

RECLAMATION

Managing Water in the West

Supplemental Information Report: Documentation of Missouri River Depletion Data Application & Analysis – Post Record of Decision

**Northwest Area Water Supply Project, North Dakota
Great Plains Region**



**U.S. Department of the Interior
Bureau of Reclamation**

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Mission Statement

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Summary

As part of the cumulative effects analysis for the Northwest Area Water Supply Project Supplemental Environmental Impact Statement (SEIS), Reclamation evaluated the effects of existing and reasonably foreseeable future Missouri River depletions. Reclamation initiated this analysis in 2010 using data it collected, along with data provided by the Corps of Engineers (Corps). In preparation for ongoing litigation, Reclamation discovered inconsistencies in the application of criteria it developed for determining whether potential future depletions were reasonably foreseeable, and undertook this evaluation to determine if this inconsistency is of such significance to warrant additional NEPA analysis.

At the same time Reclamation was conducting its depletion analysis, the Corps conducted its own independent analyses to evaluate the effects of withdrawing what it dubs “Surplus Water” from reservoirs within the Missouri River Mainstem System. “Surplus Water” depletion estimates developed by the Corps for each reservoir included *existing withdrawals*, and *potential additional future withdrawals*. The Corps’ analyses (documented in a series of draft/final reports issued between 2010 and 2012) concluded that the temporary use of Missouri River Reservoir “Surplus Water” would not cause significant adverse effects to existing authorized purposes.

Existing withdrawals from all reservoirs were accounted for in Reclamation’s SEIS analysis. The Corps’ estimated potential additional future water withdrawals from four reservoirs (Fort Peck Reservoir, Garrison Reservoir, Oahe Reservoir, and Lake Sharpe) were included in the cumulative effects analysis. However, the Corps’ estimated potential additional future withdrawals from two reservoirs (Lake Francis Case and Lewis and Clark Lake) were inadvertently not included. The estimated potential additional future withdrawals from Lake Francis Case and Lewis and Clark Lake totaled 5,127 acre-feet per year, or less than 0.04 percent of the 13.2 million acre-feet of estimated total potential future depletions used in the cumulative effects analysis.

In Reclamation’s recent review, the agency determined that the criteria it established for determining reasonably foreseeable future depletions were not applied consistently in regard to the potential “Surplus Water” depletions. At Garrison Reservoir, the Corps’ estimated potential additional future depletions were based on permit applications for oil and gas development in North Dakota. These withdrawals are reasonably foreseeable based on Reclamation’s criteria and were correctly included in the cumulative effects analysis. For the other five reservoirs, the Corps’ estimated potential additional future depletions were based on an assumed ten percent increase over existing municipal and industrial water demands. Reclamation had already accounted for potential future changes in municipal and industrial water demands throughout the Missouri River basin by adjusting these water demands based on U.S. Census Bureau population projections, and included these demands in the cumulative effects analysis.

When Reclamation discovered the oversight of not including the 5,127 acre-feet of potential future water withdrawals in the cumulative effects analysis, it responded with due diligence and evaluated the existing information to determine its significance. As documented in this Supplemental Information Report, the inclusion of the Corps’ estimated potential additional future withdrawals for Fort Peck Reservoir, Oahe Reservoir, and Lake Sharpe in the SEIS cumulative effects analysis amounted to double-counting, resulting in an overestimate of

potential future depletions. Reclamation has determined that the inconsistent application of the criteria dealing with reasonably foreseeable future actions does not present a significant change in the cumulative effects disclosed in the SEIS and does not affect the agency's final decision as documented in the August 2015 Record of Decision. Therefore, completing additional NEPA is not warranted.

Introduction

On April 7, 2015, Reclamation released a Supplemental Environmental Impact Statement (SEIS) that analyzed impacts of the proposed Northwest Area Water Supply project (NAWS). Among other issues, the SEIS addressed the potential cumulative impacts of the project along with other reasonably foreseeable depletions on Missouri River flows.

