

Draft

TMT IN-Season Management Criteria – Objectives & Triggers

COE 2 Feb 2000

Columbia and Snake River (System)

Goals

Increase survival of listed fish populations by providing suitable migration conditions for all life phases of anadromous fish, while operating projects for multiple purposes.

Objectives

Meet BiOp objectives and commitments per action agency's Records of Decision
Meet tribal treaty and trust responsibilities

Fulfill project operating requirements, authorizations and contractual commitments

Meet multi-purpose objectives.

Achieve resident fish objectives

Meet system and local flood control objectives. Montana wants to accomplish this by implementing VARQ strategy.

Where applicable operate turbines within Fish Passage Plan (FPP)1% guidelines when smolts are present.

Where applicable maintain navigation

Lower Columbia River

Overall

Goals

Objectives

Provide a non-turbine passage route for juvenile migrants by providing spill at the lower Columbia River dams during the spring period.

Maintain spill at a level to achieve tailwater TDG levels of 120% (maximum allowable waiver of the state standard)(Idaho would be willing to go to 125%) at defined schedules during the juvenile migration period which is approximately mid-April (20th) through June 30.

Maintain the same spill conditions during the summer period (July 1 - August 31) with the exception of McNary Dam.

Collect and transport juvenile fish at McNary in the summer.

Provide adult and juvenile fish passage according to FPP

Idaho proposes to utilize a "spread-the-risk" transportation strategy based on annual pre-season projections of in-river migration conditions.

In 1999 Idaho recommended no transportation of smolts at McNary dams. Spill to the maximum allowable by state water quality agencies at all collector projects throughout the spring migration period. Trucking should be limited in the transport of smolts.

Maintain Minimum Operating Pools at all reservoirs on the Columbia rivers during the spring migration period.

Triggers

Initiation of spill: The date is near the historic migration time and juvenile fish numbers are in _ digits and show an increasing trend for _ consecutive days or are _ digits for _ days and do not decrease by more than _% on the _ day.

Bonneville

Objectives

Provide flows according to BiOp to protect Chum and Fall Chinook
Spawning below Project, late October to April

Triggers

Fall-winter flows: dates of initiation of spawning and incubation of listed chum and fall chinook; dependent on flow conditions

The Dalles

Objectives

Triggers

John Day

Objectives

Operate within a 1.5 feet of 262.5 feet from April 20 to September 30, or as coordinated with reservoir users and TMT.

Maintain Irrigation

Triggers

McNary

Objectives

Transport Juvenile Fish in the summer

220 – 260 kcfs Flow Objective from April 20 to June 30

200 kcfs Flow Objective from July 1 to August 31

Montana feels that this should be based on water availability in upstream subbasins

Triggers

Flow forecast

Begin transport when: (1) subyearling chinook predominate total chinook daily collections for 3 consecutive days and (2) in-river conditions are no longer "spring like".

Middle Columbia River

Over all

Goals

Assure reservoirs are as full as possible (Montana says use VARQ Flood Control) at the start of the migration periods so natural runoff is used to increase river flows instead of filling empty reservoir space. Draft reservoirs as needed during the spring migration period to achieve flow objectives but place a higher priority on achieving reservoir refill by July 1 than meeting spring flow levels.

Montana says use a parabolic reservoir refill trajectory at storage reservoirs (i.e. as the pool approaches full, gradually reduce the refill rate) and attempt to fill on the date that inflows decline to turbine capacity (this reduces the chance of a forced spill/gas supersaturation). Use available pass-through flow during the spring migration period to achieve flow objectives

Coordinate federal and PUD project operations to provide suitable discharge from Grand Coulee and Chief Joseph projects to enable Priest Rapids Dam operations to minimize river fluctuations and stranding of juvenile chinook salmon in the Hanford reach.

Objectives

Vernita Bar spawning and incubation.

Triggers

Establish and maintain fall chinook incubation flows according to 1988 VB Settlement Agreement.

Montana says monthly reservoir inflow forecasts define VARQ flood vacancy requirements and refill trajectory.

Priest Rapids

Objectives

135 kcfs Flow Objective from April 10th - June 30

Implement Hanford Reach Stranding agreement
Maintain a steady or increasing hydrograph through the spring to the extent possible to protect emergent fry in the Hanford reach.

Triggers

Index seining in the Hanford Reach captures 50 or more sub-yearling chinook from the 6 index seine sets.

