mainstem_Wria3
Stormwater Target Watersheds (AU)

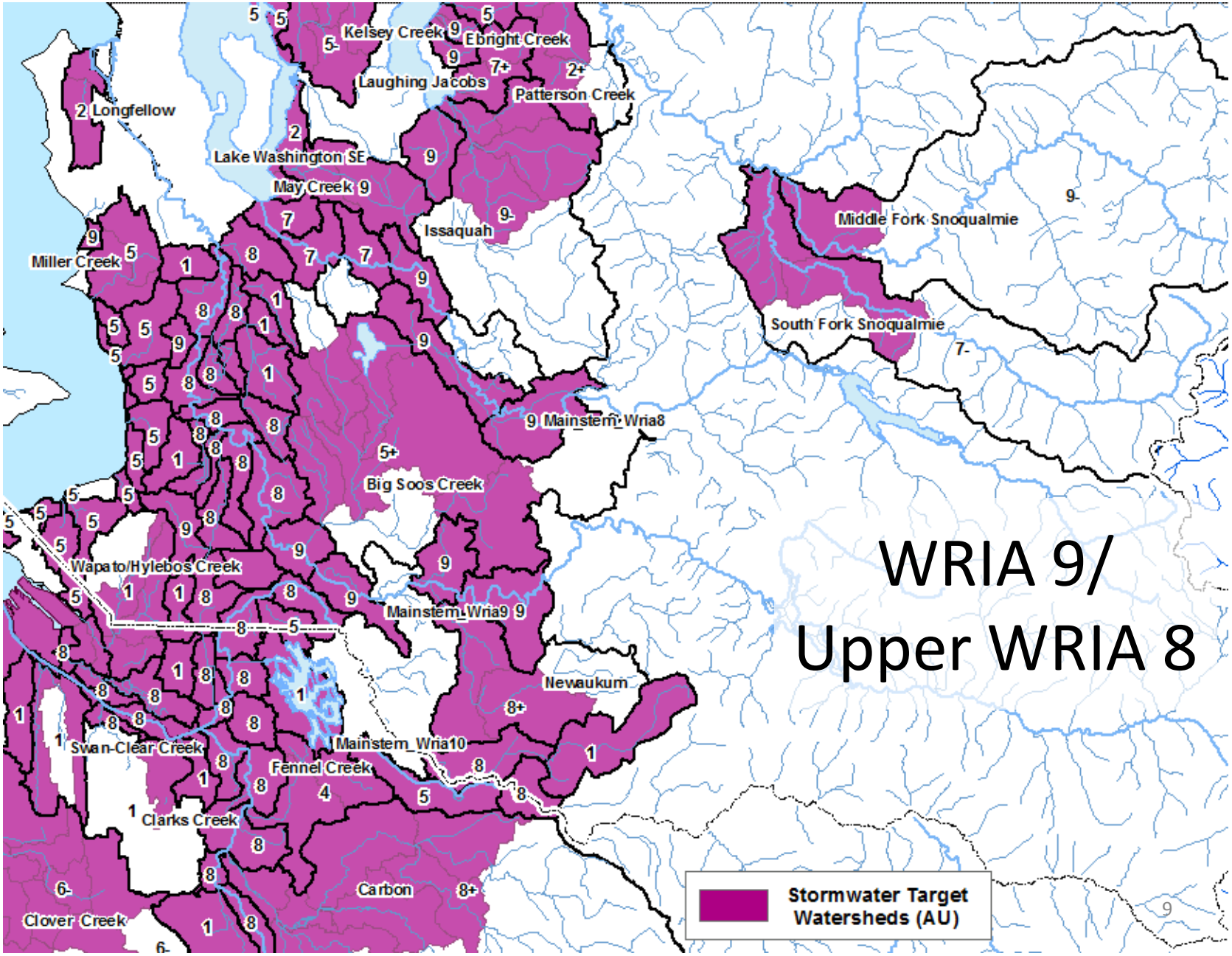
WRIA 6 & Upper 17



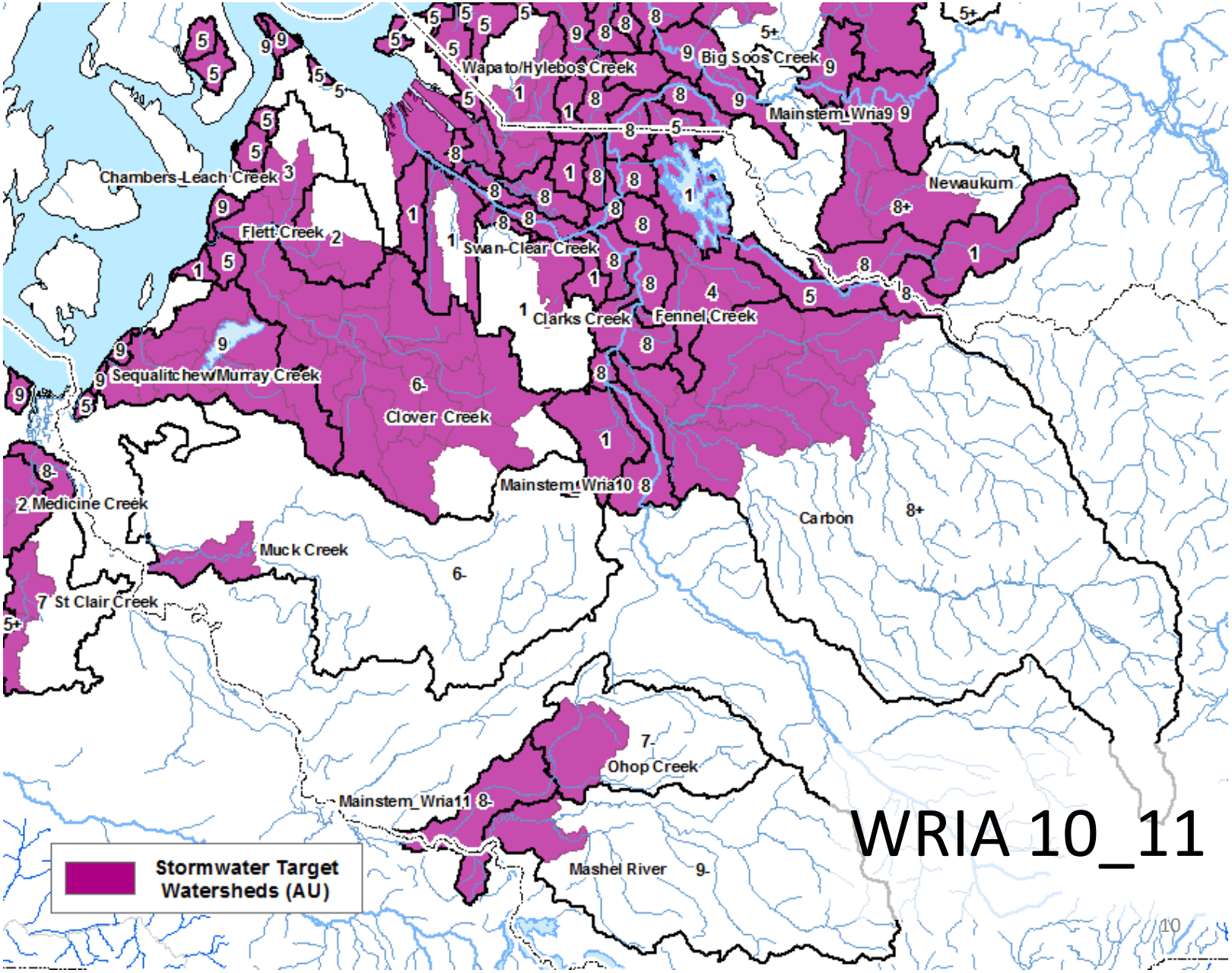
WRIA 7


Stormwater Target Watersheds (AU)
Mainstem_Wria5
Portage Creek
Mainstem_Wria3
Quilceda Creek
Allen Creek
Pilchuck River
Woods Creek
Sultan River
French Creek WRIA 7
Wallace/Olney Creek
Mainstem_Wria7
North Creek
Swamp Creek
Bear Creek WRIA 8
McAleer Creek
Bear-Evans Creek
Cherry Creek
Thornton Creek
Juanita Creek
Tolt
St Edwards
Mainstem_Samm
Kirkland
Ballard