In preparation for ongoing litigation, Reclamation reviewed comments provided by the public on the SEIS, as well as data used in various analyses. Inconsistencies were found in how data were used in the depletion analysis and cumulative impact analysis for the SEIS. These data were collected as part of the estimated reasonably foreseeable future Missouri River depletions. As Reclamation was initiating the Missouri River depletion analysis in 2010 and 2011, the Corps of Engineers (Corps) conducted its own independent analyses to identify what it dubs "Surplus Water" for each reservoir within the Missouri River Mainstem System. The Corps¹ identifies Surplus Water as water made temporarily available from storage space originally identified for sediment and irrigation storage from the Missouri River Mainstem Reservoir System to meet municipal and industrial water supply needs. Surplus Water depletion estimates for each reservoir include existing withdrawals and potential additional future withdrawals.

The Corps provided its Surplus Water depletion estimates to Reclamation in an email from R. McAllister to E. McPhillips dated May 19, 2011. Because the Corps' Surplus Water reports were not yet available when the estimates were provided for analysis, Reclamation had limited basis for determining whether the potential withdrawals met our criteria for reasonably foreseeable actions. The estimates provided by the Corps did not include specific information about the potential use of the Surplus Water; only the estimated volume of water that could potentially be temporarily withdrawn.

Existing withdrawals were accounted for in Reclamation's SEIS analysis, and it was Reclamation's intent to include all potential additional future water withdrawals estimated by the Corps as part of the cumulative effects analysis. The Corps' estimated potential additional future

¹ The Corps (2010-2012) drafted a series of Surplus Water Reports for each Missouri River Reservoir of which only the Garrison Dam/Lake Sakakawea Project Report was finalized and approved including a Finding of No Significant Impact and Environmental Assessment. The primary water demand driving regional water needs at that time was the North Dakota oil and gas industry although, the Corps proceeded to initiate reports for all Missouri River reservoirs. The purpose of Surplus Water Reports was to identify and quantify whether surplus water is available in a Reservoir Project, as defined in Section 6 of the 1944 Flood Control Act that the Secretary of the Army can use to execute surplus water supply agreements with water users, and to determine whether use of surplus water is the most efficient method for meeting regional municipal and industrial (M&I) water needs. Under Section 6 of the Flood Control Act of 1944 (Public Law 78-534), the Secretary of the Army is authorized to make agreements with states, municipalities, private concerns, or individuals for surplus water that may be available at any reservoir under the control of the Department.

water withdrawals from four reservoirs (Fort Peck Reservoir, Garrison Reservoir, Oahe Reservoir, and Lake Sharpe) were included in the cumulative effects analysis. However, the Corps' estimated potential additional future withdrawals from two reservoirs (Lake Francis Case and Lewis and Clark Lake) were overlooked. The estimated potential additional future withdrawals from Lake Francis Case and Lewis and Clark Lake totaled 5,127 acre-feet per year, or less than 0.04 percent of the 13.2 million acre-feet of estimated total potential future depletions used in the cumulative effects analysis.

Upon further review, Reclamation determined that the criteria for determining reasonably foreseeable future depletions was not applied consistently, thereby overestimating the cumulative depletions in the analysis.

In response to the increase in demand for water in the oil and gas industry, a number of companies, individuals, and one state agency submitted requests to the Corps for use of water from Garrison Reservoir (Lake Sakakawea). Because of the high water demand for oil and gas development at that time and the limited availability of water sources/supply in that part of North Dakota, Reclamation took a conservative approach and included the entire 27,000 acre-feet/year of potential additional future withdrawals estimated by the Corps as reasonably foreseeable for the cumulative impact analysis.

