ERRATA TO THE 2013 FLOOD HAZARD MANAGEMENT PLAN

Volume I
2018

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ERRATA TO THE 2013 FLOOD HAZARD MANAGEMENT PLAN

In addition to the Progress Update, the following sections of the 2013 Flood Plan have been updated to reflect current information and understanding, correct grammar or other factual errors.

EXECUTIVE SUMMARY

ES.2 GOAL AND OBJECTIVES

Page ES-3

Revised Goal 3 and 4:

(1) Reduce risks to life and property from river flooding and channel migration;

(2) Identify and implement flood hazard management activities in a cost-effective and environmentally-sensitive manner;

(3) Support resilient communities, economic activities, and improve habitat conditions in flood-prone and channel migration areas; ~~compatible human uses, economic activities, and improve habitat conditions in flood-prone and channel migration areas; and~~

(4) Continue implementing cost effective river flood hazard activities supported by a long term flexible funding strategy. ~~Develop a long-term and flexible funding strategy for river flood hazard management.~~

Page ES-3 and ES-4

Revised objectives:

(1) Evaluate the risks to public safety and existing development (e.g., critical facilities, infrastructure, and structures) in flood-prone and channel migration hazard areas;

(2) Examine and prioritize opportunities to reduce risk to life and property, while reducing economic environmental impacts of flood hazard management actions and programs; ~~alternatives to reduce risk to life and property, while reducing economic and environmental impacts of flood hazard management actions and programs;~~

(3) Regulate new development in flood-prone and channel migration hazard areas to minimize risks to life, property, and habitat;~~,~~ ~~and strive for consistency of regulations among affected local governments;~~

(4) Review ~~Identify~~ current and establish future "Levels of Service" for existing and new flood risk reduction facilities;

(5) Promote coordination among Pierce County Agencies for consistency of regulations among affected local governments;

~~(5)~~(6) Manage~~tain~~, ~~repair and modify necessary existing~~ flood risk reduction facilities in a cost-effective manner that makes the facilities less susceptible to future damage, reduces impacts on ~~aquatic and riparian~~ habitat, and ensures consistency with public law (PL) 84-99, or similar federal, tribal and state laws and programs;

~~(6)~~(7) Identify repetitive-loss properties and properties needed for future flood risk reduction facilities;

~~(7)~~(8) Identify and examine the connections between floodplain management, salmon recovery, aquatic and riparian habitat, water quality, open space, public access and agricultural resources to take advantage of efficiencies in addressing multiple objectives; ~~Prioritize projects and programs based on the level of risk, benefit, cost-effectiveness over the life of the plan or facility, and adverse effects on habitat;~~

~~(8)~~(9) Prioritize projects and programs based on the level of risk, benefit, cost effectiveness and effects in habitat; over the life of the plan or facility;~~Provide for the participation of stakeholders in the assessment of acceptable risks, evaluation and ranking of alternatives, natural resource management issues and development of recommendations;~~

~~(9)~~(10) Provide for the participation of stakeholders in the assessment of acceptable risks, evaluation and ranking of alternatives, natural resource management issues and in the development of plan; ~~Coordinate among Pierce County departments, other agencies and governments (cities, tribes, adjacent counties) to seek consistency in flood hazard management and flood disaster response and recovery;~~

~~(10)~~(11) Coordinate among Pierce County departments, other agencies and governments to seek consistency in flood hazard management, development regulations and flood disaster response and recovery. ~~Implement a County-wide public education and outreach program to improve flood awareness that includes actions people can take to reduce risks (e.g., flood insurance, flood proofing);~~

~~(11)~~(12) Implement a County-wide public education and outreach program to improve flood awareness that includes actions people can take to reduce their risks (e.g., flood insurance, flood proofing); ~~dentify possible funding sources for implementing the recommended flood hazard management activities;~~

~~(12)~~(13) Identify supplemental funding sources for implementing recommended flood hazard management activities; ~~Examine the connections between flood hazard management, river corridors, salmon recovery, aquatic and riparian habitat,~~

~~water quality, open space, public access and agricultural resources to take advantage of efficiencies in addressing multiple objectives;~~

~~(13)~~(14) Remove or modify existing flood risk reduction facilities, where feasible, ~~-~~to protect, restore, or enhance critical riparian or instream habitat that benefits threatened or endangered species;

~~(14) Identify important riparian, aquatic, fish and wildlife habitat;~~

(15) Protect and enhance natural systems that ~~-~~reduce flood risk ~~prevent flooding~~;

(16) Monitor the effectiveness of projects and repairs to learn from successes, develop long term cost-effective approaches and reduce the need for costly solutions; ~~Adaptively manage implementation to learn from successes, develop long-term cost-effective approaches and reduce the need for costly solutions;~~

~~(17) Incorporate a science-based approach in developing and evaluating alternatives and to monitor implementation;~~

~~(18)~~(17) Increase our understanding and incorporate information about climate change ~~(including potential increases in rainfall, glacial retreat and changes in sediment transport)~~ into flood hazard management decision-making; ~~and~~

(18) Maintain a network of accurate stream flow, weather gauges, and water quality data to inform management decisions. ~~Cooperate with regional agencies in maintaining a network of accurate stream flow and weather gauges, and water quality data.~~

ES.4.1 Guiding Principles and Policies

Page ES-9, third paragraph

Revised text:

Project policy #5 – Flood and Channel Migration Risk Reduction Goals – This policy proposes four "Levels of Service~~flood protection levels~~" for levees that would be applied to different river reaches based on the recommended reach management strategy. The four Levels of Service ~~flood protection levels~~ are:

ES 5.2 PROGRAMMATIC RECOMMENDATIONS

Page ES-14, FPW #14

Revised text:

FPW #14	Flood Education and Outreach Program These recommendations address consistency of education and outreach activities with the CRS program; outreach to floodplain property owners through ~~the annual flood bulletin~~ an annual mailing; promotion of all aspects of the County's flood hazard management program; promotion of flood preparedness and purchase of flood insurance; internal and external coordination and collaboration. *(Pierce County, cities/towns, public)*

Page ES-15, FPW #24

Revised Text:

FPW #24	River Reach Management Strategies This recommendation proposes four management strategies (levels of service ~~protection~~) for levees, two management strategies for revetments, and two non-structural strategies to address flood and channel migration risk reduction goals for different river reaches in the planning area; and encourages promotion of agriculture, recreation and open space as the most compatible land uses in the floodplain. *(Pierce County and cities/towns)*

ES 5.3 CAPITAL PROJECTS

Page ES-17 and ES-18, first paragraph.

Revised text:

The capital improvement projects recommended within the Flood Plan address flooding and channel migration problems which have been identified for each river reach in Chapter 5. Each section of Chapter 5 provides a list of problems identified for the river reach and a description of recommended capital project solutions. The project descriptions provide a general overview of each project. Projects were selected after the completion of an initial feasibility analysis, permitting considerations, assessment of benefits, and project cost estimates. The cost estimates are for capital expenditures only and are preliminary, based on 2017~~1~~ costs at planning design level (approximately 15 percent design level) and the information available at the time. For many of the projects multiple options were considered, however alternatives also had to be compared and filtered to be consistent with the policies and programmatic recommendations in the plan. Of the remaining alternatives, only those ~~which~~ that provided the most benefit for the least project cost were recommended for inclusion in the Plan. Initial project analysis for each project was completed by multi-disciplinary teams of Pierce County staff. The estimates and descriptions provided have been updated to reflect current costs ~~. are~~ and are a starting point for further project development as the Flood Plan is implemented. Additional design and engineering ~~will be~~ is still required for many of the ~~each~~ projects. ~~as they are developed and will be included within the Capital Improvement Element of the Pierce County Comprehensive Plan.~~ The total estimated cost ~~of~~ the 32 capital projects is between ~~$350.8~~ $673,974,588 and ~~$396.4~~ $676,783,273 million (Table ES.4).

Page ES-18, Table ES 4- Proposed Capital Improvement Projects.

Revised estimated costs:

Table ES 4 – Proposed Capital Improvement Projects				
CIP#	**Project Name/Location**	**Preferred Solution(s)**	**Score**	**Estimated Cost (~~2011~~ 2018$)**
Lower Puyallup River				

Table ES 4 – Proposed Capital Improvement Projects				
CIP#	**Project Name/Location**	**Preferred Solution(s)**	**Score**	**Estimated Cost (~~2011~~ 2018$)**
LP1	**Tacoma Wastewater Treatment Plant Flood Wall**, Left bank (RM 2.9 – RM 3.1)	Construct flood wall and storm drain backwater retrofit	65	~~$5,200,000~~ $8,420,966
LP2	**Clear Creek Acquisition/Levee,** Left bank (RM 2.9 and backwater area)	Acquiring floodplain properties and construct a levee along Clear Creek	53	~~$36,000,000 - $55,000,000~~ $55,744,043
LP3	**Oxbow Lake Flooding / Sewer Lift Station Protection**, Right bank (RM 5.0 and backwater area)	Elevate sewer lift station	51	~~$410,000~~ $460,624
LP4	**North Levee Road Setback Levee**, Right bank (RM 2.8 – RM 8.15)	Construct setback levee landward of N. Levee Road	61	~~$104,000,000~~ $315,878,160
LP5	**Puyallup Wastewater Treatment Plant Flood Wall**, Left bank (RM 6.8 – RM 6.9)	Construct flood wall	60	~~$2,500,000 $3,500,000~~ $6,300,000
LP6	**Tiffany's Skate Inn/Riverwalk Flood Wall,** Left bank (RM 8.1 – RM 8.6)	Construct flood wall, and close road at underpass during flood events	44	~~$4,500,000~~ $5,055,633
LP7	**Puyallup Executive Park**, Left bank (RM 9.1 - RM 9.25)	Construct flood wall and establish evacuation plan	48	~~$160,000~~ $179,755
LP8	**Linden Golf Course Oxbow Setback Levee**, Left bank (RM 9.6 – RM 10.5)	Construct setback levee, side channel habitat. Phase II would remove 14-acre landfill	TBD	~~43,000,000~~ $48,309,389
Middle Puyallup River				
MP1	**Rainier Manor / Riverwalk / Rivergrove and SR-410 Flood Wall and Levee**, Right bank (RM 10.6 – RM 11.8)	Construct a flood wall	55	~~$11,000,000~~ $12,358,215
MP2	**McCutcheon Road & 96th Street E. Road Barricade**, Right bank (RM 14.2 – RM 14.9)	Close road with immovable barricade during flood events and conduct post-flood repair	50	~~$50,000~~ $56,173
MP3	**116th Street E. Point Bar Gravel Removal**, Left bank (RM 15.8 – RM 16.0)	Remove 13,700 CY gravel	33	~~$220,000~~ $247,164
MP4	**Middle Puyallup & 128th Street Comp study**, Left and right bank (RM 16.7 – RM 17.4)	Construct setback levees on both left and right banks.	50	~~$12,500,000~~ $14,700,949 (per 2008 Levee Feasibility Study)
Upper Puyallup River				
UP1	**Calistoga Setback Levee,** Right bank (RM 19.9 – RM 21.3)	Construct setback levee and reconnect 46 acres of floodplain	66	~~$18,000,000 - $12,000,000~~

Table ES 4 – Proposed Capital Improvement Projects				
CIP#	**Project Name/Location**	**Preferred Solution(s)**	**Score**	**Estimated Cost (~~2011~~ 2018$)**
				$18,000,000
UP2	**Ford Levee Setback Reach Gravel Removal**, Right bank (RM 24.0 – RM 24.4)	Remove 36,000 CY gravel and construct up to 12 engineered log jams	35	~~$900,000~~ $1,011,126
UP3	**Neadham Road Flooding / Channel Migration Protection**, Right bank (RM 25.3 – RM 27.0)	Construct levee and engineered log jams (phase 1); acquire floodplain properties and abandon roadway (phase 2)	49	~~$8,100,000~~ $14,000,000
UP4	**Orville Road Revetment at Kapowsin Creek**, Left bank (RM 26.2 - RM26.4)	Property acquisition and demolition, removal of remnant levee and construction of engineered log jam/dolotimber revetment	50	~~$1, 500,000~~ $6,773,885
UP5	**Orville Road Channel Migration Protection**, Left bank (RM 26.3 -RM 28.6)	Construct revetment and install engineered log jams; secondary option (and possible long-term solution) is relocation of Orville Road	49	~~$17,300,000 - $38,000,000~~ $8,917,149
UP6	**Puyallup River/Orville Road Revetment and Riparian Habitat Restoration**, Left bank (RM 26.7 – RM 27.1)	Acquire floodplain properties, construct setback revetment along Orville Road, and install engineered log jams	50	~~$3,700,000~~ $1,891,531
Lower White River				
LW1	**State Street Flood Wall or Emergency Access**, Left bank (RM 0.2 – RM 0.3)	*Multiple Solutions*: Construct flood wall or acquire a nearby property and provide emergency access off SR-410 Traffic Ave. exit	53	Up to ~~$2,000,000~~ $1,150,000
LW2	**Lower White River Flood Protection,** Right and~~/or~~ left bank (RM 1.8 – RM 4.9)	*Multiple Solutions*: A combination of log jams, revetments, property acquisition, habitat features, another techniques for flood risk reduction. *(*Project to be completed in multiple phases)*	TBD	~~$28,627,000~~ $88,495,909
LW3	**Butte Avenue Levee/Berm;** Right bank (RM 4.9 – RM 5.5)	Construct a berm and levee	45	~~$1,700,000~~ $6,334,770
Upper White River				
None				

Table ES 4 – Proposed Capital Improvement Projects				
CIP#	**Project Name/Location**	**Preferred Solution(s)**	**Score**	**Estimated Cost (~~2011~~ 2018$)**
Greenwater River				
None				
Carbon River				
C1	**Carbon Confluence Setback Levee**, Left bank (RM 0 – RM 0.4)	Construct setback levee	45	~~$5,300,000~~ $5,954,413
C2	**Carbon Levee Bank Stabilization / Flow Deflection and Coplar Creek Backwater Improvements**, Left bank (RM 3.2 – RM 4.9)	*Multiple Solutions*: Construct engineered log jams and box culvert for Coplar Creek	48	~~$2,700,000~~ $3,033,380
C3	**Alward Road Floodplain Acquisition**, Left bank (RM 6.0 – RM 6.4)	Acquire flood-prone properties	47	~~$1,200,000~~ $1,348,169
C4	**Alward Road Floodplain Acquisition and Setback Levee**, Left bank (RM 6.4 – RM 8.3)	Acquire floodplain properties and construct setback levee	56	~~$29,600,000~~ $27,517,187
C5	**Upper Carbon/Fairfax Road Bank Stabilization**, Left bank (RM 22.4 – RM 24.0)	Construct engineered log jams	48	~~$1,500,000~~ $1,685,211
South Prairie Creek				
SP1	**South Prairie Floodplain Acquisition**, Right bank (RM 1.6 – RM 3.5)	Acquire floodplain properties	53	~~$570,000~~ $640,380
SP2	**South Prairie Fire Station Flood Protection**, Left bank (RM 6.0)	Extend existing flood berm and install backflow prevention valve	50	~~$27,000~~ $446,400
Middle Nisqually River				
MN1	**McKenna Area Floodplain Acquisition**, Right bank (RM 21.6 – RM 22.0)	Elevate existing residential structures and acquire flood prone properties	45	~~$10,900,000~~ $12,245,868
Upper Nisqually River				
UN1*	**Nisqually Park Levee Protection**, Right bank (RM 64.3 – RM 64.9)	Construct engineered log jam structures adjacent to existing levee	50	~~$2,000,000~~ ~~$4,000,000~~ $841,586
UN2*	**Upper Nisqually / Mt. Rainier National Park Revetment Retrofit / ELJs**, Right bank (RM 64.9 – RM 65.3)	Construct engineered log jam structures adjacent to existing levee/revetment	61	~~$,500,000~~ ~~$3,500,000~~ $841,586
Mashel River				
M1	**SR-161 Mashel River Bridge Scour and Slope Repair,** Left	Construct bank roughening log structures	52	~~$2,000,000~~ $2,246,948- ~~$2,500,000~~ $2,808,685

Table ES 4 – Proposed Capital Improvement Projects				
CIP#	**Project Name/Location**	**Preferred Solution(s)**	**Score**	**Estimated Cost (~~2011~~ 2018$)**
	bank (RM 5.2 – RM 5.3) and right bank (RM 5.5)			
Total Project Costs				**~~$350,864,400 - $396,364,000~~, $671,086,569 - $673,895,254**

*UN1 and UN2 have been combined into one project.

A cost of inflation calculator was used to update the project costs (https://westegg.com/inflation/), along with the Surface Water Improvement Program document 2018-2023 (https://www.co.pierce.wa.us/ArchiveCenter/ViewFile/Item/5814)

ES.6 PLAN IMPLEMENTATION AND FUNDING

Page ES-21, first paragraph, second sentence.

Revised text:

Pierce County faces significant challenges in the years ahead. The aging system of flood risk reduction facilities, many of which were built in the 1960s or earlier, were built to a lower level of service ~~protection~~ than what is now required to protect transportation, commercial, and residential structures.

ES 6.2 Funding

Page ES-22 to ES-23

Revised text:

One of the four goals of the Flood Plan is to develop a long-term and flexible funding strategy for river flood hazard management (section 1.4). The 2013 Flood Plan recommended a new county wide funding source be established. This recommendation has since been implemented. Current sources of funding include the Pierce County Surface Water Management Fund, which is paid by residents within unincorporated Pierce County, and Real Estate Excise Tax (REET), which is a 0.25 percent tax on the property selling rate prices throughout the county. Other sources of funds consist of grants and partnerships from state, local, federal agencies, and cost sharing with local jurisdictions.

RCW 86.15.025 gave the Pierce County Council the authority to establish ~~either~~a countywide flood control zone districts (FCZD). A FCZD is a special purpose district (government agency) established to specifically address flooding issues. The Pierce County Council authorized the creation of the Pierce County Flood Control Zone District ("District") on April 3, 2011, Ordinance 2011-95S. The District is authorized to construct, operate, and maintain flood control projects to reduce flooding and channel migration risks. Funding for the District is authorized annually through a property tax levy based on total assessed value of taxable property within the district's designated boundaries. The District tax levy under state law

may not exceed 50 cents per thousand dollars of assessed value. Due to potential levy suppression issues as a junior taxing district, the District may not exceed 25 cents per thousand of assessed value. Since the District's formation the property tax levy for the flood control zone has not exceeded 10 cents per thousand.

~~One of the four goals of the Flood Plan is to "develop a long-term and flexible funding strategy for river flood hazard management" (see Section 1.4). This Plan recommends that a new county-wide funding source be established to ensure equitable funding for ongoing implementation of the flood plan, as well as to support system-wide consistency and continuity of flood control maintenance, operations, and improvements.~~

~~Current sources of funding include the Pierce County Surface Water Management Fund, which is paid by residents within unincorporated Pierce County, and Real Estate Excise Tax (REET), which is a 0.25 percent tax on property rates throughout the county. Other sources of funds include designated federal and state funds that are limited and conditionally available in declared flood disasters and through grants. Over the past 20 years (1991-2011) the amount of local funds in total, together with some federal and state funds, expended by Pierce County SWM on river programs, maintenance and operations, capital projects and acquisitions has exceeded $155 million. This averages out to about $7.7 million year over the past 20 years for all maintenance and construction for flood protection on the Puyallup and Nisqually river systems.~~

~~Pierce County's current funding levels do not provide sufficient funding to address the existing needs for flood risk reduction facilities, including maintenance, repair, and capital needs. Existing dedicated funding sources must be enhanced in order for Pierce County to provide adequate flood and channel migration zone hazard services and implement preventive projects and programs to reverse the trends of declining levels of protection~~

ES.6.2.1 Potential New and Enhanced Local Funding

Page ES-23, first paragraph.

Deleted text:

~~RCW 86.15.025 gives the Pierce County Council the authority to establish either countywide or basin-level flood control zone districts (FCZD) that create additional opportunities for new, dedicated funding sources. A FCZD is a special purpose district (government agency) established to specifically address flooding issues. The purpose of the FCZD is to construct, operate, and maintain flood control projects to reduce flooding and channel migration risks. Funding for a FCZD can be initiated through a levy based on total assessed value of taxable property within the district's designated boundaries or through the imposition of fees. A FCZD was created by Pierce County Council Ordinance 2011.95S on April 3, 2012.~~

ES.6.2.2 Future Funding

Page ES-24, first paragraph.

Deleted text:

Future funding of plan implementation is being determined in a separate process carried out by the Pierce County Council. The ~~initiation of the~~ Pierce County Flood Control Zone District was established in 2012. ~~is being evaluated with input from cities, special purpose districts and other stakeholders.~~

CHAPTER ONE INTRODUCTION

1.2 GEOGRAPHIC SCOPE

Page 1-3, Table 1.2 Planning Area.

Revised Planning Area Table:

Table 1.2 Planning Area	
Puyallup River System (Lower, Middle and Upper)	
Puyallup River From Commencement Bay at RM 0 to Champion Bridge at RM 29	
Lower Puyallup Commencement Bay at RM 0 to the confluence of the White River at RM 10.3	
~~Mid-Puyallup~~ ~~Confluence of the White River at RM 10.3 to the confluence of the Carbon River at RM 17.4~~	
White River	
Lower White From its confluence with the Puyallup River at RM 0 to the King/Pierce County boundary at RM 5.5	
Upper White Near the community of Greenwater from RM 44.4 to RM 50.5	**Greenwater River** From its confluence with the White River at RM 0 to RM 4.0
Mid-Puyallup Confluence of the White River at RM 10.3 to the confluence of the Carbon River at RM 17.4	
Carbon River	
From its confluence with the Puyallup River at RM 0 to RM 8.4 near the intersection of Alward Rd. and 245th Ave E. Upper Carbon River near Fairfax at RM 22.0 – 24.0.	**South Prairie Creek** From its confluence with Carbon River at RM 0 to RM 6.4 at the Town of South Prairie
Upper Puyallup Confluence of the Carbon River at RM 17.4 to Champion Bridge at RM 29	
~~**Carbon River**~~ ~~From its confluence with the Puyallup River at RM 0 to RM 8.4 near the intersection of Alward Rd. and 245th Ave E~~	~~**South Prairie Creek**~~ ~~From its confluence with Carbon River at RM 0 to RM 6.4 at the Town of South Prairie~~
Nisqually River System (Middle and Upper)	
Nisqually River From the McKenna area to Mt. Rainier National Park	

Middle Nisqually McKenna area between RM 21.3 to RM 26	**Mashel River** From the confluence with Nisqually River at RM 0 to the Town of Eatonville at RM 6.8
Upper Nisqually From the community of Elbe at RM 50.5 to Mt. Rainier National Park at RM 65.8	

1.4 GOALS AND OBJECTIVES

Page 1-8, first paragraph.

