

**POTENTIAL OPERATIONS FOR FREMONT WEIR GATED CHANNEL  
WITH AGRICULTURAL, WATERFOWL AND FISHERY CONSIDERATIONS  
WITH COMMENTS**

**-ORGANIZED BY TIME PERIOD-**

**Before November 10**

No Fremont Weir operations except for the minimum in-bank flow required to provide fish passage (up to 500 cfs if appropriate), utilizing areas where the state has purchased floodplain easements.

**Footprint Targets:** Out-of-bank flows not created by project (zero or negligible)

**Waterfowl Considerations:**

Seasonal wetland flooding begins early September, full flood-up by mid-October. Flood harvested rice fields as early as possible after harvest.

Comments:

- Given the river stage, unlikely to be enough water to flood a very large footprint.

## **November 10 – November 30**

### **If Fremont Weir does not overtop that water year:**

Initiate Fremont Weir flows up to 6,000 cfs, only if harvest is complete or if western tributaries are already flooding. Estimate the frequency of this operation to be in zero or very few water years based on historical frequency data.

### **If Fremont Weir overtops that water year:**

When upstream flows are available, capture juvenile salmonids in up to 6,000 cfs into the Bypass and operate to achieve 30 day duration. Water availability in the river upstream will determine whether full 6,000 cfs flows are passed. Estimate the frequency of this operation to be in 11% of water years based on historical frequency data.

### **Footprint targets:**

**Smaller Inundation** - First flush "notch" operations add up to 10,000 acres to existing inundation. Operations piggybacking on overflow events prolong 7,000 to 10,000 acres of inundation.

### **Fishery Enhancement Considerations:**

*For Juvenile Salmonids on Floodplain:* Provide seasonal floodplain habitat for the large emigration of winter-run Chinook salmon (up to 80% of run) that occurs during first 400 cfs pulse flow event of the year (occurred in 22% of years [1997-2010] in November, with November 20 the earliest date.)

*For Splittail on Floodplain:* Accommodate the migration pulse of splittail adults that occurs approximately 1 week following a flow pulse of 1,000 cfs or greater

*For Adult Fish Passage:* Improve passage for adult salmonids and sturgeon through "notch" or additional fishways

### **Agricultural Considerations:**

Conservation easements or fee title will be required for all inundation on agricultural land. Late harvest must be complete before notch flows could occur for fish benefits.

### **Waterfowl Considerations:**

Circulate water in wetlands and maintain optimal levels for foraging (<30 cm). Continue flooding of rice fields, harvest typically completed.

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## **December 1 – February 15**

### **If Fremont Weir does not overtop that water year:**

Initiate Fremont Weir flows **up to 6,000 cfs**. Estimate the frequency of this operation to be in 6% to 25% of water years based on historical frequency data. A change in shallow water habitat distribution is anticipated (acres available at 0 to 1 foot depth and at 1 to 6 foot depth). As very shallow areas get deeper, new very shallow areas are created, variably offsetting the total amount available for dabbling and wading birds. These changes and tradeoffs will need to be analyzed and managed.

### **If Fremont Weir overtops that water year:**

Provide continuity between events with flows up to 6,000 cfs to achieve 30 to 45+ day duration. Estimate the frequency of this operation to occur in 64% of water years based on historical frequency data.

### **Footprint targets:**

**Larger Inundation** - First flush "notch" operations add to existing inundation. Following natural spill events (non-project flooding, including Westside tributaries or Fremont Weir), operate the notch to prolong duration and provide continuity between events. Natural spill events range considerably. Operations would target 17,000 acres of inundation. When appropriate flows are not available for a "larger inundation" operate the notch for "smaller inundation".

### **Comments:**

- Acreage amount during this time period isn't as important as being able to open the notch and move fish into the bypass.
- Bringing more water to move fish doesn't necessarily translate into a larger footprint.
- Is existing water in the bypass a constraint to adding more fish with a flush of water through the notch?
- Need to have the ability to manage the flows in this time period in a way that will increase benefits to fish, including food web support for the Delta as a whole.
- Would like to see BDCP focus on this time period, and then use adaptive management, working with stakeholders, to expand into other time periods.

## **Fishery Enhancement Considerations:**

*For Juvenile Salmonids on Floodplain:* Improve availability of floodplain habitat (food, etc) for all salmonids, particularly winter-run and spring-run Chinook salmon. November through February is when the majority of winter-run are detected upstream of the Fremont Weir.

*For Splittail on Floodplain:* Improve conditions for adults staging for spawning and spawning, improving likelihood that splittail eggs and larvae will be present in February and March.

