

Mitchell Lake Master Implementation Plan

April 2000

The following stakeholder leaders provided the energy and expertise to create this plan:

Acknowledgments

San Antonio Water System.....Owner

Board of Trustees:

- Juan J. Patlan, Chairman
- Christina L. Garcia-Sanchez, Vice Chairman
- J.J. Amaro, Secretary
- Nancy S. Bohman, Trustee
- Norman T. Dugas, Jr., Trustee
- Mary Q. Kelly, Trustee
- Howard Peak, Mayor

Executive Staff:

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- Leonard D. Young – Chief Operating Officer
- Ralph E. Huber – Chief Financial Officer
- Rebecca Q. Cedillo – Chief of Water Resources
- Gustavo Gonzalez - Vice President of Operations
- Ronald O. Graf – Vice President of Engineering
- Bob Reeves – Vice President of Treatment

Operations Staff:

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- Jane Barclay – Finance and Administration Group
- Paul Bousquet – President/CEO Group
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- Steve Clouse – Treatment Group
- Meg Conner – Treatment Group
- Tim Darilek – President/CEO Group
- Ed Griffin – Water Resources Group
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- Mike Mecke – Water Resources Group
- Kerry McCollough – Finance and Administration Group
- Sherry Mueller – Finance and Administration Group
- Dana Nichols – Water Resources Group
- Patrick Shriver – Water Resources Group
- Linda Stewart – Treatment Group
- Greg Wukasch - Water Resources Group
- Darren Thompson – Technology Support
- Greg Flowers – Technology Support

Mitchell Lake Task Force.....Prime Stakeholders

- Carole Abitz – Open Space Committee

Bill Atkins – Southwest Independent School District
Carlos Benavides – County Commissioner Robert Tejeda
Dale Bransford – Parks and Recreation Dept. – City of San Antonio
Marcia Cochran – Los Vecinos de las Misiones
Dee Emory – Master Gardeners
Leandro Esparza – Palo Alto College
Leo Galindo – San Antonio Police Academy
Frances Gonzales – Neighborhood Action Dept.- City of San Antonio
Mike Gonzalez – San Antonio River Authority
Celena Gutierrez – State Senator Frank Madla
Sarita Hall – San Antonio Convention and Visitors Bureau
Jack Jordan – Harlandale Independent School District
Marge Lumpe – Mitchell Lake Wetlands Society
Sonny Mayfield – Resident
Toni Moorhouse – State Representative Robert Puente
Rene Mosqueda – Texas A&M Agricultural Extension Service
Lynette Nelson – South San Antonio Chamber of Commerce
Thea Platz – Master Naturalists and Northeast Independent School District
Leo Rahmgren – Council Member Debra Guerrero
Sergio Rodriguez – Congressman Ciro Rodriguez
Ernest Roney – San Antonio Audubon Society
Rufus Stephens – Texas Parks and Wildlife
Steve Tillotson – American Institute of Architects
Yolanda Uresti – State Representative Carlos Uresti
Shelley Whitworth – Alamo Area Council of Governments.

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 Linda Ximenes – Principal
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J.M. Waller & Associates, Economic Planning
 Joe LaFoy – Senior Program Manager
 Rick Belan – Economic Analyst
Vickery & Associates, Cost Estimating
 Frank Berg – Preliminary Engineering, Estimating
Texas A&M University, Archeology
 Dr. Alston Thoms – Archeology

Many other stakeholders from the business, environmental, educational, Southside, and governmental communities contributed their time and energy to create the recommendations in this plan. The community involvement throughout the planning process is its foundation and will guide the plan to reality.

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1. Introduction

The purpose of the Mitchell Lake Master Implementation Plan is to implement the goals established by the SAWS Board of Trustees through the creation of a world-class wildlife refuge and a significant environmental experience for all ratepayers.

A. History

Mitchell Lake has a lengthy history that dates back to the 1700s when Spanish explorers called it both “Lagunilla” (small lake or pond) and “Laguna de los Patos” (Lake of the Ducks). Later, the Mitchell family purchased the lake and the surrounding lands, and the lake became colloquially known as Mitchell Lake. Around the turn of the century, Mitchell Lake was a private duck hunting area for San Antonio residents. The City of San Antonio purchased the lake and constructed the dam in 1901 to increase the water levels. The lake then became part of the waste management facilities for the City. In the mid-1970’s, eighty-seven acres of the upper lake were diked to form a polder complex that accepted waste activated sludge from the Rilling Road Wastewater Treatment Plant. This practice continued until 1987, when the Dos Rios Wastewater Treatment Plant came on line. The lake and polder complex were declared refuges for shore birds and waterfowl in 1973. Records kept by the Mitchell Lake Wetland Society show that up to 307 species of shore birds and waterfowl visit the lake each year, due mainly to its available mud flats and location on the migratory flyway. When San Antonio Water Systems (SAWS) was formed in 1992, Mitchell Lake became part of SAWS property along with several other licensed wastewater treatment facilities. It is located near the Medina River, the Mission Trails National Historical Park, and a new residential golf course community, Mission del Lago.

Given its past use in the wastewater facilities system, one can see how the general public perceives Mitchell Lake. Other negative situations such as odiferous algal blooms, poor water quality, and an unpredictable and unsustainable hydroperiod in the polders have created difficulties for surrounding residents and wildlife watcher alike. Because it is a powerful magnet for shore birds and waterfowl, many birdwatchers (1,495 in 1998) flock to the site in spite of access that is restricted to escorted groups only. The restricted access rule is in place for safety reasons. In short, Mitchell Lake appears to have wonderful potential for environmental purposes, but there are several problems to overcome.

SAWS Board of Trustees has committed the organization to seeing that Mitchell Lake realizes its true potential of becoming an asset to the community. In 1996, the SAWS Board generated a series of overarching goals for a master plan. The full text of those goals is listed below:

“SAWS feels that the concepts and guiding principles contained in the goals below accomplish the wish that SAWS has to share this valuable resource with the community without compromising the needs of the abundant species found at the site or SAWS’ responsibility to enhance water resources in our region.

1. To enhance wildlife diversity at Mitchell Lake/Chavaneaux Gardens through proactive ecological management strategies.
2. To share Mitchell Lake/Chavaneaux Gardens with the community and other without compromising the needs of the species found at the site.
3. To maintain Mitchell Lake as an integral part of the SAWS water program.
4. To continue to review, and when feasible, implement cost effective strategies that improve water quality for Mitchell Lake/Chavaneaux Gardens that will benefit water programs and the wetlands.
5. To encourage and facilitate partnerships between SAWS, universities, schools, and other organizations in order to promote invaluable and unique opportunities to contribute to research regarding local water resources and the natural world. To provide opportunities for the development of expertise for the management of Mitchell Lake/Chavaneaux Gardens.
6. To continue to provide a mechanism for public review and input for major decisions and activities affecting Mitchell Lake/Chavaneaux Gardens.
7. To continue SAWS commitment to south San Antonio and the greater community through the promotion of Mitchell Lake/Chavaneaux Gardens as a premier wildlife sanctuary.
8. To continue to foster SAWS commitment to providing educational opportunities for school age children and adults.”

For the purposes of this plan, the Mitchell Lake/Chavaneaux Gardens complex referred to in the SAWS Board’s goals will be called “Mitchell Lake” in the text.

In addition to these goals, SAWS has committed to following best management practices for the Mitchell Lake project and will employ the appropriate expertise to insure that performance standards are met.

These goals generated a strong need for public involvement in any improvement efforts at Mitchell Lake because of the number of stakeholders involved. Also, Mitchell Lake is currently seen as a liability to the quality of life in the Southside community, making input from the community even more critical to any project.

B. Master Plan Process

In May 1999, the San Antonio Water System selected Carter & Burgess, Inc. to provide master planning services for the Mitchell Lake project in southern San Antonio. The Master Implementation Plan process was to facilitate extensive public input in order to reach consensus for the project.

The Master Implementation Plan process consists of three distinct phases:

- Inventory and Analysis
- Concept Development
- Final Master Implementation Plan Development

The Inventory and Analysis phase consisted of data gathering in the form of site visits, a review of existing documents, study of aerial photographs, and interviews with people familiar with the site. Essential to this phase was the identification of defining factors such as SAWS permit responsibilities for the lake. Also included in this process were meetings with five groups of stakeholders: Government, Education, Community, Business, and Environmental. The stakeholder groups gave invaluable input for the inventory and analysis process. For detailed findings from this phase, please refer to the Inventory and Analysis Report dated July 9, 1999.

The next step, concept development, was shaped by a two-week charrette during which several alternatives were developed and discussed. The Mitchell Lake Task Force, stakeholder groups, and the public at large were invited into the charrette to evaluate the alternatives and give input to the designers. For detailed findings from this phase, please refer to the Vision and Concept Development Report dated November 12, 1999.

Following the charrette, a master implementation plan was derived from the preferred alternatives and the comments from the task force, stakeholders, and the public at large. The final Master Implementation Plan and accompanying documents were developed, refined, and presented to the task force and stakeholders.

C. Participants

The public participants in the Mitchell Lake Master Implementation Plan consisted of the members of the Mitchell Lake Task Force, the five stakeholder groups that participated throughout the process, and the general public that attended several of the public meetings.

SAWS created the Mitchell Lake Task Force to partner with the staff and the Carter & Burgess Team. It was charged with both overseeing the master plan process and making a recommendation to the SAWS Board of Trustees on the Master Implementation Plan. This twenty-six-member task force was appointed by the SAWS Board, and consisted of community leaders, representatives of elected officials, representatives of agencies directly related to the functions of Mitchell Lake, and representatives of the City staff. The task force members are listed in the Acknowledgements section of this document.

Six hundred fifty-nine (659) people participated in forty-two (42) public meetings that were held during the development of the Master Implementation Plan. They included stakeholder meetings, general public meetings, and meetings during the charrette process, open to the public.

During the Inventory and Analysis phase, the numerous stakeholders were divided into five groups to gain a broad base of input. Those five groups were Government, Education, Community, Business, and Environmental. The Governmental group typically included (but were not limited to) people from City of San Antonio planning staff, City Parks and Recreation, Texas Parks and Wildlife, Texas A&M Extension Service, Bexar County, Alamo Area Council of Governments, and Bexar Metropolitan Water District. The Education group included administration officials from Southside and Harlandale School Districts, middle and high school science teachers, a librarian, representatives from Palo Alto College, and others. The Community group consisted of landowners adjacent to Mitchell Lake and other Southside community residents. The Business group consisted of people from the Southside Chamber of Commerce, Southside Alliance for Economic Development, the developers of Mission del Lago, and other business organizations. The Environmental group included members of the Audubon Society, Mitchell Lake Wetland Society, Master Gardeners, Master Naturalists, Freidrich Wilderness Park, and other environmentally minded citizens.

The input during the Inventory and Analysis phase (and the early part of the Vision and Concept Development Phase) was recorded and sorted using a “carding process.” This involved recording all public input on 5” x 8” cards and displaying them on a wall during meetings. The input from each meeting was then incorporated into the planning process and reviewed at the next meeting. The hundreds of cards created during this process formed a “spreadsheet of ideas” that became the basis the design team used to develop concepts for the master plan in the Vision and Concept Development Phase.

Later, in the Vision and Concept Development Phase, meetings were held with the stakeholders and the general public. A two-week-long charrette, held in a downtown storefront on Commerce Street fronting Main Plaza, drew interested citizens from the general public as well as elected officials from the nearby City Hall. The design teams worked during the day and presented the results at a public meeting in the evening. These meetings were held each evening and allowed stakeholders and the general public to review the work completed each day. This continual interaction helped the design team closely translate the public input into a physical plan.

The end result of the charrette was a master plan that had strong backing from the stakeholders. The master plan was refined, developed into a Master Implementation Plan with phasing and cost estimates, and reviewed by the Task Force and stakeholders in public meetings.

D. The Importance of Water Quality Issues

The most important issue regarding on-site planning efforts for the Mitchell Lake Preserve is water quality. The basis for current water quality recommendations is a previous study performed in 1997 by the Simpson Group, the Wetlands Feasibility Study (WFS). The WFS included several key recommendations that are summarized as follows:

- Relocation of influent water pipeline from west side of lake to polder area.
- Improvements to polder complex to include level and flow controls, improvements to berms and addition of wetland plantings.
- Re-establishment of upland ponds to include Bird and Skips ponds.
- Development of below lake wetlands (BLW) for the purpose of water treatment, discharge permit compliance and habitat improvement.

Each of the above elements was previously recommended by a steering committee made up of interested citizens. They were accepted by the SAWS Board of Trustees and are included and endorsed in this master plan.

All of the above elements should be implemented as funding allows. Without these water quality elements in place, most of the other planning elements will be significantly diminished.

The BLW should move forward in several steps in order to assure the final system would meet the intended purpose. The proposed plan calls for about 200 acres of land below the dam to be purchased and developed as constructed wetlands for the purpose of water treatment. Prior to proceeding, it is recommended that several scenarios be evaluated regarding the actual design of these constructed wetlands. In addition, prior to full implementation, small-scale efforts should be designed, operated and evaluated for a period of time sufficient to provide a significant level of confidence that the system will work as intended. Costs should be re-evaluated based on information determined from these efforts.

In regenerating wetlands, careful consideration should be given to introducing viable wetland plantings and to creating additional mudflats. Mudflats are crucial feeding grounds for migrating birds, so maintaining and creating optimum slopes for these areas should be given priority. At the northern edge of the lake, improvements to the polder water level controls, piping, and berm and dike reconstruction would assist in mediating storm water flow and further protecting water quality. Reestablishing both of the upland ponds, namely Skip's Pond and Bird Pond, should also occur to create additional wetlands habitat and to provide further water level control. Piping the Leon Creek Treatment Plant effluent to Bird Pond so that the water can filter through the uplands drainage system will also improve water quality.

Actions to improve water quality achieve SAWS Board Goal No. 4, and also relate to Goal Nos. 1, 3, and 8. Without a doubt, improved water quality is a significant factor in achieving those goals.

E. Master Implementation Plan

The Master Implementation Plan is the community's plan. The strong level of public participation provided the assurance that, even though every participant is not 100% satisfied with every detail of the plan, consensus was reached by all of the stakeholders on the plan. Their consensus indicates that this is the plan that should be implemented to meet all of the diverse needs of the Mitchell Lake area. Since the SAWS Board's goals were the guidelines in developing the plan, the Master Implementation Plan conforms to the goals.

The SAWS Board of Trustees will be asked to consider actions outlined in the Master Implementation Plan. Options for these actions are covered in this plan under the Proposed Implementation Options (please see page 72). This section includes the Funding Opportunities Plan, the System Operational Plan, and the Access Management Plan.

