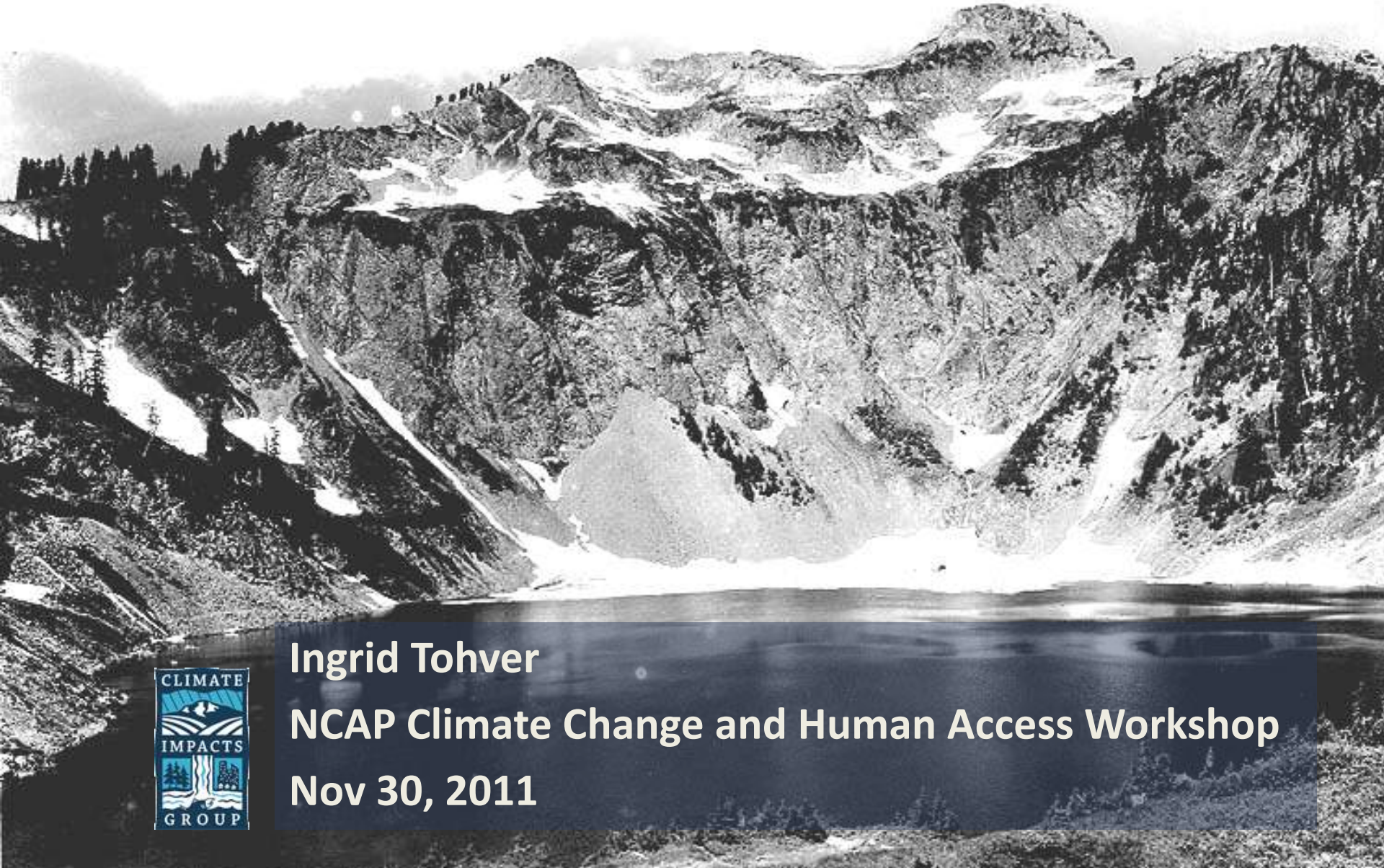
Improving Estimates of Hydrologic Extremes: Applications to National Forests and Parks



Ingrid Tohver

NCAP Climate Change and Human Access Workshop

Nov 30, 2011

Partnerships with Stakeholders

Climate Impacts Group &
Civil and Environmental Engineering,
University of Washington:

Alan Hamlet
Se-Yeun Lee
Ingrid Tohver
Robert Norheim

Olympic National Forest and Park:

Kathleen O'Halloran
Luis Santoyo
Bill Shelmerdine
Robert Metzger
Robin Stoddard

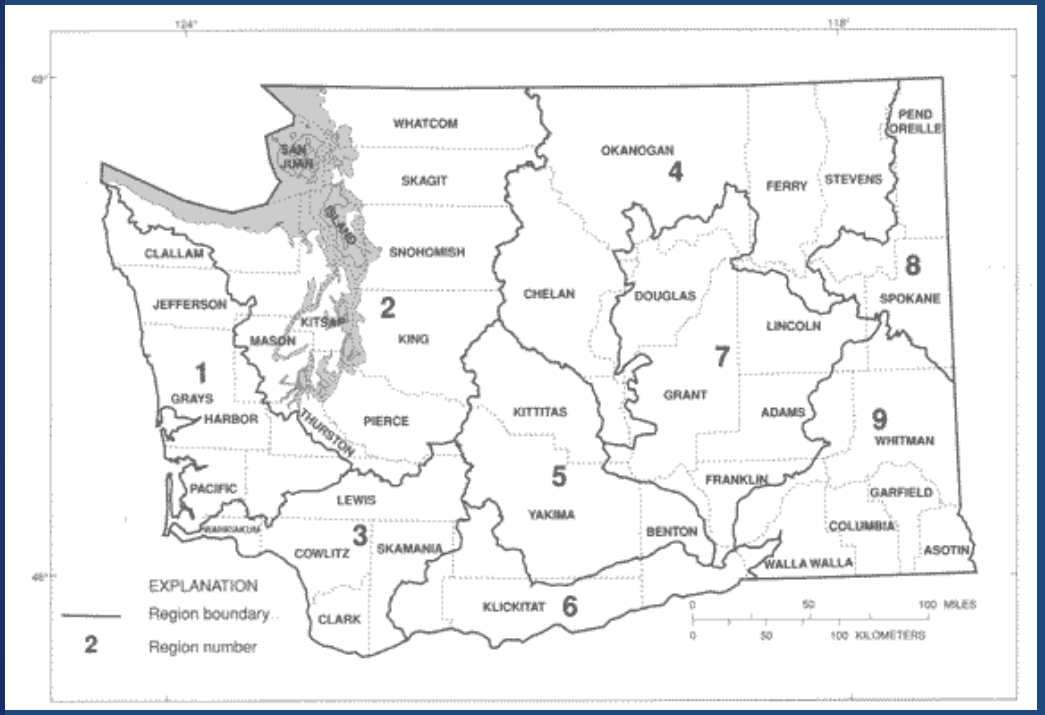
Project Premise

- Assess potential impacts of climate change on federal lands and incorporate projections into management practices
- Estimates of extreme streamflows using physically-based models
- Support protection of fish and wildlife habitat
- Support forest road management

