

Assessing King County's
development in FEMA Floodplains
for compliance with
the
Endangered Species Act

by

Gino Lucchetti, Senior Ecologist, King County DNRP

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Why?

To maintain eligibility for flood insurance under FEMA's National Flood Insurance Program (NFIP)

What is the NFIP?

A partnership between the federal, state and local governments and tribes to:

- Transfer the costs of flooding to occupants of flood hazard areas and
- Reduce the cost to the federal government of flood-related disasters.

Local Government Roles

- Adopt floodplain management ordinances that comply with Federal/State laws.
- Issue or deny development/building permits.
- Inspect development and maintain records
- Community Rating System (CRS) rewards better floodplain management programs

** “King County was the first county to achieve a class 2 rating!!!”*

NFIP meets ESA

- ❑ 2003 - NWF Sued FEMA for failure to comply with ESA in the Puget Sound
- ❑ 2004 – Court Ruled that FEMA must consult with NMFS
- ❑ 2006 - FEMA provided a Biological Assessment that concluded NFIP may affect but not adversely
- ❑ September 2008 -NMFS issued Biological Opinion with Jeopardy/ Adverse Modification
- ❑ September 21, 2011 – King County and other local jurisdictions required to comply with BiOp

BiOp Three Options (“Doors”)

1. Adopt model ordinance,
- 2.a. Checklist and accompanying narrative,
- 2.b. Programmatic assessment of the effects of implementing its regulations and other programs that affect floodplain habitats; or
3. Permit by permit assessment

Model Ordinance

Key Issues :

- Buffers - 250 feet along freshwater shorelines of the state and a 200 feet buffer on fish bearing streams wider than 5 feet & not Shorelines of the State where KC requires 165 feet buffer; and
- “65/10” Clearing Standard— retention of 65 percent native vegetation and not more than 10 percent effective impervious.

Model Ordinance NOT adopted because...

- King County recently (2005) increased buffers substantially based on best available science (KC BAS and PHA Appendix A), and
- Clearing standards not being implemented due to WA Appeals Court Ruling (Note: stormwater BMPs are strong incentive for landowners to protect significant native vegetation forest.)

Permit by Permit not adopted because...

- High technical and administrative complexities
- High costs to landowners and the County, and
- Low or no added value to improved understanding of floodplain and salmon recovery issues.

Programmatic Habitat Assessment (PHA)

- Apply the Matrix of Pathways and Indicators (NMFS 1998) for making Endangered Species Act Effects Determinations (20 habitat parameters)
- Comprehensively assess combined net effect of future development (“bad things”) and protection and restoration actions (“good things”) affecting floodplains.
- Land Use and Land Cover Change – compare current and future (full build-out) development based on zoning and allowed land uses.
- Reasonable Use Exception (RUE) - estimate the number, area of impact and locations when development may be allowed in buffers to protect property rights. (Note: RUEs require full mitigation)
- For each parameter, determine if conditions will :
 - degrade,
 - stay the same, or
 - improve
- To conclude “no adverse effect” must show condition of all variables will stay the same or improve relative to current condition. The ESA standard is a different and, typically, more restrictive standard than Washington State’s “no net loss.”

Added value of the PHA approach:

- Comprehensive (detailed, spatially-explicit) view of the effects of the County's land uses on ESA species and habitats,
- land use and land cover database for use in floodplain management and salmon recovery
- Readily updatable framework for assessing change over time.

Assessment of Land Use & Land Cover

Key Questions

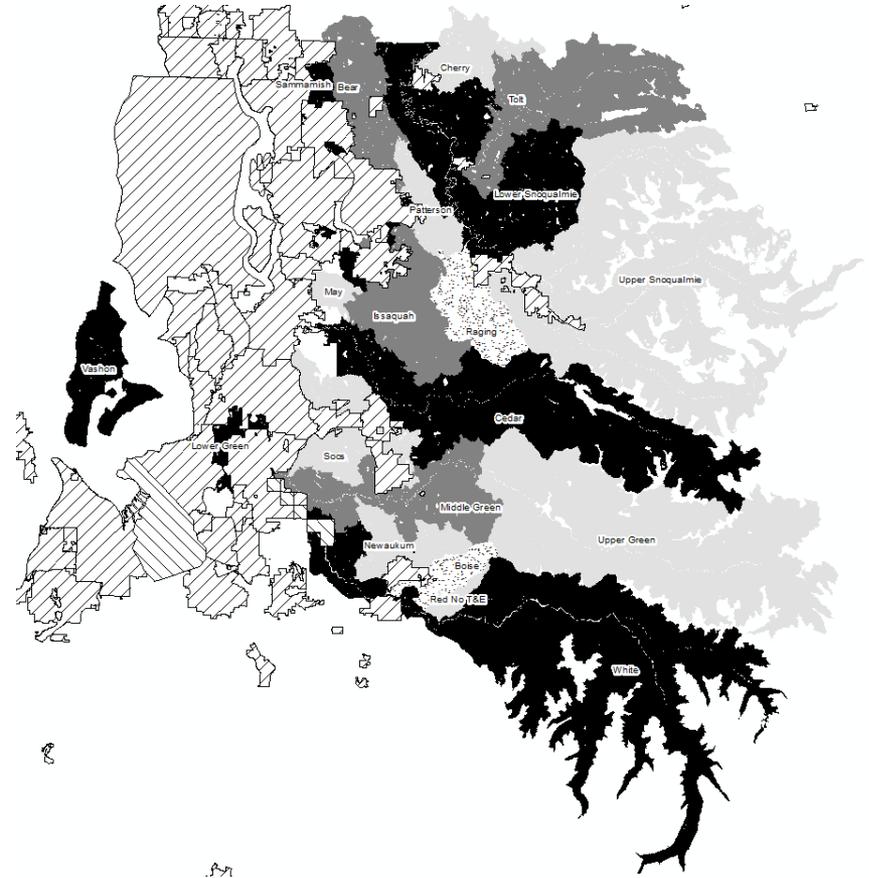
- Land Cover Change
 - What is Net Change (= Future – Current)?
 - Where? What floodplains most susceptible?
- Reasonable Use Exceptions
 - How many times will buffers need be impacted to meet property rights?
 - How much area affected under worst case?
- Watershed-scale Forest Cover & Effective Impervious Area*
 - What is watershed-scale land cover context for floodplains?
 - How compares with putative “65/10” standard?