These actions consist of program elements. These program elements are ranked in order of community-wide preference in the Master Implementation Plan. Other factors, such as funding availability, will greatly influence the ultimate order in which actions take place. The program elements are the basis of the Master Implementation Plan, and are identified separately within this report.

The program elements were further divided into onsite and offsite costs. The community and the design team recognized that onsite improvements affect the surrounding area. For example, area road improvements and development plans for the expected growth of the region complement the planned onsite improvements. Improvement costs were generally divided between the onsite and offsite activities for clarity concerning the initial funding jurisdiction. For example, the City of San Antonio has jurisdiction over city road improvements, and SAWS has jurisdiction over the onsite road development.

Lastly, the implementation plan depends on many public and private partnerships identified as potential sources of funding. When the Funding Opportunities Plan is reviewed and approved by the SAWS Board, it will be a critical tool for making improvements at Mitchell Lake. The onsite and offsite program elements of the Mitchell Lake Master Implementation Plan will take form through a variety of funding sources.

2. Public Involvement Summary

Today's complex projects involve many specialists, however the most important members of any team are the client and the stakeholders. Interaction of these two critical team members made the Mitchell Lake Implementation Plan successful.

The planning recommendations presented in this document are the result of a thorough process of public involvement that established goals, collected and organized facts, uncovered and tested concepts, and determined the needs of the project. The results are both qualitative and quantitative.

The public involvement process included the following categories of participants:

- The client – SAWS
- The Mitchell Lake Task Force (26 members appointed by SAWS)
- Landowners abutting the lake
- Stakeholders
- Southside Residents
- Citizens at large interested in Mitchell Lake
- The Carter & Burgess Design Team

As stated before, this process involved a total of thirty-nine meetings from May through December of 1999. The total participation by all categories of participants totaled 659 people during that same period. The carding process, which involved recording all stakeholder input on 5"x 8" cards and displaying them on a wall during meetings, was the basis for communications during the public involvement process. The input from each meeting was then incorporated into the planning process and reviewed at the next meeting. Consensus was continually developed throughout the process. The hundreds of cards created during this process are available for review and have been summarized in the recommendations of this plan.

Moving the consensus plan to an implementation plan consisted of three steps: prioritization, cost estimation, and review. Prioritization became an essential exercise during the final phase of this planning project. Interested parties voted via ballot on various aspects of the plan, setting the priorities for the implementation plan elements. An analysis of the completed ballots and a blank ballot are included in the appendix of this document (please see page 85). The final result of the balloting was the prioritization of the plan elements as discussed in this report.

The public involvement process involved gathering information and data from the stakeholders during Phase I, Inventory and Analysis. In Phase II, Vision and Concept Development, the two-week charrette produced consensus for the list and location of improvements proposed for the Mitchell Lake area. The public involvement in Phase III, Master Plan Development, is oriented to molding the consensus plan into a plan of action.

This strong level of participation provides the assurance that, even though every participant is not 100% satisfied with every detail of the plan, there is consensus by all of the stakeholders that this is the plan that should be implemented to meet all of the diverse needs of the Mitchell Lake Area.

For example, one stakeholder who lives near the lake wanted the lake restored to its original configuration. This would involve removing the existing polder dams, digging out the polders, and extending the lakeshore to the north edge of the polders. This would eliminate the sensitive feeding ground for the wildlife refuge. The majority of the stakeholders did not support this idea; consequently the majority consensus determined that the polders should be enhanced for the benefit of the wildlife refuge and the health, safety, and welfare of the visitors. There are several other examples of individual preferences that were over-ruled for the overall good of the Mitchell Lake area and its residents.

The public involvement process was thorough, well advertised, and successful. It created stakeholder expectations for action to implement this Master Implementation Plan. The actual implementation will be dependent on the continued involvement of these stakeholders to follow through and promote the plan.

After adoption of the Master Implementation Plan, public involvement will continue. SAWS has committed to continuing the Task Force to provide guidance until the SAWS Board approves a final course of action to implement the plan. Future public involvement will be defined by the action plan.

3. Master Development Plan

Introduction

Discussion of the proposed Mitchell Lake Master Plan will be divided into two parts. An explanation of the overall Implementation Plan will be presented, followed by a more detailed explanation of the proposed master plan for the Mitchell Lake Education Center. Review will begin with the overall master plan, considering the offsite improvements followed by a discussion of the onsite improvements.

The SAWS Board of Trustees approved a list of eight goals for the Mitchell Lake Implementation Plan. These goals are the “yardsticks” by which to measure the success of each element of the plan. The full text of these goals was provided in the introduction, and is summarized here for convenience:

1. Enhance Wildlife Diversity
2. Share Mitchell Lake with the Community
3. Maintain Mitchell Lake as Part of SAWS Water Program
4. Improve Water Quality
5. Encourage and Facilitate Partnerships
6. Provide Mechanism for Public Review
7. Promote Mitchell Lake to the Community
8. Provide Educational Opportunities

The Master Implementation Plan process itself achieves the sixth goal, “Provide Mechanism for Public Review,” by including more than 39 public meetings and hundreds of stakeholders.

It should be noted that several operational and/or construction issues are known to exist at the Mitchell Lake site which were not deemed appropriate to address as part of this plan. These include boundary questions, oil and gas leases, abandoned cars, leftover pipes, abandoned structures and drainage problems. These items are more appropriately dealt with by SAWS staff or during detailed design.

A. On-Site Improvements

*Please refer to plan on page 14.

1.) Water Quality

On-site planning efforts for the Mitchell Lake Preserve should focus on improving the water quality of the lake itself. This might be accomplished with high impact actions such as dredging the lake, in combination with additional lower impact actions such as reestablishing wetland areas to assist in filtering nutrients from the lake. In regenerating wetlands, careful consideration should be given to introducing viable wetland plantings and to creating additional mudflats. Mudflats are crucial feeding grounds for migrating birds, so maintaining and creating optimum

slopes for these areas should be given priority. At the northern edge of the lake, improvements to the polder water level controls, piping, and berm and dike reconstruction would assist in mediating storm water flow and further protect water quality. Reestablishing both of the upland ponds, namely Skip's Pond and Bird Pond, should also occur to create additional wetlands habitat and to provide further water level control. Piping the Leon Creek Treatment Plant effluent to Bird Pond so that the water can filter through the uplands drainage system will also improve water quality.

Actions to improve water quality achieve SAWS Board Goal No. 4, and also relate to Goal Nos. 1, 3, and 8. Without a doubt, improved water quality is a significant factor in achieving these goals.

2) Upland Area & Wildlife Refuge Center

In the upland area, several measures to improve the quality of the habitat are called for in the Mitchell Lake Implementation Plan. The first action to be taken in enhancing the native vegetation would be to develop a method to control and eliminate non-native grasses. A planting guide could be developed for the upland ecosystem as well as those of the wetland and transition areas. Such a guide would indicate preferred species, locations, and planting densities for each ecosystem. Using the fertile dredging material recovered from Mitchell Lake, initial test plots could be established in the upland area to study the effectiveness of the proposed prairie enhancement. Additionally, trees should be planted on the periphery of this area to develop a canopy and provide additional habitat for wildlife. These plantings would also serve to buffer the traffic on both Howard and Pleasanton Roads.

Meandering throughout the upland area, a primitive pedestrian trail would provide abundant opportunities for wildlife observation. The construction of a Wildlife Refuge Center along the proposed Transportation Efficiency Act for 21st Century (TEA-21) grant-funded trail lining Pleasanton Road could monitor the head of the trail and assure that its use be limited to pedestrian traffic. The center could fulfill such roles as facilitating meetings and environmental education workshops. It may also be feasible to relocate a historical building to the site and plan for its adaptive reuse to fulfill a new role. Whether new or remodeled, this facility would be a valuable amenity in the Mitchell Lake Master Plan. Additionally, the facility would monitor the road that leads to the upland polders. Construction designs need to be developed to stabilize the polder roads and adjacent slopes. "Pull off" viewing and passing areas should be provided in addition to post and cable barriers and signage. Educational kiosks would create environmental education nodes in these areas.

Within the proposed conservation easements, bicycle and pedestrian trails could wrap around the lake and connect nodes for rest, recreation, and environmental education. Elements such as observation towers, boardwalks and educational kiosks would facilitate and promote activities for park users. At two or more points along the southeast shore of the lake, fishing piers could be built to provide additional recreation outlets. Improved fencing and dense vegetative

plantings within the conservation easement would assist in maintaining a degree of physical separation from neighboring developments.

The design and construction of uplands area and the Wildlife refuge center achieve SAWS Board Goals Nos. 1,2,5,7, and 8. The enhanced uplands area promotes wildlife diversity (Goal No. 1). These elements also share Mitchell Lake with the community at large (Goal No. 2). Partnerships will have to be created to simply get these actions done (Goal No. 5). Finally, these facilities will promote Mitchell Lake to the community and provide educational opportunities (Goal Nos. 7 and 8).

3) Neighborhood Park

A neighborhood park should be established near the eastern edge of the site in close proximity with the proposed education center and the Mission Del Lago Community. This park should be planned for high levels of use, thereby concentrating and reducing recreational demands on the rest of the preserve. The site could be accessed from US 281 and spaces for parking provided. Amenities could include play areas and shelters.

This facility is a link between the adjacent development and Mitchell Lake Education Center, and promotes sharing Mitchell Lake with the community without incurring adverse recreation difficulties at the education center (Goal No. 2).

4) Education Center

An area for the establishment and construction of an education center has been proposed for the southeastern portion of Mitchell Lake with vehicular access from US 281 (please refer to page 15). The entry drive could meander, and access would be controlled by a gated entry into the park. A drop-off area in front of the center would be provided along with enough parking to accommodate 35-40 vehicles with additional spaces for buses. The center itself would be crowned with an observation tower looking out over Mitchell Lake. Wetland exhibits and other displays would be included in the center. A network of trails would connect the center to Mitchell Lake's overall trail system. The trails near the center would include such elements as boardwalks, overlooks, and additional observation towers. The trail would necessarily be handicap accessible and conform to all requirements of the Americans with Disabilities Act. A separate interpretive habitat/wetland area is also proposed for an area adjacent to the Education Center. Access to this area should be controlled by the Education Center and various viewing areas, overlooks, and boardwalks could be created to allow park users to view, and even enter into, the wetland habitat.

This Center achieves Goal No. 8, and also relates to Goal Nos. 2, 5, and 7.

B. Off-Site Improvements

*Please refer to plan on page 14.

1) Transportation Elements

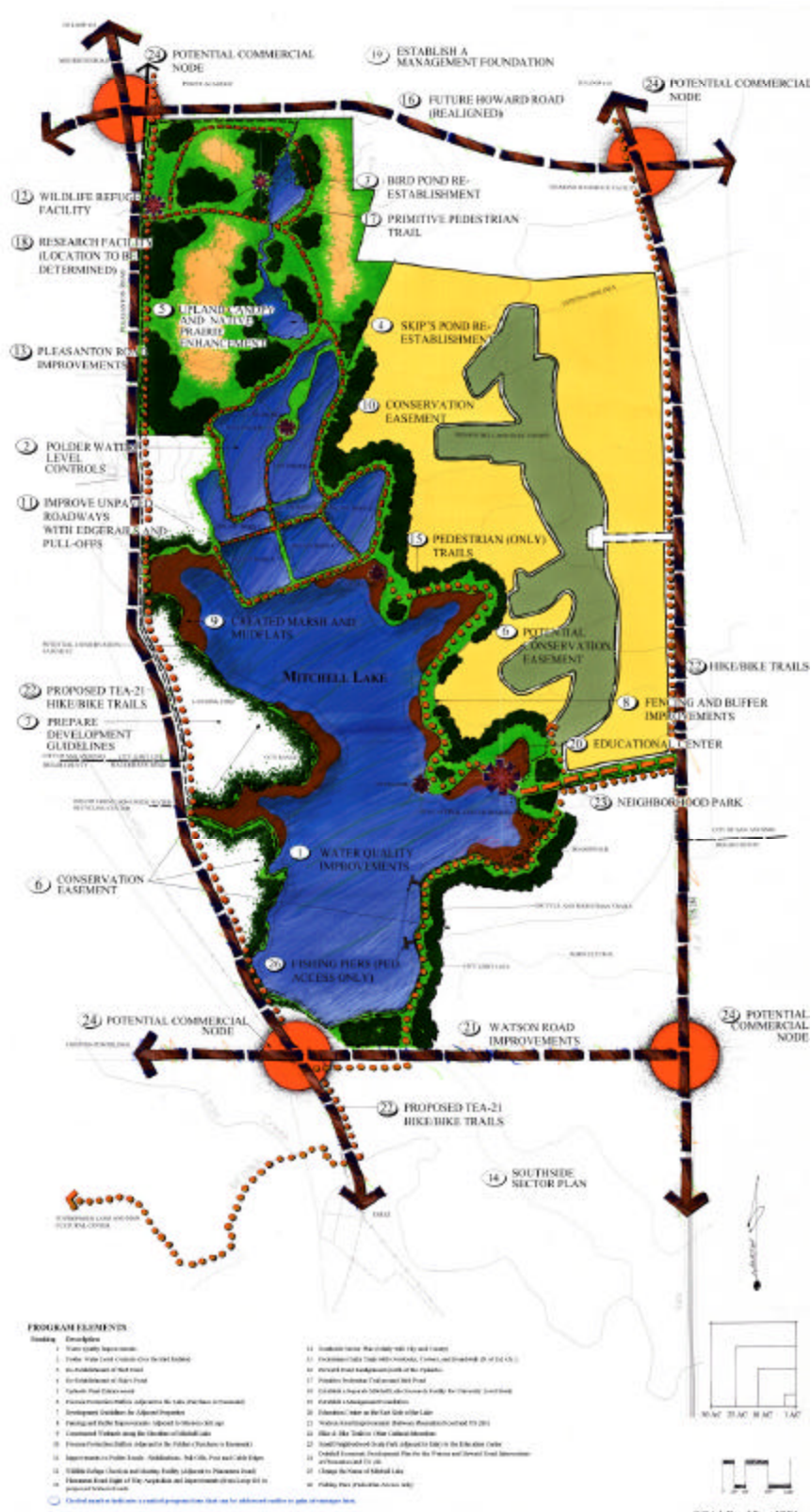
Initial off-site considerations in preparing a master plan for Mitchell Lake concern the impact of future development upon the environmental quality and scenic beauty of the site. Development guidelines for adjacent property should be created with input from all the affected stakeholders to protect and enhance the scenic quality of the preserve. Such guidelines will assist developers by creating a framework for developments that are complementary to the Mitchell Lake Master Implementation Plan. The plan also calls for working in cooperation with the adjacent landowners to procure an approximately 250' conservation easement to buffer future development from Mitchell Lake. These easements are envisioned to wrap the lake along its eastern, western, and southern shores.