Revised text:

The 2018 Flood Plan Update and Progress Report ~~and Uupdate~~ includes updated goals and objectives that are more concise to fit the needs of the County staff and the committee members. The 2013 methodology was used to update the goals and objectives. ~~Goals describe broad outcomes that the Flood Plan should achieve as agreed upon by the Flood Plan Advisory Committee. The Goals provide direction and focus towards the end results. The Plan Objectives are more specific statements of action that the Committee agreed would move the Plan towards attainment of the Plan's Goals.~~

Page 1-8, Goal 3 and 4.

Revised Goal 3 and 4:

(1) Reduce risks to life and property from river flooding and channel migration;

(2) Identify and implement flood hazard management activities in a cost-effective and environmentally-sensitive manner;

(3) Support resilient communities, economic activities, and improve habitat conditions in flood-prone and channel migration areas; ~~compatible human uses, economic activities, and improve habitat conditions in flood-prone and channel migration areas; and~~

(4) Continue implementing cost effective river flood hazard activities supported by a long term flexible funding strategy. ~~Develop a long-term and flexible funding strategy for river flood hazard management.~~

Page 1-9 and 1-10.

Revised objectives:

(1) Evaluate the risks to public safety and existing development (e.g., critical facilities, infrastructure, and structures) in flood-prone and channel migration hazard areas;

(2) Examine and prioritize opportunities to reduce risk to life and property, while reducing economic environmental impacts of flood hazard management actions and programs; ~~alternatives to reduce risk to life and property, while reducing~~

~~economic and environmental impacts of flood hazard management actions and programs;~~

(3) Regulate new development in flood-prone and channel migration hazard areas to minimize risks to life, property, and habitat~~;~~ ~~and strive for consistency of regulations among affected local governments;~~

(4) Review ~~Identify~~ current and establish future "Levels of Service" for existing and new flood risk reduction facilities;

(5) Promote coordination among Pierce County Agencies for consistency of regulations among affected local governments;

~~(5)~~(6) Manage~~tain~~, ~~repair and modify necessary existing~~ flood risk reduction facilities in a cost-effective manner that makes the facilities less susceptible to future damage, reduces impacts on ~~aquatic and riparian~~ habitat, and ensures consistency with public law (PL) 84-99, or similar federal, tribal and state laws and programs;

~~(6)~~(7) Identify repetitive-loss properties and properties needed for future flood risk reduction facilities;

~~(7)~~(8) Identify and examine the connections between floodplain management, salmon recovery, aquatic and riparian habitat, water quality, open space, public access and agricultural resources to take advantage of efficiencies in addressing multiple objectives; ~~Prioritize projects and programs based on the level of risk, benefit, cost-effectiveness over the life of the plan or facility, and adverse effects on habitat;~~

~~(8)~~(9) Prioritize projects and programs based on the level of risk, benefit, cost effectiveness and effects in habitat; over the life of the plan or facility;~~Provide for the participation of stakeholders in the assessment of acceptable risks, evaluation and ranking of alternatives, natural resource management issues and development of recommendations;~~

~~(9)~~(10) Provide for the participation of stakeholders in the assessment of acceptable risks, evaluation and ranking of alternatives, natural resource management issues and in the development of plan; ~~Coordinate among Pierce County departments, other agencies and governments (cities, tribes, adjacent counties) to seek consistency in flood hazard management and flood disaster response and recovery;~~

~~(10)~~(11) Coordinate among Pierce County departments, other agencies and governments to seek consistency in flood hazard management, development regulations and flood disaster response and recovery. ~~Implement a County-wide public education and outreach program to improve flood awareness that includes actions people can take to reduce risks (e.g., flood insurance, flood proofing);~~

~~(11)~~(12) Implement a County-wide public education and outreach program to improve flood awareness that includes actions people can take to reduce their risks (e.g., flood insurance, flood proofing); ~~dentify possible funding sources for implementing the recommended flood hazard management activities;~~

~~(12)~~(13) Identify supplemental funding sources for implementing recommended flood hazard management activities; ~~Examine the connections between flood hazard management, river corridors, salmon recovery, aquatic and riparian habitat, water quality, open space, public access and agricultural resources to take advantage of efficiencies in addressing multiple objectives;~~

~~(13)~~(14) Remove or modify existing flood risk reduction facilities, where feasible, ~~-~~to protect, restore, or enhance critical riparian or instream habitat that benefits threatened or endangered species;

~~(14) Identify important riparian, aquatic, fish and wildlife habitat;~~

(15) Protect and enhance natural systems that ~~-~~reduce flood risk ~~prevent flooding~~;

(16) Monitor the effectiveness of projects and repairs to learn from successes, develop long term cost-effective approaches and reduce the need for costly solutions; ~~Adaptively manage implementation to learn from successes, develop long-term cost-effective approaches and reduce the need for costly solutions;~~

~~(17) Incorporate a science-based approach in developing and evaluating alternatives and to monitor implementation;~~

~~(18)~~(17) Increase our understanding and incorporate information about climate change ~~(including potential increases in rainfall, glacial retreat and changes in sediment transport)~~ into flood hazard management decision-making; ~~and~~

(18) Maintain a network of accurate stream flow, weather gauges, and water quality data to inform management decisions. ~~Cooperate with regional agencies in maintaining a network of accurate stream flow and weather gauges, and water quality data.~~

1.5 GUIDING PRINCIPLES

Page 1-10, first paragraph.

Revised text:

Guiding principles are the facts, scientific foundation, and broad philosophy agreed upon by the Flood Plan Advisory Committees. ~~-~~The 2013 Guiding principles were updated during the plan update process to be more concise and comprehensive based on input from ~~to fit the needs of~~ County staff~~-~~ and the committee members. The 2013 methodology was used to update the guiding principles. Below is a summary table of the changes. ~~The guiding principles from the 2013 flood plan were updated to be more concise to fit the needs of County staff and the committee members.~~ that guided development of plan

~~recommendations and capital projects. These principles serve as a frame of reference for evaluating flood risks, identifying the range of management alternatives, and developing recommendations. Together, the goals and objectives, and guiding principles also provided a basis for the development of the flood plan policies presented in Chapter 3.~~

Page 1-10 and 1-11.

Revised guiding principles:

(1) River flooding and channel migration are natural processes that continually form and alter river valleys and the floodplain landscape. Rivers transport water, sediment, and woody material that may threaten public safety and infrastructure in flood prone areas. Biological productivity and diversity are sustained by natural riverine processes, such as flooding, that create and alter aquatic habitats that sustain fish and wildlife species.

(2) Activities in the watersheds impact flooding, channel migration, habitat, ground water, and water quality within the river corridor**.** ~~**ons in the upland and upstream portions of watersheds impact flooding, channel migration, and water quality** within the river corridor. Sources of sediment and pollution from human activities like logging and urbanization also impact water quality and habitat.~~

(3) Flood damage creates financial costs, both public and private. Effective flood hazard management can reduce long-term damage costs. Public infrastructure~~, such as roads, utilities, levees, revetments and dams,~~ and private improvements ~~such as homes, businesses and structures~~ located in the floodplain~~,~~ are vulnerable to flood damage. ~~As the budgets of federal, state, and local governments tighten, the amount of funding available for flood hazard management is reduced.~~ Funding for structural flood risk reduction projects is limited and continues to be reduced.

(4) A river and its valley floor, including adjacent floodplains, floodways, and potential channel migration areas, constitute a corridor through which floodwaters flow and within which opportunities exist for ~~various and compatible land uses, including~~ agriculture, recreation, and open space. Floodplains are subject to inundation during flooding events~~,~~ ~~varying in magnitude from the 2-year to 100-year event or larger,~~ depending on the river system and floodplain conditions.

(5) Future development in flood prone areas should be designed to reduce risks to life and property. ~~**within Pierce County, including cities and unincorporated areas if guided away from flood-prone areas, can reduce future risks to life and property.**~~ Adverse impacts of development ~~both inside and outside the floodplain~~ can be minimized by practices that preserve and enhance environmental functions. ~~by development practices that reduce future risks through appropriate regulation and land use, open land preservation and acquisition, multi-objective planning, relocation or elimination of high hazard structures, prohibiting unacceptable encroachments, and establishing ongoing maintenance practices that preserve and enhance environmental functions.~~

(6) Beneficial functions of floodplains and rivers can be achieved by restoring, preserving, and enhancing natural processes. ~~– even if these flood-prone and environmentally sensitive areas are not subject to development in the future, past degradation of them needs to be remedied through restoration and enhancement actions.~~

(7) Adequate and stable funding is necessary for ongoing flood risk reduction activities and maintenance of existing facilities. ~~**The levels of funding for floodplain management should meet demand** within Pierce County (both incorporated and unincorporated areas) to ensure that necessary infrastructure maintenance and improvements meet citizen's expectations and willingness to pay.~~

(8) Protecting and working with, rather than trying to control, natural riverine processes generally will reduce flood risks to people and property in a less costly manner than traditional structural approaches. ~~to flood hazard management, while also benefiting native fish and wildlife and preserving aesthetic landscapes.~~

(9) Communication ~~**with**~~ **and involvement of a diverse groups of citizens, and stakeholders and** ~~**public and private**~~ **landowners is vital** in developing a responsible, effective flood hazard management plan.

(10) Promote community stewardship and personal responsibility. Flood risk reduction should be a joint effort with private property owners. Assistance programs exist at the State, Federal, and local level for public agencies and individuals. The county will foster localized responsibility for flood risk, water-related resources, and wise use of flood-prone lands. ~~**Assume personal and public responsibility –** we need to revive our ethic of land and water stewardship. The County needs a framework that will foster localized responsibility for flood risk, water-related resources, and wise use of flood-prone lands. Private property rights should be respected when providing flood protection.~~

(11) Leadership and cooperation among affected governments and public agencies ~~**(counties, cities, tribes, and resource agencies)**~~ **is essential** for the success of long-term flood hazard management.

(12) Use an ~~**Advances in technical information and an evolving understanding of flood risks call for an**~~ **adaptive management approach when implementing the flood hazard management plan.** Knowledge and levels of understanding will change over time. ~~**to implementing the flood hazard management plan.** Our knowledge and levels of understanding of risk will change over time – e.g., changing flood maps, new data, etc. We need to learn from approaches and actions that are most effective in achieving the goals and objectives, and then adjust management actions to reflect the latest information.~~

(~~**13)Education**~~**13) Education regarding riverine processes, flooding, and preparedness can raise public awareness** ~~**and**~~ **reduc**~~**e**~~**ing future flood damages and costs.**

1.7.1 Pierce County Comprehensive Plan, Community Plans and Environmental Regulations

Page 1-14, first paragraph.

Revised text:

The Pierce County Comprehensive Plan was developed and adopted in 1995 in response to the requirements of the Growth Management Act and is codified in Title 19A of the Pierce County Code. The Comprehensive Plan addresses thirteen~~ten~~ elements of the natural and built environment: Land Use, Capital Facilities, Cultural Resources, Design and Character~~Rural,~~ Economic Development, Environment, Essential Public Facilities ~~and Critical Areas,~~ Housing, Open Space, Parks and Recreation, Transportation, Utilities, Capital Facilities, and Community Plans~~., and Essential Public Facilities.~~ The Land Use Element, Environment ~~and Critical Areas~~ Element, Utilities Element and Capital Facilities Element include policies regarding flood control for major rivers in Pierce County. Where the Flood Plan departs from the policies within the Comprehensive Plan, future updates, and amendments of the Comprehensive Plan will be necessary.

1.7.2 Surface Water Management Basin Plans

Page 1-14, first paragraph, first sentence.

Corrected text:

Surface water management within unincorporated Pierce County is guided by a series of nine~~ten~~ basin specific plans which address flooding of the regulated flood plain within the watershed for tributaries and other water bodies, identify existing conditions which affect storm drainage and surface water, forecasts future drainage conditions, and identify potential solutions for the streams and tributaries not included within the Flood Plan.

Page 1-15, eighth, ninth, and tenth bullets.

Revised text:

- Nisqually Basin ~~(in adoption process)~~
- ~~Upper Puyallup/Carbon River Basin (in development)~~
- White River Basin ~~(in adoption process)~~

1.7.3 Pierce County Natural Hazards Mitigation Plan (PCNHMP)

Page 1-15, second, third, fifth, sixth bullet.

Revised text:

- Protect Life and Property
- Ensure Emergency Services; ~~Continuity of Operations~~
- Increase Public Preparedness

- Establish and Strengthen Partnerships for Implementation
- ~~Protect the Environment~~ Preserve or Restore Natural Resources, and;
- ~~Increase Public Preparedness for Disasters~~
- Promote a Sustainable Economy

Page 1-15 and 1-16, third paragraph.

Deleted text:

The Pierce County Department of Emergency Management is responsible for coordinating the development of the *Pierce County Natural Hazard Mitigation Plan* which includes the divisions and agencies of Pierce County Government. This Pierce County Natural Hazard Mitigation Plan is part of the larger *Region 5 Hazard Mitigation Plan* that includes the mitigation planning of all other governments and local jurisdictions within Pierce County. ~~As part of the adoption process the *Pierce County Rivers Flood Hazard Management Plan* will need to be incorporated by reference into the *Pierce County Natural Hazard Mitigation Plan*.~~

1.7.4 Inter- County River Improvement Agreement

Page 1-16, first paragraph, last sentence.

Corrected text:

Because the Agreement is due to expire at the end of 2020~~19~~, a new agreement will need to be negotiated.

1.7.5 Settlement Agreement between the Puyallup Tribe of Indians and the Federal Government, State of Washington, Local Governments of Pierce County and Private Interests

Page 1-16, first paragraph.

Corrected text:

In 1990, a Settlement Agreement was reached between the Puyallup Tribe of Indians, local governments in Pierce County, the State of Washington, the United States of America, Port of Tacoma, and certain private property owners. Key provisions of this agreement that affect flood hazard management planning, include: (1) numerous additions to the tribe's land base including the submerged lands below the mean ~~ordinary~~ high water ~~mark~~line (riverbed) within the Puyallup River within the 1873 survey area (approximately RM 1.4 to RM 7.2); (2) provisions for substantial restoration of the fishery resource, allowing for future development while lessening impacts on fisheries; (3) resolution of conflicts over governmental jurisdiction; and (4) establishment of a consultation process. A more complete summary may be found in Appendix D.

1.7.6 Vegetation Management Agreement with Puyallup Tribe of Indians

Page 1-16, first paragraph, third sentence.

Corrected grammar:

The Agreement specifies allowable vegetation removal for maintenance activities, sediment berm, ~~and~~ gravel removal, and levee and revetment reconstruction in the Puyallup River Basin.

CHAPTER TWO
MAJOR RIVER FLOODING IN PIERCE COUNTY

2.1.5 Effects of Sediment and Wood on River Flooding and Channel Migration

Page 2-7, first full sentence on page.

Corrected spelling:

Finally, it is difficult to get authorization from permitting agencies, including the Washington State Departments of Ecology, and Fish and Wildlife, the U.S. Army Corps of Engineers, National Marine Fisheries Service, and U.S. Fish and Wildlife Service, and support from the Puyallup, Muckle~~el~~shoot, and Nisqually tribes.

2.2 FLOODING AND FUTURE TRENDS

Page 2-8, third paragraph.

Corrected text:

Since 1962 there have been 16~~15~~ Presidential Disaster Declarations that included flooding in Pierce County. These declarations do not include the many flood responses that Pierce County has responded to that do not qualify as a federal disaster.

2.3 FLOOD HAZARDS AND IMPACTS

2.3.1 Types of Flood-Related Hazards

Page 2-11, second paragraph, first sentence.

Deleted text:

Channel migration results from bank erosion caused by high ~~peak~~ flows and erosive velocities.

2.3.2 Flood and Channel Migration Hazard Mapping

Page 2-13, first paragraph.

Revised text:

Flooding and channel migration potential are mapped by FEMA and Pierce County as a means to identify risks. Flood hazard mapping is carried out by plotting estimated flood elevations generated in a hydraulic analysis onto a topographic map of the river valley. Typically, flood hazard mapping plots ~~maps~~ the extent of water inundation for the one percent annual chance flood (100-year flood event or base flood), and the 0.2 percent annual chance flood (500-year flood event). FEMA's National Flood Insurance Program (NFIP) established the one percent annual chance floodplain as a special flood hazard area

(SFHA) and ~~100-year standard for floodplain mapping as~~ a minimum standard for regulatory and insurance purposes.

Page 2-13, second paragraph.

Revised text:

Flood hazard studies and associated mapping provide critical baseline information for flood hazard management and flood risk reduction. This information is then used to inform land-use decisions, regulate existing and proposed floodplain development, and to evaluate and design flood hazard management projects. If maps are outdated and no longer reflect actual floodplain conditions, there is high likelihood that land use decisions and new development will be allowed that put property and people in flood-prone areas, which increases risk. Inaccurate maps can also put unnecessary building restrictions on some parcels that are mapped as flood prone, but are not in a floodplain. ~~As of the publication of this document, updated floodplain maps (Preliminary DFIRM) have not yet been finalized by FEMA for the Puyallup, Carbon, White, and Mashel rivers and South Prairie Creek. However, these preliminary maps are the best available data and are being used to regulate floodplain development in unincorporated Pierce County~~. On March 7, 2017 Pierce County adopted floodplain maps for all communities in the county except for the Puyallup river near Orting, the lower eight miles of the Puyallup River, and the Carbon River. These areas were secluded from the update due to non-accredited or non-certified levees being in the floodplain. However, these secluded areas do have a flood risk shown on FEMA preliminary maps from 2007 and 2009 that are regarded as best available data. These maps are currently being used along with best available data for changing flood risk.

Page 2-13, third paragraph.

Revised text:

Mapping of the special flood hazard areas (SFHA) was updated by FEMA and ~~preliminary~~ digital flood insurance rate maps (DFIRMs) were issued in 2007~~2005~~ for many of the sub-planning areas (SPAs) as shown in Table 2.4. The extent of increase in SFHA was significant for several SPAs, including the lower Puyallup, upper Puyallup, and Carbon rivers. In particular, the lower Puyallup River experienced an increase of over 300 percent due to the de-accreditation of the levees. When flood mapping was originally undertaken by FEMA in the late 1970's, there was no federal standard for accrediting levees to show protection from the one percent chance flood. ~~1987, the lower Puyallup levees met federal regulations for accreditation as 100-year levees.~~ In 1986, the Code of Federal Regulations, which governs the NFIP, added section 65.10 "mapping of areas protected by levees" which established standards for accrediting levees. However, more recent sediment deposition along the river bed and increases in the estimate of the one percent annual chance flood from 36,800 to 48,000 cfs have raised river water levels so that the levees no longer meet the three feet freeboard requirement for predicted 100-year water levels, which is one of the requirements for federal certification.

Page 2-15, Table 2.5 Area of Severe CMZ within each SPA.

Revised text:

Table 2.5 Area of Severe CMZ within each SPA		
	Sub-Planning Area	**Severe CMZ Area (Acres)**
SPA 1	Lower Puyallup River	38~~75~~
SPA 2	Mid Puyallup River	1019~~1,047~~
SPA 3	Upper Puyallup River	1329~~1,325~~
SPA 4	Lower White River	~~216~~230
SPA 5	Upper White River [a]	NA
SPA 6	Greenwater River [a]	19~~NA~~
SPA 7	Carbon River	~~999~~1,008
SPA 8	South Prairie Creek	~~183~~182
SPA 9	Middle Nisqually River [a]	NA
SPA 10	Upper Nisqually River	~~1,830~~1,546
SPA 11	Mashel River [a]	NA

[a] CMZ has not yet to be determined for these rivers
b CMZ study has not been adopted

2.3.3 Flood Hazard Risk Assessment

Page 2-16, sixth bullet, removed extra period.

Corrected grammar:

- A total of 17 properties were previously considered repetitive loss properties, but have since been mitigated (i.e., purchased and removed from the floodplain). The mitigated properties are all located within unincorporated areas of the Lower Puyallup River SPA. The unmitigated repetitive loss properties are located primarily in the Lower Puyallup River, Middle Puyallup River, and South Prairie Creek SPAs. Of the unmitigated repetitive loss properties, approximately 90 percent have active flood insurance policies in force. ~~.~~

2.3.4 Flood Damages and Impacts

Page 2-20, first bullet, removed semi-colon.

Corrected grammar:

- Category A – Debris Clearance ($3.2 million)~~;~~

2.4 PIERCE COUNTY PARTICIPIATION IN THE NFIP COMMUNITY RATING SYSTEM

Page 2-22, Heading

Corrected spelling

Page 2-22, paragraph 2.

Revised text:

The NFIP provides the financial backing for flood insurance policies within participating communities, making them more affordable to private property owners. The NFIP makes available affordable flood insurance to residents within communities that adopt approved floodplain management regulations that meet or exceed FEMA standards. ~~There~~ The Community Rating System or CRS is an incentive for jurisdictions who practice comprehensive floodplains management and ~~to~~ adopt standards that exceed the minimum standards of the NFIP ~~by reducing the cost of flood insurance premiums within jurisdictions with higher standards. The NFIP makes available affordable flood insurance to communities that adopt approved floodplain management regulations that meet or exceed FEMA standards.~~

Page 2-22, paragraph 3, last sentence.

Revised text:

To continue flood insurance coverage, and be eligible for federal assistance, the County must remain in the NFIP and maintain and enforce its adopted ~~minimum~~ floodplain management regulations.

Page 2-22, paragraph 4.