Chief Joseph

Objectives

Operate at elevation 930 – 956 feet from October 21 to February 14
Operate at a lower limit of 950 feet from February 15 to May 15 for Goose nesting.
Operate at elevation 950 – 956 feet from May 16 to October 20

Triggers

Grand Coulee

Objectives

Assist in Meeting BiOp in-season flow objectives (April 10 to August 31).
Montana adds by re-regulating upstream runoff to create a protracted runoff event.
Operate to meet 85% confidence level of meeting April 10.
Assist in meeting chum flows October-April
Serve irrigation diversion requirements
Prevent spill through SNL, or by banking the water; Spill with minimum TDG impact
Provide flows for Vernita Bar; and to help alleviate Hanford stranding
Draft/fill for power or non-power emergencies; Maintain power system integrity
Meet multi-purpose needs: tribal needs (e.g., 1283 feet), power, NWPPC-resident fish, minimum lake level for ferry operation, etc.
Refill by June 30. Provide for safe recreation from July 4 through Labor Day.
Secure optimum period-by-period storage levels to be responsive to needs and emergencies
Minimum 1225 feet FDR Lake level to maintain ferry operation
Sufficient water releases to protect such needs as navigation (e.g., reactor vessels, etc)

Triggers

BiOp flow targets, dates, elevation limits (1280 feet), fish curves
Timing of flood control draft to minimize spill.
Volume forecast
Impending, perceived, or sudden emergencies – power or non-power
Project operating requirements – daily draft or refill rate limits to prevent bank sloughing
Maintenance and other actions for dam safety, public safety
1240 feet or other elevations for efficient pumping to keep up with irrigation demands
Upstream (e.g., Canadian) operations
Montana says inflows from upstream subbasins should define refill date and trajectory based on acceptable flood risk. After the threat of flooding is past and flows from headwaters subside, gradually release storage to extend the runoff event into summer.

Upper Columbia

Hungry Horse

Goals

Provide a suitable stream flow regime for bull trout and other sensitive native species in the Flathead Watershed.

Objectives

Assist in meeting flow objectives. Montana adds by operating the reservoir above the IRCs, up to VARQ elevations (if safe in terms of flood control and economically feasible) to store water for spring release while maintaining 95% reservoir refill probability.

Montana says meet Flood Control using VARQ strategy, then use improved reservoir refill potential to increase the number of years in which storage above elevation 3550 is available for summer flow augmentation.

Operate to meet 75% confidence level of meeting April 20 (Bureau of Reclamation says April 10) Montana objects to this paragraph.

Attempt to meet IRC elevations if possible after BiOp conditions have been met Montana adds by implementing VARQ/ IRCs. Use storage above elevation 3550 for summer flow augmentation, gradually released to produce a smoothed discharge shape to benefit juvenile bull trout in the Flathead River downstream.

Normalize reservoir discharge hydrograph. Smooth discharge especially during the biologically productive summer months to avoid flow fluctuations and attendant negative varial zone effects.

Meet minimum flow requirement of 3,500 cfs at Columbia Falls.

Serve local and system-wide power or non-power emergency needs

Avoid spill through such actions as deferring April 10 refill.

Assist in meeting Flathead Basin Management operating objectives.

Secure optimum period-by-period storage levels to be responsive to needs and emergencies

Triggers

BiOp flow targets, dates, elevation limits (3540 feet), fish curves

Kerr operating conditions that may prompt Hungry Horse assistance to meet FERC requirements

Prognosis for spill; need for pre-emptive releases to avoid such spill

Available turbine/generation capacity

Impending, perceived, or sudden emergencies – power or non-power

Expectations of flow arrival downstream for BiOp objectives triggers timing of release of storage draft.

Discharge limits for downstream public safety.

River fluctuations must be minimized to protect resident fish.

Maintenance and other actions for dam safety, public safety

Montana says reservoir inflow forecasts determine VARQ and reservoir drawdown and refill trajectories based on IRC matrix.

Refill date should be on or within a few days of the date on which inflows decline to within maximum turbine capacity.

Libby

Goals

Overall sturgeon goal for the Kootenai River is to restore natural recruitment to the Kootenai River white sturgeon population by providing suitable stream flows for spawning and recruitment.

Provide a suitable stream flow regime for bull trout in the Kootenai and Flathead (Montana says only Kootenai) rivers.

Objectives

Operate to meet 75% confidence level of meeting April 20. Montana objects to this paragraph.

On upper rule curves by April 10th (from ROD) Montana objects to this paragraph

Montana says Use improved reservoir refill potential to increase the number of years in which storage above elevation 2449 is available for summer flow augmentation.

Balance the needs of providing a volume water for sturgeon spawning, riverine habitat for bull trout, and achieving refill of Libby reservoir by mid-July. Montana adds (refill date should be a sliding scale based on inflow volume, filling later in high water years).

Montana says meet flood control using VARQ strategy.