2) Transportation Elements

Other crucial “off-site” elements that should be considered for improvements and alterations include the perimeter roads that bind Mitchell Lake to the north, west and south. Actions should be taken with both the City of San Antonio and Bexar County to realign Howard Road. Its present alignment cuts through the northern section of the site and greatly reduces the usable area of the Mitchell Lake Preserve. By pushing the intersection of Howard and Pleasanton Road further north, Bird Pond may be reestablished and a more adequate buffer be created. Improvements along Watson Road to the south and Pleasanton Road to the west should also be considered to adequately deal with additional future traffic flow. Improvements along Pleasanton Road should incorporate the proposed provision of a Transportation Efficiency Act for the 21st Century (TEA-21) grant funded hike and bike trail that would, in addition to creating regional recreational opportunities, link Mitchell Lake with the proposed Land and Man Cultural Center to the southwest. TEA trails could be designated along US 281 as well. Furthermore, potential key commercial nodes at the intersections of the US 281 & Howard Road, Pleasanton & Howard, Watson & Pleasanton, and US 281 and Watson should be planned for with input from the City Planning Department, Council Office, and the County Commission.

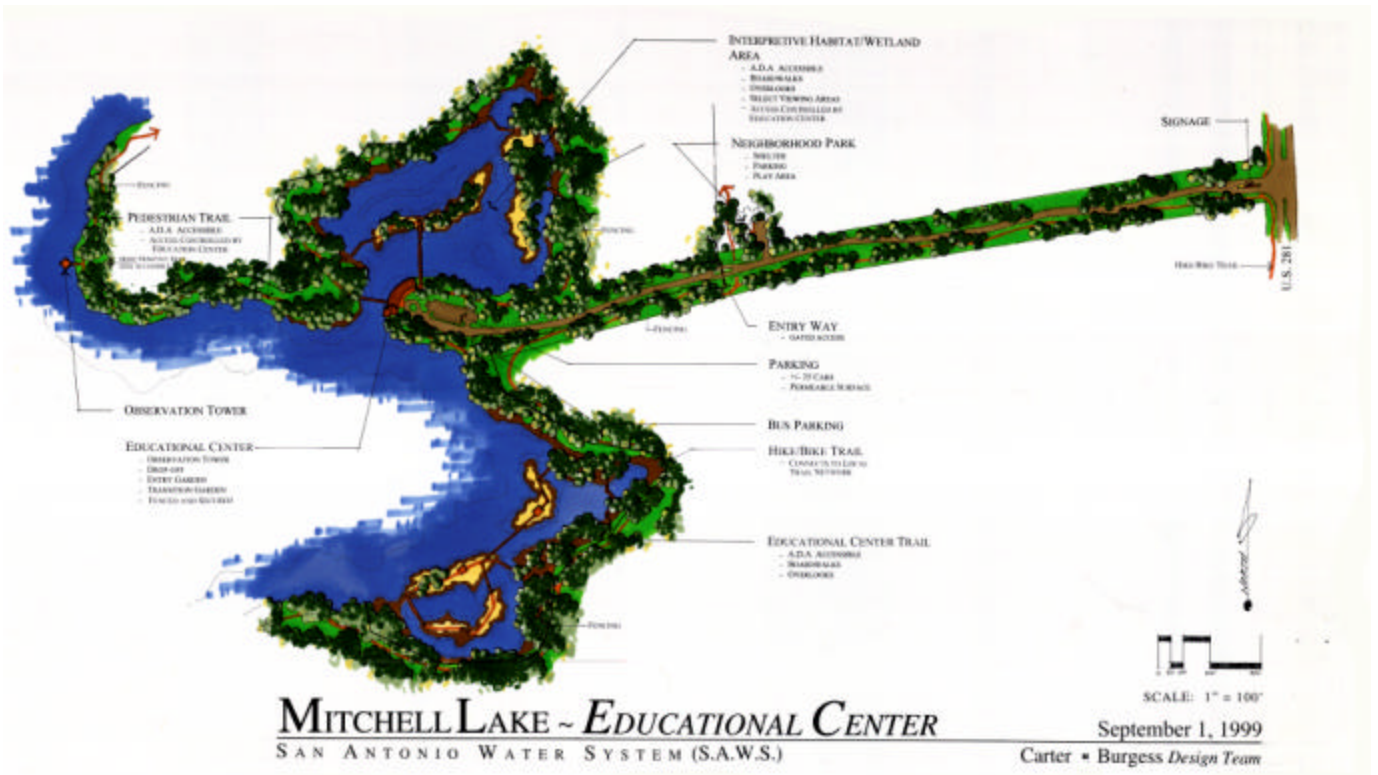
As of the date of this report the TEA-21 application for the hike and bike trail was not approved, but another attempt is currently being contemplated.

C. Master Plan Graphic



MITCHELL LAKE ~ IMPLEMENTATION PLAN
 SAN ANTONIO WATER SYSTEM (S.A.W.S.)
 January 2000
 Carter • Burgess Design Team

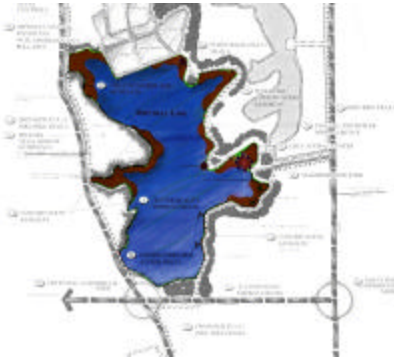
D. Education Center Graphic



4. Program Elements

The following program elements resulted from the stakeholder and public meetings designed to gain input for program elements for Mitchell Lake. These elements are the foundation of the Mitchell Lake Improvement Plan and respond to the goals established by SAWS and the stakeholders.

The following program elements have small excerpts of the Master Implementation Plan graphic beside the text. To see the entire Master Implementation Plan graphic, please refer to page 14.



Priority #1 - Water Quality Improvements

Water quality improvements restore the water to the standard necessary for wildlife habitat, recreation, public health, safety, and the welfare of lake users. The following items are recommended based on reviews of past studies and findings by various technical research sources.

Re-routing of LCWRC Water Source line – The primary water source for Mitchell Lake is the Leon Creek Water Recycling Center. The lake is currently fed from a pipeline that enters a point on the west side of the lake. The proposed project would re-route this pipeline to a point north of the polder complex. This project was originally developed during a previous study of the Wetlands/Polder area. Once the water is re-routed, the water will flow through and across the polders and wetlands prior to entering the lake. This would improve water quality by utilizing natural treatment that occurs as water flows through the polders and wetlands.

Review and Study Mitchell Lake Discharge Water Quality and Treatment Methodology – One of the greatest potential benefits of Mitchell Lake may be as a storage reservoir for the recycled water program. In order for this to be feasible, discharge from the lake must meet current permit requirements. Presently, the lake's discharge water quality violates permit requirements during significant rainfall events. It is therefore recommended that there be water and sediment studies performed in order to properly evaluate methodology for improving the discharge water quality. The recommended studies are detailed in the Eco-system Management Plan, Section 4 of this report.

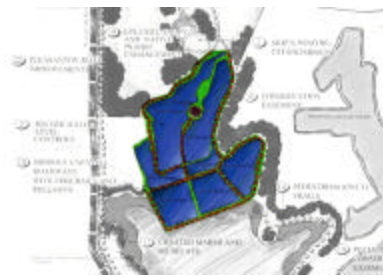
Dam Improvements – One component of water quality improvements is the ability to maintain and/or alter the water surface elevation of the main body of the lake. The dam at Mitchell Lake currently needs repairs due to erosion and excessive vegetative growth on the earthen dam. An assessment of the current state of the dam is included in Appendix E of this report. The design and construction of dam improvements would protect downstream residents while extending the life of Mitchell Lake's resource.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
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Reroute LCWRC Water Source Line	6	8	\$600,000	\$600,000
Improve Dam	12	12	\$3,515,000	\$3,515,000

Fulfill SAWS Goals:

1. Enhance Wildlife Diversity
3. Maintain Mitchell Lake as Part of SAWS Water Program
4. Improve Water Quality



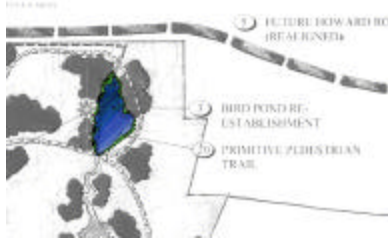
Priority #2 – Polder Water Level Controls

Design and construct polder improvements so that water levels can be regulated. Currently, water is pumped from the lake into the polders. There is no way to drain or lower the water level other than through evaporation. With re-alignment of the water source line from LCWRC, a flow-through system would be possible. Control of water elevation within the polders would become more desirable than ever.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Polder Improvements	6	8	\$1,618,045	\$1,618,045

Fulfill SAWS Goals:

1. Enhance Wildlife Diversity
4. Improve Water Quality



Priority #3 - Re-establishment of Bird Pond

Design and construct Bird Pond to accommodate the purified discharge from Leon Creek into the pond. The pond will be planned for greater storage and increased vegetative and wildlife diversity around it. It will be designed to be the first stage of flow that will drain to Skip's Pond and the polder system before entering Mitchell Lake. Bird Pond will also be a study area for wildlife research.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Re-establish Bird Pond	4	6	\$286,000	\$286,000

Fulfill SAWS Goals:

1. Enhance Wildlife Diversity
2. Share Mitchell Lake with the Community
4. Improve Water Quality



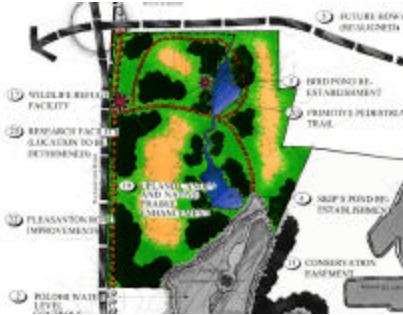
Priority #4 - Re-establishment of Skip's Pond

Design and construct Skip's Pond to work as the second holding area for the Leon Creek discharge before it flows into the polder system. The pond will be designed for greater storage and vegetative and wildlife diversity. Skip's Pond will also be an area for wildlife research and study.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Re-establish Skip's Pond	4	6	\$193,000	\$193,000

Fulfill SAWS Goals:

1. Enhance Wildlife Diversity
2. Share Mitchell Lake with the Community
4. Improve Water Quality



Priority #5 - Uplands Plant Enhancement

Study, design and plant the upland area to create greater wildlife diversity in the grasslands area. Plant diversity would enhance the diversity of wildlife in the refuge and consequently create greater opportunity for observation, education and research.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Uplands Plant Enhancement	2	8	\$84,000	\$6,552,000

Fulfill SAWS Goals:

1. Enhance Wildlife Diversity



Priority #6 -Procure Protection Buffers Adjacent to the Lake

Procure, in perpetuity, protection buffers adjacent to the lake to protect the environment immediately adjacent to the shoreline. The buffer should be no less than 100 feet in width and preferably 250' wide, measured from the 525-foot elevation line. This area will be graded, planted and fenced to prevent inundation or adverse impacts from adjacent property and to prevent inundation from the lake environment onto adjacent property. SAWS and any future-

governing agency will work with adjacent property owners to procure these buffers. Procurement of the buffer should preclude development of the adjacent properties.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Procure Protection Buffers	N/A	N/A	\$131,425	\$131,425

Fulfill SAWS Goals:

4. Improve Water Quality



Priority #7 - Development Guidelines for Adjacent Properties

Create a set of development guidelines to assist owners of property adjacent to Mitchell Lake. These guidelines would balance development needs with the preservation and protection needs of the lake environment. The guidelines should be written to promote development that is compatible with the Southside Sector Plan and the Mitchell Lake Implementation Plan. These guidelines should also address conservation easements (buffer zones), storm water management, view sheds, density credits, zoning (if the property is in the city), and other development compatibility issues.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Development Guidelines (Budget Number)	N/A	N/A	\$275,000	\$275,000

Fulfill SAWS Goals:

- 2. Share Mitchell Lake with the Community
- 4. Improve Water Quality
- 5. Encourage and Facilitate Partnerships
- 6. Provide Mechanism for Public Review



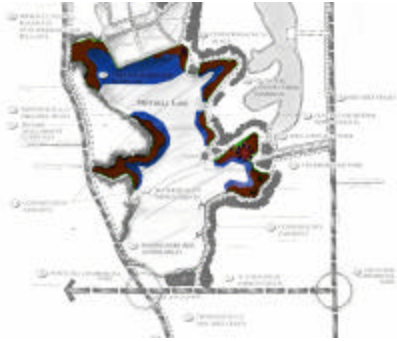
Priority #8 - Fencing Adjacent to Mission del Lago Residential Development

Design and construct improvements to the buffer zones on the east side of the lake and adjacent to the Mission del Lago development. The improvements include the construction of an eight-foot vinyl coated fence, grading and drainage improvements, vegetative buffers and screens, erosion control adjacent to the shoreline, and view corridor preservation for selected development areas.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Fencing adj. to Mission del Lago	1	3	\$307,000	\$644,700

Fulfill SAWS Goals:

- 1. Enhance Wildlife Diversity
- 4. Improve Water Quality



Priority #9 - Constructed Wetlands Adjacent to the Shoreline

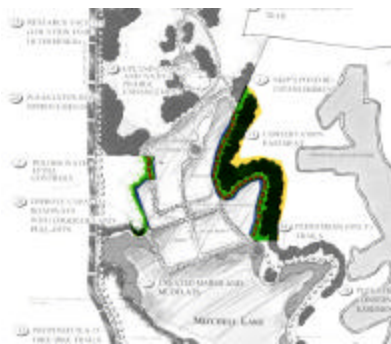
Prepare a study and design for the creation of wetlands adjacent to Mitchell Lake’s shoreline as illustrated on the Mitchell Lake Implementation Plan. These created wetlands will function as additional habitat for wildlife and vegetation, as purification areas for the water that leaves the polders and enters the wetlands, and potentially qualify as areas for mitigation banking at Mitchell Lake. The study should also identify the financial feasibility of mitigation banking in this location. The created wetlands were identified in

several locations on the Implementation Plan, so the study should also identify a phasing plan and cost estimate for construction. The water quality improvements for Mitchell Lake must be completed prior to construction of wetlands.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Constructed Wetlands	2	12	\$595,000	\$9,163,000

Fulfill SAWS Goals:

- 1. Enhance Wildlife Diversity
- 4. Improve Water Quality



Priority #10 - Procure Protection Buffers Adjacent to the Polders

Procure, in perpetuity, protection buffers adjacent to the lake to protect the environment adjacent to the polders. The buffer should be no less than 100 feet wide and optimally 250’ wide, measured from the property line. The buffer will be graded, planted and fenced to prevent inundation from adjacent property and to prevent inundation from the polders to adjacent property. SAWS and any future, governing agency will work with the adjacent property owners to procure these buffers. The buffer must be acquired prior

to the development of the adjacent property.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Procure Protection Buffers	N/A	N/A	\$12,625	\$12,625

Fulfill SAWS Goals:

- 1. Enhance Wildlife Diversity
- 4. Improve Water Quality



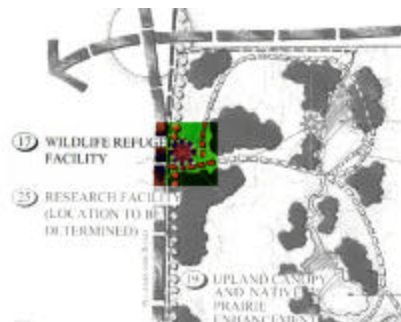
Priority #11 - Improvements to Polder Roads

Design and construct improvements to the polder levees to function as roadways for access to the wildlife refuge. The improvements will include bank stabilization, pull-off areas for vehicles, post and cable barriers adjacent to polder roads, levee improvements, and roadway stabilization for the driving surface. These roads are the only means of access into the wildlife refuge. No pedestrian access will be permitted on the polder roads.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Polder Road Improvements	3	6	\$350,000	\$1,702,222

Fulfill SAWS Goals:

- 2. Share Mitchell Lake with the Community
- 8. Provide Educational Opportunities



Priority #12 - Wildlife Refuge Center

Program, design and construct a small meeting and wildlife refuge operations center that is accessed from Pleasanton Road. This facility will be managed and operated by the future Governing agency. The facility will function as a security point for access into the wildlife refuge and uplands study area. The facility will include parking, an entry gate, and security fencing for the entire refuge. Improvements may include audio/video stations that provide real time monitoring of the refuge on a web site.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Wildlife Refuge Center	6	8	\$343,200	\$700,700

Fulfill SAWS Goals:

- 2. Share Mitchell Lake with the Community
- 8. Provide Educational Opportunities



Priority #13 - Pleasanton Road Right of Way Acquisition and Improvements

Acquire the additional right-of-way to widen Pleasanton Road to meet the projected demands between Loop 410 and proposed Watson Road. Design and construct the improvements to create a meandering country road with variable-width medians. The road should reflect the country atmosphere and environmental sensitivity that is characteristic of the wildlife refuge. These improvements will include extensive landscape and irrigation enhancements to create the character previously described.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Pleasanton Road Improvements	6	8	\$5,247,423	\$5,247,423

Fulfill SAWS Goals:

- 2. Share Mitchell Lake with the Community
- 7. Promote Mitchell Lake to the Community

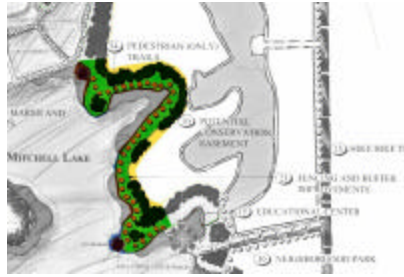
Priority #14 - Southside Sector Plan (jointly between City and County)

Create a sector plan for the Southside district bounded by Loop 410 on the north, the Medina River on the south, Applewhite Road to the west and the San Antonio River to the east. The sector plan should be jointly funded by both the City of San Antonio and Bexar County to serve as a long-term planning tool. It will guide future development and capital improvements in the Southside district. The Mitchell Lake Wildlife Refuge and this implementation plan will be incorporated into the sector plan.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Southside Sector Plan (Budget Number)	N/A	N/A	\$275,000	\$275,000

Fulfill SAWS Goals:

- 2. Share Mitchell Lake with the Community
- 7. Promote Mitchell Lake to the Community



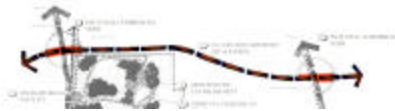
Priority #15 - Pedestrian Trails with Overlooks/Towers and Boardwalks (north of the education center)

Design and construct overlooks, towers, boardwalks and trails within the buffer area on the eastern side of Mitchell Lake and north of the education center trails. These trails and overlooks will provide observation areas and trail access to observe the created wetland habitat and bird habitat on the east shore. This trail will not access the polders or connect to the Mission del Lago residential community.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Pedestrian Trail at Education Center	3	6	\$500,000	\$1,559,434

Fulfill SAWS Goals:

- 2. Share Mitchell Lake with the Community
- 8. Provide Educational Opportunities



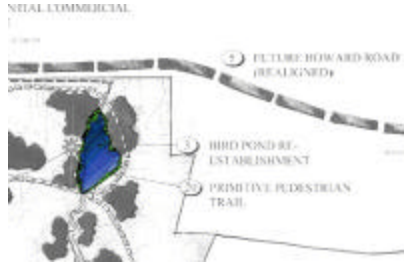
Priority #16 - Howard Road Realignment (between Pleasanton Road and Highway 281 and north of the uplands)

The current thoroughfare plan should be changed to shift the alignment of Howard Road north of the uplands and to the southern edge of the police academy. The road should be designed to create a natural buffer to the south with a fence to prevent access into the Mitchell Lake Wildlife Refuge. Development will not be permitted adjacent to the Mitchell Lake refuge on the south side of the proposed roadway. Howard Road will provide additional access and development opportunities for the Southside community, especially at the intersections with Pleasanton Road and Highway 281.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Howard Road Realignment	8	12	\$3,962,303	\$3,962,303

Fulfill SAWS Goals:

- 1. Enhance Wildlife Diversity



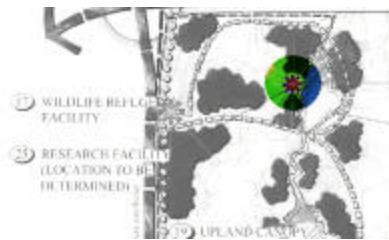
Priority #17 - Primitive Pedestrian Trail Around Bird Pond

Design and construct a primitive trail from the Wildlife Refuge Center to Bird Pond. This trail will provide the only pedestrian access to the refuge. It could also provide an opportunity for pedestrian study and observation of this portion of the upland and Bird Pond environments.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Primitive Trail around Bird Pond	1	3	\$28,322	\$28,322

Fulfill SAWS Goals:

- 2. Share Mitchell Lake with the Community
- 8. Provide Educational Opportunities



Priority #18 - Establish a Separate Mitchell Lake Research Facility

Study, program, design and construct a research facility in the upland area. This facility will be separate from the Wildlife Refuge Center. Access and use of the uplands for research will be regulated by the future Governing agency. University funding and sponsorship will be required to ensure the long-term viability of this research facility.

Fulfill SAWS Goals:

- 5. Encourage and Facilitate Partnerships
- 8. Provide Educational Opportunities

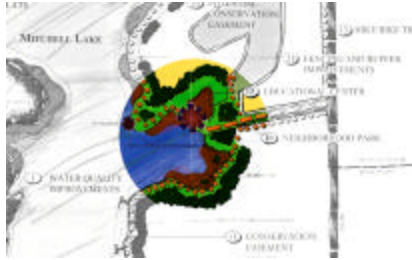
Priority #19 – Consider Establishing a Management Foundation

SAWS could consider leading an effort to legally establish a 501.c.3 non-profit Mitchell Lake Foundation, whose charter and mission could be designed to build and operate facilities associated with the Mitchell Lake Wildlife Refuge and Education Center. The foundation could also manage the education programs and fund-raising activities associated with the Mitchell Lake Education Center. SAWS could provide the assistance necessary to bring the foundation to maturity. SAWS would also potentially ensure that the make-up of the foundation's board of directors would represent a cross-section of stakeholders.

While a foundation could manage the refuge and education center, SAWS should likely retain control of Mitchell Lake's water supply and storage aspects. Close cooperation between SAWS and any proposed foundation would be critical to the success of the Mitchell Lake Wildlife Refuge.

Fulfill SAWS Goals:

2. Share Mitchell Lake with the Community
3. Maintain Mitchell Lake as Part of SAWS Water Program
5. Encourage and Facilitate Partnerships
6. Provide Mechanisms for Public Review
7. Promote Mitchell Lake to the Community
8. Provide Educational Opportunities



Priority #20 - Education Center on the East Side of the Lake

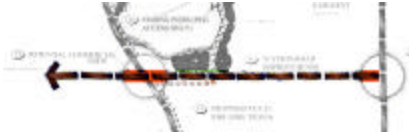
Program, design and construct an education center on the eastern side of Mitchell Lake to function as a regional attraction that provides site-based environmental education. SAWS or a designated entity could manage and operate the facilities, program the educational opportunities, and manage the staff required to successfully operate the center. An entry road from Highway 281 and adjacent to the

south property line of the Mission Del Lago development would provide the vehicular access. The entire center should be fenced for security. The center would include several acres of outdoor study areas that include ADA trails, primitive trails, observation overlooks/towers, boardwalks, interpretive habitat/wetlands areas, and bus drop-off and parking. The education programs could be created in concert with the surrounding school districts needs, as well as the local universities higher education programs. Outdoor recreation will be provided at the adjacent park, but not at the education center.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Education Center	6	12	\$5,596,717	\$12,636,487

Fulfill SAWS Goals:

1. Enhance Wildlife Diversity
2. Share Mitchell Lake with the Community
5. Encourage and Facilitate Partnerships
7. Promote Mitchell Lake to the Community
8. Provide Educational Opportunities



Priority #21 - Watson Road Improvements (between Pleasanton & Highway 281)

Watson Road is planned to be an east-west connector south of the Mitchell Lake Dam and will connect Pleasanton Road with Highway 281. This road should be moved up on the county’s list of proposed road improvement projects and be designed to encourage development at the intersections with Pleasanton and Highway 281. The design of Watson Road should meander with the rural and natural character of its setting and be landscaped for compatibility with the surrounding area.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Watson Road Improvements	8	12	\$2,847,085	\$2,847,085

Fulfill SAWS Goals:

- 2. Share Mitchell Lake with the Community
- 7. Promote Mitchell Lake to the Community



Priority #22 - Hike and Bike Trails to Other Cultural Attractions

Design ADA accessible trails that connect the proposed TEA-21 funded trail adjacent to Pleasanton Road to the proposed Mitchell Lake education center. The proposed trail will originate at Highway 281 and parallel the entry road to the education center; follow the buffer adjacent to the southeastern shoreline of the lake; and parallel the Watson Road right-of-way to connect with the Medina/TEA-21 trail adjacent to Pleasanton Road. Another ADA trail may be designed to parallel Highway 281 and connect the education center with Loop 410.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Hike & Bike Trails	4	8	\$500,000	\$1,896,764

Fulfill SAWS Goals:

- 2. Share Mitchell Lake with the Community
- 7. Promote Mitchell Lake to the Community



Priority #23 - Neighborhood Park Adjacent to the Education Center

Design and construct a small neighborhood park (2 acres or less) adjacent to the entry gate to the education center. This park could serve as an access point for the Mission del Lago development, a trailhead for bicycle visitors, and an outdoor recreation facility for families visiting the education center. The park should have vehicular parking, trail access, picnic facilities, bicycle parking, a picnic shelter,

and play area.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Neighborhood Park	3	6	\$450,000	\$450,000

Fulfill SAWS Goals:

- 2. Share Mitchell Lake with the Community
- 7. Promote Mitchell Lake to the Community



Priority #24 - Detailed Economic Development Plan for the Designated Commercial Nodes

Prepare an economic development plan for the Watson and Howard Road intersections at Pleasanton and Highway 281. These four major intersections should stimulate commercial development in a controlled and logical way for the Southside area, while minimizing the impact on the character of the roadway and access points into the Mitchell Lake refuge and educational areas.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Detailed Economic Plan	N/A	N/A	\$125,000	\$125,000

Fulfill SAWS Goals:

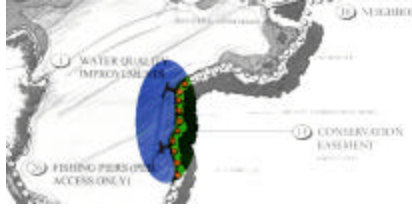
- 2. Share Mitchell Lake with the Community
- 7. Promote Mitchell Lake to the Community

Priority #25 – Consider Changing the Name of Mitchell Lake

Changing the name of Mitchell Lake by using a publicized and coordinated effort to promote the lake’s new image generated by the improvements recommended in the implementation plan. This name change would require funding to change promotional literature for various user groups. It will amplify the new image and opportunities that the implementation plan will create.

Fulfill SAWS Goals:

- 7. Promote Mitchell Lake to the Community



Priority #26 - Fishing Piers

Design and construct two fishing piers along the southeastern shoreline after the water quality improvements have been made. These fishing piers would only be accessed from the proposed trail system. This will provide pedestrian access to the lake for the residents of the south side.

CONSTRUCTION PROJECT	DESIGN TIME (MOS)	CONSTRUCTION TIME (MOS)	INITIAL BUDGET	ULTIMATE BUDGET
Fishing Piers	3	6	\$343,200	\$646,400

Fulfill SAWS Goals:

- 2. Share Mitchell Lake with the Community
- 7. Promote Mitchell Lake to the Community

A. Acceleration Potential

Although stakeholder input determined the general order of events that should occur in planning the Mitchell Lake Preserve, certain program elements should be accelerated. Some of these can safeguard the refuge and are prerequisites for other elements. This is especially important if these elements pose little financial cost and can be easily done. The following elements are not connected with construction improvements and preserve the intent of the stakeholder input. The steps discussed below fit those criteria. Some funding will be required for planning, etc. It is Carter & Burgess' recommendation that these steps be considered now in the interest of safeguarding the future of the refuge. They include the following:

Procure Protection Buffers Adjacent to the Lake (and Polders)

- Negotiations should be started with adjacent property owners in preparation for the acquisition of the 100' buffer along the west, south and east boundaries of Mitchell Lake. Appraisals should be started for these buffers so that a value for each can be ascertained. In the event that a mutually beneficial arrangement cannot be made, the governing agency should continue to monitor the property in the hopes of acquiring it in the future. As water quality in the lake improves, the shoreline will become all the more valuable, decreasing the chances to get the buffer needed to permanently protect the lake and polders.
- **Create Development Guidelines for Adjacent Properties**
Begin meeting and working with adjacent landowners to initiate the development of design guidelines that can be developed to the mutual benefit of both the landowners and the governing agency.
- **Southside Sector Plan**
Work should begin on a sector plan for the Southside area, which encompasses properties in both the City and the County. Given that the City has current experience in developing sector plans, the City should lead the effort with significant participation by the County. The property owners within the sector are a key interest in the Plan, as well as entities such as the South San Antonio Chamber of Commerce.
- **Howard Road Realignment**
Howard Road is currently a planned roadway shown on the Future Thoroughfare Map of the City. The City of San Antonio has not acquired a right of way near Mitchell Lake for this road. Nevertheless, since the roadway will be built in the future, revising the Future Thoroughfare Map to show the alignment north of the uplands is important. Such a process takes about ninety days, and can be sponsored by the City.
- **Consider Establishing a Management Foundation**
This proposed foundation could be the management and funding entity for the refuge. Getting the foundation up and functioning would create an opportunity to build the rest of the program elements.

