



Yolo Bypass Inundation Mapping

**Yolo Bypass Fishery
Enhancement Planning Team
Meeting #9
February 10, 2012**



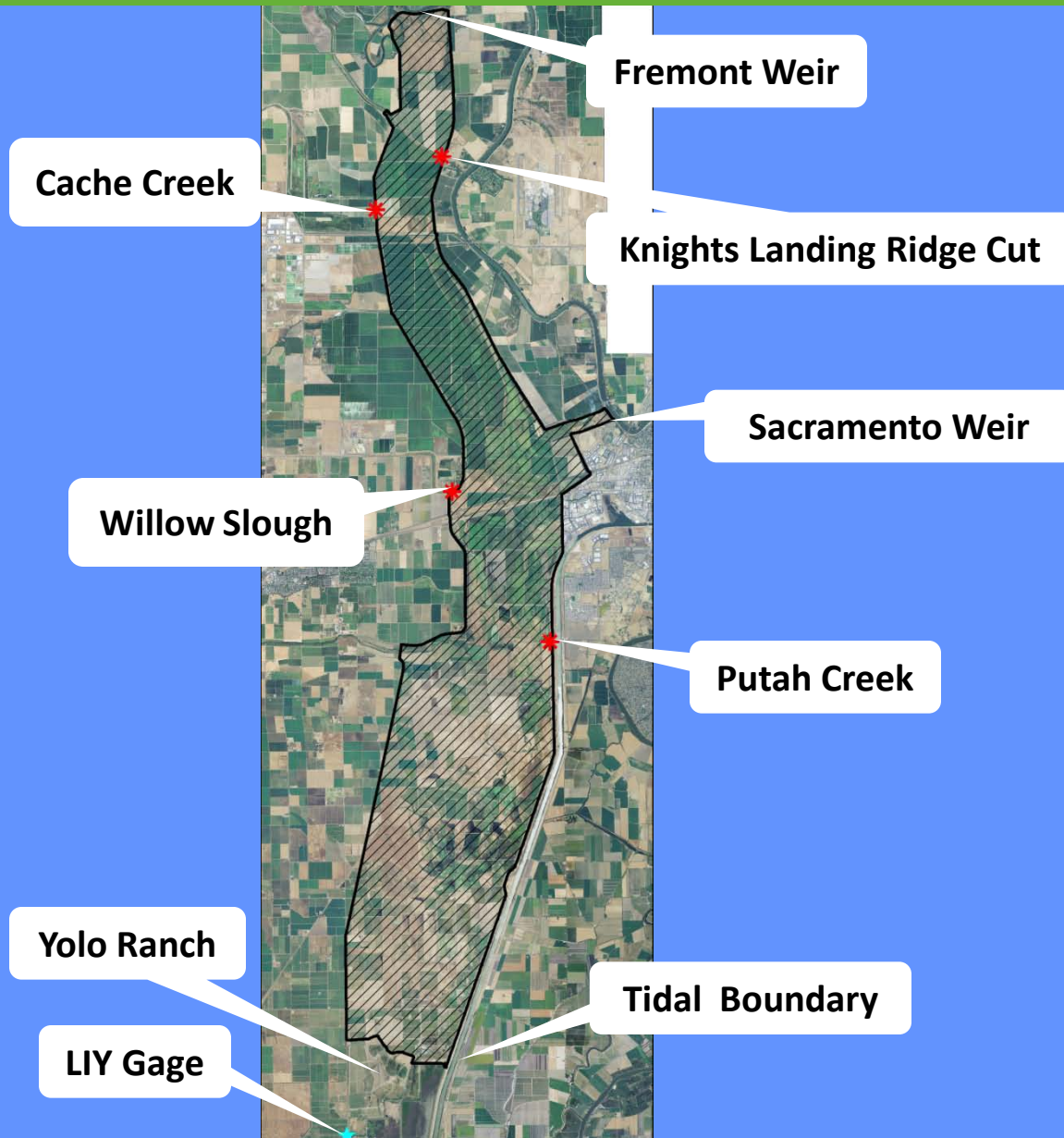
2D Model Development

- Software
 - MIKE 21FM (DHI, 2011)
- Bypass Topography
 - DWR 2005 LiDAR
 - cbec 2009/2010 Tule Canal and Toe Drain bathy
 - No supplemental changes to guide flow on the landscape were modeled
- Roughness
 - USACE 2007 RMA2 values

