Appendix 11M Inundated Floodplain and Side-Channel Habitat Analysis, including Yolo and Sutter Bypasses

Appendix 11M Inundated Floodplain and Side-Channel Habitat Analysis, including Yolo and Sutter Bypasses

11M.1 Introduction

This appendix includes methods and results for quantifying inundated floodplain habitat in the Yolo and Sutter bypasses and inundated side-channel habitat in the Sacramento River for the No Action Alternative (NAA) and Alternatives 1, 2, and 3. Inundated floodplain habitat is created by flows that spill from the Sacramento River into the Yolo Bypass at the Fremont and Sacramento Weirs and into the Sutter Bypass at Ord Ferry and at the Moulton, Colusa, and Tisdale Weirs. Inundated side-channel habitat is created by high flows in the Sacramento River that flood side channels along the main river channel. In addition to estimating acreage of suitable habitat available under the NAA and Alternatives 1, 2, and 3, this appendix provides an analysis of the frequency, duration, and flow of weir spills into the Yolo and Sutter Bypasses. Inundated floodplain and side-channel habitat habitats are important for early life stages of several fish species in the Sacramento River and its tributaries, especially Chinook salmon (*Oncorhynchus tshawytscha*), steelhead (*Oncorhynchus mykiss irideus*), and Sacramento splittail (*Pogonichthys macrolepidotus*). Juvenile Chinook salmon and steelhead use inundated habitat for juvenile rearing, and Sacramento splittail use it for spawning and for larval and juvenile rearing. The analysis of weir spills provides information on the possibility of fish entering the bypasses via weir spills, which is an important avenue by which juvenile salmonid access the bypasses (Acierto et al. 2014). Because of their regulatory importance and their heavy reliance on inundated off-channel habitat, this appendix focuses on the three species listed above.

11M.2 Methods

11M.2.1 Bypass and Side-Channel Inundated Habitat Area

This analysis examines the surface area of suitable inundated floodplain and side-channel habitat that would be available under the NAA and Alternatives 1, 2, and 3. Inundated habitat with depths up to 1 meter, which correspond to optimal depths for rearing salmonids and steelhead in the Sacramento River drainage, was considered suitable for rearing salmonids and Sacramento splittail (Aceituno 1993; Hampton 1997; Sommer et al. 2002; U.S. Fish and Wildlife Service 2005; Merced Irrigation District 2013; Whipple et al. 2019). Note that splittail also spawn on inundated floodplains and side channels with depths from about 0.5 meter to 2 meters (Moyle 2002:149; Merced Irrigation District 2013). Flow velocity was not explicitly modeled because previous modeling showed that almost all inundated habitat in the bypasses has flows less than 1.5 feet per second (Attachment 1), which is optimal for rearing salmonids and splittail (U.S. Fish and Wildlife Service 2005; Merced Irrigation District 2013; Whipple et al. 2019).

Daily estimates of the surface area of suitable inundated habitat were generated from HEC-RAS model runs using daily flow data (Upper Sacramento River Daily Operations Model [USRDOM]) for the NAA and Alternatives 1, 2, and 3. Yolo Bypass habitat area was estimated from flow spills at the Fremont and Sacramento Weirs, plus monthly westside stream flows disaggregated into daily flows using the historical flow patterns. Sutter Bypass habitat area was estimated using flows entering the Sutter Bypass from the Sacramento River at Ord Ferry and the Moulton, Colusa, and Tisdale Weirs. Inundated side-channel habitat was estimated for three reaches of the upper Sacramento River: Reach 1 – Bend Bridge to Hamilton City; Reach 2 – Hamilton City to Colusa; and Reach 3 – Colusa to Knights Landing. The Reach 1 flow was computed as the flow at Bend Bridge minus the diversion flows at Red Bluff and Hamilton City. The Reach 2 and Reach 3 flows are the flows at Hamilton City and Colusa, respectively. Flow versus habitat area curves were developed from the HEC-RAS modeling results (Figure 11M-1 through Figure 11M-5). The HEC-RAS modeling of habitat inundation area uses steady state-like flow conditions lasting 8 days or more. As a result, daily inundation areas were calculated based on the 8-day running averages of flow throughout the 82-year simulated flow data record, excluding the first 8 days. Note that suitable habitat plateaus in the Yolo Bypass at flows between about 4,000 cubic feet per second (cfs) and 11,000 cfs and in the Sutter Bypass at flows between 1,000 cfs and 3,000 cfs. Higher flows reduce the acreage of suitable habitat as the area of inundation with depth less than 1 meter declines. Note also that HEC-RAS model was focused on high flow conditions to evaluate flow over Fremont Weir and was not tailored to low-flow conditions.

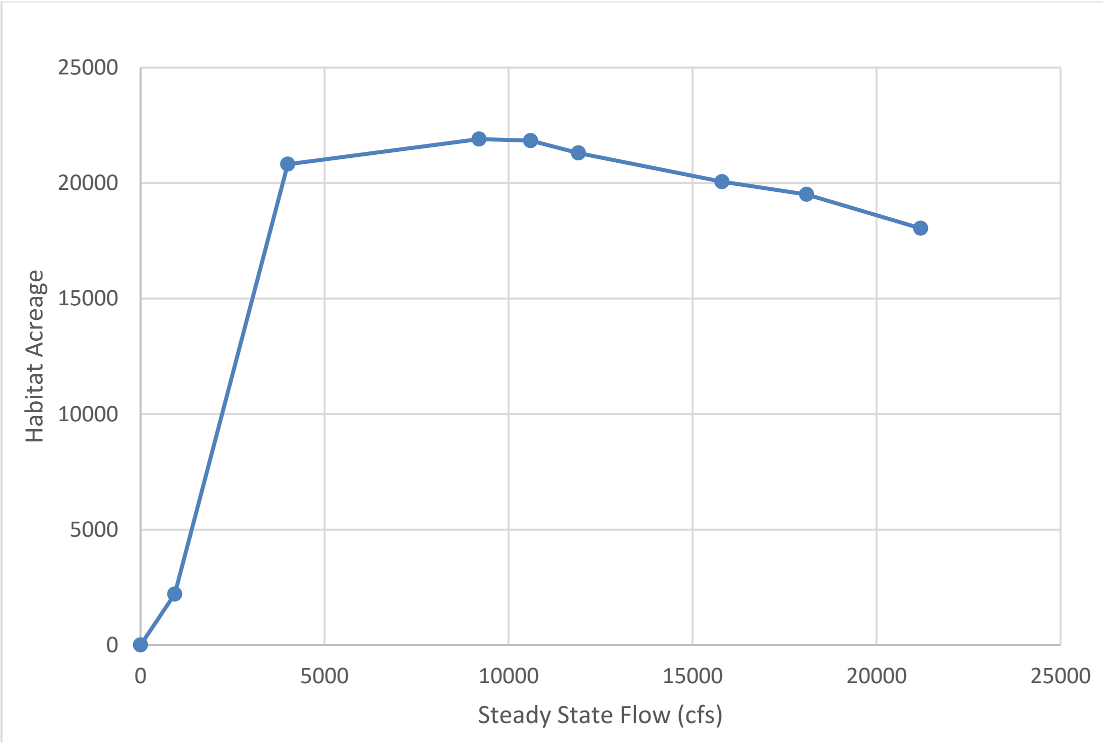


Figure 11M-1. Yolo Bypass Suitable (<1 Meter Deep) Habitat Acreage versus Total Bypass Flow.

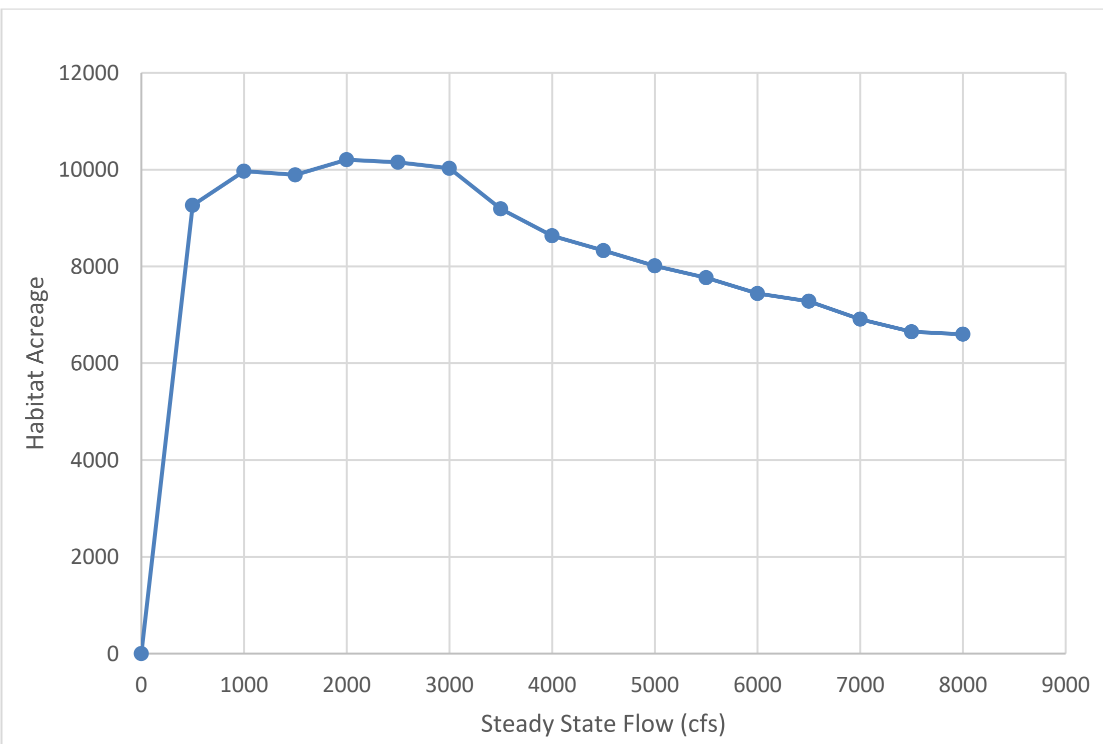


Figure 11M-2. Sutter Bypass Suitable (< 1 Meter Deep) Habitat Acreage versus Total Bypass Flow.

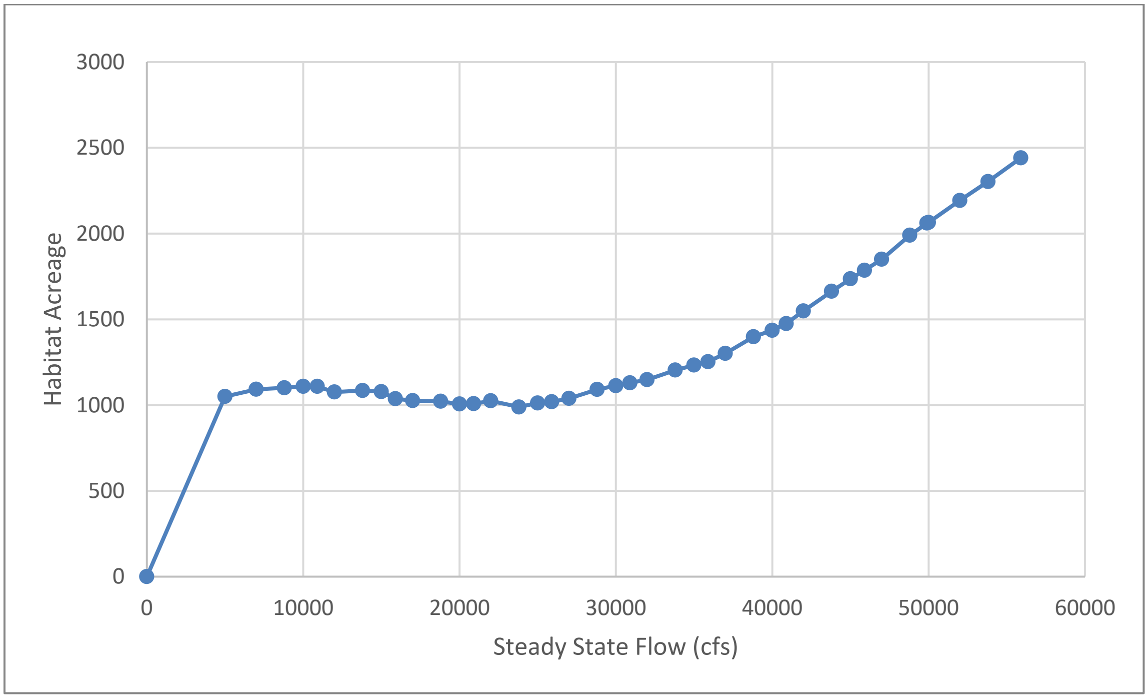


Figure 11M-3. Sacramento River Reach 1 (Bend Bridge to Hamilton City) Side-Channel Suitable (< 1 Meter Deep) Habitat Acreage versus Bend Bridge Flow (minus Red Bluff and Hamilton City Diversions).

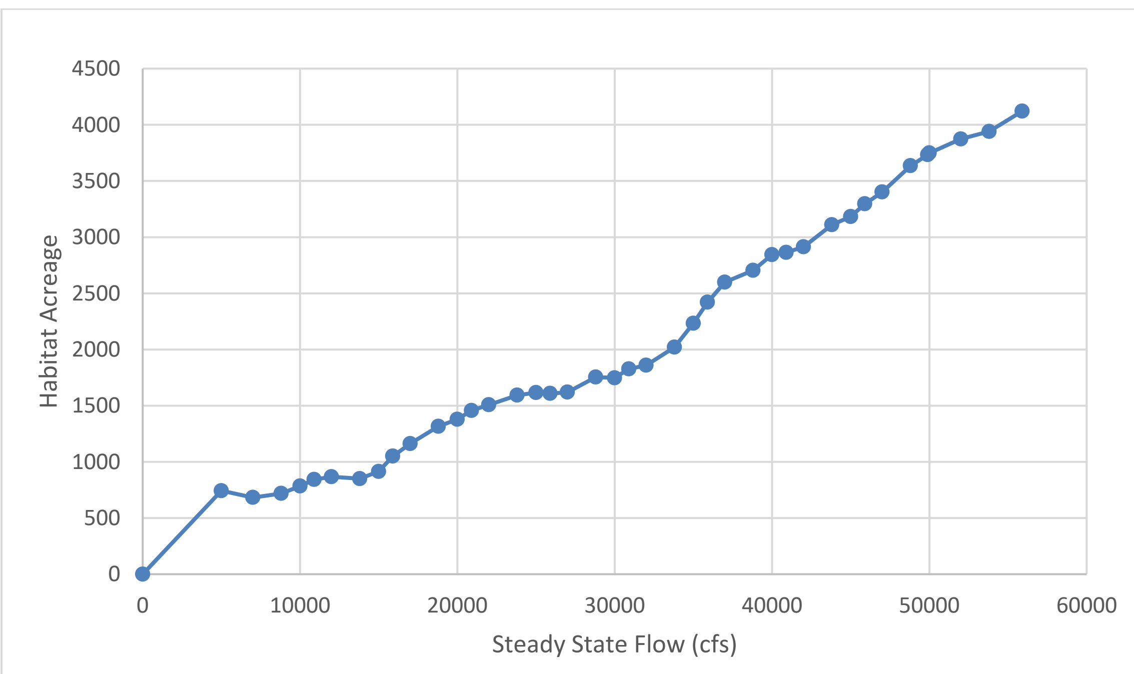


Figure 11M-4. Sacramento River Reach 2 (Hamilton City to Colusa) Side-Channel Suitable (< 1 Meter Deep) Habitat Acreage versus Hamilton City Flow.

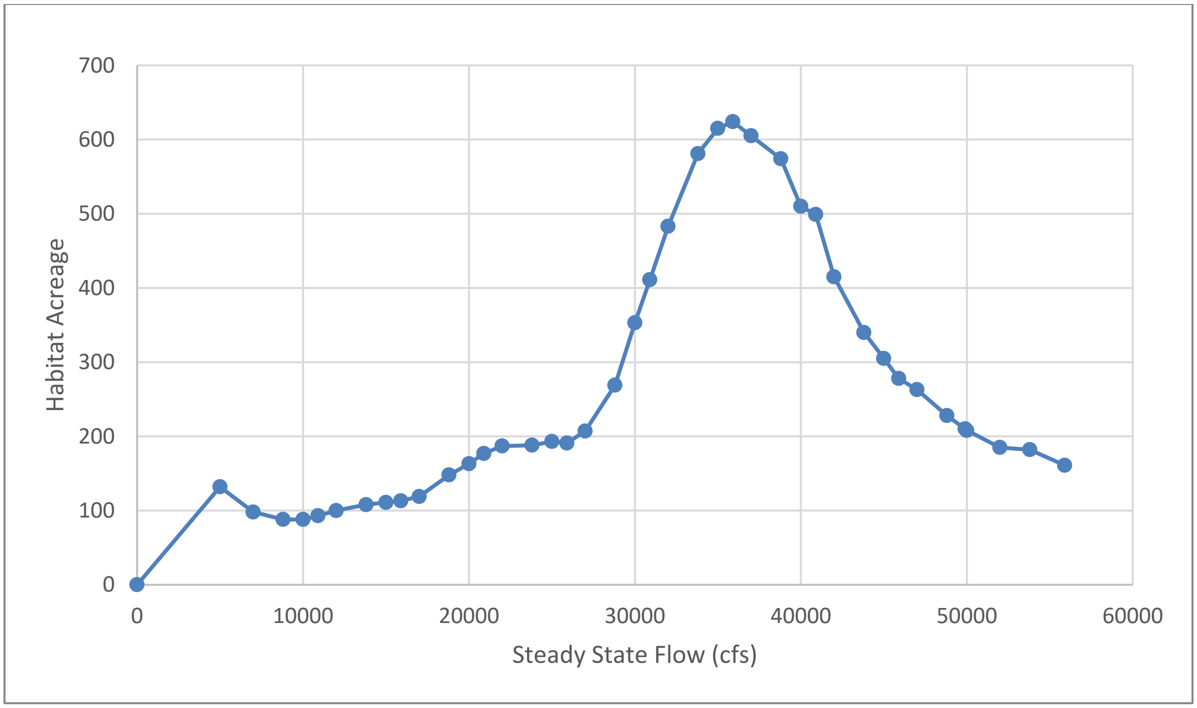


Figure 11M-5. Sacramento River Reach 3 (Colusa to Knights Landing) Side-Channel Suitable (< 1 Meter Deep) Habitat Acreage versus Colusa Flow.

In addition to the estimates of daily habitat acreage, frequencies of inundation events of different acreages and durations were estimated for the NAA and Alternatives 1, 2, and 3. For durations, the events were grouped into ranges: 8–17 days; 18–24 days; and over 24 days. For acreages, the events were grouped into different ranges for the three different regions (Yolo Bypass, Sutter Bypass, and Sacramento River side channels) analyzed, with the Yolo Bypass having categories with the largest acreages and the Sacramento River having categories with the smallest acreages.

11M.2.2 Bypass Flow and Weir Spill

As discussed in the introduction, most juvenile salmonids likely enter the bypasses via weir spills (Acierto et al. 2014). The frequency, duration, and volume of the spills characterize the frequency and size of juvenile salmonid movements into the bypasses via the weir spills. Note, however, that the total flow in the bypass is not always a good indicator of suitable habitat availability, as shown in Figures 11M-1 and 11M-2.

11M.2.2.1. Yolo Bypass

The number of years in the 82-year simulation period with at least one Fremont Weir spill event of varying sizes (0; 2,000; 4,000; 6,000; 8,000; and 10,000 cfs) with a duration of 0–10 days, 11–20 days, 21–30 days, 31–45 days, and over 45 days are calculated from the daily flow results. This analysis was limited to the October through April period in which juvenile salmonids and spawning splittail could be present in the Yolo Bypass.

Daily total Yolo Bypass flow results used in the current analysis were estimated using the daily CALSIM II outputs of flow spills at Fremont and Sacramento Weirs, and monthly west-side stream flows disaggregated into daily flows using the historical flow patterns.

Daily Fremont Weir spill output from CalSim II was used in this analysis. Daily outputs from CalSim II were based on a monthly-to-daily flow mapping technique applied in the model for a better representation of flows and spills along the Sacramento River between Red Bluff and Freeport. More information regarding CalSim II's incorporation of daily variability is included in Appendix 5A7, *Daily Pattern Development for the Estimation of Daily Flows and Weir Spills in CalSim II*.

11M.2.2.2. Sutter Bypass

Similar to the methodology used for the Yolo Bypass, modeled daily spill into the Sutter Bypass from the Sacramento River at Ord Ferry and the Moulton, Colusa, and Tisdale Weirs was used to examine the frequency, duration, and flow of total spill into the Sutter Bypass that could provide rearing habitat for salmonids and splittail. Spill (flow) at Ord Ferry, Moulton Weir, and Colusa Weir were combined to assess potential changes in the northern portion of the Sutter Bypass; total spill at Ord Ferry and the Moulton, Colusa, and Tisdale Weirs was combined to assess potential impacts in the central portion of the bypass; and total flow through the bypass was used as an indicator of potential changes in floodplain habitat in the southern portion of the bypass. The number of years where there is at least one event of spill over the weirs into the Sutter Bypass of varying amounts (0; 2,000; 4,000; 6,000; 8,000; and 10,000 cfs) with a duration of 0–10 days, 11–20 days, 21–30 days, 31–45 days, and greater than 45 days was calculated from the daily results. This analysis was limited to the October through April period in which juvenile salmonids are anticipated to enter the Sutter Bypass.

11M.3 Results

11M.3.1 Yolo Bypass Weir Spill Events and Inundated Floodplain Habitat Area

Results for Yolo Bypass Fremont Weir spill events are provided in Attachment 2, Table 1. The results suggest that Alternatives 1, 2, and 3 would have fewer days of Fremont Weir spill than the NAA, especially for the shorter duration flows (less than 20 days). Opportunities for juvenile salmonids to enter the Yolo Bypass for rearing are therefore somewhat reduced under Alternatives 1, 2, and 3 relative to the NAA.

Takata et al. (2017) examined various juvenile Chinook salmon biological responses to Yolo Bypass flooding, which they defined as the number of days from January through June with daily mean flows at the downstream end of Yolo Bypass greater than 4,000 cfs; this is the flow at which floodplain inundation occurs. Takata et al. (2017) found that growth and floodplain residence of coded-wire-tagged juvenile Chinook salmon and catch per unit effort of wild juvenile Chinook salmon are significantly positively related to the annual duration of Yolo Bypass flooding (Takata et al. 2017: Figures 3 and 4c). Daily-downscaled CALSIM modeling suggests that operations under Alternatives 1, 2, and 3 may reduce Yolo Bypass inundation from January through June by approximately 1 day across most water year types (Table 11M-1). Given the variability in the observed biological relationships indicated by the spread in the data

(Takata et al. 2017: Figures 3 and 4c), and no significant difference in survival to capture in ocean fisheries between coded-wire-tagged juvenile Chinook salmon released in the Yolo Bypass and those released at the same time in the Sacramento River (Takata et al. 2017), the small differences in Yolo Bypass inundation indicated by the CALSIM modeling suggest that Alternatives 1, 2, and 3 are limited in their potential for negative effects on juvenile Chinook salmon, including winter-run.

Table 11M-1. Mean Annual Number of Days in January–June With Yolo Bypass Floodplain Inundation by Alternative and Water Year Type.

Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
Wet	71	70 (-2%)	70 (-2%)	70 (-2%)	70 (-2%)
Above Normal	52	51 (-2%)	51 (-2%)	51 (-2%)	52 (-1%)
Below Normal	19	18 (-4%)	18 (-4%)	18 (-4%)	18 (-4%)
Dry	8	7 (-7%)	7 (-7%)	7 (-7%)	7 (-7%)
Critically Dry	4	4 (-2%)	4 (-2%)	4 (-2%)	4 (-2%)

Note: Percentage values in parentheses indicate differences of alternatives compared to NAA. Floodplain inundation is Yolo Bypass flow >4,000 cfs per Takata et al. (2017).

The modeling results of Yolo Bypass inundated suitable habitat show considerable increases in mean daily habitat acreage under Alternatives 1, 2, and 3 relative to the NAA during August through October (Table 11M-2). Note, however, that these increases may be overestimated because the HEC-RAS model used for the inundation evaluation was focused on high flow conditions to evaluate flow over Fremont Weir and was not tailored to summer, low-flow conditions. These increases are the result of planned agricultural flow releases from Sites Reservoir. The releases reach the Yolo Bypass via the CBD, entirely bypassing the Sacramento River. For this reason and because of the months in which they occur, these summer–fall increases in habitat acreage have no effect on most of the fish species of management concern that use the Yolo Bypass for spawning and rearing habitat in the winter and spring. Note that for convenience in locating results of the Alternatives 1, 2, and 3 with the largest differences from the NAA, results with >5% increases or reductions in habitat area are flagged with green or red highlighting, respectively. This convention is used in all the results tables below (Table 11M-2 through Table 11M-5).

For January through July, the model results range from no change to moderate reductions in Yolo Bypass mean daily habitat acreage under Alternatives 1, 2, and 3 (Table 11M-2). The results for November and December range from moderate reductions to moderate increases in habitat. Note that while the increases during late summer and fall are, on a percentage basis, consistently much larger than the reductions in winter, spring, and early summer, in terms of absolute differences in acreage, some of the winter and spring reductions are larger than some of the summer and fall increases (Table 11M-2). For instance, the reductions in acreage from the NAA to Alternatives 1, 2, and 3 for March of Below Normal Water Years are larger than some of the summer and fall increases. The largest reductions under Alternatives 1, 2, and 3 occur for March of Below Normal and Dry Water Years and April of Below Normal Water Years, ranging from about 6% to 11% below the NAA acreages. In terms of mean daily acreage, the differences range from 175 acres to 418 acres. The only other relatively large reductions are 17% (183 acres) and 13% (137 acres) reductions in November of Above Normal Water Years under Alternatives 2 and 3. The reductions in July are moderately large on a percentage basis but are small in terms of acreage, with all July reductions being less than 12 acres. Other mean daily acreage reductions in winter and spring are minor but numerous; they occur for most of the months and water year types under all Alternatives 1, 2, and 3 (Table 11M-2).

Table 11M-2. Estimated Mean Daily Inundated Habitat (Acres <1 Meter Deep) for Juvenile Salmonids in the Yolo Bypass and the Percent Differences (in parentheses) for the No Action Alternative (NAA) and Alternatives 1–3 (Alt 1A, Alt 1B, Alt 2, and Alt 3).

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
January	Wet	14,250	14,169 (-0.6%)	14,169 (-0.6%)	14,189 (-0.4%)	14,172 (-0.5%)
	Above Normal	11,853	11,777 (-0.6%)	11,778 (-0.6%)	11,778 (-0.6%)	11,774 (-0.7%)
	Below Normal	6,202	6,078 (-2%)	6,084 (-1.9%)	6,082 (-1.9%)	6,089 (-1.8%)
	Dry	1,758	17,16 (-2.4%)	1,707 (-2.9%)	1,716 (-2.4%)	1,725 (-1.9%)
	Critically Dry	1,533	1,500 (-2.1%)	1,500 (-2.1%)	1,500 (-2.2%)	1,500 (-2.1%)
	All	7,922	7,850 (-0.9%)	7,849 (-0.9%)	7,857 (-0.8%)	7,855 (-0.9%)
February	Wet	17,195	17,182 (-0.1%)	17,183 (-0.1%)	17,181 (-0.1%)	17,176 (-0.1%)
	Above Normal	16,646	16,537 (-0.7%)	16,567 (-0.5%)	16,549 (-0.6%)	16,634 (-0.1%)
	Below Normal	10,559	10,403 (-1.5%)	10,417 (-1.4%)	10,408 (-1.4%)	10,436 (-1.2%)
	Dry	4,730	4,564 (-3.5%)	4,584 (-3.1%)	4,564 (-3.5%)	4,582 (-3.1%)
	Critically Dry	1,424	1,393 (-2.1%)	1,393 (-2.1%)	1,393 (-2.1%)	1,394 (-2.1%)
	All	10,930	10,843 (-0.8%)	10,854 (-0.7%)	10,845 (-0.8%)	10,865 (-0.6%)
March	Wet	14,644	14,562 (-0.6%)	14,559 (-0.6%)	14,561 (-0.6%)	14,547 (-0.7%)
	Above Normal	12,983	12,750 (-1.8%)	12,771 (-1.6%)	12,751 (-1.8%)	12,767 (-1.7%)
	Below Normal	5,387	4,968 (-7.8%)^	4,982 (-7.5%)^	4,972 (-7.7%)^	5,003 (-7.1%)^
	Dry	3,906	3,631 (-7%)^	3,634 (-7%)^	3,634 (-7%)^	3,656 (-6.4%)^
	Critically Dry	1,362	1,306 (-4.2%)	1,305 (-4.2%)	1,305 (-4.2%)	1,308 (-4%)
	All	8,520	8,319 (-2.4%)	8,324 (-2.3%)	8,320 (-2.3%)	8,329 (-2.2%)
April	Wet	11,327	11,173 (-1.4%)	11,164 (-1.4%)	11,185 (-1.3%)	11,158 (-1.5%)
	Above Normal	5,434	5,442 (0.2%)	5,442 (0.2%)	5,442 (0.2%)	5,442 (0.2%)
	Below Normal	1,603	1,428 (-10.9%)^	1,428 (-10.9%)^	1,428 (-10.9%)^	1,428 (-10.9%)^
	Dry	1,205	1,202 (-0.2%)	1,202 (-0.2%)	1,202 (-0.2%)	1,204 (-0.1%)
	Critically Dry	520	520 (0%)	520 (0%)	520 (0%)	520 (0%)
	All	5,001	4,923 (-1.6%)	4,920 (-1.6%)	4,927 (-1.5%)	4,918 (-1.7%)
May	Wet	2,776	2,647 (-4.6%)	2,643 (-4.8%)	2,647 (-4.6%)	2,611 (-5.9%)^

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
	Above Normal	1,548	1,543 (-0.3%)	1,543 (-0.3%)	1,543 (-0.3%)	1,543 (-0.3%)
	Below Normal	455	455 (0%)	455 (0%)	455 (0%)	455 (0%)
	Dry	267	267 (0%)	267 (0%)	267 (0%)	267 (0%)
	Critically Dry	168	168 (0%)	168 (0%)	168 (0%)	168 (0%)
	All	1,267	1,226 (-3.3%)	1,225 (-3.4%)	1,226 (-3.3%)	1,215 (-4.2%)
June	Wet	856	827 (-3.3%)	827 (-3.3%)	827 (-3.3%)	828 (-3.3%)
	Above Normal	166	166 (0%)	166 (0%)	166 (0%)	166 (0%)
	Below Normal	160	160 (0%)	160 (0%)	160 (0%)	160 (0%)
	Dry	164	164 (0%)	164 (0%)	164 (0%)	164 (0%)
	Critically Dry	155	155 (0%)	155 (0%)	155 (0%)	155 (0%)
	All	382	373 (-2.4%)	373 (-2.4%)	373 (-2.3%)	373 (-2.3%)
July	Wet	121	110 (-9.8%)^	110 (-9.8%)^	110 (-9.8%)^	110 (-9.8%)^
	Above Normal	112	100 (-10.3%)^	100 (-10.1%)^	100 (-10.7%)^	101 (-9.5%)^
	Below Normal	108	101 (-6.6%)^	101 (-6.3%)^	99 (-8.6%)^	101 (-6.3%)^
	Dry	114	107 (-6.2%)	107 (-6.6%)	106 (-7.6%)	108 (-5.7%)
	Critically Dry	117	113 (-3.4%)	114 (-2.7%)	113 (-4.1%)	116 (-1.1%)
	All	116	107 (-7.6%)^	107 (-7.5%)^	106 (-8.4%)^	107 (-7%)^
August	Wet	309	958 (210.3%)*	958 (210.2%)*	956 (209.8%)*	959 (210.6%)*
	Above Normal	195	800 (309.7%)*	792 (305.3%)*	835 (327.3%)*	750 (283.9%)*
	Below Normal	253	679 (167.9%)*	680 (168.3%)*	799 (215.2%)*	679 (168%)*
	Dry	142	546 (285.1%)*	583 (310.7%)*	636 (348.6%)*	517 (264.5%)*
	Critically Dry	127	348 (175.1%)*	298 (135.8%)*	399 (215.1%)*	196 (54.7%)*
	All	219	708 (222.5%)*	707 (222.3%)*	760 (246.3%)*	672 (206.2%)*
September	Wet	204	957 (368.7%)*	941 (360.6%)*	1,020 (399.3%)*	924 (352.2%)*
	Above Normal	165	890 (439.7%)*	757 (358.7%)*	895 (442.6%)*	831 (403.9%)*
	Below Normal	281	620 (120.3%)*	581 (106.5%)*	734 (160.8%)*	605 (115.2%)*
	Dry	161	610 (279.9%)*	540 (236%)*	568 (253.9%)*	416 (158.8%)*
	Critically Dry	181	322 (78.4%)*	345 (91.1%)*	283 (56.6%)*	261 (44.3%)*

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
	All	199	721 (262.9%)*	677 (241%)*	746 (275.5%)*	647 (225.9%)*
October	Wet	375	889 (137%)*	794 (111.7%)*	848 (126.1%)*	792 (111.2%)*
	Above Normal	101	368 (262.6%)*	360 (255.2%)*	434 (327.9%)*	391 (284.9%)*
	Below Normal	104	460 (341.6%)*	445 (326.7%)*	494 (374.4%)*	375 (259.6%)*
	Dry	319	735 (130.9%)*	717 (125.2%)*	729 (128.9%)*	557 (75%)*
	Critically Dry	106	272 (157.3%)*	202 (91.1%)*	316 (198.9%)*	200 (89.2%)*
	All	237	616 (159.6%)*	568 (139.3%)*	624 (162.8%)*	524 (120.9%)*
November	Wet	2,174	2,217 (2%)	2,241 (3.1%)	2,212 (1.8%)	2238 (3%)
	Above Normal	1,073	1,093 (1.8%)	1,104 (2.9%)	890 (-17.1%)^	936 (-12.8%)^
	Below Normal	111	141 (26.8%)*	145 (30.3%)*	142 (27.7%)*	135 (21.3%)*
	Dry	614	641 (4.4%)	640 (4.4%)	640 (4.4%)	622 (1.3%)
	Critically Dry	54	65 (20.8%)*	72 (32.3%)*	70 (28.9%)*	59 (8.1%)*
	All	1,008	1,037 (2.9%)	1,048 (4%)	1,007 (-0.1%)	1,015 (0.7%)
December	Wet	11,276	11,280 (0%)	11,293 (0.1%)	11,287 (0.1%)	11,389 (1%)
	Above Normal	3,571	3,553 (-0.5%)	3,552 (-0.5%)	3,538 (-0.9%)	3,508 (-1.8%)
	Below Normal	1,801	1,780 (-1.2%)	1,781 (-1.1%)	1,780 (-1.2%)	1,783 (-1%)
	Dry	1,607	1,610 (0.2%)	1,667 (3.8%)	1,617 (0.6%)	2,120 (31.9%)*
	Critically Dry	234	240 (2.4%)	241 (2.7%)	240 (2.3%)	240 (2.5%)
	All	4,792	4,789 (-0.1%)	4,806 (0.3%)	4,790 (0%)	4,929 (2.9%)

* Results for which habitat acreage under Alternative 1, 2, or 3 is more than 5% below habitat acreage under the NAA are highlighted green.
^ Results for which habitat acreage under Alternative 1, 2, or 3 is more than 10% higher than habitat acreage under the NAA are highlighted red.

The differences between the NAA and Alternatives 1, 2, and 3 in Yolo Bypass habitat availability were also examined by plotting probabilities of exceedance of all the daily habitat acreages for the months of January through April combined (Figure 11M-6). The exceedance curves show a consistent but small reduction in habitat acreages under Alternatives 1, 2, and 3 relative to the NAA from about the 40% to 20% exceedances. There are no appreciable differences between the NAA and Alternatives 1, 2, and 3 for the uppermost and lowermost acreages. Figure 11M-6 provides only a portion of the full exceedance plot (i.e., 2,000 acres to 20,000 acres) to make differences more visible.

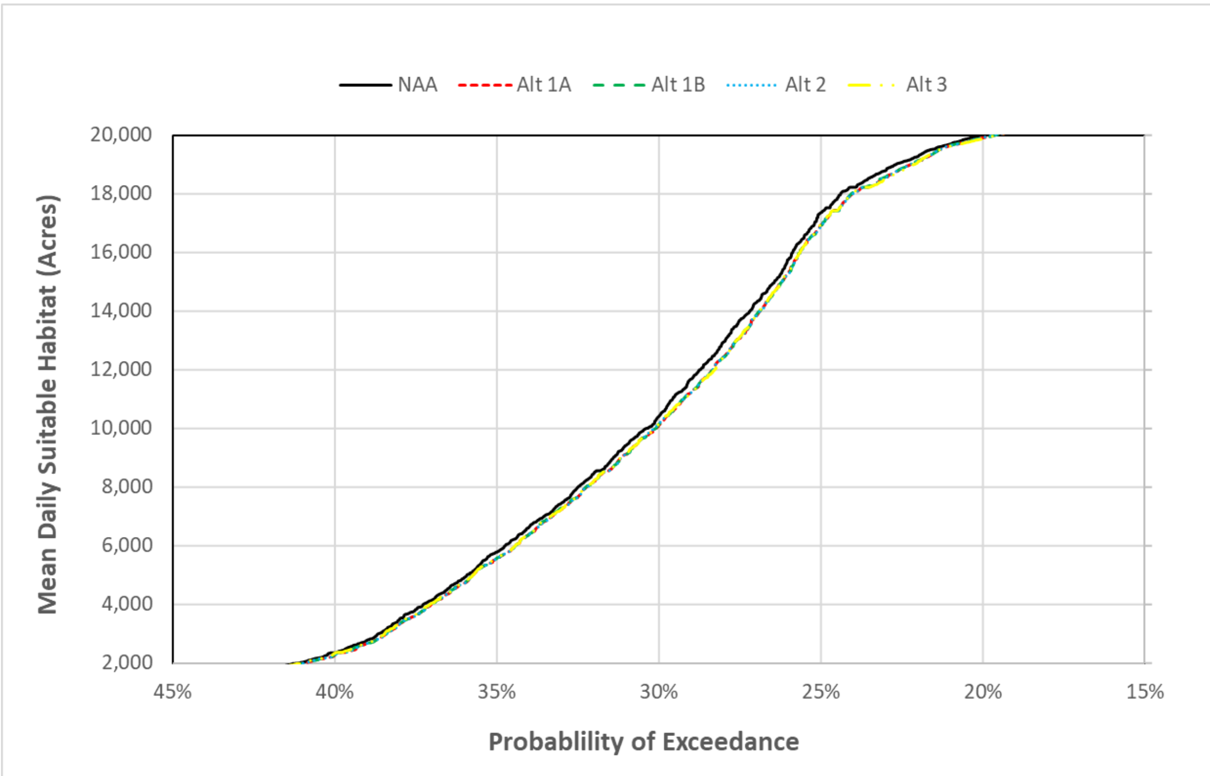


Figure 11M-6. Portions of Exceedance Curves for January through April Daily Yolo Bypass Suitable Habitat Acreage between for the No Action Alternative (NAA) and Alternatives 1–3 (Alt 1A, Alt 1B, Alt 2, and Alt 3).

A further analysis was carried out to examine the net effect of all the January through April changes between the NAA and Alternatives 1, 2, and 3 in daily habitat acreage. For this analysis, means were computed for all daily habitat acreages from January through April for all years (Table 11M-3). The average difference is a reduction of 107 acres, or about 1.3% of the NAA acreage.

Table 11M-3. Estimated Mean Daily January through April Inundated Habitat (Acres <1 Meter Deep) for Juvenile Salmonids in the Yolo Bypass and the Differences (in parentheses) for the No Action Alternative (NAA) and Alternatives 1–3 (Alt 1A, Alt 1B, Alt 2, and Alt 3).

NAA	Alt 1A	Alt 1A	Alt 1A	Alt 1A
8,053	7,942 (-110)	7,945 (-107)	7,946 (-107)	7,950 (-103)

It should be noted that the modeling results slightly overestimate some reductions in the winter and spring suitable habitat acreage between the NAA and Alternatives 1, 2, and 3. This occurs because 21,200 cfs is an upper boundary condition of the habitat model and all higher flows are assigned a constant habitat acreage value of 18,043 acres (see Figure 11M-1). However, flows greater than 21,200 cfs are generally somewhat higher under the NAA than Alternatives 1, 2, and 3 because of diversions by Alternatives 1, 2, and 3 to the Sites Reservoir (Figure 11M-7). Figure 11M-7 provides only a small portion of the full exceedance plot (i.e., 210,000 cfs to 340,000 cfs) to make differences more visible. Suitable inundated habitat on the Yolo Bypass declines with flow at flows above about 11,000 cfs (Figure 11M-1) and continues to do so at flows well above 21,200 cfs (Cordoleani et al. 2020: Appendix B). Therefore, habitat acreage at flows above 21,200 cfs, which the model sets at 18,043 acres for the NAA and Alternatives 1, 2, and 3, are actually larger for Alternatives 1, 2, and 3 than for the NAA, which means that the model slightly underestimates habitat acreage of Alternatives 1, 2, and 3 relative to the NAA for all means that include flows greater than 21,200 cfs.

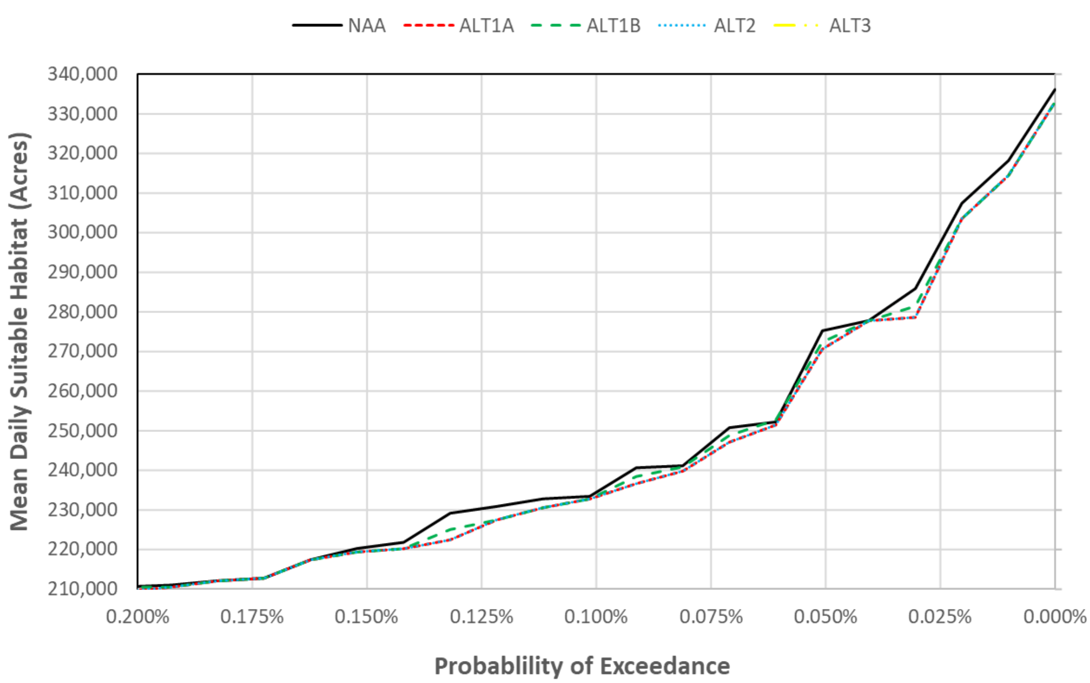


Figure 11M-7. Portions of Exceedance Curves for January through April Daily Yolo Bypass Flow for the No Action Alternative (NAA) and Alternatives 1–3 (Alt 1A, Alt 1B, Alt 2, and Alt 3).

The fish species of management concern most likely to be affected by the changes in Yolo Bypass inundated suitable habitat are Chinook salmon, steelhead, and Sacramento splittail. Recent studies have demonstrated that, when inundated by high flows in the winter and spring, the Yolo Bypass provides good rearing habitat for juvenile salmonids (Sommer et al. 2001b; Sommer et al. 2005; Hinkelman et al. 2017; Katz et al. 2017; Bellido-Leiva et al. 2021). Additionally, the Yolo Bypass is the most important spawning, nursery, and juvenile rearing habitat for Sacramento splittail (Sommer et al. 2001a, Sommer et al. 2002; Moyle et al. 2004; Feyrer et al. 2006a; Feyrer et al 2006b; Sommer et al. 2008). These species use the Yolo Bypass during the winter and spring, the natural period for seasonal floodplain inundation in the Sacramento River Basin. By late summer and fall, when Alternatives 1, 2, and 3 are expected to result in the largest percentage increases in Yolo Bypass suitable habitat (Table 11M-2), rearing salmonids and Sacramento splittail have emigrated from the bypass, except for those trapped in pools (Sommer et al. 2005). Most of the fish species remaining in the bypass after mid-summer are nonnative species, including black bass (*Micropterus* spp.) and striped bass (*Morone saxatilis*), which are fish species (or species groups) of management concern (Sommer et al. 2001a; Sommer et al. 2004).

Salmon and steelhead juveniles are most likely to enter the Yolo Bypass while rearing in and emigrating from the lower Sacramento River. California Department of Water Resources has a Rotary Screw Trap (RST) at Knights Landing that is 11 kilometers upstream of Fremont Weir and provides the most reliable information on when the juveniles are most likely to access the Yolo Bypass, assuming the Fremont Weir is spilling. Most of the catch of juvenile salmon and steelhead at Knights Landing occurs during October through May (Attachment 1 of Appendix 11A). Significant spilling of the Fremont Weir generally begins in November or December and may occur as late as May. One race or another of juvenile Chinook salmon or steelhead is likely to enter the Yolo Bypass during most of this period. Based on the Knights Landing RST data, the presence of the different races and species of juvenile salmon and steelhead near the Fremont Weir generally occurs as follows: winter-run from October through March, spring-run from December through April, fall-run from January through April, late fall–run from April through January, and steelhead from January through May. Once on the Yolo Bypass, the juveniles may remain for a month or more, depending on conditions (Sommer et al. 2005). On this basis, the March and April reductions in suitable habitat expected to result from Alternatives 1, 2, and 3 would potentially affect rearing juveniles of all four salmon races and steelhead. As noted above, the largest difference in mean acreages for March and April was 419 acres. The reductions in January and February are small but consistent, which could result in a cumulative effect (Table 11M-2). The exceedance curves also show small but consistent reductions under Alternatives 1, 2, and 3 (Figure 11M-6). However, when the net effect of all daily differences between the NAA and Alternatives 1, 2, and 3 are examined, the differences are small (Table 11M-3) and the effect on the Chinook salmon and steelhead populations is expected to be minor.