For the other five Missouri River reservoirs, the Corps' estimate of potential additional future withdrawals was based on the existing average withdrawals, plus 10 percent to account for uncertainties in future municipal and industrial water demand. The Corps noted generally steady or declining trends in surrounding population and water demand for each of these reservoirs. Except for 1.05 acre-feet per year from Fort Peck, an inconsequential amount, no requests or plans have been made for Surplus Water from these reservoirs. Thus, the 10 percent increase in withdrawals is likely high, should not have been identified as reasonably foreseeable, and should not have been included in the estimated future depletions used in the cumulative impacts analysis. Furthermore, Reclamation had already accounted for potential future changes in municipal and industrial water demands throughout the Missouri River basin by adjusting these water demands based on U.S. Census Bureau population projections, and included these demands in the cumulative effects analysis. Thus, the inclusion of the Corps' estimated potential additional future withdrawals for Fort Peck Reservoir, Oahe Reservoir, and Lake Sharpe in the SEIS cumulative effects analysis amounted to double-counting, resulting in an overestimate of potential future depletions.

This Supplemental Information Report explains the following: (1) the types of data needed in the depletion analysis, (2) the methods used to obtain the data, (3) criteria Reclamation established to define whether a potential future action/depletion was reasonably foreseeable, (4) how such data were used in the depletion analysis, and (5) the inconsistent application of the established criteria in the cumulative effects analysis.

Reclamation prepared this Supplemental Information Report to document its analysis of inconsistencies and decision regarding additional NEPA. This report is included in Reclamation's Project file and posted to the Project website for public access.

Explanation of SEIS Analyses used for Missouri River Depletions

Appendix D of the SEIS briefly summarizes the methods and analysis used by Reclamation and the Corps to evaluate the potential effects of water withdrawal for the NAWS project. First, Reclamation quantified the historic, present level, and reasonably foreseeable future Missouri River basin depletions (Reclamation 2012). Second, the Corps worked with Reclamation to evaluate cumulative impacts to the Missouri River by running the Reclamation data through Corps models. For a detailed description of the modeling data and results, see *Missouri River Basin Depletions Database* (Reclamation 2012) and *Report on the Cumulative Impacts to the Missouri River for the Bureau of Reclamation Northwest Area Water Supply Project* (Corps 2013).

Missouri River Depletions Database

The Bureau of Reclamation's Great Plains Regional Office Hydrology Group has been involved in the development and maintenance of a Missouri River Depletions database for many years. In 1977, Reclamation, along with state and other federal agencies within the Missouri River basin, formed work teams to evaluate the effects of depletions on streamflows in the Missouri River basin. This study, completed in 1982, was initiated by the Missouri River Basin Commission, later to be known as the Missouri Basin States Association (MBSA). In 2005, Reclamation completed a report titled *A Study to Determine the Historic and Present Level Depletions in the Missouri River Basin* which built upon the work done in the MBSA study by extending the period of record to 2002 and increasing and expanding information collected for more accuracy. Reclamation's 2012 report, *Missouri River Basin Depletions Database*, further updated the depletion database so it could be used in the SEIS analyses.

Reclamation has developed depletion estimates for historic water use (Table D.2) and present level water use (Table D.3). Depletions were estimated for five different water use categories: 1) irrigated agriculture, 2) public surface water supply systems, 3) industrial water users, 4) storage in Reclamation reservoirs, and 5) trans-basin diversions. The top two depletions categories for water diversions (irrigated agriculture and public surface water supply systems) together account for approximately 94 percent of the total estimated depletions in the basin (Figure 1).