2D Model Development

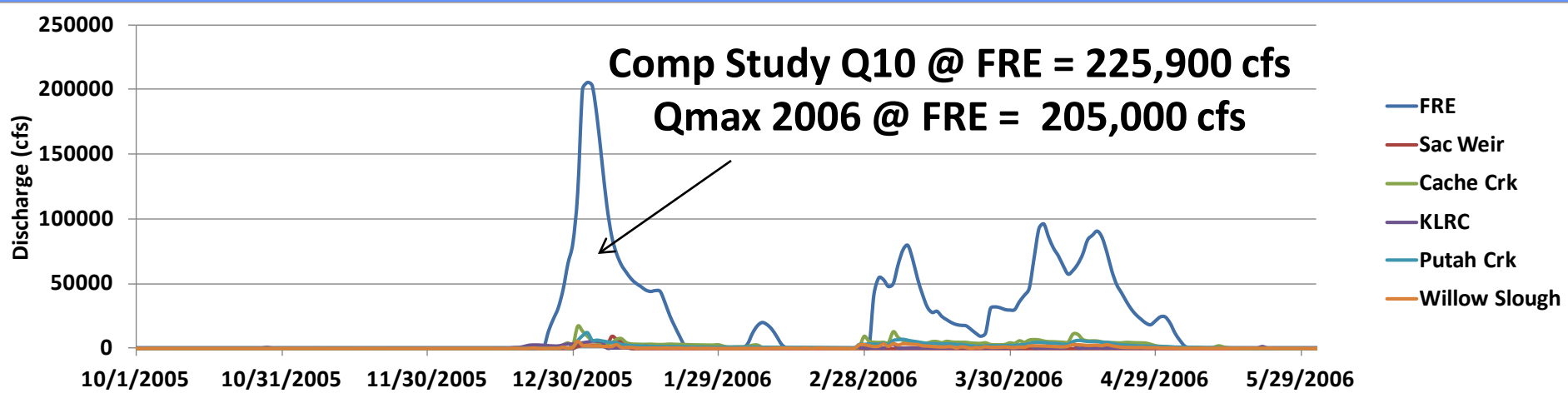
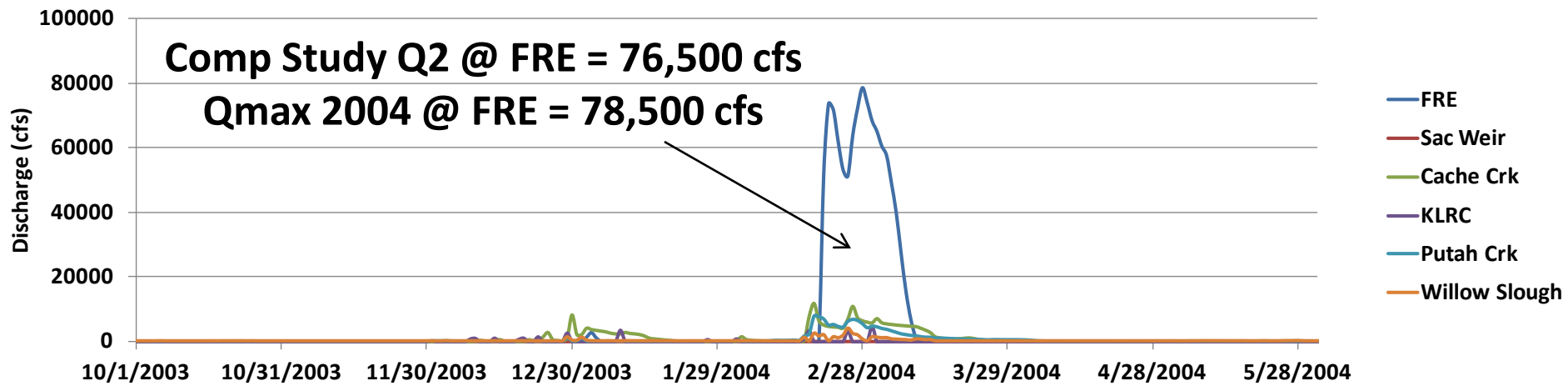
- Hydrology
 - Yolo Bypass Management Strategy (JS/ICF, 2001)
 - cbec updated the dataset for 1999 – 2011
- Tidal boundary
 - Liberty Island – Yolo Bypass gage (LIY)
- Model limitations
 - Calibrated for low flows (1,000 – 3,000 cfs)
 - Depths < 2 inches not reported
 - Standing water not lost