*Not covered in this presentation

Unincorporated Floodplain Areas Assessed

Six Major Areas and Eighteen Sub-Areas

1. Lower Snoqualmie River and five sub-areas:
 - Lower Snoqualmie,
 - Tolt and Raging Rivers and
 - Patterson and Cherry Creeks.
2. Sammamish River, and three sub-areas:
 - Sammamish River and
 - Issaquah and Big Bear Creeks.
3. Cedar River, and two sub-areas:
 - Cedar River and
 - May Creek (a Lake Washington tributary).
4. Green River, and five sub-areas:
 - the Lower, Middle and Upper Green River and
 - Soos and Newaukum Creeks.
5. White River, including two sub-areas:
 - the White River and
 - Boise Creek sub-area.
6. Vashon-Maury Island - VMI has small amounts of floodplain on Shinglemill, Christianson, Fisher, Judd, Tahlequah and Raab's Lagoon Creeks. VMI floodplain narrower than KC Buffers.



* Floodplains above falls on Snoqualmie and SF Skykomish Rivers and Red Creek (White River tributary) were not assessed because listed species are absent or the potential for new development in floodplains under King County jurisdiction is very small.

Floodplain Land Use and Zoning

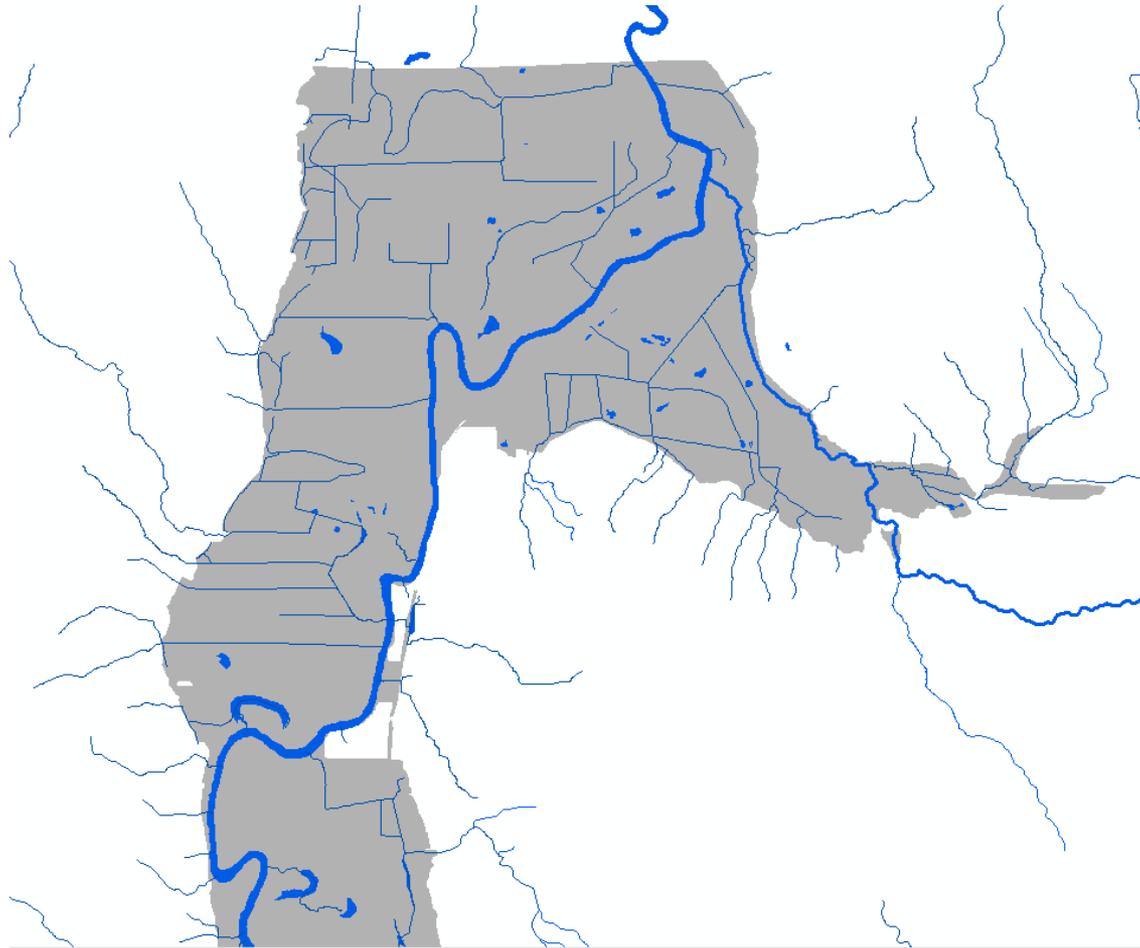
Zoning Designations	Density Allowed	Acres in Floodplain	% of total King County floodplain
RURAL AREA			
RA-2.5 - Rural Area	5 acres per lot (NOT 2.5)	1,189.94	3.53%
RA-5 – Rural Area	5 acres per lot or 10 acres per lot if located in SDO	4,039.86	11.99%
RA-10 – Rural Area	10 acres per lot	4,815.76	14.29%
	Total	10,045.56	29.81%
RESOURCES LANDS			
A-10 or A-35 - Agricultural	10 acres per lot or 35 acres per lot	17,323.84	51.41%
F – Forest	80 acres per lot	2,120.53	6.29%
M – Mining	residential not allowed	21.15	0.06%
	Total	19,465.52	57.77%
URBAN AREA			
UR – Urban Reserve	5 acres per lot	915.09	2.72%
R-1, R-4, R-6, R-8, R-12 Residential & NB – Neighborhood Business	1 – 12 dwelling units per acre	925.18	2.73%
CB – Community Business	18 dwelling units per acre	6.52	0.02%
RB – Regional Business & O – Office	36 dwelling units per acre (incentives or TDR)	0.35	0.00%
I – Industrial	residential not allowed	288.84	0.86%
	Total	2,136.57	6.34%
No designation	general non-buildable	2,048.24	6.08%
Total		33,695.89	100.00%