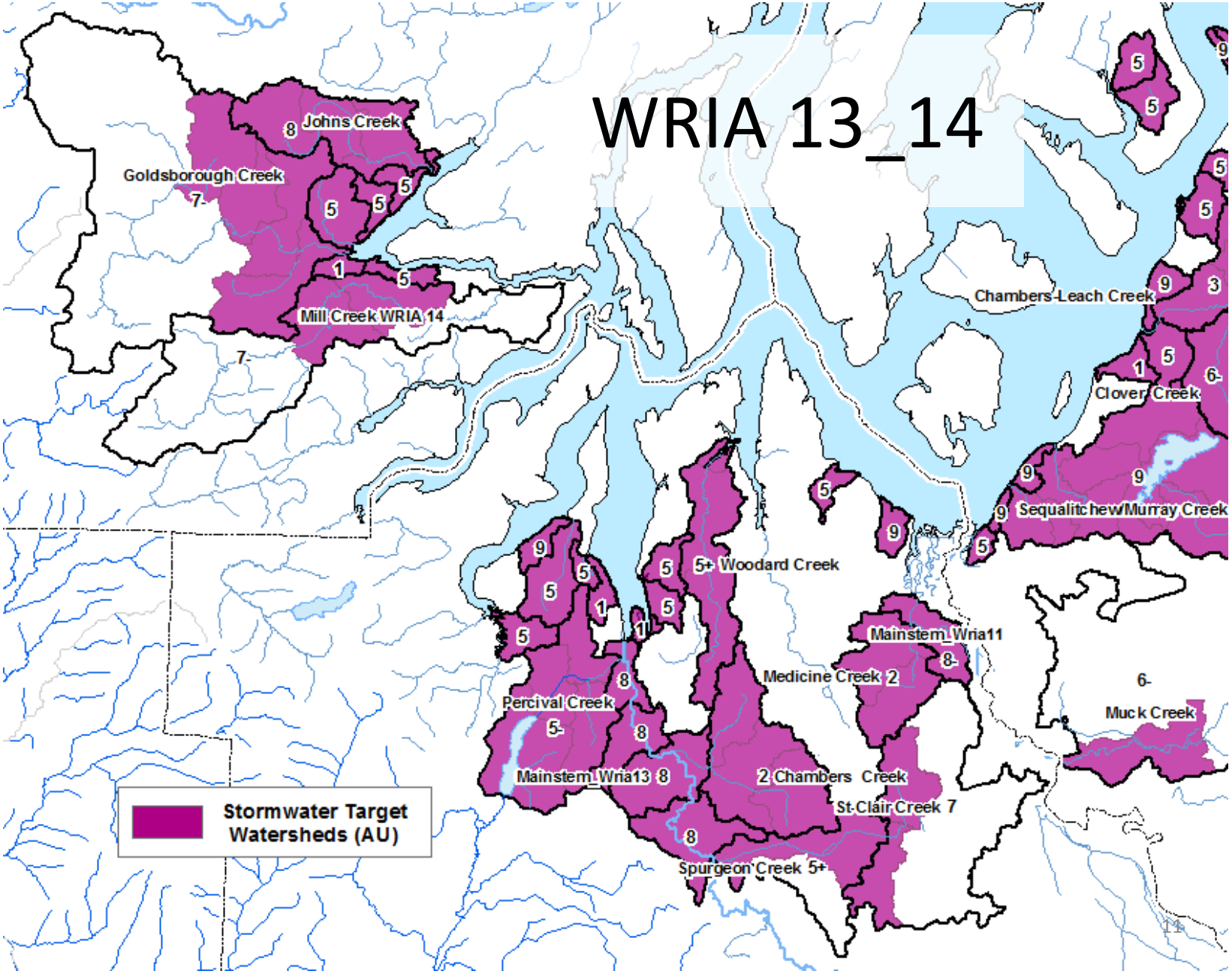

Stormwater Target Watersheds (AU)
Seattle / Lower WRIA 8
North Creek
Swamp Creek
Bear Creek WRIA 8
McAleer Creek
Thornton Creek
St Edwards
Juanita Creek
Mainstem_Samm
Kirkland 4
Ballard
Queen Anne Hill
Kelsey Creek
Longfellow
Lake Washington SE
May Creek
Mainstem_Wria8
Mainstem_Wria9
Miller Creek
Laughing Jacobs
Ebright Creek
Patterson Creek
Bear-Evans Creek
Cherry Creek
Woods Creek
French Creek WRIA 7
Sultan River
Wallace/Olney Creek
Mainstem_Wria7
Tolt
Issaquah
Middle Fork Snoqualmie
South Fork Snoqualmie