Model Domain and Inflow Locations



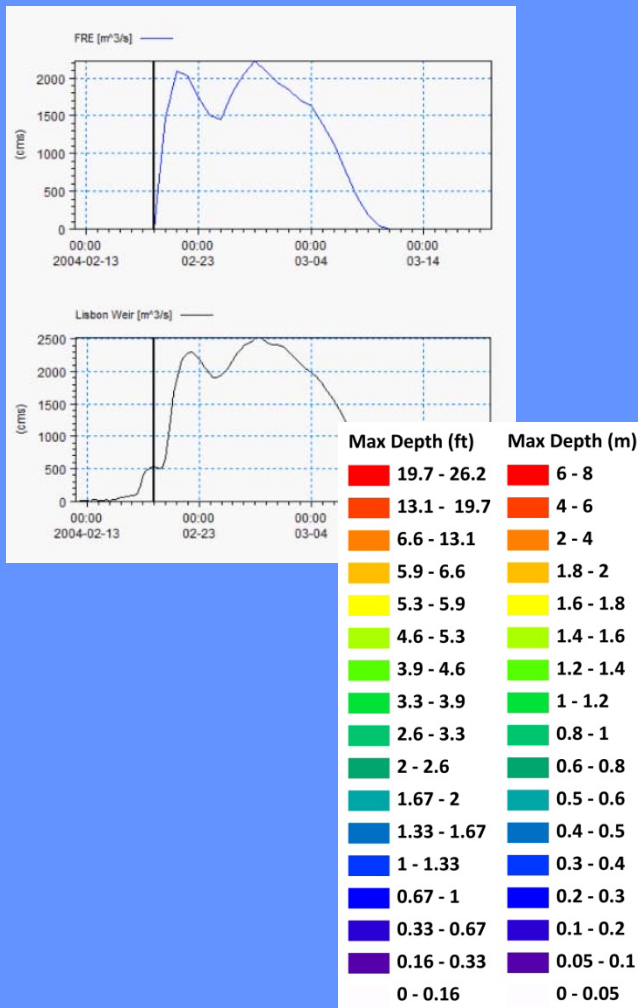
CVFPP Q2 and Q10 Hydrology

- February 2004 event = Q2 surrogate
- January 2006 event = Q10 surrogate



CVFPP 2004 / Q2 Preliminary Results

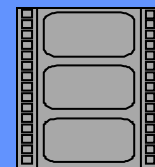
Snapshot from animation after 6 simulated days, pre-wetting before FRE spills