BiOp vs King County Protected Areas

Floodplain Regulatory Element	BiOp	KC
Floodway	Same	Same
Channel Migration Zone	CMZ +50 ft or, if no mapped CMZ, entire floodplain	CMZ only
Buffers:		
•Type S – streams that are Shorelines of the State	250'	165'
•Type F - fish bearing streams > 5 feet wide	200'	165'
•Type N – streams < 5-feet wide, non- fish-bearing, lake and marine shorelines	150'	165'

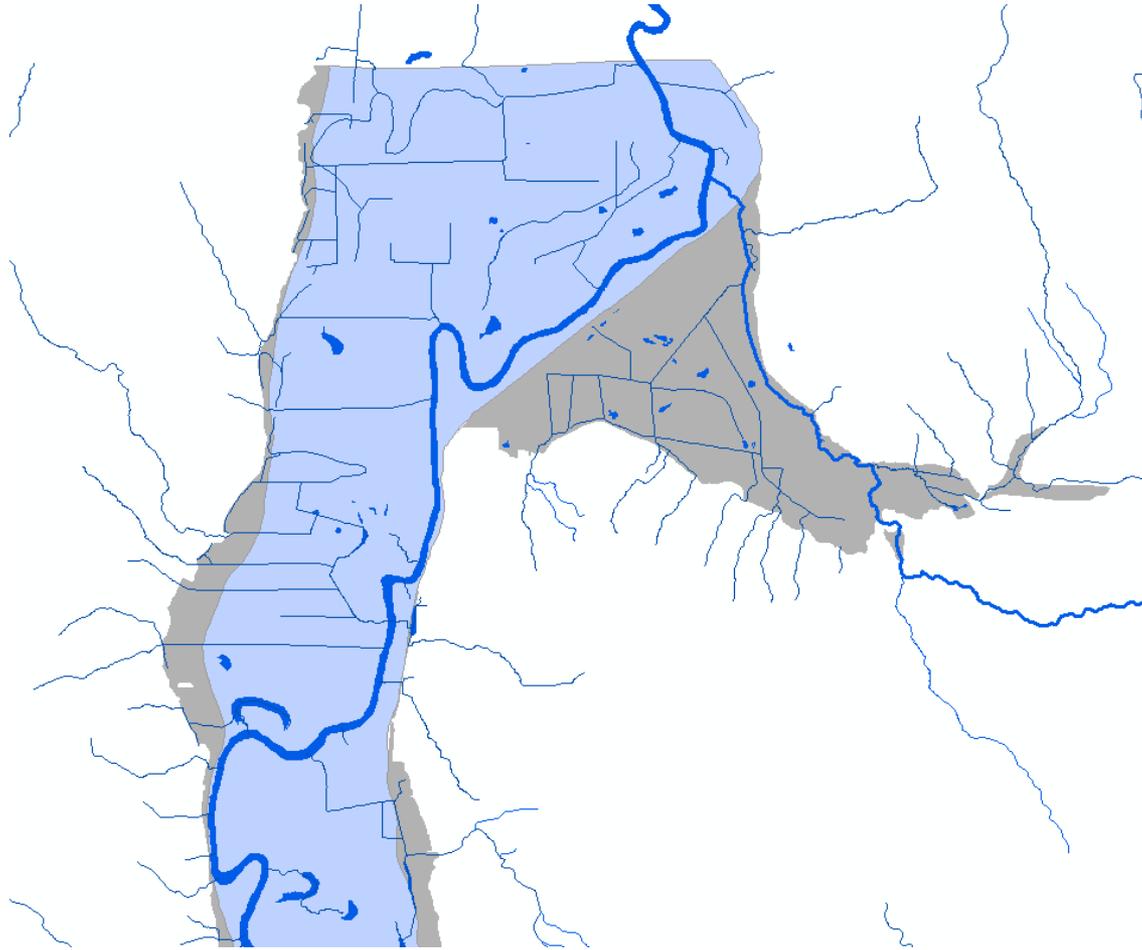
