Lower Columbia River Habitat Restoration & Conservation Targets: Assessing Impacts Due to SLR

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Science Work Group

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Habitat Targets Process Review

A. Analysis for current flooding regime (completed 2012 – 2018)

1. Quantify loss of all habitat types. (2012)

2. Identify Priority Habitats (PH) for recovery based on loss severity. By Reach. (2013-2014)

3. Set baseline recovery targets (30 and 40% of historical extent) for each PH. By Reach. (2013-2016)

4. Adjust recovery targets based on restoration activity to date (ongoing):

   i.   pre/post occurrence of action (relative to habitat change analysis)

   ii. include only acres that contribute to <u>recovery</u> of PH

5. Repeat step 4 for each PH (in-progress)

Habitat Targets Process Review, cont.

B. Adjustments to targets for SLR flooding regimes (0.5–1.5 m rise)

1. Analysis of current 'intact' habitats (non-diked)

    i. adjust targets based on net balance of habitat gain/loss due to SLR

    ii. is there enough recoverable habitat (RH) to compensate for net losses?

2. Considerations for analysis of diked areas (SWG input needed)

    i. how to plan for range of uncertainty in levee overtopping?

    ii. how might areas respond to levee overtopping?

    - potential gains in tidal wetland habitats

    - potential loss of recoverable habitat needed to meet targets

Baseline Targets Established (April '15 SWG)

Recovery required to meet 30% baseline (30% of historical habitat). All values are in acres.

Reach	All PH: hist. extent	All PH: target 30% of hist. extent	All PH: present extent	All PH: total deficit	PH1: deficit	PH2: deficit	PH3: deficit	PH4: deficit	avail. RH habitat	margin: deficit – RH
A	11,609	3,483	1,699	**1,784**	929	854	--	--	10,062	**8,278**
B	22,442	6,733	10,122	**0**	-251	-3,138	--	--	10,417	**10,417**
C	25,629	7,689	3,579	**4,110**	1.937	2,173	--	--	18,837	**14,727**
D	16,609	4,983	5,108	**1,177**	638	539	-950	-353	1,098	**-79**
E	15,686	4,706	4,236	**1,690**	1,157	-1,220	338	195	9,173	**7,483**
F	52,614	15,784	17,872	**939**	-319	836	-2,708	103	24,567	**23,628**
G	29,719	8,916	9,974	**683**	-792	683	-949	--	2,510	**1,827**
H	3,342	1,003	1,132	**0**	-129	--	--	--	546	**546**
totals	177,650	53,295	53,722	**10,383**					77,210	**66,828**

For negative deficits (values in green), goal is to 'hold the line' for these habitats, which already meet the 30% target criteria.

Negative margins (red values in right hand column) indicate not enough Recoverable Habitat (RH) to meet overall targets for that Reach.

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Target Adjustments Based on 2010–2018 Restoration: process summary

For each restoration project determine acres of 'priority habitat' recovery:
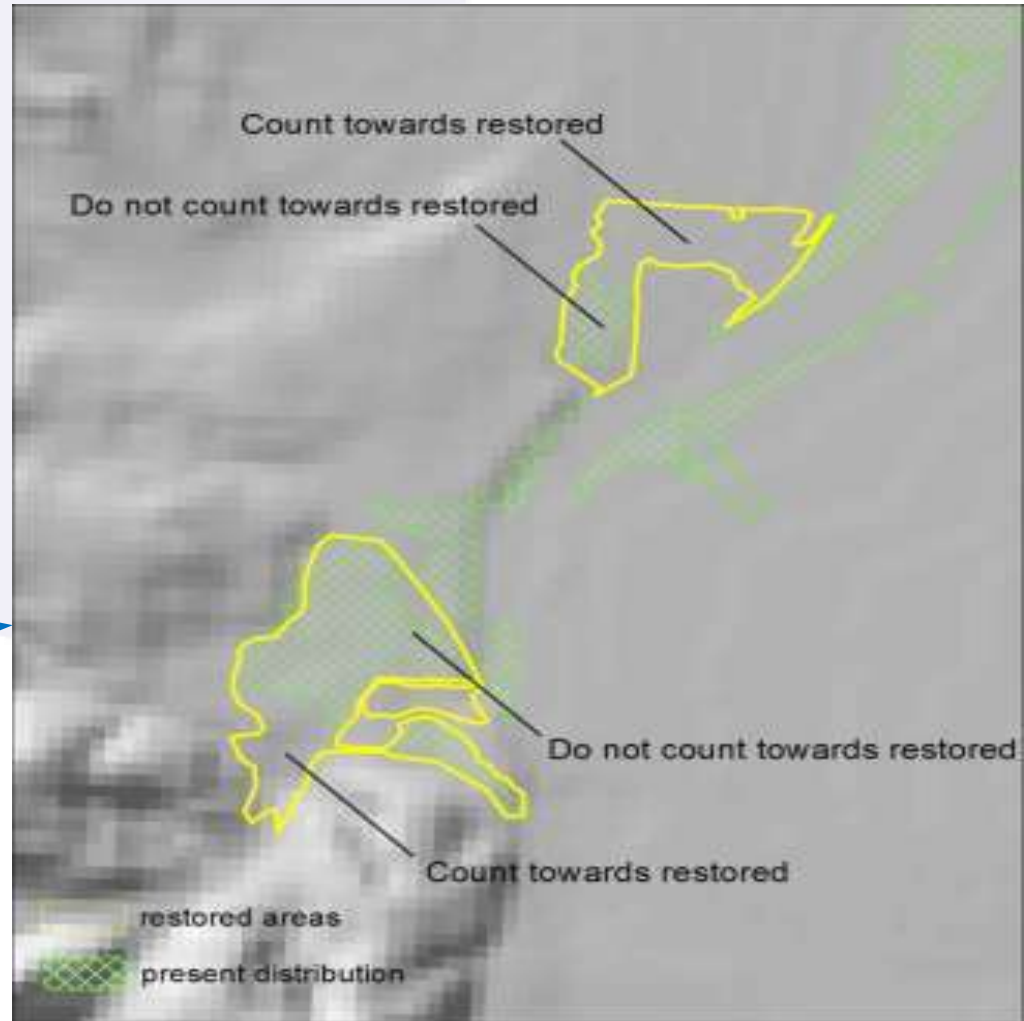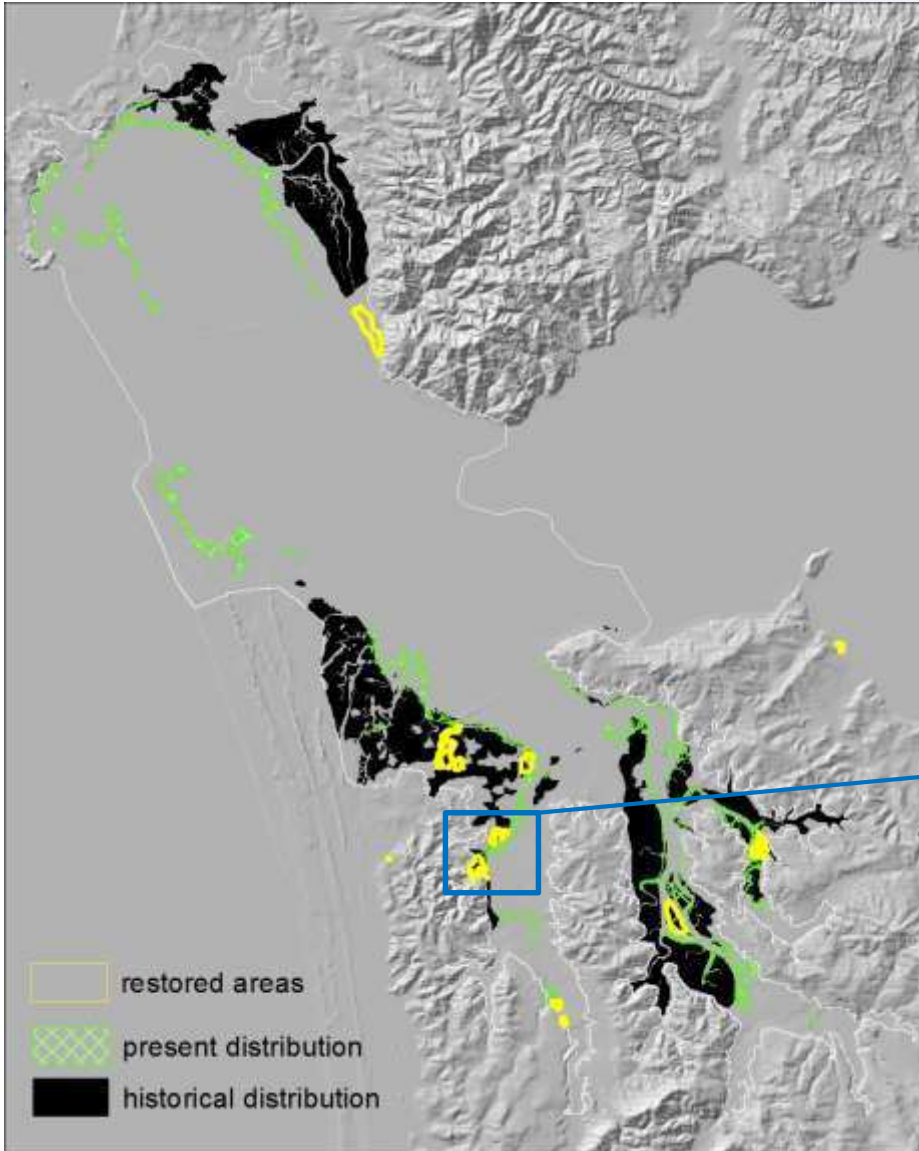
Target Adjustments: Sample Reach Evaluation (Reach A)

