Climate change and wetlands on the Colorado Plateau: Rebuilding ephemeral wetlands to withstand a drier future

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Introduction

Natural wetlands impacted by the construction of deep ponds and ditches can be rebuilt to better withstand the effects of climate change. Repaired wetlands can increase the quantity and quality of water available to wildlife. Duck Lake is a 55-acre ephemeral wetland on the Williams Ranger District of the Kaibab National Forest KNF). In 1989 ditches were blasted into the wetland to improve waterfowl habitat. Unfortunately, the hydro-period of the wetland was negatively affected because the soil in the newly created ditches was not compacted after blasting. Duck Lake was repaired in November 2014.

Figure 1. Duck Lake in 2014 before reconstruction

Methods

Actions taken to repair Duck Lake:

•Topsoil was removed and set aside

•Ditches were excavated and reshaped with slopes of 10% or less

•Clay removed from ditches was sorted to achieve optimal moisture for good compaction

•Clay was returned to excavated basins in 6 in. layers and compacted to achieve 2 ft. of compaction

•Topsoil was spread into and around basins to help quickly re-establish vegetation

•Logs obtained from just outside the wetland were placed into basins for perching sites

Equipment used:

•John Deere 700J Dozer used to excavate and shape ditches and spread clay for compaction

•Komatsu WA320 4 cu. yd. rubber tire loader used to move soils to where needed and compacting clay

•John Deere 310J rubber tire backhoe used to remove wet soils from the bottom of ditches, dig sumps for pumping water from ditches, and compacting clay

•Mark 3 water pump used to pump water from ditches

•Laserplane leveling laser with tripod used to measure depth of basins and depth of compacted clay

Results

The existing ditches were shaped into shallow (0.5 to 4-feet deep), natural appearing wetland basins. This action also generated clay needed to backfill the ditches for compaction. One additional large wetland basin was created and twelve waterfowl nesting islands were shaped from soil left over from digging the wetland basins.

Figure 2. Duck Lake 2013 before reconstruction

Figure 3. Duck Lake April 2015 after reconstruction

Figure 4. Reshaping ditches to obtain depth and slope

Figure 5. Compacting clay layers in wetland basin

Figure 6. Spreading topsoil into compacted wetland basin

Figure 7. Large pool in Duck Lake August 2015

Conclusions

Natural wetlands impacted by the construction of ponds and ditches can be repaired. Restoration will increase the quality and quantity of aquatic wildlife habitat. The techniques used at Duck Lake (Biebighauser 2011) can be applied to numerous other wetlands modified by humans across the Colorado Plateau.

Pending environmental clearance (NEPA), the Kaibab National Forest plans to continue restoring wetlands across the Williams Ranger District.

Literature Cited

Biebighauser, Thomas R. 2011. Wetland Restoration and Construction, A Technical Guide

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