

Chapter 2

Alternatives

This chapter briefly discusses the alternative development process and describes in detail the No Action and the Action Alternatives. This chapter also describes several alternatives that were eliminated from further consideration.

Alternatives Development Process

Banks Lake reservoir is authorized to operate between the full pool water surface elevation of 1570 feet and a minimum water surface elevation of 1545 feet at any time of the year. However, since 1981, the August reservoir water surface elevation of Banks Lake has ranged between 1569.5 feet and 1565 feet. Since 1998, Reclamation has drafted 5 feet from Banks Lake in August to enhance flow augmentation at McNary Dam. This operation was incorporated into the NMFS 2000 FCRPS Biological Opinion (BiOp) as RPA action 23, which states that Banks Lake is to be drafted 5 feet in August. Reclamation has determined that the operation of Banks Lake water surface elevation between 1565 and 1570 feet constitutes the most likely future August operations and was determined to be the No Action Alternative.

During the development of the 2000 FCRPS BiOp, NMFS considered how fish passage in the Columbia River could be further optimized by using additional water from Banks Lake between water surface elevations 1565 and 1560 feet and included RPA Action 31, which advised Reclamation to consider the environmental impacts of lowering the August Banks Lake water surface elevation to 1560 feet. This EIS was written to analyze those environmental effects.

BPA ran operational models of the Columbia River to show the potential increase in available water to provide for flows for juvenile fish migration and to look at the effects on generating capacity of the FCRPS. BPA used the hydro-simulation model (HYD-SIM) that they developed for power operations. The primary focus of this EIS was to quantify the potential contribution of the volume of the proposed draft at Banks Lake in meeting flow targets for the Columbia River at McNary Dam, located downstream from Grand Coulee Dam.

Output of the HYD-SIM studies reflect operations of the FCRPS in compliance with the 2000 BiOp. The model simulates system operations using the historic hydrologic and meteorologic data sets from 1929 to 1978. The data also contain 1990-level irrigation depletions and adjustments to these 1990-level modified stream flows due to Reclamation's updated Grand Coulee pumping schedule for Banks Lake. The model simulates operations for the FCRPS based on meeting the authorized project requirements and attempting to meet BiOp RPA actions. Model results reflect average monthly discharges at each dam based on a continuous operation over the 50-year period from 1929-1978.

The results of the modeling are presented in terms of flow increments and changes to the number of years that the Columbia River flow target at McNary Dam (200,000 cfs/day) is met in each of the halves of August (table 1, appendix C). Resource managers prescribe conditions necessary for salmon outmigration during these periods. From 1929 to 1978, the average discharge of the Columbia River below McNary reservoir during these periods was 174,660 cfs for August 1-15 and 144,900 cfs for August 16-31.

The available FCRPS modeling includes the draft of Banks Lake to 1565 feet in August, which is part of the No Action Alternative. The analysis of the Action Alternative presented in this EIS simply adds an additional incremental flow volume to the modeled flows at McNary Dam. The draft of Banks Lake was modeled by reducing the pumping of a specified volume from FDR Lake and allowing the irrigation demand to draft Banks Lake to a specific water surface elevation. The volume distributed over a time period yields a flow rate. This flow rate is added directly to the flows at McNary Dam. The volume of water and the time period chosen to deliver the water changes the magnitude of the increment of discharge that is added to McNary Dam flows. The results of the modeling can be presented in terms of flow increments and changes to the number of years that the Columbia River flow target at McNary Dam is met in each of the halves of August (see appendix C). This increment of flow is one of several FCRPS actions that cumulatively increase Columbia River flows for juvenile fish migration.

The equivalent flow rates represent the upper limit to the potential flow contribution for each alternative or configuration. The actual August 1 starting water surface elevation at Banks Lake could be less than water surface elevation 1570 feet. This can occur for a number of reasons such as unplanned pump outages, power emergencies, and electrical problems or for any other unforeseen event. In actual practice, Reclamation would make every reasonable effort to be as close to a pool water surface elevation of 1570 feet as practicable on August 1.