Floodplain-ology

...the mapped FEMA floodplain

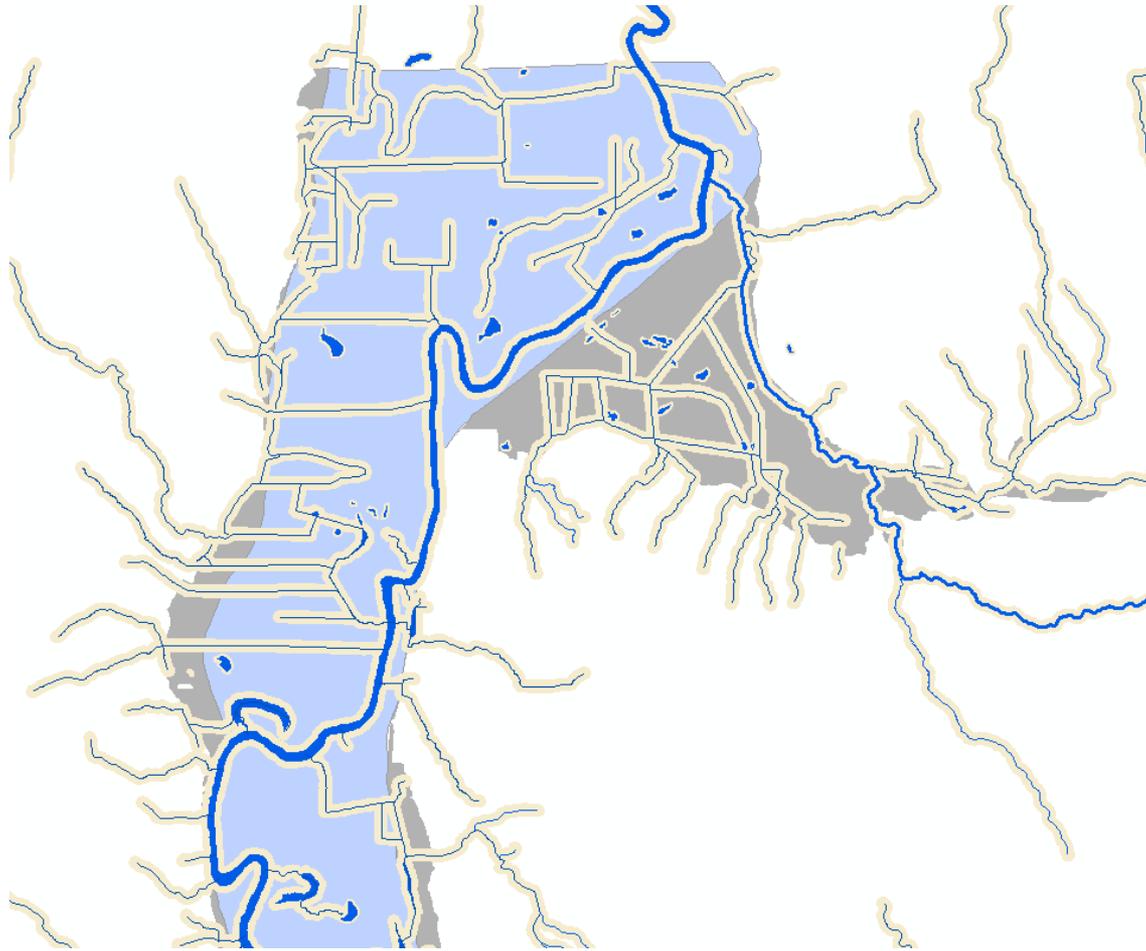


The Floodway

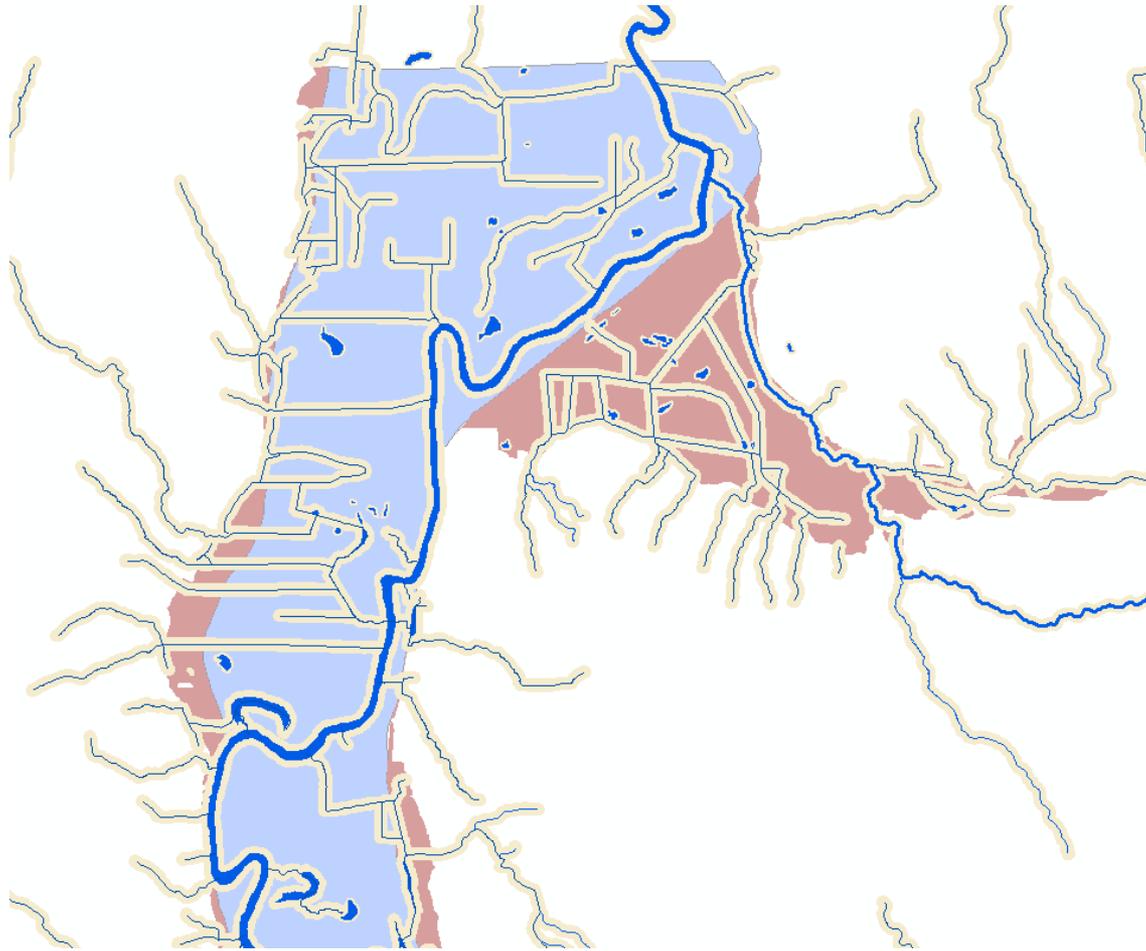
(severe and moderate channel migrations zones may be present, but currently mapped only for the Tolt, Raging and Middle Green Rivers)



King County Buffers



Delta Area = BiOp - KC



Estimating Current Condition

First, constructed database of parcels, land covers and floodway regulatory extents.