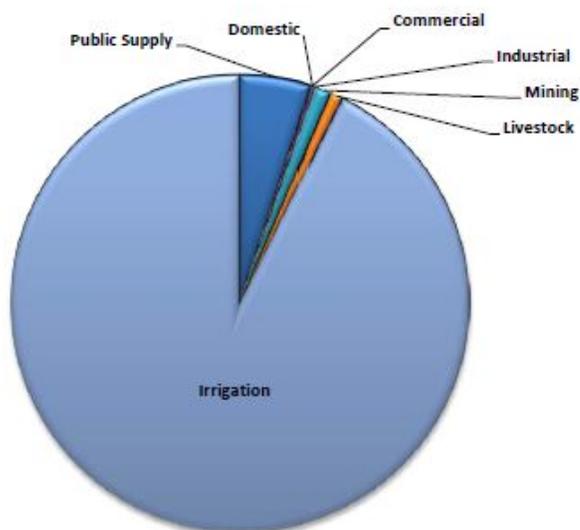


Figure 1. Depletions Categories for Water Diversions

Appendix D of the SEIS summarizes the development of the depletion files (data reported in *Missouri River Depletions Database* (Reclamation 2012) for all Missouri River reaches. Historic depletions represent the reductions in Missouri River inflows and flows that resulted from the use of water in the Missouri River basin over the 81-year period of analysis. Present level depletions are those that would have resulted in each year of the 81-year period of analysis with the present level of water use development in the basin. Net depletion values are needed for each river reach to allow the conversion of the historic inflow data to present level of development inflow data. This provides the Corps the capability to simulate each flow year in the period of analysis of 1930-2010 as if each year were under 2010 level of development.

Missouri River Depletions Database Process

Water Diversions:

- Irrigated Agriculture
- Public Surface Water Supply
- Industrial Water Users
- Storage in Reclamation Reservoirs



Develop:

- Historic Depletions
- Present level depletions
- Net Depletions (adjust flows)