- **Create a Detailed Economic Development Plan for the Watson and Howard Road Intersections**

Because this is neither closely intertwined with program elements on-site nor has prerequisites in the project, it can proceed when funding is available.

- **Change the Name of Mitchell Lake**

Many people during the planning process have seen changing the name of Mitchell Lake as important. Many different processes for changing the name exist, ranging from contests to marketing studies. Because fundraising and community involvement will be a key component in the success of the refuge, marketing the project will become more important. To effectively market the project, the name needs to remain constant. In short, change the name early on or do not change the name at all.

B. Access to Facilities

The facilities at the Mitchell Lake Wildlife Refuge are for the general public, with the exception of the proposed university-level research facility. Nevertheless, general public access should not be confused with uncontrolled access. Since this is a wildlife refuge, access to the site must be controlled in a manner consistent with the refuge's mission. Access to the uplands and polders, access to Bird and Skip's Ponds, and access to the education center and associated facilities are all controlled so that activities there do not disturb the wildlife.

The access to the uplands and polders is controlled by the Wildlife Refuge Center, which is housed in a building at the vehicular entrance off of Pleasanton Road. Visitors will be required to check in before traveling to the polders. Rules will be posted as well as up-to-date information about events at the refuge. People are required to stay in their cars in the polders except at designated points. Pedestrian/bicycle access or movement around the polders is prohibited.

Access to Bird and Skip's Ponds is controlled via the Wildlife Refuge Center as well. An unimproved trail around Bird Pond allows for limited pedestrian access for birders to watch and photograph wildlife.

At all times, the staff at the Wildlife Refuge Center could govern access to the uplands and polders, as well as movement within the site. Science-based management of the refuge will be the basis for the operation of the refuge; therefore the refuge may be closed infrequently during key events during which the wildlife may not be disturbed. The staff is responsible to the governing agency for operations and maintenance of the refuge.

The Education Center's staff could control access to the Education Center, wetland exhibits, and associated trails. Staff could close the Center during key events, and they could also control access to the polders and uplands. The Education Center staff could be responsible to the governing agency for the operations and maintenance of the center. Security for these facilities could be a coordinated effort between private security, city police, and county sheriff's deputies.

The only facility at the refuge without access for the general public is the proposed university-level research facility. Although that facility has not be programmed or planned, it can be anticipated that the laboratories and class facilities are for the exclusive use of the funding university.

All of the facilities at the Mitchell Lake Wildlife Refuge shall comply with applicable regulations for access, especially those provisions stipulated in the Americans with Disabilities Act (ADA). Regarding the trails, certain trails can be designated as challenge or unimproved trails, which may be viewed differently under the ADA regulations. For example, the pedestrian trails along the west side of the lake leading northward from the Education Center could be ADA accessible to the first tower, and be a challenge trail for the rest of the trail northward because of its length.

5. Physical Plan Guidance

Throughout the subsequent development and operations processes that will take place at Mitchell Lake, SAWS will use the appropriate expertise and performance standards to guide the development. Expertise and performance standards will define the people and methods used in developing and managing the property.

A. *Ecosystem Development and Water Quality*

1) *Introduction*

An ecosystem can be defined as “a natural unit of living and nonliving components which interact to form a stable system in which the living and nonliving units cyclically exchange materials, as in a balanced aquarium or in a large lake or forest”. The entire Mitchell Lake project area is an ecosystem and the ecosystem is what makes the Mitchell Lake project area a subject for research and discussion. Therefore, each section of this Implementation Plan is based on having a healthy, quality ecosystem that will support all of the desired uses for the site.

Ecosystem development refers to the manipulation of the appropriate living and/or non-living variables in the system in order to obtain the highest quality habitat for the greatest number of desirable species, including human use. This section of the plan identifies those components of the ecosystem that require attention or could benefit from enhancement.

The complex Mitchell Lake ecosystem currently supports a wide range of waterfowl, land birds and other wildlife as well as a diverse mix of flora. While the components of an ecosystem can be categorized in many different ways, the Mitchell Lake system can be broadly broken down into the following habitat types: aquatic, wetland, mudflat, and upland. All of these components are interrelated and integral to the overall system. Some of the variables within the ecosystem, such as water quality, require improvement while some areas, such as the mudflats, should be preserved or enhanced.

The Mitchell Lake ecosystem can also be divided into basic topographic regions: open water lake, fringing wetlands, polders, and uplands. These regions may support one or more of the habitat types listed above.

The development of the Mitchell Lake ecosystem will involve several steps, some of which must be implemented sequentially, some of which may be implemented simultaneously. Some of the necessary steps will be fully identified only after the process has begun and further studies reveal the more details about the state of the ecosystem. Since water quality is Mitchell Lake’s most important resource, and due to the fact that stakeholders ranked water quality improvements as the highest priority, this will be discussed in depth in the following section. Following this

comprehensive discussion will be more general analyses of further steps that need to be taken in bringing the Mitchell Lake Implementation Plan to fruition.

B. DEVELOPMENT COMPONENTS

1) Water Quality Improvements

Current Status

A number of challenges to water quality improvement in Mitchell Lake have been identified during this project and in previous studies. The principal water quality problems identified include the following:

- Excessive algal growth in the lake
- Low dissolved oxygen concentrations
- High pH values
- Elevated total suspended solids concentrations.

The last three problems can contribute to noncompliance with the discharge permit issued by TNRCC during periods when the lake is discharging into the Medina River. All of the problems identified during the study can be attributed to excessive algal growth. Therefore, the solution to water quality problems is directly related to reducing the algal population in the waters of the lake.

The algal population is driven predominately by three factors; excessive nutrient concentrations, elevated temperatures, and long periods of sunlight. Temperatures and sunlight are functions of the geographical location of the lake and cannot be controlled. The excessive nutrient concentrations can be addressed.

The nutrient sources available to exacerbate the algal problem include phosphorus and nitrogen in the existing water column, the effluent from the Leon Creek Wastewater Treatment Plant, and the nutrients in the sediment pool. The nutrients available from the sediment are the most significant source and these must be controlled before any significant improvement in water quality will be realized.

The two nutrients of concern are nitrogen and phosphorus. Phosphorus is the easiest nutrient to control in an aquatic ecosystem, and for long-term water quality management the strategy should be to limit the phosphorus concentration in Mitchell Lake.

Existing Water Quality

Based on data provided by other studies, the water quality in Mitchell Lake is summarized in the table below.

Summary of Water Quality In Mitchell Lake

Parameter	Concentration (mg/l)
5-day Bio. Oxygen Demand (BOD ₅)	40
Total Suspended Solids (TSS)	138
Total Phosphorus (P)	1.1
Total Nitrogen (N)	15.5
NH ₄ + NH ₃ – N	< 0.1
Total Dissolved Solids (TDS)	1,450
Chlorophyll	0.4 – 1.3
PH	9.4
Dissolved Oxygen (DO)	0 - 20

Current Water Quality Criteria

There are several different sources of water quality standards and criteria that can be used to assess the current water quality situation in Mitchell Lake. Mitchell Lake is in Segment 1903 of the Medina River, and is subject to the water quality standards for that segment. The criteria are based on the uses of contact recreation, high quality aquatic life, and no use as a public water supply. The criteria for Segment 1903 are given below.

Water Quality Standards for Segment 1903

Criteria	Concentration (mg/l)
Chlorides	120
Sulfates	120
Total Dissolved Solids	700
Dissolved Oxygen	5.0
PH (standard units)	6.5 – 9.0
Fecal Coliforms (#/100ml)	200
Temperature	90 degrees

In the 1986 Gold Book EPA stated that,

“To prevent the development of biological nuisances and to control accelerated or cultural eutrophication, the total phosphates as phosphorus (P) should not exceed 50 ug/l in any stream at the point where it enters any lake or reservoir, nor 25 ug/l within the lake or reservoir”

In the *NUTRIENT CRITERIA TECHNICAL GUIDANCE MANUAL: Lakes and Reservoir*, published by EPA in April 1999, the agency indicates that total phosphorus concentrations greater than 0.15 mg/l and total nitrogen concentrations greater than 1.5 mg/l are likely to “predict Blue-Green algal bloom problems during the growing season.”

The State of Texas, through the TNRCC, has issued a document entitled *Guidance for Screening and Assessing Texas Surface and Finished Drinking Water Quality Data (for State Fiscal Year 2000)*. The document provides screening criteria, not standards, which are useful for assessing water quality criteria in Mitchell Lake. The screening criteria published by the state for reservoirs are presented below.

Parameter and Screening Levels for Reservoirs in Texas

Parameter	Screening Level (mg/l)
NH ₃ – N	0.12
NO ₂ + NO ₃ – N	0.34
Ortho P	0.10
Total P	0.24
Chlorophyll a (micrograms/liter)	22.3

The TNRCC document indicates there should be no concern for those instances in which the data for a single parameter exceed the screening level in less than 25 percent of the samples. However, there should be concern when more than 25 percent of the data for any one parameter exceed the screening value.

Goals of Water Quality Improvements

It should be pointed out that goals for water quality improvements to Mitchell Lake should be set at a reasonable and attainable level. During the public involvement process, the discussion on this issue centered on improving water quality to a level similar to that of nearby Braunig and Calaveras Lakes. In technical terms, this can be measured, as a Trophic State Index (TSI) of about 70, meaning Mitchell Lake will always be a eutrophic lake with some level of algae present.

In layman's terms, water quality should be improved for the purpose of improving odor control, reducing mosquito population, meeting discharge permit requirements and providing a habitat that allows greater diversity in the fish population.

No planning efforts have looked at attempts to achieve a TSI below 70. This planned TSI level is appropriate with SAWS goals of improving wildlife habitat and environment for the surrounding area. Efforts to exceed this level to the point of promoting swimming, skiing or other forms of contact recreation were not considered.

Past Studies/Baseline Improvements

Past studies have provided the baseline for proposed water quality improvements for the lake. As part of the master planning process for this project, these studies were reviewed and compared against the most current technical literature. The primary study used as a baseline for future water quality improvements for Mitchell Lake is the Wetlands Feasibility Study prepared by the Simpson Group in 1997. This study looked at improvements to the polder complex for the purpose of improving water quality in the lake and polders. The study was later broadened to include review of constructed wetlands as a post-lake treatment method for improving lake discharge permit compliance as well as lake water quality. Several alternative scenarios were developed and ranked

according to predetermined criteria. Alternative 8A was the highest ranked alternative and was recommended by the established review committee for that project. That alternative formed the basis for current water quality recommendations and included the following general components:

- Relocation of influent water pipeline from west side of lake to polder area.
- Improvements to polder complex to include level and flow controls, improvements to berms and addition of wetland plantings.
- Re-establishment of upland ponds to include Bird and Skips ponds.
- Development of post-lake wetlands for the purpose of water treatment, permit compliance and habitat improvement.

All of the above improvements, as recommended by the Wetlands Feasibility Study, are endorsed and recommended by the Master Plan. In addition, the priority rankings suggested by the plan follow the above sequence. However, prior to performing item #4, it is recommended that additional steps be taken to assure that the proposed constructed wetlands for post-lake treatment would perform as needed for permit compliance. These additional steps include the following:

- Prior to full implementation, perform small scale efforts in regard to constructed wetlands for treatment of Mitchell Lake water: The type of wetlands constructed will greatly affect ultimate water quality improvements and permit compliance. The proposed post-lake wetlands should be constructed on a small scale and operated to determine treatment performance.
- Review post lake treatment alternatives and associated costs: In conjunction with the above small scale wetland efforts, several scenarios should be reviewed in regard to wetland design and other possible treatment methods.

It should be noted that although Alternative 8A recommended post-lake wetlands, no other post-lake treatment alternatives were considered in that study. In addition, SAWS has previously constructed a small-scale wetland (a rock-reed filter) on the east side of the lake with the intention of treating Mitchell Lake water for use at the Mission del Lago golf course. Although the system initially worked well in regard to algae removal, the performance deteriorated after several months. Eventually, the effort was abandoned in favor of polymerization-flocculation units. This effort is mentioned in order to emphasize that although there are numerous examples of working wetlands that perform as desired, proper design and operation is critical.

Cost review will be critical during the evaluation of treatment scenarios. Wetland designs in particular can vary considerably regarding cost, ranging from as little as \$12,500 an acre all the way up to \$100,000 per acre. For this reason, the post-lake treatment is not included in current cost estimates for this Master Plan. Rather, cost of small-scale efforts for wetland design and treatment evaluation is included.

- Prepare mechanistic model for lake water quality: Many factors will continue to influence water quality. Among these are: sediment composition, lake depth, water quality of Leon Creek effluent, wetlands performance and contributing drainage water quality. A mechanistic model that includes all of these factors is recommended to help evaluate present and future scenarios prior to embarking on post-lake treatment scenarios or additional sediment/dredging evaluations. For instance, while it is believed that Alternative 8A will definitely improve water quality in regard to odor control, insect control, habitat improvement and permit compliance, it is unknown whether visual appearance of the lake water will be significantly improved even after a number of years. The lake will likely continue to have high algae content and therefore its deep green appearance. In order to reduce nutrient levels and thereby reduce algae, other steps will likely be necessary.

2) Re-establishment of Bird & Skips Ponds

Bird and Skips ponds are two shallow depressions north of the polder complex. Northernmost Bird Pond is approximately 1,500 feet from the polder complex. The ponds were historically connected to each other and to Mitchell Lake by a drainage channel through the polder area. Development to the north has severely limited the surface water run-off that fed these ponds. As a result, they are dry during times of low rainfall. The development goal is to restore and enhance the two ponds so they will support a diverse mix of floral and faunal species year round and reconnect them hydrologically to the polders and, thus, to Mitchell Lake.