Meet International Joint Commission (IJC) requirements at Kootenay Lake

Assist in Meeting Flow Objectives Montana adds by operating the reservoir above the IRCs, up to VARQ elevations (if safe in terms of flood control and economically feasible) to store water for spring release while maintaining 95% reservoir refill probability.

Normalize reservoir discharge hydrograph. Smooth discharge especially during the biologically productive summer months to avoid flow fluctuations and attendant negative varial zone effects.

Use storage above elevation 2449 for summer flow augmentation, gradually released to produce a smoothed discharge shape to benefit juvenile white sturgeon and bull trout in the Kootenai River downstream. Provide suitable river flow and water temperature for sturgeon spawning, incubation, hatching, and juvenile survival.

15 kcfs flow at Bonners Ferry from May 1 to Start of Sturgeon Spawning
Then release full powerhouse capacity for up to 42 days. Goal 35 kcfs at Bonners Ferry.

Then 11 kcfs at Bonners ferry for 21 days.

Maintain stable discharge from Libby Dam between the sturgeon spawning and salmon flow augmentation operations. This discharge may be between 4 kcfs and 10 kcfs.

Attempt to meet IRC elevations if possible after BiOp conditions have been met

Meet BiOp conditions in the lower Columbia by implementing VARQ/IRCs.

Ramp stream flows in the Kootenai River at a rate that does not strand or otherwise adversely impact bull trout. This ramp rate should not exceed a 10% change within a day or between days.

Montana submits the following guidelines for the Sturgeon Operation
When low elevation runoff increases flows to 15 kcfs at Bonners Ferry, use Libby discharge as needed to maintain or increase flows (simulating a natural ascending limb of the runoff hydrograph) during the start of Sturgeon Spawning.

Then release full powerhouse capacity for up to 42 days. Goal 35 kcfs at Bonners Ferry release Libby discharge as needed to meet the "tiered flow objective" at Bonners Ferry as described in the WS Recovery Plan and cited literature [Note: there seems to be some confusion about the operation specified by the WS Recovery Plan].

Maintain stable discharge from Libby Dam between (Montana says after) the sturgeon spawning and salmon flow augmentation operations. This discharge may be between 4 kcfs and 10 kcfs.

Triggers

Montana says reservoir refill date should occur on or within a few days of the date on which inflows decline to within turbine capacity.

Montana says reservoir inflow forecasts determine VARQ and reservoir drawdown and refill trajectories based on IRC matrix.

Volume of sturgeon tiered flows are estimated based on the May 1 forecast and refined using subsequent monthly forecasts and flow

enveloping [Note: tiered flows were designed assuming that reservoir elevations were at or above the KIRC (or IRC)].

Initiation of sturgeon spawning.

Will be provided when 2000 Sturgeon Guidelines for Libby Dam operations are developed by the FWS.

The 1999 sturgeon guidelines can be used as a reference example. The 1999 guidelines specified maintaining 4kcfs outflow from Libby Dam starting April 1. Once local runoff downstream from Libby Dam increases flow at Bonners Ferry to 15kcfs, then maintain 15kcfs. If local inflow does not provide sufficient water to reach 15kcfs, regulate outflow from Libby Dam to reach 15kcfs at Bonners Ferry in June.

Triggers to start the flow pulsing operation for sturgeon include: 1) the combined water temperature at Bonners Ferry is expected to be maintainable at 10 degrees C.; 2) radio tagged sturgeon spawners have moved into the Kootenai River; and 3) local inflow to the Kootenai River between Libby Dam and Bonners Ferry is increasing or believed to be near the annual peak. When these trigger conditions are met, increase the Libby Dam discharge to the maximum extent possible.

Bull Trout Triggers will be developed by the FWS for 2000. Flow requirements for 1999 can be used as an example for 2000. In 1999, the FWS requested that all flow changes be limited to a maximum of 10% within and between days when the river flow was less than 14 kcfs. The FWS also requested that Libby Dam discharge be maintained at about 8 kcfs during the summer between the sturgeon spawning flow pulse and the start of salmon flow augmentation.

Montana says Bull Trout Triggers will be developed by the FWS for 2000. Flow requirements for 1999 can be used as an example for 2000. In 1999, the FWS requested that all flow changes be limited to a maximum of 10% within and between days when the river flow was less than 14 kcfs. The FWS also requested that Libby Dam discharge be maintained at about 8 kcfs during the summer between the sturgeon spawning flow pulse and the start of salmon flow augmentation. . [I recommend that the "flat flow" discharge volume be based on water availability to reduce fluctuations and associated varial zone impacts and to assure maximum benefit to all sensitive Columbia River stocks.