Project	Historical hab. Type	2010 LC hab. type	Reported Acres	Contributed Acres	PH Gained
Chinook River	tidal wl	ag, diked wl	427	427	herb. tidal wl
Fort Columbia	not analyzed	tidal & non-tidal wl	96	12	herb. tidal wl
Otter Point	forest, tidal wl	tidal & non-tidal wl	33	18	herb. tidal wl
Wallacut River	tidal wl	non-tidal wl	42	42	herb. tidal wl
Wallooskee – Young's	tidal wl ⟶	ag	193 ⟶	193	herb. tidal wl
Sharnelle Fee	tidal wl	ag, diked wl	50	50	herb. tidal wl
Trestle Bay	water →	water, tidal wl	628 ⟶	0	
Totals			1436	742	

Note: older projects not included because they were already adjusted in the habitat change analysis (Ft. Clatsop, Lewis & Clark, etc.)

Adjustments to Targets for Restoration, cont.

Tidal/fluvial wetland habitats:

- Most restoration is targeted here.

- 100% of Reach A-C priority habitats, so evaluating recovery of these Reaches is most straightforward.

- Challenges with evaluating wooded (shrub/forested) wetland recovery.

Upland habitats (forested, herbaceous, shrub):

- Less restoration efforts. More difficult to quantify recovery.

- Included in Reach D-G priority habitats, so evaluating recovery of these Reaches is most difficult.

Adjustments to Targets For Restoration: Results

currently have:

Reach	All Priority Habitat (PH)			Available RH
	baseline deficit for 30% recovery	restored, 2010-2018	deficit adjusted for restoration (30% recovery)	
A	1,784	742	1041	9,320
B	0	740	0	9,677
C	4,110	328	3,782	18,509
D	1,177	5	1,172	1,093
E	1,690	482	1,208	8,691
F	939	1,704	0	22,863
G	683	321	362	2,189
H	0	96	0	450
Totals	**10,383**	**4,418**	**6,704**	72,792