The development plan for the re-establishment of Bird and Skips ponds should be based on an analysis of the existing soils, vegetation, & hydrology. This information has already been gathered in part during the inventory and analysis phase of the Implementation Plan. It is important that the design for the re-establishment of the ponds allows for a substrate that will hold water. The ponds should be enlarged, possibly deepened, and contoured with 1:8 or 1:10 slopes and/or littoral shelves to provide varying water depths for habitat and plant diversity. Water control structures should be constructed for each of the ponds to offset evaporative losses and assure a stable hydroperiod. It has been recommended that treated water be piped directly from the Leon Creek Wastewater Recycling Center into Bird Pond, through Skips Pond, into the polder complex, and eventually into Mitchell Lake.

The natural drainage that connects Bird Pond, Skips Pond, and Mitchell Lake should be dredged and contoured to support the estimated flows. The sides and channel should be earthen and the overall design of the channels should be configured in natural curves. In other words, the ponds and the channels should not have straight lines and riprap. Planting trees and shrubs along the banks of the connecting channel would provide a high-value riparian corridor between the water bodies.

Construction activity at these two pond locations and on the connecting drainage ways should occur during times when the migratory birds are not as numerous in the polders and lake system in order to avoid impacts or disruption to this important wildlife component. Coordination with the local

Audubon Society and Mitchell Lake Wetlands Society representatives will help determine the best times for construction.

Once vegetation is established around the ponds, this area might be used as an on-site source for seeds or seedlings to transplant into wetland or transitions zones throughout the Mitchell Lake system.

3) *Enhancement of Polders*

Enhancing the polders is sensitive due to the well-established nature of the bird habitat in this region. While other variables in the Mitchell Lake ecosystem are altered, the effects on the polders will be carefully monitored to prevent degradation of this habitat and determine if enhancement is occurring as an indirect effect. For example, how will improving the quality of the water in the polders affect the system? Also, when a constant water source enters Mitchell Lake from Bird and Skips ponds through the polder complex and water control structures are working correctly within the polders, the water levels in the polders will be more consistent than at present and will be controllable. This will allow preservation of existing mudflats and the creation of additional mudflats if more of this habitat is desirable.

It may be discovered that, once the water quality has been improved, a constant water source is established, and viable water control structures are constructed, no further action is necessary within the polders. Any actions that are undertaken in the bird habitat of the polders should occur during low use periods out of the main migration season.

4) *Construct Wetlands along Lake Shoreline*

There are several areas around the lake that are identified on the conceptual plan as possible sites for wetland development. Wetlands along the lake shoreline and in some of the protected coves of the lake would increase habitat and species diversity. Wetland vegetation would filter runoff from adjacent land, trap sediments, improve and protect the quality of the lake, and serve as a buffer to lessen wave erosion of the shore. Wetlands also serve as a visual amenity.

The City of San Antonio intends to use Mitchell Lake as a water storage facility. Therefore, the water level in the lake itself will not only fluctuate with inflow, rainfall, and evaporation, but will also vary with the frequency and amount of water used. Hydrologic budgets will determine the amount and duration of water drawdown. Wetland areas along the lake shoreline must be planned to accommodate such water fluctuations by careful grading and plant species selection.

The wetland vegetation that is planted along the lake shoreline or in the polder areas will most likely require some protection from extreme water level fluctuations and predators during at least the first

growing season. A management and monitoring plan will be essential for the created wetland areas. Once vegetation is established in these wetland areas, they might be used as an on-site source for seeds or seedlings to transplant into other sites in the Mitchell Lake system.

5) Enhancement of Uplands

Portions of the upland portion of the Mitchell Lake ecosystem are valuable habitats for the birds and other wildlife species that visit or live in the area. However, much of the upland vegetation is less diverse and more stunted in areas than it was historically planted with invader weedy species, such as bermudagrass, overtaking many areas. With careful planting and management more upland diversity can be achieved to benefit the wildlife and human visitors.

There is potential for the uplands to support land management research projects such as the development of a tall grass prairie. There are few remnants of tall grass prairies remaining in Texas, but recent vegetation sampling in the uplands revealed the presence of viable grass species from just such a prairie system. To reestablish such an ecosystem within the Mitchell Lake complex would be a point for research, visitation, and possible funding.

Bermudagrass is firmly established over many acres of the upland area. A design for enhancing the uplands might include constructing a levee around a large area and piping dredged material from the lake into the levied area to allow it to dewater into the lake. Over a period of 2-4 years, monitoring of the site would determine whether or not the overburden of dredged material had successfully smothered the bermudagrass, what plants might best grow in that soil, etc. A small test project may have to be performed to judge the suitability of this method.

6) Enhancement of Buffer Zone

The buffer zone between the Mitchell Lake and polder complex and any development adjacent to the complex will serve many purposes and will be a vital part of the ecosystem development.

Upland vegetated buffers are widely regarded as being necessary to protect wetlands, streams, and other aquatic resources as well as certain wildlife habitat such as the polder/basin complex at the northern end of Mitchell Lake and the shoreline of the lake itself. The buffer zone should be enhanced with careful planting of trees, shrubs, and herbaceous species that would provide some, if not all, of the following functions: a visual and aesthetic screen between the Mitchell Lake ecosystem and nearby development; a somewhat rugged and natural yet protected and safe bird viewing experience for visitors; cover, foraging opportunities, nesting habitat, and potential roost sites for a variety of birds and other wildlife; limiting easy access and by blocking or attenuating the conveyance of noise, light, odors, and debris; and by attenuating noise during the construction of the development. The addition of appropriate fencing would help keep children and domesticated

animals out of the refuge. This would, in turn, cut down on vandalism, impacts, predation, and lawsuits as a result of accidents within the refuge.

7) Additional Ecosystem Issues

a. Mitigation Banking

Mitigation Banking is a viable option for Mitchell Lake. However, there are some significant issues that must be addressed.

Financial Considerations - Mitigation Banking

The time frame to obtain approval from the USACE for a Mitigation Bank can be a year or more. The bank will be approved for a specific geographic area. This area has been limited by the USACE (with some minor exceptions) to the watershed within which the mitigation bank is located. Mitchell Lake is in the San Antonio River watershed but may not have enough of the right type of wetlands to warrant a bank. Impacts to wetlands and other waters of the United States (lakes, ponds, creeks, rivers, etc.) should be mitigated by a similar type of ecosystem. Most of the wetland areas within the San Antonio watershed are riparian (vegetated edges to rivers, streams, and creeks). Mitchell Lake wetlands would be marsh, emergent, or possibly wooded with upland buffers and open water components. Creating a wetland can cost anywhere from \$10,000 to \$100,000 an acre depending on existing soil, grade, water supply, plant source, quantity of dirt to be moved, etc. Credits cannot be sold until the wetlands are “up and running” to the satisfaction of the agencies. This can take 2-3 or more years.

SAWS would be responsible for ensuring that money is available for the operation and maintenance of the bank during its operational lifetime. The demand and the financial return on investment for a mitigation bank in the San Antonio River watershed must be assessed. There are several steps to determine the need:

- a. The USACE does not have wetland impacts and mitigation requirements per impact in any form that would assist us in determining need within the watershed or within the 12 or so counties included in this watershed. Therefore, it would be necessary for someone to physically go through the USACE files in Fort Worth to determine these statistics. This would establish past impacts to wetlands, the types of wetlands impacted, who is applying for such permits, and how many acres of wetland mitigation were required under each permit.
- b. An analysis should be made of the proposed plans of entities (SAWS, TxDOT, private developers, SARA, et al.) that may have the need to apply to the USCE for a permit to impact wetlands or other waters of the U.S. within the next 5-10+ years. However, the mitigation bank itself may not be available for credit sales

for 3-5 years. This step is very speculative but will provide a basis for determining future demand.

The mitigation banks approved to date by the USACE Galveston District are in the coastal plain and in East Texas. These are areas with a high percentage of wetlands and high development activity - the two key components for mitigation banking demand.

Practical Considerations - Mitigation Banking

Land must be purchased. It might be feasible to levee off small areas of the lake adjacent to the polders to create manageable wetland areas. A constant and naturally sustainable source of water must be insured that will support the wetland. The agencies do not approve of mechanical means to insure the water source.

Although the USACE might give some consideration to existing wetland areas (i.e., the polder complex), more credit is given for newly created wetlands. More limited credit will be given for the enhancement of marginal wetland areas. Enhancement might be feasible for areas around the polders and the lake itself.

The quality of the water going into the wetlands must be capable of supporting the wetland plant species. While a wetland is capable of “cleaning up” many kinds of degraded waters, it cannot survive with the present high pH of the Mitchell Lake water.

The Mitigation Bank itself should be protected in perpetuity with appropriate real estate arrangements (e.g., conservation easements, transfer of title to Federal or State resource agency or non-profit conservation organization).

Other uses planned for the Mitigation Bank must not interfere with the quantity and quality of wetlands. The proposed multi-use aspects of the Mitchell Lake area should not interfere with the operation of the bank.

Another consideration is that the potential service area for the bank is in two USACE districts: Fort Worth District for Bexar and Wilson counties and portions of counties northwest of Bexar and Galveston District for Karnes, Goliad, and Refugio counties. These last three counties probably have the most wetlands, but the least development. They are also within the GLO’s Coastal Zone Management area that would possibly require more mitigation to any wetland impacts within that zone. It has yet to be determined what, if any, impact the overlap of USCE districts would have on setting up the bank.

An alternative to a full-scale mitigation bank approved by the USACE might be to use created wetlands in the Mitchell Lake ecosystem as more informal mitigation areas for development planned by the City of San Antonio or other partnership entities.

b. Vector Control

Ecosystem development should minimize mosquito problems by minimizing the potential formation of stagnant water and by using natural biological control mechanisms, such as mosquito fish, bats, and purple martins. Local mosquito abatement districts can provide valuable assistance in ways to minimize mosquito habitat.

c. Hazardous Materials

Prior to construction activity within the project area, an updated review of the agency records for hazardous materials and an Environmental Site Assessment are recommended. These efforts will reveal any issues, such as an underground storage tank, that must be dealt with.

d. Endangered & Threatened Species

No habitat for, or presence of any resident endangered or threatened species, has been observed in the Mitchell Lake project area. However, the latest bird list from the Mitchell Lake birdwatchers lists sightings of three migratory birds that are federally listed: the peregrine falcon, the piping plover, and the eskimo curlew. While several observers have reported seeing the Peregrine Falcon, the other two species are historical notations and may have been incidental visitors to Mitchell Lake.

There are a few truly native grasses from remnant tall grass prairie days in the uplands. This endangered ecosystem could be brought back to the area with a seeding and management plan.

Creating habitat that will support one or more faunal or floral species, or an ecosystem such as the tall grass prairie, is a feasible and beneficial component of the Mitchell Lake ecosystem development.

e. Aquatic Resources

Aquatic resources, both faunal and floral, are currently low in diversity and numbers due to the hypereutrophic nature of the water in Mitchell Lake. Once the water quality has been improved in the lake, more desirable plant and animal species can be introduced or, in some cases, will establish naturally.

f. Spring-fed Lake?

There have been unsubstantiated reports that Mitchell Lake is or has been spring-fed. The “Mitchell Lake Wetland Feasibility Study” (1997) describes the east-west fault lines running just north of Bird Pond and through the southern end of Mitchell Lake. These faults “created a shallow body of water.” The report further states that “The Edwards Aquifer, thought by some to be a historical source of spring flow to Mitchell Lake, lies some 1,500 feet beneath the project area and does not likely provide natural flow to the project site.”

However, it is important that any new evidence for a spring-fed water source to the system be explored and factored into the ecosystem development of Mitchell Lake.

g. Fly Ash in Decant Basin #2

The Mitchell Lake Wetland Feasibility Study (1997) discusses the fly ash issue at Basin No. 2 in detail. This issue should be revisited during ecosystem development of the polder area by coordinating with TNRCC on current guidelines for the use of fly ash, bird use of this polder, and how dredging, grading and/or fill material can or should best be accomplished to enhance this polder.

h. Coordination with Other Environmental Programs

There are numerous environmental focus groups and environmental programs in the San Antonio area and in the state that may have a direct bearing on Mitchell Lake ecosystem development. Many of these environmental programs were identified in the Inventory and Analysis Report that preceded this plan.

Coordination with these groups and their proposed programs will ensure that every program benefits from shared knowledge, research, and educational opportunities. Mitchell Lake is a key element in this coordination of effort because of its size, its location, its recognized value as a bird refuge, its unique water issues, and its great potential for ecosystem development and enhancement.

i. Management Plan for Mitchell Lake Ecosystem

As each component of the ecosystem development plan is designed and implemented, a management plan for the Mitchell Lake ecosystem should be updated to incorporate the monitoring, etc. for that element and describe its place in the overall plan. The Management Plan should include baseline analysis of the ecosystem components, goals, and monitoring results. The governing agency, probably through a Refuge Manager, should prepare this plan.

j. Permitting

Mitchell Lake, the polders, and possibly Bird and Skip's ponds are waters of the United States and are, therefore, subject to the jurisdiction of the U.S. Army Corps of Engineers (USACE). Prior to any earthmoving activity in these areas, the USACE must be contacted for any necessary permits and coordination should be made with all pertinent local, state, and federal agencies.

SUMMARY

The ecosystem development for the Mitchell Lake project area involves numerous variables that are interrelated. The specific order in which these components are addressed and

implemented can vary depending on the need, the dependency on other aspects of the plan, priority assessment, time of year, and funding.

B. Education

Introduction

The educational opportunities at Mitchell Lake and surrounding environments have been well documented since R. Menger, M.D., wrote the book *Texas Nature Observations and Reminiscences* in 1913. Early Spanish settlers referred to Mitchell Lake as both “Lagunilla” (small lake or pond) and “Laguna de los Patos” and recognized the area along the Camino Real as a landmark. This unique environment and resource for the San Antonio region has evolved into a world-renowned refuge for over 300 species of birds and a variety of other flora and fauna. In 1973, the San Antonio City Council issued an ordinance that designated the uplands area of the lake as a “Refuge for Shore Birds and Waterfowl.” The 1500 acres comprised of the lake and the area owned and managed by SAWS, is a rich source of cultural and environmental resources that has been influenced by man since its discovery. Educating all age groups about this unique resource is one of the primary goals of the Mitchell Lake Implementation Plan.