Then, for each parcel in each sub-area...

- Estimated current forest cover and total impervious area (TIA) - 2006 National Land Cover database (NLCD)
- TIA converted to EIA (Dinicola 1990)
 - Rural EIA = TIA X 0.4
 - Urban EIA = TIA X 0.8
- Rural EIA likely overstated:
 - Used Dinicola's "low density development" of one unit per two to five acres vs 5 to 10 acre zoning, and
 - Floodplains are flat

Estimating Future Condition

What's Left to be Developed?

What's Not?

...Agricultural Lands –

- All or vast majority of farmable land converted long ago;
- Almost all are within APDs with little or no chance for conversion to more impacting alternative;
- Therefore, assumed **no change** in agricultural land covers.
- ~ 51% of total floodplain area

Assessing Parcel Development Status -

Step 1: Identify all parcels with FEMA floodplain (8,980) and Floodplain Delta (5,486)

Step 2: Remove parcels above barriers on Snoqualmie, SF Skykomish and Red Creek (1,928), on tribal lands (12) and duplicate records (49)

Step 3: Identify permanent open space (POS) parcels (838)

Step 4: From KC Assessor database, screen for parcels with < \$10,000 improvements , the criterion for “developed” under the FEMA Community Rating System.

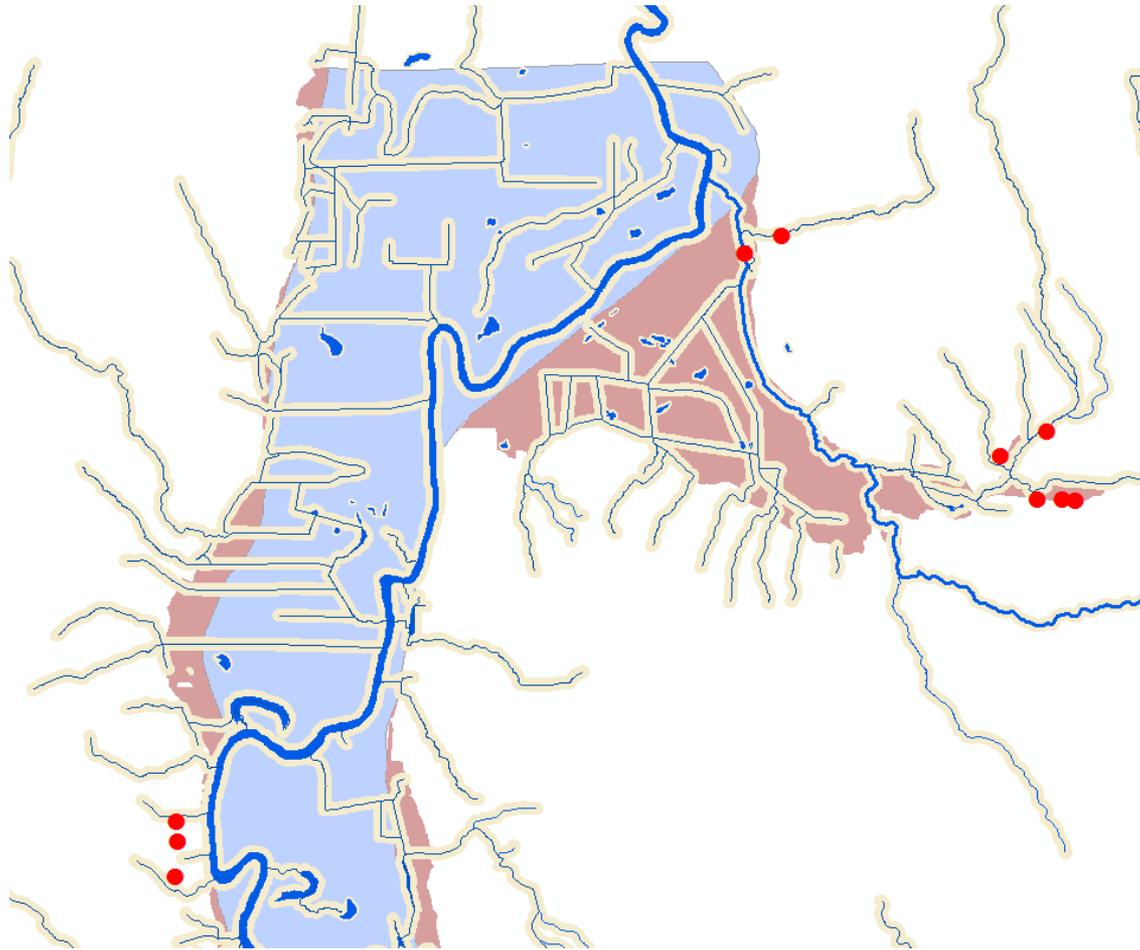
Step 5: Orthophoto review found many parcels meeting Step 4 criterion were in fact developed with complete houses or clearing, buildings and roads that appeared equal to a SFR’s worth of development footprint, so...

Step 6: Orthophotos used to individually assess 2,275 parcels (out of 8,980) meeting Step 4 criterion to remove parcels:

- a) already developed (548),
- b) in-water, on gravel bars and beaches (59),
- c) with very small amounts of floodplain (349),
- d) with insufficient area to build house, septic and water systems outside the severe CMZ and floodway (802), and
- e) expected to annex to a city (1)

Step 7: On parcels with development potential in the floodplain (516) and parcels designated as POS estimate current forest and impervious land covers from 2006 NLCD and compare with projected future forest and impervious land covers using future scenarios.