Revised text:

FEMA created the Community Rating System (CRS) as a reward for communities that do more than meet minimum NFIP requirements. The CRS goals are to reduce or avoid flood damage to insurable property; strengthen and support insurance aspects of the NFIP; and foster comprehensive floodplain management. ~~by taking actions to minimize flood losses and promote public awareness of flood hazards.~~ Community participation in the CRS is voluntary. The CRS offers reduced insurance rates based upon the class rating of a community. The CRS contains ten classes. "Class 1" gives the greatest insurance premium reduction of 45 percent. A "Class 10" community receives no premium reduction. Pierce County entered the program in 1995 and was the first county in the nation to earn a "Class 5" rating and has continued to strive for even better ratings. Pierce County currently holds a "Class 2" rating, ~~one of only three communities in the nation,~~ which results in a premium reduction of 40 percent. Pierce County is one of only three counties in the nation to have a "Class 2" rating, the others are ~~our neighbors~~ King County and Thurston County. ~~Two cities~~ Orting is the only other community in Pierce County currently ~~also~~ participatinge in the CRS

program. ~~The City of Fife entered the CRS program in 2006 and currently has a Class 5 rating, resulting in a 25 percent discount.~~ The City of Orting entered the program in 2008 ~~and has~~ at a Class 6 rating, and currently has a Class 5 ~~-~~rating resulting in a 25~~20~~ percent discount. The County continues to work with other communities to join the program.

Page 2-22, paragraph 5.

Revised text:

Table 2.9 shows a breakdown of Pierce County's 2014~~2011~~ CRS credit. Pierce County continues to strive to improve its program and rating under the CRS program. This will continue to be aided by implementation of the *Pierce County Rivers Flood Hazard Management Plan*.

CHAPTER THREE
FLOOD HAZARD MANAGEMENT POLICIES

3.2 PROJECT POLICIES

Page 3-3, number 5, Flood and Channel Migration Risk Reduction Goals.

Revised text:

5. Flood and Channel Migration Risk Reduction Goals – Flood risk reduction facilities designed to contain floodwaters (e.g., levees), or reduce channel migration (e.g., revetments) should be designed to be consistent with the adopted river reach management strategy. Four levels of service~~flood protection levels~~ for levees include:

Page 3-3, number 5, Flood and Channel Migration Risk Reduction Goals.

Revised text:

Deviations from the level of ~~protection~~ service shall be approved by the manager of the Surface Water Management Division.

3.3 FLOODPLAIN LAND USE POLICIES

Page 3-5, number 2, National Flood Insurance Program.

Deleted text:

2. National Flood Insurance Program – Pierce County and cities and towns with floodplains should participate and maintain good standing in the National Flood Insurance Program and its Community Rating System in order to better protect public safety, reduce the risk of flooding and channel migration hazards to existing ~~public and private~~ property, and achieve flood insurance premium discounts.

CHAPTER FOUR
PROGRAMMATIC RECOMMENDATIONS

4.0 PROGRAMMATIC RECOMMENDATIONS

Page 4-0, Updated Programmatic Recommendations table to include the SWIF elements.

Additional Text:

Programmatic Recommendations							
		Pierce County	Cities	Tribes	Other Agencies	SWIF	SWIF Chapters
4.1 Flood Hazard Information/Mapping/Technical Assistance							
4.1.1	FPW #1 Floodplain Mapping	*	*		*	*	Ch. 5: Risk Assessment Report,
4.1.2	FPW #2 Channel Migration Zone Mapping and Regulation	*	*			*	Ch. 5: Risk Assessment Report
4.1.3	FPW#3 Technical Assistance on Floodplain Information	*			*	*	Ch. 5: Risk Assessment Report
4.1.4	FPW#4 Flood Insurance and the Community Rating System (CRS)	*	*		*	*	Ch. 4: Regional Considerations and Approaches, Ch. 5: Interim Risk Reductions Measures Plan
4.2 Regulations and Management of Land Uses							
4.2.1	FPW #5 Consistent Floodplain Development Regulations	*	*			*	Ch. 4: Regional Considerations and Approaches
4.2.2	FPW #6 Urban Growth Area Expansion	*	*			*	Ch. 5: Risk Assessment Report (pop. at risk, infrastructure at risk, property at risk i.e. economic impacts)
4.2.3	FPW #7 Agricultural Land Uses and Activities	*	*			*	Ch. 4: Regional Considerations and Approaches Ch. 5: Risk Assessment Report Ch. 6: Interim Risk Reduction Measures
4.2.4	FPW #8 Floodplain Acquisition and Home Buyouts	*	*			*	Ch. 4: Regional Considerations and Approaches Ch. 6: Interim Risk Reduction Measures
4.2.5	FPW #9 Home/Structure Elevation and Floodproofing	*	*			*	Ch. 4: Regional Considerations and Approaches Ch. 6: Interim Risk Reduction Measures
4.3 River Channel Management							
4.3.1	FPW #10 River Channel Monitoring	*		*	*	*	Ch. 6: Interim Risk Reduction Measures

Programmatic Recommendations							
		Pierce County	Cities	Tribes	Other Agencies	SWIF	SWIF Chapters
4.3.2	FPW #11 Management of Large Woody Material	✻			✻		
4.3.3	PR#1/ WR#1/ CR#1 Sediment Management and Gravel Removal	✻	✻		✻	✻	Ch. 6: Interim Risk Reduction Measures
4.4 Flood Risk Reduction Facility Repair and Maintenance							
4.4.1	FPW #12 Facility Repair & Maintenance – PL 84-99 Program	✻				✻	Ch 4: SWIF Vegetation Strategy Ch. 8: SWIF Action Plan
4.4.2	FPW #13 Annual Repair and Maintenance Program	✻				✻	Ch. 8: SWIF Action Plan
4.5 Flood Education, Flood Warning and Emergency Response							
4.5.1	FPW #14 Flood Education and Outreach Program	✻	✻	✻	✻	✻	Ch.6 Interim Risk Reduction Measures
4.5.2	FPW #15 Flood Warning and Evacuation System	✻	✻			✻	Ch.6 Interim Risk Reduction Measures
4.5.3	FPW #16 Emergency Response and Flood Fighting	✻	✻	✻		✻	Ch.6 Interim Risk Reduction Measures
4.6 Coordination, Adaptive Management and Multiple Benefits							
4.6.1	FPW #17 Incidental Take Authorization	✻		✻	✻		Ch.4: Regional Considerations and Approaches
4.6.2	FPW #18 Adaptive Management	✻					
4.6.3	FPW #19 Climate Change	✻			✻		
4.6.4	FPW #20 Habitat and Riparian Areas Mitigation	✻		✻	✻		Ch.4: Regional Considerations and Approaches
4.6.5	FPW #21 Public Access to Rivers	✻	✻			✻	
4.6.6	FPW #22 Minimizing Water Quality Impacts of Flooding	✻	✻	✻	✻	✻	
4.6.7	FPW #23 Coordination with Other Jurisdictions, Tribes and Agencies	✻	✻	✻	✻	✻	Ch.1: SWIF Communication Plan Ch. 4 Regional Considerations and Approaches
4.6.8	PR#2/ WR#2 Inter-County River Improvement Agreement	✻			✻		Ch. 4 Regional Considerations and Approaches
4.7 Implementation of Capital Projects							
4.7.1	FPW #24 River Reach Management Strategies	✻					Ch. 5: Risk Assessment Report Ch. 8: SWIF Action Plan
4.7.2	FPW #25 Levee and Revetment Setback Program	✻					Ch. 4: Regional Considerations and Approaches Ch. 8: SWIF Action Plan
4.7.3	FPW #26 Additional Capital Project Analysis	✻					

Programmatic Recommendations							
		Pierce County	Cities	Tribes	Other Agencies	SWIF	SWIF Chapters
4.7.4	FPW #27 Transportation – Roads and Bridges	✻	✻		✻	✻	Ch. 5: Risk Assessment Report

4.1.1.3 Future Mapping Needs

Page 4-7, paragraph one, fourth sentence.

Corrected spelling:

These floods resulted in damage to areas outside the FEMA~~MEA~~ mapped areas.

4.1.4.1 NFIP and Community Rating System Program

Page 4-15, paragraph two.

Revised text:

Special Flood Hazard Area (SFHA). Policy holders residing outside of the SFHA, a 10 percent discount is given for communities having a CRS Class Rating between 1 and 6; and a 5 percent discount given for communities having a Class Rating between 7 and 9. ~~The City of Fife entered the CRS program in 2006 and currently has a Class 5 rating, resulting in a 25 percent discount.~~ The City of Orting entered the program in 2008 and currently has a Class 5~~6~~ rating, resulting in a ~~20~~25 percent discount.

4.1.4.2 Flood Insurance Participation

Page 4-15, paragraph two.

Revised text:

All homeowners in a special flood hazard area (SFHA) with mortgages from federally regulated or insured lenders are required to buy flood insurance. In recent years there has been an increase in the purchase of flood insurance in the mapped~~-~~ SFHA~~100-year floodplain areas~~. This could be due to recent flood events raising awareness or changes by Congress to the NFIP that greatly increased penalties to lenders for not requiring the insurance. ~~All homeowners in these areas with mortgages from federally regulated or insured lenders are now required to buy flood insurance. However, this only applies to approved and adopted FEMA maps, which are now over 20 years old (mostly dating to 1987). When the new FEMA maps are approved, substantially more residential and commercial structures will require flood insurance.~~

4.2 REGULATIONS AND MANAGEMENT OF LAND USES

4.2.1 Consistent Flood Plain Development Regulations

Page 4-16, header.

Corrected header spelling:

Consistent Flood~~p~~Plain Development Regulations

Page 4-16, FPW #5

Revised text:

FPW #5 – Consistent Floodplain Development Regulations
Recommendations
1. Cities and towns in the planning area of the Flood Plan should adopt policies and regulations that are consistent with current~~2011~~ unincorporated Pierce County critical area regulations for flood hazard areas, including regulating based on the best available data, such as updated flood studies. Regulations should address development in the floodway, zero-rise, compensatory storage and critical facilities (see policies in Chapter 3). Other important considerations include locating development out of the floodplain as feasible, elevating above the base flood elevation, substantial damage and improvement calculations, and non-residential flood-proofing. 2. A regulatory working group should be established to support development of more consistent regulations across jurisdictions and to meet the goals and objectives of the Flood Plan. The group should promote a regional discussion about residual flood risks and appropriate development regulations behind certified levees. 3. Pierce County will provide technical assistance to cities and towns within the planning area of the Flood Plan, in support of aligning their flood hazard regulations with unincorporated Pierce County critical area regulations for flood hazard areas.

4.2.1.1 Management of Floodplain Development

Page 4-17, paragraph two.

Revised text:

An important issue in the management of floodplain development is the data utilized to determine flood risk and the applicability of regulations. As noted in FPW #1, flood insurance studies and FIRMs have been updated for most of Pierce County's major rivers in the past seven years.~~,~~ The maps were adopted in March 2017. ~~but the FEMA maps have not yet become effective and therefore are not required to be adopted by local jurisdictions.~~ Some, but not all, jurisdictions use this best available data for regulating floodplains and floodways. Because of the long process of updating floodplain maps, all jurisdictions should use best available data for development regulation.

4.2.1.4 Development within the Floodway

Page 4-20, paragraph five.

Corrected spelling:

The genesis for the DFF Floodway came from the 1988 US Department of Reclamations study on Dam Failures and downstream hazards which calculated the depths and velocities that are dangerous to structures and a person trying to walk through the flow.

4.2.2 Urban Growth Area Expansion

Page 4-21, paragraph two, first sentence.

Revised text:

Effective June 2010, ~~Chapter 19A.30.010 (Comprehensive Plan – Urban Growth Areas)~~ Title 19A Comprehensive Plan, Chapter 2 Land Use Element of the Pierce County Code was amended to prohibit the expansion of the UGA into the 100-year floodplains of rivers or river segments above 1000 cfs of mean annual flow.

4.2.2.1 Urban Growth Area Expansion

Page 4-22, paragraph three.

Revised text:

Pierce County Surface Water Management should work with Planning and Land Services to revise Chapter 19A~~.30.010~~ to implement the recommendation through a Comprehensive Plan amendment. The jurisdictions of Eatonville, Orting and South Prairie are adjacent to floodplain not covered by RCW 36.70A.110 and should modify their local ordinance to implement this recommendation.

4.2.3 Agricultural Land Use and Activities

Page 4-23, Table FPW#7

Additional text:

FPW #7 – Agricultural Land Use and Activities
Recommendations
1. Pierce County should amend regulations to authorize farmers to quickly and inexpensively remove sediment deposited by floods from productive agricultural land. 2. Pierce County should amend development regulations to allow construction of flow-through nonresidential agricultural structures per the flood fringe standards (such as pier and pile) in the floodway of the lower Puyallup River downstream of Clarks Creek, excluding the Clear Creek floodway. 3. Pierce County should identify publicly owned floodplain lands suitable for agricultural use and work with the agricultural community to improve and promote the current leasing program. 4. Pierce County should amend development regulations to allow composting in floodways and floodplains when accessory to on-site agriculture. Composting activities should be sited in such a location as to comply with fish and wildlife habitat area requirements.

5. Develop a Drainage Management Program to improve drainage on agricultural lands located in floodplains and flood prove areas that includes programmatic permitting for maintenance and provides technical assistance to drainage districts and farmers.
6. Pierce County should work with drainage districts and the farming community to develop a program to separate agricultural drainage ditches from streams and creeks where possible.

4.2.3.2 Farm Support Structures in Lower Puyallup Floodplain and Floodways

Page 4-23, Title.

Revised text: **Support Structures in Lower Puyallup Floodplain and Floodways**

Page 4-23 and 4-24, paragraph one.

Additional text:

The County provides an agriculture building exemption for one story detached agriculture buildings up to 600 square feet. The International Building Code defines an agriculture building as a structure designed and constructed to house farm implements, hay grain, poultry, livestock or other horticulture products. Agricultural structures may not be used as housing, agricultural production, businesses or as a public venue. Agriculture buildings are only exempt from review if they comply with the provisions of Pierce County Code, and are not located within a floodway, wetland, or regulated fish and wildlife species area. Additional information can be found in Pierce County Code 17C.

Page 4-24, paragraph two.

Additional text:

Regulations for the flood fringe allow new structures when meeting certain requirements, such as having the first horizontal member above the base flood elevation (BFE) and having areas below BFE constructed to allow the passage of floodwater, such as pier and pile construction. Piles are mechanically driven or jetted deep into the ground. Piers are vertical structural members that are supported entirely by concrete footings. Both must be embedded sufficiently below the expected depth of erosion to remain stable during floods. These standards can be applied to the lower Puyallup floodway and allow non-residential agricultural buildings with low risk of creating adverse conditions for adjoining areas. Potential Action that could protect farms, farm buildings and equipment, crops and livestock is to allow for the construction of a critter pad/farm sanctuary mound on different areas of a property including floodplain and floodway areas. A critter pad/farm sanctuary mound is an area where approved fill materials raise the ground above base flood elevation (BFE). During flood events, farm equipment, crops harvested and stored, and livestock can move to these elevated safety zones.

King County recently established a program to provide technical assistance to help farmers in the Snoqualmie Valley to locate and construct elevated farm pads including assistance with permits. Since the installation of these elevated pads, the farm community has overall

experienced substantially less losses due to floods. Pierce County should consider doing the same

Page 4-26, Agricultural Ditch Maintenance and Invasive Plants

Add new section and text:

4.2.3.5 Agricultural Ditch Maintenance and Invasive Plants

Poor drainage is a limiting factor for agricultural properties within the floodplain or flood prone areas, particularly in the Puyallup Watershed. Draining excess water off agriculture lands primarily relies on a system of drainage ditches and nearby creeks and streams. Existing drainage systems are constrained by reliance on the county's streams and ditches. The ability of these streams and ditches to be effective are impacted by deferred ditch maintenance by the county or inactive or ineffective Drainage Districts; excessive sediment or invasive plants which clog the streams, and regulatory barriers such as the presence of threatened and endangered fish species which impact the timing and method of ditch or stream improvements.

As part of the Floodplains for the Future Program, a sub group called Farming in the Floodplain Project (FFP) was formed in 2015 to begin looking at agricultural issues within the Clear Creek area, a sub-basin of the Puyallup Watershed. Beginning in 2016 the Farming in the Floodplain Project (FFP) conducted a drainage inventory to understand the complexities of the drainage system and what drainage ditches were a priority to enhance drainage efficiency. Through this experience the FFP worked with stakeholders to identify multiple recommendations to improve drainage on agriculture lands in flood prone and floodplain areas. Although the project was focused on the Clear Creek sub-basin of the Puyallup Watershed, many of the recommendations may apply to improving drainage on agriculture lands located in floodplain and flood prone areas of other parts of the County.

As a first effort towards improving drainage in the Clear Creek area, the FFP conducted an invasive plant removal from drainage ditches in the Clear Creek area. The project involved landowners, farmers, Drainage District 10, and multiple regulatory agencies such as Washington State Department of Fish and Wildlife, Pierce County Planning and Public Works, Tribes, and Washington State Department of Ecology. Following removal of the invasive plants, the FFP and Pierce Conservation District recruited local community volunteers to replant sections of the cleared ditches in an effort to shade out the regrowth of the invasive plants. This work continues to be maintained and monitored for effectiveness.

4.2.4 Floodplain Acquisition and Home Buyouts

4.2.4.3 Grants and Cost-Share Funding

Page 4-26, paragraph one, second sentence.

Revised text:

Specific programs offered by FEMA include Hazard Mitigation Grant Program (HMGP), Pre-

Disaster Mitigation (PDM), and Flood Mitigation Assistance (FMA). ~~, Repetitive Flood Claims (RFC) and Severe Repetitive Loss (SRL)~~.

Page 4-27, bullet three.

Revised text:

- **Flood Mitigation Assistance (FMA)**. The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). The FMA program is focused on mitigating Repetitive Loss (RL) properties and Severe Repetitive Loss (SRL) properties.
  - A **Repetitive Loss** property is defined as a residential property that is covered under an NFIP flood insurance policy and: (a) has incurred flood-related damage on two occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structures at the time of each such event; or (b) at the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage. Repetitive Loss properties may receive up to 90 percent Federal funding.
  - A **Severe Repetitive Loss** property is defined as a residential property that is covered under an NFIP flood insurance policy and: (a) has at least four separate NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceed $20,000; or (b) for which at least two separate claims payments (includes only building) have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured building. Severe Repetitive Loss Properties may receive up to 100 percent Federal funding. ~~The FMA program was created as part of the National Flood Insurance Reform Act of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FEMA provides FMA funds to assist states and communities in implementing measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. Cost share for this grant is 75 percent federal and 25 percent local. The State does not cost share in FMA grants.~~

Page 4-27, bullet four and five.

Deleted text:

- ~~**Repetitive Flood Claim (RFC)**. The RFC grant program provides up to $10 million nationwide annually for FEMA to assist states and communities in reducing flood damages to insured properties that have had one or more claims to the NFIP. Cost share for this grant is 100 percent federal and no local cost share is required.~~
- ~~**Severe Repetitive Loss (SRL)**. The SRL grant program provides funding to reduce or eliminate the long-term risk of flood damage to SRL structures insured under the~~

~~NFIP. An SRL property is defined as a residential property that is covered under an NFIP flood insurance policy and: (a) that has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or (b) for which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building. For both (a) and (b) above, at least two of the referenced claims must have occurred within any ten-year period. Cost share for this grant is 75 percent federal and 25 percent local. Local jurisdictions that have an adopted repetitive loss plan strategy qualify for federal share increases to 90 percent with 10 percent local share.~~

Page 4-28, bullets seven, eight, and nine.

Additional text:

- **Floodplains by Design (FbD).** This grant program is offered in the fall of each odd numbered year. It funds large-scale river projects the emphasize the following values; reducing flood risk and damage, ecological restoration and preservation, climate change, tribal support and engagement, enhancing agriculture, creating partnerships and meeting community needs. SWM has received almost $10 million from this program since 2013 and is anticipating upwards of $7.5 million in 2018. These funds are used almost entirely for the Floodplains for the Future program which unites various stakeholders in Pierce County. This program has allowed Pierce County to exponentially expand the scope of the Clear Creek Floodplain Restoration and Acquisition project on the Puyallup River to include agriculture, habitat and flood risk reduction components. This program allows in-kind match which allows Pierce County to ask for larger amounts of grant funding, making this a dependent and successful source of funding for the Flood Plan.

- **Puget Sound Acquisition and Restoration Fund (PSAR).** The Puget Sound Acquisition and Restoration program was created in 2007 to help implement the most important habitat protection and restoration priorities for Puget Sound. Funding is appropriated by the Legislature through the Salmon Recovery Funding Board. Pierce County has received over $1.5 million just in the 2015-2017 biennium and is anticipating almost $400,000 in the 2017-2019 biennium.

- **Puget Sound Acquisition and Restoration Fund Large Capital Projects (PSAR Large Cap).** The Puget Sound Salmon Recovery Council and the Puget Sound Partnership are developed a grant program which funds high priority habitat acquisition and restoration capital projects. SWM has been continuously unsuccessful in applying for this program and has decided to postpone any further applications to this particular grant program as the cost of applying for such a large program greatly outweighs the benefit SWM has received from this program. PSAR Large Cap is under review by SRFB and could experience fundamental changes within the next funding biennium. If the changes to the program increase likeliness

of success, SWM will reexamine its decision to withhold applications in the future for large Flood Plan capital improvement projects.

4.4.2 Annual Repair and Maintenance Program

Page 4-47, FPW #13.

Revised text:

FPW #13: Annual Repair and Maintenance Program

Recommendations

1. Pierce County should continue to perform routine repair and preventive maintenance activities on flood risk reduction facilities damaged from annual high water or flood events and normal wear and tear.
2. The SWIF Plan should be followed as the guide for maintenance of the levees enrolled in the PL84-99 Program. The implementation of the SWIF should be aligned with programmed funding over a 20-year period of implementation (2017-2036).
3. Maintenance work will be prioritized to optimize flood risk reduction. Maintenance deficiencies will be resolved through implementation of the Pierce County SWIF; extended to non-PL84-99 program structures
4. For flood risk reduction facilities where recurring repairs are necessary, Pierce County should continue to evaluate options for focused capital maintenance to build increased structural resiliency and long-term capital solutions to reduce the need for recurring repairs.
5. Pierce County should continue with its current Puyallup River vegetation management program in cooperation with the Puyallup Tribe and in coordination with the U.S. Army Corps of Engineers.
6. The county has implemented the SWIF levee vegetation management strategy.
7. Pierce County should create a Best Management Practices manual that defines the operations, repair and maintenance program and details how to complete the various tasks in a way that minimizes adverse impacts on water resources and habitat.
8. Pierce County should continue to work with resource agencies and tribes to maintain programmatic approval of annual repair and maintenance activities.
9. Pierce County obtained programmatic approval for levee and culvert maintenance work in 2017.