Of the three fish species of management concern, Sacramento splittail likely benefits most from inundated floodplain habitat (Sommer et al. 2001a, Feyrer et al. 2005). Adult splittail begin their upstream spawning migrations from the Delta during winter and spring and spawn on the Yolo Bypass from late winter to late spring in years when the bypass is inundated. Timing of spawning depends on the timing of inundation, but most often peaks during March (Feyrer et al. 2006a). Egg incubation and larval development require a few weeks to a month, depending on water temperature (Moyle et al. 2004). The juveniles rear in the bypass for as long as conditions are suitable and typically return to the Delta from April through July (Feyrer et al. 2005),

Splittail benefit from Yolo Bypass inundation primarily during the spawning and rearing periods, which typically run from February through April or May. This period largely overlaps the timing of the greatest and most consistent habitat reductions associated with Alternatives 1, 2, and 3 (Table 11M-2). However, as noted above, the net effect of all daily differences between the NAA and Alternatives 1, 2, and 3 are small reductions in habitat acreage (Table 11M-3). Therefore, the habitat reductions are not expected to have a substantial negative effect on the Sacramento splittail population.

As noted in the Section 2, *Methods,* in addition to evaluating effects of Alternatives 1, 2, and 3 on mean daily habitat acreage, this report also examines effects of Alternatives 1, 2, and 3 on the frequency, duration and acreage of inundation events. This analysis is important because the value of inundated habitat varies with its duration and total acreage, and the value may be species-specific. For instance, the productivity of inundated floodplain habitat for juvenile salmonids is maximized after about 18 days of inundation and begins to diminish by about 24 days (Whipple et al. 2019). In contrast, Sacramento splittail require at least 30 days of inundation for completion of spawning, egg incubation, and larval development, after which the juveniles are large and strong enough to emigrate more safely from the floodplain (Feyrer et al. 2006a).

The results of the frequency analysis of inundation of events for the Yolo Bypass generally show only minor difference between Alternatives 1, 2, and 3 and the NAA (Figure 11M-8). However, there are moderate increases in frequency for Alternatives 1, 2, and 3 compared to the NAA for events of 2,500 to 15,000 acres lasting 8 to 17 days, with frequencies ranging from once per 1.8 years for Alternative 1B to once per 2.2 years for the NAA. There are minor reductions for Alternatives 1, 2, and 3 for the same acreage range lasting 18–24 days, with frequencies ranging from once per 17 years for the NAA to once per 25 years for Alternatives 1B and 3. There are also minor increases in frequency for events greater than 20,000 acres lasting 18–24 days for all Alternatives 1, 2, and 3 except Alternative 3. Note that the greater frequency of the large acreage inundation events under Alternatives 1, 2, and 3 likely results from the moderately lower frequency of high flows under Alternatives 1, 2, and 3 because of diversions to Sites Reservoir and the fact that suitable inundated habitat declines with flow at flows above about 11,000 cfs (Figure 11M-1). The differences in frequencies of inundation events of varying duration and acreage show no consistent differences between the NAA and Alternatives 1, 2, and 3. Tables providing the results plotted in Figure 11M-8 and frequency of inundation tables for every month are provided in Attachment 3.

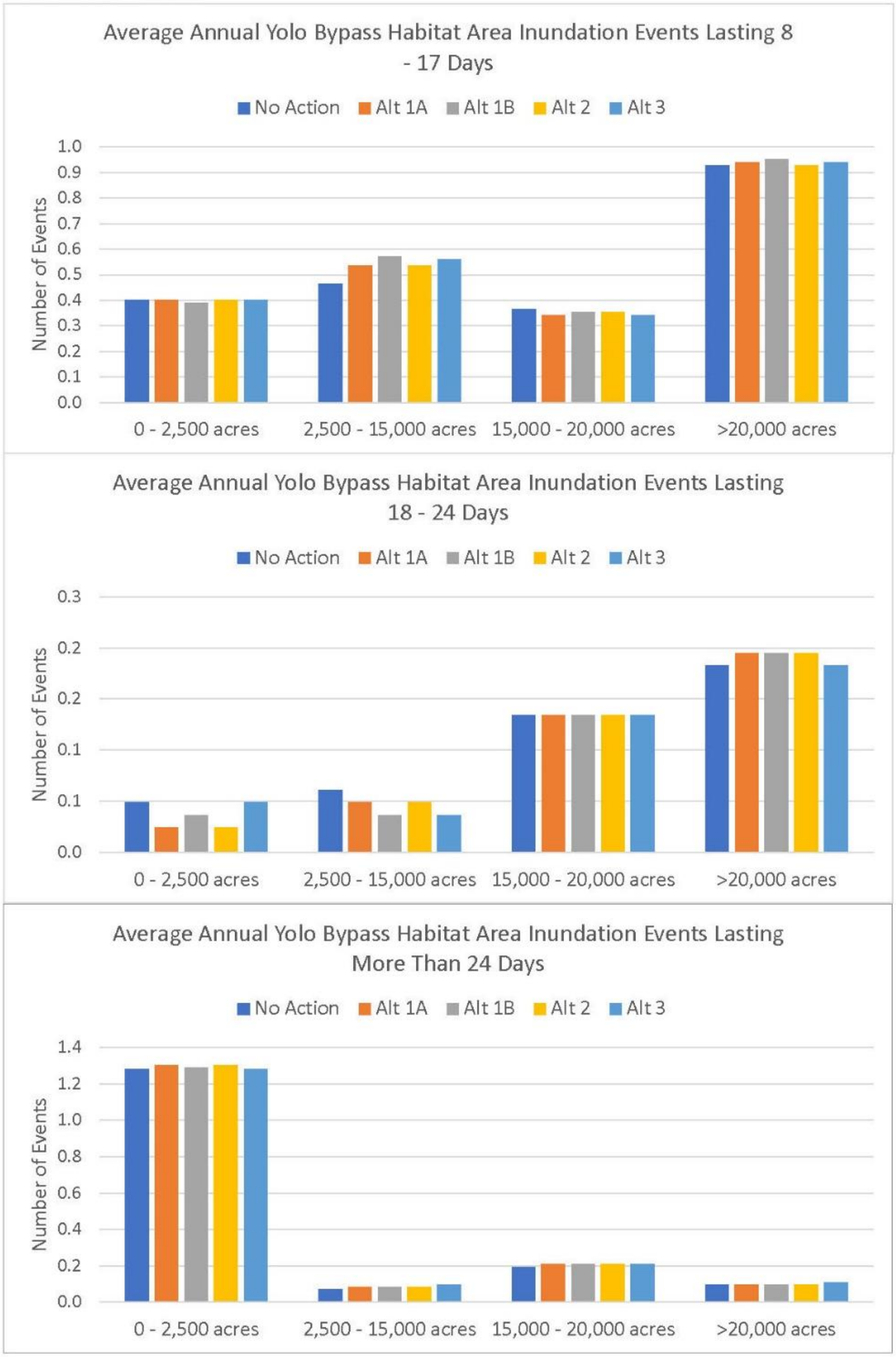


Figure 11M-8. Average Annual Number of Yolo Bypass Inundation Events with Three Different Ranges of Duration and Four Ranges of Suitable Habitat Acreages for the No Action Alternative (NAA) and Alternatives 1–3 (Alt 1A, Alt 1B, Alt 2, and Alt 3).

11M.3.2 Sutter Bypass Weir Spill Events and Inundated Floodplain Habitat Area

Results for the Sutter Bypass weir spill events are provided in Attachment 4, Tables 1 through 4. The results suggest that there would be several fewer weir spill events into the Sutter Bypass under Alternatives 1, 2, and 3 than the NAA, especially for spills lasting more than 45 days. This result indicates that opportunities for juvenile salmonids to enter the Sutter Bypass for rearing would be lower under Alternatives 1, 2, and 3 relative to the NAA. Note that flow in the Sutter Bypass greater than 3,000 cfs results in reduction of suitable habitat.

The Sutter Bypass when inundated, as discussed for the Yolo Bypass, provides important rearing habitat for juvenile Chinook salmon and steelhead and spawning and rearing habitat for Sacramento splittail (Moyle 2004; Feyrer et al. 2006b; Cordoleani et al. 2020; Bellido-Leiva et al. 2021). For the Sutter Bypass, however, the modeling results indicate that Alternatives 1, 2, and 3 would produce very little change in mean daily suitable habitat compared to the NAA (Table 11M-4). The largest differences are an increase of 54 acres for April of Wet Water Years under Alternative 3 and a reduction 58 acres for December of Dry Water Years under Alternative 3. Both differences are less than 1%. The results of the frequency analysis of inundation of events similarly show little to no differences between the NAA and Alternatives 1, 2, and 3 (Figure 11M-9). Tables providing the results plotted in Figure 11M-9 and frequency of inundation tables for every month are provided in Attachment 5. Alternatives 1, 2, and 3 are expected to have little effect on availability of suitable inundated fish habitat in the Sutter Bypass.

Table 11M-4. Estimated Mean Daily Inundated Habitat (Acres <1 Meter Deep) for Juvenile Salmonids in the Sutter Bypass and the Percent Differences (in parentheses) for the No Action Alternative (NAA) and Alternatives 1–3 (Alt 1A, Alt 1B, Alt 2, and Alt 3).

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
January	Wet	7,992	8,003 (0.1%)	8,005 (0.2%)	8,002 (0.1%)	8,006 (0.2%)
	Above Normal	7,966	7,999 (0.4%)	7,998 (0.4%)	7,998 (0.4%)	7,999 (0.4%)
	Below Normal	8,354	8,363 (0.1%)	8,362 (0.1%)	8,363 (0.1%)	8,361 (0.1%)
	Dry	8,308	8,313 (0.1%)	8,310 (0%)	8,313 (0.1%)	8,310 (0%)
	Critically Dry	7,687	7,691 (0%)	7,691 (0%)	7,691 (0%)	7,691 (0%)
	All	8,075	8,086 (0.1%)	8,086 (0.1%)	8,086 (0.1%)	8,086 (0.1%)
February	Wet	7,580	7,607 (0.4%)	7,604 (0.3%)	7,606 (0.3%)	7,604 (0.3%)
	Above Normal	7,891	7,936 (0.6%)	7,943 (0.6%)	7,936 (0.6%)	7,910 (0.2%)
	Below Normal	8,715	8,734 (0.2%)	8,722 (0.1%)	8,734 (0.2%)	8,723 (0.1%)
	Dry	8,726	8,744 (0.2%)	8,745 (0.2%)	8,744 (0.2%)	8,746 (0.2%)
	Critically Dry	8,537	8,541 (0%)	8,540 (0%)	8,541 (0%)	8,541 (0%)
	All	8,212	8,235 (0.3%)	8,233 (0.3%)	8,234 (0.3%)	8,228 (0.2%)
March	Wet	7,988	8,009 (0.3%)	8,011 (0.3%)	8,002 (0.2%)	8,020 (0.4%)
	Above Normal	8,266	8,304 (0.5%)	8,304 (0.4%)	8,303 (0.4%)	8,312 (0.5%)
	Below Normal	9,095	9,137 (0.5%)	9,137 (0.5%)	9,140 (0.5%)	9,141 (0.5%)

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
	Dry	9,186	9,205 (0.2%)	9,206 (0.2%)	9,204 (0.2%)	9,201 (0.2%)
	Critically Dry	9,041	9,045 (0%)	9,045 (0%)	9,045 (0%)	9,045 (0%)
	All	8,635	8,659 (0.3%)	8,660 (0.3%)	8,657 (0.3%)	8,663 (0.3%)
April	Wet	8,243	8,280 (0.4%)	8,288 (0.5%)	8,272 (0.4%)	8,298 (0.7%)
	Above Normal	9,125	9,128 (0%)	9,125 (0%)	9,128 (0%)	9,126 (0%)
	Below Normal	9,508	9,517 (0.1%)	9,517 (0.1%)	9,517 (0.1%)	9,517 (0.1%)
	Dry	9,451	9,455 (0%)	9,454 (0%)	9,455 (0%)	9,455 (0%)
	Critically Dry	8,791	8,791 (0%)	8,791 (0%)	8,791 (0%)	8,791 (0%)
	All	8,934	8,948 (0.2%)	8,950 (0.2%)	8,945 (0.1%)	8,953 (0.2%)
May	Wet	9,203	9,208 (0.1%)	9,210 (0.1%)	9,208 (0.1%)	9,211 (0.1%)
	Above Normal	9,483	9,483 (0%)	9,483 (0%)	9,483 (0%)	9,483 (0%)
	Below Normal	9,381	9,377 (0%)	9,376 (-0.1%)	9,377 (0%)	9,373 (-0.1%)
	Dry	9,018	9,018 (0%)	9,018 (0%)	9,018 (0%)	9,018 (0%)
	Critically Dry	8,166	8,166 (0%)	8,166 (0%)	8,166 (0%)	8,166 (0%)
	All	9,082	9,083 (0%)	9,084 (0%)	9,083 (0%)	9,083 (0%)
June	Wet	9,273	9,274 (0%)	9,274 (0%)	9,274 (0%)	9,274 (0%)
	Above Normal	8,876	8,876 (0%)	8,876 (0%)	8,876 (0%)	8,876 (0%)
	Below Normal	8,358	8,358 (0%)	8,358 (0%)	8,358 (0%)	8,358 (0%)
	Dry	7,755	7,755 (0%)	7,755 (0%)	7,755 (0%)	7,755 (0%)
	Critically Dry	6,736	6,736 (0%)	6,736 (0%)	6,736 (0%)	6,736 (0%)
	All	8,354	8,355 (0%)	8,355 (0%)	8,355 (0%)	8,355 (0%)
July	Wet	8,213	8,213 (0%)	8,213 (0%)	8,213 (0%)	8,213 (0%)
	Above Normal	7,349	7,349 (0%)	7,349 (0%)	7,349 (0%)	7,349 (0%)
	Below Normal	6,271	6,271 (0%)	6,271 (0%)	6,271 (0%)	6,271 (0%)
	Dry	5,254	5,254 (0%)	5,254 (0%)	5,254 (0%)	5,254 (0%)
	Critically Dry	4,118	4,118 (0%)	4,118 (0%)	4,118 (0%)	4,118 (0%)
	All	6,506	6,506 (0%)	6,506 (0%)	6,506 (0%)	6,506 (0%)
August	Wet	7,187	7,187 (0%)	7,187 (0%)	7,187 (0%)	7,187 (0%)
	Above Normal	5,963	5,963 (0%)	5,963 (0%)	5,963 (0%)	5,963 (0%)
	Below Normal	4,257	4,257 (0%)	4,257 (0%)	4,257 (0%)	4,257 (0%)
	Dry	3,204	3,204 (0%)	3,204 (0%)	3,204 (0%)	3,204 (0%)
	Critically Dry	2,447	2,447 (0%)	2,447 (0%)	2,447 (0%)	2,447 (0%)
	All	4,940	4,940 (0%)	4,940 (0%)	4,940 (0%)	4,940 (0%)
September	Wet	6,644	6,644 (0%)	6,644 (0%)	6,644 (0%)	6,644 (0%)
	Above Normal	5,612	5,612 (0%)	5,612 (0%)	5,612 (0%)	5,612 (0%)
	Below Normal	3,682	3,682 (0%)	3,682 (0%)	3,682 (0%)	3,682 (0%)
	Dry	3,385	3,385 (0%)	3,385 (0%)	3,385 (0%)	3,385 (0%)
	Critically Dry	2,346	2,346 (0%)	2,346 (0%)	2,346 (0%)	2,346 (0%)
	All	4,643	4,643 (0%)	4,643 (0%)	4,643 (0%)	4,643 (0%)

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
October	Wet	6,451	6,451 (0%)	6,451 (0%)	6,451 (0%)	6,450 (0%)
	Above Normal	5,699	5,699 (0%)	5,699 (0%)	5,699 (0%)	5,699 (0%)
	Below Normal	5,069	5,069 (0%)	5,069 (0%)	5,069 (0%)	5,069 (0%)
	Dry	5,391	5,391 (0%)	5,391 (0%)	5,391 (0%)	5,391 (0%)
	Critically Dry	4,959	4,959 (0%)	4,959 (0%)	4,959 (0%)	4,959 (0%)
	All	5,654	5,654 (0%)	5,653 (0%)	5,653 (0%)	5,653 (0%)
November	Wet	7,809	7,809 (0%)	7,809 (0%)	7,809 (0%)	7,809 (0%)
	Above Normal	7,640	7,640 (0%)	7,639 (0%)	7,640 (0%)	7,639 (0%)
	Below Normal	7,168	7,168 (0%)	7,168 (0%)	7,168 (0%)	7,168 (0%)
	Dry	7,097	7,098 (0%)	7,098 (0%)	7,098 (0%)	7,098 (0%)
	Critically Dry	5,850	5,850 (0%)	5,850 (0%)	5,850 (0%)	5,850 (0%)
	All	7,232	7,232 (0%)	7,232 (0%)	7,232 (0%)	7,232 (0%)
December	Wet	8,193	8,200 (0.1%)	8,212 (0.2%)	8,200 (0.1%)	8,206 (0.2%)
	Above Normal	8,027	8,038 (0.1%)	8,037 (0.1%)	8,037 (0.1%)	8,039 (0.1%)
	Below Normal	7,698	7,701 (0%)	7,700 (0%)	7,701 (0%)	7,700 (0%)
	Dry	8,045	8,048 (0%)	8,028 (-0.2%)	8,048 (0%)	7,987 (-0.7%)
	Critically Dry	6,900	6,900 (0%)	6,900 (0%)	6,900 (0%)	6,900 (0%)
	All	7,862	7,868 (0.1%)	7,867 (0.1%)	7,867 (0.1%)	7,856 (-0.1%)

Figure 11M-9. Average Annual Number of Sutter Bypass Inundation Events with Three Different Ranges of Duration and Four Ranges of Suitable Habitat Acreages for the No Action Alternative (NAA) and Alternatives 1–3 (Alt 1A, Alt 1B, Alt 2, and Alt 3).

11M.3.3 Sacramento River Side-Channel Habitat Area

Like the floodplain habitat of the Yolo and Sutter Bypasses, inundated side-channel habitat in the Sacramento River provides important habitat for several fish species, including Chinook salmon, steelhead, and Sacramento splittail. Juvenile salmon and steelhead use inundated side-channel habitat for rearing and Sacramento splittail use it for spawning and rearing (Moyle et al. 2004; Feyrer et al. 2005; Limm and Marchetti 2009; Moyle et al. 2015; Bellido-Leiva et al. 2021). Rearing juvenile salmon and steelhead use side-channel habitat, when it is available and water temperature is suitable, along the full length of the lower Sacramento River from Keswick Dam to the Delta. Adult Sacramento splittail have been found as far upstream as RBDD, although juveniles have not been found upstream of about Colusa, so the upstream limit of splittail spawning is uncertain (Moyle et al. 2004; Feyrer et al. 2005).

The modeling results for acreage of suitable side-channel habitat in the three reaches of the Sacramento River analyzed indicate that Alternatives 1, 2, and 3 would produce minor changes in mean daily suitable habitat as compared to the NAA in all three reaches (Table 11M-5, Table 11M-6, and Table 11M-7). None of the differences for Reach 1 are greater than 5% and none of those for Reaches 2 and 3 are greater than 6%. The largest differences are an increase of 34 acres in Reach 1 for November of Critically Dry Water Years under Alternative 3 and a reduction of 97 acres in Reach 2 for March of Above Normal Water Years under Alternative 3.

Table 11M-5. Estimated Mean Daily Side-Channel Habitat (Acres <1 Meter Deep) for Juvenile Salmonids in the Sacramento River Reach 1 (Bend Bridge to Hamilton City) and the Percent Differences (in parentheses) for the No Action Alternative (NAA) and Alternatives 1–3 (Alt 1A, Alt 1B, Alt 2, and Alt 3).

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
January	Wet	1,368	1,348 (-1.4%)	1,348 (-1.5%)	1,348 (-1.4%)	1,352 (-1.1%)
	Above Normal	1,137	1,109 (-2.5%)	1,110 (-2.4%)	1,109 (-2.5%)	1,110 (-2.4%)
	Below Normal	1,092	1,080 (-1.2%)	1,079 (-1.2%)	1,079 (-1.2%)	1,079 (-1.2%)
	Dry	1,037	1,020 (-1.6%)	1,021 (-1.5%)	1,020 (-1.6%)	1,022 (-1.5%)
	Critically Dry	1,035	1,020 (-1.5%)	1,019 (-1.6%)	1,019 (-1.6%)	1,020 (-1.5%)
	All	1,166	1,147 (-1.6%)	1,147 (-1.6%)	1,147 (-1.6%)	1,149 (-1.4%)
February	Wet	1,481	1,460 (-1.4%)	1,456 (-1.6%)	1,462 (-1.3%)	1,456 (-1.7%)
	Above Normal	1,198	1,186 (-1%)	1,183 (-1.2%)	1,184 (-1.1%)	1,192 (-0.5%)
	Below Normal	1,112	1,083 (-2.6%)	1,083 (-2.6%)	1,080 (-2.9%)	1,078 (-3.1%)
	Dry	1,057	1,038 (-1.8%)	1,037 (-1.8%)	1,038 (-1.8%)	1,040 (-1.6%)
	Critically Dry	1,058	1,053 (-0.4%)	1,053 (-0.4%)	1,053 (-0.4%)	1,053 (-0.4%)
	All	1,221	1,203 (-1.5%)	1,201 (-1.6%)	1,203 (-1.5%)	1,202 (-1.5%)
March	Wet	1,338	1,311 (-2%)	1,309 (-2.2%)	1,312 (-2%)	1,306 (-2.4%)
	Above Normal	1,298	1,249 (-3.8%)	1,248 (-3.8%)	1,249 (-3.8%)	1,247 (-3.9%)
	Below Normal	1,071	1,024 (-4.3%)	1,025 (-4.3%)	1,024 (-4.3%)	1,025 (-4.3%)
	Dry	1,056	1,033 (-2.1%)	1,029 (-2.5%)	1,034 (-2.1%)	1,029 (-2.5%)
	Critically Dry	1,064	1,058 (-0.5%)	1,057 (-0.6%)	1,058 (-0.5%)	1,056 (-0.8%)