Undeveloped parcels with development potential in the floodplain



Modeling the future

Throughout...

- Future condition uncertain,
- ESA requires precautionary approach
- Therefore, to minimize potential for Type II Error – *predict no effect when, in fact, there is an effect:*
 - **somewhat overstate the potential for bad** (loss of forest cover, increase in impervious), and
 - **somewhat understate the potential for good** (increase in forest cover, loss of impervious).

Estimating Potential for Good Changes

- Considered only permanent open space (POS) parcels designated as of summer 2011 – did not estimate value of future acquisitions
- Many POS parcels recently acquired and undergoing restoration
 - Active restoration - removal of existing development & tree planting, e.g., Chinook Bend on Snoqualmie River and Rainbow Bend on Cedar River, or
 - Passive restoration – letting trees grow, especially in buffers and floodplains
- Scenarios for POS parcels:
 - If Forest Cover > 50%, assume no change
 - If Forest Cover < 50%, raise to 50%
 - No change or credit for removal of impervious

Estimating Potential for Bad Changes – Future Condition Scenarios for Undeveloped Parcels by Zoning (If $< X$, raise to X . If $>$ or $= X$, no change.)

Potential future TIA

- Urban Small (< 0.25 acre) parcels: Future TIA = 90% of parcel area. Where current TIA is $<$ 90% of parcel area, compute and show difference in area as TIA increase. Where current TIA is \geq 90% of parcel area, use current TIA as future TIA (i.e., no change).
- Urban Medium and Large (> 0.25 acre) parcels: Future TIA = 75% of parcel area. Where current TIA is $<$ 75% of parcel area, compute and show difference in area between current and future area as TIA increase. Where current TIA is \geq 75% of parcel area, use current TIA as future TIA (i.e., no change).
- Rural and Forest Small ($<$ or $= 1$ acre) parcels: Future TIA = 7,000 sf TIA (=5,000 sf development footprint + 2,000 sf roads and other). Where current TIA is $<$ 7,000 sf, compute and show difference between current and future area as TIA increase. Where current TIA is \geq 7,000 TIA, use current TIA as future TIA (i.e., no change).
- Rural and Forest Medium (> 1 acre, ≤ 10 acre) parcels: Future TIA = 7,500 TIA (=5,000 sf development footprint + 2,500 sf roads and other). Where current TIA is $<$ 7,500 sf, compute and show difference between current and future area as TIA increase. Where current TIA is \geq 7,500 TIA, use current TIA as future TIA (i.e., no change).
- Rural and Forest Large (> 10 acre) Future TIA = 8,500 sf TIA (=5,000 sf development footprint + 3,500 sf roads and other). Where current TIA is $<$ 8,500 sf, compute and show difference between current and future area as TIA increase (i.e., no change).

Potential future forest cover (FC)

- Urban Small (< 0.25 acre) parcels: Future FC = 10% of parcel area. Where current FC is $>$ 10% of parcel area, compute and show difference between current and future area as FC decrease. Where current FC is \leq 10% of parcel area, use current FC as future FC (i.e., no change).
- Urban Medium and Large (> 0.25) parcels: Future FC = 25% of parcel area. Where current FC is $>$ 25% of parcel area, compute and show difference in area as FC decrease. Where current FC is \leq 25% of parcel area, use current FC as future FC (i.e., no change).
- Rural and Forest Small ($<$ or $= 1$ acre) parcels: Future FC = 10% of parcel. Where current FC is $>$ 10%, compute and show difference between current and future area as FC decrease. Where current FC is \leq 10%, use current FC as future FC (i.e., no change).
- Rural and Forest Medium (> 1 acre, ≤ 10 acre) parcels: Future FC = 50% of parcel area. Where current FC is $>$ 50%, compute and show difference between current and future area as FC decrease. Where current FC is \leq 50%, use current FC as future FC (i.e., no change).
- Rural and Forest Large (> 10 acre) parcels: Future FC = parcel size minus 5 acres/parcel. Where current FC is $>$ parcel size minus 5 acres, compute and show difference between current and future area as FC decrease. Where current FC is \leq parcel size minus 5 acres, use area of current FC as area of future FC (i.e., no change).

Land Cover Change - Key Findings

Floodplain scale –

- Forest cover: 22.9% to 25.7% (+2.8 %; +692 acres)
- EIA: 1.2% to 1.3% (+0.01%)
- Among the six major floodplains: forest cover projected to increase in all but Vashon, where 12.5 acres of forest loss (2.4 % total VMI floodplain) is projected
- Among fifteen floodplain sub-areas: Forest cover projected to increase in all but three areas – Tolt and Boise creek (-0.4 acres) and Upper Green (-0.28 acres)

Floodplain Delta scale –

- Forest cover: 23.6% to 27.5% (+3.9%; +222 acres)
- EIA: no appreciable change from current 1.6 %
- Among the six major floodplains: Forest cover projected to increase in all but Vashon, where 2.4 acres of forest loss (28.9 to 23.5%) is projected
- Among floodplain sub-areas: Forest cover projected to increase in all but two Delta areas – Upper Green (-0.3 acres) and Boise Creek (-0.4 acres)

Note: There was no accounting for increases in forest biomass or structural complexity which should result as buffers are left alone.