The data used in model simulations include a wide range of annual flow volumes, and the timing of the runoff can be completely different between similar runoff volumes. Figures 2-1 and 2-2 illustrate the range of monthly flows at McNary Dam for August found in the simulation data set. Median flows range from about 180,000 cfs the first half of August and 140,000 cfs the second half of August at McNary Dam.

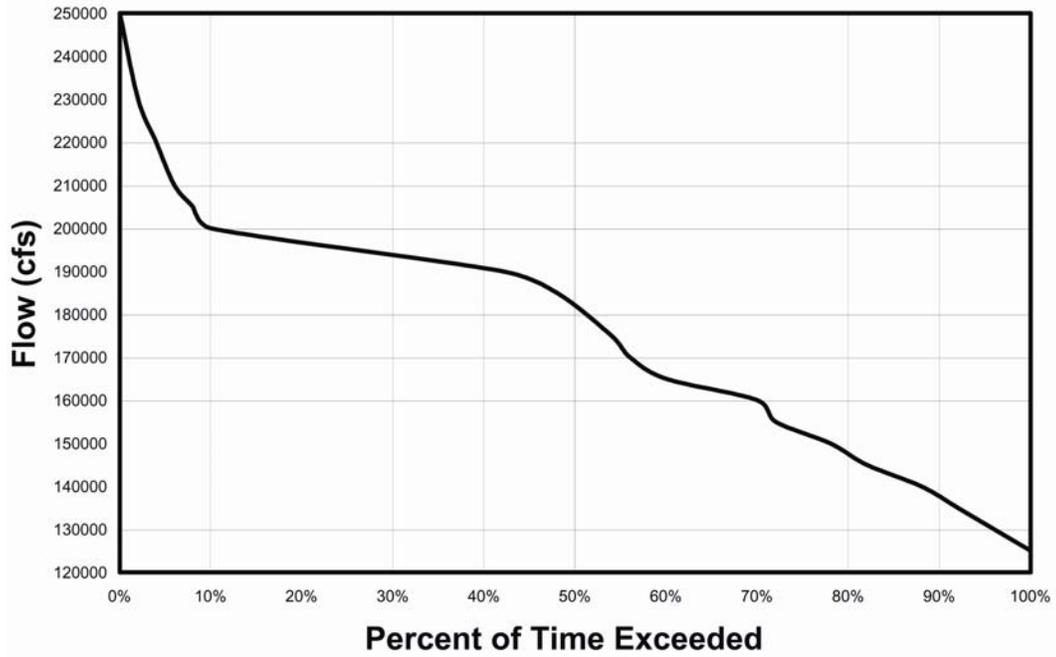


Figure 2-1.—The range of average flows at McNary Dam for August 1 through 15.