Maximum inundation Extents

- Observed Flow at FRE = 78,500 cfs peak
- Modeled Flow at LIS = 89,000 cfs peak

Modeled discharge extracted at Lisbon Weir

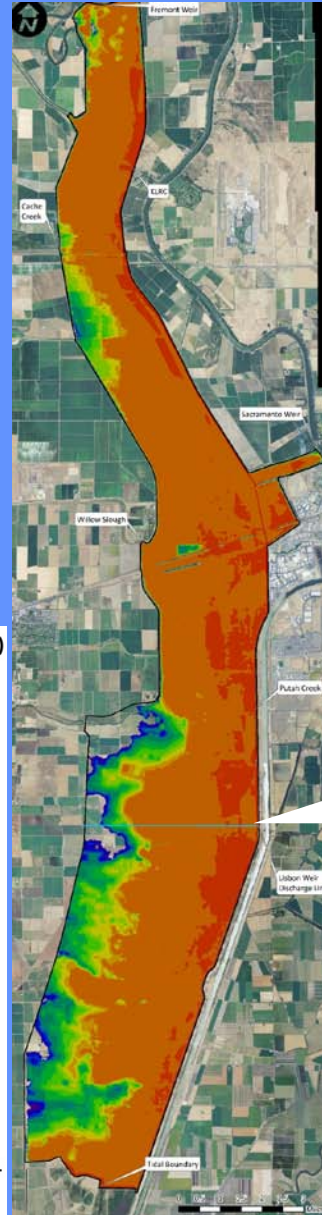
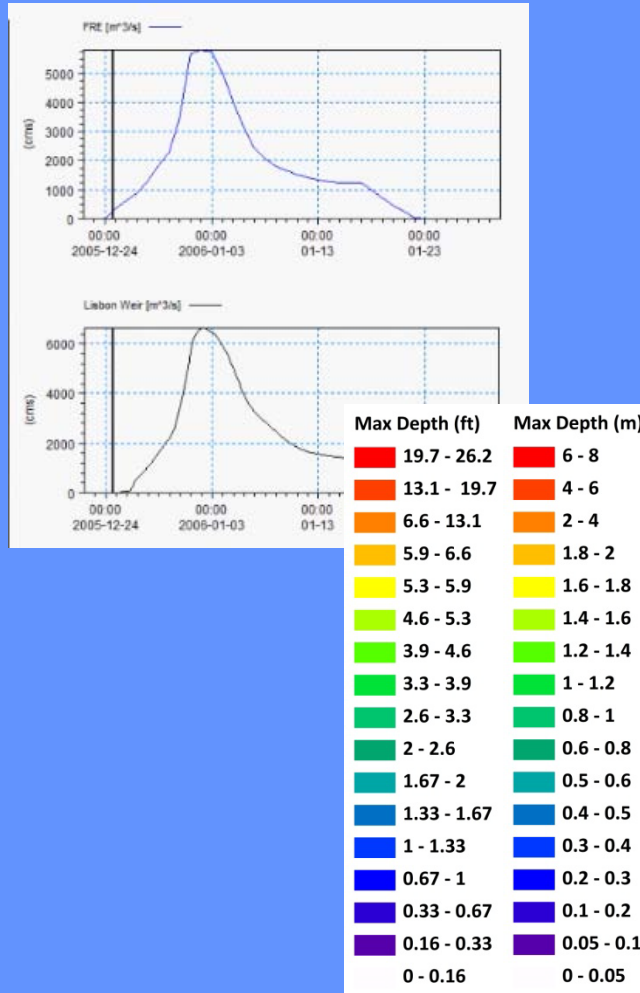


Q2 (2004) Animation

CVFPP 2006 / Q10 Preliminary Results



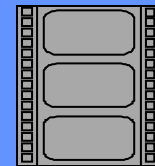
Snapshot from animation after 2.5 simulated days, no pre-wetting before FRE spills