4.4.2.1 Vegetation Management

Page 4-48, Vegetation Management.

Additional section and text:

SWIF- Levee Vegetation Management Strategy

The USACE PL 84-99 program provides an interim vegetation policy allowing for alternative vegetation management strategies to be incorporated into a System Wide Improvement Framework. Vegetation is currently no longer directly a criterion for determining program eligibility (footnote USACE Interim Policy). Indirectly, vegetation may impact the ability to undertake proper visual inspection of the levee, impede vehicular access, or pose a hazard to the structural integrity or operation of the levee structure.

The Pierce County SWIF levee vegetation management strategy (SWIF strategy) represents a local preferred approach to levee vegetation management that balances the needs of flood risk reduction with the habitat needs of salmonids and other aquatic species found within Pierce County river systems. Currently, three of these species are listed as threatened under the Endangered Species Act. The SWIF strategy acknowledges the agreement established by federal decree (United States District Court, Western District of Washington at Tacoma, Case No. C79-269T) between Pierce County and the Puyallup Tribe of Indians relating to vegetation management along the Puyallup River system (Puyallup River Vegetation Management Program (PRVMP)). The SWIF strategy works within the constraints of that Court-ordered agreement and the USACE SWIF interim guidance policy (USACE 2014b). The levee vegetation strategy is driven by Pierce County's need to ensure all PL 84-99 levees within the county's river system meet the USACE inspection criteria to retain PL 84-99 program eligibility.

It is understood that the vegetation management strategy developed for the SWIF may need to be revised as necessary to comply with the PL 84-99 program levee maintenance standards once the USACE provides updated guidance on vegetation management. Current understanding is that vegetation management strategies developed through the SWIF once approved will be honored through the implementation lifetime of the plan.

The goal of the SWIF vegetation management strategy echoes the goal stated in the Puyallup River Vegetation Management Program (PRVMP): to provide for the riparian vegetation habitat requirements of the fish and wildlife resources in conjunction with the basic requirements entrusted to Pierce County of revetment (and levee) integrity and inspection, emergency revetment repairs, river channel capacity, and County road maintenance along tributary streams.

The SWIF strategy provides basic guidelines to help establish an appropriate balance between maintenance of flood risk reduction structures and habitat considerations. The strategy will be implemented annually and monitored for effectiveness and potential impacts to fish and wildlife. The program will be adaptively managed to adjust as identified through routine annual monitoring. This SWIF strategy will be extended as practical to the rivers revetment structures as resources are available for implementation.

The SWIF vegetation management strategy is performance-driven, centered by three main performance considerations:

- Risk – Vegetation management will be performed in a manner to minimize risk to both habitat and flood risk reduction structures.
- Habitat – Vegetation management will be performed in a manner that avoids or minimizes impacts upon fish and wildlife habitat.
- Maintenance – A vegetation management strategy will be developed that is cost-effective and practical to implement

General Levee Vegetation Management Strategies

The following strategies are applied as the basic protocols for all vegetation management applied across the levee prism:

- **Levee vegetation management zones** – Levee vegetation management subzones will be established to reflect the various components of the levee structure relative to the adjacent river habitat. This vegetation management zone guidance is not intended to be prescriptive, but is intended to guide design, construction, long-term maintenance and operations, and decision-making. These concepts may be customized to best serve the unique conditions of each individual PL 84-99 shoreline reach.
- **Levee structure schematics** – Levee vegetation management strategies are applied to various levee structure scenarios, each representing a unique levee construction and orientation to the adjacent river and habitat.
- **Vegetation Removal** - Vegetation will be managed in a manner to maintain PL 84-99 eligibility while minimizing impacts to adjacent habitat. Vegetation will be managed to maintain levee accessibility, "inspectability," and structural integrity.
    - Levee vegetation understory will be thinned to provide visibility and physical access for inspections, retaining clusters of native shrubs and saplings approximately 10 to 25 feet in diameter, for recruitment of future understory native vegetation and overstory trees. The cleared area around the native shrubs will be approximately 8 to 25 feet between clusters, depending on site conditions and character of vegetation present (additional detail is provided in Section 4.8.6).
    - Woody riparian vegetation will be preserved as feasible on the riverside levee slope to provide riparian functions including bank stability, roughness, cover, shade, wood and nutrient contribution, water quality filtering, and moderation of water temperature. Vegetation that provides for shading of adjacent waters will be retained to the fullest extent feasible. Generally, trees six inches in diameter or greater will be retained where possible, unless the tree interferes with minimum inspection access standards, or is considered a hazard tree. The retention of mature trees is a priority, and these trees will not be removed unless the tree presents an unacceptable hazard to people, levee structural integrity, public infrastructure, or adjacent private property. Vegetation maintenance work should be conducted in a way that does not kill or weaken the remaining trees, and retains saplings for continued growth of desirable species. Efforts will be made to identify and retain sapling trees within cluster areas to provide for long-term successional growth of trees. Vegetation on silt benches formed upon levee structures will be

preserved as feasible, unless site conditions indicate underlying structural concerns that necessitate removal.

- Major vegetation clearing to allow for levee repairs will follow the standards of the Puyallup River Vegetation Management Program. At all times, precautions will be taken to protect trees that might be retained as feasible. This may include flagging trees for retention, installing protective construction fencing, and working from the riverside upon a gravel bar in the dry when site conditions allow retention of the larger trees on the levee structure. Areas where vegetation is cleared to facilitate repairs or to remove undesirable vegetation (hazard trees or invasive species) will be replanted with native vegetation per plan details (additional detail is provided in Section 4.8.6).

- **Targeted invasive species removal** – Specified non-native invasive species will be controlled through a programmatic approach of working with resource agencies, tribal biologists, and private property owners.
- **Mature tree preservation** – Mature trees (i.e., those whose diameter at breast height exceeds 12 inches) may exist in sections of the levee where the general maintenance schematics would suggest their removal. Often these trees are integral to the structural integrity of the levee. These special situations will be evaluated on a case-by-case basis using a site-specific levee vegetation risk matrix. Given the importance of retaining large trees within the riparian zone, mature trees will be retained to the fullest extent feasible.
- **Hazardous trees** – Trees that pose a threat to levee structural integrity, nearby structures, people, public infrastructure, or pose an elevated danger to the safety of maintenance personnel will be surveyed and monitored for degree of hazard based on level of risk. High-risk hazard trees will be cut and typically left on site or placed within the river channel to integrate with existing habitat. Medium- and low-risk hazard trees will be monitored. Strategies for assessing and addressing potential hazard trees and reducing the impacts of vegetation removal will be developed.
- **Riparian habitat protection/enhancement** – Riparian vegetation along the levees will be maintained and enhanced with native plantings, and invasive plants removed, to support habitat functions critical to fish and wildlife resources. Riparian native plantings will be provided within the levee vegetation management zone to offset the removal of hazardous trees and removal of vegetation necessary to perform levee repairs
- **Upland zone** – long-term tree preservation and conservation – Due to the dynamic nature of the levee face, interests for long-term riparian tree preservation should be directed to the area beyond the upland side of the levee, with a focus upon the first 200 feet of property (from OHWM) contained within the riverine riparian zone. Efforts will generally be directed to retain the largest mature trees that provide

benefit to thermal cooling, as well as other benefits to habitat. Trees that are removed for levee maintenance or repair will be replaced with replanting upon the upland side of the levee structure for long-term preservation. Since approximately only 20 percent of the riparian corridor associated with the system of PL 84-99 levees is under the control of Pierce County, it will be necessary to work closely with owners of private holdings to provide for additional long-term preservation. As opportunities are made available, land may be set aside in conservation easements where existing native trees will be preserved and the area enhanced with appropriate conifer and deciduous trees. These efforts are best pursued through conservation groups and land trusts outside of the efforts to implement this SWIF. Once implemented, these efforts should help to offset perceived impacts from levee maintenance activities.

- **Large woody debris placement program** – LWD is placed in the river channel to offset the loss of vegetation when levees are repaired, and to offset the short-term impact from in-water levee maintenance work. LWD will generally be placed within the wetted river channel where there is immediate habitat benefit to resident fish in the form of cover, refuge, and rearing habitat. LWD will be allowed to naturalize in the system with root wads intact. LWD will begin to function immediately after placement. LWD will be placed at a ratio commensurate with level of impact.

4.5.1.1 CRS Outreach Criteria

Page 4-51, paragraph one.

Revised text:

The Community Rating System (CRS) ~~currently awards up to 380 points for flood hazard~~ credits education and outreach activities under Activity 330. Activity 330 credits messages that either clearly state what the audience should do (e.g., "Turn around, don't drown" or "Get a floodplain permit from . . .") or that provide some basic information with a note on where to get more information (e.g., "You may live in a floodplain. Find out by calling 555-1234" or "Information on ways to protect your property from flooding can be found at http://piercecountywa.org/3945/Flooding

There are six priority topics that the CRS want to see delivered:

- Know your hazards
- Insure your property for your flood hazard
- Protect people from the hazards
- Protect your property from the hazards
- Build responsibly
- Protect natural floodplain functions

Page 4-51, paragraph one.

Deleted text:

~~A total of 774 points are available for public information activities and approximately 15,000 points are available overall. To receive maximum CRS credit, information must be conveyed to the entire community and floodplain residents on the following ten topics: (1) local flood hazards, (2) flood safety, (3) flood insurance, (4) property protection measures, (5) natural and beneficial functions of the local floodplain, (6) mapping of local flood hazards, (7) flood warning systems, (8) floodplain development permit requirements, (9) substantial improvement/damage requirements, and (10) drainage system maintenance.~~

Page 4-51, paragraph two.

Deleted text:

~~Maximizing CRS credits for flood education and outreach contributes to Pierce County's overall CRS credit which, in turn, reduces flood insurance premium rates. Lower insurance rates are an incentive for residents to purchase and maintain flood insurance.~~

Page 4-51, paragraph three**.**

Revised text:

~~The National Flood Insurance Program (NFIP) is currently revising the 2012 Community Rating System (CRS) manual and proposing significant changes to Activity 330. The proposed changes should allow greater flexibility in planning for and implementing Pierce County's flood education and outreach program.~~ The CRS program recognizes education and outreach projects tailored to the communities needs and delivered on an annual basis and for delivering messages as a response to a flood event. The credit points for annual outreach and flood response projects can be increased by 40% if they are developed and implemented pursuant to a Program for Public Information (PPI). Pierce County should develop and implement a Program for Public Information Program (PPI~~PIP~~) to meet the ~~2012~~ CRS Manual education and outreach requirements. The PIP should be developed by a committee comprised of Pierce County staff and stakeholders, who will conduct a needs assessment, identify target audiences, messages, and projects to implement, and include monitoring and evaluation to ensure the program is efficient and effective. The PIP would be a comprehensive flood education and outreach program.

Page 4-51, paragraph four.

Additional text:

Maximizing CRS credits for flood education and outreach contributes to Pierce County's overall CRS credit which, in turn reduces flood insurance premium rates. Lower insurance rates are an incentive for residents to purchase and maintain flood insurance.

Page 4-51, paragraph five.

Revised text:

The number of homeowners and citizens purchasing and maintaining flood insurance is low in Pierce County. The ~~draft 2012 CRS Manual proposes addition~~ CRS Manual has ~~of~~ a new activity (370) to improve flood insurance coverage in communities. ~~This new activity will provide additional CRS credits to communities.~~ Credit is given for performing a comprehensive assessment of insurance coverage and for developing a program to make improvements. Additional credit is given for monitoring the results of the program.~~who actively encourage citizens and businesses to purchase and maintain flood insurance coverage. Promotion of the flood insurance program, education about flood risks, and awareness about the flood insurance discounts available should increase participation. Prior to~~ With the adoption of the new countywide FEMA floodplain maps, Pierce County should continue to conduct education and outreach to residential and commercial property owners impacted by revised flood insurance coverage requirements.

4.5.2 Flood Warning and Evacuation System

Page 4-52, FPW #15 Flood Warning and Evacuation System, number 4.

Revised text:

FPW #15 – Flood Warning and Evacuation System

Recommendations

1. Pierce County should continue to monitor National Weather Service (NWS) flood information bulletins, advisories, watches, and warnings for information that could impact Pierce County operations, facilities and citizens.
2. Pierce County should monitor the river gauges along all rivers and match the results against the forecast information from the NWS. If there is a discrepancy in the information received, a physical check of the river should be conducted by Pierce County River Watch and/or Surface Water Management.
3. Pierce County should continue to coordinate with Tacoma Public Utilities (operators of Alder Dam) and the USACE (operators of Mud Mountain Dam) and King County (for flows along the White River) regarding reservoir levels, inflows and release rates that affect the magnitude and timing of downstream flood flows and incorporate this information into flood warnings.
4. Pierce County should coordinate with and disseminate information to local public safety answering points (PSAPs) concerning flood advisories, watches and warnings, and conditions as they become available. When required, Pierce County should work with the NWS to alert the public of imminent flooding through various methods, including ~~National~~ NOAA Weather Radio, Pierce County Alert, and when necessary door-to-door notification. In portions of the Puyallup Valley, Pierce County should use the voice messaging from ~~portion of~~ the lahar warning AHAB sirens and the AM 1580 emergency radio station.
5. Pierce County should continue to support the River Watch Program in support of County flood response activities.
6. Pierce County should continue to work in collaboration with the NWS to assist them with climatic gauge station installations so that the NWS can develop and implement new technology for more accurate river flooding forecasts. Pierce County should encourage NWS efforts to develop technology to provide probabilistic river forecasts to improve the information available to emergency managers and responders.

FPW #15 – Flood Warning and Evacuation System

Recommendations

7. Pierce County should develop a stage-discharge/evacuation rating curve or chart for each river system. Pierce County should work with local partners to develop protocols or criteria to guide when evacuation procedures should be implemented.
8. Pierce County should develop flood inundation mapping for various river flow peaks. The range of peaks should reflect 10-yr, 25yr, 50-yr, and 75-yr recurrence intervals.

4.5.3 Emergency Response and Flood Fighting

Page 4-57, Table 4.3

Additional text:

Table 4.3 Federal Flood Disaster Declarations 1964- 2012	
Federal Flood Disaster Declarations	**Notes**
DR-1817-WA—01/06-16/2009	Flooding from a severe storm throughout much of Washington. 23 counties declared.
DR-1734-WA—12/1-17/2007	Flooding throughout most of W. Washington. Pierce County, while having flooding, was not declared.
DR-1671-WA--11/5-6/2006	Major flooding on the Puyallup, Carbon, White, Stuck and Nisqually rivers.
DR-1499-WA--10/2003	Surface flooding
DR-1159-WA--12/96-2/1997	Ice storm, snow and flood. Stafford Act assistance - $83 million, SBA $31.7 million.
DR-1100-WA--1-2/1996	Three deaths in Washington. Stafford Act disaster assistance provided – $113 million. SBA disaster loans approved - $61.2 million
DR-1079-WA--11-12/1995	100-year flood at Alderton on the Puyallup and 50-year flood at La Grande
DR-896-WA--12/1990	Stafford Act assistance provided $5.1 million
DR-883-WA--11/1990	Stafford Act assistance provided $57 million
DR-852-WA--1/1990	Stafford Act assistance provided $17.8 million
DR-784-WA--11/1986	Two deaths. $11 million in private property damage and $6 million in public damage
DR-545-WA--12/1977	16 counties were declared. Very heavy rain in the upper Nisqually caused significant damage.
DR-492-WA--12/1975	13 counties flooded
DR-328-WA--2/1972	King, Pierce and Thurston counties flooding
DR-185-WA--12/1964	Wide ranging flooding affected 19 counties in both eastern and western Washington
DR-4056-WA—1/2012	Washington Severe Winter Storm, Flooding, Landslides, and mudslides

4.5.3.1 County Department Standard Operation Procedures, Mutual Aid and Finance

Page 4-58, paragraph four.

Revised text:

Pre-incident resources, like acquisition of sandbags and sandbagging equipment, are usually funded by grants or approved general fund purchases. Incident specific acquisitions may be purchased outright, come through local agency mutual aid, pre-arranged contracts, or EMAC requests submitted through the Washington State Emergency Management ~~Department~~Division.

4.6.3 Climate Change

Page 4-65, paragraph one.

Revised text:

Climate change in the Pacific Northwest is predicted to have significant effects on flooding and channel migration within Pierce County river systems. More precipitation is expected to fall as rain instead of snow, which could increase the magnitude of fall and winter flooding along the major rivers. ~~As a result,~~ As heavy rain events become more intense, the rates of both erosion and sediment transport are expected to increase (Mauger et al., 2015). ~~flood events may be more frequent and longer in duration.~~ Glacial retreat on Mt. Rainier is expected to continue, exposing large quantities of sediment to transport downstream, potentially increasing aggradation and channel migration in river valleys. It is necessary to account for these changes as part of project and program implementation within the river corridors and floodplains of the planning area.

Page 4-67, paragraph one.

Revised text:

The Climate Impacts Group at the University of Washington completed a report in November 2015 that summarizes the current state of knowledge concerning observed and likely future climate trends in the Puget Sound (Mauger et al., 2015). ~~has made projections for some local rivers based on different modeling scenarios.~~ For example, the extent and the frequency of flooding is projected to increase. Heavy rain events are projected to intensify, increasing flood risk in all Puget Sound watersheds. Continued sea level rise will extend the reach of storm surge, putting coastal areas at greater risk of inundation. In snow-accumulating watersheds, winter flood risk will increase as the snowline recedes, shifting precipitation from rain to snow (Mauger et al., 2015). As watersheds become increasingly rain dominant, streamflow is projected to increase in winter by +28% to 34% on average ~~-~~and decrease in spring and summer by -24% to -31% on average by the 2080's~~, and the timing of peak flow is projected to shift earlier~~ (Mauger et al., 2015). Additionally, t~~T~~he highest river flows are expected to increase by +18% to +55% on average by the 2080s (Mauger et al., 2015). ~~the average increase in 100 year flood flows for the Snohomish River at Monroe for the 2040s is estimated at +20 percent under the A1B greenhouse gas emissions scenario. Generally speaking, 100 year flood magnitudes (Q100 values) are projected to systematically increase in many areas of the PNW due to increasing precipitation and rising snowlines. (The Pacific Northwest Climate CIGnal, Issue #24, Winter 2011).~~

Page 4-67, paragraph two.

Additional text:

The effects of climate change ~~is~~ are also being seen on our glaciers. From 1913 to 1994, Mt. Rainier glaciers decreased by approximately 25 percent. Preliminary data from Mount Rainier National Park indicates that the glacier has lost another 18 percent since 2003. The south-facing Nisqually Glacier has retreated more than one mile since 1840, but in the last

seven years its recession rate has seen a three-fold increase (Abbe et al., 2010). The Emmons and Nisqually glaciers have been measured using a mass balance approach to look at annual changes, comparing winter accumulation and summer melting. In all years between 2003 and 2009, there has been a net melting of the both glaciers between 0.5 and 2.0 m water equivalent (Kennard et al., 2010). Current trends indicate that Mt. Rainer's glaciers and others contributing to summertime stream flows and sedimentation in Puget Sound watersheds will continue to melt as temperatures warm.

Page 4-67, paragraph three.

Additional text:

The Pierce County Council passed Resolution No. R2016-56 which endorsed the Sustainability 2020 Plan on April 26, 2016. One of the goals of this plan is to complete a Climate Change Resilience Strategy for Pierce County. SWM along with other departments have been participating in the development of this plan which is projected to be completed in 2018. Updates on this planning effort can be found on the following webpage;

https://www.co.pierce.wa.us/5558/Climate-Change-Resilience

4.6.5 Public Access to Rivers

Page 4-70 and 4-71.

Deleted text:

~~Rivers and associated riparian corridors are desirable locations for passive or active recreational uses for the citizens of Pierce County. Activities include trail use, fishing, boating, and passive recreation. Within the planning area, there is extensive river mileage with minimal public access. Many fisherman and boaters access the river at unauthorized locations, and numerous people are using the river with few appropriate supporting facilities (e.g., parking, restrooms). The Pierce County Park, Recreation and Open Space (PROS) Plan (Chapter 19D.160) identifies riverfront water access as a high priority and value.~~

~~Some public lands in flood hazard areas may be highly suitable for public use, whereas others may not be due to regulatory issues, liability concerns, easement issues, or compatible use. Levees and revetments that appear to provide public access may be limited by an easement granted exclusively to Pierce County for flood management purposes. Such lands cannot legally be used for public access. Other issues include costs to make improvements for public access, available net-useable land, ongoing operation and maintenance costs, and concerns about potential environmental degradation such as impacts on habitat and water quality due to human traffic and incompatible uses.~~

~~Public access may be appropriate at suitable locations along river corridors, but it is necessary to balance costs, liability, and environmental considerations.~~

4.6.6 Minimizing Water Quality Impacts of Flooding

Page 4-72, paragraph three.

Deleted text:

~~Septic systems and drainfields located in floodplains are at risk of inundation and failure.~~ New development requirements prevent the construction of septic systems and drain fields in floodplains, but pre-existing systems remain a problem in some areas. Such systems need to be carefully managed to reduce risks to water quality.

Page 4-74, paragraph one.

Deleted text:

Pierce County Code 18E.70~~.040.B.8.k~~ addresses chemical storage in floodways. It specifies that "storage of agricultural chemicals, fertilizers, pesticides, and similar hazardous materials shall be permitted only where no other on-site storage alternative outside of the floodplain exists."

4.6.8 Inter-County River Improvement Agreement

Page 4-75, paragraph one, second to last sentence.

Corrected text:

Because this 105-year agreement is due to expire in 2020~~01~~9, it is for both counties to discuss renewal of the agreement before that time. Any proposed changes to the existing agreement need to be negotiated between the two counties, with input as necessary from other impacted parties.

Page 4-76, PR#2/WR#2.

Revised text:

PR#2/WR #2* – Inter-County River Improvement Agreement
Recommendations
1. Pierce County should collaborate with King County to revisit~~new~~ the Inter-County River Improvement Agreement to address flood hazard management activities for the lower White and lower Puyallup River systems. This should include a discussion of capital and maintenance needs, responsibilities, and funding considerations. 2. Pierce County and King County should convene a work group to develop a list of issues for discussion and establish a process and timeline to develop and ratify an agreement to cooperatively fund necessary flood hazard management needs.