Assessing Potential Reasonable Use Exceptions (RUEs)

- RUEs used for parcels large enough to accommodate development footprint (buildings, roads, setbacks, septic and water supply) **but** constrained by critical areas, buffers or setbacks.
- All impacts must be fully mitigated including off-site mitigation and mitigations bonds if necessary.
- How many? Where?
- Recent history from period of high rates of development...
 - RUEs 1998 to 2010 = 55
 - RUEs in FEMA Floodplain = 7
 - Of these, five were to bypass steep slope requirements along Vashon Island and Lake Sammamish, one to encroach in a wetland buffer and one was indeterminate.
- Decision process for RUE is contextual and complex, based on several factors: availability of water and sewer, parcel configuration, soils, topography, access

RUE - Parcel Size & Results

Urban Parcels – if less than 5,000 sf outside buffer then potential RUE

Rural Parcels- much, much, MUCH (!) more complicated:

Intersection of two possible categories:

- Category 1 (w/ off-site water supply): Parcel size > 0.5 acre with < 0.5 acre outside the 165-foot aquatic area buffer and > 0.5 acre outside the FEMA floodway or severe CMZ, or
- Category 2 (w/out off-site water supply): Parcel size > 1 acre, with < 0.75 acre outside the 165-foot aquatic area buffer and >0.75 acre outside the FEMA floodway or severe CMHA. Must also be at least 200-ft wide to accommodate sanitary setback area for wellhead.

A total of 158 rural parcels met these criteria. Each was examined to determine if buildable and whether a RUE would be required.

Found:

- 29 parcels buildable, no RUE needed
- 71 parcels buildable, RUE needed
- 58 parcels too small/narrow, not buildable
- In highly unlikely worst case, if all RUE-related development were placed in buffers, the net result would be 28 acres of clearing across all floodplains
- In reality, RUEs require avoidance, minimization and mitigation and thus actual impact would be far less

Key Findings - Context

Comprehensive Approach - King County's approach to environmental protection and restoration is comprehensive, wherein regulatory protections are complemented by many additional capital and programmatic actions, most of which contribute, either directly or indirectly, to floodplain health and salmon recovery.

Future development precluded or severely limited in many areas - Includes almost all floodplain agricultural lands (~51% of floodplain area) and many other tracts by current use taxation, public benefit rating, transfer of development rights, forest and farmland preservation and open space acquisition programs

Floodplains benefit from non-floodplain regulations - Regulations upstream from and adjacent to floodplains provide added protections and contribute to floodplain health and restoration potential, including:

- Over 8,300 riparian acres in aquatic area buffers along Coho-bearing streams alone upstream from floodplains.
- The non-floodplain area of wetlands at least partially in a mapped floodplain (2,100 acres),
- Mapped moderate or severe channel migration areas extending beyond a mapped FEMA floodplain (760 acres),
- Mapped steep slopes (>40%, 6,300 acres), landslide hazard areas (11,800 acres) and erosion hazard areas (18,000 acres) within one-thousand feet of a floodplain, and
- About 30,000 acres of critical aquifer recharge area (Coho-bearing streams are used for illustration purposes only. They are inclusive of all Chinook-bearing stream reaches and almost all steelhead-bearing stream reaches, except those in relatively steep headwaters.

Flood and Salmon Plans have future benefits not accounted for - The King County Flood Hazard Management Plan and WRIA salmon recovery plans identify many additional floodplain and surrounding watershed habitats likely to be protected and restored in the future but not assessed. Between 2010 and 2016, the County has—or will—implement about 60 CIPs in - or in close proximity to - mapped FEMA floodplains

Key Findings - Pathways and Indicators

Generally, increasing trajectory but unlikely to meet thresholds for “restore”

PATHWAYS: INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
	Properly Functioning 1	At Risk 1	Not Properly Functioning 1	Restore 2	Maintain 3	Degrade 4
Water Quality:						
Temperature			X		S & L	
Sediment/Turbidity			X		S & L	
Chemistry Contam./Nutrients			X		S & L	
Habitat Access:						
Physical Access		X			S & L	
Habitat Elements:						
Substrate		X			S & L	
Large Woody Debris (LWD)			X		S & L	
Pool Frequency			X		S & L	
Pool Quality/Large Pools			X		S & L	
Off-Channel Habitat			X		S & L	
Refugia			X		S & L	
Channel Cond. & Dyn.						
Width/Depth Ratio			X		S & L	
Streambank Condition			X		S & L	
Stream Buffers			X		S & L	
Floodplain Connectivity			X		S & L	
Flow/Hydrology:						
Altered Peak/Base Flows			X		S & L	
Drainage Network Increase			X		S & L	
Watershed Conditions:						
Road Density/Location		X			S & L	
Disturbance History			X		S & L	
Riparian Reserves			X		S & L	

