Figure 4 – Articulated Concrete Blocks

Figure 5 – Example of ACB mat in place

Figure 6 – ACB with native plants

Remove the Dam

Removing the dam would involve several steps, as follows: installation of erosion control measures, draining approximately 36 acre feet of water from the lake in a controlled release, topsoil salvage, excavating the material that was used to construct the dam and hauling it away, removing the head gate and other infrastructure associated with the operation of the dam, placement of topsoil in the disturbed area, replanting native vegetation where the dam was removed and on approximately 3 acres of exposed shoreline, and reconstructing the trail where it formerly crossed the dam. The resulting lake would be about 14 acres in surface area and would contain about 39 acre feet of water (please see Figure 7).

Figure 7 – Lily Lake shoreline with and without the dam

RMNP has identified several possible consequences of removing the dam. These include:

- The flood hazard associated with the Lily Lake impoundment would be eliminated
- The one-time cost of removing the dam and restoring the area to natural conditions is estimated to be $150,000.
- Until native vegetation is reestablished, the annual cost of controlling exotic plants is estimated at $1,200.
- The annual operation and maintenance costs associated with the dam would end, saving about $30,000 per year.
- The non-breeding and experimental population of greenback cutthroat trout in the lake may not be sustainable if the water level in the lake is lowered by 4 feet, even if the lake is oxygenated during the winter months.
- The wetlands south of Lily Lake, which in part may have been created by the construction of the dam, may be affected if the water table is lowered. This would also affect plant and animal species associated with the wetland. However, the wetland may be expanded to portions of the newly exposed shoreline.
- The accessible trail would no longer be adjacent to the south and east shores of the lake. In that location the average distance between the trail and the lake would increase by 45 feet. Some sections of the trail may need to be relocated, and there would be additional costs associated with moving the trail.
- The National Park Service would be giving up a water storage right, which has economic value

National Park Service
U.S. Department of the Interior

Rocky Mountain National Park
Colorado

LILY LAKE DAM PROJECT

Dear Reader:

The Lily Lake Dam, located in Rocky Mountain National Park (RMNP), has been rated a high-hazard dam by the U.S. Bureau of Reclamation. The National Park Service is considering two options to reduce the hazard – either repair or remove the dam. Maintaining the status quo is not an option. This brochure includes more information on Lily Lake and the dam, and we are seeking your input on the two alternatives. You can use the following questions as a guide for submitting your comments:

1. Which alternative do you favor? Repair the dam or remove it?
2. Why did you choose the alternative that you favor?
3. What are the reasons why you did not choose the other alternative?
4. Do you have any concerns about the alternative you favor? In other words, what should RMNP be mindful of during implementation?
5. Have we overlooked something important that we should be aware of?
6. Are there any other ideas or observations you would like to share about this project?

Your comments should be received in writing by close of business on February 29, 2012

If you have Internet access, the preferred method for submitting comments is to use the National Park Service Planning, Environment and Public Comment (PEPC) website: http://parkplanning.nps.gov/romo. From this site, select the Lily Lake Dam Project. Your comments can be submitted online.

You can also submit your comments to us in the following ways:

- By email: romo_superintendent@nps.gov
- By Mail: Superintendent, Rocky Mountain National Park, Estes Park, Colorado 80517
- By Fax: (970) 586 -1397
- By Express Delivery: Superintendent, Rocky Mountain National Park, 1000 Highway 36, Estes Park, Colorado 80517
- Hand Delivery: Rocky Mountain National Park Headquarters, 1000 Highway 36, Estes Park, Colorado or to Kawuneeche Visitor Center, Rocky Mountain National Park, 16018 Highway 34, Grand Lake, Colorado

Purpose and Need for the Project

The Lily Lake Dam in Rocky Mountain National Park is situated at the headwaters of Fish Creek, which flows into Lake Estes in Estes Park (see Figure 1 on the following page). Fish Creek is about 5 miles in length and the elevation difference between Lily Lake and Lake Estes is about 1,500 feet. The Lily Lake Dam is rated as a high hazard dam by the U.S. Bureau of Reclamation. If the dam were to fail, the ensuing floodwaters could result in the loss of life and property along Fish Creek. Repairs are needed to the dam to reduce the hazard, or the dam could be removed and the area restored to natural conditions.

Background

Lily Lake was once a natural lake. Isabella Bird, who climbed Longs Peak in 1873, described the lake in her book, "A Lady's Life in the Rocky Mountains." The photograph of Lily Lake shown in Figure 2 on the following page was taken by famed photographer William Henry Jackson in 1873. It is estimated that the natural lake covered about 14 acres and contained about 39 acre feet of water. The land where Lily Lake is located was homesteaded in the early 1900s. In 1913 the State Engineer's Office approved plans for a dam at Lily Lake, and a storage right was decreed for 75 acre feet of water. The dam was constructed in 1915 and the water level was raised by 4 feet. When the impoundment is full, Lily Lake covers about 17 acres. The highest point of the dam above the natural terrain is about 10 feet. It is very likely that the dam raised the water table in the vicinity of the lake, and a 1.8-acre wetland now exists south of the lake. There is also about 5.7 acres of riparian vegetation associated with the south side of the lake.