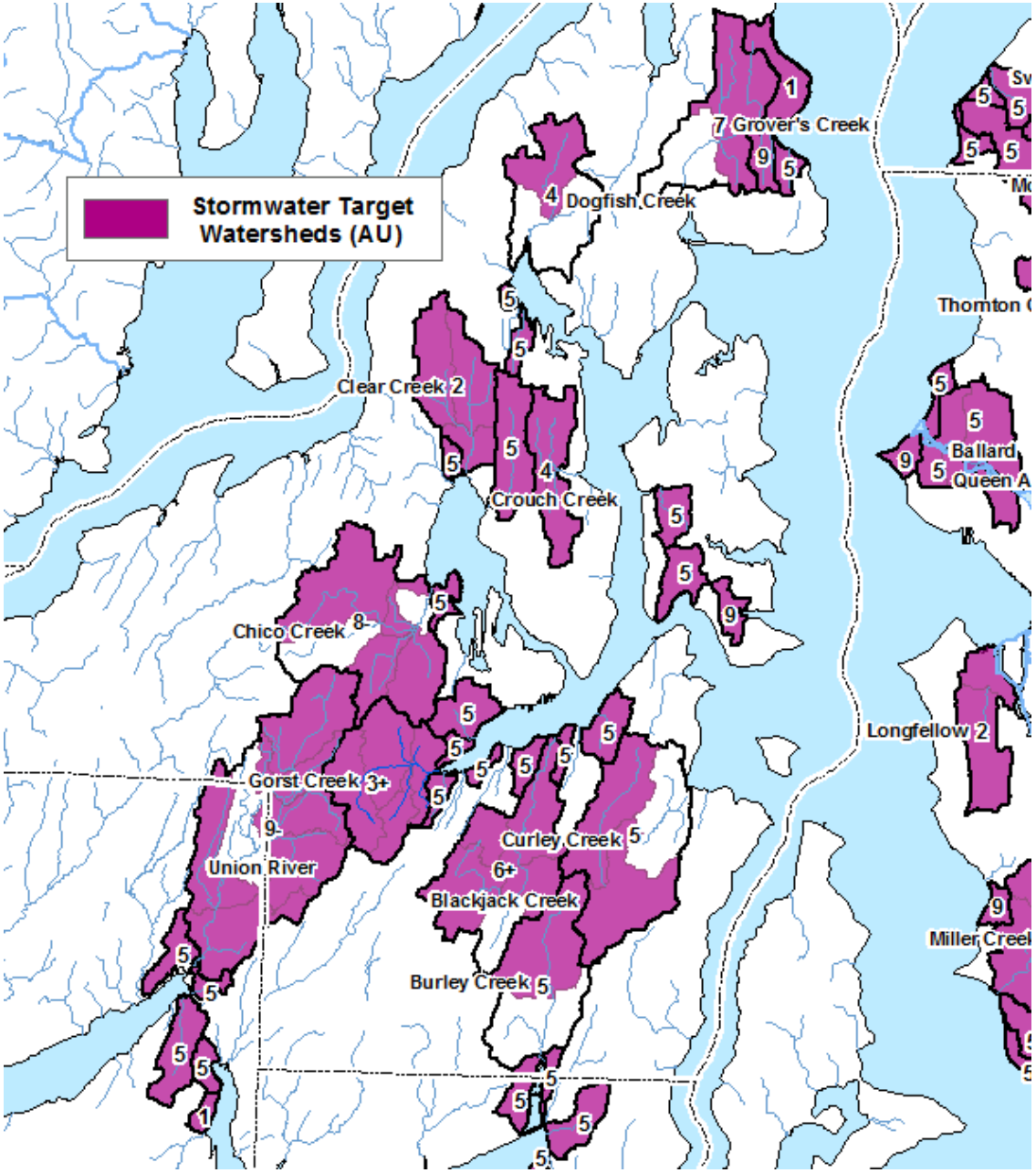


WRIA 9/ Upper WRIA 8


Wapato/Hylebos Creek
Big Soos Creek
Mainstem_Wria9
Nevaukum
Chambers_Leach Creek
Flett Creek
Swan-Clear Creek
Clarks Creek
Fennel Creek
Sequalitchew/Murray Creek
Clover Creek
Mainstem_Wria10
2 Medicine Creek
Muck Creek
Carbon
7 St Clair Creek
Ohop Creek
Mainstem_Wria11
Mashel River
Stormwater Target Watersheds (AU)
WRIA 10_11

