

ACTION: FLDSQ-R1

DESCRIPTION:

Maintain existing high-runoff procedures.

MUTUALLY EXCLUSIVE INTERACTIONS:

- **CUL-R1, R2:** The CUL actions specify keeping the reservoir at full pool or reducing reservoir fluctuations; FLDSQ-R1 would maintain large seasonal reservoir drawdowns.
- **FLD-R1:** Similar measure, but no pre-releases in FLDSQ-R1.
- **FLD-R2:** Similar measures, but increased flood control pool and pre-releases in FLD-R2.
- **REC-R21:** Significantly affects flood control flexibility.
- **TER-R12:** TER action specifies reducing seasonal drawdowns; FLDSQ-R1 would maintain large seasonal reservoir drawdowns.

MUTUALLY SUPPORTIVE INTERACTIONS:

- **SOC-R1:** Maintaining existing procedures would not change existing utility rates.
- **WTS-R7:** Spills during floods would help distribute LWD passed through project through downstream reaches; could be negative interaction depending on how many spills occur.

NEGATIVE INTERACTIONS:

- **AQU-R1 – R10, R18 – R20, R27:** Large reservoir fluctuations would increase cost of fish passage facilities by increasing size of facilities and range of flows through which they must be able to operate, and may decrease biological effectiveness of these facilities. Occasional spill events (under existing conditions) could cause spill-related entrainment of bull trout and reintroduced anadromous species making AQU-R27 less effective at minimizing entrainment.
- **AQU-R12:** Occasional spill events (under existing conditions) would adversely affect aquatic habitat and aquatic organisms in the Swift bypass reach.
- **AQU-R19:** Occasional spill events (under existing conditions) would adversely affect aquatic habitat and aquatic organisms in the Swift bypass reach adversely affecting reintroduced anadromous salmonids.
- **AQU-R32:** Spills may result in insufficient water in summer for continuous flow through reservoirs.
- **REC-R9:** Spills into the Swift bypass reach would potentially create hazards to recreationists in that reach.
- **WTS-R2:** Spills would transport gravel added to Swift bypass reach downstream.
- **WTS-R3:** Spills would transport LWD added to Swift bypass reach downstream.
- **WTS-R4:** Spills would transport LWD added to reach downstream of Merwin downstream.
- **WTS-R5:** Spills would transport gravel in Swift bypass reach downstream.

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ACTION: FLD-R1

DESCRIPTION:

Modify existing high runoff procedures to improve flood control with existing dependable flood storage to protect life and property values.

NOTES:

Max/min flood control levels the same as existing. More frequent spills at Merwin. Pre-releases would be made on average about once a year and would typically have a duration between 12 and 48 hours. Decreased damaging flows below Merwin, increased duration of moderate flows. Theoretical minor increase in risk of failure to refill reservoirs.

As an example, modify existing high runoff procedures to improve flood control with existing dependable flood storage to protect life and property values.

- Dependable flood storage will remain at 70,000 acre-ft (17 feet of hole).
- The 70,000 acre-ft of flood control storage will be reallocated to increase the amount of storage dedicated to holding releases at 60,000 cfs from 26,000 acre-ft to 38,000 acre-ft.
- Pre-releases of 25,000 cfs will be made whenever natural inflows exceed 40,000 cfs and total project hole is less than 260,000 acre-ft (63 feet of hole).
- Turbines at Merwin will be run at capacity (approximate release of 11,500 cfs) whenever there is low elevation snow pack (indicated by depth of snow at Cougar exceeding 6 inches) and project hole is less than 260,000 acre-ft (63 feet of hole).
- Flood control operations will be modified to allow the projects to operate with higher water levels on the receding limb of flood hydrographs to reduce the risk of spill increases after project inflows have peaked.
- Drawdown for flood control operation will begin on September 20 and reach 70,000 acre-ft of storage by November 1. Such space will be retained through 15 March with gradual refilling from March 15 through April 15. (The length of the flood control season would be reduced by two weeks compared with existing operations)

MUTUALLY EXCLUSIVE INTERACTIONS:

- **AQU-R32:** Minimizing seasonal drawdowns at Yale and Swift would result in less available water for continuous flows through these reservoirs (under some scenarios interaction with AQU-R32 may be mutually exclusive, under others negative).
- **CUL-R1, R2:** The CUL actions specify keeping the reservoir at full pool or reducing reservoir fluctuations; FLD-R1 would maintain large seasonal reservoir drawdowns and expose some sensitive cultural resource sites to potential vandalism and erosion.
- **FLD-R2:** Similar measures, but increased dependable flood storage in FLD-R2.
- **FLDSQ-R1:** Similar measure, but no pre-releases in FLDSQ-R1.
- **REC-R21:** Significantly affects flood control flexibility.
- **TER-R12:** The TER action specifies reducing seasonal drawdowns; FLD-R1 would maintain large seasonal reservoir drawdowns.