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
	All	1,184	1,155 (-2.5%)	1,153 (-2.6%)	1,155 (-2.5%)	1,152 (-2.8%)
April	Wet	1,197	1,183 (-1.2%)	1,181 (-1.3%)	1,183 (-1.2%)	1,173 (-2%)
	Above Normal	1,126	1,115 (-0.9%)	1,117 (-0.7%)	1,115 (-0.9%)	1,117 (-0.7%)
	Below Normal	1,013	1,009 (-0.4%)	1,010 (-0.3%)	1,009 (-0.4%)	1,010 (-0.2%)
	Dry	979	968 (-1.2%)	967 (-1.3%)	968 (-1.2%)	966 (-1.4%)
	Critically Dry	971	972 (0.1%)	974 (0.3%)	972 (0.1%)	973 (0.2%)
	All	1,074	1,065 (-0.9%)	1,065 (-0.8%)	1,065 (-0.8%)	1,062 (-1.1%)
May	Wet	1,047	1,029 (-1.7%)	1,029 (-1.6%)	1,029 (-1.7%)	1,026 (-1.9%)
	Above Normal	1,019	1,014 (-0.5%)	1,013 (-0.6%)	1,014 (-0.5%)	1,013 (-0.5%)
	Below Normal	998	998 (0%)	1,000 (0.2%)	998 (0%)	1,007 (0.9%)
	Dry	998	988 (-1%)	987 (-1.1%)	988 (-1%)	995 (-0.3%)
	Critically Dry	1,019	999 (-2%)	1,002 (-1.7%)	999 (-1.9%)	1,003 (-1.6%)
	All	1,020	1,008 (-1.1%)	1,009 (-1.1%)	1,008 (-1.1%)	1,011 (-0.9%)
June	Wet	1,081	1,078 (-0.3%)	1,078 (-0.3%)	1,078 (-0.3%)	1,078 (-0.3%)
	Above Normal	1,087	1,087 (0%)	1,085 (-0.2%)	1,087 (0%)	1,084 (-0.2%)
	Below Normal	1,083	1,079 (-0.3%)	1,079 (-0.3%)	1,079 (-0.3%)	1,083 (0%)
	Dry	1,085	1,079 (-0.5%)	1,079 (-0.5%)	1,080 (-0.5%)	1,082 (-0.2%)
	Critically Dry	1,087	1,082 (-0.5%)	1,083 (-0.4%)	1,082 (-0.5%)	1,083 (-0.4%)
	All	1,084	1,080 (-0.3%)	1,080 (-0.3%)	1,080 (-0.3%)	1,081 (-0.2%)
July	Wet	1,096	1,096 (0%)	1,096 (0%)	1,096 (0%)	1,096 (0%)
	Above Normal	1,092	1,091 (0%)	1,092 (0%)	1,091 (0%)	1,091 (-0.1%)
	Below Normal	1,093	1,093 (0%)	1,093 (-0.1%)	1,093 (0%)	1,094 (0%)
	Dry	1,099	1,097 (-0.2%)	1,097 (-0.2%)	1,097 (-0.2%)	1,097 (-0.2%)
	Critically Dry	1,091	1,092 (0.1%)	1,092 (0%)	1,092 (0.1%)	1,092 (0%)
	All	1,095	1,095 (0%)	1,095 (0%)	1,095 (0%)	1,094 (-0.1%)
August	Wet	1,098	1,098 (-0.1%)	1,098 (-0.1%)	1,098 (0%)	1,098 (-0.1%)
	Above Normal	1,098	1,098 (0%)	1,098 (0%)	1,098 (0%)	1,095 (-0.3%)
	Below Normal	1,093	1,094 (0%)	1,094 (0%)	1,094 (0%)	1,093 (0%)
	Dry	1,092	1,096 (0.4%)	1,096 (0.4%)	1,096 (0.4%)	1,094 (0.2%)
	Critically Dry	1,082	1,083 (0.1%)	1,085 (0.3%)	1,084 (0.2%)	1,083 (0.1%)
	All	1,094	1,095 (0.1%)	1,095 (0.1%)	1,095 (0.1%)	1,094 (0%)
September	Wet	1,098	1,096 (-0.2%)	1,096 (-0.1%)	1,096 (-0.1%)	1,096 (-0.1%)
	Above Normal	1,093	1,095 (0.1%)	1,098 (0.4%)	1,095 (0.1%)	1,100 (0.6%)
	Below Normal	1,046	1,048 (0.2%)	1,052 (0.6%)	1,048 (0.2%)	1,055 (0.8%)
	Dry	998	1,023 (2.5%)	1,025 (2.8%)	1,023 (2.5%)	1,018 (2%)
	Critically Dry	979	999 (2%)	1,001 (2.2%)	1,000 (2.1%)	998 (1.9%)
	All	1,049	1,057 (0.8%)	1,059 (1%)	1,058 (0.8%)	1,058 (0.9%)

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
October	Wet	1,064	1,074 (0.9%)	1,080 (1.5%)	1,074 (0.9%)	1,071 (0.7%)
	Above Normal	1,063	1,080 (1.5%)	1,074 (1%)	1,078 (1.4%)	1,075 (1.1%)
	Below Normal	1,048	1,061 (1.3%)	1,063 (1.4%)	1,064 (1.5%)	1,061 (1.2%)
	Dry	1,059	1,061 (0.2%)	1,061 (0.2%)	1,062 (0.2%)	1,065 (0.6%)
	Critically Dry	991	1,010 (1.9%)	998 (0.6%)	1,010 (1.9%)	1,025 (3.4%)
	All	1,049	1,060 (1%)	1,060 (1%)	1,061 (1.1%)	1,062 (1.2%)
November	Wet	1,077	1,074 (-0.2%)	1,077 (0%)	1,074 (-0.2%)	1,079 (0.2%)
	Above Normal	1,068	1,075 (0.7%)	1,077 (0.9%)	1,066 (-0.2%)	1,078 (0.9%)
	Below Normal	1,053	1,046 (-0.7%)	1,046 (-0.6%)	1,047 (-0.6%)	1,050 (-0.3%)
	Dry	1,068	1,068 (0%)	1,066 (-0.2%)	1,068 (0%)	1,065 (-0.2%)
	Critically Dry	1,022	1,030 (0.7%)	1,039 (1.7%)	1,036 (1.3%)	1,057 (3.4%)
	All	1,061	1,061 (0%)	1,064 (0.2%)	1,061 (0%)	1,068 (0.6%)
December	Wet	1,178	1,174 (-0.3%)	1,172 (-0.5%)	1,175 (-0.3%)	1,171 (-0.6%)
	Above Normal	1,064	1,027 (-3.6%)	1,028 (-3.4%)	1,026 (-3.6%)	1,027 (-3.5%)
	Below Normal	1,065	1,052 (-1.2%)	1,052 (-1.2%)	1,051 (-1.3%)	1,054 (-1.1%)
	Dry	1,056	1,047 (-0.8%)	1,045 (-1%)	1,045 (-1%)	1,040 (-1.5%)
	Critically Dry	1,026	1,016 (-0.9%)	1,019 (-0.6%)	1,019 (-0.6%)	1,025 (-0.1%)
	All	1,093	1,081 (-1.1%)	1,080 (-1.2%)	1,081 (-1.1%)	1,080 (-1.2%)

Table 11M-6. Estimated Mean Daily Side-Channel Habitat (Acres <1 Meter Deep) for Juvenile Salmonids in the Sacramento River Reach 2 (Hamilton City to Colusa) and the Percent Differences (in parentheses) for the No Action Alternative (NAA) and Alternatives 1–3 (Alt 1A, Alt 1B, Alt 2, and Alt 3).

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
January	Wet	1,933	1,889 (-2.2%)	1,887 (-2.3%)	1,892 (-2.1%)	1,890 (-2.2%)
	Above Normal	1,508	1,435 (-4.8%)	1,436 (-4.8%)	1,434 (-4.8%)	1,435 (-4.8%)
	Below Normal	1,000	978 (-2.2%)	979 (-2.1%)	978 (-2.1%)	980 (-2%)
	Dry	792	783 (-1.2%)	784 (-1%)	783 (-1.2%)	785 (-0.9%)
	Critically Dry	754	748 (-0.7%)	746 (-1%)	746 (-0.9%)	746 (-1%)
	All	1,288	1,257 (-2.4%)	1,257 (-2.4%)	1,258 (-2.4%)	1,258 (-2.3%)
February	Wet	2,418	2,353 (-2.7%)	2,348 (-2.9%)	2,360 (-2.4%)	2,355 (-2.6%)
	Above Normal	1,659	1,594 (-3.9%)	1,575 (-5%)	1,589 (-4.2%)	1,610 (-3%)
	Below Normal	1,081	1,050 (-2.9%)	1,052 (-2.7%)	1,045 (-3.4%)	1,052 (-2.7%)
	Dry	950	922 (-2.9%)	921 (-3.1%)	922 (-2.9%)	920 (-3.2%)
	Critically Dry	769	765 (-0.6%)	764 (-0.7%)	764 (-0.7%)	765 (-0.6%)
	All	1,514	1,472 (-2.8%)	1,467 (-3.1%)	1,472 (-2.8%)	1,475 (-2.6%)

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
March	Wet	1,928	1,888 (-2.1%)	1,882 (-2.4%)	1,895 (-1.7%)	1,868 (-3.1%)
	Above Normal	1,768	1,680 (-5%)	1,680 (-5%)	1,681 (-4.9%)	1,671 (-5.5%)
	Below Normal	936	893 (-4.5%)	893 (-4.5%)	890 (-4.8%)	895 (-4.3%)
	Dry	885	843 (-4.8%)	840 (-5.1%)	846 (-4.4%)	846 (-4.4%)
	Critically Dry	743	735 (-1.1%)	732 (-1.5%)	735 (-1.1%)	735 (-1.1%)
	All	1,333	1,290 (-3.3%)	1,287 (-3.5%)	1,292 (-3.1%)	1,283 (-3.8%)
April	Wet	1,555	1,508 (-3.1%)	1,501 (-3.5%)	1,515 (-2.6%)	1,487 (-4.4%)
	Above Normal	1,104	1,086 (-1.7%)	1,089 (-1.4%)	1,086 (-1.7%)	1,088 (-1.5%)
	Below Normal	779	765 (-1.8%)	766 (-1.7%)	765 (-1.8%)	766 (-1.7%)
	Dry	729	720 (-1.2%)	722 (-1%)	720 (-1.1%)	722 (-0.9%)
	Critically Dry	697	696 (0%)	697 (0%)	696 (0%)	696 (-0.1%)
	All	1,050	1,027 (-2.1%)	1,026 (-2.2%)	1,030 (-1.9%)	1,022 (-2.7%)
May	Wet	879	863 (-1.8%)	857 (-2.5%)	863 (-1.8%)	854 (-2.8%)
	Above Normal	818	816 (-0.3%)	816 (-0.3%)	816 (-0.3%)	816 (-0.3%)
	Below Normal	735	735 (-0.1%)	736 (0%)	735 (-0.1%)	737 (0.2%)
	Dry	708	702 (-0.8%)	702 (-0.8%)	702 (-0.8%)	704 (-0.5%)
	Critically Dry	702	701 (-0.1%)	703 (0.1%)	702 (0%)	702 (0%)
	All	782	775 (-0.9%)	774 (-1.1%)	775 (-0.8%)	773 (-1.1%)
June	Wet	809	802 (-0.8%)	800 (-1.1%)	802 (-0.8%)	798 (-1.3%)
	Above Normal	731	723 (-1.2%)	721 (-1.5%)	723 (-1.2%)	722 (-1.3%)
	Below Normal	728	728 (0.1%)	727 (-0.1%)	728 (0.1%)	723 (-0.7%)
	Dry	739	740 (0.2%)	742 (0.4%)	740 (0.1%)	742 (0.4%)
	Critically Dry	710	712 (0.2%)	712 (0.2%)	712 (0.3%)	711 (0.1%)
	All	754	751 (-0.4%)	750 (-0.5%)	751 (-0.4%)	749 (-0.6%)
July	Wet	763	760 (-0.4%)	760 (-0.4%)	760 (-0.4%)	760 (-0.4%)
	Above Normal	800	800 (-0.1%)	797 (-0.4%)	800 (-0.1%)	805 (0.7%)
	Below Normal	771	775 (0.5%)	774 (0.4%)	775 (0.5%)	776 (0.8%)
	Dry	752	780 (3.7%)	781 (3.8%)	780 (3.7%)	778 (3.5%)
	Critically Dry	715	731 (2.3%)	731 (2.3%)	728 (1.9%)	724 (1.3%)
	All	760	768 (1.1%)	768 (1%)	768 (1%)	768 (1.1%)
August	Wet	733	731 (-0.3%)	731 (-0.3%)	732 (-0.2%)	731 (-0.3%)
	Above Normal	735	735 (0%)	738 (0.4%)	735 (0%)	733 (-0.3%)
	Below Normal	708	710 (0.3%)	711 (0.4%)	710 (0.3%)	713 (0.7%)
	Dry	707	720 (1.9%)	718 (1.7%)	719 (1.8%)	715 (1.2%)
	Critically Dry	706	709 (0.5%)	707 (0.2%)	707 (0.1%)	711 (0.8%)
	All	719	723 (0.4%)	722 (0.4%)	722 (0.4%)	722 (0.3%)
September	Wet	776	773 (-0.3%)	775 (-0.1%)	775 (-0.1%)	773 (-0.3%)

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
	Above Normal	709	710 (0.1%)	712 (0.3%)	710 (0.1%)	717 (1.1%)
	Below Normal	696	696 (0%)	699 (0.4%)	696 (-0.1%)	698 (0.2%)
	Dry	676	686 (1.6%)	690 (2.1%)	687 (1.7%)	685 (1.4%)
	Critically Dry	657	672 (2.3%)	672 (2.3%)	673 (2.4%)	670 (2%)
	All	713	717 (0.5%)	719 (0.9%)	718 (0.6%)	718 (0.6%)
October	Wet	733	731 (-0.3%)	735 (0.4%)	731 (-0.2%)	731 (-0.2%)
	Above Normal	714	715 (0.1%)	717 (0.4%)	716 (0.3%)	720 (0.8%)
	Below Normal	707	710 (0.4%)	710 (0.5%)	713 (0.8%)	709 (0.4%)
	Dry	705	701 (-0.6%)	702 (-0.4%)	702 (-0.5%)	703 (-0.3%)
	Critically Dry	681	680 (-0.1%)	678 (-0.5%)	680 (-0.1%)	697 (2.4%)
	All	712	711 (-0.1%)	713 (0.1%)	712 (0%)	715 (0.4%)
November	Wet	821	818 (-0.4%)	824 (0.3%)	818 (-0.4%)	827 (0.7%)
	Above Normal	733	736 (0.5%)	736 (0.5%)	730 (-0.4%)	734 (0.2%)
	Below Normal	715	713 (-0.3%)	713 (-0.2%)	712 (-0.3%)	714 (0%)
	Dry	730	728 (-0.3%)	729 (-0.1%)	728 (-0.3%)	731 (0.1%)
	Critically Dry	695	704 (1.3%)	701 (0.8%)	702 (1%)	714 (2.8%)
	All	752	752 (0%)	753 (0.2%)	750 (-0.2%)	757 (0.7%)
December	Wet	1,474	1,461 (-0.9%)	1,454 (-1.4%)	1,463 (-0.8%)	1460 (-1%)
	Above Normal	923	886 (-4.1%)	886 (-4.1%)	884 (-4.2%)	886 (-4%)
	Below Normal	818	811 (-0.8%)	812 (-0.6%)	811 (-0.8%)	814 (-0.4%)
	Dry	797	790 (-0.8%)	805 (1%)	790 (-0.9%)	820 (2.9%)
	Critically Dry	713	716 (0.5%)	714 (0.1%)	714 (0.1%)	719 (0.9%)
	All	1,021	1,010 (-1.1%)	1,010 (-1.1%)	1,009 (-1.2%)	1,017 (-0.5%)

* Results for which habitat acreage under Alternative 1, 2, or 3 is more than 5% below habitat acreage under the NAA are highlighted green.

^ Results for which habitat acreage under Alternative 1, 2, or 3 is more than 10% higher than habitat acreage under the NAA are highlighted red.

Table 11M-7. Estimated Mean Daily Side-Channel Habitat (Acres <1 Meter Deep) for Juvenile Salmonids in the Sacramento River Reach 3 (Colusa to Knights Landing) and the Percent Differences (in parentheses) for the No Action Alternative (NAA) and Alternatives 1–3 (Alt 1A, Alt 1B, Alt 2, and Alt 3).

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
January	Wet	250	243 (-3.1%)	242 (-3.5%)	243 (-2.9%)	242 (-3.5%)
	Above Normal	226	213 (-5.6%)	214 (-5.6%)	213 (-5.6%)	213 (-5.6%)
	Below Normal	138	135 (-1.8%)	135 (-1.7%)	135 (-1.8%)	135 (-1.6%)
	Dry	120	120 (-0.1%)	121 (0.2%)	120 (0%)	121 (0.2%)
	Critically Dry	112	112 (0.6%)	113 (1%)	113 (0.9%)	113 (1.2%)

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
	All	179	174 (-2.6%)	174 (-2.7%)	174 (-2.5%)	174 (-2.7%)
February	Wet	321	314 (-2.1%)	315 (-1.8%)	314 (-2.1%)	317 (-1.1%)
	Above Normal	245	233 (-4.8%)	232 (-5.3%)	233 (-4.8%)	234 (-4.7%)
	Below Normal	152	148 (-2.3%)	151 (-0.5%)	148 (-2.4%)	153 (0.9%)
	Dry	143	139 (-2.4%)	139 (-2.5%)	139 (-2.4%)	139 (-2.8%)
	Critically Dry	110	109 (-0.7%)	109 (-0.7%)	109 (-0.7%)	109 (-0.5%)
	All	211	205 (-2.5%)	206 (-2.3%)	205 (-2.5%)	207 (-1.7%)
March	Wet	256	254 (-1.1%)	253 (-1.2%)	254 (-0.7%)	251 (-2.3%)
	Above Normal	243	232 (-4.7%)	232 (-4.6%)	232 (-4.6%)	231 (-5.2%)
	Below Normal	129	127 (-1.8%)	127 (-1.9%)	126 (-2.3%)	127 (-1.4%)
	Dry	123	117 (-5.2%)	116 (-5.5%)	117 (-4.9%)	118 (-4.4%)
	Critically Dry	102	101 (-1.6%)	101 (-1.9%)	101 (-1.6%)	102 (-0.7%)
	All	181	176 (-2.5%)	176 (-2.7%)	177 (-2.4%)	176 (-2.9%)
April	Wet	231	222 (-3.9%)	220 (-4.5%)	223 (-3.3%)	219 (-5.3%)
	Above Normal	151	148 (-1.8%)	149 (-1.5%)	148 (-1.8%)	148 (-1.6%)
	Below Normal	112	108 (-3.7%)	108 (-3.8%)	108 (-3.7%)	108 (-3.8%)
	Dry	109	109 (-0.6%)	109 (-0.5%)	109 (-0.5%)	109 (-0.2%)
	Critically Dry	113	113 (0.7%)	113 (0.6%)	113 (0.7%)	113 (0.6%)
	All	155	151 (-2.6%)	150 (-2.8%)	151 (-2.3%)	150 (-3.2%)
May	Wet	119	117 (-2.2%)	116 (-2.9%)	117 (-2.1%)	115 (-3.5%)
	Above Normal	128	128 (-0.1%)	128 (-0.1%)	128 (-0.1%)	128 (-0.1%)
	Below Normal	119	119 (0.1%)	118 (-0.3%)	119 (0.1%)	118 (-0.7%)
	Dry	115	114 (-0.6%)	114 (-0.7%)	114 (-0.6%)	114 (-0.4%)
	Critically Dry	114	115 (0.5%)	115 (1%)	115 (0.7%)	115 (0.9%)
	All	119	118 (-0.8%)	117 (-1%)	118 (-0.7%)	117 (-1.2%)
June	Wet	117	117 (0%)	117 (-0.2%)	117 (0%)	117 (-0.3%)
	Above Normal	106	106 (-0.5%)	107 (0.9%)	106 (-0.5%)	107 (1.1%)
	Below Normal	108	108 (0.4%)	109 (1%)	108 (0.4%)	109 (0.7%)
	Dry	106	107 (0.9%)	107 (0.8%)	107 (1%)	106 (-0.1%)
	Critically Dry	111	110 (-0.3%)	111 (0.2%)	111 (0.2%)	111 (0.2%)
	All	111	111 (0.1%)	111 (0.4%)	111 (0.2%)	111 (0.2%)
July	Wet	97	96 (-0.2%)	96 (-0.2%)	96 (-0.2%)	96 (-0.2%)
	Above Normal	95	96 (0.6%)	96 (0.9%)	96 (0.6%)	99 (4.5%)
	Below Normal	98	97 (-0.5%)	98 (0.2%)	97 (-0.4%)	98 (0.1%)
	Dry	97	96 (-0.7%)	96 (-1%)	96 (-0.8%)	96 (-0.8%)
	Critically Dry	110	107 (-3.2%)	107 (-3%)	107 (-3.1%)	107 (-3.1%)
	All	99	98 (-0.8%)	98 (-0.6%)	98 (-0.7%)	99 (-0.1%)

Month	Water Year Type	NAA	Alt 1A	Alt 1B	Alt 2	Alt 3
August	Wet	98	98 (0.7%)	98 (0.7%)	98 (0.6%)	98 (0.7%)
	Above Normal	98	98 (0.5%)	98 (0.8%)	98 (0.5%)	101 (3.3%)
	Below Normal	106	105 (-0.8%)	105 (-0.8%)	105 (-0.9%)	106 (-0.6%)
	Dry	107	101 (-5.5%)	101 (-5.5%)	101 (-5%)	104 (-2.8%)
	Critically Dry	110	109 (-1.1%)	107 (-3%)	108 (-2.3%)	110 (-0.5%)
	All	103	102 (-1.3%)	101 (-1.6%)	101 (-1.4%)	103 (-0.2%)
September	Wet	95	95 (-0.2%)	95 (0%)	95 (-0.1%)	95 (-0.2%)
	Above Normal	95	95 (-0.1%)	93 (-2.8%)	95 (-0.2%)	91 (-4.5%)
	Below Normal	115	114 (-1%)	114 (-0.9%)	114 (-1%)	113 (-1.4%)
	Dry	119	115 (-2.7%)	117 (-1.5%)	116 (-2.6%)	118 (-0.6%)
	Critically Dry	114	115 (0.5%)	115 (0.5%)	115 (0.8%)	115 (0.4%)
	All	106	105 (-0.9%)	106 (-0.8%)	106 (-0.7%)	105 (-1%)
October	Wet	105	105 (-0.5%)	105 (0%)	105 (-0.4%)	104 (-1%)
	Above Normal	110	108 (-1.7%)	109 (-1.1%)	108 (-1.7%)	109 (-1.2%)
	Below Normal	111	111 (-0.6%)	110 (-1%)	111 (0%)	109 (-1.8%)
	Dry	113	110 (-1.9%)	111 (-1.4%)	110 (-1.8%)	109 (-3%)
	Critically Dry	110	109 (-0.9%)	110 (-0.4%)	109 (-0.7%)	114 (3.1%)
	All	109	108 (-1.1%)	109 (-0.7%)	108 (-0.9%)	108 (-1%)
November	Wet	121	122 (0.5%)	123 (1.8%)	122 (0.5%)	123 (2%)
	Above Normal	109	109 (0.6%)	109 (0.1%)	108 (-0.3%)	109 (-0.2%)
	Below Normal	111	111 (0.4%)	111 (0.5%)	111 (0.3%)	111 (0.5%)
	Dry	112	112 (-0.3%)	113 (0.5%)	112 (-0.3%)	114 (1.3%)
	Critically Dry	110	114 (3.1%)	113 (2.8%)	113 (2.1%)	115 (4.7%)
	All	114	115 (0.7%)	115 (1.2%)	114 (0.4%)	116 (1.7%)
December	Wet	211	210 (-0.7%)	207 (-1.9%)	210 (-0.6%)	208 (-1.6%)
	Above Normal	140	137 (-1.9%)	137 (-2.4%)	137 (-2.2%)	137 (-2.3%)
	Below Normal	120	120 (-0.2%)	121 (0.1%)	120 (-0.1%)	121 (0.6%)
	Dry	111	111 (0%)	113 (1.9%)	111 (0.4%)	116 (4.4%)
	Critically Dry	113	116 (3.1%)	115 (2.2%)	115 (2.1%)	115 (2%)
	All	149	149 (-0.2%)	148 (-0.6%)	148 (-0.3%)	149 (0%)

* Results for which habitat acreage under Alternative 1, 2, or 3 is more than 5% below habitat acreage under the NAA are highlighted green.