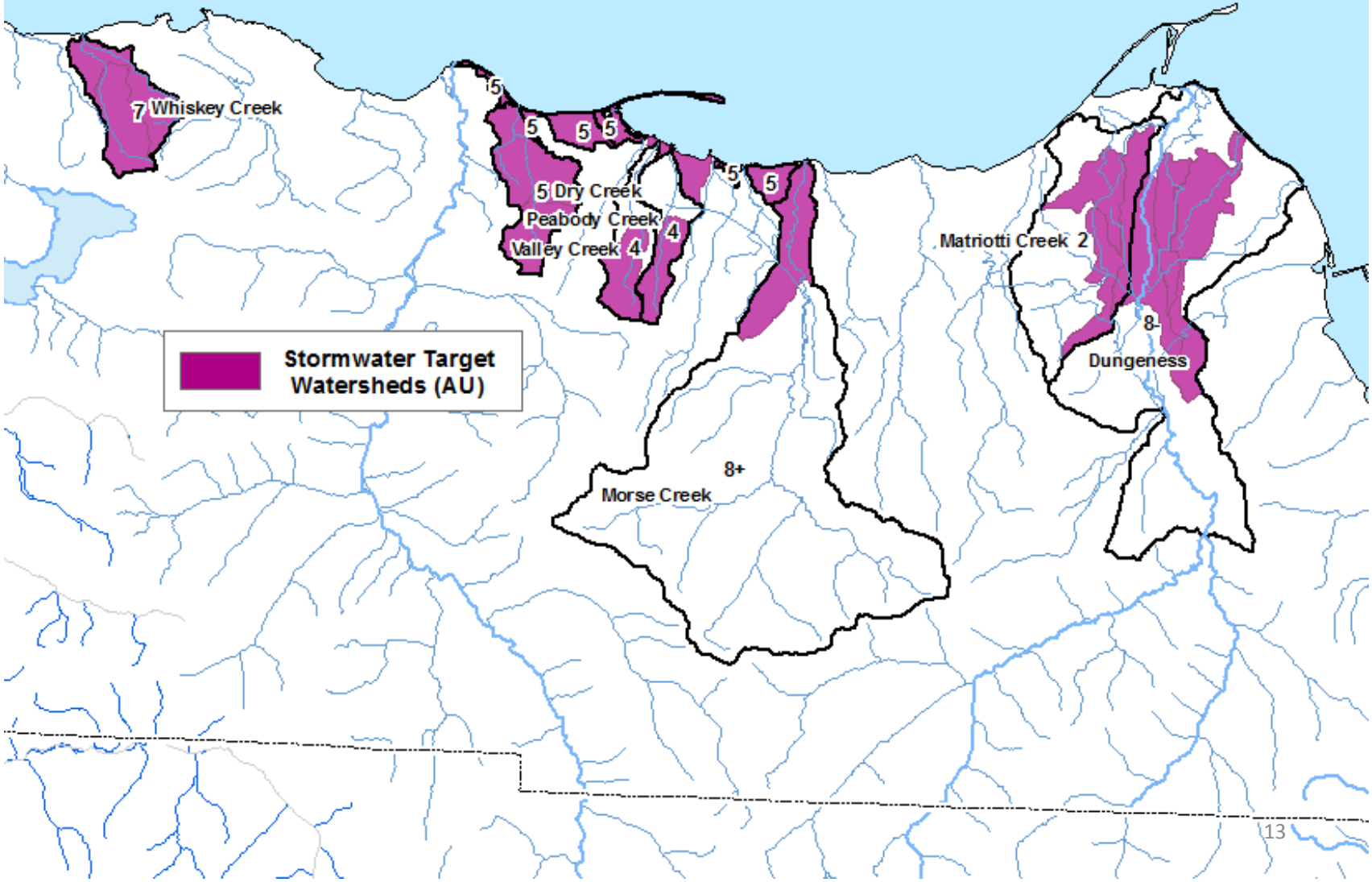
WRIA 13_14


Johns Creek
Goldsborough Creek
Mill Creek WRIA 14
Chambers-Leach Creek
Clover Creek
Sequalitchew/Murray Creek
Woodard Creek
Mainstem_Wria11
Medicine Creek 2
Muck Creek
Percival Creek
Mainstem_Wria13
2 Chambers Creek
St-Clair Creek 7
Spurgeon Creek 5+
Stormwater Target Watersheds (AU)

