

APPENDIX A
CITY OF PASCO REACH
CHARACTERIZATION TABLES AND
REACH MAPS

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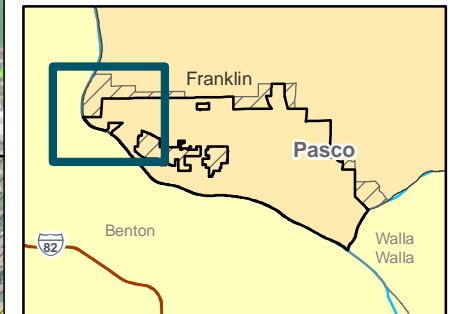


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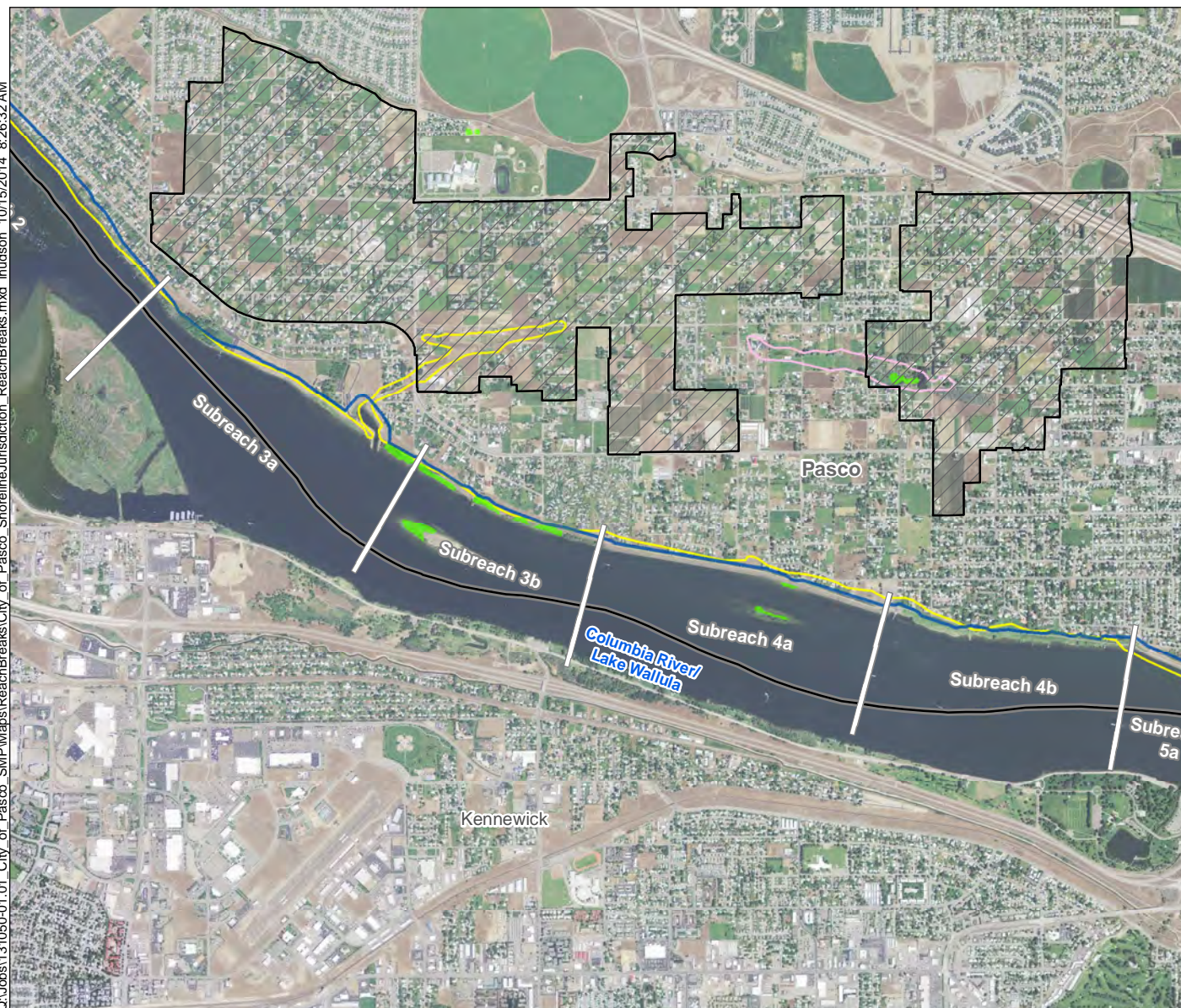
- Reach Break
- Incorporated City of Pasco
- Urban Growth Area
- County Boundary
- SMA Jurisdiction
- NWI Wetland
- 100-year Floodplain

NOTES:

1. This information is to be used for planning purposes only. Data is displayed as is and without any guarantee of accuracy or completeness.
2. Aerial image courtesy of USDA NAIP (2013).
3. NWI data acquired from USFWS.
4. Floodplain and floodway data acquired from FEMA.



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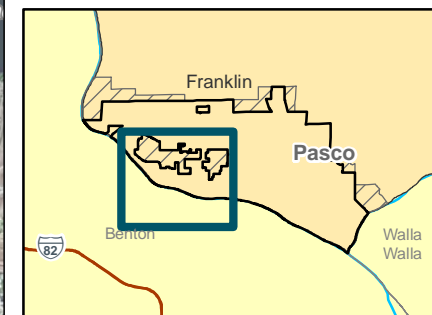


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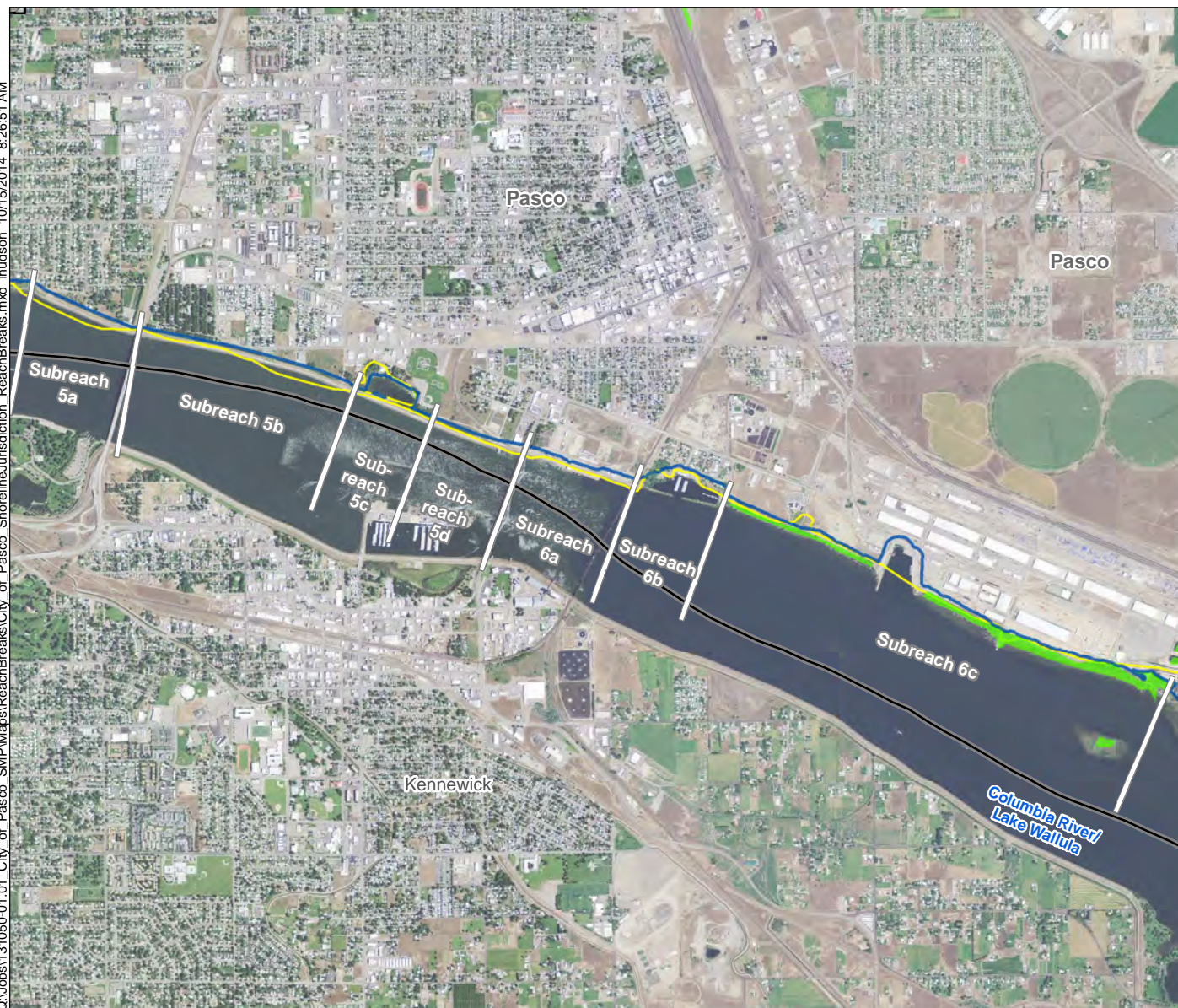
- Reach Break
- Incorporated City of Pasco
- Urban Growth Area
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- SMA Jurisdiction
- NWI Wetland
- 100-year Floodplain
- 500-year Floodplain