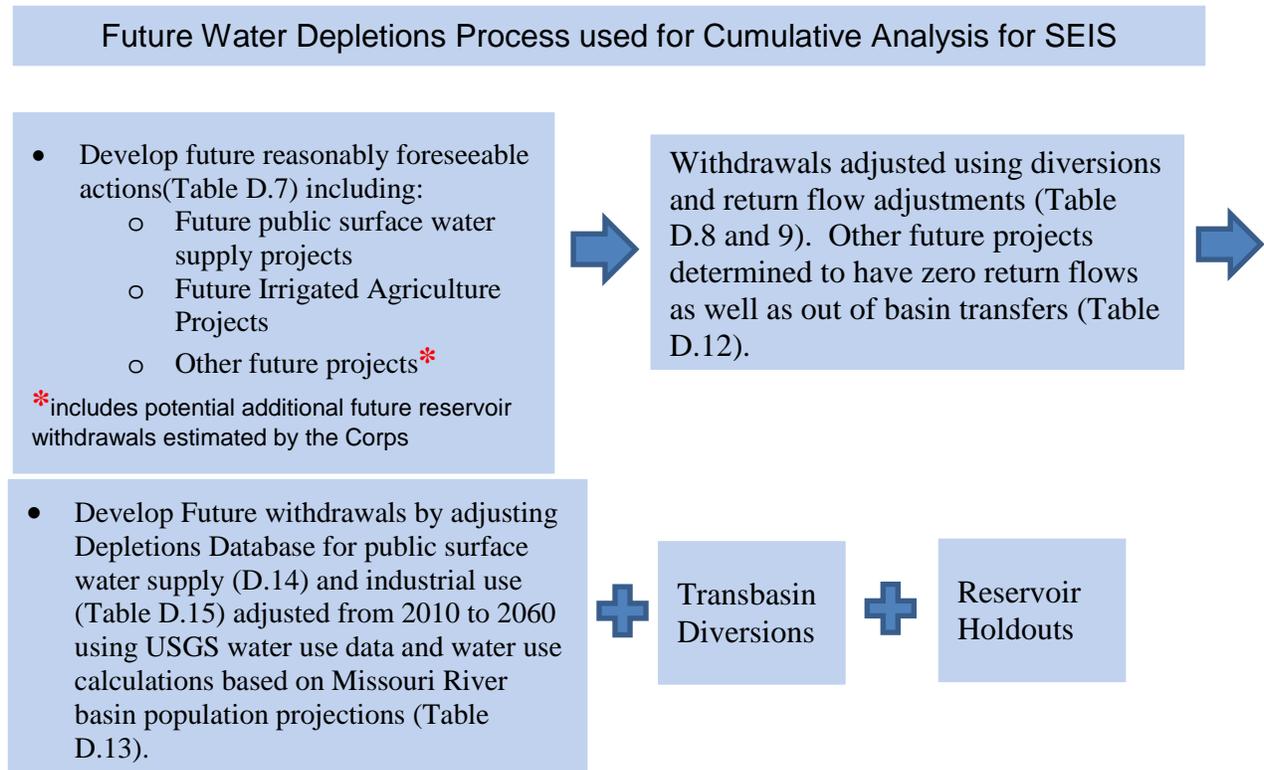
Future Water Project Depletions

Upon completing the Depletions Database, Reclamation's next step was to look at potential reasonably foreseeable future water project depletions for a cumulative impact analysis. To do so, Reclamation identified reasonably foreseeable future depletions by specific projects within the Missouri River basin that may occur between 2011 and 2060, which is the planning horizon for the Project. Projects meeting the following criteria developed by Reclamation (must meet all criteria) were identified as reasonably foreseeable actions for purposes of the SEIS's cumulative effects analysis of Missouri River resources:

- Water withdrawal identified could reasonably be implemented between now and 2060.
- Water withdrawal identified could contribute measurably to cumulative effects in the geographic area and on the Missouri River resources that would be affected by the SEIS alternatives.
- Water withdrawal identified has sufficient specifics about the amount of water proposed for withdrawal and other information available to define the activity and conduct a meaningful analysis.
- Water withdrawal has been identified in some type of planning document.

Reclamation created a future Missouri River water withdrawal spreadsheet and populated the spreadsheet with information on the identified reasonably foreseeable depletions within or from the Missouri River basin by projects that may be built between 2011 and 2060. The spreadsheet of reasonably foreseeable actions was completed in the fall of 2011 and provided by Dakotas Area Office staff to Reclamation's Regional Hydrology Group. The data were used with

Reclamation’s updated Missouri River Depletions Database to estimate future projections through the year 2060 as documented in Appendix D of the SEIS (Pages D-2-21). This process is illustrated in a diagram below.