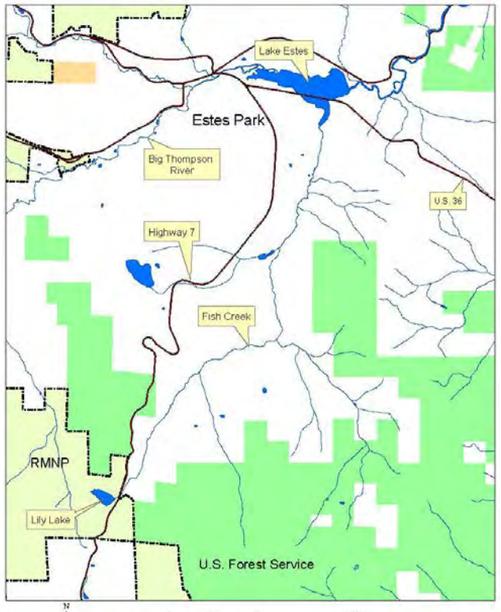

Figure 1 – Vicinity map

William Henry Jackson photograph

Figure 2 – Lily Lake in 1873

The Conservation Fund acquired the land on which Lily Lake is located in 1989 to halt the proposed development of 561 dwelling units on the property. The land was added to Rocky Mountain National Park in 1991, and eventually the park, with assistance from numerous partners, acquired the water and recreation rights associated with Lily Lake. Since being added to RMNP in 1991, the Lily Lake area has become very popular with visitors.

In 1997, a ¾ mile-long accessible trail was completed around Lily Lake, with funding provided by the Rocky Mountain Nature Association. An accessible fishing pier was completed in 1996. The Lily Ridge Trail was developed on the lower slopes of Lily Mountain in 1997. Five additional trails tie into the Lily Lake area. These are the Homer Rouse Trail, completed in 1998, the Storm Pass Trail, completed in 1999, the Aspen Brook Trail, the Tahosa Valley Trail, and the Twin Sisters Trail.

In 1990, an experimental population of greenback cutthroat trout was placed in Lily Lake. Greenback cutthroat trout are federally listed as a threatened species, and RMNP is participating in recovery efforts. The greenback population in Lily Lake is not reproducing and therefore is not self-sustaining. The population is augmented annually by stocking. An oxygenation system is placed in the lake each fall and operates throughout the winter. Without the oxygenation system, it is unlikely that the greenback cutthroat trout would overwinter in the shallow lake.

In 2009, RMNP developed a plan for the Lily Lake area as part of the Highway 7 Recreation Improvements Plan and Environmental Assessment. It is anticipated that the plan for the Lily Lake area will be officially approved this year. The plan includes several improvements in the vicinity of Lily Lake (please see Figure 3). The most significant improvements are the development of a new trailhead and parking area south of the lake, an access road to serve the new trailhead, and a new trail to connect the Lily Lake area to the Lily Mountain Trail. Funding has not been secured for these improvements, and it may be several years before they are completed.

Figure 3 – Plan for the Lily Lake area

Lily Lake Dam Alternatives

Repair the Dam

Repairing the dam would involve several steps, as follows: installation of erosion control measures, removal of vegetation from the downstream face of the dam, topsoil salvage, subgrade preparation, geotechnical fabric placement, articulated concrete blocks (ACB) installation on the face of the dam, backfill of the ACB with topsoil and planting with native grasses. The concrete blocks are linked together with stainless steel cable to form an "articulated" mat (see Figures 4 – 6 on the following page). The outlet structure that passes through the dam may also require repairs. The repairs are expected to take four months, and would start in the fall of 2012 or in 2013.

During the repairs, the accessible trail that crosses the dam may be closed for a period of time, and some or all of the parking area at Lily Lake would be closed and used for a construction staging area. The water level in Lily Lake would remain unchanged during the repairs. Following the repairs, Lily Lake would continue to hold about 75 acre feet of water and have a surface area of about 17acres.

RMNP has identified several possible consequences of repairing the dam:

- The flood hazard associated with the Lily Lake impoundment would be significantly reduced
- The cost of repairing the dam is estimated at $1.4 million. There would be costs associated with continued operation and maintenance of the dam, including annual inspections. The estimated annual cost is $30,000, which is likely to increase as time goes on. There will be additional expenses in the future as repairs to the dam are needed.
- No significant environmental consequences have been identified for this alternative.