NOTES:








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3. NWI data acquired from USFWS.
4. Floodplain and floodway data acquired from FEMA.



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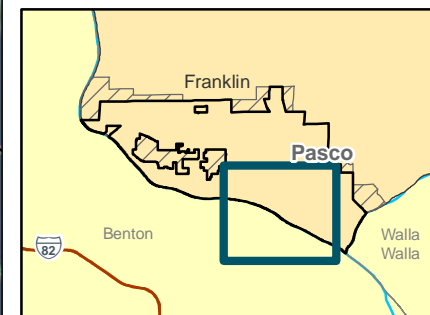


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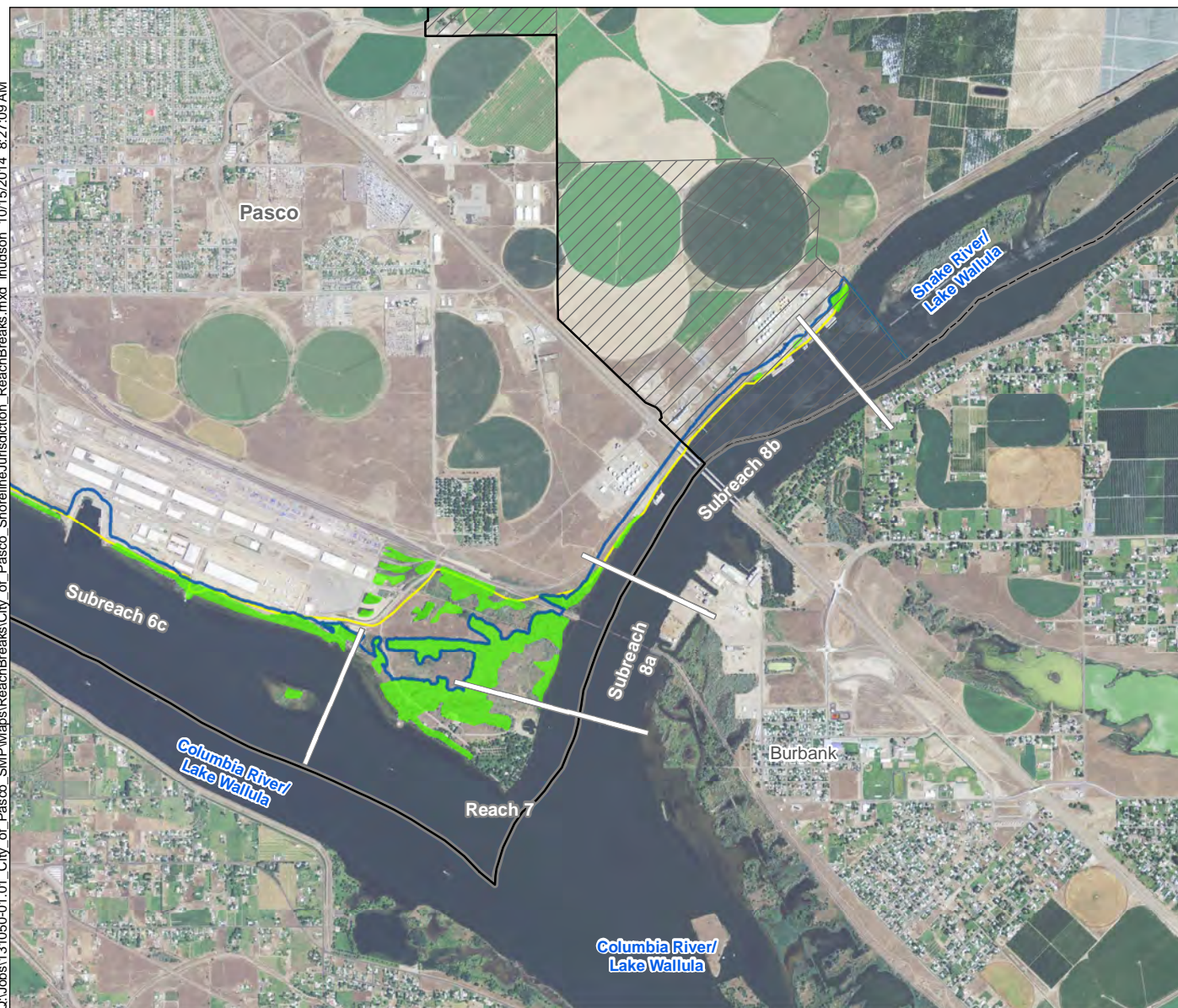
-  Reach Break
-  Incorporated City of Pasco
-  Urban Growth Area
-  County Boundary
-  SMA Jurisdiction
-  NWI Wetland
-  100-year Floodplain

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3. NWI data acquired from USFWS.
4. Floodplain and floodway data acquired from FEMA.



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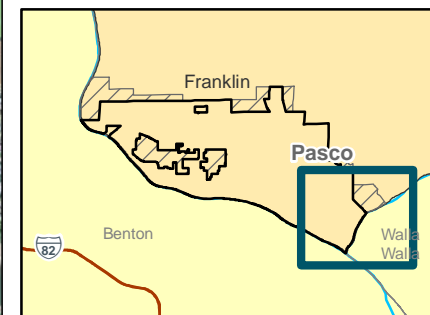



LEGEND

- Reach Break
- Incorporated City of Pasco
- Urban Growth Area
- County Boundary
- SMA Jurisdiction
- NWI Wetland
- 100-year Floodplain

NOTES:

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4. Floodplain and floodway data acquired from FEMA.




