

# RECLAMATION

*Managing Water in the West*

## **High Lakes Stabilization Clements Lake Brown Duck Basin Technical Memorandum Uinta Basin Replacement Project**



U.S. Department of the Interior  
Bureau of Reclamation  
Provo Area Office  
Provo, Utah

June 2007

# High Lakes Stabilization Clements Lake Brown Duck Basin Technical Memorandum

Uinta Basin Replacement Project

*prepared by*

**Provo Area Office  
Upper Colorado Region**



U.S. Department of the Interior  
Bureau of Reclamation  
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Provo, Utah

June 2007

## Concurrence

The undersigned concur with the recommendations identified in this Technical Memorandum.  
This Technical Memorandum will serve as a Decision Memorandum.

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Jerry Olds, P.E. Date  
Utah State Engineer

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Reed R. Murray Date  
Department of the Interior  
CUPCA Office

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Jack Troyer Date  
Regional Forester  
U.S. Forest Service

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Michael C. Weland Date  
Executive Director  
Utah Reclamation Mitigation and Conservation Commission



**U.S. Department of the Interior  
Bureau of Reclamation  
Provo Area Office  
Provo, Utah**

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## Introduction

The Uinta Basin Replacement Project (UBRP Project) was authorized by Section 203 of the Central Utah Project Completion Act [CUPCA: Titles II through VI of P.L. 102-575, as amended]. The UBRP Project is located in Duchesne County near the towns of Altamont, Upalco, and Roosevelt, within the Uinta Basin of northeastern Utah. Its purposes are to increase efficiency, enhance beneficial uses, and achieve greater water conservation within the Uinta Basin. The Central Utah Water Conservancy District (District) is implementing the water development portions of the UBRP Project, and the Utah Reclamation Mitigation and Conservation Commission (Commission) is responsible for mitigating project impacts to fish, wildlife and wetland habitats. Funding for mitigation measures is provided under Title II of CUPCA through the U.S. Department of the Interior. The Final Environmental Assessment for the UBRP Project was prepared by the District and was signed by the Department of the Interior in October 2001. Project construction began in 2003. The Commission issued a Decision Notice and Finding of No Significant Impact in February 2004 for implementing fish and wildlife mitigation features of the UBRP Project.

A component of the UBRP Project is that thirteen high mountain lakes formerly used to store water rights would be stabilized at No-Hazard levels, and the water rights transferred downstream for storage in the enlarged Big Sand Wash Reservoir, another feature of the UBRP Project. The stabilization of the thirteen reservoirs is mitigation for the enlargement of Big Sand Wash Reservoir. Because of the breach potential of the High Lakes Dams, and the difficulty in monitoring and maintaining these dams in the Wilderness area, the Mitigation Commission is undertaking the stabilization of the thirteen dam structures. Storage of the water rights will be downstream in the expanded Big Sand Wash dam where maintenance and monitoring is practical. These wilderness dams vary in size, hazard rating and condition and have peak breach flow potential ranging from hundreds to several thousand cubic feet per second (cfs). Breach flows of this magnitude far exceed the carrying capacity of existing streams and they would cause extensive damage to the downstream forest resource, campgrounds, trails, roads, dams and in some cases, private property and residents. The “Do Nothing” option was not considered appropriate because of the eventuality of the deterioration and catastrophic failure of these dams.

There are no absolute criteria for defining a No-Hazard dam. The Utah State Engineer is authorized to make that determination. Section R655-10-5 of The State of Utah Statutes and Administrative Rules for Dam Safety dated July 1996 states “The State Engineer is the ultimate authority on the hazard classification designation for a given dam”. However, the Forest Service also has dam safety responsibilities and the two agencies have outlined a number of protocols regarding dam safety matters in a memorandum of understanding between the two agencies (attached as Appendix A).

Therefore, all decisions and recommendations regarding these structures are mutually agreed on by both parties.

Essentially, the No-Hazard rating is achieved by demonstrating that in the event of failure, there is no appreciable damage or adverse affects downstream of the dam. For the more significant structures, this demonstration is accomplished through a dam break analysis. Various stabilized reservoir elevations are assumed and the resulting flood from a sunny day break is compared to the existing downstream channel capacity. When the reservoir elevation results in a flood that can be contained within the downstream channel, the dam can be considered to be No-Hazard.

The thirteen reservoirs are located in the High Uintas Wilderness Area. The U.S. Forest Service, Moon Lake Water Users Association, U.S. Bureau of Reclamation and Duchesne County Water Conservancy District all have knowledge and experience with operation, maintenance and stabilization of the high mountain lakes. The Commission entered into Interagency Agreement No. 05-AA-UT-1300 with Reclamation to provide engineering, design, construction, and oversight services for the stabilization project. This technical memorandum is a work product under the Interagency Agreement and addresses design criteria needed to achieve “No Hazard” ratings as defined by the State of Utah and as agreed to by the Forest Service, for the four lakes in Brown Duck Basin.

Typically, the stabilization of these dams will require the excavation of an outlet channel notch, with stable side slopes, through the middle of the embankment and the removal of the low level outlet. An armored, stabilized low level channel would then be constructed in the notch to pass normal runoff as well as large storm events without jeopardizing the remaining structure by impounding excess water. In some cases the embankment may be removed or rolled over on itself to decrease the height and increase the stability and ability of the remaining embankment to withstand any seismic event or overtopping during extreme events. This work is the minimum necessary to stabilize these dam structures and restore natural hydrologic flows to the greatest extent possible, while still meeting a "No Hazard" dam safety rating.

Stabilization of the thirteen high mountain lakes at No-Hazard levels will provide constant lake water levels year-round. Nine of these lakes (Bluebell, Drift, Five Point, Superior, Water Lily, Farmers, East Timothy, White Miller, and Deer) are located in the Upper Yellowstone River watershed and four (Brown Duck, Island, Kidney and Clements) are in the Brown Duck Basin of upper Lake Fork watershed. Consequently, streamflows originating in these upper watersheds will return to natural hydrologic runoff patterns, wilderness fishery and recreational values will be restored within the High Uintas, and operation and maintenance impacts will be eliminated in the wilderness area.

Clements Lake is one of four lakes in the Brown Duck Basin to be stabilized. The other lakes are Kidney Lake, Island Lake and Brown Duck Lake. The stated objective for these lakes is to create conditions such that any dam, if remaining, is assigned a “No