Conclusions

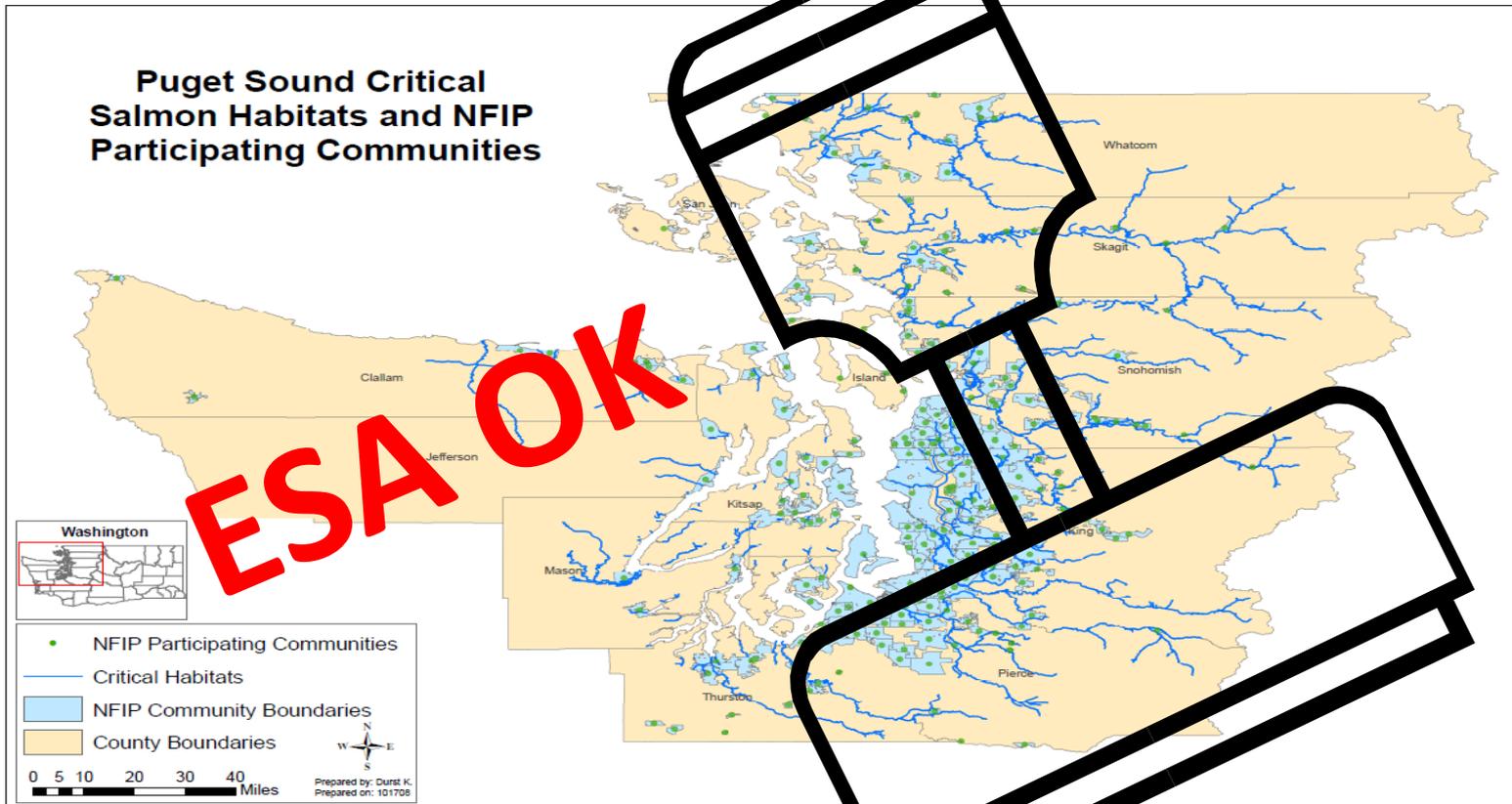
- Ongoing and future land-use in floodplains under King County jurisdiction may affect, but would **not likely adversely affect** ESA and MSA-listed species and will result in **no adverse effects** within the Protected Area as defined by the BiOp.
- ***The condition of most, if not all, of twenty-one habitat variables that were assessed would likely be on an improving trajectory*** but not likely “restored” for any given variable (as per assessment criteria within the NMFS Matrix of Pathways and Indicators). Hence the net result will be that the condition of all the habitat variables that were assessed in this PHA will remain in their current status
- Although not directly assessed, ***remediating the effects of historic and existing land uses may be as much or a greater concern as the effects of future development*** on the County’s floodplains and ESA-listed species.

Caveats and Monitoring

- Projects requiring Special use and Mining permits are NOT covered by the PHA. They will require separate assessments.
- King County has agreed to re-assess floodplain conditions and update PHA on a five to ten year basis, depending on activity.

FEMA Approved July 9, 2012

<http://www.kingcounty.gov/environment/waterandland/flooding/documents/programmatic-habitat-assessment.aspx>



Document Overview

The PHA has chapters that describe the:

- purpose and history (Chapter 1);
- species use and habitat conditions (Chapters 2 and 3);
- County's land use regulations (Chapter 4);
- range of actions beyond floodplain regulations that benefit floodplains (Chapter 5 and Appendix C);
- assessment of land cover and land use (Chapter 6);
- ESA effects and determinations (Chapter 7); and
- history of FEMA interactions (Chapter 8).

And Appendices that describe the:

- science basis and justification for the County's current buffer standards (Appendix A),
- Agricultural Drainage Assistance Program (Appendix B), and
- provide reference maps of FEMA floodplains, floodplain delta areas (where King County's protections are less than the Bi-Op's), location of parcels with development potential, and salmon distribution (Appendix D).

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Department of Natural Resources and Parks

River and Floodplain Management Section Contributing Staff:

Sylvia Aro, Administrative Specialist

Steve Bleifuhs, Manager

Priscilla Kaufmann, Co-Lead, Project/Program Manager,
Countywide Policy and Planning Unit

Brian Murray, Supervisor, Countywide Policy and Planning Unit

Ken Zweig, Project/Program Manager, Countywide Policy and
Planning Unit

Scientific and Technical Support Section Contributing Staff:

Gino Lucchetti, Co-Lead, Environmental Scientist

Ruth Schaefer, Environmental Scientist

Jennifer Vanderhoof, Environmental Scientist

Stormwater Services Contributing Staff:

Curt Crawford, Manager

Ken Krank, Supervising Engineer

Doug Navetski, Senior Engineer

Mark Wilgus, Senior Engineer

Agriculture and Forestry Program

Kathy Creahan, Manager

Claire Dyckman, Program/Project Manager

Rick Reinlasoder, Program/Project Manager

Wastewater Treatment Division Contributing Staff:

Steve Hirschey, Water Quality Planner

Department of Development and Environmental Services

Director's Office Contributing Staff:

Harry Reinert, Special Projects Manager

Information Services Contributing Staff:

Paul McCombs, GIS Specialist, Master

Land Use Services Division, Critical Area Review Contributing Staff:

Steve Bottheim, Supervisor, Land Use Services Division

Pesha Klein, Acting Supervisor, Critical Areas Review

Greg Wessel, Environmental Scientist

Department of Public Health

Community Environmental Health Contributing Staff:

Gregory Bishop, Health and Environmental Investigator

David Koperski, Health and Environmental Investigator

END