Maximum inundation Extents

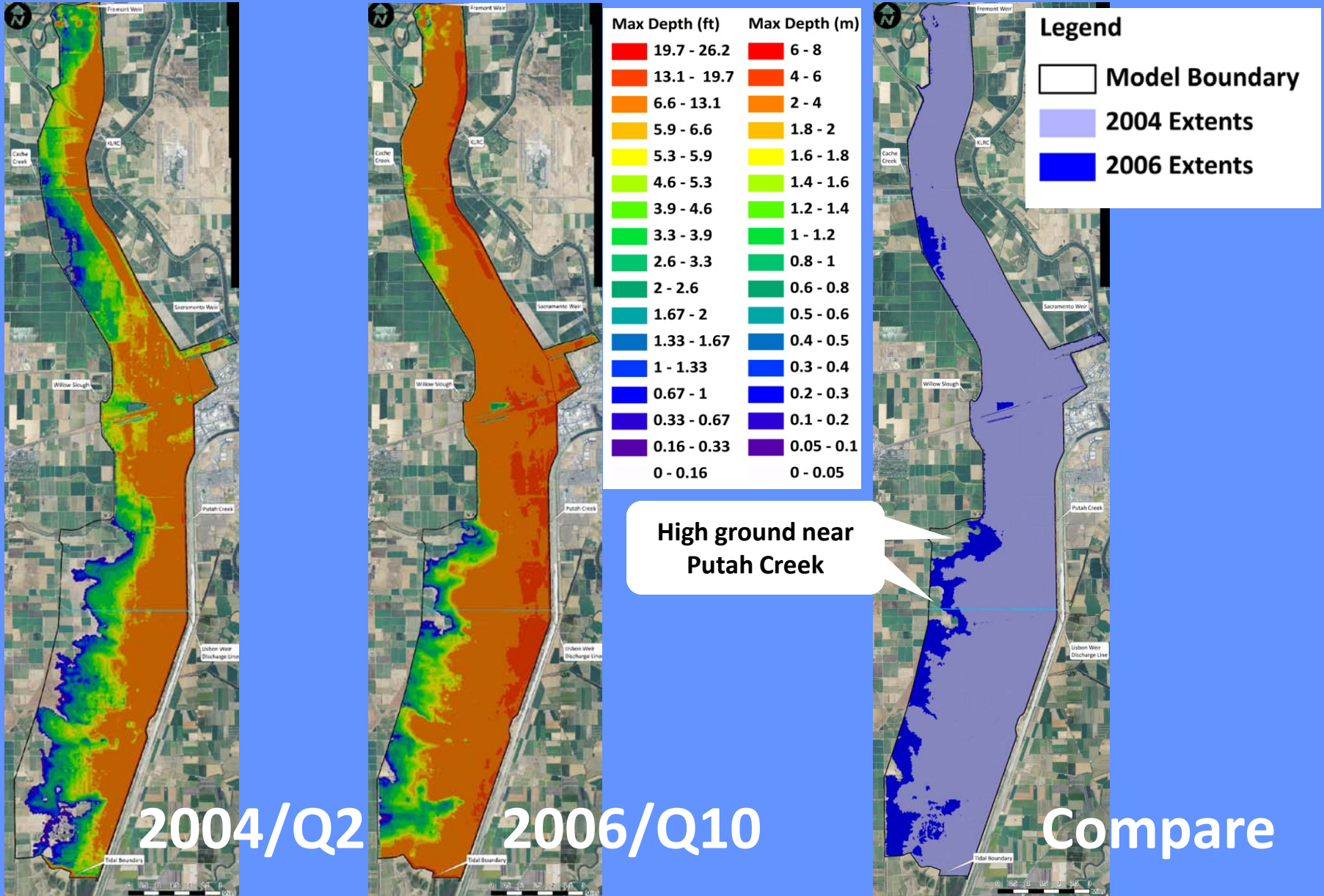
- Observed Flow at FRE = 205,000 cfs peak
- Modeled Flow at LIS = 234,000 cfs peak