Reach 1	City of Pasco
Reach Description: Columbia River from City of Pasco boundary to Interstate 182 bridge	
Shoreline Jurisdiction: 368 acres	
 <p style="text-align: right; font-size: small;">© 2007 Washington State Department of Ecology</p>	
Source: https://fortress.wa.gov/ecy/coastalatlas/UICoastalAtlas/Tools/ShorePhotos.aspx	
Subreaches (SRs); see Map 1: SR 1a: Begins at City of Pasco Urban Growth Area (UGA) boundary extending south to the edge of residential developments SR 1b: Extends 0.5 mile to the south to the edge of agricultural lands SR 1c: Extends 0.7 mile to the south to the beginning of river bend and where the City limits begin SR 1d: Extends 0.9 mile to the southeast to the edge of residential developments where the City limits end SR 1e: Extends 0.8 mile to the southeast to the Interstate 182 bridge and entirely within the UGA	
CHARACTERISTICS	
Ownership: Reach 1 is mostly private with a small amount (less than 10%) of public ownership.	
Land Use/Current Shoreline Master Program (SMP): Land use designation: <ul style="list-style-type: none"> • Current land uses are Low Density Residential, Mixed Residential, Mixed Residential Commercial, and Open Space Nature • Zoning – Suburban District (RS-20) and Residential Transition (RT) Current SMP Environment Designation: Rural and Urban (SR 1e)	

Reach 1	City of Pasco
Existing Land Cover/Development: Reach 1 includes a mix of natural unimproved land, riparian vegetation, agricultural land, roads, utilities, and residential structures. SR 1b and SR 1e include residential and accessory structures. SR 1c includes a boat dock, irrigation pump, and parking. SR 1d includes a boat launch.	
Geomorphic Character: Description: The shoreline throughout the reach consists of mostly of outburst flood deposits with relatively low banks. In addition, a minor amount of alluvium and sand dune deposits are located at the most downstream extent of the reach (SR 1e). Residential and some industry infrastructure are present along the shoreline throughout Reach 1. Hardened Banks: A minor amount of hardened banks appear to exist along the Reach 1 extent and is primarily associated with the Interstate 182 bridge crossing at downstream extent (SR 1e).	
Flooding and Geological Hazards: Flooding: Flooding is regulated by upstream dam operations and Lake Wallula pool elevation controls (SR 1d and SR 1e). Geological Hazards: SR 1b, 1c, and 1d have soils susceptible to erosion. SRs 1d and 1e contain slopes that are greater than 15% and underlain by dune sand, which make them designated landslide hazard areas.	
Existing Public Access: Reach 1 currently does not include any significant public access amenities. West Court Street parallels much of the Columbia River in this reach. Dent Road ends near the shoreline providing access to the publicly owned portion of the shoreline. The Pasco Ranch boat dock is also located on U.S. Army Corps of Engineers (USACE) property. Identified Public Access Improvements: The Rivershore Linkage and Amenity Plan (Pasco 2012) indicates opportunities to preserve right-of-ways on Dent Road in SR 1a. It also recommends the extension of the Sacajawea Heritage Trail in this reach. The Broadmoor Area Plan encompassing SR 1d plans to provide trail and boat accesses.	
ECOLOGICAL CONDITIONS	
Water Quantity and Sediment: Local inputs to water quantity include a minor drainage ditch in SR 1c. An irrigation pump in SR 1d appears to withdraw water from the reach. Sediment may aggrade in SR 1d where the normal pool elevation of Lake Wallula begins, which would likely cause reduced velocities. Agricultural runoff from SR 1a, 1c, and 1e may contribute some sediment, as well as a gravel mining operation in SR 1d.	

Reach 1	City of Pasco
<p>Water Quality:</p> <p>Water quality may be slightly impacted from agricultural runoff in SR 1a, SR 1c, and SR 1e. Water quality may also be impacted by gravel mining in SR 1d and residential runoff in SR 1b and SR 1e. Boat use may also impact water quality throughout the reach. These impacts are expected to be minor compared to the volume of water in the river.</p>	
<p>Habitat Characteristics and Priority Habitat Species (PHS) Presence:</p> <p>This reach has minimal undeveloped habitat and is noted for presence of chukar, urban natural open space, waterfowl concentrations, and specifically, grebe species. The Columbia River in this reach supports a number of Endangered Species Act (ESA)-listed fish species, as identified in the Inventory, Analysis, and Characterization Report (IAC) Report.</p> <p>SR 1a: SR 1a is adjacent to an agricultural area with crops extending almost to the water. There is a 20-to 50-foot band of vegetation of mostly larger trees immediately adjacent to the shoreline. No docks occur in this subreach.</p> <p>SR 1b: SR 1b is adjacent to a low-density residential neighborhood with landscaped vegetation extending almost to the water's edge on several parcels. Some parcels maintain a 30-foot band of vegetation, including larger trees along the shoreline edge of their property, although some have significantly more tree cover. This subreach does not include any residential docks.</p> <p>SR 1c: SR 1c contains upland lands in agricultural and orchard use. There is a small manmade/dredged off-channel area adjacent to Court Street and Dent Road that contains a private small craft boat dock and that may provide private access for the upland land owners. Shoreline vegetation is either absent or limited mainly to small shrubs in a wide 50- to 100-foot band. Waterfowl, including grebes, are known to congregate here.</p> <p>SR 1d: The main land use in the northern half of this subreach is orchards, and the main use in the southern half is upland aggregate sorting operations. The river makes a bend along this subreach, and the riparian vegetation zone along the curve of this bend is wider. This zone may be partially flooded subject to changes in water levels, as aerial photos show some evidence of standing water and potential off-channel habitat. Farther downstream, the riparian vegetation becomes more confined and sparse where it is adjacent to the aggregate facility. The northern end of this subreach also contains a small embayment that is used as an intake water supply and water access area for foot traffic. Because shoreline riparian habitat is limited, this subreach provides lower functioning habitat to ESA-listed and resident fish species that populate the river.</p> <p>SR 1e: The north half of this subreach is adjacent to low-density residential development and includes another small portion of land near the Interstate 182 bridge. Along the residential area are five visible residential boat docks with two other informal river access points, and the riparian vegetation is thin and patchy, but does include overhanging trees and shrubs. Wildlife habitat is sparse due to development. The south half of this subreach is adjacent to agricultural use. Because shoreline riparian habitat is limited or patchy, this subreach provides lower functioning habitat to ESA-listed and resident fish species that populate the river.</p>	


Reach 1	City of Pasco
ECOLOGICAL FUNCTIONS ANALYSIS	
SR 1a	
<p>Level of Existing Function: Partially Functioning</p> <p>Stressors:</p> <p>Upland development: Orchard field and dirt maintenance access areas in between riparian area (approximately a 25-foot width) an orchard, overhead power lines, a few non-native riparian species (Russian-olive).</p> <p>Recreational use: Informal water access area</p> <p>Potential Restoration Opportunities: Replace non-native riparian species with native alternatives. Control dust through placing gravel on access roads.</p> <p>Potential Protection Opportunities: Protect existing riparian areas. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	
SR 1b	
<p>Level of Existing Function: Partially Functioning</p> <p>Stressors:</p> <p>Upland development: Single family residential development with irrigated landscaping, limited riparian areas in northern half of subreach, established riparian buffers in southern half though approximately half consists of non-native (Russian-olive species), informal water access paths.</p> <p>Potential Restoration Opportunities: Establish riparian plantings at northern half of subreach, considering the use of lower shrubs to preserve views of the water, consider incentives for homeowners to replace irrigated turf with native plantings of shrub-steppe or riparian vegetation. Replace non-native riparian species with native alternatives.</p> <p>Potential Protection Opportunities: Protect existing riparian areas. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	
SR 1c	
<p>Level of Existing Function: Partially Functioning</p> <p>Stressors:</p> <p>Upland development: Irrigated agricultural fields, rural residential development, armored banks associated with infrastructure, small segment of W. Court Street within shoreline jurisdiction, non-native riparian species (Russian-olive) where tall trees are present.</p> <p>Recreational use: One overwater structure associated with informal boat launch.</p> <p>Potential Restoration Opportunities: Establish riparian buffer within central portion of subreach. Replace non-native riparian species with native alternatives.</p> <p>Potential Protection Opportunities: Protect existing riparian areas. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	