4.7 IMPLEMENTATION OF CAPITAL PROJECTS

4.7.1 River Reach Management Strategies

Page 4-78, paragraph one, last sentence.

Revised text:

The ~~vast~~ majority of river risk reduction facilities, ~~which total over~~ is approximately 70 miles

in length (the sum of both left and right banks), lay along the lower 29 miles of the Puyallup River, the lower 5.5 miles of the White River, and the lower 8.4 miles of the Carbon River.

Page 4-78, paragraph two.

Revised text:

Pierce County's Capital Facilities Plan ~~Comprehensive Plan~~ (19E.~~1~~50.130~~1~~0) ~~establishes~~ identifies a level of service for flood risk reduction facilities, and recommends a "storm protection level standard" for water surface elevations of the one percent annual chance flood (i.e., 100-year flood), ~~plus three feet of freeboard for the Puyallup, Carbon, White, Greenwater and Nisqually Rivers~~. The Pierce County Comprehensive Plan (19A.10) refers readers to the Flood Plan for specific information regarding level of service.

Page 4-78, paragraph three.

Deleted text:

~~For several reasons, this level of service has not been achieved. Generally, funds for maintenance and repairs of river management facilities and capital projects have not been enough to achieve the level of service set out in the Comprehensive Plan. Additionally, this "one size fits all" level of service in the Comprehensive Plan does not take into account the significant differences in land use, assessed value, river channel conditions, salmon habitat areas, sediment transport and similar factors~~.

Page 4-78, paragraph four.

Revised text:

This ~~Flood Plan~~Flood Plan recommends levels of service be established which reflect the unique physical and cultural differences~~d~~ among the various reaches of Pierce County's rivers. These recommendations propose to link management strategies to the land uses being protected and other factors noted above. Levels of protection are tailored to flooding and channel migration risks and reach priorities. Management strategies for reaches containing flood risk reduction facilities identify levels of protection goals for levees and revetments. Non-structural management strategies (e.g., floodplain development regulations and acquisition/buyout of flood prone properties) are proposed for all reaches.

Page 4-78 and 4-79, FPW #24.

Revised text:

FPW #24 – River Reach Management Strategies
Recommendation
1. Pierce County should manage flood hazards by river reach and establish structural and non-structural management strategies based on the following factors: (1) existing development and land use patterns in the adjacent floodplain, (2) service level of existing river management facilities (levees, revetments), (3) river channel gradient and width, (4) presence of fish spawning and rearing habitat, and (5) sediment transport conditions (see Appendix F).

FPW #24 – River Reach Management Strategies

Recommendation

2. Pierce County should identify river reach "Levels of Service~~Protection~~" as goals for flood risk reduction facility design and maintenance and to guide future capital projects. Levels of flood protection for levees should include:
    a. 200-year design, plus three feet of freeboard,
    b. 100-year design, plus three feet of freeboard,
    c. Maintenance of existing (2009) conveyance capacity, and
    d. Maintenance of existing levee prisms.

    Levels of erosion protection for revetments should include:
    a. Channel migration prevention design, and
    b. Channel migration resistance design.
3. Non-structural management strategies (e.g., floodplain development regulations and acquisition, buyout, or purchase of development rights) should be applied to all river reaches to reduce future flood risks.
4. Where feasible, agriculture, recreation, and open space should be promoted as the most compatible land uses within 100-year floodplains.

Page 4-79, paragraph one, last sentence.

Revised text:

If adopted as part of the Rivers Plan, policy changes and amendment of the Capital Facilities Plan ~~Comprehensive Plan~~ will follow.

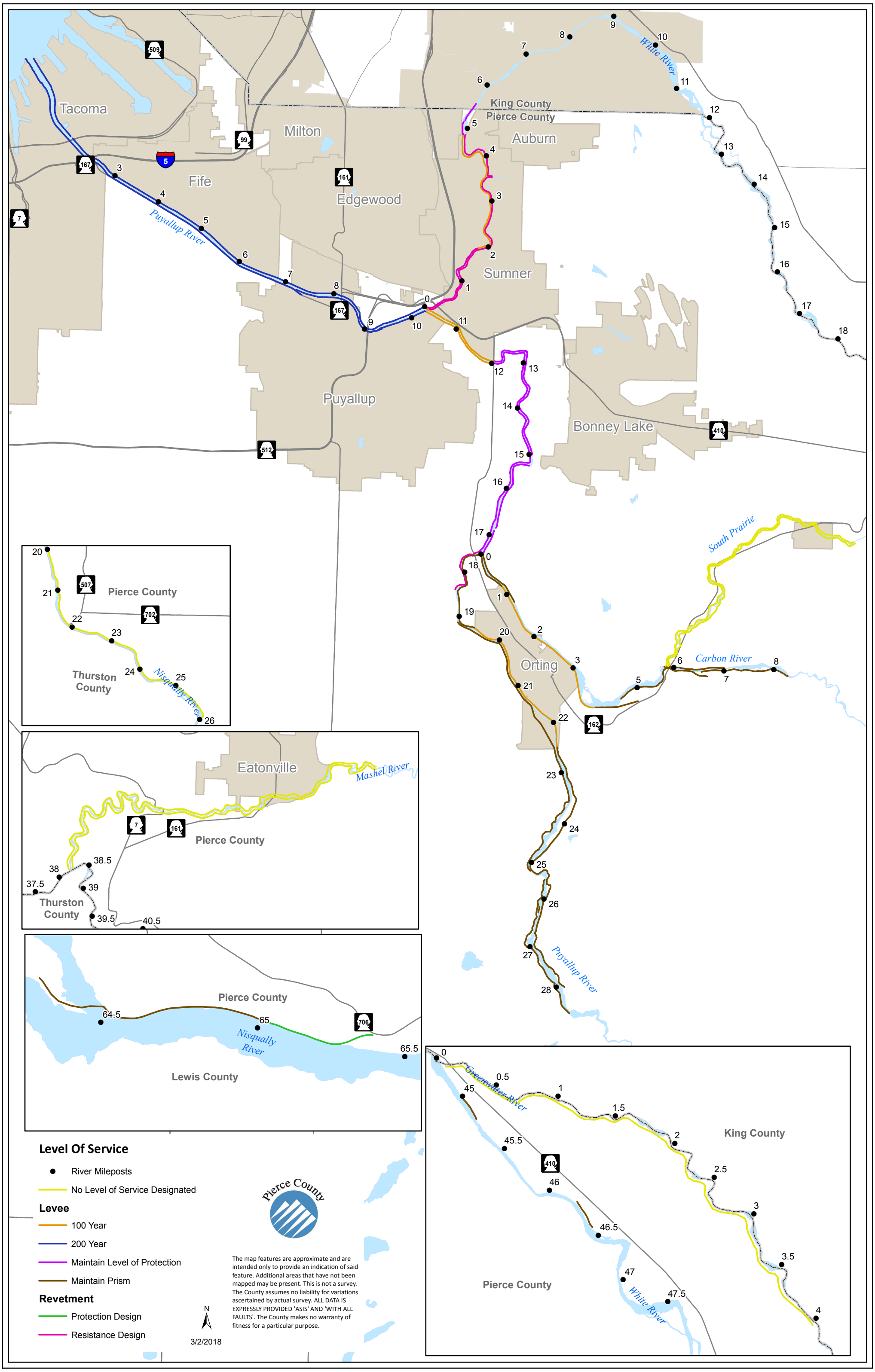
Page 4-80, bullet two.

Revised text:

- **Presence of salmon spawning and rearing habitat** – All rivers in the study area are used by salmon. Salmon presence is impacted in the Upper Puyallup, Upper White, and the Nisqually River by structures that prevent free migration of Salmon & other fish species.~~, with the exception of the upper Nisqually River for which passage is prevented due to existing dams.~~ Migration and rearing occur throughout the study area; however spawning areas vary by species, river gradient and width, substrate conditions and habitat. Chinook, steelhead and bull trout species are listed as threatened under the Endangered Species Act.

Page 4-81, River Reach Management Strategies Map.

Revised map:


Tacoma
Fife
Milton
Edgewood
Auburn
King County
Pierce County
Sumner
Puyallup
Bonney Lake
Orting
Eatonville
Thurston County
Pierce County
Lewis County
King County
White River
Puyallup River
Nisqually River
Mashel River
South Prairie
Carbon River
Greenwater River
509
5
99
167
161
7
512
410
507
702
162
706
Level Of Service
River Mileposts
No Level of Service Designated
Levee
100 Year
200 Year
Maintain Level of Protection
Maintain Prism
Revetment
Protection Design
Resistance Design
N
3/2/2018
Pierce County
The map features are approximate and are intended only to provide an indication of said feature. Additional areas that have not been mapped may be present. This is not a survey. The County assumes no liability for variations ascertained by actual survey. ALL DATA IS EXPRESSLY PROVIDED 'ASIS' AND 'WITH ALL FAULTS'. The County makes no warranty of fitness for a particular purpose.

4.7.1.1 Structural Approaches for Levee and Revetment Reaches

Page 4-82, number one.

Revised text:

1. 200-year Level of ~~Protection~~ Service – Levees are designed and maintained to safely convey a 200-year storm event. ~~the 200-year level of protection with three feet of freeboard.~~

   Proposed Application: Lower Puyallup River from the river mouth at Commencement Bay to the confluence of the White River (RM 0 – RM 10.3), including the cities of Tacoma, Fife, and Puyallup, and parts of unincorporated Pierce County. This could include a setback levee along North Levee Road, flood walls or some other approach.

Page 4-82, number two.

Revised text:

2. 100-year Level of ~~Protection~~ Service– Levees are designed and maintained safely convey a 100-year storm event. ~~to the 100-year level of protection with three feet of freeboard.~~

   Proposed application: Most new levees, including setback levees (e.g., Soldiers Home, Calistoga setback levees) and in urban areas (e.g., city centers, high density residential) such as Puyallup, Sumner, Pacific, and Orting, not including the lower Puyallup River.

Page 4-82, number four.

Revised text:

4. Maintenance of Existing Levee Prism – Maintain the existing levee in terms of height, toe and facing rock to ensure minimum standard of levee integrity. In some locations with long-term net sediment accumulation, the level of protection will decrease over time. There is not a commitment to "put the river back" if the levee fails; a repair might be constructed at the new location of the river channel, depending on river conditions, channel migration zone mapping, a post-event evaluation of site conditions, and planned projects. Some river reaches are target for property acquisition and a setback levee or other structures to protect infrastructure and improve habitat.

   Proposed Application: Rural (low density residential) and open space areas, agricultural areas, areas of salmon spawning and rearing (particularly for listed species, including Chinook, steelhead and bull trout). This is proposed for all levee reaches not in the lower and middle Puyallup, lower White or Orting area.

Page 4-83, number two.

Revised text:

2. Channel Migration Resistance Design – This strategy maintains current revetment conditions. Revetment design and river channel management is carried out to "resist" channel migration and river bank erosion. There is not a commitment to "put the river back" if the revetment fails; a revetment repair might be constructed at the new location of the river channel, depending on river conditions, channel migration zone mapping, ~~and~~ a post-event evaluation of site conditions, and planned projects. Some river reaches are target for property acquisition and a setback levee or other structures to protect infrastructure and improve habitat.

   Proposed Application: This design applies to all revetments identified in the 2013 Flood Plan along the Puyallup, Carbon, and White rivers not designated as prevention design, or proposed for conversion to levee to provide flood risk reduction.

4.7.2 Levee and Revetment Setback Program

Page 4-84, paragraph one.

Revised text:

In 2008~~4~~, Pierce County published its Setback Levee Feasibility Study. That study identified 32 potential setback levee flood protection and floodplain/restoration sites for the Puyallup River system. Additionally, in 2014 the Pierce County Water Programs Division hired Natural Systems Design to update the existing Levee Setback Feasibility Study. This update re-evaluated the 32 project sites with respect to existing habitat.

CHAPTER FIVE

5.1 LOWER PUYALLUP RIVER

5.1.1 Overview

Page 5-10, paragraph one.

Revised text:

The lower Puyallup River corridor includes extensive areas mapped as 100-year floodplain, based on the 2009 FEMA Flood Insurance Study (FEMA 2009) and ~~preliminary~~ Digital Flood Insurance Rate Map (DFIRM).

5.1.5 River Management Facilities, Flooding, and Flood Damage

Page 5-18, paragraph two, first sentence.

Revised text:

The lower two and a quarter mile of levee from RM 0.7- RM 3.0 ~~2.8~~ are owned and maintained by the U.S. Army Corps of Engineers.

Page 5-18, paragraph three.

Revised text:

The channel conveyance included straightening of the channel, building levees and making necessary bridge changes to convey 50,000 cfs between the East 11th Street Bridge and RM 2.9. The remaining levees along the lower Puyallup River from RM 3.0 to 10.3 are owned and operated by Pierce County as summarized in Table 5.2.

Page 5-19, Table 5.2 Levees and Revetments in the Lower Puyallup.

Revised text:

Table 5.2 Levees and Revetments in the Lower Puyallup River

Name	Location [a]	Ownership
Right Bank		
Port of Tacoma Revetment	RM 0.0 – RM 0.7	Port of Tacoma
COE Port of Tacoma Levee	RM 0.7 – RM 3.0 ~~2.8~~	US Army Corps of Engineers
North Levee Road Levee	RM 3.0 ~~2.8~~ – RM 8.1~~5~~, PL 84-99	Pierce County
Murphy Levee	RM 8.1 – RM 8.6	Pierce County
Benston/Boatman ~~Levee~~	RM 8.6 – RM 9.7	Pierce County
Old Cannery Levee	RM 9.7 – RM 10.3, PL 84-99	Pierce County
Left Bank		

Table 5.2 Levees and Revetments in the Lower Puyallup River		
Name	**Location [a]**	**Ownership**
Simpson Revetment	RM 0.0 – RM 0.7	Simpson Tacoma Kraft Company
COE Portland Ave Levee	RM 0.7 – RM 3.0 ~~2.8~~	US Army Corps of Engineers
River Road Levee	RM 3.0 ~~2.8~~ – RM 7.45, PL 84-99	Pierce County
Tiffany's Revetment	RM 7.45 – RM 9.4 ~~8.6~~	Pierce County
Linden/Flashcube Revetment	RM 9.35 ~~8.6~~ – 10.7	Pierce County

[a] RM = river mile; PL 84-99 USACE Flood Control and Coastal Emergency Act
Source: USACE and Pierce County Surface Water records

5.1.5.1 Major Flooding

Page 5-21, paragraph one.

Revised text:

Major flooding occurred in the lower Puyallup River in 1917, 1933, 1965, 1977, 1986, 1990, 1996, 2006, and 2009 (see Table 5.4). The largest flood on record since construction of MMD occurred in January 2009, with a flow of 48,200 cfs, an approximately 100-year event in the lower Puyallup River based on current flood frequency flow estimates (FEMA 2009). Flows in excess of 45,000 CFS are considered severe with significant flooding expected. Moderate flooding occurred in the lower Puyallup in November 2014, and again in October, November, and December 2015.

Page 5-21, Table 5.4 Historical Flooding in the Lower Puyallup River.

Revised text:

Table 5.4 Historical Flooding in Lower Puyallup River	
Date	**Puyallup River Flows at Puyallup Gauge (cfs)**
December 1915	39,800
December 1917	40,500[a]
December 1933	57,000[a]
October 1934	39,500
January 1965	41,500
December 1977	40,600
November 1986	43,800
January 1990	44,800
November 1990	41,900
February 1996	46,700
November 2006	39,700

January 2009	48,200
December 2015	39,800

[a] Mud Mountain Dam (constructed on the White River in 1946) not in place
Source of data: USGS Puyallup Gauge flow records

5.1.5.2 Flood Damage to Facilities

Page 5-21 and 5-22, paragraph one.

Additional text:

Flood damages to Lower Puyallup River flood risk reduction facilities generally been pretty mild in the past three ~~-~~decades. However, two substantial repairs have been made to repair damages due to erosion and one repair to fix fractured concrete panels. Damages from major floods and high-water events between 1990 – 2017 have resulted in approximately 24 identified damage locations comprising 0.6 mile of levees and revetments. Damages have been estimated at nearly $2.15 million dollars (based on 2017 dollars). The table listed below summarizes recorded levee and revetment damages. No significant flood damage is currently apparent along the lower Puyallup River reach. There are isolated locations along the reach where repairs have occurred. The system is approximately 100 years and showing signs of its age. Pierce County maintenance crews annually inspect and monitor the reach and implement repairs when necessary.

5.1.6.2 Land Purchases

Page 5-23, Caption for figure 5.8.

Revised caption text:

Figure 5.21 - – (a) RM 11.0-11.5 Flooding of residential structures in Sumner in 2006, and (b) looking downstream from RM 17.0, rural residential and farmland in unincorporated Pierce County in 2006

5.1.7 Flood and Channel Migration Hazard Mapping

5.1.7.1 Flood Hazard Mapping.

Page 5-24, paragraph one.

Revised text:

Hazard mapping in the lower Puyallup River includes detailed flood studies (FEMA ~~2009~~, NHC 2006) showing significant flood hazards in the lower Puyallup ~~v~~Valley. The flood hazards were~~are~~ identified because ~~due to~~ the existing levees are not ~~being~~ built high enough to meet current FEMA standards. ~~accredited by FEMA because they cannot demonstrate that the levees provide enough to show protection from flooding. and the creation of preliminary~~In order to publish the countywide Digital Flood Insurance Rate Maps (DFIRM~~),~~), the areas behind the ~~that were affected by~~ non-accredited levees were ~~"~~secluded from the map update. This means that most of the lower Puyallup valley is ~~still~~ showing the old ~~same~~ flood risk as it was understood in the 1970's. In t~~T~~he FEMA~~a~~/NHC study ~~identified~~which as of ~~this publication of this document have not been issued by FEMA.~~ f ~~F~~lood risk~~prone~~ areas

along the lower Puyallup River ~~that~~ include extensive industrial, commercial, residential, and agricultural land uses along the right bank at the Port of Tacoma; cities of Tacoma, Fife and Puyallup~~; and unincorporated Pierce County~~. ~~In unincorporated Pierce County, these identified areas are being regulated using the best available data even though they do not show up on the DFIRM.~~ Along the left bank, there are fewer commercial and industrial uses, but extensive residential and agricultural uses, and public infrastructure. In unincorporated Pierce County, flood risk areas behind the levees are being regulated based on the risk of a levee failure or overtopping even though this risk is not shown on the DFIRM. The Tacoma wastewater treatment plant, on the left bank between State Route 509 and Lincoln Avenue, is an example of a critical facility along the lower Puyallup River potentially subject to flooding. The ~~preliminary~~ DFIRM maps for the lower Puyallup show ~~4,494~~1211 ~~-~~acres within the special flood hazard area (SFHA) or 100-year floodplain and unincorporated Pierce County regulates an additional 942 acres as flood fringe~~.~~ The mapped deep and fast flowing area is 1,087 acres.

5.1.7.2 Channel Migration Hazard Mapping.

Page 5-24, paragraph one.

Revised text:

Channel Migration methods require measuring changes over the period of record. No channel migration zones have been mapped for the lower river due to the river being confined between the levees for the last hundred years. ~~attenuation of flood flows from Mud Mountain Dam. Few levee repairs have been documented since construction of the dam.~~ The regulated FEMA floodway within existing levees is the default channel migration zone (CMZ) for the lower Puyallup River according to Pierce County Code 18E~~.70.020~~. ~~The severe CMZ covers an area of 27 acres.~~

5.1.8 Problem Identification

Page 5-25, Table 5.6 Priority Problems Identified in Lower Puyallup River.