Photos courtesy of Olympic National Park

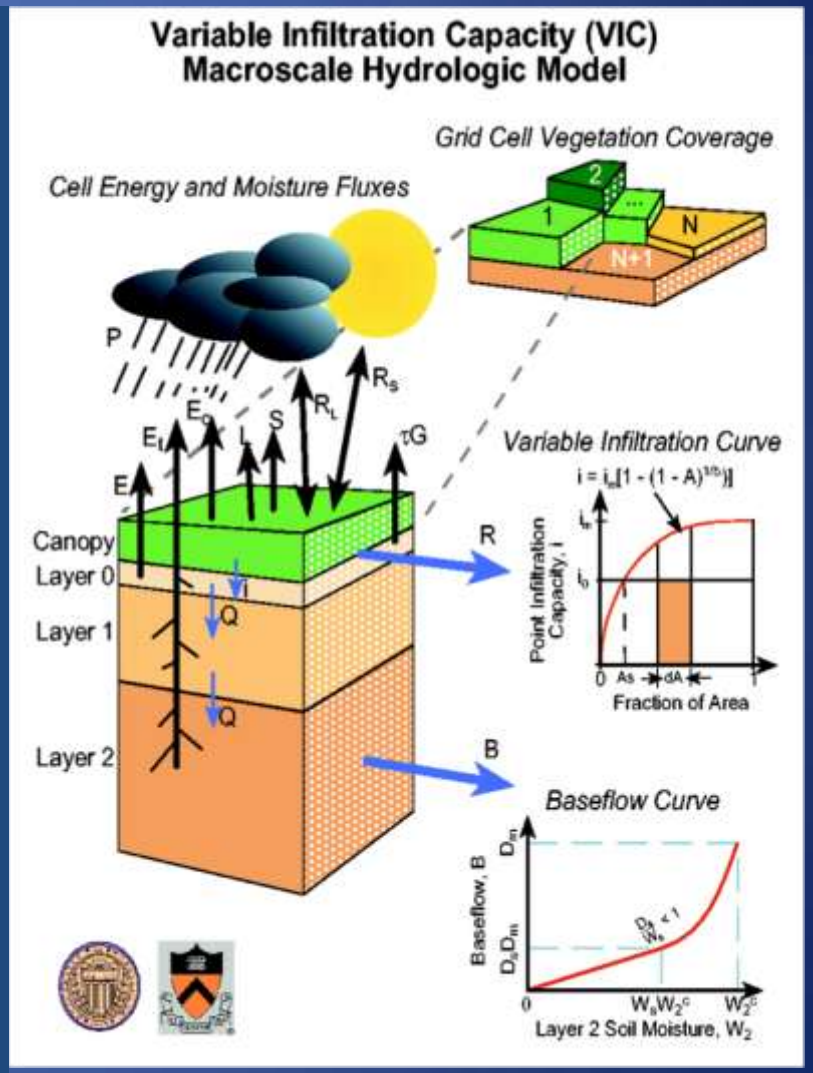
Contrasting Methodologies

USGS Regression-based model



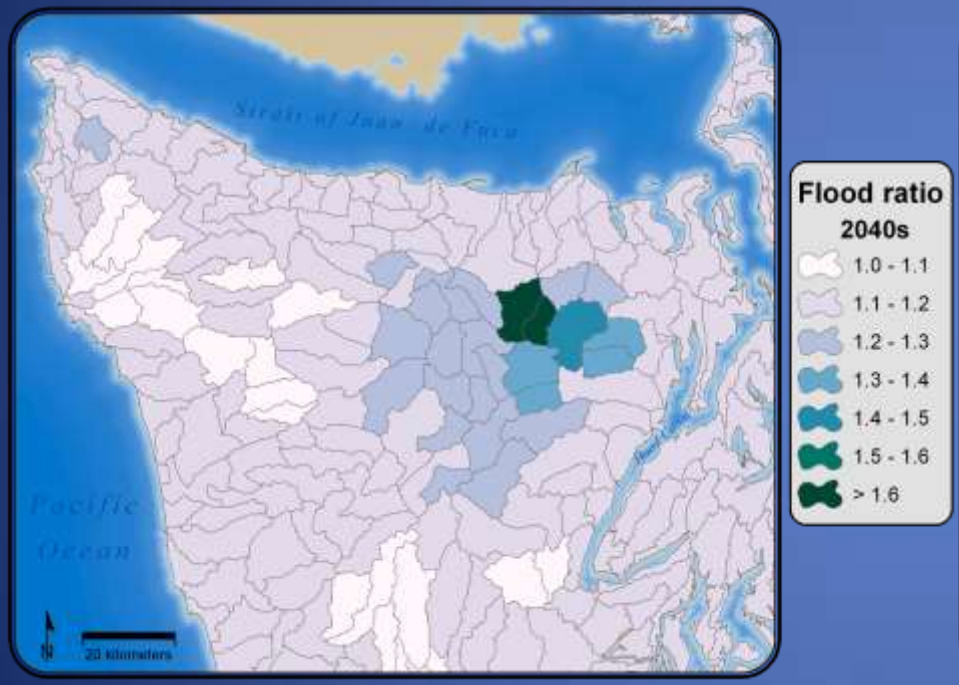
Inputs: Annual precipitation
Basin size & elevation