but we really need this for each PH1 within each Reach

Impacts to Wetlands Due to Sea Level Rise (SLR)
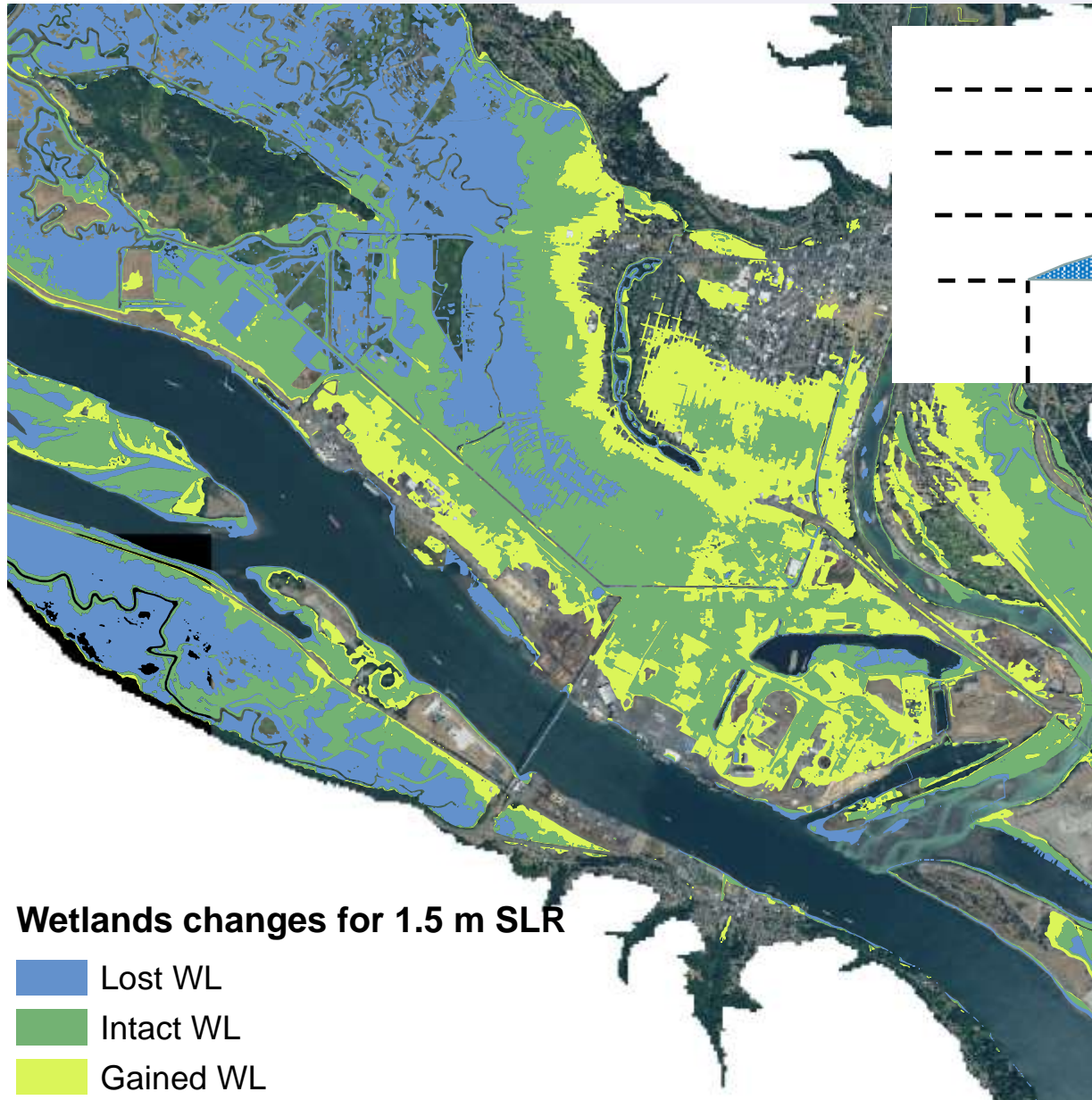
Diked areas are not separated in this example
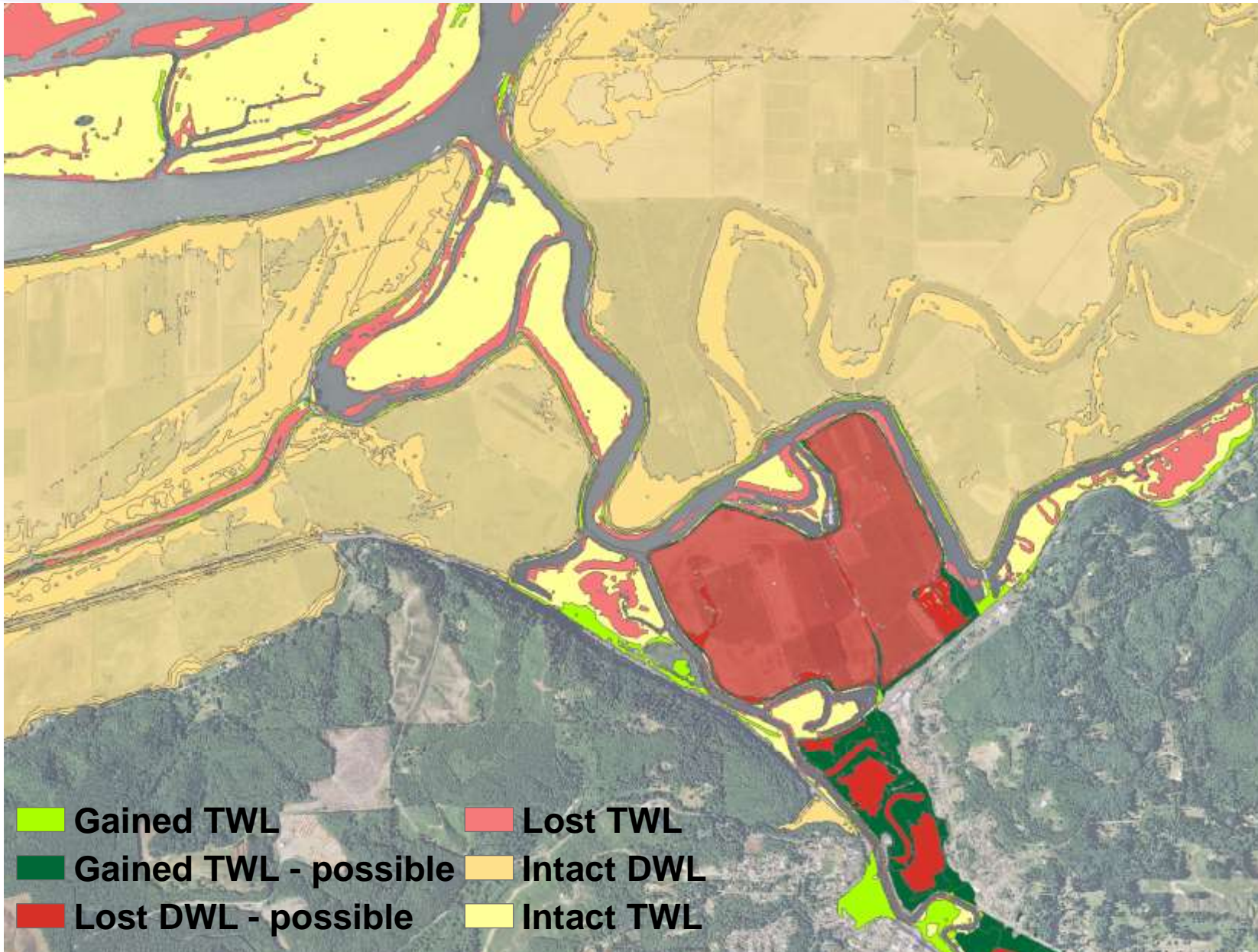
Wetlands changes for 1.5 m SLR

- Lost WL
- Intact WL
- Gained WL

Impacts to Wetlands Due to Sea Level Rise (SLR)

Legend:

- Gained TWL
- Gained TWL - possible
- Lost DWL - possible
- Lost TWL
- Intact DWL
- Intact TWL

Impacts to Wetlands Due to Sea Level Rise (SLR)