Revised text:

Table 5.6 Priority Problems Identified in Lower Puyallup River

Location	Problem Description	Source
Levee and Revetment Overtopping and Breaching		
RM 2.9 – RM 3.1 LB	Levee overtopping potential upstream threatens Tacoma Wastewater Treatment Plant	City of Tacoma
RM 2.8 - RM 8.15 RB	De-accredited North Levee Rd. levee results in increased flood risk for infrastructure and property	City of Fife, Tacoma, Pierce County, Port of Tacoma
~~RM 4.4 -~~ RM 4.45 RB	Settlement of levee at Sha-Dadx restoration site causes road settling and possible future destabilization	City of Fife
RM 4.6 – RM 4.7 RB	Flood levels in 2006 and 2009 nearly overtopped levee at 54th Ave. E.	City of Fife

Table 5.6 Priority Problems Identified in Lower Puyallup River		
Location	**Problem Description**	**Source**
RM 6.8 – RM 6.9 RB	Flood levels in 1996 and 2009 nearly overtopped levee at Freeman Road	City of Fife
RM ~~8.2~~7.9 ~~–~~ RM 8.~~3~~6 LB	Levee overtopping floods Tiffany's skating rink, Riverwalk Apts., and road underpass	City of Puyallup, Pierce County
RM 8.1 – RM 8.2 RB	Levee overtopping floods N. Meridian-north shore underpass	City of Puyallup
RM 9.1 – RM 9.25 LB	Levee overtopping floods E. Main St. "flash cube" building	City of Puyallup
RM 9.3-9.5 LB	Levee overtopping floods Rite Aid shopping center parking lot and loading docks	Pierce County
RM 9.8 – RM 10.3 LB	Levee overtopping floods Linden golf course	City of Puyallup
RM 9.4 – RM 10.6 LB	Levee overtopping and sedimentation impacts levee access road and public trail	Pierce County
Tributary Backwater Flooding		
RM 2.1 LB	Backwater flooding at Cleveland Way pump station caused extensive flooding in 1996	City of Tacoma
RM 2.9 LB	Clear Creek backwater flooding caused extensive flooding in 1996 and 2009; some flooding in 2006	Pierce County, City of Tacoma
RM 5.0 RB	Oxbow Lake backwater flooding of pump station	City of Fife
RM 5.8 LB	Clarks Creek backwater flooding of homes	Pierce County, Tacoma
RM 6.9 LB	City storm drain flooding (NW 13th Ave.)	City of Puyallup
RM 7.9 LB	City storm drain flooding (4th St. NW)	City of Puyallup
RM 9.4 LB	Deer Creek backwater flooding (Shoppe concrete)	City of Puyallup
Public Safety/Emergency Rescues		
RM 2.9 – RM 4.8 LB	Clear Creek (>10 emergency rescues in 2009)	Pierce County Sheriff
RM 4.2 – RM 8.2 LB	Emergency evacuation in Fife in 2009	City of Fife
Flooding of Structures and Infrastructure (Roads/Bridges) [not already noted above]		
RM 0.7 – RM 2.2 RB~~N~~/LB	Three bridges of concern (11th Ave., Lincoln Ave., and Puyallup Ave.) – wood on piers and capacity	City of Tacoma
RM 2.9 – RM 6.9 RB	Critical facilities (schools, police station) at risk of flooding due to overtopping/breaching of levee	City of Fife
RM 3.1 LB	Localized road flooding north of I-5	City of Tacoma
RM 4.0 – RM 5.5 RB	Potential flooding of Tacoma Power's Fife substation	City of Tacoma
RM 5.75 RB/LB	Milroy bridge fails to meet minimum standard for bridge clearance	Pierce County Transportation, City of Fife
RM 6.8 – RM 6.9 LB	Puyallup Wastewater Treatment Plant flooding	City of Puyallup
RM 9.1	SR-512 bridge at Pioneer – wood accumulation and bed scour at piers	WSDOT
Sediment and Gravel Bar Accumulation		
RM 2.9 – RM 6.9	Bed elevation increases between I-5 and Freeman Rd. a concern due to reduced conveyance capacity	City of Fife, Pierce County

Table 5.6 Priority Problems Identified in Lower Puyallup River		
Location	**Problem Description**	**Source**
RM 5.8 – RM 10.3	Bed elevation increases from Clarks Cr. to White River a concern due to reduced conveyance capacity	City of Puyallup, Pierce County
Facility Maintenance and Repair Needs		
RM 2.8 – RM ~~8.6~~ RB/LB	Concrete panel repair as needed due to veg./roots	Pierce County
Fish Habitat Problem Areas		
RM 2.6 – RM 3.7 RB	Levee separates river from historic estuary on Union Pacific property and adjacent farmland	Pierce County, Puyallup Tribe
RM 5.0 RB	Oxbow Lake is former river meander that has been cut-off from river by levee	City of Fife
RM 6.7 – RM 7.4 RB	Freeman Road Oxbow cut-off from river by levee	Puyallup Tribe, Pierce County
RM 8.2 RB	72" Wapato Cr. outflow to Puyallup River prevents headwater flow to Wapato Cr.	Puyallup Tribe
RM 9.4 – RM 10.3 RB	Levee cuts off confluence wetlands river channel	Puyallup Tribe
RM 9.6 – RM 10.5 LB	Levee cuts off-channel habitat and floodplain from river channel	Puyallup Tribe
Public Access		
RM 0.6 – RM 2.9 RB/LB	Corps of Engineers limits access to levee	City of Tacoma
RM 2.0 – RM 6.5 RB/LB	Lack of connecting trail along river from RM 6.5 to City of Tacoma (on left or right bank)	City of Tacoma, Pierce County Parks
RM 6.8 – RM 10.7	Repeated flood damage to trail limits access; no trespassing sign at RM 6.8 discourages access	City of Puyallup

Source: Pierce County Surface Water Management

5.1.9 River Reach Management Strategies

Page 5-28, Structural management strategy

Revised text:

Structural management strategy:

- RM 0.0 – RM 10.3 left and right bank - The "level of ~~protection~~service" goal for levees should be 200-year design plus three feet of freeboard.

5.1.10.2 LP2 Clear Creek Acquisition and Levee

Page 5-32, second paragraph.

Revised text:

Construction of the project levee preserves existing infrastructure, preserves farmland, and relieves the level of flooding in the Clear Creek floodplain. Removal or modification of the

flood gates will allow for free fish passage in and out of Clear Creek.

5.2 MIDDLE PUYALLUP RIVER

5.2.5 River Management Facilities, Flooding and Flood Damage

Page 5-54, Table 5.8 Levees and Revetments in the Middle Puyallup River.

Revised Text:

Table 5.8 Levees and Revetments in the Middle Puyallup River

Name	Location [a]	Ownership
Right Bank		
Traffic Avenue Revetment	RM 10.3 – RM 11.0	Pierce County
River Grove Levee	RM 11.0 – RM 11.45, PL 84-99	Pierce County
Riverwalk Revetment	RM 11.45 – RM 12.0	Pierce County
Riverside Levee	RM 12.0 – RM 12.75~~8~~, PL 84-99	Pierce County
Riverside Revetment	RM 12.75-12.8	Pierce County
Van Ogle Revetment	RM 12.8 – RM 14.2	Pierce County
Evanger/White Revetment	RM 14.2 – RM 15.0	Pierce County
Fennel Creek Revetment	RM 15.15 – RM 15.9	Pierce County
Mosby Revetment	RM 15.9 – RM 16.65	Private
~~Dollar Creek~~ 128th-McCutcheon	RM 16.65 – RM 16.8~~9~~	Pierce County
Lindsay Levee	RM 16.9 – Carbon RM 1.2	Pierce County
Left Bank		
Knutson Revetment	RM 10.7 – RM 12.0	Pierce County
WAZZU Revetment	RM 12.0 – RM 12.8	Pierce County
Bowman/Hilton Levee	RM 12.8 – RM 13.55~~6~~ , PL 84- 99	Pierce County
Sportsman Levee	RM 13.55~~6~~ – RM 14.4 , PL 84-99	Pierce County
Ball Creek Revetment	RM 14.4 – RM 15.7	Pierce County
McMillin Levee	RM 15.7 - RM 16.65 , PL 84-99	Pierce County
Bowen/Parker Levee	RM 16.65 – RM 17.5 , PL 84-99	Pierce County

[a] RM = river mile; PL 84-99 USACE Flood Control and Coastal Emergency Act
Source: Pierce County Surface Water Management and USACE records

5.2.5.1 Major Flooding

Page 5-55, Table 5.9 Historical Major Flooding on the Middle Puyallup River.

Revised text:

Table 5.9 Historical Major Flooding on the Middle Puyallup River	
Date	**Puyallup River Flow at Alderton Gauge (cfs)**
December 1921	20,000
December 1946	22,600
December 1953	21,900
December 1955	23,300
January 1990	34,600
November 1990	42,300
February 1996	41,500
November 1999	24,800
January 2003	21,000
January 2005	23,300
November 2006	40,300 ~~51,600~~[a]
November 2008	40,200
January 2009	41,600 ~~53,600~~[a]

a These two estimates are questionable because they exceed downstream peak flow estimates
Source: USGS Alderton Gauge flow records

5.2.5.2 Flood Damage to Facilities

Page 5-56 and 5-57, Table 5.10 Summary of Damage to Facilities in the Middle Puyallup 1990-2017.

Delete Table

5.2.6.1 Major Projects

Page 5-58, third paragraph.

Revised text:

Table 5.11 shows major repairs, generally considered 750 lineal feet or more in length, along the middle Puyallup River following significantly large storm events. Records maintained by Pierce County SWM Operations and Maintenance show three several major repairs have been completed between RM 10.3 and RM 17.3.

5.2.7 Flood and Channel Migration Hazard Mapping

Page 5-59, first paragraph.

Revised text:

Hazard mapping in the middle Puyallup River includes detailed flood studies (FEMA ~~-2009~~,

NHC 2006) and the creation of ~~Preliminary~~ Digital Flood Insurance Rate Maps (DFIRM)~~, which as of the publication of this document have not been issued by FEMA~~ which ~~.~~ were adopted in March 2017. In order to publish the countywide Digital Flood Insurance Rate Maps, areas that were affected by non-accredited levees were "secluded" from the map update. This means that the Puyallup River from the Carbon River to the Ford Setback levee shows the same flood risk as it was understood in the 1970's.

5.2.8 Problem Identification

Pages 5-60, Table 5.12 Flooding-related Problems Identified in the Middle Puyallup River.

Revised text:

Tributary Backwater Flooding		
RM 12.8 – RM 13.0 RB	Backwater at tributary floods Pierce County's Riverside Park	Pierce County
RM 15.8~~9~~ – RM 16.4 RB	Canyon Falls backwater floods McCutcheon Rd.	Pierce County

Pages 5-60, Table 5.12 Flooding-related Problems Identified in the Middle Puyallup River.

Revised text:

RM 14.15 RB/LB	Flooding of 96th St. E. and bridge closed roads and wood buildup on bridge piers	Pierce County Roads
RM 16.7	128th St. E Bridge woody debris buildup on piers	Pierce County Roads
RM 16.7	Tacoma Water Line Bridge woody debris buildup on piers	Pierce County

Pages 5-61, Table 5.12 Flooding-related Problems Identified in the Middle Puyallup River.

Revised text:

Sediment and Gravel Bar Accumulation		
RM 10.3-10.7	Gravel bar accumulation from the confluence of White River upstream to Main St. bridge	City of Puyallup
RM 10.3~~4~~-10.7~~2.0~~	Large gravel bar along right bank adjacent to Sumner WWTP causes flow constriction	City of Sumner
RM 12.2-17.4	Gravel accumulation between Sumner and Orting a concern due to reduced conveyance capacity and directing flows at levees, damaging structures	Pierce County

Pages 5-61, Table 5.12 Flooding-related Problems Identified in the Middle Puyallup River.

Revised text:

Public Access		
RM 10.7 – RM 11.5 LB	Lack of connecting trail between Main Street and Foothills trail at East Puyallup Trailhead	Pierce County Parks
RM 12.8~~7~~ – RM 13.4 RB	Desire to maintain public access for boat launch and fishing at Riverside Park if setback levee is constructed	Pierce County Parks

Page 5-64, first paragraph.

Revised text:

The following capital improvement projects are recommended to address the problem areas identified in Table 5.12~~1~~. Capital Projects are defined as construction projects over $75,000 and included within the yearly Capital Improvement Element, of the Comprehensive Plan for Pierce County Washington. Projects less than $75,000 are included within the Maintenance Program.

5.2.9 River Reach Management Strategies

Page 5-62 and 5-63, Structural management strategy

Revised text:

Structural management strategy:

- RM 10.3 – RM 12.0 right and left banks – "Level of ~~protection~~Service" goal for levees should be 100-year design plus three feet of freeboard. Revetments should be designed to resist channel migration.
- RM 12.0 – RM 15.6 right and left banks – "Level of ~~protection~~Service" goal for levees should be to maintain the current (2009) level of protection. Revetments should be designed to resist channel migration.

5.2.10 Recommended Capital Projects

Page 5-69, MP3 McCutheon Rd and 128th St. East.

Revised text:

5.2.10.3 MP~~4~~3 Middle Puyallup 128th Comp Study ~~McCutcheon Rd and 128th St East~~

Page 5-72, MP4 McCutheon 116th St. E Point Bar Gravel Removal

Revised text:

5.2.10.4 MP~~3~~4 116th St E. Point Bar Gravel Removal

5.3 UPPER PUYALLUP RIVER

5.3.5 River Management Facilities, Flooding and Flood Damage

Page 5-81, Table 5.14 Levees and Revetments in the upper Puyallup River.

Revised text:

Table 5.14 Levees and Revetments in the Upper Puyallup River		
Name	**Location [a]**	**Ownership**
Right Bank		

~~High Cedars~~ Bartroff Revetment	RM 17.4 – RM 17.5	Pierce County
High Cedars Levee	RM 17.5 – RM 19.7, PL 84-99	Pierce County
Calistoga Levee	RM 19.7 – RM 21.25, PL 84-99	Pierce County
Jones Levee	RM 21.25 – RM 22.5, PL 84-99	Pierce County
Ford Levee	RM 22.5 – RM 24.8~~9~~, PL 84-99	Pierce County
High Bridge Revetment	RM 24.8~~9~~ – RM 25.45	Pierce County Roads
Neadham Road Levee	RM 26.4 – RM 2~~7~~6.0~~9~~, PL 84-99	Pierce County
Left Bank		
South Fork Levee	RM 17.5 – RM 18.5	Pierce County
Leach Road Levee	RM 19.1 – RM 21.25, PL 84-99	Pierce County
Soldier's Home Levee	RM 21.25 –RM 23.1, PL 84-99	Pierce County
McAbee Levee	RM 23.1 – RM 23.6, PL 84-99	Pierce County
Orville Road Revetment	RM 26,85~~25.6~~ – RM 27.0~~28.1~~	Pierce County
Champion Bridge Levee/Revetment	RM 28.15 – RM 28.6	Pierce County

[a] RM = river mile; PL 84-99 USACE Flood Control and Coastal Emergency Act
Source: Pierce County Surface Water Management records

5.3.5.1 Major Flooding

Page 5-81, first paragraph.

Additional Text:

The categorization of major flooding is based on a threshold of discharges in excess of approximately 16,000 cfs at the Orting gauge.

Page 5-82, Table 5.15 Historical Flooding in Upper Puyallup River.

Additional Text:

Table 5.15 Historical Flooding in Upper Puyallup River

Date	Puyallup River Flow at Orting Gauge (cfs)
November 1932	11,800
December 1933	12,800
December 1955	12,100
November 1959	12,900
November 1962	15,300
January 1965	12,200
December 1977	12,100
January 1990	11,600
February 1996	18,300
November 1999	11,600
November 2006	21,500

November 2008	15,200
January 2009	16,900
November 2014	16,500
December 2015	17,200

Source: United States Geologic Survey records

5.3.5.2 Flood Damage to Facilities

Page 5-83 through 5-85, Table 5.16 Flood Damage to Levees in the Upper Puyallup River.

Delete Existing Table

5.3.6 Key Accomplishments since the 1991 Flood Plan

Page 5-86, number 1.

Revised text:

1. **Ford Levee setback project 1998, RM 23.1 – RM 25.4, right bank**

   The setback project consisted of constructing a new 8,400-foot levee setback up to 600 feet from the main channel of the Puyallup River. Portions of the existing levee structure were removed to allow the river to meander and remove the remainder of the levee over time. The project reconnected 125 acres of floodplain with the river. The total cost is ~~was~~ approximately ~~$3.3~~ 1,011,126 million.

Page 5-86, number 2.

2. **Soldiers Home levee setback project 2006, RM 21.8 - 23.0, left bank**

   The project consisted of constructing a new 5,000-foot levee which was set back 900 feet from the main channel of the river. The existing levee was removed to allow the river to meander in the opened floodplain area. The project reconnected 67 acres of floodplain isolated from the river into a complex of braided channels. Large woody material was placed along the setback levee alignment to enhance habitat. (NOAA, Natural Resource Restoration projects). The levee was tied into high ground at the Calistoga Bridge for compliance with FEMA levee accreditation standards. The total cost was approximately $6.4 million.

5.3.7 Flood and Channel Migration Hazard Mapping

Page 5-88, paragraph 1.

Revised Text:

Hazard mapping in the upper Puyallup includes detailed flood studies (FEMA /~~2009,~~ NHC 2006) and the creation of ~~preliminary~~ Digital Flood Insurance Rate Maps (DFIRM), which became effective March 2017. ~~as of the publication of this document have not been issued by FEMA.~~ Flood prone areas along the upper Puyallup River include the High Cedars Golf

Club, local roads such as Orville Road and Neadham Road, numerous roads and structures in the Village Green area of Orting, agricultural and rural lands and structures in unincorporated Pierce County, and Orting School District property. In order to publish the countywide Digital Flood Insurance Rate Maps (DFIRM) areas that were affected by non-accredited levees were "secluded" from the map update. This means that most of the Puyallup valley in the vicinity of Orting is still showing the same flood risk as it was understood in the 1970's. ~~The preliminary DFIRM maps for the upper Puyallup River show 2,562 acres within the special flood hazard area (SFHA) or 100-year floodplain.~~ The DFIRM maps in the vicinity of Orting show 1830 acres within the special flood hazard area (SFHA) or 100-year floodplain and unincorporated Pierce County regulates an additional 212 acres as flood fringe. The mapped deep and fast flowing area is 119 acres.

5.3.8 Problem Identification

Page 5-88 through 5-90, Table 5.18 Flooding-related problems Identified in Upper Puyallup River.

Revised text:

Table 5.18 Flooding-related Problems Identified in ~~Middle~~ Upper Puyallup River

Location	Problem Description	Source
Levee and Revetment Overtopping and Breaching		
RM 17.6 – RM 17.9 LB	Revetment overtopping in 2006 and 2008 deposited debris and blocked access road	Pierce County
RM 18.0 – RM 19.2 RB	Levee overtopping floods High Cedars Golf Course	Pierce County
RM 19.2 – RM 19.8 LB	Levee overtopping damaged levee and levee access road	Pierce County
RM 19.6 – RM 21.25 RB	Levee/revetment overtopping in 1996, 2006, 2009 impacting residential areas, schools and city roads	City of Orting, Pierce County
RM 22.5 – RM 22.55 RB	Levee overtopping floods Calistoga Street and baseball fields	City of Orting
RM 25.4- RM 28.6	Repetitive damages to Neadham Road levee and Champion Bridge revetment	Pierce County
Tributary Backwater Flooding		
RM 25.4~~3~~ RB	Backwater flooding at Fiske Creek results in flooding of Brooks Rd. bridge causing road closure	Pierce County
RM 26.3 LB	Kapowsin Creek backwater flooding impacts Orville Rd. bridge over creek	Pierce County
Public Safety/Emergency Rescues		
RM 25.8 – RM 26.5 RB	Emergency evacuations of Neadham Rd. area occurred during 1996 flood event	Pierce County
Channel Migration Problem Areas		
RM 25.3~~3.6~~ – RM ~~23.9~~25.45 LB	Channel migration occurred numerous times since 1995 eroding left bank levee upstream of Rock Pt.	Pierce County

Table 5.18 Flooding-related Problems Identified in ~~Middle~~ Upper Puyallup River		
Location	**Problem Description**	**Source**
RM 23.9 – RM 25 LB	Channel migration causes bank erosion of threatening 6-8 homes in "The Country"	Pierce County
RM 26.1 – RM 26.3 LB	Channel migration upstream of high bridge eroding bank near Brooks Rd. and upstream during 2006, 2008 and 2009	Pierce County
RM 26.4~~1~~ – RM 27.2~~6.3~~ LB	Channel migration threatens Orville Rd.	Pierce County
~~RM 26.6 – RM 27.1 LB~~	~~Channel migration threatens Orville Rd.~~	~~Pierce County~~
RM 27.2~~1~~ – RM 2~~8~~7.1~~7~~ LB	Channel migration starting in 1996 and ongoing threatens 10-12 homes in Stehn large lot area	Pierce County
RM 28.1 – RM 28.4 RB	Channel migration downstream of Champion Bridge threatens forested area	Pierce County
RM ~~28.2~~ 27.0~~–~~ RM 28.6~~5~~ LB	Channel migration threatens revetment, 6 homes and Orville Rd.	Pierce County
Flooding of Structures and Infrastructure (Roads/Bridges) [not already noted above]		
RM 20.6~~5~~ – RM 21.25~~3~~ L~~R~~B	Leach Rd. E. flooding north of Calistoga bridge	Pierce County Roads
RM 21.25~~3~~ LB/RB	Calistoga bridge is a constriction point for flow (gravel deposition, LWD impacting bridge)	Pierce County Roads
RM 25.4 – RM 2~~7~~6.0~~7~~ RB	Neadham Rd. E. flooding causes road and infrastructure damage during major floods	Pierce County Roads
Sediment and Gravel Bar Accumulation		
RM ~~17.4-19.4~~ 15.8-16.0	Gravel bar accumulation downstream of Orting reduces conveyance capacity; one specific bar at 116th ~~Ave.~~ Street E. causes levee overtopping/threatens homes	Pierce County
RM 19.4-~~22.0~~21.25	Gravel bar accumulation downstream of Calistoga bridge reduces conveyance capacity	City of Orting
RM 22.5-28.6~~4~~4	Gravel accumulation upstream of Calistoga Bridge~~Orting~~ reduce conveyance capacity and threaten levee integrity	Pierce County
Facility Maintenance and Repair Needs		
RM 17.54 – RM 19.8 RB	High Cedars levee suffers damage during every large flood (1990, 1995, 1996, 2006, 2008, 2009)	Pierce County
RM 19.8 – RM 28.6	Numerous locations along levees and revetments have required repairs following many flood events (see Table 5.3.4 above)	Pierce County
Fish Habitat Problem Areas		
RM 17.8 - RM 18.1 LB	Historical side channel habitat and wall-based cool water channel has been cut off from Puyallup River by revetment construction	Puyallup Tribe
RM 19.1~~2~~ – RM 20.2 LB	Levee/revetment construction cut off floodplain from river channel, limiting rearing/spawning habitat (Horsehaven and 150th St. setback levee locations)	Puyallup Tribe, Pierce County

Table 5.18 Flooding-related Problems Identified in ~~Middle~~ Upper Puyallup River		
Location	**Problem Description**	**Source**
RM 21.3 – RM 23.0 RB	Levee/revetment construction cut off floodplain from river channel, limiting rearing/spawning habitat (190th Ave. upstream/downstream levee setback locations)	Puyallup Tribe, Pierce County
RM 24.8 – RM 25.2 LB	Mint Creek wetland cutoff from Puyallup River by remnant left bank levee preventing off-channel rearing	Puyallup Tribe
RM 27.0 – RM 28.2 RB	Remnant railroad bed limits channel migration which degrades riparian habitat and connection with floodplain	Puyallup Tribe
Public Access		
RM 17.5 – RM 17.6 RB	McMillan trailhead – Lack of public access to water (e.g., for fishing or viewing)	Pierce County Parks
RM 29 – RM 30 RB	Lack of access to river/water; interest in new regional park in Kapowsin vicinity near river	Pierce County Parks

Source: Pierce County Surface Water Management records

5.3.9 River Reach Managament Strategies

Page 5-91, paragraph 2.

Revised text:

The primary objective for the upper Puyallup River is to maintain the structural integrity of the levee and revetment system so the system continues to reduce risks to public health and safety, and reduce ~~public and private~~ property and infrastructure damage. Since the 2013 Flood Plan, the City of Orting has constructed a setback levee which meets the 100-year level of service, with the ability to be added on to as conditions in the river channel change over time. ~~Another objective is to make improvements to the levees so that they provide 100-year level of protection in the urban portion of the City of Orting, on the right bank between RM 19.4 and RM 22.5~~. ~~The final~~An additional management strategy is to realize capital projects that enhance and create aquatic habitat through levee setbacks, riparian re-vegetation, and strategic placement of large woody material. Some river reaches are being targeted for property acquisition, a setback levee, or other structures that are planned to protect public roads and improve habitat.