^ Results for which habitat acreage under Alternative 1, 2, or 3 is more than 10% higher than habitat acreage under the NAA are highlighted red.

The results of the frequency analysis of inundation of events for all three reaches combined also show some differences between the NAA and Alternatives 1, 2, and 3 (Figure 11M-10). For events with 2,000 to 3,000 acres, the results show modest reductions in frequencies under

Alternatives 1, 2, and 3 for events lasting 8–17 days and events lasting over 24 days. In contrast, for events with 2,000 to 3,000 acres lasting 18–24 days, the results show moderate increases in frequencies under Alternatives 1 and 2, but not Alternative 3. As previously noted, inundation lasting 18–24 days has been shown to result in maximum productivity in field studies (Whipple et al. 2019). Tables providing the results plotted in Figure 11M-10 and frequency of inundation tables for every month are provided in Attachment 6.

Alternatives 1, 2, and 3 would result in both reductions and increases in acreage and frequency of suitable inundated side-channel habitat in the Sacramento River. On balance, however, the effects would not be large enough to substantially affect the Chinook salmon, steelhead, and Sacramento splittail populations.

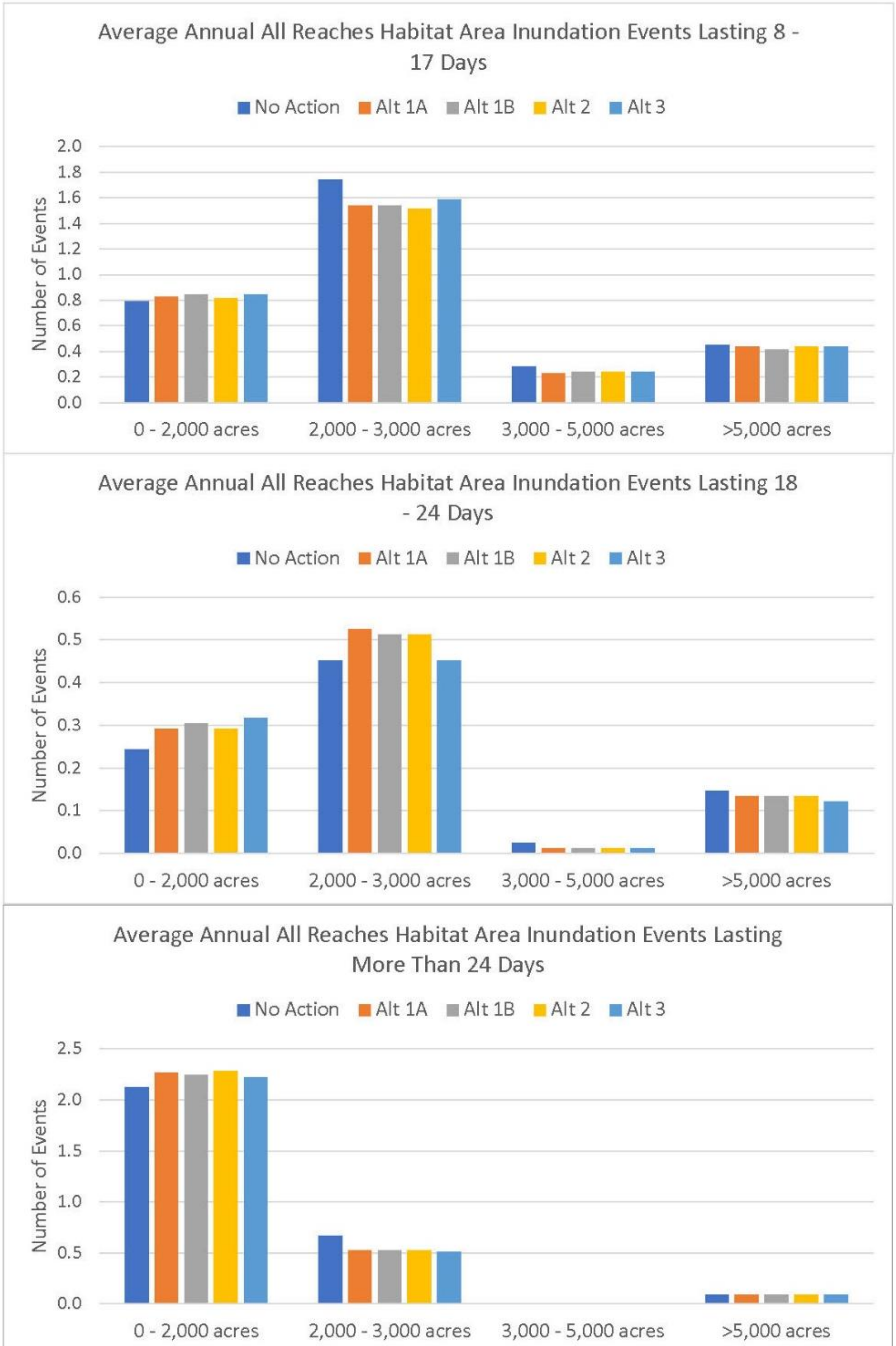


Figure 11M-10. Average Annual Number of Sacramento River Side-Channel Inundation Events (Three River Reaches Combined) with Three Different Ranges of Duration and Four Ranges of Suitable Habitat Acreages for the No Action Alternative (NAA) and Alternatives 1–3 (Alt 1A, Alt 1B, Alt 2, and Alt 3).

11M.4 Conclusion

Except for the Sutter Bypass, the analyses indicated that during the winter and spring months, when inundated habitat is most important to Chinook salmon, steelhead, and Sacramento splittail, the mean daily acreages of suitable habitat are usually lower under Alternatives 1, 2, and 3 than under the NAA. However, the reductions are mostly small and unlikely to have substantial effects on the fish populations. The reductions were largest for the Yolo Bypass (Table 11M-2), but the net reduction for all January through April days was 107 acres or 1.3% (Table 11M-3). The Sutter Bypass results showed almost no reductions and many minor increases in daily habitat acreage under Alternatives 1, 2, and 3 (Table 11M-4). No consistent differences in the frequency of inundation events were found between the NAA and Alternatives 1, 2, and 3.

11M.5 References Cited

Aceituno, M. E. 1993. The relationship between instream flow and physical habitat availability for Chinook salmon in the Stanislaus River, California. U.S. Department of the Interior. Fish & Wildlife Service, Sacramento, California.

Acierto, K. R., J. Israel, J. Ferreira, and J. Roberts. 2014. Estimating juvenile winter-run and spring-run Chinook salmon entrainment onto the Yolo Bypass over a notched Fremont Weir. *California Fish and Game*. 100(4): 630-639.

Bellido-Leiva, F. J., R. A. Lusardi, and J. R. Lund. 2021. Modeling the Effect of Habitat Availability and Quality on Endangered Winter-Run Chinook Salmon (*Oncorhynchus tshawytscha*) Production in The Sacramento Valley. *Ecological Modelling* 447.

Cordoleani, F., W. H. Satterthwaite, M. E. Daniels, M. R. Johnson. 2020. Using Life-Cycle Models to Identify Monitoring Gaps for Central Valley Spring-Run Chinook Salmon. *San Francisco Estuary and Watershed Science* 18(4).

Feyrer, F., T. R. Sommer, and R. Baxter. 2005. Spatial-Temporal Distribution and Habitat Associations of Age-0 Splittail in the Lower San Francisco Estuary Watershed. *Copeia* 2005(1):159-168.

Feyrer, F., T. Sommer, and W. Harrell. 2006a. Managing Floodplain Inundation for Native Fish: Production Dynamics of Age-0 Splittail (*Pogonichthys macrolepidotus*) in California's Yolo Bypass. *Hydrobiologia* 573:213-226.

Feyrer, F., T. Sommer, and W. Harrell. 2006b. Importance of Flood Dynamics versus Intrinsic Physical Habitat in Structuring Fish Communities: Evidence from Two Adjacent Engineered Floodplains on the Sacramento River, California. *North American Journal of Fisheries Management* 26:408–417.

Hampton, M. 1997. *Microhabitat Suitability Criteria for Anadromous Salmonids of the Trinity River*. U. S. Fish and Wildlife Service. Arcata, CA.

Hinkelman, T. M., J. Myfanwy, and J. E. Merz. 2017. *Yolo Bypass Salmon Benefits Model: Modeling the Benefits of Yolo Bypass Restoration Actions on Chinook Salmon.* Prepared by Cramer Fish Sciences for United States Bureau of Reclamation and California Department of Water Resources. West Sacramento, CA.

Katz, J. V. E., C. Jeffres, J. L. Conrad, T. R. Sommer, J. Martinez, S. Brumbaugh, N. Corline, and P. B. Moyle. 2017. Floodplain Farm Fields Provide Novel Rearing Habitat for Chinook Salmon. *Plos One* 2017:1–16.

Limm, M. P. and M. P. Marchetti. 2009. Marchetti. Juvenile Chinook Salmon (Oncorhynchus Tshawytscha) Growth in Off-Channel and Main-Channel Habitats on the Sacramento River, CA Using Otolith Increment Widths. *Environmental Biology of Fishes* 85:141–151.

Merced Irrigation District. 2013. Technical Memorandum 3-5. Instream Flow (PHABSIM) Downstream of Crocker-Huffman Dam. Merced Hydroelectric Project, FERC Project No. 2179.

Moyle, P. B. 2002. *Inland Fishes of California*. Second edition. University of California Press, Berkeley.

Moyle, P. B., R. D. Baxter, T. Sommer, T.C. Foin, and S. A. Matern. 2004. Biology and Population Dynamics of Sacramento Splittail (*Pogonichthys macrolepidotus*) in the San Francisco Estuary: A Review. *San Francisco Estuary and Watershed Science* 2(2):1–47.

Moyle, P. B., R. M. Quiñones, J. V. Katz, and J. Weaver. 2015. *Fish Species of Special Concern in California*. Third Edition. California Department of Fish and Wildlife. Sacramento, CA.

Sommer, T., B. Harrell, M. Nobriga, R. Brown, P. Moyle, W. Kimmerer, and L. Schemel. 2001a. California's Yolo Bypass: Evidence that Flood Control Can Be Compatible with Fisheries, Wetlands, Wildlife, and Agriculture. *Fisheries* 26:6–16.

Sommer, T., R., M. L. Nobriga, W. C., Harrell, W. Batham, R. Brown, and W.J. Kimmerer. 2001b. Floodplain Rearing of Juvenile Chinook Salmon: Evidence of Enhanced Growth and Survival. *Canadian Journal of Fisheries and Aquatic Sciences* 58:325–333.

Sommer, T. R., L. Conrad, G. O'leary, F. Feyrer, and W. C. Harrell. 2002. Spawning and Rearing of Splittail in a Model Floodplain Wetland. *Transactions of the American Fisheries Society* 131:966–974.

Sommer, T. R., W. C. Harrell, R. Kurth, F. Feyrer, S. C. Zeug, G. O'Leary. 2004. Ecological Patterns of Early Life Stages of Fishes in a Large River-Floodplain of the San Francisco Estuary. *American Fisheries Society Symposium* 39:111–123.

Sommer, T. R., W. C. Harrell, and M. L. Nobriga. 2005. Habitat Use and Stranding Risk of Juvenile Chinook Salmon on a Seasonal Floodplain. *North American Journal of Fisheries Management* 25:1493–1504.

Sommer, T. R., W. C. Harrell, Z. Matica, and F. Feyrer. 2008. Habitat Associations and Behavior of Adult and Juvenile Splittail (Cyprinidae: *Pogonichthys macrolepidotus*) in a Managed Seasonal Floodplain Wetland. *San Francisco Estuary and Watershed Science*, 6(2):1–16. http://escholarship.org/uc/item/85r15611.

Takata, L., T. R. Sommer, J. L. Conrad, and B. M. Schreier. 2017. Rearing and migration of juvenile Chinook salmon (*Oncorhynchus tshawytscha*) in a large river floodplain. *Environmental Biology of Fishes* 100(9):1105-1120.

U.S. Fish and Wildlife Service. 2005. *Flow-Habitat Relationships for Chinook Salmon Rearing in the Sacramento River between Keswick Dam and Battle Creek*. August 2, 2005. Sacramento, CA.

Whipple A., T. Grantham, G. Desanker, L. Hunt, A. Merrill, B. Hackenjos, R. Askevold. 2019. Chinook Salmon Habitat Quantification Tool: User Guide (Version 1.0). Prepared for American Rivers. Funded by the Natural Resources Conservation Service Conservation Innovation Grant (#69-3A75-17-40), Water Foundation and Environmental Defense Fund. A report of SFEI-ASC’s Resilient Landscapes Program, Publication #953. San Francisco Estuary Institute, Richmond, CA.

Area (acres) of Yolo Bypass with Different Limiting Habitat Suitability Criteria for Rearing Salmonids (Depth < 1 meter deep and/or Flow Velocity < 1.5 feet per second) under Three Different Fremont Weir Spills Levels.

Limiting Habitat Suitability Criteria	2,000 cfs	7,000 cfs	15,000 cfs
Total Suitable Inundated Habitat	25,242 (77%)	25,793 (58%)	23,672 (46%)
Habitat with depth limiting	5,407 (17%)	15,135 (34%)	24,018 (46%)
Habitat with flow velocity limiting	191 (1%)	287 (1%)	393 (1%)
Habitat with depth and velocity limiting	1,915 (6%)	2,959 (7%)	3,673 (7%)
Total Inundated Habitat	32,755 (100%)	44,174 (100%)	51,756 (100%)

Table 1. Count of Years that Exceed Fremont Weir Flow Magnitude Thresholds Between 1922 and 2003 for Each Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	Count of Years That Exceed Fremont Weir Flow Magnitude Thresholds Between 1922 and 2003, Alternative 1A																			
	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action	Alternative 1A	Difference		No Action	Alternative 1A	Difference		No Action	Alternative 1A	Difference		No Action	Alternative 1A	Difference		No Action	Alternative 1A	Difference	
> 0 cfs	81	82	1	1.2%	77	77	0	0.0%	74	74	0	0.0%	70	70	0	0.0%	55	53	-2	-3.6%
> 1,000 cfs	71	71	0	0.0%	55	51	-4	-7.3%	45	45	0	0.0%	39	39	0	0.0%	33	33	0	0.0%
> 2,000 cfs	70	68	-2	-2.9%	49	48	-1	-2.0%	41	41	0	0.0%	34	34	0	0.0%	26	26	0	0.0%
> 3,000 cfs	64	63	-1	-1.6%	47	46	-1	-2.1%	36	34	-2	-5.6%	30	29	-1	-3.3%	22	21	-1	-4.5%
> 4,000 cfs	62	59	-3	-4.8%	43	43	0	0.0%	32	32	0	0.0%	26	25	-1	-3.8%	18	18	0	0.0%
> 6,000 cfs	49	48	-1	-2.0%	34	31	-3	-8.8%	26	24	-2	-7.7%	18	18	0	0.0%	10	10	0	0.0%
> 8,000 cfs	47	44	-3	-6.4%	29	26	-3	-10.3%	22	22	0	0.0%	16	15	-1	-6.3%	5	5	0	0.0%
> 10,000 cfs	45	44	-1	-2.2%	28	26	-2	-7.1%	22	22	0	0.0%	11	11	0	0.0%	4	3	-1	-25.0%

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	Count of Years That Exceed Fremont Weir Flow Magnitude Thresholds Between 1922 and 2003, Alternative 1B																			
	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action	Alternative 1B	Difference		No Action	Alternative 1B	Difference		No Action	Alternative 1B	Difference		No Action	Alternative 1B	Difference		No Action	Alternative 1B	Difference	
> 0 cfs	81	81	0	0.0%	77	77	0	0.0%	74	74	0	0.0%	70	70	0	0.0%	55	55	0	0.0%
> 1,000 cfs	71	71	0	0.0%	55	51	-4	-7.3%	45	45	0	0.0%	39	39	0	0.0%	33	34	1	3.0%
> 2,000 cfs	70	68	-2	-2.9%	49	48	-1	-2.0%	41	41	0	0.0%	34	34	0	0.0%	26	26	0	0.0%
> 3,000 cfs	64	63	-1	-1.6%	47	46	-1	-2.1%	36	34	-2	-5.6%	30	29	-1	-3.3%	22	21	-1	-4.5%
> 4,000 cfs	62	58	-4	-6.5%	43	43	0	0.0%	32	32	0	0.0%	26	25	-1	-3.8%	18	18	0	0.0%
> 6,000 cfs	49	48	-1	-2.0%	34	31	-3	-8.8%	26	24	-2	-7.7%	18	18	0	0.0%	10	10	0	0.0%
> 8,000 cfs	47	44	-3	-6.4%	29	26	-3	-10.3%	22	22	0	0.0%	16	15	-1	-6.3%	5	5	0	0.0%
> 10,000 cfs	45	44	-1	-2.2%	28	26	-2	-7.1%	22	22	0	0.0%	11	11	0	0.0%	4	3	-1	-25.0%

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	Count of Years That Exceed Fremont Weir Flow Magnitude Thresholds Between 1922 and 2003, Alternative 2																			
	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action	Alternative 2	Difference		No Action	Alternative 2	Difference		No Action	Alternative 2	Difference		No Action	Alternative 2	Difference		No Action	Alternative 2	Difference	
> 0 cfs	81	81	0	0.0%	77	77	0	0.0%	74	74	0	0.0%	70	70	0	0.0%	55	54	-1	-1.8%
> 1,000 cfs	71	71	0	0.0%	55	51	-4	-7.3%	45	45	0	0.0%	39	39	0	0.0%	33	33	0	0.0%
> 2,000 cfs	70	68	-2	-2.9%	49	48	-1	-2.0%	41	41	0	0.0%	34	34	0	0.0%	26	26	0	0.0%
> 3,000 cfs	64	63	-1	-1.6%	47	46	-1	-2.1%	36	34	-2	-5.6%	30	29	-1	-3.3%	22	21	-1	-4.5%
> 4,000 cfs	62	59	-3	-4.8%	43	43	0	0.0%	32	32	0	0.0%	26	25	-1	-3.8%	18	18	0	0.0%
> 6,000 cfs	49	48	-1	-2.0%	34	31	-3	-8.8%	26	24	-2	-7.7%	18	18	0	0.0%	10	10	0	0.0%
> 8,000 cfs	47	44	-3	-6.4%	29	26	-3	-10.3%	22	22	0	0.0%	16	15	-1	-6.3%	5	5	0	0.0%
> 10,000 cfs	45	44	-1	-2.2%	28	26	-2	-7.1%	22	22	0	0.0%	11	11	0	0.0%	4	3	-1	-25.0%

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	Count of Years That Exceed Fremont Weir Flow Magnitude Thresholds Between 1922 and 2003, Alternative 3																			
	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action	Alternative 3	Difference		No Action	Alternative 3	Difference		No Action	Alternative 3	Difference		No Action	Alternative 3	Difference		No Action	Alternative 3	Difference	
> 0 cfs	81	81	0	0.0%	77	77	0	0.0%	74	74	0	0.0%	70	70	0	0.0%	55	55	0	0.0%
> 1,000 cfs	71	71	0	0.0%	55	51	-4	-7.3%	45	45	0	0.0%	39	39	0	0.0%	33	34	1	3.0%
> 2,000 cfs	70	68	-2	-2.9%	49	48	-1	-2.0%	41	41	0	0.0%	34	35	1	2.9%	26	27	1	3.8%
> 3,000 cfs	64	63	-1	-1.6%	47	46	-1	-2.1%	36	34	-2	-5.6%	30	29	-1	-3.3%	22	21	-1	-4.5%
> 4,000 cfs	62	58	-4	-6.5%	43	44	1	2.3%	32	32	0	0.0%	26	25	-1	-3.8%	18	18	0	0.0%
> 6,000 cfs	49	48	-1	-2.0%	34	31	-3	-8.8%	26	23	-3	-11.5%	18	18	0	0.0%	10	9	-1	-10.0%
> 8,000 cfs	47	44	-3	-6.4%	29	27	-2	-6.9%	22	22	0	0.0%	16	15	-1	-6.3%	5	5	0	0.0%
> 10,000 cfs	45	44	-1	-2.2%	28	26	-2	-7.1%	22	22	0	0.0%	11	11	0	0.0%	4	3	-1	-25.0%

Figure 1. Frequency of Yolo Bypass Habitat Area Inundation Events.

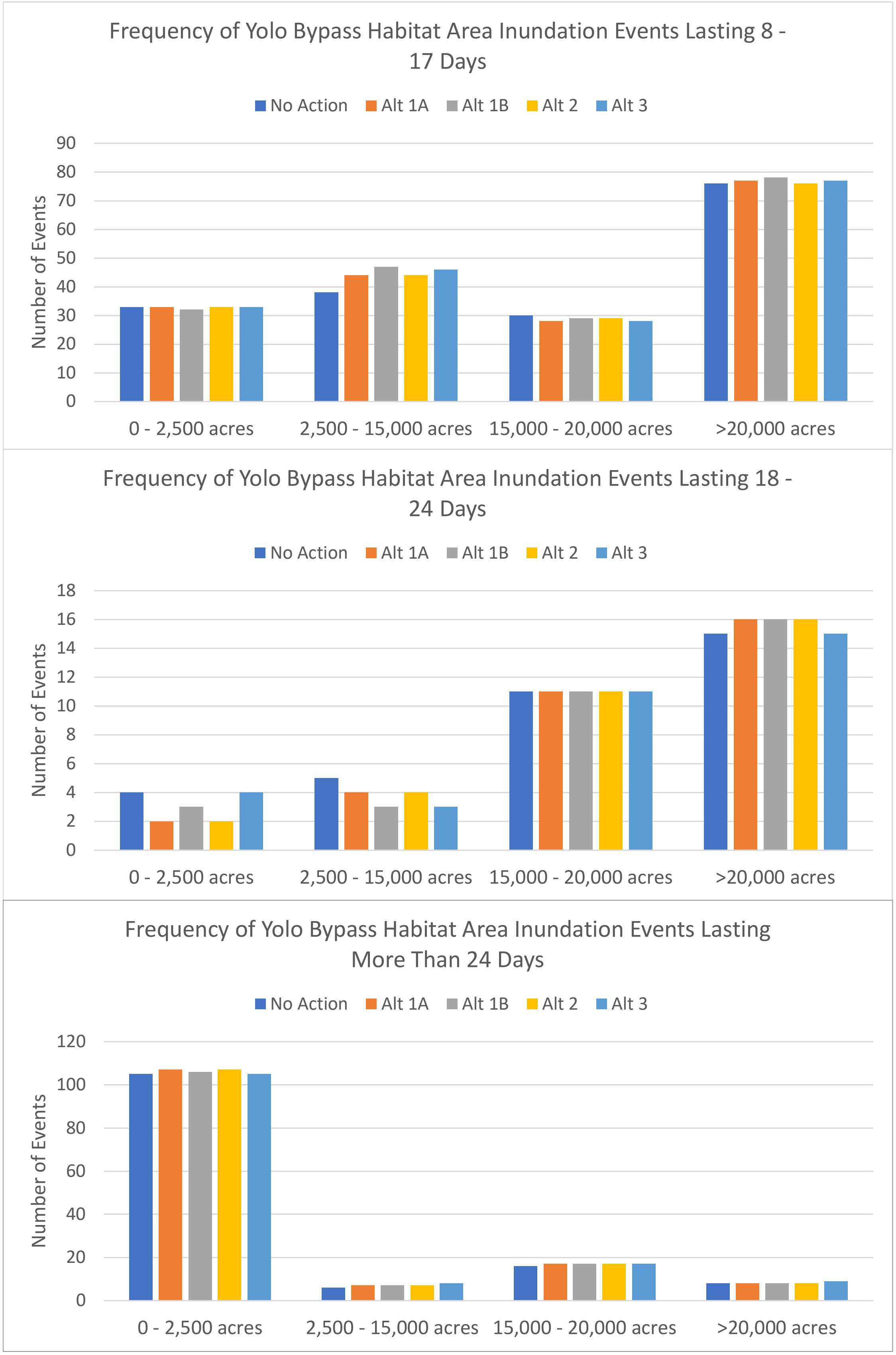


Table 1. Frequency of Yolo Bypass Habitat Area Inundation Events.