Legend:
- Gained TWL
- Gained TWL - possible
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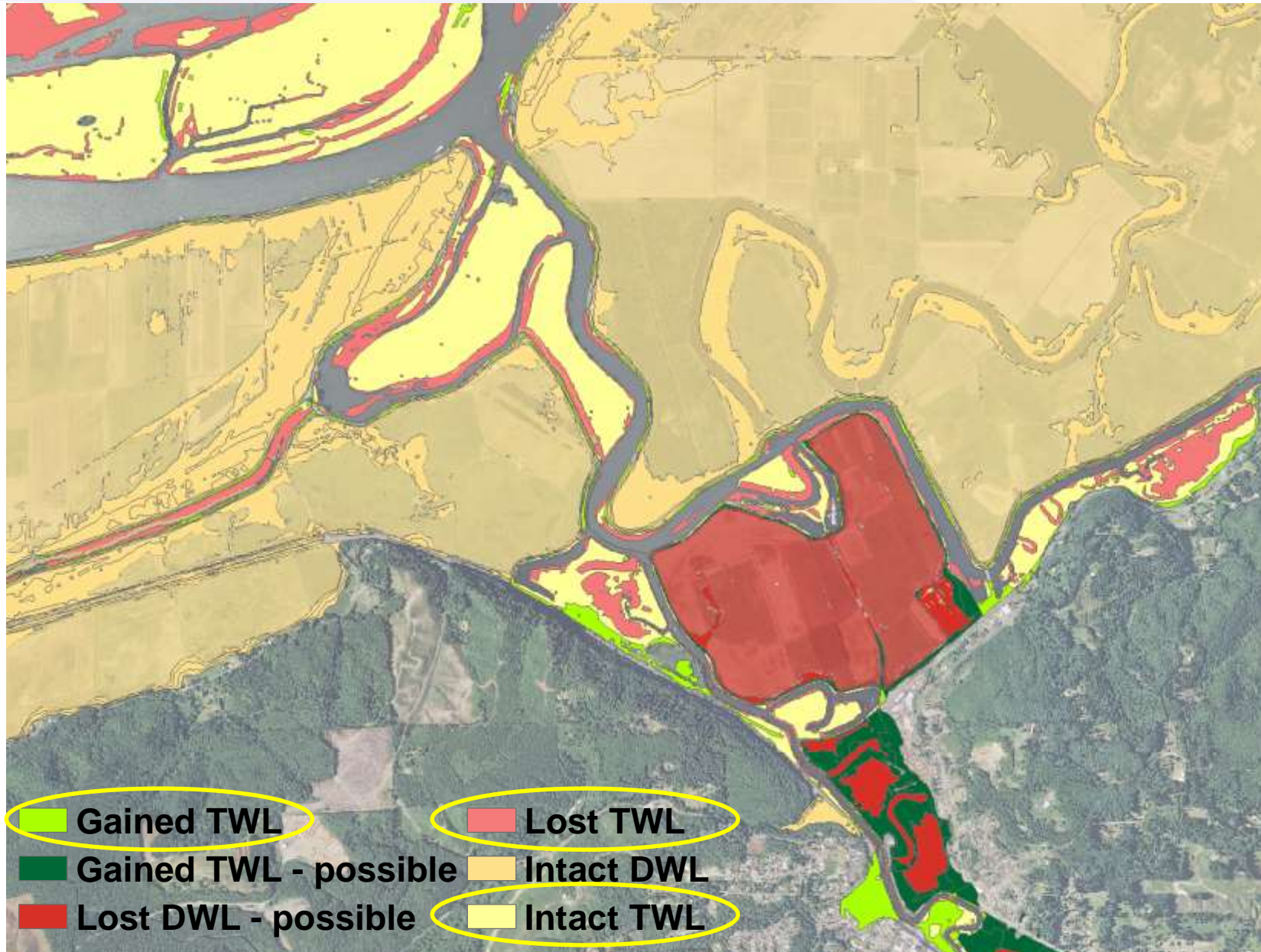
Predicted Losses of non-Diked Wetlands Due to SLR

Reach	Net habitat loss in acres for:		
	0.5 m SLR	1.0 m SLR	1.5 m SLR
A	319	160	209
B	1,579	2,663	4,953
C	219	493	1,255
D	-75	-169	-162
E	-74	-222	-244
F	1,240	1671	3,294
G	151	129	58
H	49	72	86
Totals	**3,408**	**4,797**	**9,449**

consider worst case values for Habitat Recovery Targets analysis

Predicted Losses of non-Diked Wetlands Due to SLR
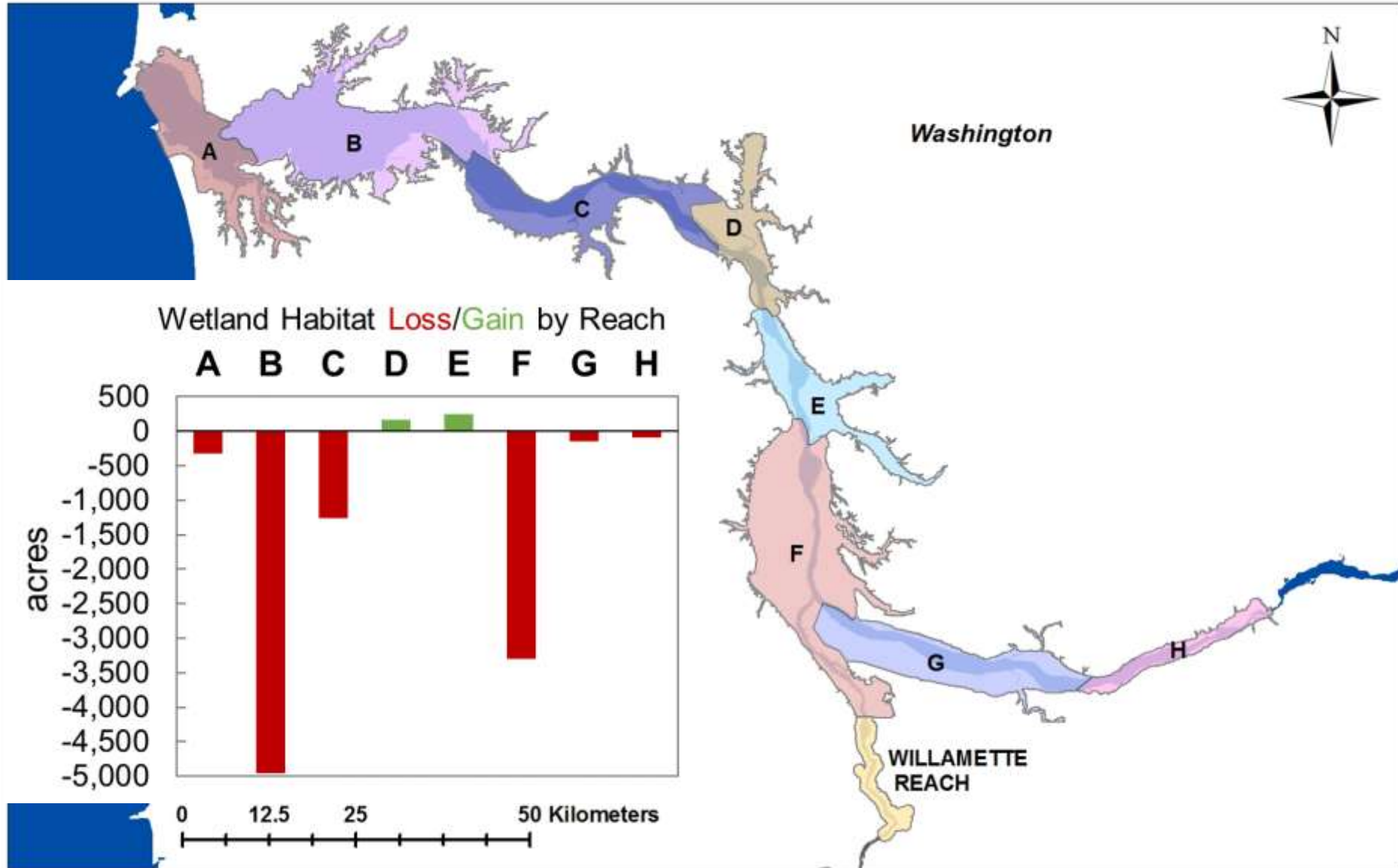
Summary of Required Adjustments to 30% Recovery Targets (completed recovery + SLR impacts)

Reach	Baseline deficit (acres)	Adjusted Deficit: completed recovery (acres)		Adjusted Deficit: recovery + worst case SLR (acres)		Available RH (acres)
A	1,784	- 742 =	1,041	+ 319 =	1,360	9,320
B	-3389 (0)	- 740 =	-4,129 (0)	+4,953 =	824	9,677
C	4,110	- 328 =	3,782	+1,255 =	5,037	18,509
D	1,177	- 5 =	1,172	- 75 =	1,097	1,093
E	1,690	- 482 =	1,208	- 74 =	1,134	8,691
F	939	-1,704 =	-765 (0)	+3,294 =	2,529	22,863
G	683	- 321 =	362	+151 =	513	2,189
H	-129 (0)	- 96 =	-225 (0)	+86 =	-139 (0)	450
Totals	**10,382**		**7,565**		**12,494**	