*For Adult Fish Passage:* Improve passage for adult salmonids and sturgeon through "notch" or additional fishways.

Comments:

- Variable depth and temperature is more desirable than uniform depth and temperature. Need variety within the bypass during any one timeframe, and variable throughout the timeframe as well.

## **Agricultural Considerations:**

Conservation easements or fee title will be required for all inundation on agricultural land. No impacts to agriculture during this period. Willows and marsh plants must be managed to allow for subsequent planting.

## **Waterfowl Considerations:**

Circulate water in wetlands and rice fields to maintain optimal levels for foraging (<30 cm)

Additional Waterfowl Comments:

- Two primary considerations for waterfowl habitat compatibility: water depth, and the timing of draw down from the previous spring.
- The timing of the draw down affects the type of seed crop: the later the draw down, the less desirable the seed crop.
- Drawing down water earlier than April 1 generally provides a better seed crop than later draw-downs.
- In terms of depth, a 12 inch depth or less is more beneficial to more types of waterfowl than a deeper depth would be.
- [Reference: Ducks Unlimited research project to provide better and more specific information.]
- Hunting also impacts waterfowl use of the bypass.

- Also need to keep in mind that fringe areas are not the same quality as managed areas.
- Focus on a smaller footprint and areas that wouldn't be good waterfowl habitat.
- Typical draw-down takes one week to 10 days.

## **February 16 – February 28**

### **If Fremont Weir does not overtop that water year:**

Initiate Fremont Weir flows **up to 6,000 cfs**. Estimate the frequency of this operation to be in 8% to 14% of water years based on historical frequency data. A change in shallow water habitat distribution is anticipated (acres available at 0 to 1 foot depth and at 1 to 6 foot depth). As very shallow areas get deeper, new very shallow areas are created, variably offsetting the total amount available for dabbling and wading birds. These changes and tradeoffs will need to be analyzed and managed.

### **If Fremont Weir overtops that water year:**

Provide continuity between events with flows up to 6,000 cfs to achieve 30 to 45+ day duration. Estimate the frequency of this operation to occur in 58% to 61% of water years based on historical frequency data.

Comment: Need more data about what the result would be to add water to an already flooded bypass (from Westside tributaries).

### **Footprint targets:**

**Larger Inundation** - Following natural spill events (non-project flooding, including westside tributaries or Fremont Weir), operate the notch to prolong duration and provide continuity between events. Natural spill events range considerably. Operations would target 17,000 acres of inundation. Ramp larger inundation flows down to the smaller acreage range by February 28. When appropriate flows are not available for a "bigger inundation" operate the notch for "smaller inundation".

### **Fishery Enhancement Considerations:**

*For Juvenile Salmonids on Floodplain:* Improve availability of floodplain habitat (food, etc) for all salmonids, particularly winter-run and spring-run Chinook salmon. November through February is when the majority of winter-run are detected upstream of the Fremont Weir.

*For Splittail on Floodplain:* Improve conditions for adults staging for spawning and spawning, improving likelihood that splittail eggs and larvae will be present in February and March.

*For Adult Fish Passage:* Improve passage for adult salmonids and sturgeon through "notch" or additional fishways.

### **Agricultural Considerations:**

When out-of-bank flow occurs in the Yolo Bypass during this period it causes zero to some yield impacts on affected lands. Drainage occurs approximately 11 days after flows measured at YBY gauge drop to 6,000 cfs. Create berms to manage and focus flows on low yield lands to minimize impacts to agriculture. Drainage improvements to high yield lands as needed to accelerate planting.

Comments:

- Main concern is not when bypass is already flooded in this time period, because agriculture is already impacted. If it is not already flooded, or if the bypass is already in the process of drying, need to see clear benefit for fish in creating flooding in that time period and look at the associated agricultural impacts.

### **Waterfowl Considerations:**

Maintain wetlands through February and March. Water levels in most rice fields typically drawn down in late February in anticipation of field preparation.

- Two primary considerations for waterfowl habitat compatibility: water depth, and the timing of draw down from the previous spring.
- The timing of the draw down affects the type of seed crop: the later the draw down, the less desirable the seed crop.
- Drawing down water earlier than April 1 generally provides a better seed crop than later draw-downs.
- In terms of depth, a 12 inch depth or less is more beneficial to more types of waterfowl than a deeper depth would be.
- [Reference: Ducks Unlimited research project to provide better and more specific information.]
- Hunting also impacts waterfowl use of the bypass.
- Also need to keep in mind that fringe areas are not the same quality as managed areas.
- Focus on a smaller footprint and areas that wouldn't be good waterfowl habitat.
- Typical draw-down takes one week to 10 days.