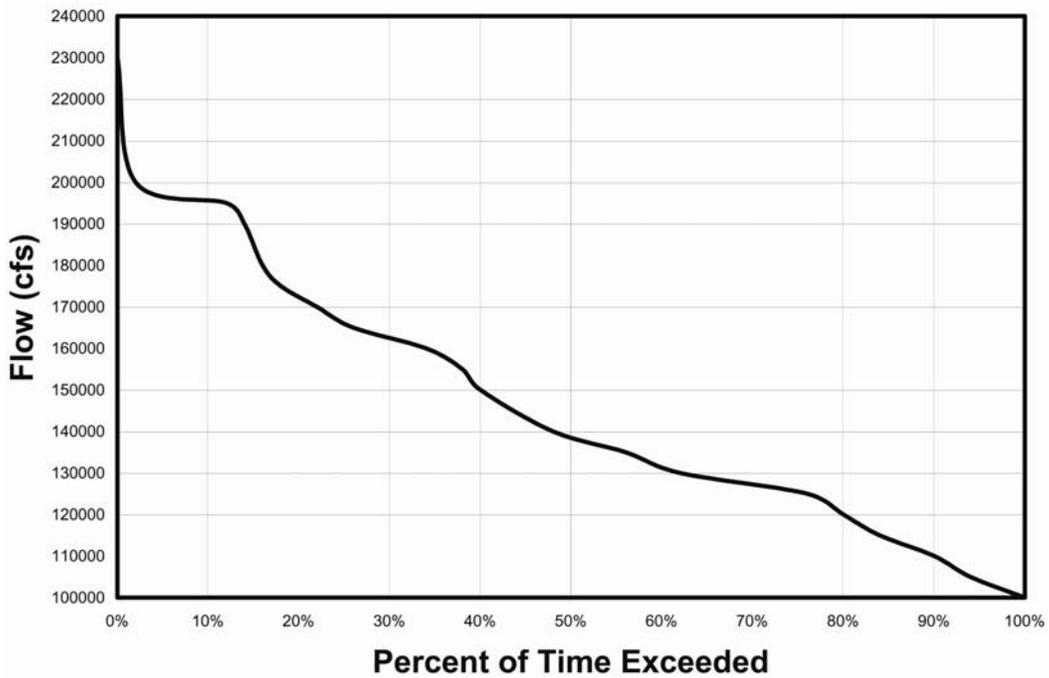


Figure 2-2.—The range of average flows at McNary Dam for August 16 through 31.

The FCRPS model shows impacts to the lower river and analyzes September on a monthly basis. Even though Reclamation shows a rapid refill to elevation 1569 feet, then slows the rate of refill for modeling purposes, McNary flow impact is expressed in average flow change over the month of September. There are no flow targets on the Columbia River in September, and September flows are relatively consistent year to year. Reclamation describes impacts in terms of the average impact in September over a 50-year period, instead of performing a 50-year study.

Reclamation considered several alternative methods to lower the Banks Lake water surface elevation to 1560 feet. Alternatives developed early in the process considered specific August dates with specific water surface elevations that would provide water for flows during specific times of the month. However, Columbia River flows vary. The additional flows needed in the Columbia River will differ greatly over a 50-year period, and possibly even in consecutive years. Providing a specific August date for when the Banks Lake water would be available to increase Columbia River flows would unnecessarily restrict the ability to meet fishery needs based on the dynamics of river flows.

To increase potential flexibility to optimize fish passage, Reclamation required an alternative that would allow the Banks Lake water to be used for each year's specific August fish passage needs. One alternative was developed that would allow Reclamation to operate Banks Lake between water surface elevations 1570 and 1560 feet. Scenarios were developed to illustrate how the water surface elevation of 1560 feet could potentially be reached. The No Action and the Action Alternatives are described below.

Alternatives Considered in Detail

Two alternatives are described and analyzed in this EIS. The first alternative is the No Action Alternative, which describes the Banks Lake August water surface elevations that would occur if Reclamation decided not to implement the Action Alternative. Four scenarios on how the water surface elevation of 1565 feet by August 31 could be achieved are presented. These scenarios vary, depending upon the hydrology of any particular year. The Action Alternative describes the proposed operational modification of August water surface elevations to achieve 1560 feet elevation by August 31. Four scenarios are presented to illustrate how this water surface elevation could be potentially reached.

There may be conditions when Reclamation would not provide the drawdown described in the No Action and Action Alternatives. In addition, in some years drawdown may be more than that described in the alternatives. Conditions that may trigger a lesser or greater drawdown could include, but are not limited to (1) mechanical limitations to pumping capacity, (2) low water years when flows in September are predicted to be insufficient to supply refill water, (3) high water years when the contribution of Banks Lake is not needed to meet flow targets, (4) years when energy demand is predicted to limit the amount of power available for refill

during early September, and (5) drawdown for maintenance needs. Even during years with these types of conditions, partial drawdown might be possible. Conditions that would preclude drawdowns are anticipated to occur infrequently.

For the analysis in this EIS, it is assumed that Banks Lake would be operated as described in the alternatives, with the scenario dependent on the hydrology of any given year. Impacts resulting from the infrequent changes to the described operation would be evaluated on a case specific basis with appropriate NEPA compliance being conducted at that time.

No Action Alternative—Preferred Alternative

Under No Action, Banks Lake water surface would normally range between water surface elevation 1570 feet and elevation 1565 feet between August 1 and September 22. The goal and maximum possible draft of Banks Lake in August would be from water surface elevation 1570 feet to 1565 feet, based on RPA Action 23 of NMFS 2000 BiOp, which states that Reclamation shall operate Banks Lake at an elevation 5 feet from full pool during August. Approximately 133,600 acre-feet of water, the volume between elevation 1570 and 1565 feet, would be available to increase streamflow for fish migration targets during August. Under the No Action Alternative, Reclamation would still have the discretion to manage the lake level to other water surface elevations for authorized purposes. Three different scenarios to draft this volume of water in August were modeled, while another scenario assumed no draft during August.