Summary of Required Adjustments to 40% Recovery Targets (completed recovery + SLR impacts)

Reach	Baseline deficit (acres)	Adjusted Deficit: completed recovery (acres)		Adjusted Deficit: recovery + worst case SLR (acres)		Available RH (acres)
A	2,944	- 742 =	2,202	+ 319 =	2,521	9,320
B	1,195	- 740 =	455	+4,953 =	5,408	9,677
C	6,672	- 328 =	6,344	+1,255 =	7,599	18,509
D	1,708	- 5 =	1,703	- 75 =	1,628	1,093
E	2,511	- 482 =	2,029	- 74 =	1,955	8,691
F	4,721	-1,704 =	3,017	+3,294 =	6,311	22,863
G	2,524	- 321 =	2,203	+151 =	2,354	2,189
H	205	- 96 =	109	+86 =	195	450
Totals	**22,480**		**18,062**		**27,971**	

Net Balance After Restoration and SLR Adjustments

Legend:
- ▇ (yellow) Adjustment to target recovery due to SLR
- ▇ (dark yellow) Baseline 30% target recovery value
- ▇ (light green) PH gained from restoration
- ▇ (dark green) Baseline existing PH
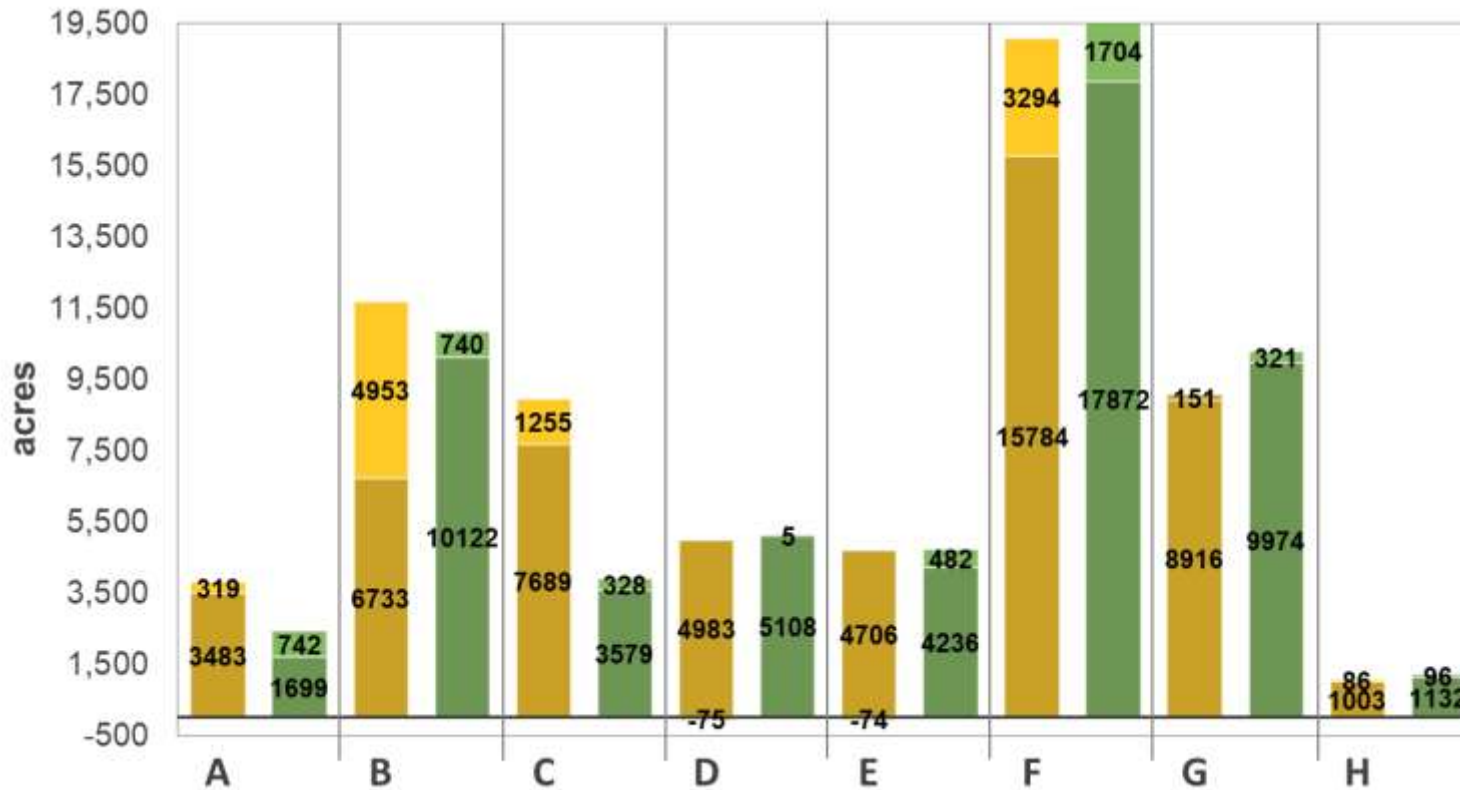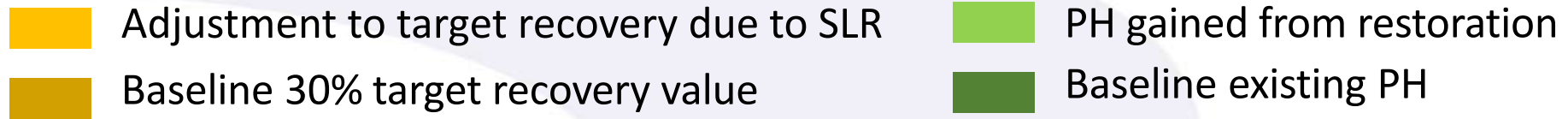
- balance will shift based on recovery of individual PH types (D-G most sensitive)
- overall there is enough RH to offset SLR impacts to non-diked areas (Reach D slightly limited)

Levee Considerations for Adjusting Recovery Targets

1. How to plan for range of uncertainty in levee overtopping?

Overtopping scenarios:
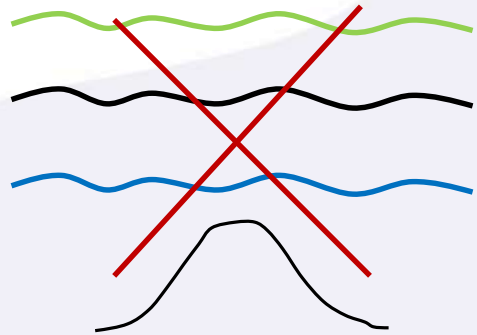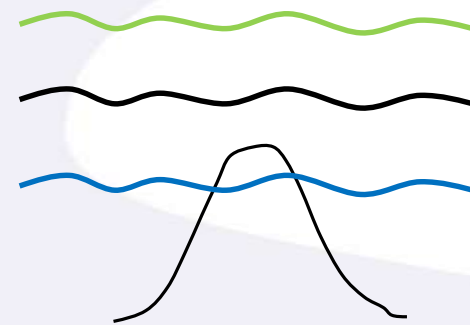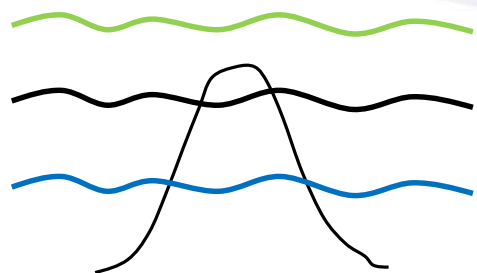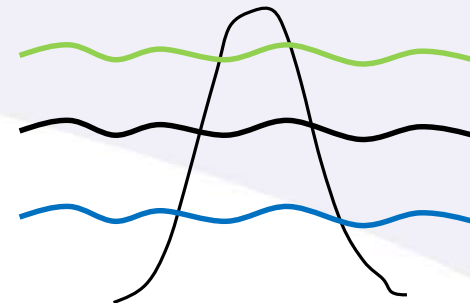
Levee Impacts – overtopping potential