MUTUALLY SUPPORTIVE INTERACTIONS:

- **WTS-R7:** Increased spill from pre-releases would help distribute LWD passed through project through downstream reaches; could be negative interaction depending on how many spills occur.

NEGATIVE INTERACTIONS:

- **AQU-R1 – R10, R27:** Large reservoir fluctuations and pre-release spills would increase cost of fish passage facilities by increasing size of facilities and range of flows through which they must be able to operate, and may decrease biological effectiveness of these facilities. Increased spill from pre-releases could potentially increase spill-related entrainment of bull trout (making AQU-R27 less effective at minimizing entrainment).
- **AQU-R12:** Increased spill from pre-releases would adversely affect aquatic habitat and aquatic organisms in the Swift bypass reach.
- **AQU-R18 – R20:** Increased spill from pre-releases would adversely affect aquatic habitat and aquatic organisms in the Swift bypass reach and mainstem Lewis River below Merwin Dam. If reservoirs fail to refill, there would be a decrease in the amount of available reservoir habitat for reintroduced anadromous fish species.
- **AQU-R32:** Increased spills may result in less water available in summer for continuous flow through reservoirs. (Under some scenarios interaction with AQU-R32 may be mutually exclusive, under others negative).
- **REC-R1:** Lower pool levels would impact year-round public boating access to the shoreline and may require one or more boat ramp extensions to lower elevations to provide adequate access.
- **REC-R9:** Increased spill from pre-releases into the Swift bypass reach would potentially create hazards to recreationists in that reach.
- **SOC-R1:** In isolation, any action that increases the cost of operating the projects and/or reduces power generation will directly impact the utilities' ability to maintain or reduce utility rates. In particular, Cowlitz PUD rates are tied directly to the costs of operating Swift No. 2. Since rate-making is a complex issue involving many factors and since the magnitude of the costs are not known at this time, this action is shown as having a "negative" interaction
- **WTS-R2:** Increased spill from pre-releases would transport gravel added to Swift bypass reach downstream.
- **WTS-R3:** Increased spill from pre-releases would transport LWD added to Swift bypass reach downstream.
- **WTS-R4:** Increased spill from pre-releases would transport LWD added to reach downstream of Merwin downstream.
- **WTS-R5:** Increased spill from pre-releases would transport gravel in Swift bypass reach downstream.

ACTION: FLD-R2

DESCRIPTION:

Modify existing high runoff procedures to improve flood control with increased dependable flood control storage to protect life and property values.

NOTES:

Water levels during the flood control season will be lower than under existing conditions. More frequent spills at Merwin. Pre-releases would be made on average about once a year and would typically have a duration between 12 and 48 hours. Decreased damaging flows below Merwin, increased duration of moderate flows. Some increase in risk of failure to refill reservoirs. Overall, same effects at FLD-R1, but larger reservoir drawdown during the flood control season.

As an example, modify existing high runoff procedures to improve flood control with increased dependable flood control storage to protect life and property values.

- Dependable flood storage will be increased from 70,000 acre-ft (17 feet of hole) to 86,000 acre-ft (21 feet of hole).
- Flood control storage will be reallocated as under FLD-R1, with the additional storage also being dedicated to holding releases at 60,000 cfs.
- Pre-releases of 25,000 cfs will be made whenever natural inflows exceed 40,000 cfs and total project hole is less than 260,000 acre-ft (63 feet of hole).
- Flood control operations will be modified to allow the projects to operate with higher water levels on the receding limb of flood hydrographs to reduce the risk of spill increases after project inflows have peaked.
- Drawdown for flood control operation will begin on 20 September and reach 70,000 acre-ft of storage by November 1. Such space will be retained through March 15 with gradual refilling from March 15 through April 15. (The length of the flood control season would be reduced by two weeks compared with existing operations)

MUTUALLY EXCLUSIVE INTERACTIONS:

- **AQU-R32:** Minimizing seasonal drawdowns at Yale and Swift would result in less available water for continuous flows through these reservoirs (under some scenarios interaction with AQU-R32 may be mutually exclusive, under others negative).
- **CUL-R1, R2:** The CUL actions specify keeping the reservoir at full pool or reducing reservoir fluctuations; FLD-R2 would increase large seasonal reservoir drawdowns.
- **FLD-R1:** Similar measures, but increased flood control pool fluctuations in FLD-R2.
- **FLDSQ-R1:** Similar measure, but no pre-releases in FLDSQ-R1.
- **REC-R21:** Significantly affects flood control flexibility.
- **TER-R12:** The TER action specifies reducing seasonal drawdowns; FLD-R1 would increase large seasonal reservoir drawdowns.

MUTUALLY SUPPORTIVE INTERACTIONS:

- **WTS-R7:** Increased spill from pre-releases would help distribute LWD passed through project through downstream reaches; could be a negative interaction depending on how many spills occur.