## **March 1 – March 23**

### **If Fremont Weir does not overtop that water year:**

Initiate Fremont Weir flows up to 6,000 cfs. If a natural flood event, lasting for a 30-day duration, has not occurred within 5-7 years during March 1 - May 15, prescribe an inundation regime to meet or exceed a minimum duration of 30 days with small flooding footprint. Estimate the frequency of this operation to be in 11% to 19% of water years based on historical frequency data.

A change in shallow water habitat distribution is anticipated (acres available at 0 to 1 foot depth and at 1 to 6 foot depth). As very shallow areas get deeper, new very shallow areas are created, variably offsetting the total amount available for dabbling and wading birds. These changes and tradeoffs will need to be analyzed and managed.

### **If Fremont Weir overtops that water year:**

After FW overtopping stops, extend small flooding footprint in low-yield areas with up to 6,000 cfs notch flows to achieve at least 30 day duration, then ramp down to in-bank fish passage flows up to 500 cfs if appropriate. If a natural flood event, lasting for a 30-day duration, has not occurred within 5-7 years during March 1 - May 15, prescribe an inundation regime to meet or exceed a minimum duration of 30 days with small flooding footprint. Estimate the frequency of this operation to be in 61% of water years based on historical frequency data.

### **Footprint targets:**

**Smaller Prolonged Inundation** - Acreage of 7,000 to 10,000 acres, with mitigation of impacts on agriculture.

Comment: Clarify when ramp-down would begin (complete ramp-down by the end of this time period, or?)

### **Fishery Enhancement Considerations:**

*For Juvenile Salmonids on Floodplain:* Improve availability of floodplain habitat (food, etc.) for all salmonids, particularly fall-run and Butte Creek spring-run Chinook salmon and steelhead. Nearly the entire run of Butte Creek spring-run emigrate down Butte Creek past Chico in January and February and continue their emigration through the Sutter Bypass in the following three months depending on flow.

*For Splittail on Floodplain* Provide seasonal floodplain habitat for splittail spawning and rearing as water conditions allow.

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Comment: Too many agricultural impacts in this time period. Would prefer to see splittail benefits maximized in February and avoid March. Also, there are other splittail activities proposed in the BDCP outside of the bypass; may derive benefits there instead.

*For Adult Fish Passage:* Improve passage for adult salmonids and sturgeon through "notch" or additional fishways.

### **Agricultural Considerations:**

When out-of-bank flow occurs in the Yolo Bypass during this period it causes **some to high yield impacts on affected lands**. Drainage occurs approximately 11 days after flows measured at YBY gauge drop to 6,000 cfs. Create berms to manage and focus flows on low yield lands to minimize impacts to agriculture. Drainage improvements to high yield lands as needed to accelerate planting.

Comments:

- This time period most crucial for agriculture operations.
- Concern about tipping point for agriculture in this time period. Already seeing many farmers walking away due to impact on their operations from flooding events.
- Would it be possible to identify early in the year if this was a year in which splittail operations would apply, to give farmers some predictability?
- Drainage considerations: [add]

### **Waterfowl Considerations:**

Begin draw down flooded seasonal wetlands on April 1 to promote germination of swamp timothy (a forage crop). Later draw down results in undesirable vegetation. Duck nesting in uplands begins.

## **March 24 – April 10**

### **If Fremont Weir does not overtop that water year:**

No Fremont Weir notch operations except ramping down of flows initiated earlier to in-bank fish passage flow levels of 1,000 cfs or less, by April 10, at a rate that does not increase fish stranding. When natural events drop to 6,000 cfs at the YBY gauge, flows go in-bank approximately 11 days later. Unless natural floods are dominating the system during this time, time-to-drainage should be much less than 11 days from the time notch flows drop to 1,000 cfs. More detail about flow ramping is desirable. It will need to be determined in the YBFEP.

If a natural flood event, lasting for a 30-day duration, has not occurred within 5-7 years during March 1 - May 15, prescribe an inundation regime to meet or exceed a minimum duration of 30 days with small flooding footprint.

Estimate the frequency of this operation to be in 8% to 11% of water years based on historical frequency data.