0.5 m SLR scenario

Legend:
- overtop likely
- overtop possible
- no overtop
- unknown
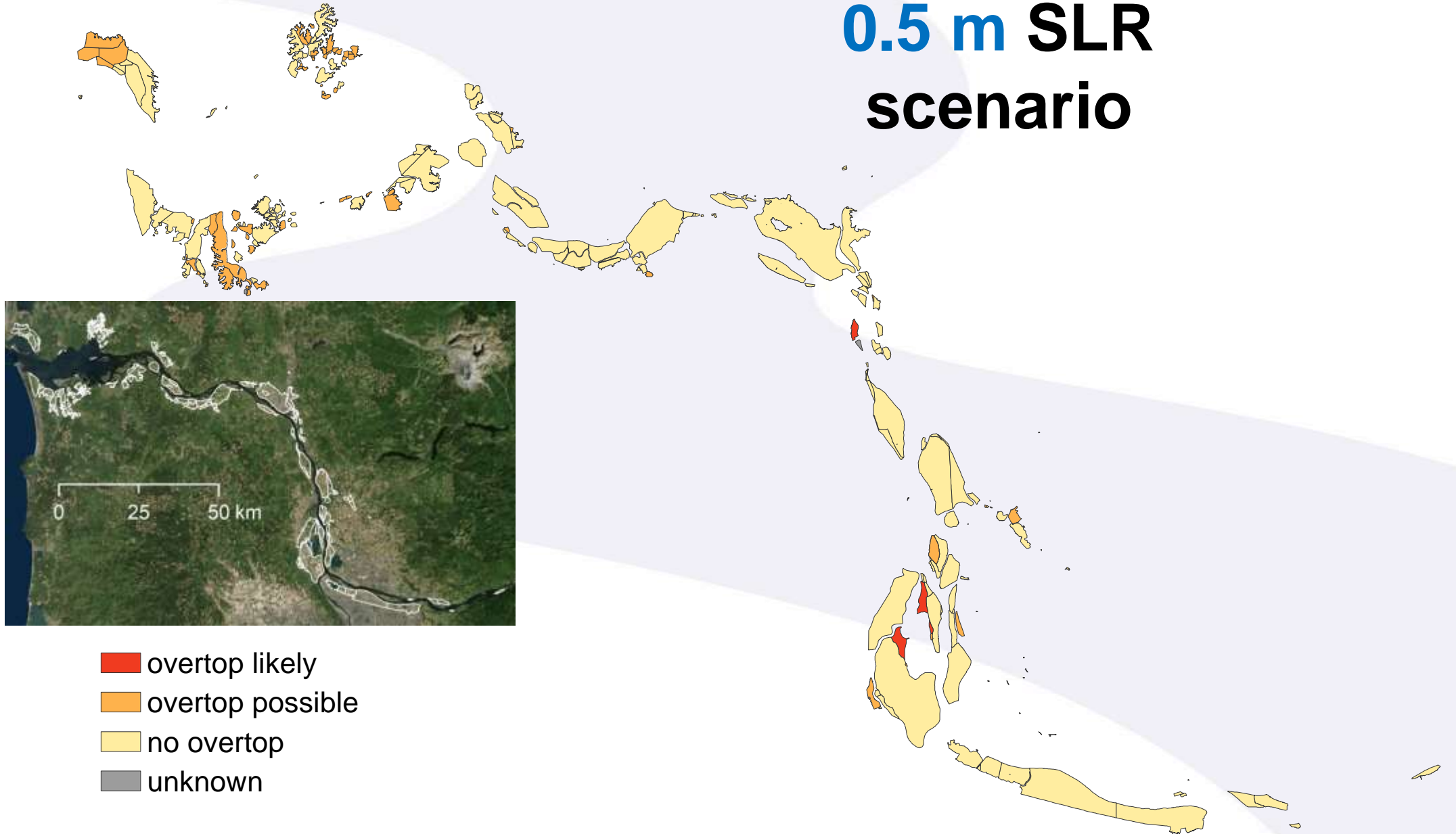
Levee Impacts – overtopping potential