Aggregate - 12 digit HUCs

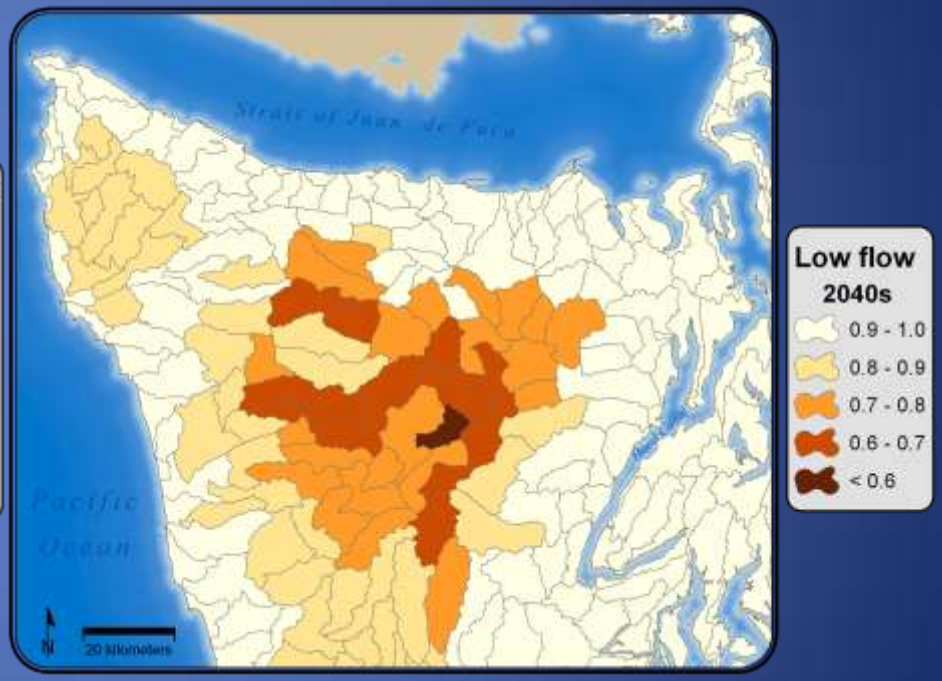


Results for the Olympic Peninsula

100-year Flood Ratio

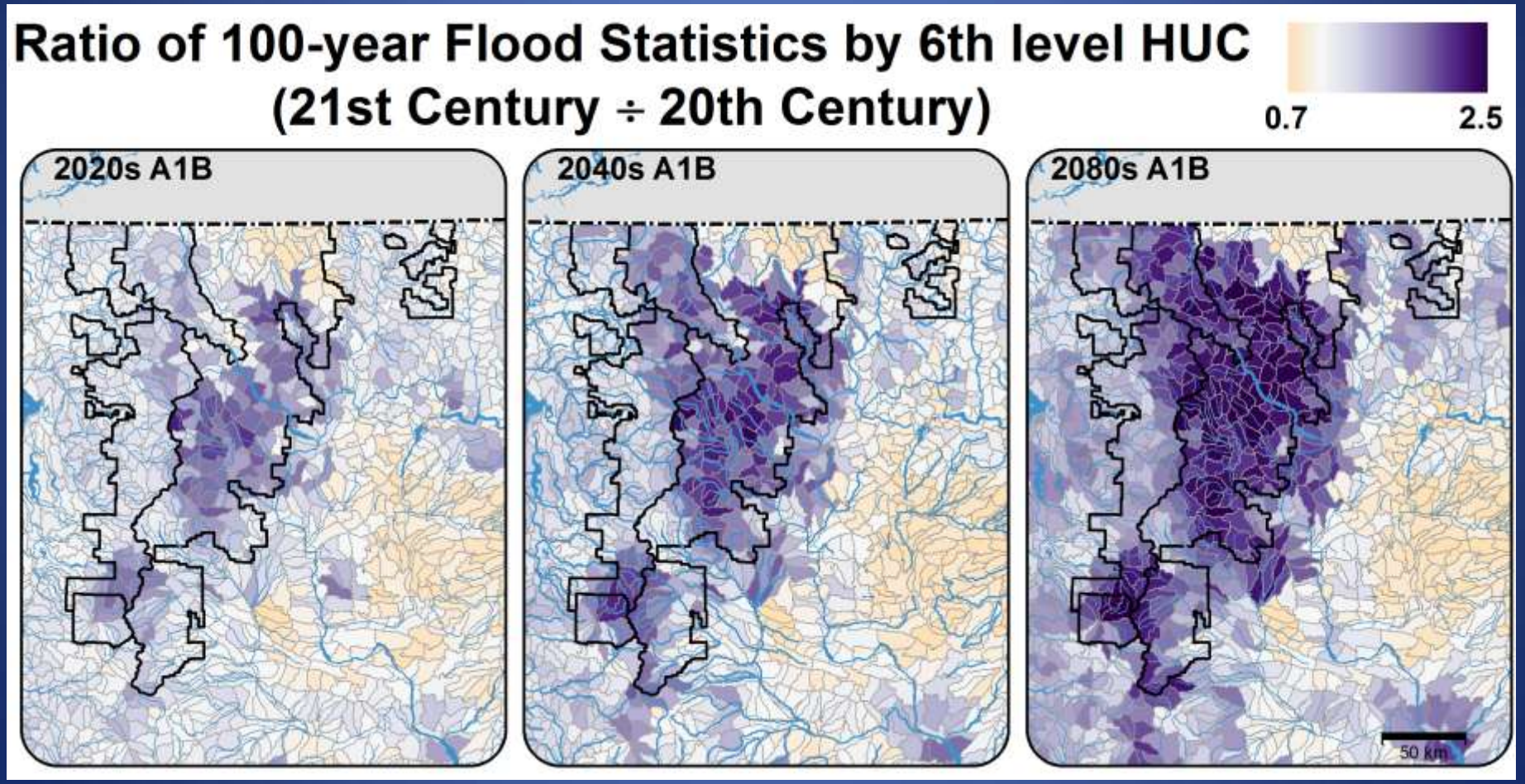


Low Flow Ratio

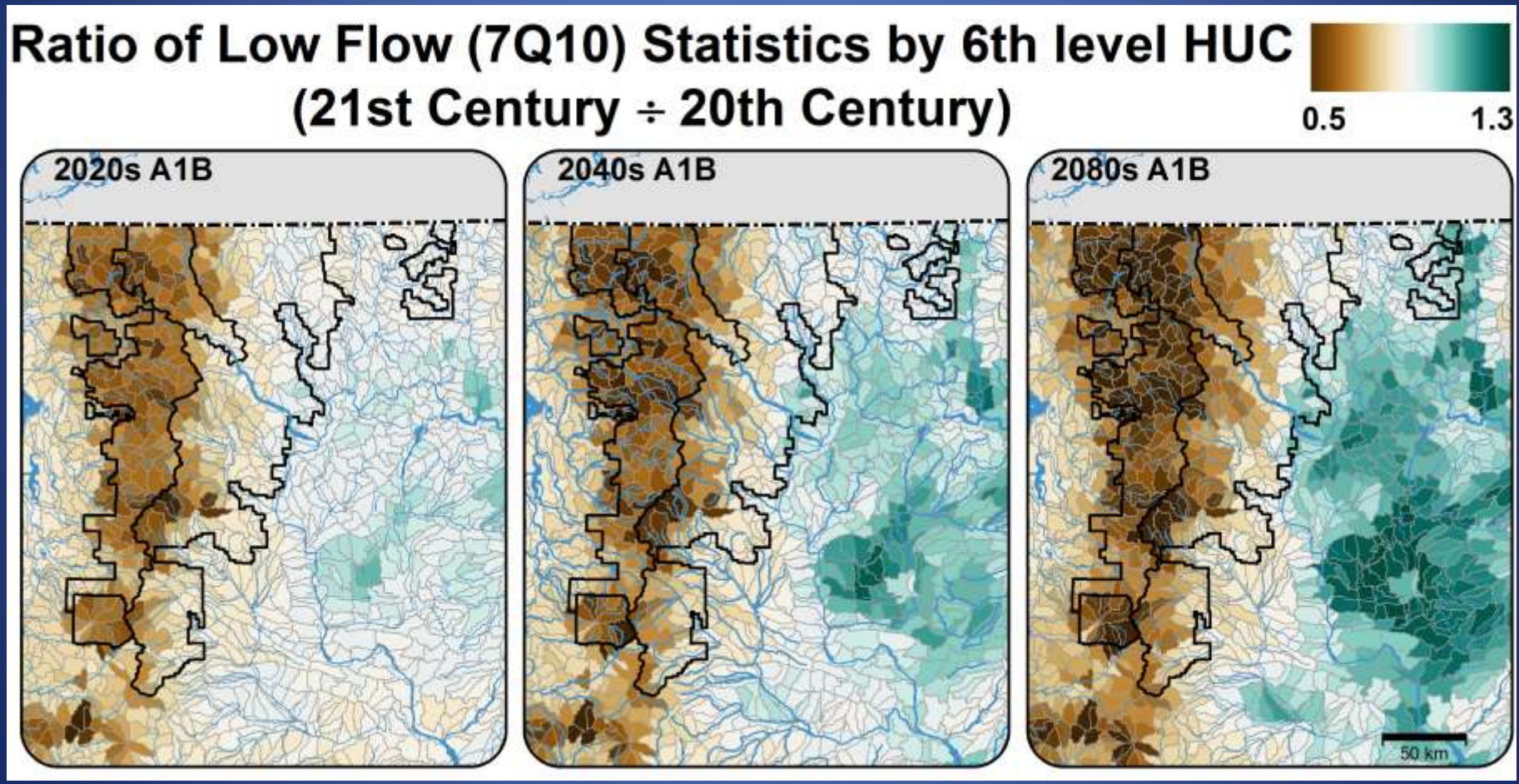


Ratios of the future (A1B 2040s) to historical extreme flow magnitudes indicate spatial shifts projected by climate and hydrologic models