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	33	33	0	0%	32	-1	-3%	33	0	0%	33	0	0%
2,500 - 15,000 acres	38	44	6	16%	47	9	24%	44	6	16%	46	8	21%
15,000 - 20,000 acres	30	28	-2	-7%	29	-1	-3%	29	-1	-3%	28	-2	-7%
>20,000 acres	76	77	1	1%	78	2	3%	76	0	0%	77	1	1%
	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	4	2	-2	-50%	3	-1	-25%	2	-2	-50%	4	0	0%
2,500 - 15,000 acres	5	4	-1	-20%	3	-2	-40%	4	-1	-20%	3	-2	-40%
15,000 - 20,000 acres	11	11	0	0%	11	0	0%	11	0	0%	11	0	0%
>20,000 acres	15	16	1	7%	16	1	7%	16	1	7%	15	0	0%
	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	105	107	2	2%	106	1	1%	107	2	2%	105	0	0%
2,500 - 15,000 acres	6	7	1	17%	7	1	17%	7	1	17%	8	2	33%
15,000 - 20,000 acres	16	17	1	6%	17	1	6%	17	1	6%	17	1	6%
>20,000 acres	8	8	0	0%	8	0	0%	8	0	0%	9	1	13%

*Based on total number of events in 82 year simulation period.

Table 2. Monthly Summary of Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in October

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in November

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in December

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	6	5	-1	-17%	5	-1	-17%	5	-1	-17%	6	0	0%
2,500 - 15,000 acres	7	7	0	0%	9	2	29%	7	0	0%	8	1	14%
15,000 - 20,000 acres	4	4	0	0%	4	0	0%	4	0	0%	4	0	0%
>20,000 acres	10	11	1	10%	12	2	20%	11	1	10%	12	2	20%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in January

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	7	7	0	0%	7	0	0%	7	0	0%	7	0	0%
2,500 - 15,000 acres	9	10	1	11%	10	1	11%	10	1	11%	10	1	11%
15,000 - 20,000 acres	6	6	0	0%	6	0	0%	6	0	0%	6	0	0%
>20,000 acres	19	18	-1	-5%	18	-1	-5%	18	-1	-5%	18	-1	-5%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in February

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	8	8	0	0%	8	0	0%	8	0	0%	8	0	0%
2,500 - 15,000 acres	9	9	0	0%	10	1	11%	9	0	0%	10	1	11%
15,000 - 20,000 acres	10	9	-1	-10%	10	0	0%	10	0	0%	9	-1	-10%
>20,000 acres	22	22	0	0%	22	0	0%	22	0	0%	22	0	0%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in March

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	6	7	1	17%	7	1	17%	7	1	17%	7	1	17%
2,500 - 15,000 acres	8	12	4	50%	12	4	50%	12	4	50%	12	4	50%
15,000 - 20,000 acres	5	4	-1	-20%	4	-1	-20%	4	-1	-20%	4	-1	-20%
>20,000 acres	15	13	-2	-13%	13	-2	-13%	13	-2	-13%	12	-3	-20%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in April

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	3	3	0	0%	2	-1	-33%	3	0	0%	2	-1	-33%
2,500 - 15,000 acres	3	4	1	33%	4	1	33%	4	1	33%	4	1	33%
15,000 - 20,000 acres	5	5	0	0%	5	0	0%	5	0	0%	5	0	0%
>20,000 acres	6	9	3	50%	9	3	50%	8	2	33%	9	3	50%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in May

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
2,500 - 15,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in June

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in July

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in August

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in September

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Table 3. Monthly Summary of Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in October												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in November												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in December												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
2,500 - 15,000 acres	1	1	0	0%	0	-1	-100%	1	0	0%	0	-1	-100%
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	6	6	0	0%	6	0	0%	6	0	0%	5	-1	-17%

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in January												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	1	1	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
>20,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in February												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	2	1	-1	-50%	1	-1	-50%	1	-1	-50%	1	-1	-50%
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	4	4	0	0%	4	0	0%	4	0	0%	4	0	0%
>20,000 acres	2	3	1	50%	3	1	50%	3	1	50%	3	1	50%

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in March												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	1	0	-1	-100%	0	-1	-100%	0	-1	-100%	0	-1	-100%
2,500 - 15,000 acres	2	1	-1	-50%	1	-1	-50%	1	-1	-50%	1	-1	-50%
15,000 - 20,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
>20,000 acres	2	3	1	50%	3	1	50%	3	1	50%	3	1	50%

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in April												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	1	1	-	0	0	-	1	1	-
2,500 - 15,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
15,000 - 20,000 acres	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%
>20,000 acres	3	2	-1	-33%	2	-1	-33%	2	-1	-33%	2	-1	-33%

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in May												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in June												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in July												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in August												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

	Frequency of Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in September												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Table 4. Monthly Summary of Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in October

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
2,500 - 15,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in November

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	4	4	0	0%	3	-1	-25%	4	0	0%	3	-1	-25%
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in December

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	5	6	1	20%	6	1	20%	6	1	20%	6	1	20%
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	1	1	-
15,000 - 20,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
>20,000 acres	1	1	0	0%	1	0	0%	1	0	0%	2	1	100%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in January

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	10	10	0	0%	10	0	0%	10	0	0%	9	-1	-10%
2,500 - 15,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
15,000 - 20,000 acres	6	6	0	0%	6	0	0%	6	0	0%	6	0	0%
>20,000 acres	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in February

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	4	5	1	25%	5	1	25%	5	1	25%	5	1	25%
2,500 - 15,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
15,000 - 20,000 acres	6	7	1	17%	7	1	17%	7	1	17%	7	1	17%
>20,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in March

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	7	7	0	0%	7	0	0%	7	0	0%	7	0	0%
2,500 - 15,000 acres	2	3	1	50%	3	1	50%	3	1	50%	3	1	50%
15,000 - 20,000 acres	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%
>20,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in April

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in May

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
2,500 - 15,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in June

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	8	9	1	13%	8	0	0%	9	1	13%	8	0	0%
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in July

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	21	21	0	0%	21	0	0%	21	0	0%	21	0	0%
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in August

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	27	25	-2	-7%	27	0	0%	25	-2	-7%	27	0	0%
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days in September

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	14	15	1	7%	14	0	0%	15	1	7%	14	0	0%
2,500 - 15,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
15,000 - 20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>20,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Figure 2. Average Annual Yolo Bypass Habitat Area Inundation Events.

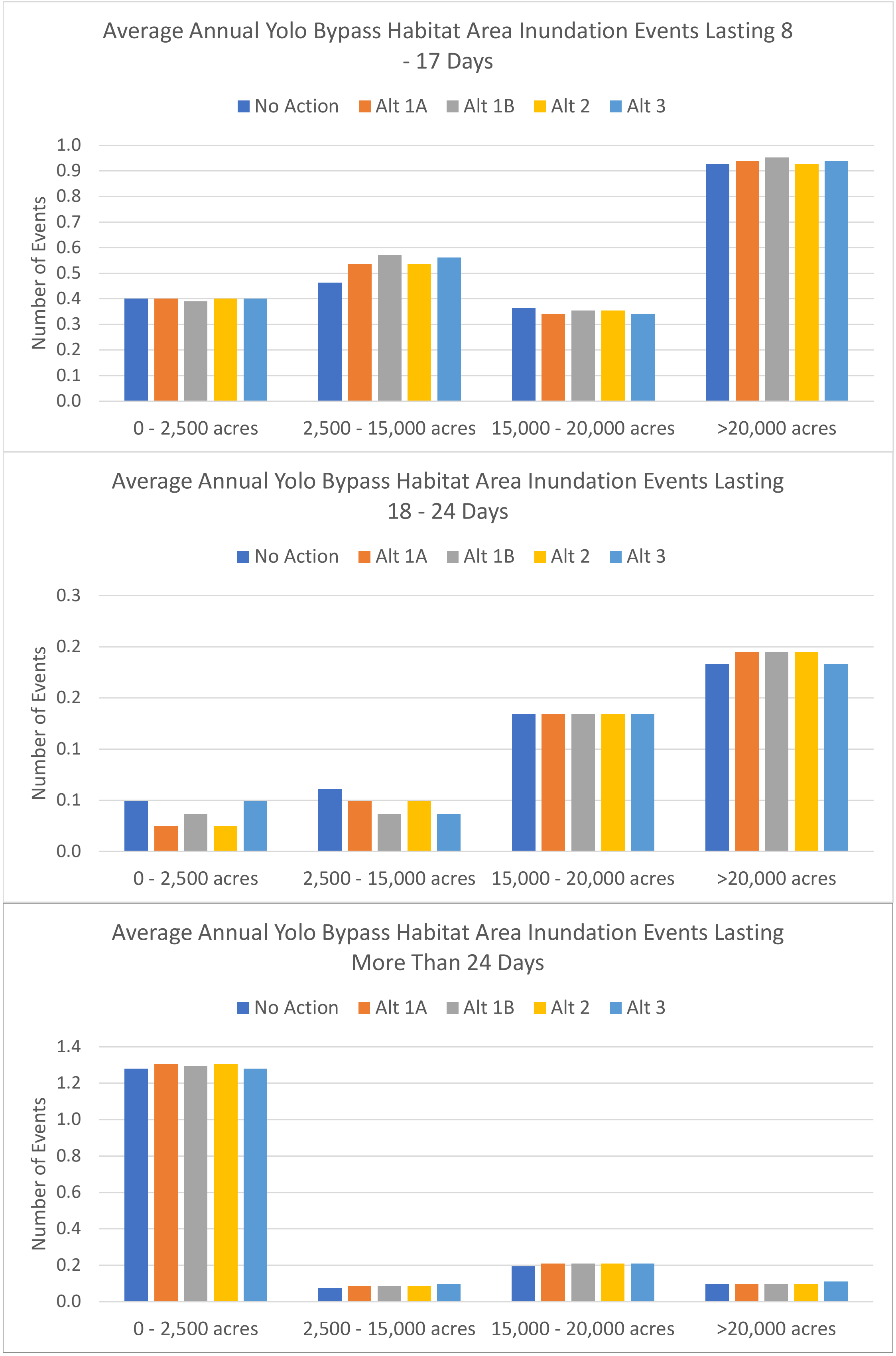


Table 5. Average Annual Yolo Bypass Habitat Area Inundation Events.

	Average Annual Yolo Bypass Habitat Area Inundation Events Lasting 8 - 17 Days											
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0.40	0.40	0.00	0%	0.39	-0.01	-3%	0.40	0.00	0%	0.40	0.00	0%
2,500 - 15,000 acres	0.46	0.54	0.07	16%	0.57	0.11	24%	0.54	0.07	16%	0.56	0.10	21%
15,000 - 20,000 acres	0.37	0.34	-0.02	-7%	0.35	-0.01	-3%	0.35	-0.01	-3%	0.34	-0.02	-7%
>20,000 acres	0.93	0.94	0.01	1%	0.95	0.02	3%	0.93	0.00	0%	0.94	0.01	1%
	Average Annual Yolo Bypass Habitat Area Inundation Events Lasting 18 - 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	0.05	0.02	-0.02	-50%	0.04	-0.01	-25%	0.02	-0.02	-50%	0.05	0.00	0%
2,500 - 15,000 acres	0.06	0.05	-0.01	-20%	0.04	-0.02	-40%	0.05	-0.01	-20%	0.04	-0.02	-40%
15,000 - 20,000 acres	0.13	0.13	0.00	0%	0.13	0.00	0%	0.13	0.00	0%	0.13	0.00	0%
>20,000 acres	0.18	0.20	0.01	7%	0.20	0.01	7%	0.20	0.01	7%	0.18	0.00	0%
	Average Annual Yolo Bypass Habitat Area Inundation Events Lasting More Than 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,500 acres	1.28	1.30	0.02	2%	1.29	0.01	1%	1.30	0.02	2%	1.28	0.00	0%
2,500 - 15,000 acres	0.07	0.09	0.01	17%	0.09	0.01	17%	0.09	0.01	17%	0.10	0.02	33%
15,000 - 20,000 acres	0.20	0.21	0.01	6%	0.21	0.01	6%	0.21	0.01	6%	0.21	0.01	6%
>20,000 acres	0.10	0.10	0.00	0%	0.10	0.00	0%	0.10	0.00	0%	0.11	0.01	13%

*Based on total events in 82 year simulation period.

Table 1a. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Ord Ferry, Moulton Weir, and Colusa Weir Spill Results - Alternative 1A Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference	
> 0 cfs	67	65	-2	-3.0%	44	44	0	0.0%	30	29	-1	-3.3%	22	21	-1	-4.5%	8	7	-1	-12.5%
> 1,000 cfs	65	64	-1	-1.5%	44	44	0	0.0%	30	29	-1	-3.3%	19	19	0	0.0%	8	7	-1	-12.5%
> 2,000 cfs	61	61	0	0.0%	44	44	0	0.0%	28	26	-2	-7.1%	18	16	-2	-11.1%	6	5	-1	-16.7%
> 3,000 cfs	59	58	-1	-1.7%	43	42	-1	-2.3%	26	23	-3	-11.5%	15	14	-1	-6.7%	5	4	-1	-20.0%
> 4,000 cfs	59	58	-1	-1.7%	42	39	-3	-7.1%	24	21	-3	-12.5%	15	14	-1	-6.7%	5	4	-1	-20.0%
> 6,000 cfs	54	53	-1	-1.9%	38	37	-1	-2.6%	20	20	0	0.0%	12	11	-1	-8.3%	4	3	-1	-25.0%
> 8,000 cfs	53	51	-2	-3.8%	36	32	-4	-11.1%	19	19	0	0.0%	10	10	0	0.0%	3	2	-1	-33.3%
> 10,000 cfs	50	49	-1	-2.0%	32	30	-2	-6.3%	17	17	0	0.0%	10	9	-1	-10.0%	2	2	0	0.0%

Table 1b. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Total Weir Spill Results - Alternative 1A Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference	
> 0 cfs	71	70	-1	-1.4%	50	50	0	0.0%	38	37	-1	-2.6%	26	25	-1	-3.8%	15	13	-2	-13.3%
> 1,000 cfs	70	70	0	0.0%	49	47	-2	-4.1%	37	34	-3	-8.1%	25	25	0	0.0%	14	13	-1	-7.1%
> 2,000 cfs	69	68	-1	-1.4%	48	45	-3	-6.3%	34	33	-1	-2.9%	23	22	-1	-4.3%	13	12	-1	-7.7%
> 3,000 cfs	68	68	0	0.0%	46	45	-1	-2.2%	32	31	-1	-3.1%	22	22	0	0.0%	13	11	-2	-15.4%
> 4,000 cfs	67	65	-2	-3.0%	44	44	0	0.0%	31	28	-3	-9.7%	22	21	-1	-4.5%	10	7	-3	-30.0%
> 6,000 cfs	62	62	0	0.0%	44	43	-1	-2.3%	29	27	-2	-6.9%	20	20	0	0.0%	8	7	-1	-12.5%
> 8,000 cfs	59	58	-1	-1.7%	42	42	0	0.0%	25	24	-1	-4.0%	17	15	-2	-11.8%	5	4	-1	-20.0%
> 10,000 cfs	57	56	-1	-1.8%	41	40	-1	-2.4%	24	21	-3	-12.5%	15	14	-1	-6.7%	4	4	0	0.0%

*Total Weir Spill Results include spills from Ord Ferry, Moulton Weir, Colusa Weir, and Tisdale Weir.

Table 1c. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Total Sutter Bypass Flow Results - Alternative 1A Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference		No Action Alternative	Alternative 1A	Difference	
> 0 cfs	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%
> 1,000 cfs	81	81	0	0.0%	76	76	0	0.0%	69	69	0	0.0%	60	60	0	0.0%	47	47	0	0.0%
> 2,000 cfs	81	81	0	0.0%	67	67	0	0.0%	52	52	0	0.0%	41	41	0	0.0%	33	33	0	0.0%
> 3,000 cfs	81	81	0	0.0%	62	60	-2	-3.2%	49	48	-1	-2.0%	38	37	-1	-2.6%	24	23	-1	-4.2%
> 4,000 cfs	80	80	0	0.0%	59	58	-1	-1.7%	46	46	0	0.0%	32	31	-1	-3.1%	19	19	0	0.0%
> 6,000 cfs	76	76	0	0.0%	55	54	-1	-1.8%	40	38	-2	-5.0%	26	26	0	0.0%	13	13	0	0.0%
> 8,000 cfs	73	73	0	0.0%	47	47	0	0.0%	35	33	-2	-5.7%	23	22	-1	-4.3%	11	10	-1	-9.1%
> 10,000 cfs	68	68	0	0.0%	46	45	-1	-2.2%	33	30	-3	-9.1%	22	22	0	0.0%	9	8	-1	-11.1%

Table 2a. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Ord Ferry, Moulton Weir, and Colusa Weir Spill Results - Alternative 1B Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference	
> 0 cfs	67	65	-2	-3.0%	44	44	0	0.0%	30	29	-1	-3.3%	22	21	-1	-4.5%	8	8	0	0.0%
> 1,000 cfs	65	64	-1	-1.5%	44	44	0	0.0%	30	29	-1	-3.3%	19	19	0	0.0%	8	8	0	0.0%
> 2,000 cfs	61	61	0	0.0%	44	44	0	0.0%	28	25	-3	-10.7%	18	16	-2	-11.1%	6	5	-1	-16.7%
> 3,000 cfs	59	58	-1	-1.7%	43	42	-1	-2.3%	26	23	-3	-11.5%	15	14	-1	-6.7%	5	4	-1	-20.0%
> 4,000 cfs	59	58	-1	-1.7%	42	39	-3	-7.1%	24	20	-4	-16.7%	15	14	-1	-6.7%	5	4	-1	-20.0%
> 6,000 cfs	54	53	-1	-1.9%	38	37	-1	-2.6%	20	19	-1	-5.0%	12	10	-2	-16.7%	4	3	-1	-25.0%
> 8,000 cfs	53	51	-2	-3.8%	36	32	-4	-11.1%	19	19	0	0.0%	10	10	0	0.0%	3	3	0	0.0%
> 10,000 cfs	50	49	-1	-2.0%	32	31	-1	-3.1%	17	17	0	0.0%	10	9	-1	-10.0%	2	2	0	0.0%

Table 2b. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Total Weir Spill Results - Alternative 1B Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference	
> 0 cfs	71	71	0	0.0%	50	50	0	0.0%	38	37	-1	-2.6%	26	25	-1	-3.8%	15	13	-2	-13.3%
> 1,000 cfs	70	71	1	1.4%	49	46	-3	-6.1%	37	35	-2	-5.4%	25	24	-1	-4.0%	14	13	-1	-7.1%
> 2,000 cfs	69	69	0	0.0%	48	46	-2	-4.2%	34	34	0	0.0%	23	22	-1	-4.3%	13	12	-1	-7.7%
> 3,000 cfs	68	68	0	0.0%	46	46	0	0.0%	32	32	0	0.0%	22	22	0	0.0%	13	10	-3	-23.1%
> 4,000 cfs	67	65	-2	-3.0%	44	44	0	0.0%	31	28	-3	-9.7%	22	21	-1	-4.5%	10	8	-2	-20.0%
> 6,000 cfs	62	62	0	0.0%	44	42	-2	-4.5%	29	26	-3	-10.3%	20	19	-1	-5.0%	8	8	0	0.0%
> 8,000 cfs	59	59	0	0.0%	42	42	0	0.0%	25	24	-1	-4.0%	17	15	-2	-11.8%	5	4	-1	-20.0%
> 10,000 cfs	57	56	-1	-1.8%	41	41	0	0.0%	24	21	-3	-12.5%	15	14	-1	-6.7%	4	4	0	0.0%

*Total Weir Spill Results include spills from Ord Ferry, Moulton Weir, Colusa Weir, and Tisdale Weir.

Table 2c. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Total Sutter Bypass Flow Results - Alternative 1B Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference		No Action Alternative	Alternative 1B	Difference	
> 0 cfs	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%
> 1,000 cfs	81	81	0	0.0%	76	76	0	0.0%	69	69	0	0.0%	60	61	1	1.7%	47	47	0	0.0%
> 2,000 cfs	81	81	0	0.0%	67	68	1	1.5%	52	52	0	0.0%	41	41	0	0.0%	33	33	0	0.0%
> 3,000 cfs	81	81	0	0.0%	62	60	-2	-3.2%	49	48	-1	-2.0%	38	37	-1	-2.6%	24	23	-1	-4.2%
> 4,000 cfs	80	80	0	0.0%	59	58	-1	-1.7%	46	46	0	0.0%	32	32	0	0.0%	19	19	0	0.0%
> 6,000 cfs	76	76	0	0.0%	55	54	-1	-1.8%	40	38	-2	-5.0%	26	26	0	0.0%	13	13	0	0.0%
> 8,000 cfs	73	73	0	0.0%	47	48	1	2.1%	35	33	-2	-5.7%	23	22	-1	-4.3%	11	10	-1	-9.1%
> 10,000 cfs	68	68	0	0.0%	46	45	-1	-2.2%	33	30	-3	-9.1%	22	22	0	0.0%	9	8	-1	-11.1%

Table 3a. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Ord Ferry, Moulton Weir, and Colusa Weir Spill Results - Alternative 2 Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference	
> 0 cfs	67	65	-2	-3.0%	44	44	0	0.0%	30	29	-1	-3.3%	22	21	-1	-4.5%	8	7	-1	-12.5%
> 1,000 cfs	65	64	-1	-1.5%	44	44	0	0.0%	30	29	-1	-3.3%	19	19	0	0.0%	8	7	-1	-12.5%
> 2,000 cfs	61	61	0	0.0%	44	44	0	0.0%	28	26	-2	-7.1%	18	16	-2	-11.1%	6	5	-1	-16.7%
> 3,000 cfs	59	58	-1	-1.7%	43	42	-1	-2.3%	26	23	-3	-11.5%	15	14	-1	-6.7%	5	4	-1	-20.0%
> 4,000 cfs	59	58	-1	-1.7%	42	39	-3	-7.1%	24	21	-3	-12.5%	15	14	-1	-6.7%	5	4	-1	-20.0%
> 6,000 cfs	54	53	-1	-1.9%	38	37	-1	-2.6%	20	20	0	0.0%	12	12	0	0.0%	4	3	-1	-25.0%
> 8,000 cfs	53	51	-2	-3.8%	36	32	-4	-11.1%	19	19	0	0.0%	10	10	0	0.0%	3	2	-1	-33.3%
> 10,000 cfs	50	49	-1	-2.0%	32	30	-2	-6.3%	17	17	0	0.0%	10	9	-1	-10.0%	2	2	0	0.0%

Table 3b. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Total Weir Spill Results - Alternative 2 Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference	
> 0 cfs	71	70	-1	-1.4%	50	50	0	0.0%	38	36	-2	-5.3%	26	25	-1	-3.8%	15	14	-1	-6.7%
> 1,000 cfs	70	70	0	0.0%	49	47	-2	-4.1%	37	34	-3	-8.1%	25	25	0	0.0%	14	13	-1	-7.1%
> 2,000 cfs	69	68	-1	-1.4%	48	45	-3	-6.3%	34	33	-1	-2.9%	23	22	-1	-4.3%	13	12	-1	-7.7%
> 3,000 cfs	68	68	0	0.0%	46	45	-1	-2.2%	32	31	-1	-3.1%	22	22	0	0.0%	13	12	-1	-7.7%
> 4,000 cfs	67	65	-2	-3.0%	44	44	0	0.0%	31	28	-3	-9.7%	22	21	-1	-4.5%	10	7	-3	-30.0%
> 6,000 cfs	62	62	0	0.0%	44	43	-1	-2.3%	29	27	-2	-6.9%	20	19	-1	-5.0%	8	7	-1	-12.5%
> 8,000 cfs	59	58	-1	-1.7%	42	42	0	0.0%	25	24	-1	-4.0%	17	15	-2	-11.8%	5	4	-1	-20.0%
> 10,000 cfs	57	56	-1	-1.8%	41	40	-1	-2.4%	24	21	-3	-12.5%	15	14	-1	-6.7%	4	4	0	0.0%

*Total Weir Spill Results include spills from Ord Ferry, Moulton Weir, Colusa Weir, and Tisdale Weir.