Modeled discharge extracted at Lisbon Weir



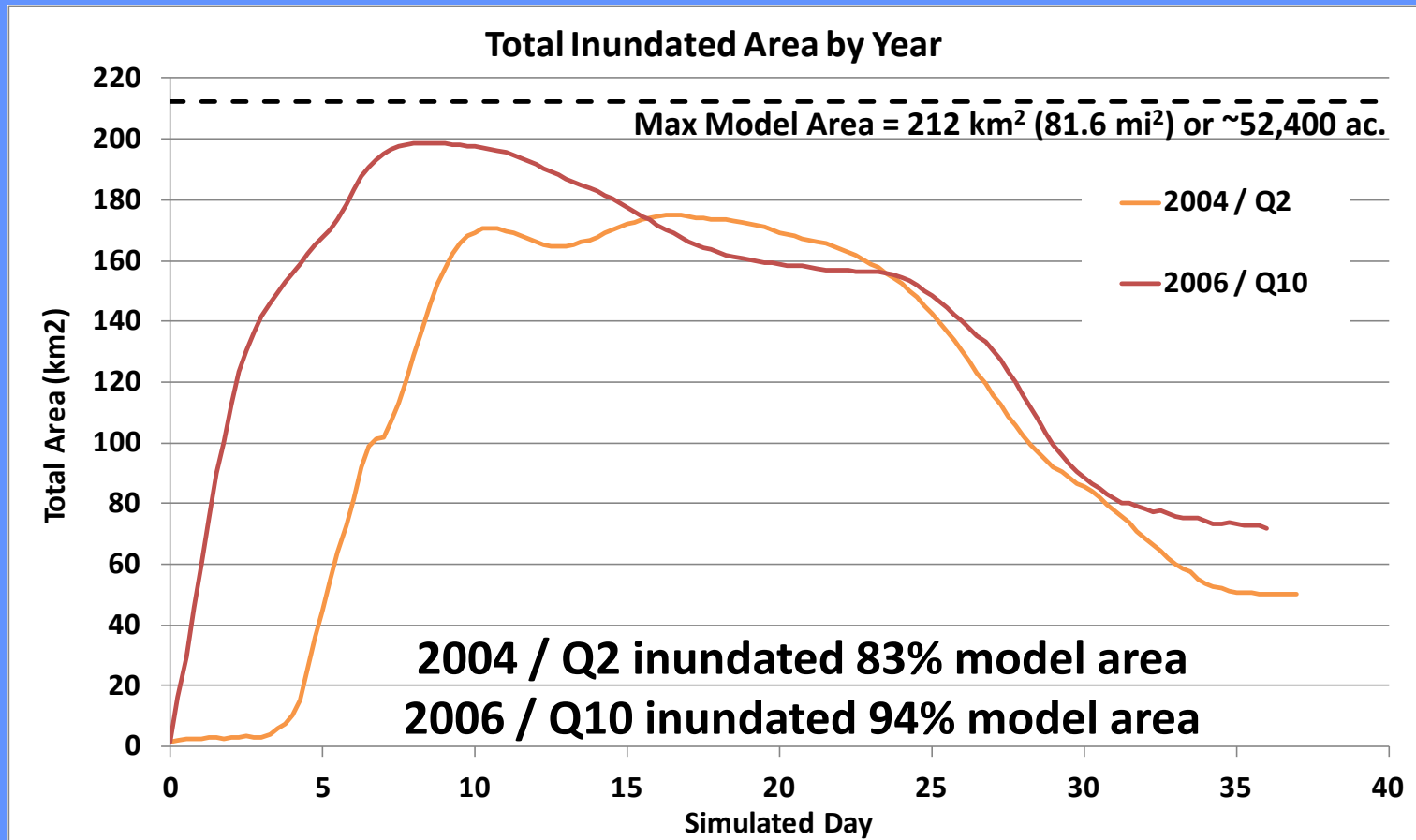
Q10 (2006) Animation

CVFPP Q2 and Q10 Comparison



Maximum Inundation Area

- Q2 = Max of 175 km² (67.6 mi²) or ~43,200 ac.
- Q10 = Max of 199 km² (76.8 mi²) or ~49,150 ac.