Reach 1	City of Pasco
SR 1d	
<p>Level of Existing Function: Functioning</p> <p>Stressors:</p> <p>Upland development: Armoring within cove associated with infrastructure (water intake facilities), sparse non-native (Russian-olive) trees within riparian area.</p> <p>Recreational use: Upland recreation trails and a few water access areas at north side of subreach.</p> <p>Potential Restoration Opportunities: Replace non-native riparian species with native alternatives. Formalize recreation trail to discourage new informal trails through upland and riparian areas.</p> <p>Potential Protection Opportunities: Protect riparian area and intact shrub-steppe habitat.</p>	
SR 1e	
<p>Level of Existing Function: Partially Functioning</p> <p>Stressors:</p> <p>Upland development: Industrial development and Harris Road outside of shoreline jurisdiction, limited riparian buffer, and presence of non-native (Russian-olive) trees, single family residential development with irrigated landscaping and limited quantity of overwater structures, small area of upland irrigated agricultural fields adjacent to shoreline slope, W. Court Street, bridge for Highway 12 and Interstate 182.</p> <p>Recreational use: Boat ramp water access and associated trails to the water at north end of subreach.</p> <p>Potential Restoration Opportunities: Establish riparian buffers where not present, replace non-native riparian species with native alternatives, add vegetative filter strip where not present around agriculture fields.</p> <p>Potential Protection Opportunities: Protect existing riparian areas. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	

Reach 2	City of Pasco
Reach Description: Columbia River from Interstate 182 bridge (City limits boundary) to the end of waterfront residential developments	
Shoreline Jurisdiction: 102 acres	
 <p style="text-align: right; font-size: small;">© 2007 Washington State Department of Ecology</p>	
Source: https://fortress.wa.gov/ecy/coastalatlantools/UICoastalAtlas/Tools/ShorePhotos.aspx	
Subreaches; see Map 1:	
Not Applicable	
CHARACTERISTICS	
Ownership: Reach 2 is mostly private with a very small amount (less than 5%) of public ownership (Washington Department of Transportation).	
Land Use/Current SMP: Land use designation: <ul style="list-style-type: none"> • Current land uses are Low Density Residential and Open Space Nature • Zoning – Residential Suburban (RS-12) and Residential Suburban (RS-20) Current SMP Environment Designation: Urban	
Existing Land Cover/Development: Reach 2 is primarily residential and accessory structures and private boat docks. Parking, an inlet filtration pump (under the Interstate 182 bridge), and an irrigation pump station are also within this reach.	
Geomorphic Character: Description: The shoreline throughout the reach consists of outburst flood deposits with relatively low banks. Moderate-density residential infrastructure is present along the shoreline throughout this reach.	


Reach 2	City of Pasco
Hardened Banks: A minor amount of hardened bank exists along the reach extent at certain private docks and landscaped areas associated with waterfront residences.	
Flooding and Geological Hazards: Flooding: Flooding is regulated by Lake Wallula pool levels. Geological Hazards: There are no geologic hazard areas in Reach 2.	
Existing Public Access: Reach 2 is mostly privately owned and developed and doesn't include direct public access. There is one parking area beneath the Interstate 182 bridge, located adjacent to the Sacajawea Heritage Trail. Identified Public Access Improvements: The Rivershore Linkage and Amenity Plan (Pasco 2012) identifies an action to work with the Franklin County Irrigation District to provide public access on this property.	
ECOLOGICAL CONDITIONS	
Water Quantity and Sediment: No local water quantity or sediment inputs are noted in this reach. Sediment may aggrade in this reach from Yakima River input reaching the Lake Wallula pool, which may cause reduced velocities, although this predominately occurs on the right bank of the Columbia River.	
Water Quality: Minor inputs from residential runoff and boat traffic may slightly impact this reach. This reach is also likely in the mixing zone of the confluence between the Columbia River and Yakima River, so water quality may be impacted from Yakima River input.	
Habitat Characteristics and PHS Presence: This reach contains 21 overwater docks and ramps located in low density residential area. Landscaped vegetation extends to the river in most cases, and most yards have terracing and/or vertical bulkheads. Most residential land parcels within this reach have at least one row of trees adjacent to the water. Because of the residential nature of this reach, undeveloped areas do not exist in the uplands; therefore, wildlife habitat is limited and connectivity is low between the river and upland habitat areas. ESA-listed and resident fish species are expected to be present in the river.	
ECOLOGICAL FUNCTIONS ANALYSIS	
Level of Existing Function: Partially Functioning Stressors: Upland development: Single family residences with irrigated landscaping, fairly limited riparian buffers (though most parcels have at least a small area with a vegetative buffer), overwater structure docks for many parcels.	

Reach 2	City of Pasco
Potential Restoration Opportunities: Consider incentives for homeowners to convert irrigated turf to native plant species.	
Potential Protection Opportunities: Protect existing riparian areas. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.	

Reach 3	City of Pasco
Reach Description: Columbia River from the upstream end of Chiawana Park to the edge of the hardened bank	
Shoreline Jurisdiction: 382 acres	
 <p style="text-align: center;">Source: https://fortress.wa.gov/ecy/coastalatlas/UICoastalAtlas/Tools/ShorePhotos.aspx</p>	
Subreaches; see Map 2: SR 3a: Begins at the upstream end of Chiawana Park extending east to near Road 84 SR 3b: Extends 0.8 mile to the east ending at the edge of the hardened bank	
CHARACTERISTICS	
Ownership: Reach 3 is mostly owned by US Army Corps of Engineers with a very small amount (less than 5%) of private ownership.	
Land Use/Current SMP: Land use designation: <ul style="list-style-type: none"> • Current land uses are Low Density Residential and Open Space Nature • Zoning – Residential Suburban (RS-20) Current SMP Environment Designation: Urban	
Existing Land Cover/Development: Reach 3 predominantly consists of riparian vegetation, vacant land, park land (Chiawana Park) along with trail, parking, pier, and boat launch facilities.	
Geomorphic Character: Description: The shoreline throughout the reach consists of outburst flood deposits with relatively low banks.	