Page 5-91, Second bullet, Structural management strategy.

Revised and added text:

- RM 19.4 – RM 22.5 (right bank) – The "level of ~~-~~service ~~protection~~" goal for levees should be 100-year design plus three feet of freeboard.

Page 5-91, fourth bullet.

Additional text:

- New revetments designed and constructed to protect Orville Road will implement a preventative design strategy.

Page 5-91, Non- structural management strategy:

Added text:

- Develop a legal process to remove remnant levee segments

5.3.10 Recommended Capital Projects

Page 5-94, UP2 Ford Levee Setback Gravel Removal.

Revised project name:

UP2 Ford Levee Setback - Gravel Removal

Page 5-96, UP3 Neadham Road Flooding/ Channel Migration Protection.

Revised project name:

UP3 Neadham Road Floodplain Reconnection~~Flooding/Channel Migration Protection~~

Page 5-96, UP3 Neadham Road Floodplain Reconnection

Revised text:

River Mile: ~~25.3 –~~ 26.5~~9~~ Right Bank

Page 5-96, UP3 Neadham Road Floodplain Reconnection

Revised text:

Council District: 1~~3~~

Page 5-99, UP4 Orville Road Revetment at Kapowsin Creek

Revised text:

What is the Recommended Solution?

The remaining 600 feet of levee was destabilized in 2013 and the river continues to re-occupy that portion of the channel. in this area would be removed. The adjacent properties have been ~~would be~~ purchased and the residences removed. A proposal to construct a ~~and a new~~ 750-lineal foot combination of engineered log jam (ELJ) and dolo timber structures will provide scour and erosion protection for Orville Road.

Page 5-99, UP4 Orville Road Revetment at Kapowsin Creek

Additional text:

What is the Recommended Solution?

Recent channel shifts and the proposed right bank projects have decreased the urgency for this project. Channel changes following the completion of the right bank project will be analyzed to assess the left bank needs.

Page 5-100, UP4 Orville Road Revetment at Kapowsin Creek

What are the Project Benefits?

Additional text:

Restoration of natural river processes

Page 5-101, UP 5 Orville Road Channel Migration Protection

Revised text:

Basin Plan: Mid-Puyallup and Upper Carbon River/Upper Puyallup River (~~future plan~~ under construction)

Page 5-101, UP 5 Orville Road Channel Migration Protection

Revised text:

River Mile: 2~~7~~6.6~~4~~ – 28.2~~6~~ Left Bank

5.4 LOWER WHITE RIVER

5.4.5.1 Major Flooding

Page 5-114, first paragraph.

Revised text:

In the last 3~~2~~0 years major flooding in the lower White River occurred in 1990, 1996, 2006, and 2009 (see Table 5.21). The largest flood on record occurred in December 1933, prior to the construction of Mud Mountain Dam. Increased flood risk in the lower White River has resulted from the reduction of channel capacity. Thresholds for flood warnings has decreased from 10,000 cfs to 5,500 cfs. Since 2013, these events have occurred multiple times a year.

Page 5-114, Table 5.21 Historical Flooding in Lower White River

Additional text:

Table 5.21 Historical Flooding in Lower White River

Date	White River Flows near Auburn[a] (cfs)
December 1933	>28,000
December 1946	>12,300
December 1955	>13,700
November 1959	>13,000
December 1977	>14,800
January 1986	>14,000
November 1986	>15,200

Table 5.21 Historical Flooding in Lower White River	
Date	**White River Flows near Auburn[a] (cfs)**
December 1996	13,600
January 2006	12,400
November 2006	14,700
January 2009	12,000

5.4.5.2 Flood Damage to Facilities

Page 5-115, Table 5.22 Damage to Facilities in the Past 20 Years along the Lower White River.

Delete table

5.4.7 Flood and Channel Migration Hazard Mapping

5.4.7.1 Flood Hazard Mapping.

Page 5-116, first paragraph.

Revised text:

Hazard mapping in the lower White River includes detailed flood studies (FEMA 2009, NHC 2006) which are shown on the ~~and preliminary~~ Digital Flood Insurance Rate Maps (DFIRM), which became effective March 2017 ~~which as of the publication of this document, have not been issued by FEMA~~. Flood prone areas along the lower White River include extensive industrial, commercial, and residential land uses along the right and left banks in the cities of Sumner and Pacific, and a small area of unincorporated Pierce County. This new mapping has been shown to be out of date due to increasing sediment load which has decreased the channel capacity. The ~~preliminary~~ DFIRM maps for the lower White River show 1,043 acres within the special flood hazard area) or 100-year floodplain. The mapped deep and fast flowing area is 312 acres.

5.4.7.2 Channel Migration Hazard Mapping

Page 5-116, first paragraph.

Revised text:

Severe, moderate, and low risk channel migration zones (CMZ) were mapped for the lower White River as part of the upper Puyallup River study (GeoEngineers 2003) and adopted in November 2004. The CMZ refers to the geographic area previously occupied by a stream or river and susceptible to channel erosion and/or channel avulsion (WSDOE 2003). ~~In the lower White River, the severe CMZ covers an area of 227 acres.~~ While the CMZ study identified 227 acres at a severe risk of channel migration, only 46 acres are in Pierce County

and regulated under ~~Pierce County regulates severe CMZ mapped areas as floodway per~~ Chapter 18E.70, Pierce County Code.

5.4.8 Problem Identification

Page 5-117, Table 5.23 Priority Problems Identified in Lower White River.

Revised text:

Flooding of Structures and Infrastructure (Roads/Bridges) [not already noted above]		
RM 0.1~~2~~ – RM 0.2 LB	Flooding of State St. (access to Sumner wastewater treatment plant)	City of Sumner
RM 3.4 – RM 3.5 LB	Flooding of roadways at 24th St. E. & 148th Ave.	City of Sumner

Page 5-118, Table 5.23 Priority Problems Identified in Lower White River.

Revised Text:

Facility Maintenance and Repair Needs		
RM 3.85 RB	Severe bank erosion. Loss of armoring. Warehouses and commercial property threatened by elevated flood risk.	Pierce County

5.4.9 River Reach Management Strategies

Page 5-119, third paragraph

Revised text:

In the near term, the primary objective for the lower White River is to maintain the structural integrity of the revetment and levee system so that the facilities continue to reduce risks to public health and safety, and reduce ~~public and private property~~ damage to property and infrastructure. Another goal is to make improvements to the facilities over time through construction of levees or setback of revetments so that the level of ~~protection~~ service is increased to ~~provide flood protection to the~~meet a 100-year ~~flood~~storm event. The final management strategy objective is to realize capital projects that enhance and create aquatic habitat through levee or revetment setbacks, riparian revegetation, and strategic placement of large woody material.

Page 5-119, Structural management strategy

Revised text:

- RM 0.0 – RM 5.5 left bank; RM 0.0 – RM 1.8 right bank – The "level of ~~protection~~ service goal" for revetments should be channel migration resistance design
- RM 1.8 – RM 5.5 right bank - The "level of ~~protection~~service" goal for levees and flow conveyance should be 100-year design plus three feet of freeboard

Page 5-120, Structural management strategy

Additional text:

Page 5-120, Structural management strategy

Additional text:

For additional information regarding the Lower White River, please refer to the 2006 King County Flood Hazard Management Plan:

https://www.kingcounty.gov/depts/dnrp/wlr/sections-programs/river-floodplain-section/documents/flood-hazard-management-plan.aspx

5.4.10 Recommended Capital Projects

Page 5-121, LW1 State Street Flood Wall or Emergency Access.

Revised text:

Basin Plan: White~~r~~ River ~~(to be adopted)~~ Adopted November 2013

Page 5-123, LW2 Lower White River Flood Protection.

Project Name Change:

5.4.10.2 LW2 Lower White River Floodplain Restoration and Flood Protection

*Projects segments included within the overall project: White River Restoration (left bank RM 2.5- RM 4), Pacific Point Bar Setback Levee (Right Bank, RM 3.9- RM 4.5); Left Bank Setback Levee (Right Bank, RM 4.5-RM 4.8); Stewart Road Bridge replacement (left and right bank RM 4.9),

Page 5-123, LW2 Lower White River Flood Protection.

Revised Text:

Basin Plan: White~~r~~ River ~~(to be adopted)~~ Adopted November 2013

River Mile: 1.8 – 4.9, right and left bank ~~bank~~

Additional text:

Page 5-123, second paragraph.

Revised text:

Since the 2009 study, the channel capacity decreased ~~to~~ from over 15,000 cfs to approximately ~~10,~~5,500~~0~~ cfs at RM 4.7. The reduction in channel conveyance capacity and floodplain area is attributed to several factors, primarily ~~such as commercial, industrial, and residential development in the floodplain,~~ increased deposition of sediments in the channel, encroachment of vegetation, and the restrictions on channel dredging.

Page 5-124, first paragraph.

Revised text:

This project will restore sustainable instream habitat, floodplains, and wetlands in addition to providing flood. protection. ~~Provide a level of protection from the 100-year Flood for the~~

~~Right Bank from RM 4.9 to RM 1.8. In this section of the river flood waters leave the channel in relatively shallow depth as they spill out onto the broad floodplain.~~ A solution, which combines ~~a~~ features such as ~~low~~ setback levees, side channels, channel roughening, engineered log jams, revetments, property acquisitions and other methods, ~~revetments to limit scour and channel widening excavation on the left bank~~ would increase conveyance capacity and create a more sustainable river system~~provide some mitigation benefits~~.

Page 5-124, first and second bullet.

Revised text:

- Reduces or eliminates flood damage to local industrial, commercial, and residential properties and structures
- ~~residential properties and structures,~~

Page 5-125, LW3 Butte Avenue Levee and Berm.

Revised text:

Basin Plan: White~~r~~ River ~~(to be adopted)~~ Adopted November 2013

5.5 UPPER WHITE RIVER

5.5.5.1 Major Flooding

Page 5-132, paragraph one.

Revised Text:

The White River gauge downstream of the Clearwater River confluence has operated intermittently from 1975 to the present, with several data gaps resulting from damage during large floods. In the last 4~~2~~0 years major flooding in the upper White River occurred in 1977 ~~90~~, 1995, 1996, 2006, and 2008~~9~~ (see Table 5.26). Flow values in the table are shown as "less than" due to the larger drainage area for the Clearwater gauge.

Page 5-133, Table 5.26 Historical Flooding in Upper White River.

Revised text:

Table 5.26 Historical Flooding in Upper White River

Date	White River Flows downstream of Clearwater River Gauge (#12097850) (cfs)
December 1977	22,800
January 1990	<17,200
November 1990	<18,400
November 1995	<20,500
February 1996	<30,000[a]

November 2008	<18,100
November 2006	Not Available
January 2009	<18,100
January 2011	28,600
January 2015	22,000

Page 5-133, Table 5.2 Damages to Facilities in the past 20 years along the Upper White

Deleted table

5.5.7 Flood and Channel Migration Hazard Mapping

5.5.7.1 Flood Hazard Mapping

Page 5-134, paragraph one.

Revised text:

The new FEMA DFIRM did not update the flood risk assessment ~~Hazard mapping~~ in the upper White River. The risk assessment continues to be the one completed in the late 1970's. ~~has not been updated since the 1987 flood insurance study.~~ Flood prone areas along the upper White River include State Route 410, Pierce County roads and bridges, and ~~low~~moderate-density ~~residential~~ residential recreation areas. The ~~1987~~ DFIRM maps for the upper White show 443 acres within the special flood hazard area (SFHA) or 100-year floodplain.

5.5.9 River Reach Management Strategies

Page 5-136, bullet two.

Revised text:

River management facilities – There is a single levee and revetment along the right bank at RM 45~~6~~.0 to RM 45~~6~~.2 owned by Pierce County. Bank armoring protects portions of State Route 410 maintained by WSDOT. Limited armoring at the Crystal River Ranch Road Bridge is maintained by Pierce County Transportation Services.

Structural management strategy:

Page 5-136, bullet one and two.

Revised text:

- RM 45~~4~~.0~~4~~ to RM 45.2 ~~50~~.5, right bank - The "level of ~~protection~~service" goal for the existing levees should be to maintain the existing levee prism. ~~The level of erosion protection for revetments should be the channel migration resistance design.~~
- RM 44.4 to RM 50.5, right bank- The "level of ~~protection~~service" goal for the non-county maintained system should be to resist channel migration.

Non-structural management strategy:

Page 5-136, last sentence.

Additional text:

For additional information regarding the Upper White River, please refer to the 2006 King County Flood Hazard Management Plan:

https://www.kingcounty.gov/depts/dnrp/wlr/sections-programs/river-floodplain-section/documents/flood-hazard-management-plan.aspx

2013 King County Flood Hazard Management Plan Update and Progress Report: https://www.kingcounty.gov/depts/dnrp/wlr/sections-programs/river-floodplain-section/documents/flood-hazard-management-plan-update.aspx

5.6 GREENWATER RIVER

5.6.5.2 Flood Damage to Facilities

Page 5-145, first paragraph.

Additional text:

As noted above, there is currently no actively maintained Pierce County flood risk reduction facility on the Greenwater River. The most significant damage occurred during the 1977 peak flood event that affected the State Route 410 Bridge and approaches. Some toe and facing rock protecting the bridge banks and approaches probably have been damaged by the peak flows since 1977. The condition and status of the private revetment is not known. There has been loss of private property. In 1990, the County purchased a home on Lumpy Lane that was falling in the river due to channel migration. The County is currently working with an adjacent property owner whose home is being threatened by channel migration.

5.6.7 Flood and Channel Migration Hazard Mapping

5.6.7.1 Flood Hazard Mapping.

Page 5-146, first paragraph.

Revised text:

Hazard mapping in the Greenwater River has not been updated since the original flood study of the 1970's. The new countywide DFIRM continues to show a detailed study on the lower Greenwater River, with the entire floodplain mapped as a FEMA defined floodway. 1987 flood insurance study. Flood prone areas along the Greenwater River include the State Route 410 crossing and residential areas on the left bank, mostly between RM 0 and RM 1.0. The ~~1987~~ DFIRM maps for the Green Water River show 129 acres within the special flood hazard area or 100-year floodplain. There are no mapped deep and fast flowing areas on the Greenwater River.

5.6.7.2 Channel Migration Hazard Mapping.

Page 5-146, first paragraph.

Revised text:

Severe, moderate, and low channel migration zones (CMZ) have ~~not~~ been mapped for the Greenwater River.

5.6.8 Problem Identification

Page 5-146, Table 5.32 Priority Problems Identified in the Lower White River.

Revised text:

Table 5.32 Priority Problems Identified in Greenwater ~~Lower White~~ River

5.6.9 River Reach Management Strategies

Page 5-147, paragraph 2

Revised text:

In the near term, the primary objective for the Greenwater River is to maintain the structural integrity of the public revetments so the facilities continue to reduce risks to ~~public~~ infrastructure (particularly State Route 410) and ~~private~~ property ~~damage~~. When repairs are necessary, enhancement ~~Another objective is to enhance~~ and creation of ~~e~~ aquatic habitat by replanting riparian areas is preferred and may include ~~, and~~ strategically ~~placing~~ placed large wood material in areas that will not exasperate known channel migration hazard risks identified in the lower reach of the river~~when conducting future repairs~~.

Page 5-147, structural management strategy

Revised text:

Structural management strategy:

- RM 0.0 – RM 4.0 - The "level of ~~protection~~service" for county maintained revetments should be the channel migration resistance design.

Page 5-147, Non-structural management strategy

Added text:

- Relocation of homes to outside of known channel migration hazards should be considered where appropriate.

5.7 CARBON RIVER

5.7.5 River Risk Reduction Facilities, Flooding and Flood Damage

Page 5-157, Table 5.34 Levee and Revetments along the Carbon River.

Revised text:

Table 5.34 Levees and Revetments along the Carbon River		
Name	**Location [a]**	**Ownership**
Right Bank		
Lindsay Levee	RM 16.9 (PR) – RM 1.7, PL 84-99	Pierce County
~~Water~~ Ski Park Levee	RM 5.95 – RM 7.0, PL 84-99	Pierce County
Left Bank		
Riddell Levee	RM 0.0 – RM 1.7, PL 84-99	Pierce County
Orting Treatment Plant Levee	RM 1.7 – RM 3.05, PL 84-99	Pierce County
Bridge Street Levee	RM 3.05 – RM 3.7, PL 84-99	Pierce County
Voight Downstream Revetment	RM 3.7 – RM 4.0	Pierce County
Voight Upstream Revetment	RM 4.0 – RM 4.4	Pierce County
Guy West Levee	RM 4.6 – RM 5.6, PL 84-99	Pierce County
Guy West Revetment	RM 5.6 – RM 5.95	Pierce County
Alward Segment No 2 Levee	RM 5.95 - RM 6.4, PL 84-99	Pierce County
Fish Ladder Revetment	RM6.35- RM 6.65	Pierce County
Alward Segment No 1 Levee	RM 6.55 – RM 8.26, PL 84-99	Pierce County
Alward Revetment	RM 8.26- RM 8.33	Pierce County

[a] RM = river mile; PL 84-99 = USACE Flood Control and Coastal Emergency Act
Source: Pierce County Surface Water Management records

5.7.5.1 Major Flooding

Page 5-157, first paragraph.

Revised text:

Major flooding of the Carbon River has been recorded occurred in 1933, 1959, 1977, 1990, 1996, 2006, 2008, and 2009 (see Table 5.35). The November 2006 flood is the largest on record, with a measured flow of 14,500 cfs. The categorization of major flooding is based on a threshold of discharges in excess of approximately 10,000 cfs at the Fairfax gauge.

Page 5-158, Table 5.35 Historical Major Flooding on Carbon River.

Revised text:

Table 5.35 Historical Major Flooding on Carbon River	
Date	**Carbon River Flows at Fairfax Gauge (cfs) – USGS #12094000[a]**
December 1933	11,000
November 1959	9,970
December 1977	10,000
November 1990	13,000

February 1996	12,000
December 1996	13,600
November 2006	14,500
November 2008	11,700
January 2009	11,300
December 2015	10,200

Note: There is a gap in the USGS record from 1977 to 1989
Source: Pierce County Surface Water Management and United States Geologic Survey records

5.7.5.2 Flood Damage to Facilities

Page 5-158, first paragraph.

Revised text:

Flood damages to Carbon River flood risk reduction facilities have been extensive in the past three ~~two~~ decades. Seven ~~Six~~ significant flood events have occurred along the study reach since 1990. Damages sustained ranged from full washout of the flood control structure over several hundred lineal feet to localized moderate scour and erosion. Damages from the major flood events resulted in approximately 244 ~~99~~ identified damage locations comprising ~~5.9~~12.5 miles of levees and revetments. Damages have been estimated at nearly $~~15~~ 17.34 million dollars (based on 2017~~0~~ dollars). Table 5.36 summarizes recorded levee and revetment ~~segments subject to the most significant and repetitive~~ damages. The upper portion of this Carbon River reach between RM 6.0 and RM 8.3 ~~incurred~~ has historically been the most vulnerable to repetitive damages requiring repair. ~~the most damage.~~ Examples of existing levees on the Carbon River are shown in Figure 5.52.

5.7.5.2 Flood Damage to Facilities

Page 5-158 through 5-160, Table 5.36 Damage to Facilities in the past 20 years along the Carbon River.

Deleted table

5.7.6.2 Land Purchases

Page 5-162, paragraph one.

Revised text:

A significant number of parcels and flood damaged homes have been purchased along the Carbon River since the 1991 ~~flood plan~~ Flood Plan was adopted.~~–~~ Acquisitions have been ~~mostly~~ focused on the Upper Carbon River between RM 6.4 & 8.3 in support of a future setback levee project planned along this reach. The objective of the project is to help resolve repetitive damages to the levee as well as reconnect historic floodplain that is currently cutoff by the existing levee.

5.7.6.3 Partnerships

Page 5-162, paragraph one.

Revised text:

As noted above, Pierce County has partnered with the Floodplains ~~by Design~~ for the Future program to bring in an estimated $600,000 in grant funds that have assisted with property acquisitions along the Carbon river. FEMA following disaster declarations #1671 and #1682 to purchase numerous flood damaged or repetitive loss properties resulting from the November 2006 flood. HMGP grants pay 75 percent of acquisition costs, with match of 12.5 percent from the State of Washington and 12.5 percent from Pierce County.

5.7.7 Flood and Channel Migration Hazard Mapping

5.7.7.1 Flood Hazard Mapping.

Page 5-162, paragraph one.

Revised text:

Flood hazard mapping for the Carbon River includes detailed flood studies (FEMA ~~/2009,~~ NHC 2006) and the creation of ~~preliminary~~ Digital Flood Insurance Rate Maps (DFIRM). The DFIRM maps were adopted in 2017. In order to publish the countywide Digital Flood Insurance Rate Maps (DFIRM) areas that were affected by non-accredited levees were "secluded" from the map update. This means that the Carbon river form the Puyallup River to South Prairie Creek still shows the same flood risk as it was understood in the 1970's. ~~As of the publication of this document FEMA has not issued new maps.~~ Flood prone areas in the City of Orting include; schools, ~~along the Carbon River include~~ residential and commercial lands. ~~, schools in the City of Orting, and agricultural land both upstream and downstream of Orting.~~ In unincorporated areas, agricultural and residential properties are in the flood prone areas. The ~~preliminary~~ FEMA/NHC 2006 flood study ~~DFIRM maps~~ for the Carbon River show 1,317 acres within the special flood hazard area or 100-year floodplain. The FEMA/NHC 2006 flood study is regulated as best available data by Pierce County and used as guidance by the City of Orting. The mapped deep and fast flowing area in unincorporated areas is 945 acres.

5.7.7.2 Channel Migration Hazard Mapping.

Page 5-162 to 5-163, paragraph one.

Revised text:

Severe, moderate, and low channel migration zones (CMZ) were mapped for the Carbon River (GeoEngineers 2003) and adopted in November 2004. The CMZ refers to the geographic area where a stream or river has been and is susceptible to channel erosion and/or channel occupation (WSDOE 2003). The severe CMZ covers an area of 999 acres in unincorporated areas along the Carbon River. Pierce County regulates severe CMZ mapped areas as floodway per Chapter 18E.70, Pierce County Code.