Correct me if I'm wrong, but an ACOE model analysis showed that the benefits to anadromous recovery of a) the double peak operation and b) Flat flow operation, were nearly identical as measured at Corra Linn Dam. If this were true, why would anyone want to harm white sturgeon and juvenile bull trout by wildly fluctuating flows, if there is no benefit to salmon?].

Montana has the following triggers for Sturgeon operation:

Initiation of sturgeon spawning migration begins in-season-management to use the controllable portion of the tiered flow (that portion from Libby Dam) to the greatest benefit for white sturgeon.

Will be provided when 2000 Sturgeon Guidelines for Libby Dam operations are developed by the FWS. Montana adds [Does this differ from the signed Recovery Plan? If so, Montana requests a detailed description and rationale].

Triggers to start the flow pulsing operation for sturgeon include: 1) the combined water temperature at Bonners Ferry is expected to be maintainable at 10 degrees C.; 2) radio tagged sturgeon spawners have moved into the Kootenai River; and 3) local inflow to the Kootenai River between Libby Dam and Bonners Ferry is increasing or believed to be near the annual peak. When these trigger conditions are met, increase

the Libby Dam discharge to the maximum extent possible. Montana says increase the Libby Dam discharge to the specified tiered flow target

Albeni Falls

Objectives

90% confidence level of being at the April 15th (ROD) or April 20 flood control elevation

Meet Minimum Flow Requirements

Triggers

Lower Snake River

Overall

Goals

"The overarching goal is to recover listed stocks of anadromous salmonids in the Snake River basin by optimizing passage conditions for juvenile and adult salmonids, and by meeting water quality standards in the Snake River. This will be achieved by providing the best utilization of Snake River basin resources to benefit anadromous and resident species, and improve conditions associated with the Clean Water Act, while recognizing trust responsibilities to Native American tribes."

Objectives

Note awaiting draft from Paul Wagner & Ed Bowles for objectives below. Assure reservoirs are as full as possible at the start of the migration periods so natural runoff is used to increase river flows instead of filling empty reservoir space. Draft reservoirs as needed during the spring migration period to shape flows on fish movement and achieve flow objectives but place a higher priority on achieving reservoir refill by July 1 than meeting spring flow levels.

Shape flood control water to the extent possible from winter and early spring to the late April period.

Determine the amount of water available to aid fish migration based on state water law and projected runoff volumes. Prioritize available water supplies for springtime migrants.

Prioritize available storage at Brownlee and Dworshak reservoirs to fill in the holes from spring snowmelt and flood control operations to help keep average flows at Lower Granite Dam from dropping below the 85-100 kcfs sliding scale seasonal flow target from mid-April through May when spring migrants are present. Idaho supported 100 kcfs for the 1999 spring migration.

Manage flood control to ensure the highest possible reservoir levels by early April and shift as much of the flood control drafting as possible to coincide with smolt migration (beginning early to mid April).

Assure contracts are in place to provide 427 kaf of water from upper Snake River reservoir storage to maintain flows in the lower Snake River during the juvenile migration season.

Provide a non-turbine passage route for juvenile migrants by providing spill at all the lower Snake River dams. Maintain spill at a level to achieve tailwater TDG levels of 120% (maximum allowable state standard) (Idaho willing to spill to 125% based on monitoring) at defined schedules during the juvenile migration period which is approximately April through June 20.

Control temperatures for juvenile summer migrants to the extent possible while using Dworshak and Brownlee reservoirs as sources of flow augmentation water.

Determine whether use of Dworshak reservoir storage to date during the juvenile migration period provides adequate adult salmon benefits and whether alternative operations are justified or feasible.

Maintain Minimum Operating Pools (MOP) at all reservoirs on the lower Snake and Columbia rivers during the spring migration period.

Utilize a "spread-the-risk" transportation strategy based on annual pre-season projections of in-river migration conditions. In 1999 Idaho recommended transportation of smolts collected at Lower Granite and Little Goose dams, and returning all bypassed fish to the river at Lower Monumental. (Spill to the maximum allowable by state water quality agencies at all collector projects throughout the spring migration period.) Trucking should be limited in the transport of smolts.

Provide adult and juvenile fish passage according to FPP

Triggers

Initiation of spill: The date is near the historic migration time frame and juvenile fish index numbers show a steady and or increasing trend.

Examples: (1) Index numbers are in the _ digits and show an increasing trend for _ consecutive days or _ digits for _ days and do not decrease by more than _% on the _ day. (2) _% of the projected run has passed lower Granite Dam to date. These would serve as initiation points to further evaluate the run.