Scenarios consist of Low Water, an Early Draft, a Uniform Draft, and a Late Draft. The Low Water scenario assumes that Banks Lake is at water surface elevation 1565 feet on August 1, while the remaining three scenarios assume that the water surface is at elevation 1570 feet on August 1.

Drawdown

The four different drawdown scenarios have been developed to show the range of conditions that may occur, depending on the hydrology, as the lake is operated between water surface elevations 1570 and 1565 feet. For this analysis, the Low Water Scenario assumes Banks Lake was drafted before the end of July and is at elevation 1565 feet at the beginning of August and remains at that water surface elevation throughout the month. The Early Draft is a linear draft starting at 1570 feet on August 1, reaching water surface elevation 1565 feet at August 10. The Uniform Draft is a linear draft throughout August starting at 1570 feet and going to water surface elevation 1565 feet at the end of the month. The Late Draft remains at water surface elevation 1570 feet until August 21, then drafts linearly to the end of the month to water surface elevation 1565 feet. All four scenarios, as shown in figure 2-3, are evaluated in the EIS.

**Banks Lake Drawdown
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1. Low Water Banks Lake water surface elevation at 1565 feet on August 1 and held at that elevation until August 31. Draft would begin no earlier than July 22. Average rate of draft during August = 0.0 feet per day.
2. Early Draft Draft Banks Lake water surface elevation from 1570 feet on August 1 to elevation 1565 feet on August 10. Average rate of draft = 0.5 foot per day.
3. Uniform Draft Draft Banks Lake water surface elevation from 1570 feet on August 1 to 1565 feet on August 31. Average rate of draft = 0.16 foot per day.
4. Late Draft Draft Banks Lake water surface elevation from 1570 feet on August 22 to 1565 feet on August 31. Average rate of draft = 0.5 foot per day.

Refill

Under the No Action Alternative, the September 1 Banks Lake water surface elevation would be no lower than 1565 feet. Projected refill would occur over the period from September 1 until September 22, when the reservoir could reach elevation 1570 feet.

Action Alternative

In the Action Alternative, Banks Lake water surface elevations would range between elevation 1570 feet and 1560 feet between August 1 and September 22 annually (see figure 2-4). Banks Lake water surface elevations could be as low as 1560 feet on August 11. Under the Action Alternative, Reclamation would still have discretion to manage the lake level to other elevations for authorized purposes.

Because normal September water surface elevations typically fluctuate from elevation 1565 feet to 1570 feet, a refill of the reservoir to elevation 1570 feet may be required. Therefore, the Action Alternative includes a refill that begins on September 1, reaching elevation 1565 feet by September 10 and 1570 feet by September 22.

Compared to No Action, the Action Alternative includes drafting an additional 5 feet annually from elevation 1565 feet to 1560 feet, providing an additional 127,200 acre-feet of water. This water would be used to increase the flow volume of the Columbia River at McNary Dam by about 1 to 2 percent during the month of August, compared to No Action. For example, 2,069 cfs (flow increase based on a uniform draft) is about 1 percent of 180,000 cfs and 1.5 percent of 140,000 cfs.