5.7.9 River Reach Management Strategies

Page 5-166, paragraph 2

Revised text:

In the near term, the primary objective for the Carbon River is to maintain the structural integrity of the levee and revetment system so the facilities continue to reduce risks to public health and safety and reduce ~~public and private property~~ damage to property and infrastructure. Another objective is to construct setback levees to increase the level of flood protection to the 100-year flood in the City of Orting. An additional~~The final~~ management strategy objective is to realize capital projects that enhance and create aquatic habitat through levee or revetment setbacks, riparian re-vegetation, and strategic placement of large woody material in addition to providing flood protection.

Page 5-166, Structural management strategies

Revised text:

Structural Management Strategies:

- RM 0.8 to RM 3.9 left bank – The "level of ~~protection~~service" goal for levees and flow conveyance should be the 100-year design ~~plus three feet of freeboard~~ in the City of Orting.
- RM 0.0 to RM 0.8 left bank; RM 3.9 to RM 8.4 left bank; RM 0.0 to RM 1.3 right bank; and RM 5.9 to RM 7.0 right bank – The "Level of service" goal for levees should be to maintain the existing levee prism.

5.7.10 Recommended Capital Projects

Page 5-169, C2 Carbon Levee Bank Stabilization / Flow Deflection and Coplar Creek Backwater Improvements.

Revised text:

5.7.10.1 C2 Carbon Levee Bank Stabilization / Flow Deflection and Cheese~~oplar~~ Creek Backwater Improvements

5.7.10.3 C3 Alward Road Floodplain Acquisition

Page 5-171, Figure 5.55.

Revised text:

Figure 5.55 – Air photo of SR 162 and Foot Hills Trail bridges over the ~~Puyallup~~ Carbon River

5.7.10.4 C4 Alward Road Floodplain Acquisition and Setback Levee

Page 5-173, River Mile.

Revised text:

River Mile: 6.4 – 8.4~~8~~, Left Bank

Page 5-174, What are the Project Benefits?

Revised text:

- Reconnection of ~~1,175~~ 142 acres of riparian floodplain to the Carbon River,

5.8 SOUTH PRAIRIE CREEK

5.8.5.1 Major Flooding

Page 5-183, paragraph 2.

Revised text:

Major flooding occurred in the South Prairie Creek in 1955, 1965, 1990, 1996, 2006, and 2009 (see Table 5.40). The January 2009 flood is the largest on record, with a measured flow of 9,480 cfs, exceeding ~~close to~~ the 100-year flood flow of 8~~9~~,700 cfs estimated by FEMA (FEMA/ ~~2009,~~ NHC 2006). Since the plan was adopted in 2013, there has been no major flooding in this reach.

5.8.5.2 Flood Damage to Facilities

Page 5-184, paragraph 2.

Revised text:

~~Records show that i~~In 1996 South Prairie Creek jumped the right bank and washed out South Prairie Road near 246th Avenue East and did the same, further downstream at Spring Site Road. Road reconstruction, bank stabilization, and an armored overflow flood re-entry channel repaired the flood damage.

5.8.6.3 Partnerships

Page 5-185, paragraph 1.

Additional text:

Inglin Dairy had the most potential for restoring floodplain connectivity and for creating habitat. Natural Systems Design was selected as the consultant to develop a restoration plan for Inglin Dairy. The objective of the project is to construct a side channel to the north, raise the mainstem of South Prairie Creek using 4 channel spanning structures that would encourage bed aggradation. Woody debris jams would also be constructed throughout the side channel and floodplain areas and an aggressive riparian/floodplain planting plan would be developed and implemented by the Pierce Conservation District. The work for this project is scheduled to be done over two construction seasons (2018 and 2019), depending on permitting. Additional partners on this project is the South Puget Sound Enhancement Group and the Puyallup Tribe of Indians.

5.8.7 Flood and Channel Migration Hazard Mapping

5.8.7.1 Flood Hazard Mapping

Page 5-185, paragraph 1.

Revised text:

Hazard mapping along South Prairie Creek includes detailed flood studies (FEMA /~~2009~~, NHC 2006) that was incorporated into the ~~and the creation of preliminary~~ Digital Flood Insurance Rate Maps (DFIRM 2017)~~, which as of the publication of this document had not been issued by FEMA~~. Flood prone areas along South Prairie Creek include rural residential land, agricultural and recreational land, and limited areas in the Town of South Prairie. The DFIRM maps for South Prairie Creek within the study area show 469 acres within the special flood hazard area or 100-year floodplain. The mapped deep and fast flowing area is 247 acres.

5.8.7.2 Channel Migration Hazard Mapping

Page 5-185, paragraph 2.

Revised text:

Severe, moderate and low channel migration potential areas (MPAs) were delineated for South Prairie Creek ~~in 2005~~ (Geo Engineers 2005). The CMZ refers to the geographic area where a stream or river has been located and is susceptible to channel erosion and/or channel occupation (WSDOE 2003). The severe CMZ covers an area of 183 acres along South Prairie Creek. Pierce County regulates severe CMZ mapped areas as floodway per Chapter 18E~~.70~~ and adopted the~~,~~ ~~Pierce County Code, but the~~ South Prairie Creek CMZ in 2017.~~map has not yet been adopted~~.

5.9 MIDDLE NISQUALLY RIVER – MCKENNA AREA

5.9.1 Overview

Page 5-193, paragraph 2.

Revised text:

The drainage area to the USGS gauge on the Nisqually River at McKenna is 517 square miles. The middle Nisqually River at McKenna forms the boundary between Pierce County and Thurston County. Flood risk on this reach is predominately in Thurston and Lewis County, as most of the Pierce County area is on high bank of the river. The focus of this reach is from approximately RM 21.3 to RM 26.0, where the 100-year floodplain is up to 2900 feet wide, and where substantial flooding occurred in the McKenna area during the February 1996 flood event. Land use in the McKenna vicinity consists of medium-density residential, rural residential and agriculture and pasture lands. There are also extensive lakes and wetlands in the surrounding area. Salmonid use in this reach of the Nisqually River includes fall Chinook, coho, chum and pink salmon and winter steelhead trout.

5.9.2 Geology and Geomorphology

Page 5-193, paragraph 1, second sentence.

Revised text:

In the lower half of this reach where the valley is over 2000 feet wide on average, several remnant historical channels are still visible throughout the historical channel migration zone (Nisqually Basin Plan 2014~~08~~).

5.9.3 Hydrology and Hydraulics

Page 5-196, paragraph 1, third sentence.

Revised text:

There are two dams on the Nisqually River LaGrande Dam at RM 42.4 and Alder Dam at RM 44.2 which forms the 3,000-acre Alder Lake. The two dams are part of the Nisqually hydroelectric project owned and operated by Tacoma Power which is part of Tacoma Public Utilities. According to Tacoma Power, the dams provide incidental attenuation of floods, but their Federal Energy Regulatory Commission (FERC) operating agreement and license has no flood control requirements (Nisqually Basin Plan, 2014~~08~~).

5.9.7 Flood and Channel Migration Hazard Mapping

5.9.7.1 Flood Hazard Mapping

Page 5-199, paragraph 1.

Revised text:

Flood hazard mapping in the middle Nisqually River was stripped of detailed flood information that was proven to understate flood risk after the 1996 flood. ~~includes the flood insurance study from 1987 (FEMA 1987).~~ Many of the destroyed properties purchased after the 1996 flood were shown to be outside the Special Flood Hazard Area. A new flood study, in collaboration with Thurston County, was started ~~for this reach~~ in 2011 and has just resumed with new funding in 2017. The new study, funded under RiskMAP, will provide base flood elevation and floodway assessments. Completion of this project is expected by 2020. ~~The data on which that study was based is over 25 years old, and does not include the record 1996 flood.~~ Due to low density in this reach, flood prone areas are limited to sparse residential areas outside of McKenna and some commercial buildings and agricultural uses~~Flood prone areas along the middle Puyallup Nisqually in Pierce County include residential land in McKenna, a few commercial buildings, and State Route 507. Upstream there is low density residential, agricultural and forest land use.~~ The ~~1987~~ DFIRM maps for the middle Nisqually River show 886 acres within the special flood hazard area or 100-year floodplain. ~~Many of the destroyed properties purchased after the 1996 flood were not shown to be within the Special Flood Hazard Area on the 1987 FIRM maps.~~ Deep and fast flowing areas have not been mapped for this reach.

Page 5-201, Non-structural management strategy, below second bullet.

Additional text:

For additional information regarding the Nisqually River, please refer to the 2013 Thurston County Flood Hazard Management Plan: http://www.co.thurston.wa.us/planning/natural-res/docs/flood-plan.pdf

2017 Thurston County Flood Plan: https://www.trpc.org/DocumentCenter/View/4775

5.9.10 Recommended Capital Projects

Page 5-202, Basin Plan.

Revised text:

Basin Plan: Nisqually Adopted January 2012 ~~(to be adopted)~~

5.10 UPPER NISQUALLY RIVER

5.10.2 Geology and Geomorphology

Page 5-208, Figure 5.69.

Reversed pictures to match caption:





5.10.5 River Management Facilities, Flooding and Flood Damage

Page 5-210, Table 5.46 Levees and Revetments on the Upper Nisqually.

Revised text:

Table 5.46 Levees and Revetments on the Upper Nisqually River		
Name	**Location**	**Ownership**
Right Bank		

Nisqually Park Levee	RM 64.5~~67.6~~ – RM 65.4~~68.4~~	Pierce County

[a] RM = river mile; RB = right bank
Source: Pierce County Surface Water Management records

5.10.5.1 Major Flooding

Page 5-210, paragraph one.

Revised text:

Since the USGS gauge was installed in 1942, major flooding has been recorded occurred in the upper Nisqually River in 1974, 1977, 1990, 1996, 2006, and 2008 (see Table 5.47). The February 1996 and November 2006 floods both exceeded 21,000 cfs, and were similar in magnitude to the estimated 1.0 percent annual chance flood (100-year) of 21,950 cfs estimated by Pierce County SWM. The categorization of major flooding is based on a ~~threshold of~~ discharge greater than ~~s in excess of~~ 15~~3~~,000 cfs for the Nisqually River gauge near National, Washington.

Page 5-211, Table 5.47 Historical Major Flooding on Nisqually River.

Revised text:

Table 5.47 Historical Major Flooding on Nisqually River

Date[a]	Nisqually River Flows at National Gauge (cfs) – USGS #12082500
January 1974	**15,000**
December 1975~~January 1974~~	~~15,000~~13,200
January 1974	15,000
December 1977	17,100
January 1990	14,500
February 1996	21,200
November 2006	21,800
November 2008	13,900
January 2009	13,200
December 2015	16,700

[a]Period of record is 1941 – 2010
Source: United States Geologic Survey records

5.10.5.2 Flood Damage to Facilities

Page 5-211, paragraph one.

Revised text:

The only flood control structure Pierce County owns on this reach is the Nisqually Park Entrance levee that extends into Mount Rainier National Park which protects the highway. Due to the high energy of the Nisqually River, the levee is consistently being repaired for loss of face and toe rock that has eroded away. In November 2006, Mt. Rainier experienced a record breaking rain event resulting in severe flood damages throughout the National Park. Eighteen inches of rain fell in 36 hours near Paradise. One of the hardest hit areas was near the Nisqually entrance at the Sunshine Point Campground. More than 1,000 linear feet of ~~river bank revetment and~~ levee ~~providing protection to the Nisqually park entrance and downstream residences~~ was washed away (see Figures 5.71 and 5.72).

Page 5-212, Figure 5.71.

Revised text:

Figure 5.71 - (a) June 30, 2006 aerial photo of Sunshine Point area prior to flood damage (RM 65.5- 65.6), and (b) after repair of revetment and levee following November 2006 flood event

Page 5-212, Figure 5.72.

Revised text:

Figure 5.72 - Aerial photo of Sunshine Point damage area along the upper Nisqually River after November 2006 flood event (RM 65.5-65.6)

Page 5-213, Table 5.48 Damage to Facilities on the past 20 years along the Upper Nisqually River.

Delete table.

5.10.6 Key Accomplishments since the 1991 Flood Plan

5.10.6.1 Major Projects

Page 5-213, paragraph one.

Revised text:

As noted above, flood damages to the Nisqually Park levee have been quite extensive in the past three ~~two~~ decades. Damaged portions of the levee needed repair in 1991, 1992, 1993, 1995, 1996, 2003, 2004, 2005, 2006, 2010~~09~~, and 2011, 2012, and 2017 (see Table 5.49 for total repair costs).

Page 5-214, Table 5.49 Damage Repair Costs to Nisqually Park Levee.

Revised text:

Table 5.49 Damage Repair Costs to Nisqually Park Levee

Year	Repair Costs (Pierce County)	Repair Costs (Corps of Engineers)
1991	$74,610	

Table 5.49 Damage Repair Costs to Nisqually Park Levee		
Year	**Repair Costs (Pierce County)**	**Repair Costs (Corps of Engineers)**
1992	$142,718	
1993	$217,000	
1995	$50,000	$200,000
1996	$50,000	$200,000
2003	$122,500	
2004	$203,000	
2005	$131,000	
2006	$900,760	
2010	$529,500	
2011	$185,682	$752,529~~$928,400~~
2012	$783,185	
2017	$243,440	$973,760
Total	$2,421,088	$1,328,400
Total Cost = $~~3,749,488~~ 5,759,684 (inflation adjusted = $~~4.6~~ 7.09 million)		

Source: Pierce County Surface Water Management records

5.10.7 Flood and Channel Migration Hazard Mapping

5.10.7.1 Flood Hazard Mapping.

Page 5-215, paragraph one.

Revised text:

Hazard mapping in the upper Nisqually River shows an unstudied Zone A SFHA on the old and recently updated FIRM. ~~includes the flood insurance study from 1987 (FEMA 1987). The data on which that study was based is over 25 years old, and does not include the two largest floods of record which occurred in November 1996 and October 2006.~~ Flood prone areas along the upper Nisqually include low- and medium-density residential land, limited commercial areas, and floodplain forests. The ~~1987~~ FIRM maps for the upper Nisqually River show 1,114 acres within the special flood hazard area or 100-year floodplain. Deep and fast flowing areas have not been mapped for this reach.

5.10.7.2 Channel Migration Hazard Mapping.

Page 5-215, paragraph one.

Revised text:

Severe and moderate channel migration zones (CMZ) were mapped for the upper Nisqually River (GeoEngineers 2007). The CMZ refers to the geographic area where a stream or river has been or ~~and~~ is susceptible to channel erosion or channel occupation (WSDOE 2003). The severe CMZ covers an area of 1,830 acres along the upper Nisqually River. Pierce County regulates severe CMZ mapped areas as floodway per Chapter 18E.70, Pierce County Code, ~~but~~ the severe CMZ map was ~~has not been~~ adopted for the upper Nisqually area in 2017.

5.10.8 Problem Identification

Page 5-215, paragraph one.

Additional text:

The primary hazard on the Nisqually ~~r~~River is erosion rather than inundation. Erosion continues to cause damage to levees, bridges, and roadways. It is also the primary flood related risk to residential structures within the floodplain. The few residential communities are built on terraces above the floodplain and the larger lots typically have developable areas above the flood hazard. ~~On the other hand, erosion continues to cause damage to levees, bridges, and roadways. It is also the primary flood related risk to residential structures.~~ Table 5.50 includes the flooding and channel migration problems identified in the upper Nisqually River floodplain. For more detail on these problems, see Appendix G.

Page 5-217, Figure 5.74.

Revised text:

Figure 5.74 - Channel migration near RM 62.0~~at~~ Alpine Village threatens homes and property (2009)

5.10.9 River Reach Management Strategies

Page 5-217, second bullet.

Revised text:

- **River management facilities** – There is a single levee and revetment at the entrance to Mt. Rainier National Park and along State Route 706 and the Nisqually Park subdivision on the right bank (RM 64.5~~3~~ to RM 65.4~~3~~). There is also armoring at bridge crossings and near the community of Elbe.

Structural management strategy:

Page 5-217, first, second, and third bullets.

Revised text:

- RM 50.2 to RM 61~~4~~.7~~2~~ – Tacoma Power, Tacoma Rail and Kernahan Bridge revetment protection (channel migration resistance design),
- RM 64.5~~3~~ to RM 65.1 right bank – "Level of ~~protection~~ Service" goal for the Nisqually Park levee should be to maintain the existing levee prism, and

- RM 65.1 to RM 65.43 right bank – "Level of Service" goal for the Mt. Rainier National Park entrance revetment is the channel migration prevention design.

5.10.10 Recommended Capital Projects

5.10.10.1 UN1 Nisqually Park Subdivision Levee Protection

Page 5-219, River Mile.

Revised text:

River Mile: 64.53 – 654.19, Right Bank

5.10.10.2 UN2 Upper Nisqually/Mt. Rainier National Park Revetment Retrofit/ ELJs

Page 5-221, River Mile.

Revised text:

River Mile: 64.53 – 654.19, Right Bank

5.11 MASHEL RIVER

5.11.1 Overview

Page 5-223, paragraph one.

Revised text:

The Mashel River sub basin, covering about 85 square miles, is higher in elevation and steeper than most other tributaries to the Nisqually River. Over 40 percent of the basin has slopes greater than 30 percent (Nisqually Basin Plan 20142008). Major tributaries of the Mashel River are the Little Mashel River, Beaver Creek, and Busy Wild Creek. Elevations range from 460 feet at the mouth to 4,845 feet on the flanks of Mount Rainier. The Mashel River winds through a steep, sinuous canyon as it approaches the Nisqually River, where it enters at approximately RM 39.6.

5.11.2 Geology and Geomorphology

Page 5-223, paragraph one, last sentence.

Revised text:

The channel bed material is typically cobbles and large gravel with some bedrock outcrops (Nisqually Basin Plan 2014 2008).

5.11.6 Key Accomplishments since the 1991 Flood Plan

5.11.6.1 Major Projects

Page 5-229, paragraph one.

Revised text:

~~Since the *1991 Puyallup River Comprehensive Flood Control Management Plan* was completed, Pierce County has carried out an annual program that includes maintenance and repair of facilities.~~ Specific capital projects are listed below:

Page 5-229, bullet one.

Revised Text:

1. **Mashel River Restoration Project (Nisqually Indian Tribe)**

   Numerous engineered log jam structures have and will be installed in a multiphase project to rehabilitate degraded in-stream and riparian habitat to restore geomorphic and ecological functions beneficial to native salmonid species. An example of these ELJs is located on the right bank of the Mashel River, upstream of the State Route 161 crossing (see Figure 5.80~~37~~)

Page 5-230, paragraph one.

Revised text:

Flood hazard mapping along the Mashel River includes detailed flood studies (FEMA/~~ and~~ NHC 2006) and the creation of preliminary Digital Flood Insurance Rate Maps (DFIRM). As of the publication of this document the DFRIM maps have not been issued by FEMA.

5.11.10.1 M1 – SR-161 Mashel River Bridge – Bridge Scour and Slope Repair Project

Page 5-233, second bullet.

Revised text:

- State Route 161 is at risk of future damage from bank erosion from high flows that result in highway closures, and

CHAPTER SIX
FLOOD PLAN IMPLEMENTATION AND FUNDING

6.1.1 Pierce County Role in Implementation

Page 6-2, paragraph one, first sentence.

Revised text:

The Pierce County Rivers Flood Hazard Management Plan will be adopted by reference as part of Pierce County Code, Title 19D.~~60~~, as well as other comprehensive planning documents and the Pierce County Storm Drainage and Surface Water Management Plan.

Page 6-2, paragraph two.

Revised text:

Since the adoption of the plan, ~~After adoption of the Plan,~~ SWM has ~~will~~ identifiedy the capital improvement projects in the Plan to add to the Capital Facilities Element of the Comprehensive Plan (CFP). The CFP is updated annually and includes projects capital expenses over six years. Typically, annual budgets reflect the adopted CFP. Pierce County will seek to partner with local governments on capital projects and maintenance and operations of flood risk reduction facilities in incorporated areas. For additional information on the CFP for 2018-2023, please ~~refer to the below link~~ visit: http://www.co.pierce.wa.us/ArchiveCenter/ViewFile/Item/5814

6.2.1.1 Current Funding

Page 6-6, paragraph one, first sentence.

Revised text:

Current sources of funding include the Pierce County's Surface Water Management Fund collected from citizens and business in unincorporated Pierce County, a portion of the Real Estate Excise Tax, and occasional designated federal and state funds that are limited and conditionally available in declared flood disasters, and through grants.

Page 6-7, fifth and sixth bullet.

Revised text:

- Federal Emergency Management Agency (FEMA),
  - Hazard Mitigation Grant Program (HMGP)
  - Pre-Disaster Mitigation (PDM)
  - Flood Mitigation Assistance (FMA)
  - ~~Repetitive Flood Claims (RFC)~~
  - ~~Severe Repetitive Loss (SRL)~~

Page 6-7, twelfth bullet.

- State of Washington Department of Ecology (WDOE)
  - Flood Control Assistance Account Program (FCAAP)
  - Floodplains by Design (FbD)

Page 6-7, bullets fifteen through seventeen.

  - Salmon Recovery Fund Board (SRFB)
  - Puget Sound Acquisition and Restoration Fund (PSAR)
  - Puget sound Acquisition and Restoration Fund Large Capital Projects (PSAR Large Cap)

6.2.1.2 Potential New and Enhanced Local Funding Options

Flood Control Zone District Levy or Fee

Page 6-8, paragraph one.

Additional text:

RCW 86.15.025 gives the Pierce County Council the authority to establish either countywide or basin-level flood control zone districts (FCZD) that create additional opportunities for new, dedicated funding sources. A FCZD is a special purpose district (government agency) established to specifically address flooding issues. The purpose of the FCZD is to construct, operate, and maintain flood control projects to reduce flooding and channel migration risks. Funding for a FCZD can be initiated through a levy based on total assessed value of taxable property within the district's designated boundaries or through the imposition of fees. The District tax levy under state law may not exceed 50 cents per thousand dollars of assessed value. Due to potential levy suppression issues as a junior taxing district, the District may not exceed 25 cents per thousand of assessed value. Since the District's formation the property tax levy for the flood control zone has not exceeded 10 cents per thousand.