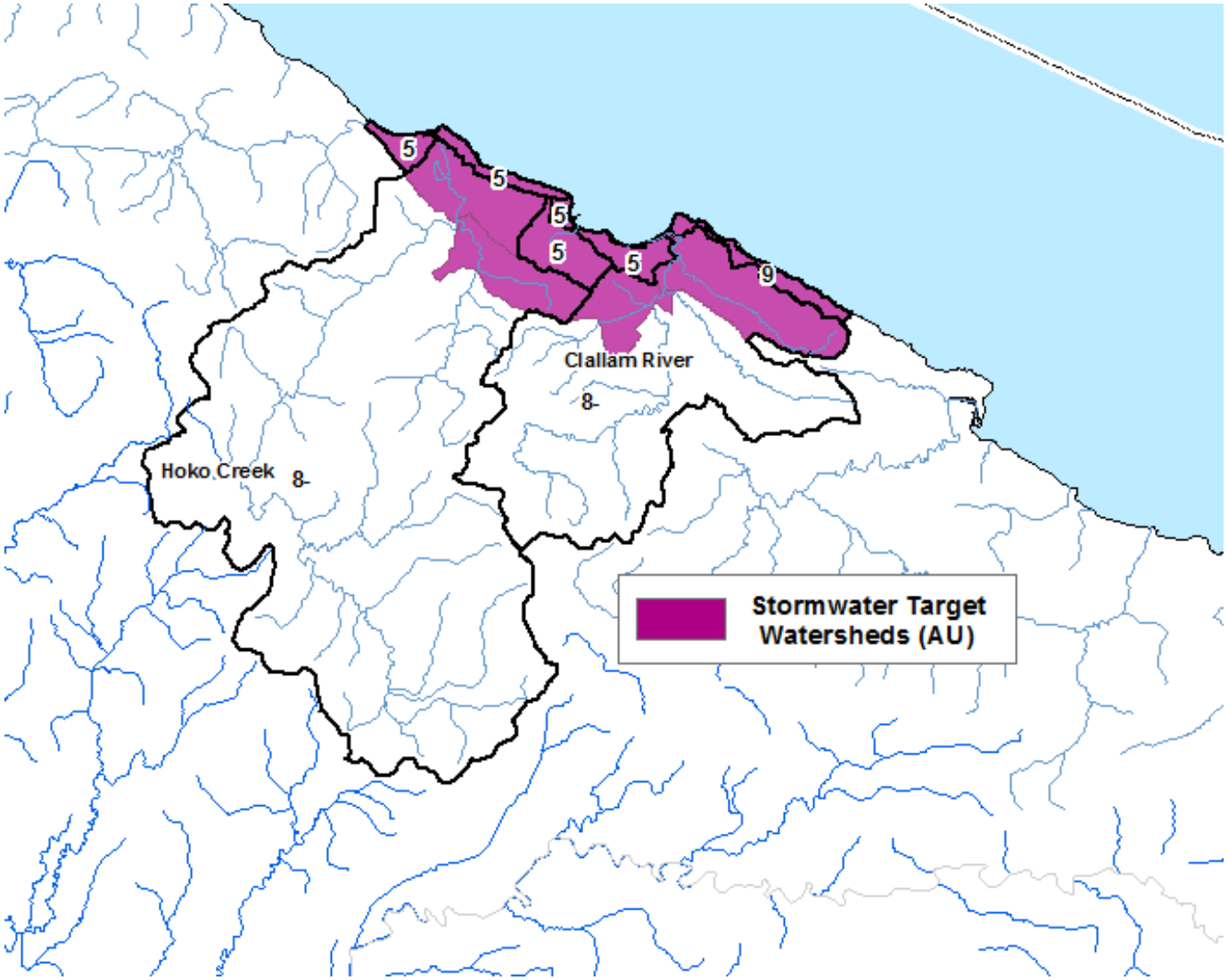

Stormwater Target Watersheds (AU)
Grover's Creek
Dogfish Creek
Clear Creek 2
Crouch Creek
Chico Creek
Gorst Creek 3+
Union River
Curley Creek
Blackjack Creek
Burley Creek
Longfellow 2
Ballard
Miller Creek

WRIA 15

WRIA 18


7 Whiskey Creek
5
5
6
5
5 Dry Creek
Peabody Creek
Valley Creek 4
4
5
5
Matriotti Creek 2
8-
Dungeness
Stormwater Target Watersheds (AU)
8+
Morse Creek

WRIA 19


5
5
5
5
5
9
Clallam River
8
Hoko Creek
8
Stormwater Target Watersheds (AU)