NEGATIVE INTERACTIONS:

- **AQU-R1 – R10, R27:** Large reservoir fluctuations and pre-release spills would increase cost of fish passage facilities by increasing size of facilities and range of flows through which they must be able to operate, and may decrease biological effectiveness of these facilities. Increased spill from pre-releases could potentially increase spill-related entrainment of bull trout (making AQU-R27 less effective at minimizing entrainment).
- **AQU-R12:** Increased spill from pre-releases would adversely affect aquatic habitat and aquatic organisms in the Swift bypass reach.
- **AQU-R18 – R20:** Increased spill from pre-releases would adversely affect aquatic habitat and aquatic organisms in the Swift bypass reach and mainstem Lewis River below Merwin Dam. If reservoirs fail to refill, there would be a decrease in the amount of available reservoir habitat for reintroduced anadromous fish species.
- **AQU-R32:** Increased spills may result in less water available in summer for continuous flow through reservoirs (under some scenarios interaction with AQU-R32 may be mutually exclusive, under others negative).
- **REC-R9:** Increased spill from pre-releases into the Swift bypass reach would create hazards to recreationists in that reach.
- **REC-R16, R20:** Lower pool levels would impact year-round public boating access to the shoreline and may require one or more boat ramp extensions to lower elevations to provide adequate access.
- **SOC-R1:** In isolation, any action that increases the cost of operating the projects and/or reduces power generation will directly impact the utilities' ability to maintain or reduce utility rates. In particular, Cowlitz PUD rates are tied directly to the costs of operating Swift No. 2. Since rate-making is a complex issue involving many factors and since the magnitude of the costs are not known at this time, this action is shown as having a "negative" interaction.
- **WTS-R2:** Increased spill from pre-releases would transport gravel added to Swift bypass reach downstream.
- **WTS-R3:** Increased spill from pre-releases would transport LWD added to Swift bypass reach downstream.
- **WTS-R4:** Increased spill from pre-releases would transport LWD added to reach downstream of Merwin downstream.
- **WTS-R5:** Increased spill from pre-releases would transport gravel in Swift bypass reach downstream.

ACTION: FLD-R3

DESCRIPTION:

Promote adoption of regulations to restrict development in hazardous locations.

MUTUALLY EXCLUSIVE INTERACTIONS:

None identified.

MUTUALLY SUPPORTIVE INTERACTIONS:

- **LND-R1:** This action could restrict development in hazardous areas of floodplains.
- **TER-R3, R6:** Riparian buffers would be protected by restrictions on development.

NEGATIVE INTERACTIONS:

- **SOC-R1:** In isolation, any action that increases the cost of operating the projects and/or reduces power generation will directly impact the utilities' ability to maintain or reduce utility rates. In particular, Cowlitz PUD rates are tied directly to the costs of operating Swift No. 2. Since rate-making is a complex issue involving many factors and since the magnitude of the costs are not known at this time, this action is shown as having a "negative" interaction.

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ACTION: FLD-R4

DESCRIPTION:

Promote educational outreach program concerning flood hazard.

MUTUALLY EXCLUSIVE INTERACTIONS:

None identified.

MUTUALLY SUPPORTIVE INTERACTIONS:

- **REC-R1, R4:** REC-R4 would promote educational measures and could become part of the proposed Interpretation & Education (I&E) program, a separate plan or a component of the proposed RRMP (REC-R1).
- **TER-R3:** A public outreach program could promote an understanding of the role of wetland and riparian buffers (see REC-R4 also).

NEGATIVE INTERACTIONS:

- **SOC-R1:** In isolation, any action that increases the cost of operating the projects and/or reduces power generation will directly impact the utilities' ability to maintain or reduce utility rates. In particular, Cowlitz PUD rates are tied directly to the costs of operating Swift No. 2. Since rate-making is a complex issue involving many factors and since the magnitude of the costs are not known at this time, this action is shown as having a "negative" interaction.

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ACTION: FLD-R5

DESCRIPTION:

Improve flood notification systems and procedures.

NOTES:

May include assisting in implementation by County Emergency Management Services (EMS) and improving flood forecasting ability.

MUTUALLY EXCLUSIVE INTERACTIONS:

None identified.

MUTUALLY SUPPORTIVE INTERACTIONS:

- **AQU-R26:** Telemetered stream gages with Internet or phone access would improve ability to monitor flow conditions.

NEGATIVE INTERACTIONS:

- **SOC-R1:** In isolation, any action that increases the cost of operating the projects and/or reduces power generation will directly impact the utilities' ability to maintain or reduce utility rates. In particular, Cowlitz PUD rates are tied directly to the costs of operating Swift No. 2. Since rate-making is a complex issue involving many factors and since the magnitude of the costs are not known at this time, this action is shown as having a "negative" interaction.

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