Reach 3	City of Pasco
Hardened Banks: Hardened bank exists at the Chiawana Park boat dock.	
Flooding and Geological Hazards:	
Flooding: Flooding is controlled by Lake Wallula pool elevations.	
Geological Hazards: There are no geologic hazard areas in Reach 3.	
Existing Public Access:	
Reach 3 has public access along Chiawana Park. The Sacajawea Heritage Trail parallels the shoreline in this reach. The park contains public access amenities such as a boat launch and pier.	
Identified Public Access Improvements:	
The Rivershore Linkage and Amenity Plan (Pasco 2012) identifies improvement of park amenities and adding a second boat launch and a beach along the park. The Plan also recommends improving the trail amenities by adding park areas at the termini of Roads 76 and 84 and developing the USACE area as an extension of Chiawana Park.	
ECOLOGICAL CONDITIONS	
Water Quantity and Sediment:	
A minor drainage ditch appears to be a minor input to SR 3a. No known local sediment inputs are noted.	
Water Quality:	
Water quality in this reach may be slightly impacted by residential and recreational (boating) use.	
Habitat Characteristics and PHS Presence:	
Reach 3 is primarily characterized by a park-like environment, with public use areas along the shoreline for the entirety of the reach. While shoreline vegetation is rather limited, open and undeveloped areas are present within several hundred feet of the shore, which may support limited numbers of upland mammal and bird species, and provide access from the upland areas to the shoreline. ESA-listed and resident fish species are present in the river.	
SR 3a: This subreach almost entirely comprises Chiawana Park, which exhibits riparian vegetation of several hundred feet in width at the northern end of the subreach. Otherwise, mowed areas extend to the water's edge. The park has landscaped areas and picnic pavilions throughout the upland area. There is one dock present in this subreach, an 80-foot-long, T-shaped structure associated with the park. There is also a dredged inlet serving as a public boat launch at the southern end of this subreach.	
SR 3b: Low-density residential areas characterize this subreach with lawns that end about 275 feet short of the shoreline. The remaining area near the shoreline contains unvegetated areas with a multi-use recreational trail. Sparse trees in patchy zones are along the water's edge. These areas are identified as habitat for Townsend's ground squirrel and burrowing owl.	

Reach 3	City of Pasco
ECOLOGICAL FUNCTIONS ANALYSIS	
SR 3a	
<p>Level of Existing Function: Partially Functioning</p> <p>Stressors:</p> <p>Upland development: Park development, including parking areas and buildings, irrigated turf landscaping, limited riparian buffer throughout park.</p> <p>Recreational use: Boat launch, overwater structures, shoreline trail associated with Chiawana Park.</p> <p>Potential Restoration Opportunities: Riparian buffer restoration within park.</p> <p>Potential Protection Opportunities: Protect intact shrub-steppe habitat. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	
SR 3b	
<p>Level of Existing Function: Partially Functioning</p> <p>Stressors:</p> <p>Upland development: Bulkhead area and access road in central portion of subreach, some non-native species (Russian-olive) within riparian buffer.</p> <p>Recreational use: Multiple informal upland trails to water connected to formal paved trail at top of slope.</p> <p>Potential Restoration Opportunities: Replace non-native species with native alternatives. Formalize water access trails to discourage new informal access trails.</p> <p>Potential Protection Opportunities: Protect intact shrub-steppe and riparian habitat. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	

Reach 4	City of Pasco
Reach Description: Columbia River from the upstream edge of hardened bank to the downstream end of Wade Park	
Shoreline Jurisdiction: 463 acres	
 <p style="text-align: right; font-size: small;">©2007 Washington State Department of Ecology</p>	
Source: https://fortress.wa.gov/ecy/coastalatlas/UICoastalAtlas/Tools/ShorePhotos.aspx	
Subreaches; see Map 2:	
SR 4a: Begins at the upstream edge of hardened bank to the downstream end of hardened bank	
SR 4b: Extending 1 mile to east ending at the downstream edge of Wade Park	
CHARACTERISTICS	
Ownership: Reach 4 is mostly owned by USACE with a very small amount (less than 5%) of private ownership.	
Land Use/Current SMP:	
Land use designation:	
<ul style="list-style-type: none"> • Current land uses are Low Density Residential and Open Space Nature • Zoning – Suburban District (RS-12), Suburban District (RS-20) and Suburban District (RS-1) 	
Current SMP Environment Designation: Urban	
Existing Land Cover/Development:	
There is a levee along the entire stretch of SR 4a and parkland along the entire stretch of SR 4b. SR 4a groundcover consists mostly of riprap with a trail on top of the levee and some riparian vegetation. SR 4b groundcover consists of improved parkland (Wade Park) with a boat launch, piers, a trail, and gravel parking.	

Reach 4	City of Pasco
Geomorphic Character: Description: The shoreline throughout the reach consists of outburst flood deposits (SR 4a) and alluvium (SR 4b) with relatively low banks. Hardened Banks: Approximately 6,000 feet of artificial hardened banks exist along the Columbia River (left bank) and occur along the entire length of SR 4a.	
Flooding and Geological Hazards: Flooding: Flooding is controlled by Lake Wallula pool levels. Levees are present along SR 4a that reduce flooding potential. Geological Hazards: There are no geologic hazard areas in Reach 4.	
Existing Public Access: Reach 4 consists of the Sacajawea Heritage Trail on top of the levee and Wade Park. Access points to the trail are limited due to the drainage ditch behind the levee. Wade Park consists of a boat launch, piers, a trail, and gravel parking. Identified Public Access Improvements: The Rivershore Linkage and Amenity Plan (Pasco 2012) recommends adding amenities to the park, lowering the levee, creating beach area, and creating parks with boats or access points along Roads 60 and 68.	
ECOLOGICAL CONDITIONS	
Water Quantity and Sediment: A pump connected to a drainage ditch may locally impact water quantity in SR 4a. Sediment may be impacted by levees in subreach 4a as the hardened banks may cause higher velocities, which may result in more sediment movement, and cause potential aggradation in SR 4b downstream of the levees.	
Water Quality: Water quality may be slightly impacted from residential runoff and recreational use in this reach.	
Habitat Characteristics and PHS Presence: Reach 4 contains park and multi-use path shorelines adjacent to moderate residential development, offering undeveloped areas, but not a great deal of habitat. The shores are managed for the main use and recreational enjoyment. Fish and wildlife habitat is limited. SR 4a: Banks of this subreach are rocky, contain little to no vegetation, and are within 40 to 50 feet of the multi-use trail that lines the shore. There is a linear ditch that parallels the trail for the length of the subreach. Wetlands and waterfowl concentrations are found just offshore on the small channel islands. There are no docks in this subreach. SR 4b: This subreach contains three smaller docks and one larger dock at the western end of the subreach, all within the waterfront of Wade Park. The park exhibits mowed grass to the water's edge and shoreline vegetation is absent except for several sparse trees. As such, wildlife habitat is limited in this subreach.	


Reach 4	City of Pasco
ECOLOGICAL FUNCTIONS ANALYSIS	
SR 4a	
<p>Level of Existing Function: Impaired</p> <p>Stressors:</p> <p>Upland development: Armored levee, single family residential, and irrigated agriculture upland of levee.</p> <p>Recreational use: Paved trail/maintenance road at top of levee.</p> <p>Potential Restoration Opportunities: Consider incorporating wood structure and vegetation where possible.</p> <p>Potential Protection Opportunities: Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	
SR 4b	
<p>Level of Existing Function: Partially Functioning</p> <p>Stressors:</p> <p>Upland development: Bulkhead area at north end of subreach, minimal riparian buffers, irrigated turf within Wade Park.</p> <p>Recreational use: Overwater structures and boat launch with informal parking associated with Wade Park.</p> <p>Potential Restoration Opportunities: Riparian buffer restoration within park.</p> <p>Potential Protection Opportunities: Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	