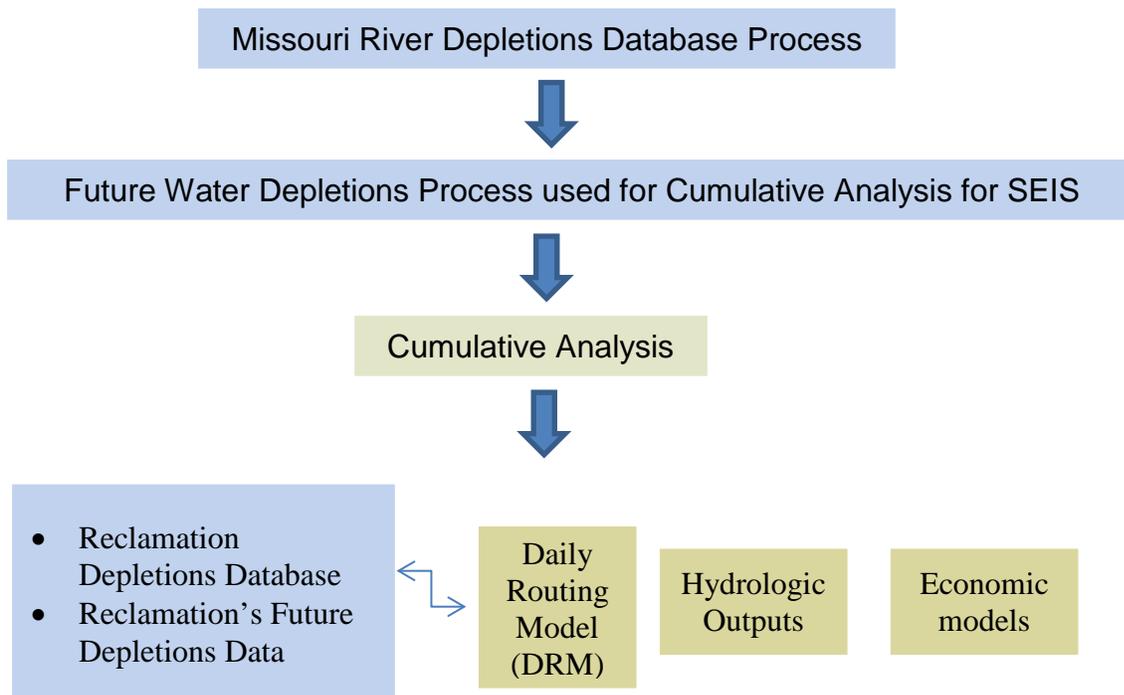


Future Depletion Data Use and Analysis of Missouri River Effects

The collective water depletion data developed in the above processes were then used by the Corps as input for hydrologic simulations. Reclamation initiated a study with the Corps to identify the impacts of the withdrawal of water from Lake Sakakawea for the Project. That study, the *Report on the Cumulative Impacts to the Missouri River for the Bureau of Reclamation Northwest Area Water Supply Project* (Corps 2013), assessed the effects of Project depletions on Missouri River uses and resources. The Corps evaluated the effects of 1) existing (present level) depletions, 2) continuing sedimentation in Missouri River System reservoirs, 3) anticipated future depletions from throughout the Missouri River basin, and 4) depletions associated with the Project. The Corps’ Missouri River hydrologic and economic models were used to quantify the impacts caused by changes in the volume of water stored in the Missouri River System.

The Corps used a two-step process for the cumulative impact analysis. Using historic, present level, and future depletions provided by Reclamation, Corps staff adjusted the historic inflow data for each year in the 81-year period of analysis of 1930-2010 so that each year’s inflows were based on the present level of development in the Missouri River basin. These adjusted historic flows were used to simulate 2010 conditions, or Existing Conditions, using the Corps’ Daily Routing Model (DRM) to provide the hydrologic, navigation service, and hydropower

output files. The output files were then used to compare the relative effects of the alternatives evaluated in the SEIS. As noted above, four other simulations were developed and used to evaluate the cumulative impact of the NAWS Project. In the analysis, the Corps found that NAWS Project depletions would have very small effects on reservoir levels and releases.. For example, DRM simulations indicate that NAWS Project withdrawals would lower the average elevation of Lake Sakakawea by 0.007 feet (less than 0.1 inch). As for the economic analysis, when the Corps’ hydrologic outputs were applied to economic models (including flood control, navigation, hydropower, water supply, recreation and energy revenues) the relative differences of the economic benefits of the action alternatives from those of No Action were all less than one percent.



Significance of Inconsistent Use of Reasonably Foreseeable Data

Reclamation intended to follow the criteria for reasonable foreseeable future depletions for all six Missouri River Surplus Water supply estimates in the cumulative impacts analysis. However, potential additional future withdrawals identified by the Corps were used for four of the mainstem reservoirs, and the potential additional future withdrawals for Lake Francis Case (2,543 acre feet/year) and for Lewis and Clark Lake (2,584 acre-feet/year) were not included. This was an unintentional oversight. After further review, Reclamation discovered that there were no planning documents identifying uses for “Surplus Water” and that potential changes in municipal and industrial water demands had already been accounted for in Reclamation’s analysis.

As part of Reclamation’s responsibility to review this inconsistent use of criteria for reasonably foreseeable actions, Reclamation reviewed the most recent information available for the six Surplus Water estimates and compared the information for each reservoir to the criteria established for identification of reasonably foreseeable actions (noted above in the Future Water Project Depletions section).

Early in the SEIS process, Reclamation determined that a project must meet criteria for reasonably foreseeable actions to be included in the SEIS cumulative impact analysis. Table 1 displays the additional future Surplus Water withdrawal estimates, and whether or not the estimates conform to the criteria.