The educational component is central to the redevelopment of Mitchell Lake for the following reasons:

- Educational facilities (Wildlife Refuge Center - #12, Separate Research Facility - #18, Education Center - #20) represent the community’s consensus as to the different levels of access envisioned at Mitchell Lake.
- The three ‘zones’ of access protect the wildlife and habitat by channeling the greatest impacts towards the least sensitive areas, maintaining and enhancing the existing access for wildlife viewing, and preserving the more remote and ‘wildest’ part of the site for research.
- Mitchell Lake’s educational appeal is multifaceted. The wildlife, its habitat, and the lake’s links to other points along the migratory path represent one aspect. The lake’s proximity to a major city makes it an asset and a significant opportunity to the region’s residents as well as visitors. The historic links indicated by the lake’s presence on old Spanish maps suggests a rich, largely untapped opportunity for students of Texas history. The Texas Department of Transportation publication, [A Texas Legacy: The Old San Antonio Road and the Caminos Reales](#), discusses the different routes (the route relevant to Mitchell Lake is the Camino de en Medio or Lower Presidio Road) and offers suggestions for future research.
- Mitchell Lake may have a link to Mission Espada as it may have been part of the Mission Rancho.
- In addition to the general history of human settlement in the area, Mitchell Lake may represent an important resource of the history of water resource management in the San Antonio region.

1. Education as a Catalyst to Implement the Mitchell Lake Plan

Education figures prominently in SAWS Board's goals for the project, since three of those goals relate directly to education. Education as a driving force behind the development of the Master Plan could bring about opportunities for partnering and creating organizations whose focus is to coordinate education functions at Mitchell Lake. While the SAWS Board will direct what efforts will be made towards providing educational opportunities at Mitchell Lake, a couple of alternatives merit discussion. These are not the only means of creating educational opportunities at Mitchell Lake.

One potential method to assist in meeting the plan's education goal is to establish a foundation at Mitchell Lake. A 501.c.3 tax-exempt foundation established for the purpose of implementing the Mitchell Lake Master Plan could perpetuate this multi-objective resource as it has been defined by the plan. The foundation could also be a mechanism for raising funds, hiring staff, and managing the site's resources. Such a foundation could protect and enhance the cultural, environmental, recreational, and utility-based resources for San Antonio. It is recommended that one of the first goals of the foundation would be to define the educational goals and objectives for Mitchell Lake and take the necessary action to meet them. The foundation's education program could be a marketing catalyst that generates interest from every segment of the fund-raising and volunteer communities. Education is the most generally accepted goal by these communities and can benefit the greatest number of people for the cost.

If the San Antonio Water System (SAWS), chose to establish such a foundation, then one of its functions would be to ensure that SAWS's goals would be met and that the foundation would have proper operational agreements on SAWS's property. In addition, SAWS could assist by providing necessary seed money for the first few years to get the foundation established.

The foundation could hire a naturalist/education coordinator to get the education program started, even though there wouldn't be any education facilities at Mitchell Lake until it becomes a priority. The education coordinator could also be a community outreach leader for the foundation. The coordinator would be involved in education, fund raising, marketing, and general leadership for the foundation in its formative years.

Another method of accomplishing the education goals involved could be partnering with local educational institutions and agencies. It is recommended that one of the first educational goals would be to coordinate with local school districts to begin a Mitchell Lake educational outreach program that brings the program to schools. This could be accomplished with an approved curriculum at a designated grade level that all of the school districts participating in the program would adopt. A coordinator, chosen by the educational institution and SAWS, could implement the curriculum in conjunction with each district's science curriculum and encourage participation from science curriculum coordinators. This seed educational program may generate support from students, parents, teachers, volunteers, and other potential advocates. A mature

educational outreach program at the schools can then generate financial and staffing support from the school districts. The school districts need to be financial and educational partners in order for the program to succeed.

A volunteer program should be part of the Mitchell Lake educational outreach effort as well. Volunteers must be educated and certified by an education coordinator, so that they are qualified to lead groups at the site and can begin the site-based education program. Coordination with local environmental and cultural groups will expedite the volunteer program.

Other resources exist that could assist SAWS and potential partners in establishing an educational program at Mitchell Lake. Such a resource is the “Adopt-a-Wetland” program that provides educational support materials and guidelines on conducting field classes on the importance of wetlands. “Adopt-a-Wetland” is supported through a cooperative partnership between the Center for Coastal Studies/Texas A&M University-Corpus Christi, the US Fish & Wildlife Service-Region 2, and the Texas Parks and Wildlife Department.

Initial program participants include school children (K-12), and other youth groups such as 4-H, Scouts, and Boys and Girls Clubs. Volunteers are currently being recruited to teach these youth about the importance of wetlands by utilizing a "hands-on" approach. Program facilitators are also needed to augment teacher/youth group leader training, providing a vehicle for increased program availability.

Whatever form the education program takes on, education is universally accepted and supported as an important part of our society. The educational outreach program could provide the basis for the marketing and fund-raising efforts. The educational programs can be explained using videos, brochures, televised educational programs, newspaper specials, and fund-raising events throughout the region. Public awareness of the Mitchell Lake resources should be continuously elevated by promoting the educational programs to the media, volunteer groups, and citizen groups that may be contributors to the Mitchell Lake programs.

2. Coordinate with the School Districts and Universities

The school districts in the San Antonio area are interested in Mitchell Lake as an environmental and cultural resource for their science curriculums. Thirteen of the districts have been contacted and have expressed interest in participating in the Mitchell Lake educational program. All of the districts want additional information and a chance to participate in crafting the program. The following matrix identifies the contacts and status of interest for each district:

Independent School Districts

	Interested	Interested / Contact Not Available	Current Environmental Program	No Environmenta l Program
Alamo Heights ISD 7101 Broadway San Antonio, 78209 Barbara Curriculum Office Phone: 824-2483		◆		
Lackland ISD 2460 Kenley Avenue, Bldg. 8265 San Antonio, 78236 Church Watkins Superintendent Phone: 357-5000				
East Central ISD 6634 New Sulphur Springs Road San Antonio, 78263 Dennis Elledracht High School Phone: 649-2951 x 133		◆	◆ at high school	
North East ISD 8961 Tesoro Drive San Antonio, 78217 Thea Platz Phone: 804-7145	◆			
Edgewood ISD 5358 W. Commerce Street San Antonio, 78237 Eddie Rodriguez Phone: 433-8035	◆		◆	
Northside ISD 5900 Evers Road San Antonio, 78238 Judy Fowles Secondary Science Phone: 706-8661	◆		◆	
Fort Sam Houston ISD 1902 Winans Road San Antonio, 78234 Mrs. Jean Willis Chairperson, Science Dept. Phone: 368-8739	◆		◆	
Randolph Field ISD P. O. Box 2217 Universal City, 78148 Mr. Bruce Canon Phone: 357-2300	◆		◆	
San Antonio ISD 141 Lavaca Street San Antonio, 78210 Jefferson High School, Environmental Magnate Ms. Carita Thomas Phone: 736-1981	◆		◆	
Somerset ISD 19644 Somerset Road; P. O. Box 279 Somerset, 78069 Connie Petruskevich, Science Dept. Phone: 622-9165	◆		◆	
South San Antonio ISD 2515 Bobcat Lane San Antonio, 78224 Ruben Flores Phone: 210/ 977-7400	◆		◆	

Southside ISD 1610 Martinez-Losoya Road San Antonio, 78221 Mrs. McCarthee Phone: 626-0600	◆		◆	
Southwest ISD 11914 Dragon Lane San Antonio, 78252 Bill Atkins Phone: 210/622-3455	◆		◆	

The universities in the San Antonio area that have environmental and science curriculums are generally interested in the Mitchell Lake resource. However, they need more information about the potential availability of this resource for their programs. Palo Alto College is a prime candidate for future participation in a research based program because of its proximity to Mitchell Lake and its recent affiliation with Texas A&M. The University of Texas at San Antonio has a strong science and archaeology program. St. Phillips College has a strong science program, and Trinity University has already been studying small mammals on-site for some years. Obviously, the potential for a research partnership between SAWS or a designated entity and some of these universities is strong. The research facility, proposed in the Mitchell Lake Implementation Plan, could be confined to the uplands area of Mitchell Lake and be accessed through the proposed Wildlife Refuge Center located off Pleasanton Road.

3. Develop an Education Program for All Ages

Start the education program by bringing the program to the schools, as previously mentioned. The naturalist/education coordinator could begin the program at the elementary age level and target a specific grade level, initially. Once that program has matured, then target other elementary grade levels to expand the program. The elementary level is the best level to start with because the program can then grow and mature along with the students.

Another way to start the elementary level outreach program would be to include it as part of an existing university education development program. If university level funding became available, it would be possible for the university to assist in the development of elementary level programs. Ultimately, the implementation timeline for these items will, like other elements, depend on funding availability.

Once the elementary level outreach program is in place, a program for training volunteers could be implemented. Local environmental groups, cultural groups, school faculty and parents, and civic organizations can be tapped for volunteers to bring small groups of students to the site. The training program for volunteers could be thorough and approved by the participating school districts.

Identify a site at the proposed education center site that can be the designated field visitation area for field trips. This will be the first location of the on-site education program. This field visitation area will also need to be made accessible for school buses and emergency vehicles.

Establish an on-site field trip program that is coordinated by the naturalist/education coordinator. The field trips could be coordinated through the school districts and be part of the Mitchell Lake education program. Certified volunteers could become part of the program's staff and lead groups on the field trips. Once the elementary age field trip program is established, it can then be expanded to accommodate older groups.

The educational programs would grow dramatically after an educational facility is built. Whatever entity is managing the education program would probably wish to hire a director of education after or during the construction of the facility. This person could be responsible for all the program's educational programming and staffing. The director of education could also coordinate and lead efforts to obtain accreditation from local, state and federal agencies. It would be especially important to organize the educational programs around the accreditation requirements of The National Association for the Education of Young Children. This accreditation would be very important to parents, educators, and foundations that are interested in supporting Mitchell Lake. Further, such programs should be consistent with State of Texas standards and have the state "seal of approval."

As mentioned on Page 59, the "Adopt-a-Wetland" program could be an important part of the education program. The Adopt-A-Wetland Program (AAWP) is a wetland conservation education program that emphasizes teaching youth about the ecological and economic importance of wetlands. Housed in Corpus Christi, Texas, the AAWP is currently recruiting volunteers to facilitate expansion outside the Coastal Bend to other areas of the State. The AAWP has appeal for school children from kindergarten through high school, so it could be a long-term partner for the education program.

The educational programs will grow and diversify as they mature, so that all age groups will be served. It is important to ultimately provide educational opportunities suitable in range from pre-school age students through retired adults. The director should also coordinate with similar programs throughout the country.

4. Build an Education Facility

A major program element for Mitchell Lake Implementation Plan is to program, design and construct an educational center for Mitchell Lake. This center will be the culmination of a major fund-raising effort that will draw public and private sector funds from the resources identified in this report. Designs should reflect the goals of the SAWS and demonstrate the latest sustainable technologies.

The Education Center should function as a regional attraction that reflects the unique regional and national significance of the Mitchell Lake resources. The facilities' design should also be a reflection of the rich cultural and environmental heritage of this area. The Education Center may be operated by a separate entity from SAWS. The cost of maintenance may be supplemented by City of San Antonio funds, but likely will not be a specific city department's jurisdiction.

The program for the Educational Center should generally be as follows:

- A. Landscaped entry road from Highway 281 that includes walls, signage and lighting
- B. Education building with an observation tower (10,000 to 15,000 s.f.)
- C. Drop-off area for buses and visitors

- D. Entry garden
- E. Parking for 5 buses, 35-40 vehicles, and 10 bicycles
- F. Fencing and security for the entire education center
- G. Pedestrian trails, observation towers, and observation areas
- H. Interpretive habitat/wetland areas that include the following:
 - a. ADA accessible trails
 - b. Boardwalks
 - c. Overlooks
 - d. Select viewing areas
 - e. Controlled access from education building

The program for the education building should generally be as follows:

- Reception area
- Classrooms
- Small auditorium
- Exhibit area with permanent and rotating exhibits
- Animal holding area
- Staff offices
- Gift shop
- Restrooms
- Observation area

Fees should be designed to offset the cost of operations and maintenance and can be generated from entrance fees, gift shop sales, educational class fees, special events, and supplemental city and SAWS funds. SAWS or a designated entity could outline management and operational guidelines, and special consideration could be given to visitation levels at various facilities. The goal should be to optimize educational opportunities while preserving and enhancing natural resources.

5. Build a Research Facility

SAWS could partner with universities to develop a research facility in the upland area of Mitchell Lake when such an on-site research facility became important to their programs. In such partnerships, SAWS and the universities could jointly approve the program and operations plan. Access to the facility would be strictly controlled through the Wildlife Refuge Center on Pleasanton Road. The facility could be funded, programmed, designed and constructed by the selected universities; however, all aspects of such a process would require SAWS review and approval.

The research facility could be located near Skip's pond in the upland area of Mitchell Lake. The facility could also be managed, operated and maintained by the selected universities.

6. Build the Wildlife Refuge Center

This facility would be the gateway to Mitchell Lake's Wildlife Refuge, research facility, and upland area. The center could be managed, operated and maintained by SAWS or a designated entity. This entity could also establish guidelines for operation of the refuge and hire a full-time refuge manager. A refuge manager could enforce the guidelines and ensure that resources would be preserved and enhanced.

