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Client:

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Management Recommendations for Piute Ponds Edwards Air Force Base, California

ON THE WEB AT [HTTP://WWW.BREN.UCSB.EDU](http://www.bren.ucsb.edu)

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Introduction

Piute Ponds is the largest freshwater marsh in Los Angeles County (Figure 1) and an important stop for migratory birds on the Pacific Flyway. It is designated as an Important Bird Area by the Audubon Society and identified as a Significant Ecological Area by the County of Los Angeles (Cooper, 2004). The ponds are located on Edwards Air Force Base in the Antelope Valley about 100 miles northeast of Los Angeles (Figure 2). Piute Ponds is supplied with effluent water from the Lancaster Water Reclamation Plant (LWRP) treatment facility, operated by the Los Angeles County Sanitation District 14 (District 14). The LWRP is being upgraded and expanded to meet future growth in the Antelope Valley and will eliminate unauthorized effluent-induced overflows from Piute Ponds to Rosamond Dry Lake (LACSD, 2004).



Figure 1. View of Piute Ponds

Problem

Edwards Air Force Base (EAFB) is interested in improving the wildlife habitat and unique educational and recreational opportunities provided by Piute Ponds. Currently, the ponds are passively managed and a comprehensive plan for the area does not exist. Stakeholder input has not been widely sought and no formal assessment of the ecological health of the ponds exists.

Purpose

The purpose of this project was to evaluate the current status of Piute Ponds and develop management recommendations for the future. The project evaluated possible future scenarios and developed recommendations which take into account client and stakeholder interests and concerns.

Background

Piute Ponds are a series of interconnected impoundments constructed in 1961 to evaporate effluent from the LWRP (Tybrin, 2006). The ponds currently receive more than 2400 million gallons of treated wastewater from the LWRP each year. Additional water flows intermittently to Piute Ponds from Amargosa and other creeks in the area (EAFB, 2008b). Existing infrastructure includes culverts, spillways, and unpaved roads that allow perimeter access to the area.

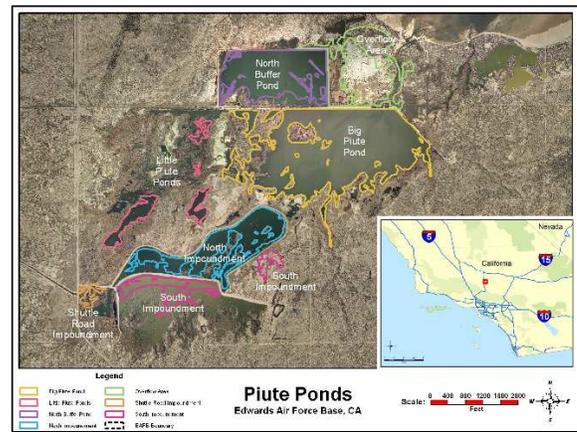


Figure 2. Piute Ponds

Effluent from the LWRP enters at the southwest corner of the ponds and flows northeast, eventually overflowing on to Rosamond Dry Lake located immediately northeast of the Ponds. Piute Ponds are located in the Antelope Valley a closed basin with no outlets to the ocean. Without a connection to navigable waters, Piute Ponds are not considered a wetland under the Clean Water Act (CWA) and are not subject to CWA regulations (LACSD, 2004).

Piute Ponds supports over 200 species of birds (LACSD, 2004) and single-day populations of greater than 5,000 waterfowl and 10,000 total birds have been recorded (Figure 3). In addition to its ecological value, Piute Ponds is recognized for its recreational and educational uses. The largest recreational activity at Piute Ponds is bird watching. Hunting for waterfowl takes place on a limited basis from fall through winter. Access to the area is controlled by Edwards AFB Environmental Management.



Figure 3. Black-Necked Stilts at Piute

Piute Ponds receives the majority of its water from the LWRP. The LWRP currently discharges approximately 15 million gallons per day (MGD) of treated effluent for agriculture, landscaping, and Piute Ponds. During the late fall, winter, and early spring, agricultural and landscaping demands for reclaimed water decrease to almost zero and the majority of the effluent from the plant is diverted to the ponds. Evaporation rates during this timeframe are low and the high effluent discharge from the treatment plant exceeds the capacity of the ponds which then overflow to Rosamond Dry Lake. These overflows taper off and cease in April. The Air Force uses Rosamond Dry Lake for flight test missions and as an emergency landing strip and overflows from Piute Ponds reduce the availability of the lakebed. Overflows reduce pollutants and increase dissolved oxygen (DO) levels in the ponds, and reductions in flushing flows may negatively impact the overall health of Piute Ponds.