1.0 m SLR scenario

Legend:
- overtop likely
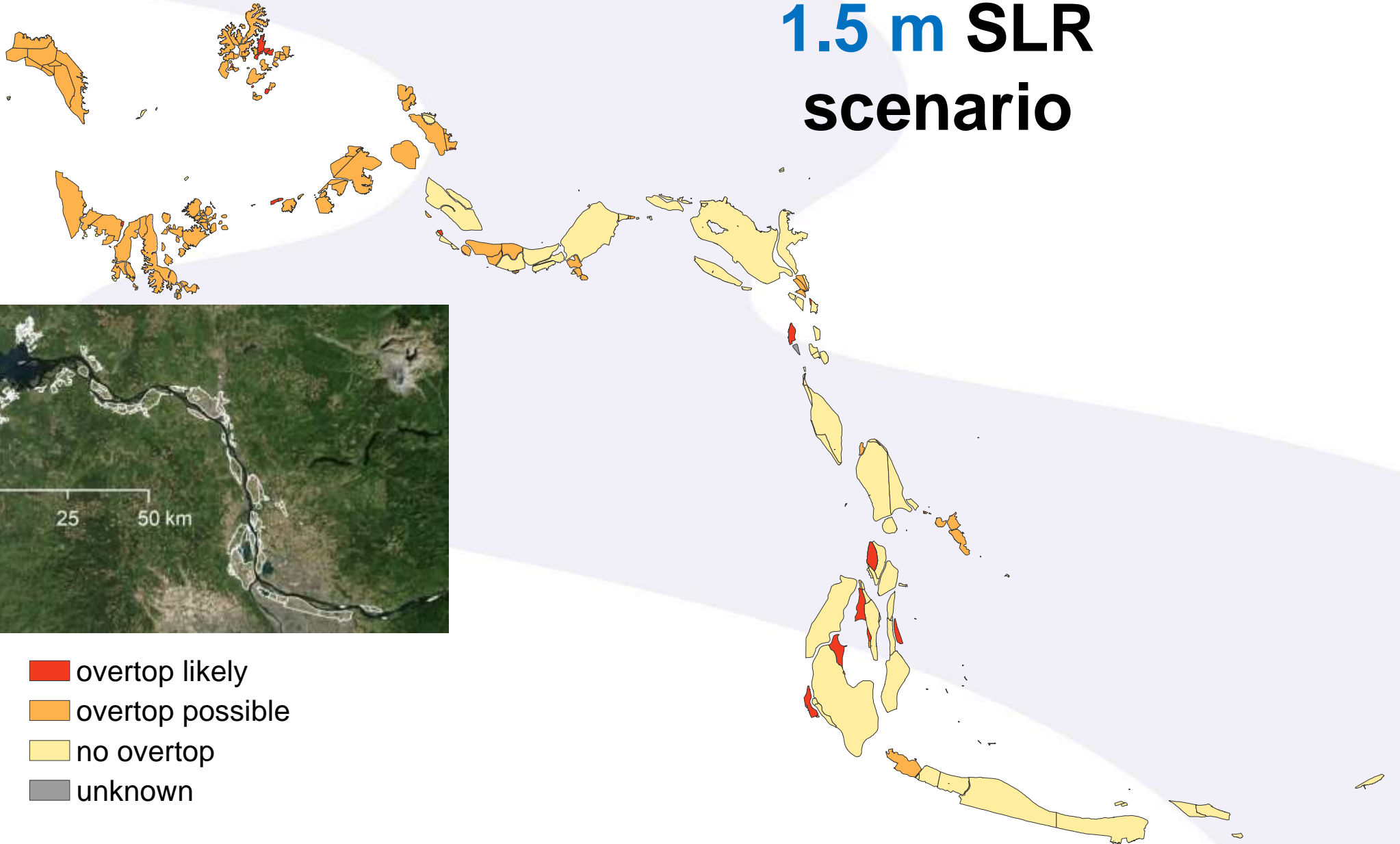- overtop possible
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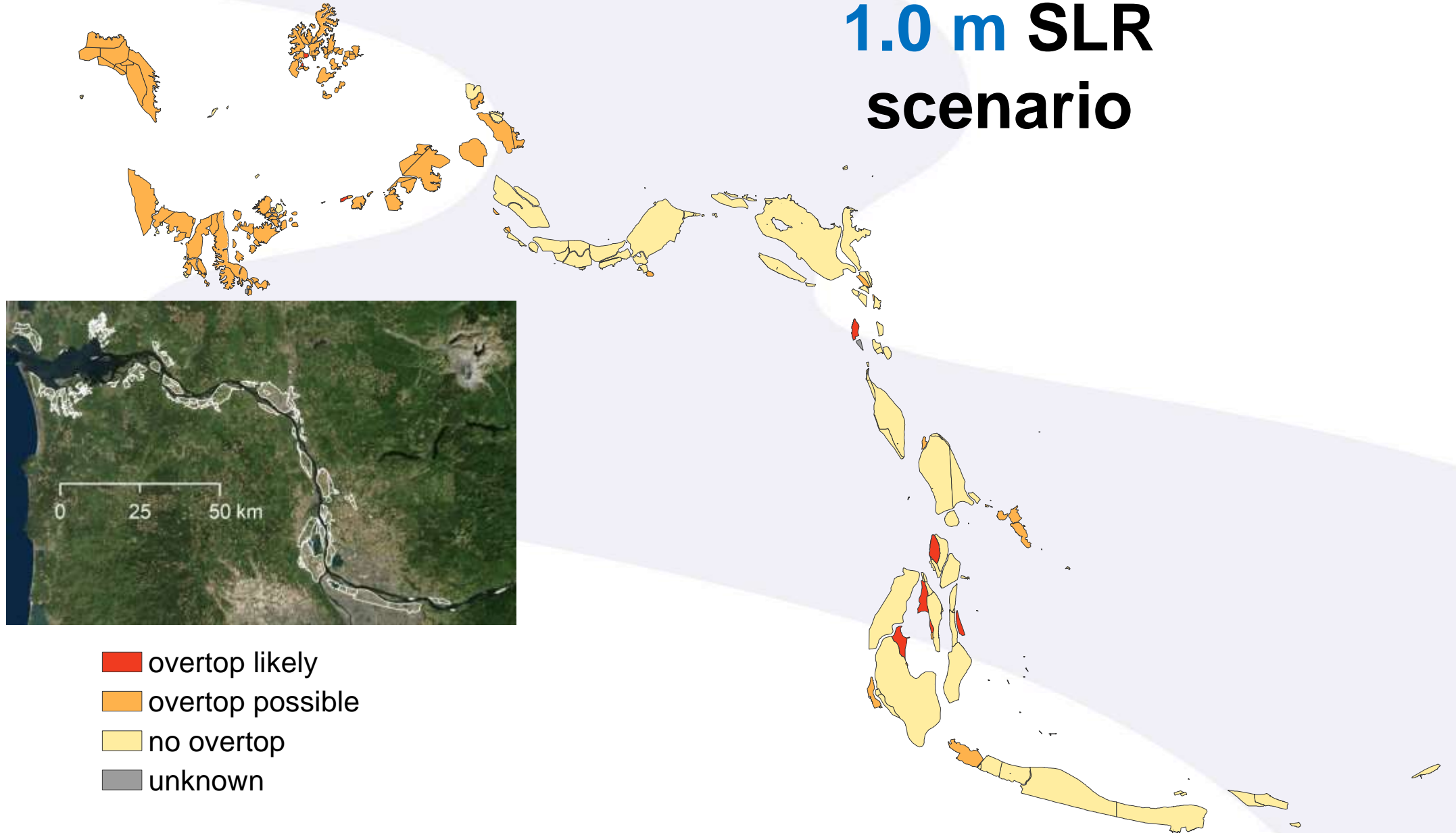
Levee Impacts – overtopping potential

1.5 m SLR scenario

Legend:
- overtop likely
- overtop possible
- no overtop
- unknown

Levee Considerations for Adjusting Recovery Targets

2. Habitat target implications of SLR impacts in leveed areas

- Potential gained wetlands

- Loss of what is currently considered potential recoverable habitat (RH)

Levee Considerations: potential gained wetlands

Range of outcomes based on levee overtopping predictions:

Potential wetland transitions (acres):

	SLR	Lost DWL-poss.	Lost DWL-likely	Lost TWL	Intact DWL	Intact TWL	Gained TWL-poss	Gained TWL-likely	Gained TWL
	0.5	-902	0	-6,521	69,809	43,422	5,609	875	3,113
	1.0	-8,850	-166	-11,762	55,376	38,181	14,589	1,221	6,409
	1.5	-17,648	-473	-19,073	53,656	30,858	9,599	1,474	9,506

1. Wetland transitions grouped for <u>minimal predicted overtopping</u>

SLR	Lost DWL	Lost TWL	Intact DWL	Intact TWL	Gained TWL	Net change TWL
0.5	0	-6,521	76,321	43,422	3,988	-5 (%)
1.0	-166	-11,762	78,814	38,181	7,630	-8 (%)
1.5	-473	-19,073	80,903	30,858	10,980	-16 (%)

Levee Considerations: potential gained wetlands

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1. Minimal tidal wetland formation behind levees ('possible' areas remain 'diked' WL):

SLR	Lost DWL	Lost TWL	Intact DWL	Intact TWL	Gained TWL	Net change TWL	
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1.5	-473	-19,073	80,903	30,858	10,980	-16	(%)