Reach 5	City of Pasco
Reach Description: Columbia River from the edge of hardened bank upstream of US 395 (Blue Bridge) to State Route 397 bridge (Cable Bridge)	
Shoreline Jurisdiction: 195 acres	
 <p style="text-align: right; font-size: small;">©2007 Washington State Department of Ecology</p>	
Source: https://fortress.wa.gov/ecy/coastalatlantools/UICoastalAtlas/Tools/ShorePhotos.aspx	
Subreaches; see Map 3: SR 5a: Begins at the edge of hardened bank to the US 395 bridge SR 5b: Extending 0.9 mile to the east to the upstream edge of water retention facility SR 5c: Extending 0.4 mile to the east to the downstream end of retention facility SR 5d: Extending 0.4 mile to the east to the State Route 397 bridge	
CHARACTERISTICS	
Ownership: Reach 5 is mostly owned by USACE, City of Pasco, and Washington Department of Transportation. There is a very small amount (less than 5%) of private ownership.	
Land Use/Current SMP: Land use designation: <ul style="list-style-type: none"> • Current land uses are Open Space Nature, Low Density Residential, Mixed Residential, Mixed Residential Commercial, Commercial, and Industrial • Zoning – Low Density Residential (R-1), Residential Suburban (RS-12), Residential Suburban (RS-20), Residential Park (RP) and Light Industrial (I-1) Current SMP Environment Designation: Urban	

Reach 5	City of Pasco
Existing Land Cover/Development: Reach 5 is primarily consists of a levee, riprap, a drainage ditch behind the levee, and a trail on top of the levee. There is riparian vegetation, parking, and a park facilities structure on SR 5c. A rail line on SR 5d is near the Blue Bridge.	
Geomorphic Character: Description: The shoreline throughout the reach consists of alluvium with relatively low banks through urban development area. Hardened Banks: Approximately 10,500 linear feet of artificial hardened banks exist along the Columbia River (left bank).	
Flooding and Geological Hazards: Flooding: Flooding is controlled by Lake Wallula pool levels. Levees are present along the reach, which reduce flooding potential. Geological Hazards: There are no geologic hazard areas in Reach 5.	
Existing Public Access: Reach 5 contains the Sacajawea Heritage Trail and Riverview Park. Similar to Reach 4, access points to the trail are limited due to the levee and drainage ditch behind the levee. Identified Public Access Improvements: The Rivershore Linkage and Amenity Plan (Pasco 2012) recommends improving the open space area near W. Havstad Street, adding beach area at the Wade Park entrance and south of the Riverview Park, adding a multi-use path over the Blue Bridge, developing the levee, and improving access from the levee to the river.	
ECOLOGICAL CONDITIONS	
Water Quantity and Sediment: Pumps connected to a drainage ditch (all subreaches) and a connected pond (in SR 5c) may locally impact water quantity. Sediment may be impacted by levees as the hardened banks may cause higher velocities, which may result in more sediment movement.	
Water Quality: Water quality may be slightly impacted from residential runoff and recreational use in this reach.	
Habitat Characteristics and PHS Presence: Reach 5 shorelines include park areas and multi-use paths, with mixed development ranging from residential to light industrial areas. There is little habitat for wildlife along the shoreline, and the habitat function of the nearshore river area is limited due to the lack of riparian vegetation along the shoreline. No PHS are noted within this reach, except for ESA-listed and resident fish in the river. SR 5a: Similar to SR 4a (in Reach 4), the banks of this subreach are rocky, contain little to no vegetation	

Reach 5	City of Pasco
<p>and are within 40 to 50 feet of the multi-use trail that lines the shore. There is a linear ditch that parallels the trail for the length of the subreach. There are no docks within this subreach. Wildlife habitat is limited here due to the level of development.</p> <p>SR 5b: Similar to SR 5a, the banks of this subreach are rocky, contain little to no vegetation, and are within 40 to 50 feet of the multi-use trail that lines the shore. There is a linear ditch just landward of the trail that parallels the trail for the length of this subreach. There are no docks within this subreach. There is a shoreline park at the street end at South 25th Avenue where patchy shrubs occur. This subreach has limited habitat function for wildlife or aquatic species.</p> <p>SR 5c: The Pasco Youth Baseball Complex is adjacent to this subreach, and Riverview Park sits along the water. This subreach has shorelines similar to SR 5b, with rocky unvegetated shorelines, a multi-use path within 40 to 50 feet of the shore, and a linear ditch present. Riverview Park is directly east of an open-water pond approximately 1,000 feet in length that connects to the ditch on the pond's western end. The pond is not connected to the river, but does contain emergent vegetation and trees for upland wildlife habitat.</p> <p>SR 5d: Similar to SR 5a in this reach, the banks of this subreach are rocky, contain little to no vegetation, and are within 40 to 50 feet of the multi-use trail that lines the shore. There are no docks within this subreach but there is one small structure just west of the Cable Bridge across the Columbia River on the eastern end of SR 5d. Riparian habitat is limited in this subreach due to development and encroachment by the trail and highway, and this also affects the function of the nearshore aquatic habitat for fish species.</p>	
ECOLOGICAL FUNCTIONS ANALYSIS	
SR 5a	
<p>Level of Existing Function: Impaired</p> <p>Stressors:</p> <p>Upland development: Armored levee, residential and vacant lots upland of levee, substantial non-native species (Russian-olive) within vacant lot, Blue Bridge.</p> <p>Recreational use: Paved trail/maintenance road at top of levee.</p> <p>Potential Restoration Opportunities: Consider incorporating wood structure and vegetation where possible.</p> <p>Potential Protection Opportunities: Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	
SR 5b	
<p>Level of Existing Function: Impaired</p> <p>Stressors:</p> <p>Upland development: Armored levee, behind levee is a residential area at north end of subreach and industrial and vacant lands in southern portion.</p> <p>Recreational use: Paved trail/maintenance road at top of levee.</p> <p>Potential Restoration Opportunities: Consider incorporating wood structure and vegetation where</p>	


Reach 5	City of Pasco
possible. Potential Protection Opportunities: Provide stormwater controls consistent with Eastern Washington Stormwater Manual.	
SR 5c	
Level of Existing Function: Impaired Stressors: Upland development: Armored levee, stormwater treatment basin landward of levee, substantial non-native species (Russian-olive) surrounding basin. Recreational use: Paved trail/maintenance road at top of levee. Potential Restoration Opportunities: Consider incorporating wood structure and vegetation where possible. Potential Protection Opportunities: Provide stormwater controls consistent with Eastern Washington Stormwater Manual.	
SR 5d	
Level of Existing Function: Partially Functioning Stressors: Upland development: Armored levee, Pasco Youth Baseball Complex and associated landscaping upland of levee, and infrastructure (water intake) at south end of this subreach. Recreational use: Paved trail/maintenance road at top of levee. Potential Restoration Opportunities: Consider incorporating wood structure and vegetation where possible. Potential Protection Opportunities: Protect intact shrub-steppe habitat upland of levee. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.	