Termination of spill: June 20 or spring migrants are consistently in double digits.

Use of Brownlee and Dworshak for flow augmentation. This needs some analysis given Billy Conner's presentation and an understanding of the Nez Perce's position.

End MOP when adult fall chinook enter lower Snake except at LWG.

Spill trigger: At least 85 kcfs seasonal average flow forecast.

Ice Harbor

Objectives

Triggers

Lower Monumental

Objectives

Spring and Summer Juvenile Fish Transport

Triggers

Little Goose

Objectives

Spring and Summer Juvenile Fish Transport

Triggers

Lower Granite

Objectives

Spring and Summer Juvenile Fish Transport

85 – 100 kcfs Flow Objective April 3 to June 20

Provide flow augmentation in the Snake River until 90% of the subyearling chinook salmon have passed Lower Granite Dam, to increase their survival.

50 – 55 kcfs Flow Objective June 21 to August 31

Operate within 1 foot of MOP from April 3 to November 15

Triggers

augment flow when significant fish are present and forecasted runoff is less than that year's flow objective

Dworshak

Objectives

Assist in Meeting Snake and Columbia Salmon Flow Objectives

Be no higher than 1558 elevation on December 15

Be on the flood control curve by April

Provide Temperature Control for Lower Snake Projects

Idaho has the following objectives:

Pass inflow and release storage (in complement with Brownlee) as necessary to fill in the holes from natural spring runoff to help keep average flows at Lower Granite Dam from dropping below 100 kcfs from mid-April through May.

Strive for a full pool by June 1, and maintain as full a pool as possible through Labor Day by delaying large-scale drafts until mid-August.

Limit late summer drafting to elevation 1535 ft msl. This will reserve approximately 200 kaf storage to be shaped in the fall to aid adult steelhead and fall chinook migration.

Strive for as full pool as possible, within flood control constraints, by early April. Shift timing to release as much of the flood control volume as possible after smolt migration begins early to mid-April.

Water used from Dworshak should not jeopardize the ability of federal and state hatcheries at Ahsahka, Idaho, from fulfilling their federal mitigation debt.^c

Triggers

Water and fish conditions at Hatcheries

Condition of juvenile and adult migrating fish on lower Snake

Consider flow augmentation from Dworshak Dam when water temperature in the Lower Granite Dam tailrace reaches 17 to 19 degrees C.

Brownlee

Objectives

The following objectives are from Idaho:

Strive for as full pool as possible, within flood control constraints, by early April. Shift timing to release as much of the flood control volume as possible after smolt migration begins early to mid-April.

Contribute up to 110 kaf storage (approximately eight feet) as needed prior to mid-May to help ensure flows at Lower Granite Dam do not drop below 100 kcfs. If Lower Granite flow are adequate, inflow can be used to help refill Brownlee Reservoir by June 7.

Maintain stable or rising reservoir levels (at no lower than 2,069 ft msl.) from mid-May through June.

Pass through or shape up to 427 kaf BOR contribution from uncontracted storage and will seller/lessor agreements for anadromous fish. Provide this water as best possible to meet the real-time needs of migrating fish, taking into consideration management factors such as resident fish and water quality.

Any late summer drafts should be timed and shaped as best possible for the benefit of adult fall chinook and steelhead migration, taking into consideration resident fish needs and provided that reservoir elevation is 2,059 ft msl. by September 30.

Any flow augmentation operations by Idaho Power Company to assist survival of anadromous fish at downstream federal facilities must meet Idaho's requirement that BPA reimburse energy, capacity and head losses incurred by IPC at its facilities.

Triggers

Begin flow augmentation from Brownlee Dam (Hells Canyon Complex) before Lower Snake water temperature reaches 17 to 19 degrees C.

Consider maximizing the release of outflow from Brownlee Dam (Hells Canyon Complex) within total dissolved gas standards and ramp down outflows in the shape of the natural hydrograph when water temperature in the Lower Granite Dam tailrace reaches 17 to 19 degrees C.

Upper Snake(427 KAF)

Objectives

- Secure annual volume on a willing buyer/seller basis, in compliance with Idaho State law
- Deliver available volumes into Brownlee in coordination with Idaho Power Company
- Achieve water quality objectives from volume deliveries

Triggers

- BiOp flow targets, dates
- River flow limit (e.g., 1500 cfs at Milner, _____ cfs at Lime Point)
- Delivery is after flood control releases, typically late spring or in summer
- Consistent with Water Master scheduling
- Volumes delivered into Brownlee are summer/winter split per arrangements
- Shaping services from Brownlee delivers the full 427 KAF into Lower Granite in-season.
- Operating plans expressed by letter to the State of Idaho