Table 1. Determination of Reasonably Foreseeable Actions for Additional Future Surplus Water Withdrawal Estimates

Missouri River Reservoir	Corps of Engineers Estimated Potential Additional Future Withdrawals (acre-feet/year)	Volume of Potential Withdrawals with Associated Permit Applications or a planning document (acre-feet/year)	Volume of Potential Withdrawals used in SEIS Analysis (acre-feet/year)	Conformance with Criteria for Reasonably Foreseeable Future Actions
Fort Peck Reservoir	630	1	630	No
Garrison Reservoir (Lake Sakakawea)	27,000	27,000	27,000	Yes
Lake Oahe	5,211	0	5,211	No
Lake Sharpe	5,661	0	5,661	No
Lake Francis Case	2,543	0	0	No
Lewis and Clark Lake	2,584	0	0	No

Estimates of potential additional future withdrawals based on the Corps’ surplus water reports for Fort Peck Reservoir, Oahe Reservoir, Lake Sharpe, Lake Francis Case and Lewis and Clark Lake do not include sufficient specifics about the amount of water proposed for withdrawal or other information to conduct a meaningful analysis. For each of these reservoirs, the Corps’ estimate was based on the existing average withdrawals, plus 10 percent to account for uncertainties in future municipal and industrial water demand. Reclamation had already accounted for anticipated changes in municipal and industrial water demands throughout the Missouri River basin by adjusting these water demands based on U.S. Census Bureau population projections, and included these demands in the cumulative effects analysis. Except for 1.05 acre-feet per year from Fort Peck, an inconsequential amount, no requests or plans have been made for surplus water from these reservoirs. Thus, the assumed 10 percent increase in withdrawals

used by the Corps is likely high, should not have been identified as reasonably foreseeable, and should not have been included in the estimated future depletions used in the cumulative impacts analysis.

Potential additional future withdrawals from Fort Peck Reservoir, Oahe Reservoir, Lake Sharpe, Lewis and Clark Lake, and Lake Francis Case used by the Corps in their analysis do not meet Reclamation's criteria for reasonably foreseeable future actions. However, Fort Peck Reservoir, Oahe Reservoir, and Lake Sharpe Surplus Water estimates were included in the SEIS analysis. The estimated additional future water withdrawals from these three reservoirs total 11,502 acre feet/year. Thus, the SEIS depletion analysis included a higher volume of withdrawals than it should have in light of established criteria for reasonably foreseeable actions. As previously stated, Lewis and Clark Lake and Lake Francis Case were the two potential future Surplus Water withdrawal estimates that Reclamation overlooked in the SEIS cumulative impacts analysis. Subsequent review of information in the Corps' Surplus Water reports indicated that these potential withdrawals do not meet the criteria for a reasonably foreseeable future action, and thus should not have been included.

The Corps has also determined that the potential temporary use of Missouri River Reservoir Surplus Water would not cause significant adverse effects to existing authorized purposes. These findings are documented in *Garrison Dam & Lake Sakakawea Surplus Water Report and Environmental Assessment/FONSI (Finding of No Significant Impact) (March 2011, amended July 2012)* and in Draft Surplus Water Reports and Environmental Assessments for Fort Peck Dam and Lake, Oahe Dam and Lake, Big Bend Dam and Lake Sharpe, Fort Randall Dam and Lake Francis Case, and Gavins Point Dam and Lewis and Clark Lake. Copies of these reports can be found at

<http://www.nwo.usace.army.mil/Missions/CivilWorks/Planning/PlanningProjects.aspx>

These Corps' reports were published after Reclamation's determination of what were considered reasonably foreseeable actions. Information regarding identified water withdrawal requests that was available to Reclamation at the time of the cumulative impact analysis was limited to requests on Garrison Reservoir for oil and gas development.

Conclusion

The cumulative effects analysis used in the SEIS was found to be overly conservative, double-counting some potential future withdrawals, and including volumes of Surplus Water that did not meet the criteria of a reasonably foreseeable future action. However, this inconsistency and inclusion of withdrawals that should have been excluded resulted in a cumulative effects analysis that overestimated potential future depletions. Reclamation has determined that its inclusion of additional potential withdrawals in the cumulative effects analysis does not result in a significant change in the cumulative effects disclosed in the SEIS and does not affect the agency's decision as documented in the August 2015 Record of Decision. This report is available to all parties interested in the Project and supports the NEPA process undertaken to evaluate the Federal action. A copy of this report is posted on the Project website: www.usbr.gov/gp/dkao.