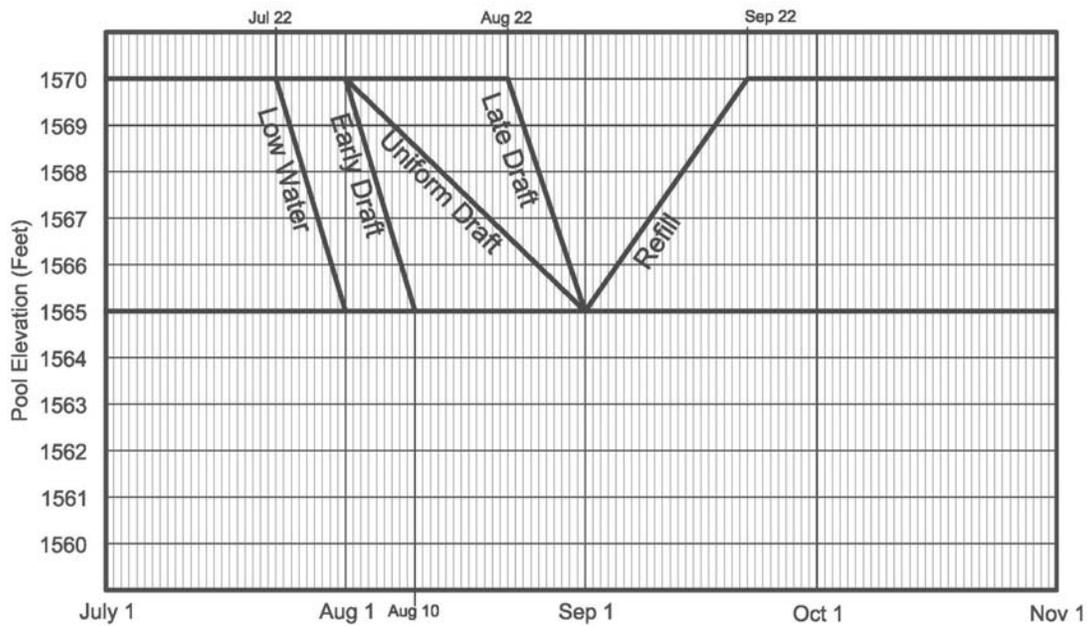


Figure 2-3.—The four scenarios for the No Action Alternative.

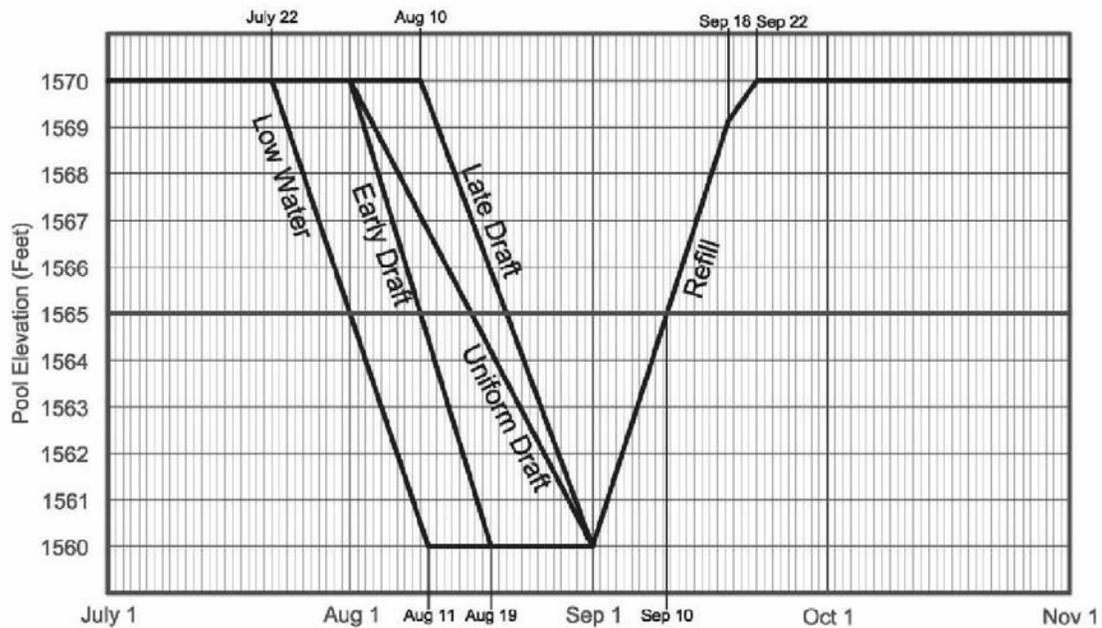


Figure 2-4.—The four scenarios for the Action Alternative.

Drawdown

The timing of possible water releases under the Action Alternative has been evaluated by selecting four scenarios, as shown in figure 2-4. These scenarios consist of a Low Water, Early Draft, Uniform Draft, and a Late Draft. The first scenario assumes that the water surface is at elevation 1565 feet on August 1. The other scenarios assume that the Banks Lake water surface elevation is at 1570 feet on August 1.