### **If Fremont Weir overtops that water year:**

After FW overtopping stops, extend small flooding footprint in low-yield areas with up to 6,000 cfs notch flows to achieve at least 30 day duration, then ramp down to in-bank fish passage flows up to 500 cfs if appropriate. If a natural flood event, lasting for a 30-day duration, has not occurred within 5-7 years during March 1 - May 15, prescribe an inundation regime to meet or exceed a minimum duration of 30 days with small flooding footprint. Estimate the frequency of this operation to be in 53% to 56% of water years based on historical frequency data.

### **Footprint targets:**

**Smaller Prolonged Inundation** - Acreage of 7,000 to 10,000 acres, with mitigation of impacts on agriculture.

### **Fishery Enhancement Considerations:**

*For Juvenile Salmonids on Floodplain:* Improve availability of floodplain habitat (food, etc.) for all salmonids, particularly fall-run and Butte Creek spring-run Chinook salmon and steelhead. Nearly the entire run of Butte Creek spring-run emigrate down Butte Creek past Chico in January and February and continue their emigration through the Sutter Bypass in the following three months depending on flow.

*For Splittail on Floodplain* Provide seasonal floodplain habitat for splittail spawning and rearing as water conditions allow.

*For Adult Fish Passage:* Improve passage for adult salmonids and sturgeon through "notch" or additional fishways.

**Agricultural Considerations:**

When out-of-bank flow occurs in the Yolo Bypass during this period it causes **some to high yield impacts on affected lands**. Drainage occurs approximately 11 days after flows measured at YBY gauge drop to 6,000 cfs. Create berms to manage and focus flows on low yield lands to minimize impacts to agriculture. Drainage improvements to high yield lands as needed to accelerate planting.

**Waterfowl Considerations:**

Begin draw down flooded seasonal wetlands on April 1 to promote germination of swamp timothy (a forage crop). Later draw down results in undesirable vegetation. Duck nesting in uplands begins.

## **April 11 – May 15**

### **If Fremont Weir does not overtop that water year:**

No Fremont Weir notch operations except for in-bank fish passage flows up to 500 cfs (if appropriate).

If a natural flood event, lasting for a 30-day duration, has not occurred within 5-7 years during March 1 - May 15, prescribe an inundation regime to meet or exceed a minimum duration of 30 days with small flooding footprint.

### **If Fremont Weir overtops that water year:**

After FW overtopping stops, extend small flooding footprint in low-yield areas with up to 6,000 cfs notch flows to achieve at least 30 day duration, then ramp down to in-bank fish passage flows up to 500 cfs if appropriate. If a natural flood event, lasting for a 30-day duration, has not occurred within 5-7 years during March 1 - May 15, prescribe an inundation regime to meet or exceed a minimum duration of 30 days with small flooding footprint. Estimate the frequency of this operation to be in 19% of water years based on historical frequency data.

### **Footprint targets:**

**Smaller Prolonged Inundation** - Acreage of 7,000 to 10,000 acres, with mitigation of impacts on agriculture.

### **Fishery Enhancement Considerations:**

*For Juvenile Salmonids on Floodplain:* Improve availability of floodplain habitat (food, etc.) for all salmonids, particularly late-fall-run Chinook salmon and steelhead.

*For Splittail on Floodplain* Provide seasonal floodplain habitat for splittail spawning and rearing as water conditions allow.

*For Adult Fish Passage:* Improve passage for adult salmonids and sturgeon through "notch" or additional fishways.

### **Agricultural Considerations:**

May 10 is the final day for planting without yield impacts. Final cessation of Yolo Bypass flows during this period could be too late to allow successful land preparation and planting by June 10, the reported last possible day to plant (with high yield impacts).

**Waterfowl Considerations:**

Peak nesting period for resident ducks (uplands) and shorebirds (wetlands/rice). Maintain some permanent wetlands for brood/chick habitat. Newly planted rice provides forage and habitat for breeding waterbirds.

## **May 16 or Later**

No Fremont Weir operations except for the minimum in-bank flow required to provide fish passage (up to 500 cfs if appropriate).

**Footprint targets:** Out-of-bank flows not created by project (zero or negligible)

**Fishery Enhancement Considerations:** Improve passage for adult salmonids and sturgeon through "notch" or additional fishways.

### **Agricultural Considerations:**

Cessation of Yolo Bypass flows by May 15 is too late to prepare land to plant by June 10, the last possible day to plant (with high yield impacts).

### **Waterfowl Considerations:**

Maintain some wetlands for breeding waterbirds and broods. Waterbird nesting increases in rice fields and brood use continues until August. Fallow rice fields (on Yolo WA) flooded for migrating shorebirds (Jul/Aug).