Table 3c. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Total Sutter Bypass Flow Results - Alternative 2 Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference		No Action Alternative	Alternative 2	Difference	
> 0 cfs	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%
> 1,000 cfs	81	81	0	0.0%	76	76	0	0.0%	69	69	0	0.0%	60	60	0	0.0%	47	47	0	0.0%
> 2,000 cfs	81	81	0	0.0%	67	67	0	0.0%	52	52	0	0.0%	41	41	0	0.0%	33	33	0	0.0%
> 3,000 cfs	81	81	0	0.0%	62	60	-2	-3.2%	49	48	-1	-2.0%	38	37	-1	-2.6%	24	23	-1	-4.2%
> 4,000 cfs	80	80	0	0.0%	59	58	-1	-1.7%	46	46	0	0.0%	32	31	-1	-3.1%	19	19	0	0.0%
> 6,000 cfs	76	76	0	0.0%	55	54	-1	-1.8%	40	38	-2	-5.0%	26	26	0	0.0%	13	13	0	0.0%
> 8,000 cfs	73	73	0	0.0%	47	47	0	0.0%	35	33	-2	-5.7%	23	22	-1	-4.3%	11	10	-1	-9.1%
> 10,000 cfs	68	68	0	0.0%	46	45	-1	-2.2%	33	30	-3	-9.1%	22	22	0	0.0%	9	9	0	0.0%

Table 4a. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Ord Ferry, Moulton Weir, and Colusa Weir Spill Results - Alternative 3 Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference	
> 0 cfs	67	66	-1	-1.5%	44	44	0	0.0%	30	29	-1	-3.3%	22	20	-2	-9.1%	8	8	0	0.0%
> 1,000 cfs	65	65	0	0.0%	44	44	0	0.0%	30	28	-2	-6.7%	19	19	0	0.0%	8	8	0	0.0%
> 2,000 cfs	61	61	0	0.0%	44	44	0	0.0%	28	25	-3	-10.7%	18	16	-2	-11.1%	6	6	0	0.0%
> 3,000 cfs	59	59	0	0.0%	43	41	-2	-4.7%	26	22	-4	-15.4%	15	14	-1	-6.7%	5	4	-1	-20.0%
> 4,000 cfs	59	59	0	0.0%	42	38	-4	-9.5%	24	20	-4	-16.7%	15	14	-1	-6.7%	5	4	-1	-20.0%
> 6,000 cfs	54	54	0	0.0%	38	36	-2	-5.3%	20	19	-1	-5.0%	12	10	-2	-16.7%	4	3	-1	-25.0%
> 8,000 cfs	53	51	-2	-3.8%	36	32	-4	-11.1%	19	19	0	0.0%	10	10	0	0.0%	3	3	0	0.0%
> 10,000 cfs	50	49	-1	-2.0%	32	31	-1	-3.1%	17	17	0	0.0%	10	9	-1	-10.0%	2	2	0	0.0%

Table 4b. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Total Weir Spill Results - Alternative 3 Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference	
> 0 cfs	71	71	0	0.0%	50	51	1	2.0%	38	36	-2	-5.3%	26	24	-2	-7.7%	15	13	-2	-13.3%
> 1,000 cfs	70	71	1	1.4%	49	47	-2	-4.1%	37	36	-1	-2.7%	25	24	-1	-4.0%	14	13	-1	-7.1%
> 2,000 cfs	69	69	0	0.0%	48	47	-1	-2.1%	34	34	0	0.0%	23	22	-1	-4.3%	13	11	-2	-15.4%
> 3,000 cfs	68	69	1	1.5%	46	47	1	2.2%	32	32	0	0.0%	22	22	0	0.0%	13	9	-4	-30.8%
> 4,000 cfs	67	66	-1	-1.5%	44	45	1	2.3%	31	28	-3	-9.7%	22	20	-2	-9.1%	10	8	-2	-20.0%
> 6,000 cfs	62	62	0	0.0%	44	43	-1	-2.3%	29	26	-3	-10.3%	20	20	0	0.0%	8	7	-1	-12.5%
> 8,000 cfs	59	59	0	0.0%	42	42	0	0.0%	25	23	-2	-8.0%	17	15	-2	-11.8%	5	4	-1	-20.0%
> 10,000 cfs	57	58	1	1.8%	41	40	-1	-2.4%	24	20	-4	-16.7%	15	14	-1	-6.7%	4	4	0	0.0%

*Total Weir Spill Results include spills from Ord Ferry, Moulton Weir, Colusa Weir, and Tisdale Weir.

Table 4c. Count of Years That Exceed Flow Magnitude and Duration Thresholds Between 1922 and 2003
Total Sutter Bypass Flow Results - Alternative 3 Compared to No Action Alternative

Number of years that contain events with consecutive days of spills (max 7 day gap to count as new event)	> 0 days				>10 days				> 20 days				> 30 days				> 45 days			
	No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference		No Action Alternative	Alternative 3	Difference	
> 0 cfs	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%	82	82	0	0.0%
> 1,000 cfs	81	81	0	0.0%	76	76	0	0.0%	69	69	0	0.0%	60	61	1	1.7%	47	47	0	0.0%
> 2,000 cfs	81	81	0	0.0%	67	68	1	1.5%	52	52	0	0.0%	41	41	0	0.0%	33	33	0	0.0%
> 3,000 cfs	81	81	0	0.0%	62	60	-2	-3.2%	49	48	-1	-2.0%	38	37	-1	-2.6%	24	23	-1	-4.2%
> 4,000 cfs	80	80	0	0.0%	59	58	-1	-1.7%	46	46	0	0.0%	32	32	0	0.0%	19	19	0	0.0%
> 6,000 cfs	76	76	0	0.0%	55	54	-1	-1.8%	40	38	-2	-5.0%	26	25	-1	-3.8%	13	13	0	0.0%
> 8,000 cfs	73	73	0	0.0%	47	49	2	4.3%	35	32	-3	-8.6%	23	22	-1	-4.3%	11	9	-2	-18.2%
> 10,000 cfs	68	69	1	1.5%	46	45	-1	-2.2%	33	30	-3	-9.1%	22	21	-1	-4.5%	9	8	-1	-11.1%

Figure 1. Frequency of Sutter Bypass Habitat Area Inundation Events.

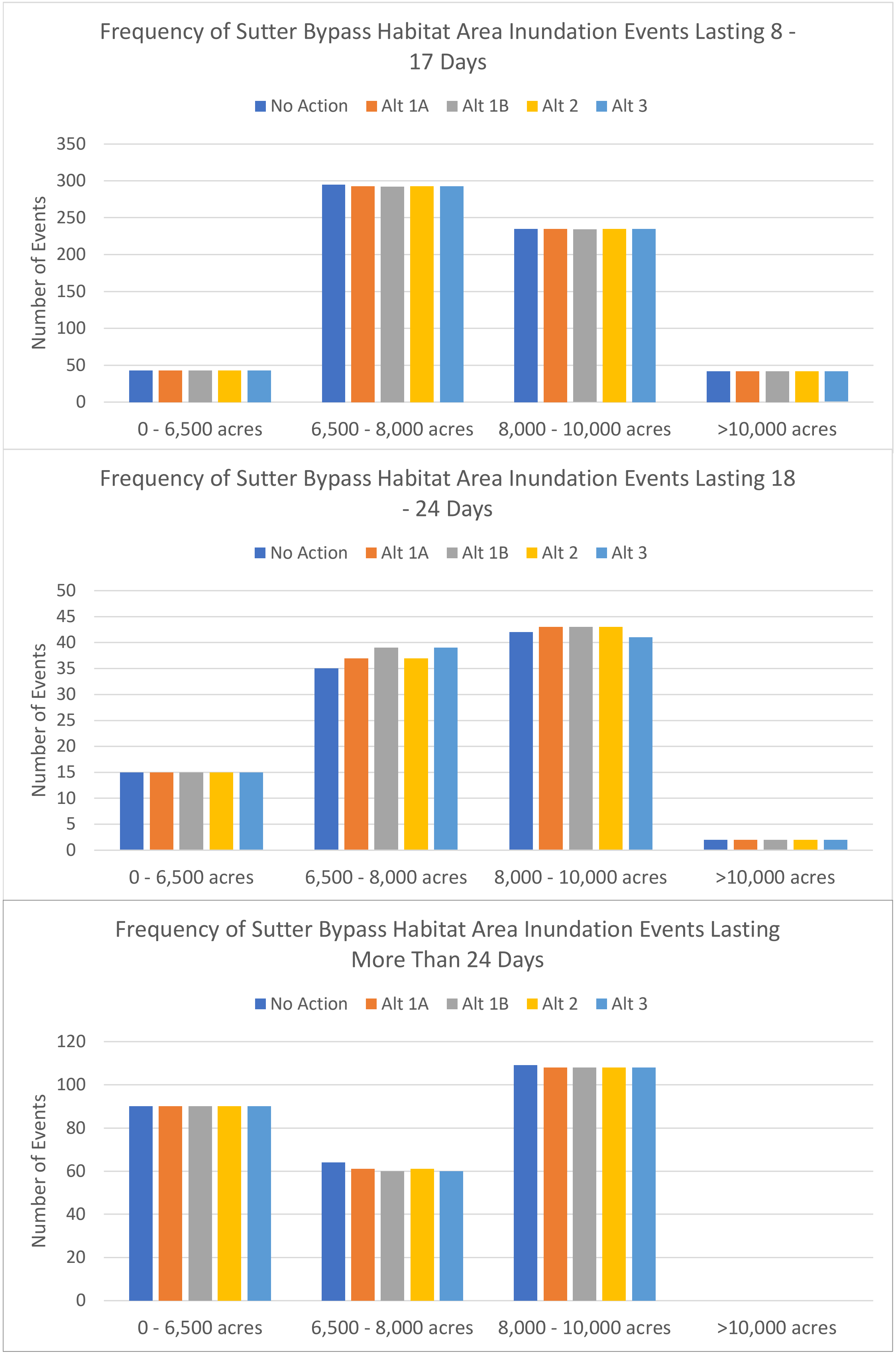


Table 1. Frequency of Sutter Bypass Habitat Area Inundation Events.

	Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	43	43	0	0%	43	0	0%	43	0	0%	43	0	0%
6,500 - 8,000 acres	295	293	-2	-1%	292	-3	-1%	293	-2	-1%	293	-2	-1%
8,000 - 10,000 acres	235	235	0	0%	234	-1	0%	235	0	0%	235	0	0%
>10,000 acres	42	42	0	0%	42	0	0%	42	0	0%	42	0	0%

	Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	15	15	0	0%	15	0	0%	15	0	0%	15	0	0%
6,500 - 8,000 acres	35	37	2	6%	39	4	11%	37	2	6%	39	4	11%
8,000 - 10,000 acres	42	43	1	2%	43	1	2%	43	1	2%	41	-1	-2%
>10,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%

	Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	90	90	0	0%	90	0	0%	90	0	0%	90	0	0%
6,500 - 8,000 acres	64	61	-3	-5%	60	-4	-6%	61	-3	-5%	60	-4	-6%
8,000 - 10,000 acres	109	108	-1	-1%	108	-1	-1%	108	-1	-1%	108	-1	-1%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

*Based on total number of events in 82 year simulation period.

Table 2. Monthly Summary of Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in October

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	8	8	0	0%	8	0	0%	8	0	0%	8	0	0%
6,500 - 8,000 acres	26	26	0	0%	26	0	0%	26	0	0%	26	0	0%
8,000 - 10,000 acres	7	7	0	0%	7	0	0%	7	0	0%	7	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in November

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	8	8	0	0%	8	0	0%	8	0	0%	8	0	0%
6,500 - 8,000 acres	25	25	0	0%	25	0	0%	25	0	0%	25	0	0%
8,000 - 10,000 acres	33	33	0	0%	33	0	0%	33	0	0%	33	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in December

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	5	5	0	0%	5	0	0%	5	0	0%	5	0	0%
6,500 - 8,000 acres	34	33	-1	-3%	33	-1	-3%	33	-1	-3%	34	0	0%
8,000 - 10,000 acres	32	32	0	0%	30	-2	-6%	32	0	0%	31	-1	-3%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in January

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	7	7	0	0%	7	0	0%	7	0	0%	7	0	0%
6,500 - 8,000 acres	32	32	0	0%	32	0	0%	32	0	0%	32	0	0%
8,000 - 10,000 acres	37	38	1	3%	38	1	3%	38	1	3%	38	1	3%
>10,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in February

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
6,500 - 8,000 acres	22	21	-1	-5%	21	-1	-5%	21	-1	-5%	23	1	5%
8,000 - 10,000 acres	29	29	0	0%	29	0	0%	29	0	0%	29	0	0%
>10,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in March

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	13	13	0	0%	12	-1	-8%	13	0	0%	10	-3	-23%
8,000 - 10,000 acres	20	19	-1	-5%	19	-1	-5%	19	-1	-5%	19	-1	-5%
>10,000 acres	8	8	0	0%	8	0	0%	8	0	0%	8	0	0%

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in April

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
6,500 - 8,000 acres	15	15	0	0%	15	0	0%	15	0	0%	15	0	0%
8,000 - 10,000 acres	17	17	0	0%	17	0	0%	17	0	0%	17	0	0%
>10,000 acres	18	18	0	0%	18	0	0%	18	0	0%	18	0	0%

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in May

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	18	18	0	0%	18	0	0%	18	0	0%	18	0	0%
8,000 - 10,000 acres	15	15	0	0%	16	1	7%	15	0	0%	16	1	7%
>10,000 acres	13	13	0	0%	13	0	0%	13	0	0%	13	0	0%

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in June

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
6,500 - 8,000 acres	40	40	0	0%	40	0	0%	40	0	0%	40	0	0%
8,000 - 10,000 acres	23	23	0	0%	23	0	0%	23	0	0%	23	0	0%
>10,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in July

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	51	51	0	0%	51	0	0%	51	0	0%	51	0	0%
8,000 - 10,000 acres	15	15	0	0%	15	0	0%	15	0	0%	15	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in August

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	8	8	0	0%	8	0	0%	8	0	0%	8	0	0%
8,000 - 10,000 acres	6	6	0	0%	6	0	0%	6	0	0%	6	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days in September

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	10	10	0	0%	10	0	0%	10	0	0%	10	0	0%
6,500 - 8,000 acres	11	11	0	0%	11	0	0%	11	0	0%	11	0	0%
8,000 - 10,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Table 3. Monthly Summary of Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in October

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	5	5	0	0%	5	0	0%	5	0	0%	5	0	0%
6,500 - 8,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
8,000 - 10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in November

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
6,500 - 8,000 acres	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%
8,000 - 10,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in December

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%
6,500 - 8,000 acres	3	3	0	0%	3	0	0%	3	0	0%	4	1	33%
8,000 - 10,000 acres	7	7	0	0%	8	1	14%	7	0	0%	6	-1	-14%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in January

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
6,500 - 8,000 acres	5	5	0	0%	5	0	0%	5	0	0%	5	0	0%
8,000 - 10,000 acres	5	6	1	20%	6	1	20%	6	1	20%	6	1	20%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in February

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	2	5	3	150%	5	3	150%	5	3	150%	4	2	100%
8,000 - 10,000 acres	8	8	0	0%	8	0	0%	8	0	0%	8	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in March

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	4	4	0	0%	5	1	25%	4	0	0%	5	1	25%
8,000 - 10,000 acres	9	9	0	0%	9	0	0%	9	0	0%	9	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in April

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	4	3	-1	-25%	4	0	0%	3	-1	-25%	4	0	0%
8,000 - 10,000 acres	4	4	0	0%	4	0	0%	4	0	0%	4	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in May

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
8,000 - 10,000 acres	3	3	0	0%	2	-1	-33%	3	0	0%	2	-1	-33%
>10,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in June

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
8,000 - 10,000 acres	4	4	0	0%	4	0	0%	4	0	0%	4	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in July

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%
8,000 - 10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in August

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
6,500 - 8,000 acres	7	7	0	0%	7	0	0%	7	0	0%	7	0	0%
8,000 - 10,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days in September

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	4	4	0	0%	4	0	0%	4	0	0%	4	0	0%
6,500 - 8,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
8,000 - 10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Table 4. Monthly Summary of Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in October

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	9	9	0	0%	9	0	0%	9	0	0%	9	0	0%
6,500 - 8,000 acres	4	4	0	0%	4	0	0%	4	0	0%	4	0	0%
8,000 - 10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in November

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	7	7	0	0%	7	0	0%	7	0	0%	7	0	0%
6,500 - 8,000 acres	4	4	0	0%	4	0	0%	4	0	0%	4	0	0%
8,000 - 10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in December

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	6	6	0	0%	6	0	0%	6	0	0%	6	0	0%
6,500 - 8,000 acres	9	9	0	0%	9	0	0%	9	0	0%	8	-1	-11%
8,000 - 10,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in January

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
6,500 - 8,000 acres	6	6	0	0%	6	0	0%	6	0	0%	6	0	0%
8,000 - 10,000 acres	6	5	-1	-17%	5	-1	-17%	5	-1	-17%	5	-1	-17%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in February

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	13	11	-2	-15%	11	-2	-15%	11	-2	-15%	11	-2	-15%
8,000 - 10,000 acres	10	10	0	0%	10	0	0%	10	0	0%	10	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in March

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	8	7	-1	-13%	7	-1	-13%	7	-1	-13%	8	0	0%
8,000 - 10,000 acres	13	13	0	0%	13	0	0%	13	0	0%	13	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in April

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	5	5	0	0%	4	-1	-20%	5	0	0%	4	-1	-20%
8,000 - 10,000 acres	20	20	0	0%	20	0	0%	20	0	0%	20	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in May

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
8,000 - 10,000 acres	33	33	0	0%	33	0	0%	33	0	0%	33	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in June

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
6,500 - 8,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
8,000 - 10,000 acres	21	21	0	0%	21	0	0%	21	0	0%	21	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in July

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	4	4	0	0%	4	0	0%	4	0	0%	4	0	0%
6,500 - 8,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
8,000 - 10,000 acres	4	4	0	0%	4	0	0%	4	0	0%	4	0	0%
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in August

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	26	26	0	0%	26	0	0%	26	0	0%	26	0	0%
6,500 - 8,000 acres	8	8	0	0%	8	0	0%	8	0	0%	8	0	0%
8,000 - 10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days in September

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	36	36	0	0%	36	0	0%	36	0	0%	36	0	0%
6,500 - 8,000 acres	6	6	0	0%	6	0	0%	6	0	0%	6	0	0%
8,000 - 10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>10,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Figure 2. Average Annual Sutter Bypass Habitat Area Inundation Events.

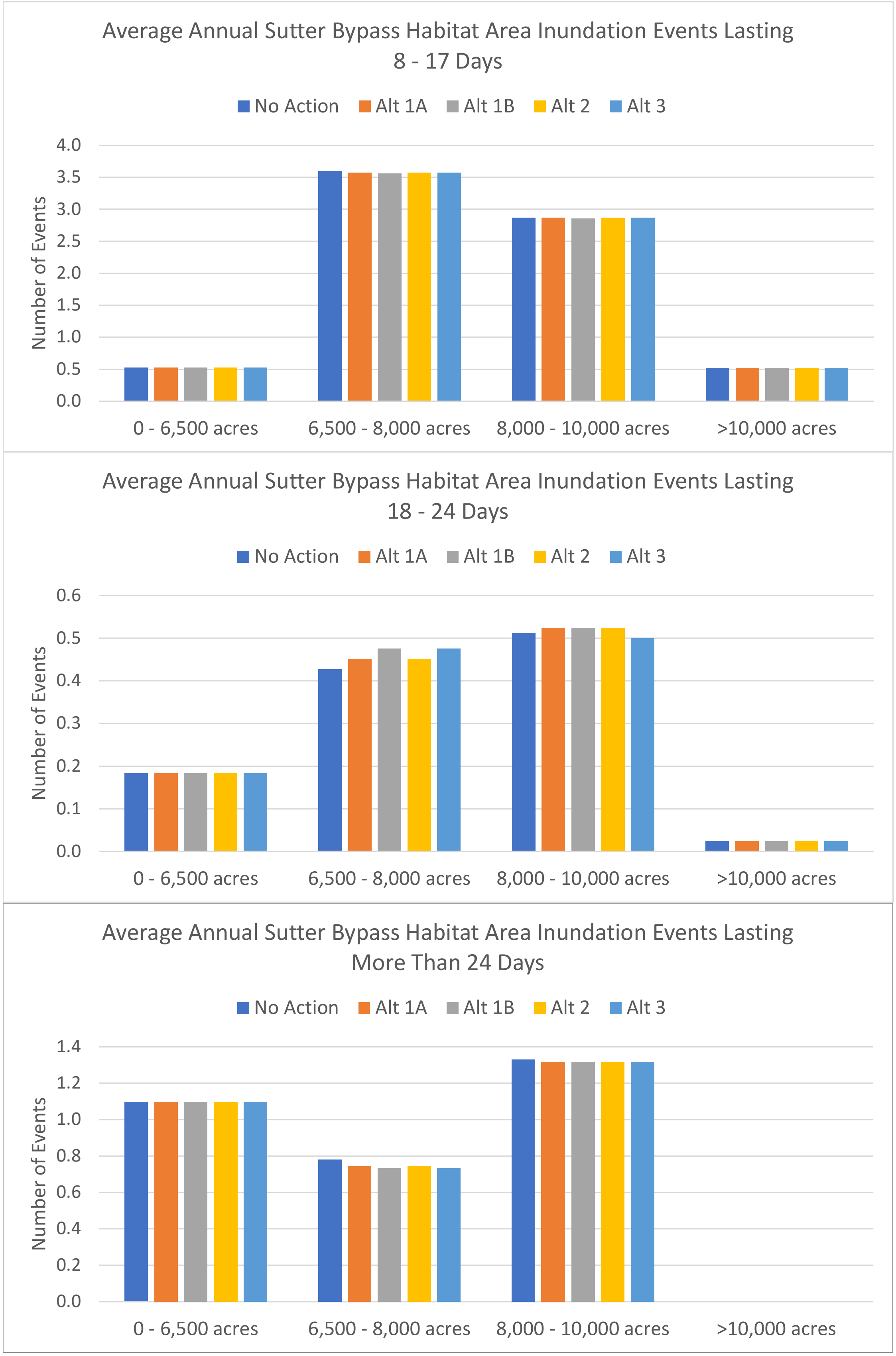
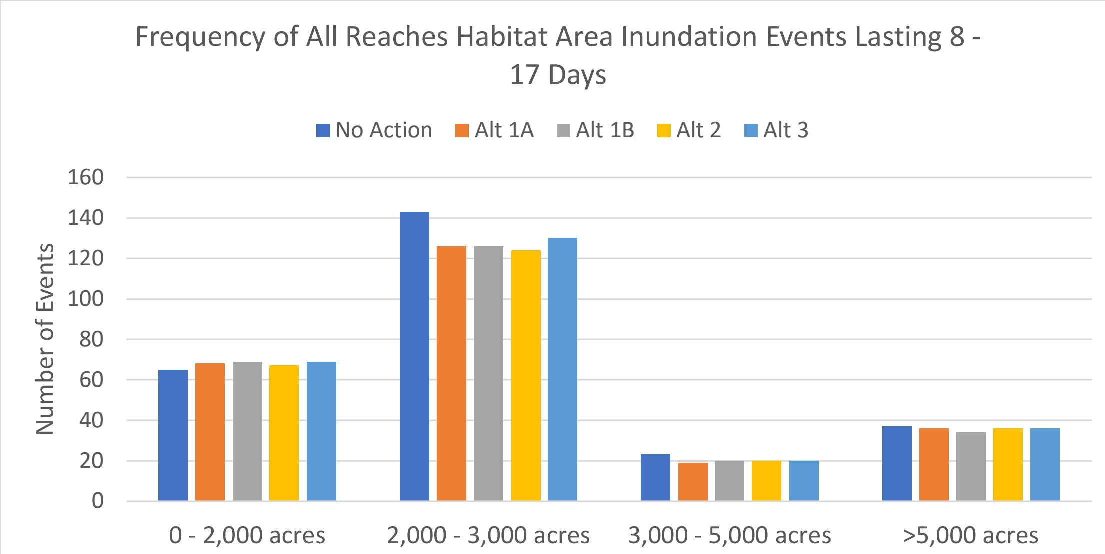