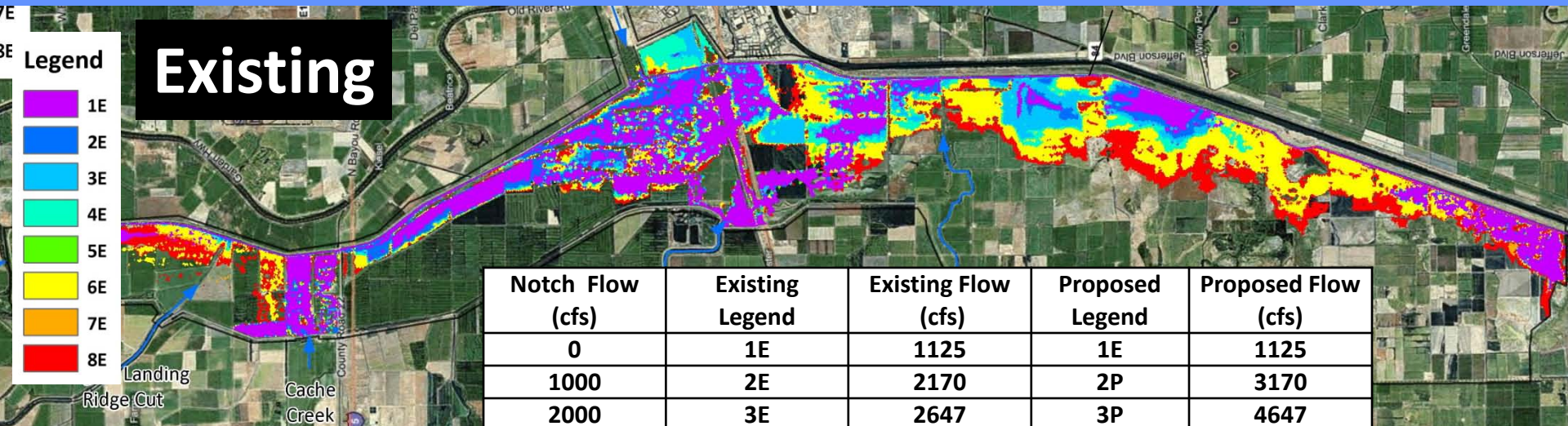


BDCP Effects Analysis Modeling Re-Cap

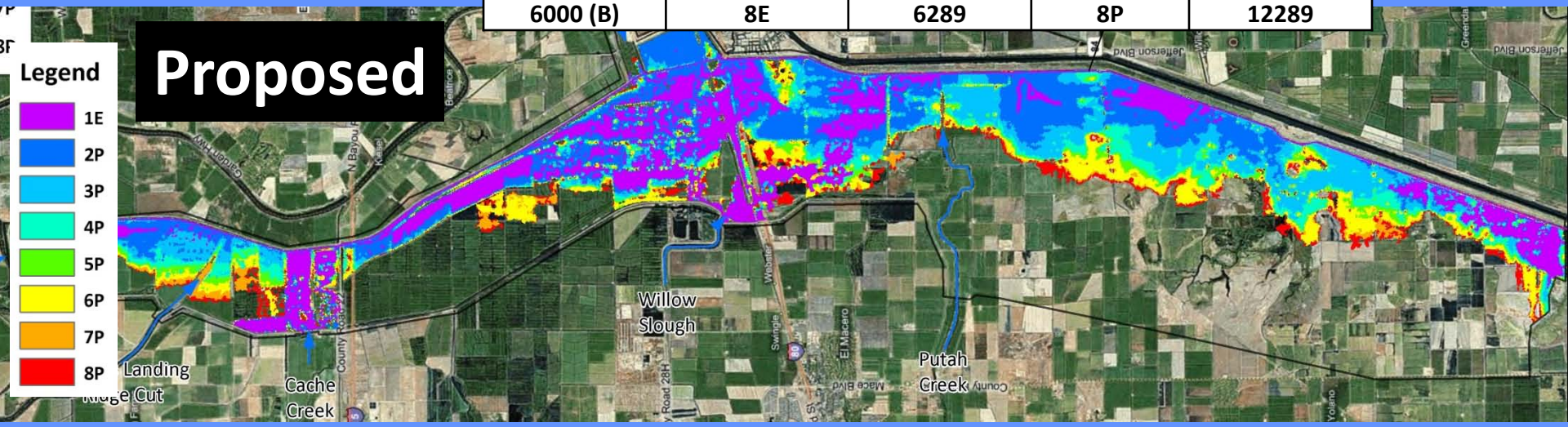
Adapted from Table 3. Average flow conditions from December through March for water years 1968 to 1998 (BDCP Effects Analysis: 2D Hydrodynamic Modeling of the Fremont Weir Diversion Structure, cbec 2010).

Sacramento River Flow at Verona Sampling Range		Restricted Notch Flow	KLRC	Cache Creek	Willow Slough	Putah Creek	West Side Tribs Only		West Side Tribs Plus Notch Flow	
(cfs)		(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	Figure ID	(cfs)	Figure ID	(cfs)
23100	28600	0	364	473	134	154	1E	1125	1E	1125
28600	32550	1000	735	965	179	291	2E	2170	2P	3170
32550	35300	2000	971	1079	213	383	3E	2647	3P	4647
35300	37500	3000	1047	1344	243	439	4E	3073	4P	6073
37500	39200	4000	998	1235	329	415	5E	2976	5P	6976
39200	40750	5000	1359	2227	353	403	6E	4343	6P	9343
40750	42150	6000 (A)	1654	1891	218	273	7E	4037	7P	10037
54000	56000	6000 (B)	1911	3190	428	760	8E	6289	8P	12289