Reach 6	City of Pasco
Reach Description: Columbia River from State Route 397 (Cable) bridge to the upstream edge of Sacajawea State Park	
Shoreline Jurisdiction: 744 acres	
 <p style="text-align: center;">Source: https://fortress.wa.gov/ecy/coastalatlas/UICoastalAtlas/Tools/ShorePhotos.aspx</p>	
Subreaches; see Map 3: SR 6a: Begins at the Cable Bridge to the railroad bridge upstream of Schlagel Park SR 6b: From the railroad bridge to the end of marina facility/breakwater SR 6c: From the edge of marina facility/breakwater to the upstream edge of Sacajawea State Park	
CHARACTERISTICS	
Ownership: Reach 6 is entirely owned by Port of Pasco, with an exception of SR 6b. The Boat Basin in SR 6b is owned by USACE.	
Land Use/Current SMP: Land use designation: <ul style="list-style-type: none"> • Current land uses are Industrial and Open Space Nature • Zoning – Light Industrial (I-1), Heavy Industrial (I-3), Medium Density Residential (R-2) and Medium Density Residential (R-3) 	

Reach 6	City of Pasco
Current SMP Environment Designation: Urban	
Existing Land Cover/Development: Reach 6 consists of a mix of riprap, riparian vegetation, a trail, a marina, residential structures, warehouses, parking, unimproved vacant land, and industrial land. SR 6a is mostly riprap that includes a barge dock. SR 397 crosses the shoreline on SR 6a. SR 6b has riparian vegetation around the marina and Schlagel Park. Industrial land cover dominates SR 6c. There is riparian vegetation on the edge of the shoreline in SR 6b and 6c.	
Geomorphic Character: Description: The shoreline throughout the reach consists of alluvium with relatively low banks through a developed area. Hardened Banks: Approximately 6,500 linear feet of artificial hardened banks exist along the Columbia River (left bank) within all the subreaches.	
Flooding and Geological Hazards: Flooding: Flooding is controlled by Lake Wallula pool levels. Levees are present along SR 6a, which reduce flooding potential. Geological Hazards: There are no geologic hazard areas in Reach 6.	
Existing Public Access: Sacajawea Heritage Trail parallels part of the shoreline in Reach 6 and shifts away from the shoreline in SR 6c. Schlagel Park area includes boat marina and related facilities. The Port of Pasco property in SR 6c does not include any major public access. Identified Public Access Improvements: The Port of Pasco Boat Basin/Marine Terminal Master Plan proposes improvements to the marina, and the addition of public beach, viewpoints, and a marina park. In addition to the Boat Basin Plan/Marine Terminal Master, the Rivershore Linkage and Amenities Plan (Pasco 2012) recommends development of water enjoyment facilities (e.g., dining) along the shoreline, improvement of trail connection between the boat basin and Pasco's urban center, and building a Sacajawea Trail underpass through the Schlagel Park boat basin neighborhood. The plan recommends building a shoreline park between the boat basin and Osprey Point. The Port of Pasco Osprey Pointe Business Park Plan indicates trail connections along the shoreline.	
ECOLOGICAL CONDITIONS	
Water Quantity and Sediment: No local impacts to water quantity are noted in this reach. Sediment may be impacted by levees as the hardened banks may cause higher velocities, which may result in more sediment movement in SR 6a and may cause aggradation in SR 6b where the levees end and velocities may slow.	


Reach 6	City of Pasco
Water Quality: Water quality may be impacted by industrial activities in SRs 6a and 6c and recreational activities throughout the reach. A boating area in SR 6b may have the potential for impacting water quality.	
Habitat Characteristics and PHS Presence: The shorelines of Reach 6 are generally armored and landscaped and offer little wildlife habitat, except for pockets of shallow water and riparian vegetation that appear near Cascade Marina and Sacajawea State Park. The reach is generally industrialized and landscaped for human use. ESA-listed and resident fish species occur within the Columbia River in this reach. SR A: Shorelines in this subreach are armored with riprap and contain overwater structures and several sets of piles, as well as a railroad bridge at the eastern end of this subreach. Riparian vegetation is absent, as access roads, parking lots, and the multi-use trail wind through the adjacent shoreline of the properties. Fish and wildlife habitat function is limited by this development. SR B: This subreach contains the Cascade Marina and Schlagel Park, which exhibit mostly armored shorelines with a thin strip of riparian tree vegetation around the perimeter of the marina embayment. The embayment has two large boat houses and one long dock with boat slips. Open water habitat is available for waterfowl and other birds, and quiet shallow water provides refugia for juvenile fish. SR C: The western third of this subreach, which contains the Port of Pasco building and property, has mowed landscaped areas along the water, as well as the multi-use trail 30 to 50 feet from the shore. Sparse vegetation grows in this area. The eastern two-thirds is industrialized in the uplands and has bare ground within 30 to 150 feet of the shore, but the immediate shoreline contains a sizeable riparian buffer with shrubs and trees next to the water for wildlife use. Nearing Sacajawea State Park on the eastern end of this subreach, waterfowl concentrations occur, and habitat begins to appear that could be potentially suitable for sage grouse and burrowing owl. There is one small dock at the end of Southeast Road 27.	
ECOLOGICAL FUNCTIONS ANALYSIS	
SR 6a	
Level of Existing Function: Impaired Stressors: Upland development: Armored levee, industrial development upland of levee, bridge for Highway 397 and railroad bridge, fill area waterward of levee alignment with warehouse structures and wooden overwater structures, mooring dolphins, and rock armoring with a small area of sheetpile armoring. Potential Restoration Opportunities: Consider incorporating wood structure and vegetation where possible. Replace creosote dock and dolphin material with material that has less water quality implications. Potential Protection Opportunities: Provide stormwater controls consistent with Eastern Washington Stormwater Manual.	

Reach 6	City of Pasco
SR 6b	
<p>Level of Existing Function: Partially Functioning</p> <p>Stressors:</p> <p>Upland development: Breakwater structures, marina in central portion of subreach with covered and uncovered moorage, armored shoreline and upland parking lot, single family residential development in southern portion of subreach, shared dock.</p> <p>Recreational use: Trails along breakwater structures, boat ramp, and associated dock at Schlagel Park.</p> <p>Potential Restoration Opportunities: Incorporate riparian buffers where absent. Offer incentives for low-impact development stormwater measures.</p> <p>Potential Protection Opportunities: Protect existing riparian areas within park, near residential areas, and along breakwater structures. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	
SR 6c	
<p>Level of Existing Function: Partially Functioning</p> <p>Stressors:</p> <p>Upland development: Vegetated riparian area with areas of mowed turf adjacent to Osprey Point, with undeveloped, non-native vegetated upland in this same vicinity. Southern portion of subreach includes industrial port development hard banks in moorage areas and elsewhere intact riparian buffers.</p> <p>Recreational use: Paved trail/maintenance road at top of levee, unpaved roads waterward of E. Commerce Street at south end of subreach.</p> <p>Potential Restoration Opportunities: Consider more riparian buffer areas within industrial complex.</p> <p>Potential Protection Opportunities: Preserve existing riparian vegetation and if possible do not mow these woody species. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	

Reach 7	City of Pasco
Reach Description: Columbia River from the upstream edge of Sacajawea State Park to Snake River just east of the Sacajawea State Park boat basin	
Shoreline Jurisdiction: 295 acres	
 <p style="text-align: right; font-size: small;">©2007 Washington State Department of Ecology</p>	
Source: https://fortress.wa.gov/ecy/coastalatlant/UICoastalAtlas/Tools/ShorePhotos.aspx	
Subreaches; see Map 4:	
Not Applicable.	
CHARACTERISTICS	
Ownership: Reach 7 is owned by Washington State Parks and Recreation Commission.	
Land Use/Current SMP: Land use designation: <ul style="list-style-type: none"> • Current land use is Industrial and Open Space Nature • Zoning – Medium Industrial (I-2), and Heavy Industrial (I-3) Current SMP Environment Designation: Conservancy	
Existing Land Cover/Development: This reach primarily consists of riparian vegetation in the Sacajawea State Park. There is also a boat launch, dock, a beach, and utility poles within this reach.	
Geomorphic Character: Description: Reach 7 consists of a topographic low area at the confluence of the Columbia River and Snake River. The shoreline throughout the reach consists of alluvium with relatively low banks throughout Sacajawea State Park.	