Methodology

Recommendations for a management plan for Piute Ponds were developed using the following approach: the current pond status was assessed, a vision for the plan was developed, other wetland management areas were reviewed, and stakeholders

were identified and polled. Future scenarios were evaluated to assist the planning process, and management recommendations were developed.

The project was broken down into four sections: water quality and quantity, ecology, recreation, and education. For each section data was gathered to assess current status. The data was then analyzed and extrapolated to develop the future scenarios and management recommendations. Water quality and quantity data, including flow data, water discharge requirements, and monitoring and testing data, were provided by District 14. A California Rapid Assessment Method (CRAM) was conducted in October 2008 to assess the ecological health of the ponds. The CRAM was selected because it is well established, scientifically validated, and requires relatively few resources to perform (Collins et al., 2007). Education and recreation data including the number of tours and number of hunter and visitor permits issued were gathered from Edwards Air Force Base.

The project developed scenarios to serve as a guide for future planning efforts at Piute Ponds (Figure 4). The two primary drivers in developing the scenarios were water supply and management resources. Water supply requirements were based on the total annual volume of water required to maintain 400 acres at current ecological health levels. Water volumes were calculated based on an increase and decrease in pond area of 25%. Resources were also adjusted by 25% from current levels to evaluate higher and lower resource availability. Scenarios which had high risk of unauthorized overflows to Rosamond Dry Lake were screened out. All other scenarios were assessed for likely overall effects on water quality, ecological health, education and recreation.

| Scenario | Water Supply | Management Resources |
|--------------------|----------------|----------------------|
| 1 | Lower | Lower |
| 2 | Lower | Current Levels |
| 3 | Lower | Higher |
| 4 | Current Levels | Lower |
| 5 (Current Status) | Current Levels | Current Levels |
| 6 | Current Levels | Higher |
| 7 | Higher | Lower |
| 8 | Higher | Current Levels |
| 9 | Higher | Higher |

Figure 4. Scenarios

Water Quality

The current LWRP effluent meets regulatory water discharge requirements with occasional exceedances of ammonium limits. When the LWRP upgrades are completed, the tertiary effluent is predicted to meet all water quality objectives. Due to reduced flows during the summer and fall, total dissolved solids (TDS) reach their highest levels while dissolved oxygen (DO) levels decline (Figure 5). Reduced overflows increase TDS levels and reduce DO, worsening the overall water quality of the ponds.

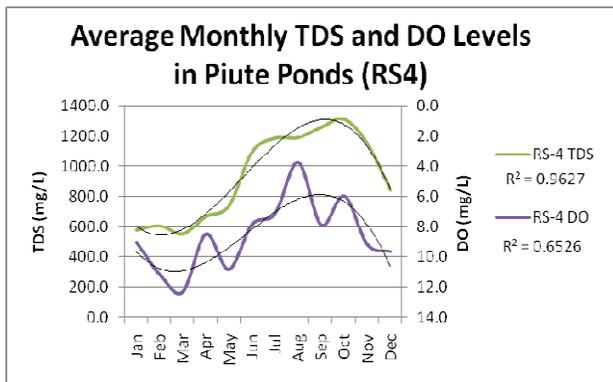


Figure 5. TDS and DO levels

Ecology

The ponds provide habitat for more than 200 species of birds. There are no federally endangered species at the site and the pond areas are poor habitat for the desert tortoise and the Mohave ground squirrel. Some sensitive bird species do utilize the ponds, but are only transients. The CRAM survey evaluated the ponds on four criteria: buffer and landscape context, hydrological processes, physical structure, and biotic structure (Figure 6).