1. Low Water Draft Banks Lake from water surface elevation 1565 feet on August 1 to 1560 feet by August 10, where the water surface elevation will remain until August 31. Draft would begin no earlier than July 22. Average rate of draft = 0.5 foot per day.
2. Early Draft Draft Banks Lake water surface elevation from 1570 feet on August 1 to 1560 feet by August 20. Banks Lake water surface elevation remains at 1560 feet until August 31. Average rate of draft = 0.5 foot per day.
3. Uniform Draft Draft Banks Lake water surface elevation from 1570 feet on August 1 to water surface elevation 1560 feet on August 31. Average rate of draft = 0.32 foot per day.
4. Late Draft Beginning on August 11, draft Banks Lake water surface elevation from 1570 feet to water surface elevation 1560 feet by August 31. Average rate of draft = 0.5 foot per day.

Refill

Under the Action Alternative, August 31 Banks Lake water surface elevation target would be 1560 feet. Refill at the fastest rate possible would start on September 1, would refill to elevation 1565 by September 10, and continue at that rate until approximately September 18, when the reservoir would be at about 1569 feet. (Rate based on pumping both LLH and HLH while meeting irrigation demand. Assumes that two units are unavailable because of annual maintenance outages.) At that time (1569 feet), the Banks Lake water surface elevation would be identical under both the Action and No Action Alternatives and additional refill to elevation 1570 feet would be identical to refill under the No Action Alternative with the reservoir reaching elevation 1570 feet on September 22. Nevertheless, under the Action Alternative, Reclamation would have discretion to manage the lake level to fill at other times for other authorized uses.

The water surface elevation of Banks Lake on August 1 ranged from 1569.8 to 1568 feet from 1981 through 2000. The historic normal operating range during August typically remained above water surface elevation 1568 feet over this 20-year period. If the starting pool water surface elevation is less than 1570 feet, the available flow contributions in August will be less. However, this does not mean that the overall

flow contribution to the system is diminished. A starting pool water surface elevation of less than 1570 feet on August 1 may be the result of a flow contribution in July. Approximate daily rates of draft for the No Action and Action Alternatives are shown in table 2-1.

Table 2-1.—Summary of Banks Lake elevation under No Action and Action Alternatives

| Altern- ative | Type of draw down | Changes in elevation and volume | Time period | Results | |
|----------------------------|----------------------|---|---------------------------------------|--|--|
| | | | | Number of days at different elevations | Potential flow changes (cfs) |
| No Action | Low water | 1565 No Change 0 kaf | Aug. 1-31 | 31 days at < 1570 ft 31 days at 1565 ft Zero days at < 1565 ft | 0 |
| | Early draft | 1570-1565 1565 133.6 kaf | Aug. 1-10 Aug. 11-31 | 31 days at < 1570 ft 21 days at 1565 ft Zero days at < 1565 ft | 6,737 - Aug. 1-10 |
| | Uniform draft | 1570-1565 133.6 kaf | Aug. 1-31 | 31 days at < 1570 ft 1 day at 1565 ft Zero days at < 1565 ft | 2,173- Aug.1-31 |
| | Late draft | 1570 1570-1565 133.6 kaf | Aug. 1-21 Aug. 22-31 | 21 days at 1570 ft 10 days at < 1570 ft Zero days at < 1565 ft | 6,737 - Aug. 22-31 |
| Refill of Banks Lake | | 1565 - 1569 1569 - 1570 | Sep. 1-18 Sep. 19-22 | 22 days to reach 1570 ft | 2,697 Sep. 1-22 |
| Action | Low water | 1565-1560 1560 127.2 kaf | Aug. 1-10 Aug. 11-31 | 31 days at < 1570 ft 31 days at < 1565 ft 21 days at 1560 ft | 6,413 - Aug. 1-10 |
| | Early draft | 1570-1565 1565-1560 1560 260.8 kaf | Aug. 1-10 Aug. 11-20 Aug. 20-31 | 31 days at < 1570 ft 21 days at < 1565 ft 11 days at 1560 ft | 6,737 - Aug. 1-10 6,413 - Aug. 11-20 |
| | Uniform draft | 1570-1565 1565-1560 260.8 kaf | Aug. 1-15 Aug. 16-31 | 31 days at < 1570 ft 16 days at < 1565 ft 1 day at 1560 ft | 4,242 - Aug. 1-31 |
| | Late draft | 1570 1570-1565 1565-1560 260.8 kaf | Aug. 1-11 Aug. 12-21 Aug. 22-31 | 11 days at 1570 ft 20 days at < 1570 ft 10 days at < 1565 ft 1 day at 1560 ft | 6,737 - Aug. 12-21 6,413 - Aug. 22-31 |
| Refill of Banks Lake | | 1560-1565 1565-1569 1569-1570 | Sep. 1-10 Sep. 11-18 Sep. 19-22 | 18 days < No Action elevation; 22 days to reach 1570 ft | 6,705 - Sep. 1-18 2,697 – Sep. 19-22 |