Flood Ratios for NCAP Region



Low Flow Ratios for NCAP Region



Summary Statistics: Low Flow

huc12_7q10_stats_ONP.xls

New Open Save Print Import Copy Paste Format Undo Redo AutoSum Sort A-Z Sort Z-A Gallery Toolbox 100% Zoom Help

Sheets Charts SmartArt Graphics WordArt

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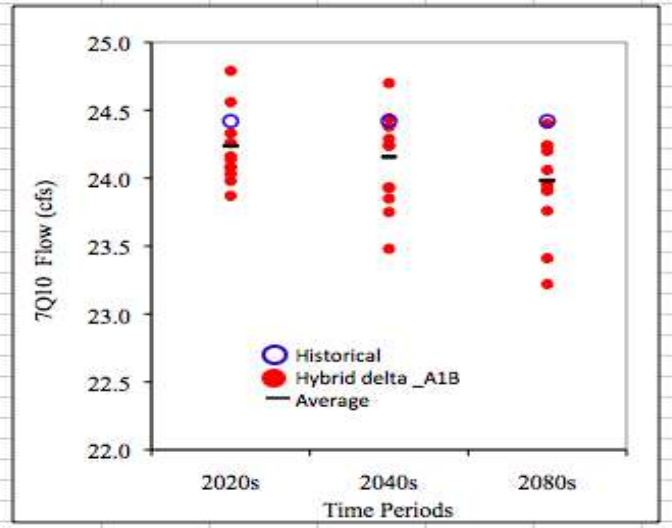
	2	3	4	5	6	7	8	9	10	11	12	
Time periods	historical	ccsm3	cgcm3.1_t4	cnrm_cm3	echam5	echo_g	hadcm	hadgem1	ipsl_cm4	miroc_3.2	pcm1	average
2020s	24.4	24.2	24.6	24.3	24.8	24.0	24.0	23.9	24.3	24.1	24.1	24.2
2040s	24.4	23.9	24.7	24.2	24.4	24.2	23.8	23.5	24.3	24.4	23.9	24.2
2080s	24.4	24.0	24.4	24.2	24.2	23.4	23.2	23.8	24.2	24.1	23.9	24.0