Reach 7	City of Pasco
Hardened Banks: Approximately 100 feet of hardened banks exist along the reach extent associated with the State Park basin boat launch.	
Flooding and Geological Hazards: Flooding: Flooding is controlled by Lake Wallula pool levels. Sacajawea State Park in this reach is within the 100-year floodplain. Geological Hazards: There are no geologic hazard areas in Reach 7.	
Existing Public Access: Reach 7 consists of Sacajawea State Park at the confluence of the Snake and Columbia Rivers. This park has historic value regarding the Lewis and Clark Expedition and contains a museum and interpretive center. The park includes boat launch, dock, campsite, and beach area. Identified Public Access Improvements: The Rivershore Linkage and Amenities Plan (Pasco 2012) identifies adding camping facilities and educational opportunities to Sacajawea State Park, and extending the Sacajawea Heritage Trail toward the Columbia Plateau/Ice Harbor Dam trail linkage.	
ECOLOGICAL CONDITIONS	
Water Quantity and Sediment: No local impacts to water quantity or sediment are identified.	
Water Quality: Water quality in this reach may be impacted by recreational use. Wetlands part of Sacajawea State Park may also have a slight impact on water quality in this reach.	
Habitat Characteristics and PHS Presence: Reach 7 entirely contains Sacajawea State Park, which occurs at the confluence of the Snake and Columbia Rivers. The park has relatively large expanses of undeveloped or restored shoreline with landscaped or natural trees and pockets of off-channel shallow water habitat. The upland portion of the park contains shrub-steppe habitat for upland wildlife species. There is also one armored embayment with a dock and boat launch along the Snake River side of the park. ESA-listed fish species use both rivers for migration and rearing habitat. Compared to adjacent reaches, this reach provides enhanced nearshore aquatic habitat rearing and migratory functions as a result of the intact riparian habitat, characterized by multiple species of native plants, trees, and shrubs.	
ECOLOGICAL FUNCTIONS ANALYSIS	
Level of Existing Function: Partially Functioning	
Stressors Upland development: Park development including five overwater structures, a boat launch, a swim beach, upland turf areas. Overall contains substantial riparian buffer areas, outside of park within upland areas non-native Russian-olive species.	

Reach 7	City of Pasco
Recreational use: Upland trails, water access, boat use.	
Potential Restoration Opportunities: Consider incorporating more riparian buffer plantings near the boat launch area at northeast side of subreach. Replace non-native species with native alternatives.	
Potential Protection Opportunities: Preserve existing riparian and shrub-steppe habitat. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.	

Reach 8	City of Pasco
Reach Description: Snake River just upstream of confluence with Columbia River, extending from City UGA eastern boundary to near Sacajawea State Park	
Shoreline Jurisdiction: 260 acres	
 <p style="text-align: right;">Source: https://fortress.wa.gov/ecy/coastalatlantools/UICoastalAtlas/Tools/ShorePhotos.aspx</p>	
Subreaches; see Map 4: SR 8a: Begins at Sacajawea State Park to the edge of industrial developments SR 8b: Extends 0.5 mile to the north ending at the US 12 bridge	
CHARACTERISTICS	
Ownership: SR 8a is owned by Washington State Parks and Recreation Commission and federal government. SR 8b is mostly private with a small amount (less than 10%) of federal ownership.	
Land Use/Current SMP: Land use designation: <ul style="list-style-type: none"> • Current land uses are Industrial and Open Space Nature • Zoning – Light Industrial (I-1), Medium Industrial (I-2), and Heavy Industrial (I-3) Current SMP Environment Designation: Urban	
Existing Land Cover/Development: SR 8a is mostly unimproved natural land with riparian vegetation. SR 8a includes a rail crossing. SR 8b includes State Route 12 crossing, a fuel storage tank, and barge facilities.	
Geomorphic Character: Description: The shoreline in this reach consists mostly of outburst flood deposits. The reach consists of low bank areas near the confluence with the Columbia River. Lake Wallula levels fluctuate with downstream dam management practices. Hardened Banks: Approximately 7,200 linear feet of artificial hardened banks exist along the Columbia River (left bank) within all the subreaches.	

Reach 8	City of Pasco
Flooding and Geological Hazards: Flooding: Flooding is controlled by Lake Wallula pool levels. Sacajawea State Park in SR 8a is located in the 100-year floodplain. Geological Hazards: SR 8b contains slopes that are greater than 15% underlain by alluvium, which make them designated landslide hazard areas.	
Existing Public Access: Reach 8 does not have public access. SR 8a is primarily unimproved and SR 8b is developed with industrial/barge facilities. Identified Public Access Improvements: The Rivershore Linkage and Amenities Plan (Pasco 2012) recommends planning and designing a Sacajawea Heritage Trail extension through the Ainsworth Town site (SR 8a), improving amenities, developing Town of Ainsworth archaeology site, and adding a pedestrian bridge to the side of the Burlington Northern Santa Fe bridge if feasible. Public Access Opportunities:	
ECOLOGICAL CONDITIONS	
Water Quantity and Sediment: Irrigation pumps in SR 8b may have a slight impact on water quantity. Agricultural runoff may cause slight sediment input.	
Water Quality: Water quality may be slightly impacted by agricultural and industrial runoff within the reach.	
Habitat Characteristics and PHS Presence: This reach is adjacent to industrial facilities and artificially hardened shorelines, including a railroad next to the water and numerous overwater structures. There are artificially hardened shorelines along the entire reach, which significantly reduce the function of the riparian zone. SR 8a: This subreach contains barge moorage area and overwater structures, which artificially shade the water in the river. Habitat is limited to open water areas of the Snake River that provide habitat for ESA-listed and resident fish species, as well as areas for waterfowl concentrations. Greater sage grouse breeding habitat occurs in the upland shrub-steppe areas flanking the shoreline of this subreach. SR 8b: This subreach contains the US 12 bridge, which creates artificially shaded overwater cover. Similar to SR 1a, habitat is limited to open water areas of the Snake River that provide habitat for ESA-listed and resident fish species, as well as areas for waterfowl concentrations. There is also greater sage grouse breeding habitat in the upland shrub-steppe areas flanking the shoreline of this subreach.	

Reach 8	City of Pasco
ECOLOGICAL FUNCTIONS ANALYSIS	
SR 8a	
<p>Level of Existing Function: Partially Functioning</p> <p>Stressors:</p> <p>Upland development: Non-native riparian species (Russian-olive), railroad corridor and railroad bridge.</p> <p>Potential Restoration Opportunities: Replace non-native species with native alternative.</p> <p>Potential Protection Opportunities: Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	
SR 8b	
<p>Level of Existing Function: Impaired</p> <p>Stressors:</p> <p>Upland development: Railroad corridor along shoreline, industrial structures and Port development and vessel use, very limited riparian buffers and non-native Russian-olive species where riparian buffer exists, US 12 bridge.</p> <p>Recreational use: Informal roads and possibly off-road vehicle recreation use within upland areas.</p> <p>Potential Restoration Opportunities: Incorporate riparian buffers where absent. Replace non-native species with native alternatives.</p> <p>Potential Protection Opportunities: Protect intact shrub-steppe habitat from degradation by limiting recreation use. Provide stormwater controls consistent with Eastern Washington Stormwater Manual.</p>	