2. Maximum tidal wetland formation behind levees ('possible' areas transition to tidal WL):

SLR	Lost DWL	Lost TWL	Intact DWL	Intact TWL	Gained TWL	Net change TWL (%)	
0.5	-902	-6,521	69,809	43,422	9,597	6	(%)
1.0	-9,016	-11,762	55,376	38,181	22,219	21	(%)
1.5	-18,121	-19,073	53,656	30,858	20,579	3	(%)

*For both of these scenarios, 'Lost DWL' is a loss of potential Recoverable Habitat

Levee Considerations: potential gained wetlands

minimal overtopping:

maximum overtopping:

Net change: **-5.8%** **-8%** **-16%** **+6%** **+21%** **+3%**

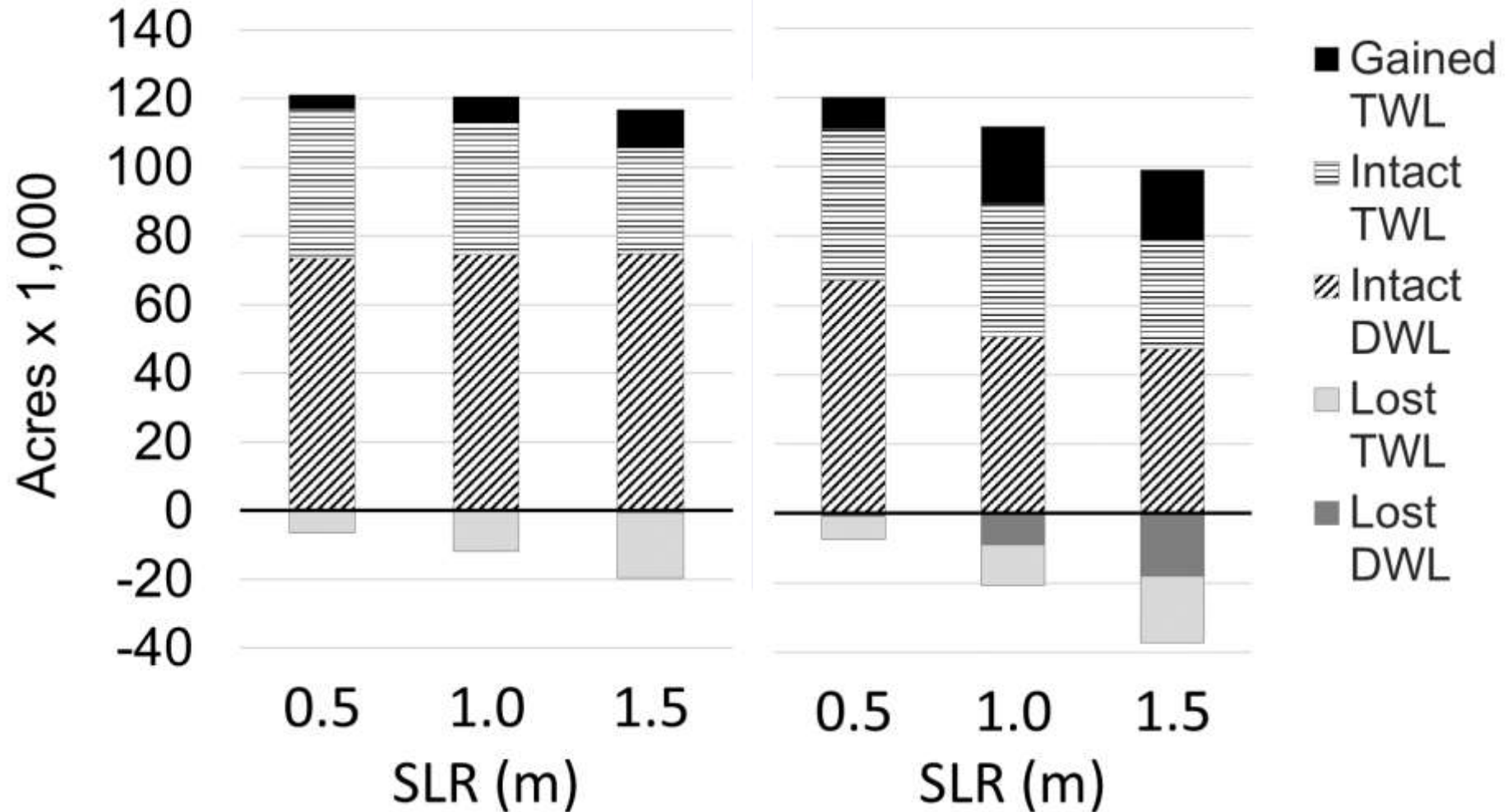- conservative overtop estimate(left): **net WL loss**

- less conservative estimate (right): **potential WL gain**

▶ **Questions:**

- **How will inundated areas function?**

- **Can these be considered 'habitat' gains?**

Legend:
- ■ Gained TWL
- ☰ Intact TWL
- ▨ Intact DWL
- ▢ Lost TWL
- ▰ Lost DWL

Y-axis: Acres x 1,000 (140, 120, 100, 80, 60, 40, 20, 0, -20, -40)

X-axis: SLR (m) — 0.5, 1.0, 1.5

Recovery Targets Adjusted for Worst Case SLR Impacts to Diked Areas

Reach	Non-diked assessment			Levee impacts: likely overtop			Levee impacts: possible overtop		
	Adj. deficit for 30% recovery	Adj. deficit for 40% recovery	Avail. RH	Adj. deficit for 30% recovery	Adj. deficit for 40% recovery	Avail. RH	Adj. deficit for 30% recovery	Adj. deficit for 40% recovery	Avail. RH
A	1,360	2,521	9,320	1,360	2,521	9,320	-4,644 (0)	-3483 (0)	2,989
B	824	5,408	9,677	629.6	5,214	9,463	-1,478 (0)	3,106	1,661
C	5,037	7,599	18,509	5,003	7,565	18,507	4,663	7,225	15,907
D	1,097	1,628	1,093	841	1,372	896	661	1,192	716
E	1,134	1,955	8,691	1,134	1,955	8,691	967	1,788	8,691
F	2,529	6,311	22,863	2,505	6,287	22,804	1,372	5,154	22,800
G	513	2,354	2,189	513	2,354	2,189	-385 (0)	1,456	1,278
H	-139 (0)	195	450	0	195	450	0	195	450

Habitat Target Adjustments Process Summary

A. Adjustments for completed habitat recovery efforts (2010-2018)

1. We have adjusted targets based on 'overall priority habitats (PH)' for each Reach, but need to complete analysis of individual PHs.

2. More complicated in Reaches D-G, where 'upland' habitats are prioritized.

B. Adjustments for predicted impacts of sea level rise (SLR)

1. We have adjusted targets based on estimated impacts to non-diked wetlands.

2. Working on process for diked wetlands. Considerations include: a) the likelihood of levee overtopping; and b) the response of inundated areas to SLR changes.

3. Recoverable Habitat loss due to levee overtopping may limit ability to achieve recovery goals.

C. Combined adjustments for recovery + SLR

1. Will need to re-adjust after individual Priority Habitat types are assessed. This will mostly affect analysis of Reaches D-G, where upland habitats are prioritized.