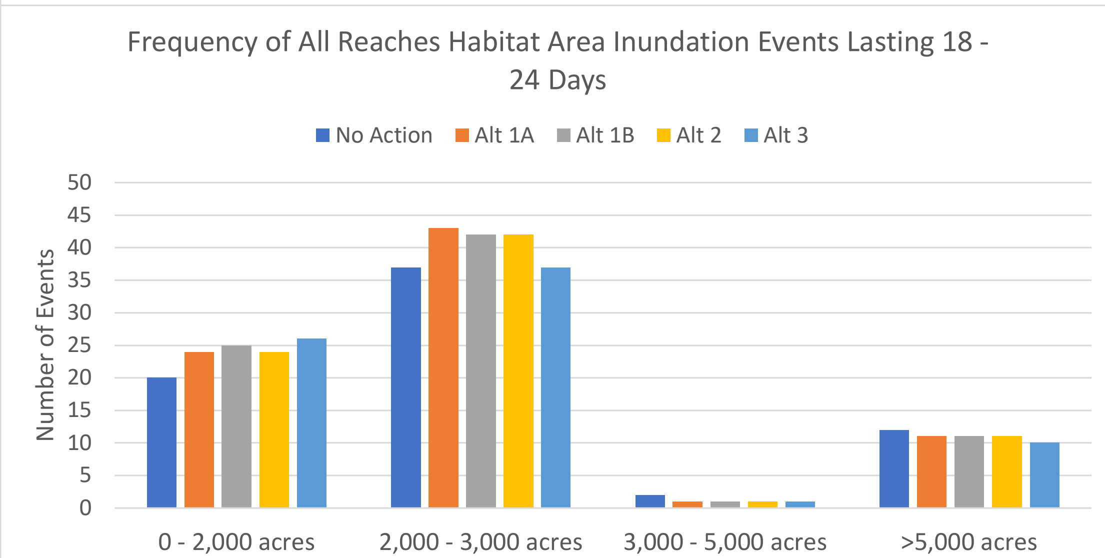
Table 5. Average Annual Sutter Bypass Habitat Area Inundation Events.

	Average Annual Sutter Bypass Habitat Area Inundation Events Lasting 8 - 17 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0.52	0.52	0.00	0%	0.52	0.00	0%	0.52	0.00	0%	0.52	0.00	0%
6,500 - 8,000 acres	3.60	3.57	-0.02	-1%	3.56	-0.04	-1%	3.57	-0.02	-1%	3.57	-0.02	-1%
8,000 - 10,000 acres	2.87	2.87	0.00	0%	2.85	-0.01	0%	2.87	0.00	0%	2.87	0.00	0%
>10,000 acres	0.51	0.51	0.00	0%	0.51	0.00	0%	0.51	0.00	0%	0.51	0.00	0%
	Average Annual Sutter Bypass Habitat Area Inundation Events Lasting 18 - 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	0.18	0.18	0.00	0%	0.18	0.00	0%	0.18	0.00	0%	0.18	0.00	0%
6,500 - 8,000 acres	0.43	0.45	0.02	6%	0.48	0.05	11%	0.45	0.02	6%	0.48	0.05	11%
8,000 - 10,000 acres	0.51	0.52	0.01	2%	0.52	0.01	2%	0.52	0.01	2%	0.50	-0.01	-2%
>10,000 acres	0.02	0.02	0.00	0%	0.02	0.00	0%	0.02	0.00	0%	0.02	0.00	0%
	Average Annual Sutter Bypass Habitat Area Inundation Events Lasting More Than 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 6,500 acres	1.10	1.10	0.00	0%	1.10	0.00	0%	1.10	0.00	0%	1.10	0.00	0%
6,500 - 8,000 acres	0.78	0.74	-0.04	-5%	0.73	-0.05	-6%	0.74	-0.04	-5%	0.73	-0.05	-6%
8,000 - 10,000 acres	1.33	1.32	-0.01	-1%	1.32	-0.01	-1%	1.32	-0.01	-1%	1.32	-0.01	-1%
>10,000 acres	0.00	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-

*Based on total events in 82 year simulation period.

Figure 1. Frequency of All Reaches Habitat Area Inundation Events.





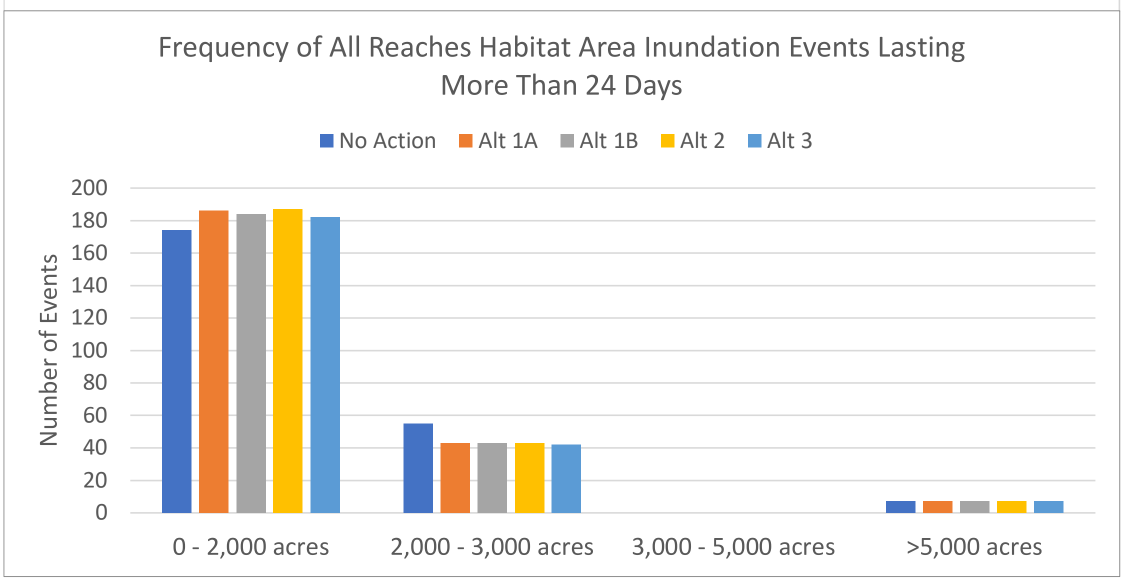


Table 1. Frequency of All Reaches Habitat Area Inundation Events.

	Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	65	68	3	5%	69	4	6%	67	2	3%	69	4	6%
2,000 - 3,000 acres	143	126	-17	-12%	126	-17	-12%	124	-19	-13%	130	-13	-9%
3,000 - 5,000 acres	23	19	-4	-17%	20	-3	-13%	20	-3	-13%	20	-3	-13%
>5,000 acres	37	36	-1	-3%	34	-3	-8%	36	-1	-3%	36	-1	-3%
	Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	20	24	4	20%	25	5	25%	24	4	20%	26	6	30%
2,000 - 3,000 acres	37	43	6	16%	42	5	14%	42	5	14%	37	0	0%
3,000 - 5,000 acres	2	1	-1	-50%	1	-1	-50%	1	-1	-50%	1	-1	-50%
>5,000 acres	12	11	-1	-8%	11	-1	-8%	11	-1	-8%	10	-2	-17%
	Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	174	186	12	7%	184	10	6%	187	13	7%	182	8	5%
2,000 - 3,000 acres	55	43	-12	-22%	43	-12	-22%	43	-12	-22%	42	-13	-24%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	7	7	0	0%	7	0	0%	7	0	0%	7	0	0%

*Based on total number of events in 82 year simulation period.

Table 2. Monthly Summary of Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in October

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
2,000 - 3,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in November

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	7	6	-1	-14%	7	0	0%	6	-1	-14%	5	-2	-29%
2,000 - 3,000 acres	3	3	0	0%	3	0	0%	4	1	33%	5	2	67%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in December

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	11	12	1	9%	13	2	18%	12	1	9%	13	2	18%
2,000 - 3,000 acres	25	24	-1	-4%	23	-2	-8%	24	-1	-4%	21	-4	-16%
3,000 - 5,000 acres	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%
>5,000 acres	6	6	0	0%	6	0	0%	6	0	0%	6	0	0%

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in January

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	13	13	0	0%	13	0	0%	13	0	0%	13	0	0%
2,000 - 3,000 acres	23	17	-6	-26%	19	-4	-17%	18	-5	-22%	19	-4	-17%
3,000 - 5,000 acres	5	2	-3	-60%	2	-3	-60%	2	-3	-60%	2	-3	-60%
>5,000 acres	6	6	0	0%	5	-1	-17%	6	0	0%	6	0	0%

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in February

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	11	12	1	9%	11	0	0%	12	1	9%	12	1	9%
2,000 - 3,000 acres	22	22	0	0%	22	0	0%	21	-1	-5%	23	1	5%
3,000 - 5,000 acres	5	4	-1	-20%	5	0	0%	5	0	0%	5	0	0%
>5,000 acres	13	12	-1	-8%	11	-2	-15%	12	-1	-8%	11	-2	-15%

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in March

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	10	14	4	40%	14	4	40%	13	3	30%	13	3	30%
2,000 - 3,000 acres	30	26	-4	-13%	25	-5	-17%	24	-6	-20%	27	-3	-10%
3,000 - 5,000 acres	5	5	0	0%	5	0	0%	5	0	0%	5	0	0%
>5,000 acres	7	6	-1	-14%	6	-1	-14%	6	-1	-14%	6	-1	-14%

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in April

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	7	7	0	0%	7	0	0%	7	0	0%	9	2	29%
2,000 - 3,000 acres	16	13	-3	-19%	13	-3	-19%	12	-4	-25%	14	-2	-13%
3,000 - 5,000 acres	5	4	-1	-20%	4	-1	-20%	4	-1	-20%	4	-1	-20%
>5,000 acres	4	5	1	25%	5	1	25%	5	1	25%	6	2	50%

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in May

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%
2,000 - 3,000 acres	12	10	-2	-17%	10	-2	-17%	10	-2	-17%	11	-1	-8%
3,000 - 5,000 acres	0	1	1	-	1	1	-	1	1	-	1	1	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in June

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	2	0	-2	-100%	0	-2	-100%	0	-2	-100%	0	-2	-100%
2,000 - 3,000 acres	3	2	-1	-33%	2	-1	-33%	3	0	0%	3	0	0%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in July

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,000 - 3,000 acres	5	6	1	20%	5	0	0%	4	-1	-20%	4	-1	-20%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in August

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,000 - 3,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days in September

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,000 - 3,000 acres	3	2	-1	-33%	3	0	0%	3	0	0%	2	-1	-33%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Table 3. Monthly Summary of Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in October

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,000 - 3,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in November

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	3	1	-2	-67%	1	-2	-67%	1	-2	-67%	1	-2	-67%
2,000 - 3,000 acres	2	2	0	0%	2	0	0%	1	-1	-50%	1	-1	-50%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in December

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
2,000 - 3,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	1	1	-	1	1	-	1	1	-	1	1	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in January

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	5	5	0	0%	5	0	0%	5	0	0%	5	0	0%
2,000 - 3,000 acres	5	7	2	40%	7	2	40%	6	1	20%	7	2	40%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	5	4	-1	-20%	4	-1	-20%	4	-1	-20%	4	-1	-20%

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in February

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	1	4	3	300%	5	4	400%	4	3	300%	5	4	400%
2,000 - 3,000 acres	7	4	-3	-43%	4	-3	-43%	4	-3	-43%	3	-4	-57%
3,000 - 5,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
>5,000 acres	2	1	-1	-50%	1	-1	-50%	1	-1	-50%	1	-1	-50%

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in March

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	5	6	1	20%	6	1	20%	6	1	20%	7	2	40%
2,000 - 3,000 acres	10	8	-2	-20%	8	-2	-20%	8	-2	-20%	7	-3	-30%
3,000 - 5,000 acres	1	0	-1	-100%	0	-1	-100%	0	-1	-100%	0	-1	-100%
>5,000 acres	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in April

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	0	1	1	-	1	1	-	1	1	-	1	1	-
2,000 - 3,000 acres	4	5	1	25%	5	1	25%	6	2	50%	5	1	25%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	2	2	0	0%	2	0	0%	2	0	0%	1	-1	-50%

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in May

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	3	2	-1	-33%	2	-1	-33%	2	-1	-33%	2	-1	-33%
2,000 - 3,000 acres	2	5	3	150%	5	3	150%	5	3	150%	5	3	150%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in June

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	0	2	2	-	2	2	-	2	2	-	2	2	-
2,000 - 3,000 acres	1	0	-1	-100%	0	-1	-100%	0	-1	-100%	0	-1	-100%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in July

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,000 - 3,000 acres	2	8	6	300%	7	5	250%	8	6	300%	5	3	150%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in August

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	1	1	0	0%	1	0	0%	1	0	0%	1	0	0%
2,000 - 3,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days in September

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
2,000 - 3,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Table 4. Monthly Summary of Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in October

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	11	18	7	64%	19	8	73%	20	9	82%	16	5	45%
2,000 - 3,000 acres	1	0	-1	-100%	0	-1	-100%	0	-1	-100%	0	-1	-100%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in November

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	11	13	2	18%	13	2	18%	13	2	18%	14	3	27%
2,000 - 3,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in December

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	14	13	-1	-7%	12	-2	-14%	13	-1	-7%	12	-2	-14%
2,000 - 3,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in January

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	13	14	1	8%	14	1	8%	14	1	8%	13	0	0%
2,000 - 3,000 acres	3	1	-2	-67%	0	-3	-100%	1	-2	-67%	0	-3	-100%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in February

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	8	10	2	25%	9	1	13%	10	2	25%	10	2	25%
2,000 - 3,000 acres	2	1	-1	-50%	1	-1	-50%	1	-1	-50%	1	-1	-50%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in March

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	11	14	3	27%	13	2	18%	14	3	27%	13	2	18%
2,000 - 3,000 acres	6	1	-5	-83%	1	-5	-83%	2	-4	-67%	0	-6	-100%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in April

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	10	10	0	0%	12	2	20%	10	0	0%	10	0	0%
2,000 - 3,000 acres	4	4	0	0%	4	0	0%	3	-1	-25%	4	0	0%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in May

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	18	24	6	33%	21	3	17%	23	5	28%	21	3	17%
2,000 - 3,000 acres	9	6	-3	-33%	6	-3	-33%	6	-3	-33%	5	-4	-44%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in June

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	12	9	-3	-25%	10	-2	-17%	10	-2	-17%	9	-3	-25%
2,000 - 3,000 acres	3	1	-2	-67%	2	-1	-33%	1	-2	-67%	2	-1	-33%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in July

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	22	23	1	5%	24	2	9%	25	3	14%	23	1	5%
2,000 - 3,000 acres	19	20	1	5%	20	1	5%	20	1	5%	21	2	11%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in August

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	12	8	-4	-33%	8	-4	-33%	8	-4	-33%	11	-1	-8%
2,000 - 3,000 acres	2	2	0	0%	2	0	0%	2	0	0%	2	0	0%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Frequency of All Reaches Habitat Area Inundation Events Lasting More Than 24 Days in September

Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	32	30	-2	-6%	29	-3	-9%	27	-5	-16%	30	-2	-6%
2,000 - 3,000 acres	6	7	1	17%	7	1	17%	7	1	17%	7	1	17%
3,000 - 5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-
>5,000 acres	0	0	0	-	0	0	-	0	0	-	0	0	-

Figure 2. Average Annual All Reaches Habitat Area Inundation Events.

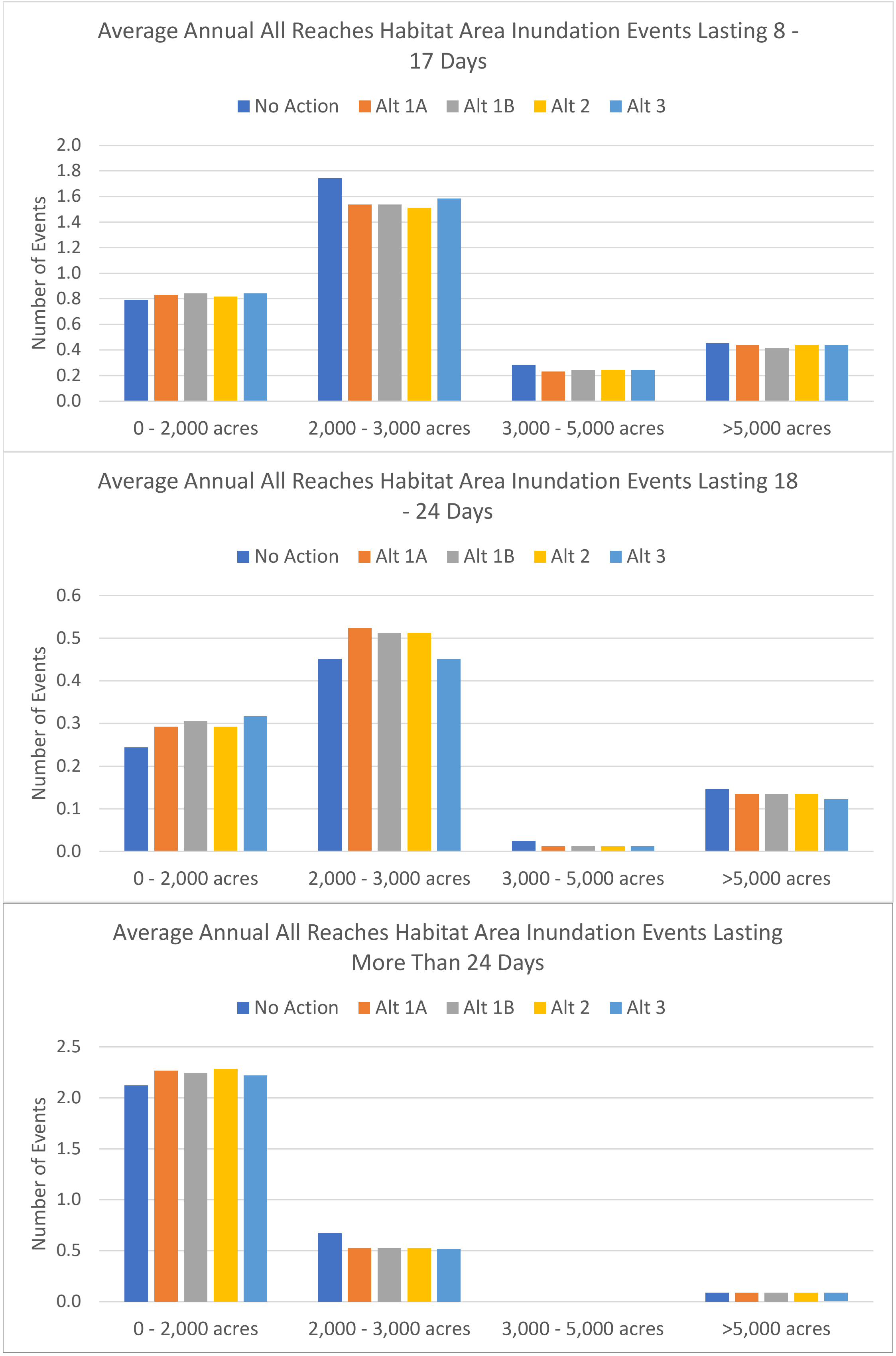


Table 5. Average Annual All Reaches Habitat Area Inundation Events.

	Average Annual All Reaches Habitat Area Inundation Events Lasting 8 - 17 Days											
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	0.79	0.83	0.04	5%	0.84	0.05	6%	0.82	0.02	3%	0.84	0.05	6%
2,000 - 3,000 acres	1.74	1.54	-0.21	-12%	1.54	-0.21	-12%	1.51	-0.23	-13%	1.59	-0.16	-9%
3,000 - 5,000 acres	0.28	0.23	-0.05	-17%	0.24	-0.04	-13%	0.24	-0.04	-13%	0.24	-0.04	-13%
>5,000 acres	0.45	0.44	-0.01	-3%	0.41	-0.04	-8%	0.44	-0.01	-3%	0.44	-0.01	-3%
	Average Annual All Reaches Habitat Area Inundation Events Lasting 18 - 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	0.24	0.29	0.05	20%	0.30	0.06	25%	0.29	0.05	20%	0.32	0.07	30%
2,000 - 3,000 acres	0.45	0.52	0.07	16%	0.51	0.06	14%	0.51	0.06	14%	0.45	0.00	0%
3,000 - 5,000 acres	0.02	0.01	-0.01	-50%	0.01	-0.01	-50%	0.01	-0.01	-50%	0.01	-0.01	-50%
>5,000 acres	0.15	0.13	-0.01	-8%	0.13	-0.01	-8%	0.13	-0.01	-8%	0.12	-0.02	-17%
	Average Annual All Reaches Habitat Area Inundation Events Lasting More Than 24 Days												
Area Range	No Action	Alt 1A	Alt 1A minus No Action	Percent Change	Alt 1B	Alt 1B minus No Action	Percent Change	Alt 2	Alt 2 minus No Action	Percent Change	Alt 3	Alt 3 minus No Action	Percent Change
0 - 2,000 acres	2.12	2.27	0.15	7%	2.24	0.12	6%	2.28	0.16	7%	2.22	0.10	5%
2,000 - 3,000 acres	0.67	0.52	-0.15	-22%	0.52	-0.15	-22%	0.52	-0.15	-22%	0.51	-0.16	-24%
3,000 - 5,000 acres	0.00	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
>5,000 acres	0.09	0.09	0.00	0%	0.09	0.00	0%	0.09	0.00	0%	0.09	0.00	0%

*Based on total events in 82 year simulation period.