kaf — thousand acre-feet

Alternatives Considered but Eliminated

Several action alternatives were considered but were eliminated from further consideration because they limited Reclamation's flexibility to provide increased water when needed most for the outmigration of the salmon. Specifically, August water flow levels in the Columbia River may be different each year for various reasons, including precipitation and operation of the CBP. Alternatives that would dictate specific lake water surface elevations during specific August dates would unduly restrict Reclamation's ability to increase flows when the fishery managers felt the salmon most needed the flows. Therefore, these alternatives were eliminated from further consideration. They were, however, carried forward as scenarios in the Action Alternative to illustrate the potential range of impacts associated with different ways of achieving the drawdown to 1560 feet in water surface elevation.

Reclamation also evaluated an action alternative that included a different refill period. Refilling to elevation 1565 by September 10 would require pumping during heavy load hours, as well as light load hours. Pumping costs are greater during heavy load hours. BPA requested that refill be delayed so that pumping could be done during light load hours only. The longer refill period, which would reduce the overall costs of power for the refill by about \$890,000, would extend from September 1 through October 14. The analysis included:

- Shallow aquatic macrophyte species such as reed canarygrass, Baltic rush, cattails and sedges that are drought tolerant would survive the drawdown and would continue to be available as critical nursery habitat for many species of juvenile fish. Several other less drought tolerant species such as American bulrush and softstem bulrush, would likely be replaced by more tolerant species.
- At least nine species of fish would be adversely impacted by a prolonged drawdown, including yellow bullhead, largemouth bass, pumpkinseed, yellow perch, longnose, largescale, and bridgelip suckers, prickly sculpin, and northern pikeminnow. Juveniles of these species depend on the cover provided by aquatic macrophytes.
- Drawdown below the zone where these plant species occur would force juveniles into open water and subject them to increased predation. Many of these species serve as forage for popular game species, such as walleye and smallmouth bass, which may be adversely impacted due to reduced food availability.
- Benthic invertebrates production would be reduced in exposed areas, reducing food availability for many species of fish.

- Riparian trees and shrubs may also be adversely impacted. While mature black cottonwood trees should tolerate drawdown, seedlings may be adversely affected. Several willow species including peachleaf and coyote, are relatively drought intolerant and may be adversely impacted by drawdown. Other species such as Russian olive, an exotic, is drought tolerant and is likely to continue to spread along the shoreline.
- Recreation at Banks Lake is heavily based upon fishing with most visitors to the reservoir fishing at least part of the time and many of the visitors coming to the reservoir solely to fish. If the fishery were to decline it is anticipated that visitation to the reservoir would decline and that would affect those businesses around the reservoir that rely on the visitors for their major market. While this would most heavily affect the Coulee City area, the north end of Banks Lake also has significant segments of the economy tied to visitor use of the reservoir.

With this cascading series of impacts increasing over the Action Alternatives impacts, it was determined that the level of impact would be too great and an alternative encompassing a longer refill was dropped from further consideration.

Summary Comparison of Alternatives

A summary comparison of the environmental consequences of the alternatives is shown in table 2-2.