The results of the CRAM survey showed that:
 The buffer and landscape context is generally good
 Hydrological processes are necessarily artificial
 Physical structure lacks complexity
 Biotic structure is poor; lacking trees and large bushes

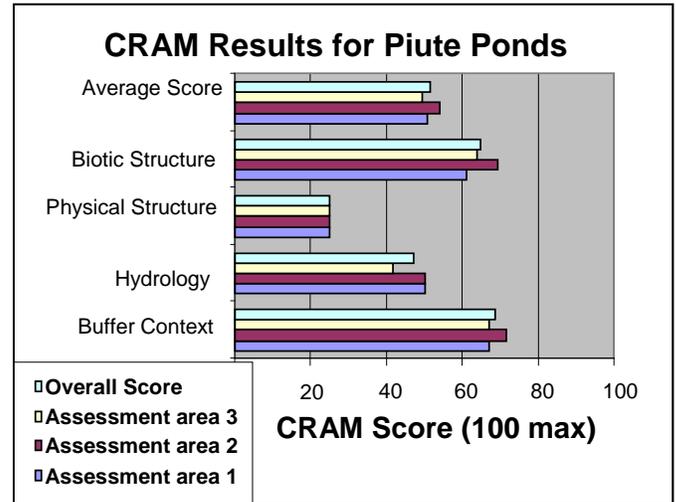


Figure 6. CRAM results (EAFB 2008a)

Recreation and Education

Currently the ponds host bird watching and duck hunting as recreational activities. On average 90 access letters are granted each year primarily to birdwatchers. Approximately 100 hunting permits are also issued each year. For education, EAFB personnel conduct school tours in partnership with the Mojave Environmental Education Consortium. Current infrastructure includes nine educational signs (Figure 7); two portable restrooms; and one covered pavilion. There are no seating areas of any type at Piute Ponds.



Figure 7. School kids visiting Piute Ponds



Poll Results

At our recommendation, a stakeholder survey was conducted by Edwards AFB which presented a list of activities at Piute Ponds and asked people to list the activities' importance on a scale from 1 to 5. The possibilities included turning Piute Ponds into a nature preserve, increasing recreational and educational activities, expanding hunting, using the ponds as a resource for research, or keeping it exactly as it is today with minimal management. Surprisingly, most of the respondents preferred to see Piute Ponds kept at its current state or turned into a nature preserve (Figure 8). Many bird watchers prefer the ponds to be managed with continued limited access. However many educators stated they enjoy taking their students to the ponds and think it is an invaluable resource. Numerous respondents expressed gratitude to the Air Force for maintaining Piute Ponds.

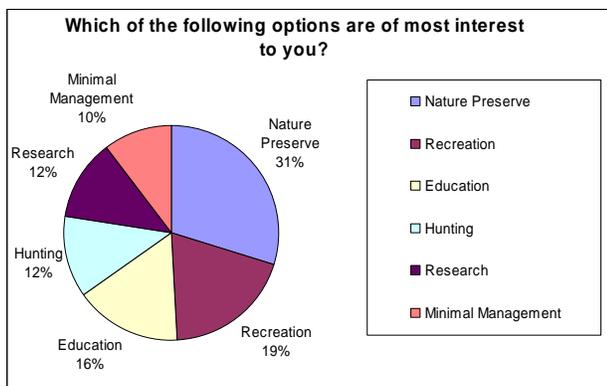


Figure 8. Poll Results

Conclusions and Recommendations

The primary focus of the management of Piute Ponds should be on ecological health, as indicated by the poll results. The preferred future scenario is Scenario 6, which has the current area managed with increased resources but with the same quantity of water. One of the most important recommendations is to formalize the amount of water supplied by District 14 through a memorandum of understanding or other mechanism. Currently, District 14's environmental impact report states that they will supply enough water to maintain 400 acres at the current status. A definition of the quantity of water needed to maintain 400 acres and a definition of the current ecological status should be negotiated and agreed upon.

Other recommendations include:

- Implement a more comprehensive ecological and water quality monitoring program
- Install flow gauges and repair/improve water control structures
- Create a vibrant and successful volunteer program
- Remove invasive species, plant native trees, and build bird boxes and perches
- Create a website to provide access and educational information to the general public
- Increase and diversify the number of school tours
- Increase the number of signs, build picnic areas, and install viewing structures for bird watchers
- Use adaptive management

In conclusion, there are multiple relatively inexpensive options which could improve the water quality, ecology, recreation and education values of Piute Ponds. The various scenarios will provide options in the face of future uncertainties. We hope that these recommendations will help Edwards AFB in the future management of this valuable resource.

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