huc12_7q10_2020s_A1B huc12_7q10_2040s_A1B huc12_7q10_2080s_A1

Normal View Ready Sum=0

Summary Statistics: Flood

huc12_flood_stats_ONP.xls

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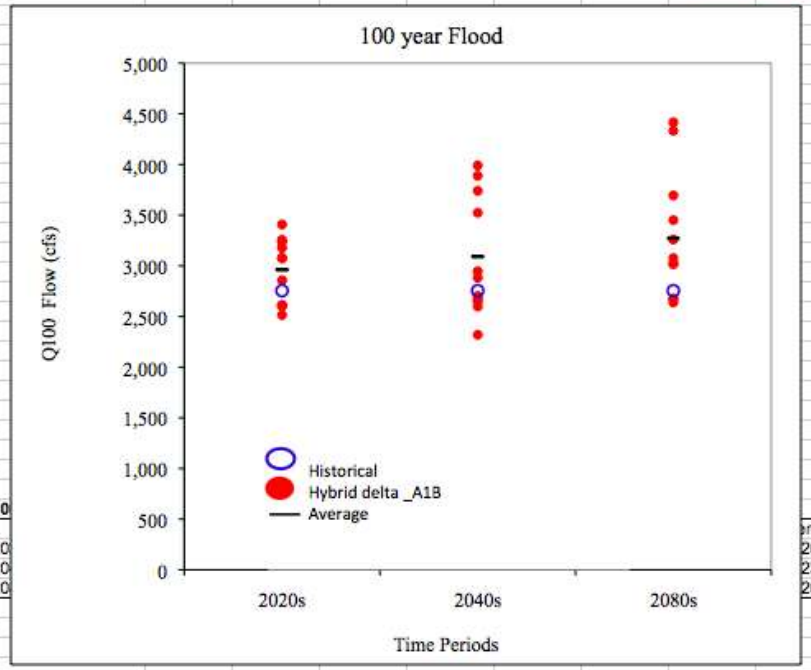
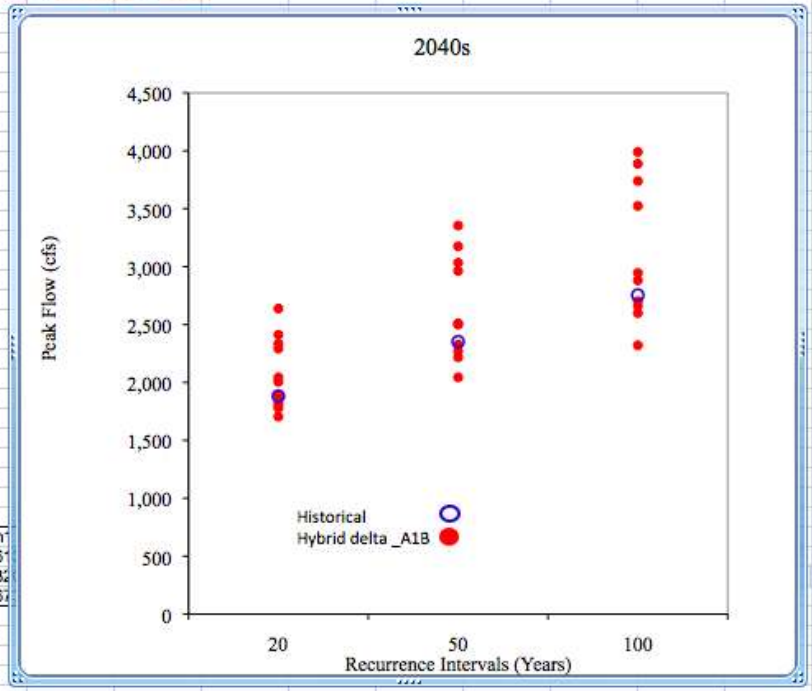
		3	4	5	6	7	8	9	10	11	12	13			3	4	5	6
		16	17	18	19	20	21	22	23	24	25	26			16	17	18	19
2020s		29	30	31	32	33	34	35	36	37	38	39		2040s	29	30	31	32
flood_freq		historical	ccsm3	cgcm3.1_t4	cnrm_cm3	echam5	echo_g	hadcm	hadgem1	ipsl_cm4	miroc_3.2	pcm1	average		historical	ccsm3	cgcm3.1_t4	cnrm_cm3	echa
	20	1882	2080	2172	2197	1790	1865	2098	1879	2197	2165	1815	2013	20	1882	2006	2412	2292	
	50	2352	2613	2744	2829	2182	2387	2620	2281	2758	2705	2239	2519	50	2352	2511	3175	3033	
	100	2754	3072	3238	3408	2514	2857	3079	2613	3256	3178	2606	2962	100	2754	2945	3888	3740	

Note that scale for each time period is not same.





huc12_flood_stats_2040s_A1B | huc12_flood_stats_2080s_A1B | Plot flood_stats | Sheet1

Normal View | Ready | SCRL | CAPS | NUM