**Banks Lake Drawdown
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Table 2-2.—Summary comparison of the environmental consequences of the alternatives

| Affected resource | No Action Alternative | Action Alternative |
|--|---|---|
| Vegetation, fish, and wildlife | Abundance and distribution continue to fluctuate with seasonal water levels, but overall stable. | Distribution and abundance impacted by more severe water level fluctuations. |
| Threatened and endangered species | Abundance and distribution continue to be limited by available habitat. | Fish prey may be more available to bald eagles. Although incrementally small, the 6 percent contribution adds to the total cumulative benefits of flow augmentation for salmon. |
| Recreation | 7 of 12 boat launches are exposed and rendered unusable during the late recreation season (elevation 1565). | 10 of 12 boat launches are exposed and rendered unusable at elevation 1562. Impacts to communities and businesses adjacent to the reservoir may be greater until users become accustomed to the greater fluctuation of the water surface. No launches on the southern half of Banks Lake would be usable. Steamboat Rock State Park (approx. 600,000 visitors annually) would not have a usable launch at elevation 1562. |
| Economics FCRPS ¹ GCPHA ² PUD ³ powerplants Regional and local economy | FCRPS operates as it has historically. Power generation is not anticipated to change and will continue as it has historically. Power generation is not anticipated to change and will continue as it has historically. Access to the water, number of recreation visits, recreation-related expenditures by the public, and the net benefits of recreation occur as they have in the past. | As a result of the action, the difference in net energy generation results in a loss of 8,000 MWh annually. Difference in net power generation losses range from 812 MWh to 1,695 MWh annually. Difference in net power generation losses that would need to be replaced range from 6,248 MWh to 6,906 MWh annually. Surface water elevations below 1565 feet affect access and recreational use and, in turn, some recreation-oriented businesses. Lower water levels may curtail recreation visits, which would result in lower expenditures at a few recreation-related businesses near the lake. Overall, economic impacts on the economy of Grant County are negligible. The effect on net benefits of recreation within the county is indeterminate. |
| Irrigated agriculture | Full delivery of water to CBP ⁴ farmers. | Full delivery of water to CBP farmers. |
| Historic resources | Same as historically. Eighty-two historical properties appear to be affected from erosion. | Surveys would be conducted in the drawdown zone between elevations 1570 and 1560. |
| Traditional cultural properties | Same as historically. Nine TCPs would be affected; three are believed to be eligible to National Register. | It is probable that more TCPs lie in drawdown area below elevation 1565 feet. |
| Indian trust assets | Some areas can no longer support traditional uses; no additional impacts. | No additional impact. |

Table 2-2.—Summary comparison of the environmental consequences of the alternatives, continued

| Affected resource | No Action Alternative | Action Alternative |
|-------------------------------------|---|--|
| Environmental justice | No impacts were identified. | No impacts. |
| Surface water quality | Temperature and stratification will continue to change with changes in water elevation and meteorological conditions. | Mixing may shift 1 or 2 weeks earlier in the fall due to greater mixing and heating of the lake surface. |
| Groundwater quality | Concentrations of chemicals and groundwater levels will fluctuate with the elevation of Banks Lake. | Water level may change in the short term but will return to normal during refill. No change in existing concentration trends. |
| Native American sacred sites | No impacts were identified. | No impacts. |
| Visual quality | Approximately 1,300 acres of an unvegetated bathtub ring between elevations 1565 and 1570 feet. | Approximately 2,500 acres of an unvegetated bathtub ring between elevations 1570 and 1560 feet. |
| Air quality | No impacts. | No impacts. |
| Soils | Impacts by erosion would continue. | No additional impacts. |
| Social environment Public health | For some, as operation of Banks Lake will not change, values will not be affected. For others who value increased water for endangered salmon runs, their values will not be upheld. Lake drawdowns in late summer likely have negative impacts to mosquito production, resulting in lesser likelihood of mosquito borne disease, such as West Nile Virus. | The values of those who desire increased water for endangered salmon runs will be upheld. The values of those desiring higher lake levels would not be upheld. In the drawdown area, little or no shallow ponding areas were evident for mosquito use. Therefore, little likelihood of additional risk of mosquito borne disease, such as West Nile Virus. |

¹ Federal Columbia River Power System

² Grand Coulee Project Hydroelectric Authority

³ Public Utility District

⁴ Columbia Basin Project