BDCP Effects Analysis Modeling Re-Cap

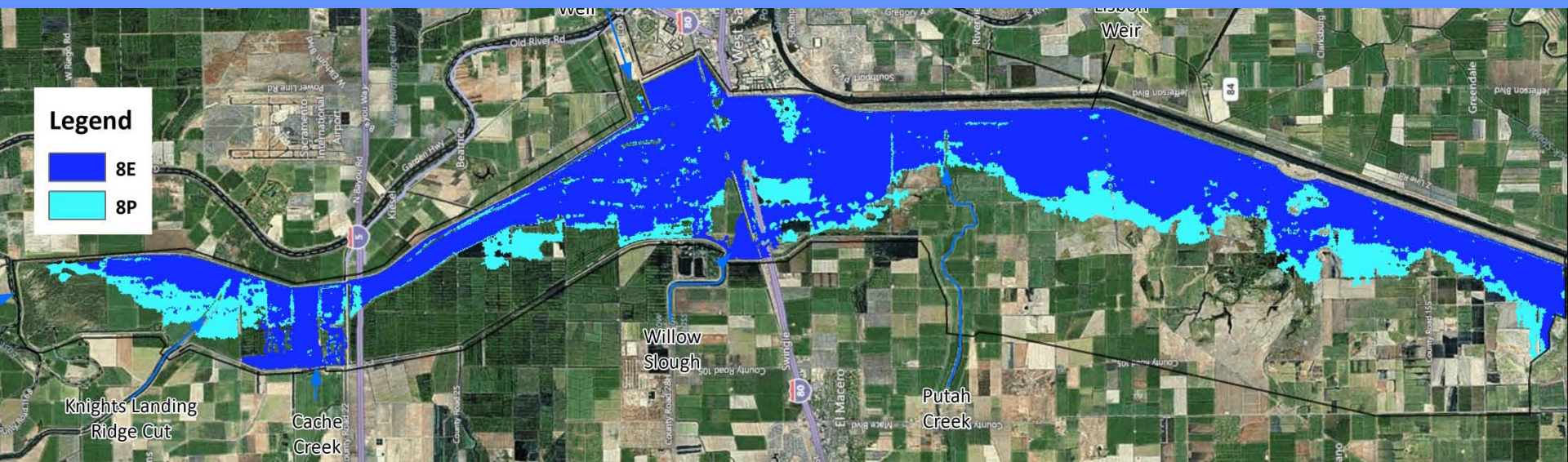


Notch Flow (cfs)	Existing Legend	Existing Flow (cfs)	Proposed Legend	Proposed Flow (cfs)
0	1E	1125	1E	1125
1000	2E	2170	2P	3170
2000	3E	2647	3P	4647
3000	4E	3073	4P	6073
4000	5E	2976	5P	6976
5000	6E	4343	6P	9343
6000 (A)	7E	4037	7P	10037
6000 (B)	8E	6289	8P	12289



BDCP Effects Analysis Modeling Re-Cap

- Existing area = 78 km² (30.1 mi²) or 19,000 ac.
- Proposed area = 102 km² (39.4 mi²) or 25,200 ac.



Notch Flow (cfs)	Existing Legend	Existing Flow (cfs)	Proposed Legend	Proposed Flow (cfs)
6000	8E	6289	8P	12289

Preliminary Conclusions

- Flow propagation variable
- Fremont Weir spills dwarf Westside tributaries
- Relative contributions are event dependent
- Inflow from Westside tribs during “notch” ops
- Putah Creek and KLRC flows introduced on east, so model under-represents existing flooding

Preliminary Conclusions

- 2-year inundation is almost levee to levee
- 10-year event floods 11% more of model area
- Adding 6,000 cfs at notch creates 33% more inundation (6,200 acres)
- Notch 6,000 cfs + existing covers 48% of model (25,200 acres)
- Alternate channel and field configurations would yield different flow patterns