The Wildlife Refuge Center will include the following program elements:

Parking area for 15 cars and 2 buses

Entry gate with landscaping and signage

Security fencing and security cameras

3000–5000 square feet of interior space that includes the following:

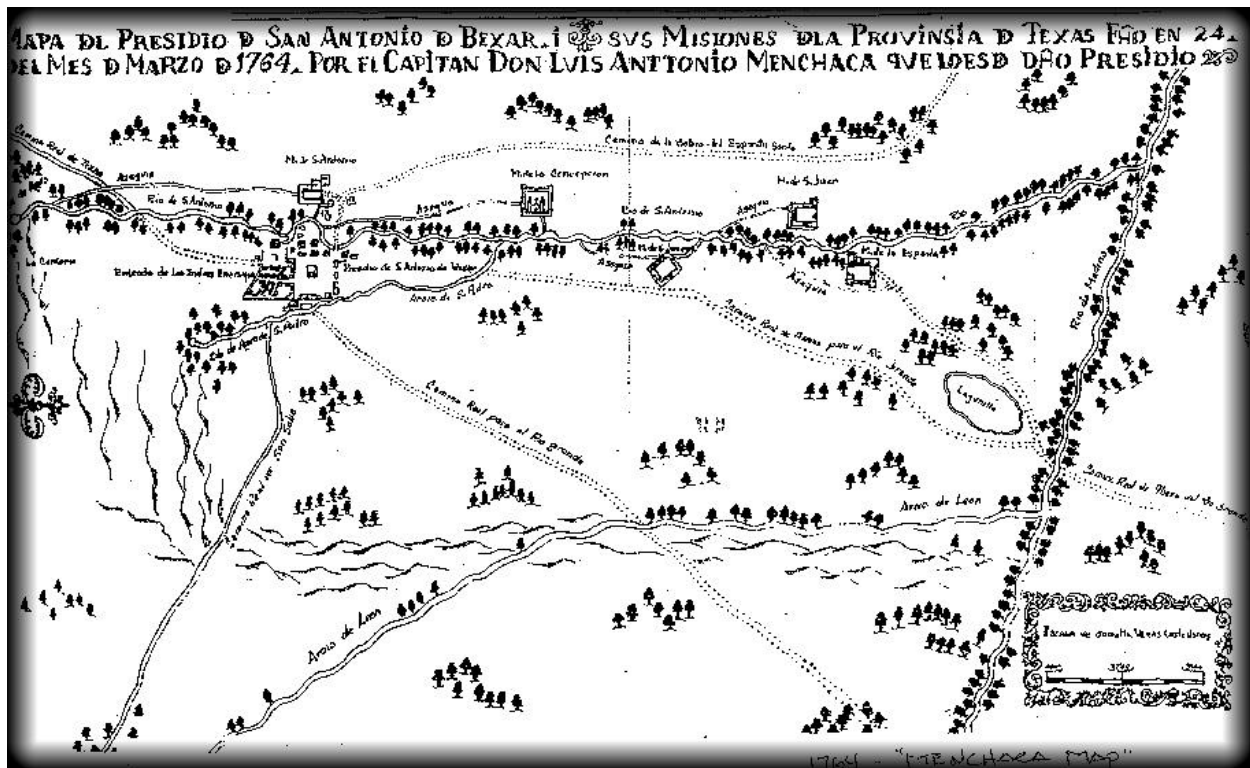
- Restrooms
- Meeting room
- Staff offices
- Exhibit and educational area

The design of this facility should be compatible with the image and character of the Mitchell Lake resources. This will be the public's first image of Mitchell Lake facilities as they enter from the north on Pleasanton Road. The development of this facility should be somewhat limited compared to the Education Center. The purpose of the Wildlife Refuge Center is to function as the office for the wildlife refuge, not be a fully developed education center. The primary users of the Wildlife Refuge Center consist of refuge staff and visitors to the refuge. The program regarding visitors to the refuge should facilitate access to simply viewing the wildlife.

C. Cultural Resources

Historically speaking, Mitchell Lake has the potential to be one of the richer archeological sites in Texas, but no detailed testing has been done to confirm that. The site has played important roles in history and therefore its rehabilitation should be sensitive to the potential impacts that any construction may have on these resources. Because of Mitchell Lake's potential archeological significance, several factors should be considered in proposing actions for rehabilitating the lake.

San Antonio itself grew as a historical crossroads, inhabited initially by Native Americans and later by Spanish explorers. Los Caminos Reales and several Catholic missions took root in San Antonio, and Mitchell Lake itself is depicted below on a Spanish map from 1764. Note the small "lagunilla" at the right side of the page.



The undiscovered nature of whatever artifacts exist around the Mitchell Lake site creates an exciting opportunity to include cultural and historical aspects in the educational programs. The juxtaposition of the Caminos Reales, the missions, and the historical pond are a perfect backdrop to promote prehistoric studies, Texas history dating back to the missionary establishments, the historical and botanical makeup of the area surrounding the pond, and much more. Using the Mitchell Lake Education Center to illustrate the history and culture surrounding water in the South Texas region is another outstanding possibility. Environmental education is a broad curriculum by itself, but adding a historical element stretches the horizons even further.

In this particular instance, State regulations can be a positive aid in unearthing whatever artifacts are around Mitchell Lake. Almost any improvements to the site will trigger the requirement of an archeological survey and pre-construction notification to the Texas Historical Commission. In general, if federal or state land, dollars, or permitting is involved in any municipal project over 5 acres in size and disturbs over 5,000 cubic yards of clay from a significant archeological site, surveys and site recordation are required. This could be very helpful in providing the catalyst necessary to perform the proper reconnaissance that will determine which areas may be the most fruitful.

In approaching the archeological study, it is recommended that a preliminary archeological survey be conducted of the city-owned upland areas. Next, coring samples of the lakebed should be conducted if the lakebed will be disturbed by improvements. It is important that these samples are taken in the earliest stages of the development of the preserve. The governing agency and SAWS should work to develop a strategy for working with the Texas Historical Commission regarding significant finds early in the process.

Given that UTSA has a strong archaeology program, the opportunity for a partnership between SAWS and UTSA for studying the cultural resources at the site may be very advantageous to both parties.

Funds may be made available to document the site if the site proves to be culturally significant. One of the negative considerations is that, if the site is excavated, recognition may have severe impacts upon the timeframe of the project. From a regulatory aspect, studying, documenting, and mapping of the site is complete only when it meets the satisfaction of the state historical society. There are no limits dictating how long the satisfaction of the commission could take.

In conclusion, the potential for discovering buried cultural resources at Mitchell Lake is high due to its position historically along the Caminos Reales just south of Mission Espada. What's difficult to work with now is the fact that no one knows for certain. Extensive fieldwork will be required before a determination about the archaeological richness of Mitchell Lake can be made.

D. Eco-Tourism and Economic Development

Eco-Tourism has been a burgeoning phenomenon for the last several years, particularly in relation to bird watching. According to the American Birding Association, the number of birdwatchers in the US has grown from 21.1 million in 1982 to 54.1 million in 1994, a 155% increase. Mitchell Lake is already a frequently visited bird watching site, in spite of the arrangements that must be made to gain access. That bird watching will continue to be a frequent activity at Mitchell Lake is a foregone conclusion. What needs to be studied is the potential effect on the local economy, and how eco-tourism at Mitchell Lake will integrate with the existing tourist economy.

Eco-tourism is not the only type of tourism that will draw visitors to Mitchell Lake. The historical nature of the site will be an attraction as well, and it can be part of a tourism program as well as part of the educational program. This aspect of Mitchell Lake could connect well with the Mission Trails National Historic Park, and could provide a synergy with the Mission Trails in terms of providing additional, related, but not identical, attractions to the tourist. For the purposes of this section, however, we will focus primarily on the eco-tourism potentials at Mitchell Lake.

1. Eco-Tourism Issues

a) Mitchell Lake's relationship to local eco-tourism opportunities

Based on a Texas Parks and Wildlife Study on Avitourism, bird watchers visiting Mitchell Lake or other local bird sanctuaries will, on average, visit 6-8 additional bird sanctuaries in the local area. This will also be supported by the future implementation of the Bexar Nature Preserve System (BNPS). Also, those same bird watchers visiting San Antonio will do additional sight seeing. The Mission Trails, due to its proximity to Mitchell Lake, is a very good candidate for increased visitations.

The Texas Parks and Wildlife Department funded a survey titled "Avitourism in Texas" dated October 12, 1999. Fermata Inc. conducted two surveys of bird watchers in Texas. Surveys were mailed to two populations of bird watchers: (1) travelers along the great Texas coastal Birding Trail and (2) attendees at the 1998 Rio Grande Valley Birding Festival held in Harlingen, Texas. One of the questions asked was, "How many sites did you visit during your most recent trip to observe, feed, or photograph birds?" The response was between 6-8 different sites.

There are 15 birding sites including Mitchell Lake in and around San Antonio that attract visitors to the area. These are: Brackenridge Park, San Antonio Botanical Center, Judson Nature Trails (Olmos Park), Friedrich Wilderness Park, Eisenhower Park, Southside Lions Park, Calaveras Lake, Braunig Lake, Hidden Valley Recreational Park, Choke Canyon State Park, Lost Maples State Natural Area, Kickapoo Cavern State Natural Area, Government Canyon State Natural Area, and Kerr Wildlife Management Area.

Mitchell Lake may be included in the Bexar Nature Preserve System. The Bexar Nature Preserve System (BNPS) will be a comprehensive, integrated coordinated network of natural areas representing all the major types of natural biological communities found in Bexar County. Owners and managers of preserves and a coordinating BNPS body will manage the BNPS. Natural areas in the system are managed to protect their natural and cultural resources but will be open to the public for education, research, and recreational activities. The significance of the BNPS is that this will integrate the Mitchell Lake Complex to other Nature Preserves within the county and provide overall Natural Preserve management and oversight.

Potential initial candidate preserve areas being considered for inclusion in the BNPS are Government Canyon, Freidrich Park, and Mitchell Lake. Owners and managers of preserves will voluntarily cooperate through a coordinating body to accomplish the following:

- Select future preserve areas
- Establish minimum management standards for the protection of preserves
- Provide for public use
- Support the development of greenways and transportation options to link the preserves with other public open space resources
- Develop educational facilities, programs and materials

The following biological community's categories have been established by the BNPS:

- Edwards plateau/hill country
- Black land/prairie
- South Texas plains/brush country
- Sandy lands
- Rivers and creeks
- Wetlands

Working with the BNPS will be the jurisdiction of a governing agency established to fund and manage Mitchell Lake in cooperation with SAWS.

The Texas Parks and Wildlife Survey "Avitourism in Texas" previously mentioned, also asked, "During your most recent trip, did you have any additional interests other than birding or wildlife watching?" The answer was 56% yes. What are these additional interests? 90.4% answered sightseeing.

As reported in the Mitchell Lake Inventory and Analysis report, the San Antonio Convention and Visitors Bureau published the results of a survey performed by McNabb, McNabb, DeSoto, Salter & Company. This extensive research study was performed in 1995 and 1997 to determine the profile of day-trip and overnight visitors to San Antonio. Over 6,200 interviews were conducted with visitors to San Antonio. Data gathered included reason for the trip, number of nights stayed, accommodations used, trip planning process, traveling party size, mode of transportation, and demographic data on the respondents.

In addition, respondents were asked their impressions of San Antonio, how they would rate various destination attributes, other destinations considered instead of visiting San Antonio, expenditure patterns on selected goods and services. Also, respondents were asked about visitation rates to San Antonio attractions such as Sea World, Six Flags/Fiesta Texas, The River Walk, Market Square, the Alamo, the San Antonio Zoo and others. The survey data, along with hotel room availability and occupancy data were used to estimate the number of visitors to San Antonio and their economic impact on the San Antonio economy.

Based on the 1997 survey, the Missions/Historical Park is ranked eighth on the list of most visited attractions in San Antonio. The significance of this data is that Mission Espada, which lies at the southern end of the park, is located approximately three miles just northeast of Mitchell Lake.

San Antonio Missions National Historic Park begins at the Alamo and continues south along the San Antonio River. From the Alamo, visitors can travel down Mission Trail to Mission Concepcion, Mission San Jose, and Mission Espada. Mission Espada is located just southwest of the intersection of Route 410 and the San Antonio River. In addition, Mission Espada is located approximately three miles northeast of Mitchell Lake.

b) Mitchell Lake's relationship to other national eco-tourism opportunities. Describe and compare similar facilities

Based on the American Birding Association (ABA) recent survey on the top 12 birding sites in North America:

1. Southeast Arizona
2. Rio Grande Valley, Texas
3. Everglades National Park, Florida
4. Texas Coastal Birding Trail
5. Cape May, New Jersey
6. Point Pelee, Ontario
7. Big Bend National Park, Texas
8. Point Reyes, California
9. Forsythe/Brigantine NWR, New Jersey
10. High Island, Texas
11. Hawk Mountain, Pennsylvania
12. Cheyenne Bottoms or Quivera NWR, Kansas

All of these sites are well-established and popular birding sites. Each of these can be studied in depth and used as successful examples for the Mitchell Lake project. Below are four sites that have some success as eco-tourism destinations and are all birding sanctuaries. More detailed descriptions for these four projects can be found in the Appendix.

The following brief comparisons of Mitchell Lake to these more famous eco-tourist destinations are intended to help the reader to realize the similarities between the projects. Subsequently, the reader may begin to understand the eco-tourism potential at Mitchell Lake, providing a vision beyond the current conditions. Four destinations were selected for comparison based on specific components applicable to this Mitchell Lake plan:

- Bosque del Apache- is a world-class refuge with extensive wetlands habitat and a visitor's center with programs similar to those planned for Mitchell Lake.
- Laguna Atascosa National Wildlife Refuge- is a refuge with wetlands habitat, auto-tour routes and trails.
- Heard Natural Science Museum & Wildlife Sanctuary- has extensive natural science education programs and facilities for groups of all ages.
- River Legacy Living Science Center- has controlled access, visitor and education facilities, hike/bike trails and is tied to the local city infrastructure.

1. Bosque del Apache

Bosque del Apache is known as one of the most spectacular refuges in North America. Each autumn, tens of thousands of birds including Sandhill Cranes, Arctic geese and ducks make the refuge their winter home. Bosque del Apache National Wildlife refuge was established in 1939 to provide a refuge and breeding grounds for migratory birds and other wildlife as well as to develop wintering grounds for greater Sandhill Cranes which were then endangered.

Bosque del Apache is located on the northern edge of the Chihuahuan desert. The refuge straddles the Rio Grande approximately twenty miles south of Socorro, New Mexico. The heart of the refuge is 7000 acres of flood plain. The remaining portion of the refuge is made up of arid foothills and mesas, which rise to the Chupadera Mountains to the west and to the San Pascual Mountains to the east. Most of these arid lands are preserved in three wilderness areas.

There are two items where Bosque del Apache relates well to Mitchell Lake. Even though the size of this refuge is much larger than Mitchell Lake (57,191 acres versus 1,200 acres respectively) the 7000 acres of flood plain where the waters of the Rio Grande have been diverted to create extensive wetlands are comparable. In addition, very similar to what is planned at Mitchell Lake, a visitor center is located on New Mexico Highway 1 that provides current information on wildlife sightings, exhibits, videos, and books.

2. Laguna Atascosa National Wildlife Refuge

This 45,187-acre coastal plain refuge is essentially flat landscape interspersed with lakes, shallow wetlands, slow creeks, and low ridges. These features create several diverse

habitats. The refuge is home to five endangered and two threatened species. In addition, the refuge offers a 15-mile auto tour route, a visitor center, and several trails.

There are several items where Laguna Atascosa National Wildlife Refuge relates well to Mitchell Lake. The auto tour route, wildlife refuge center, and the trails network are comparable to what is planned for Mitchell Lake. The wide, shallow wetlands of Laguna Atascosa are comparable to the existing polders and the future constructed wetlands, as well.

3. Heard Natural Science Museum & Wildlife Sanctuary

The Heard Museum is located in McKinney, Texas. Its founder, Bessie Heard, collected butterflies, nature prints, and other nature artifacts. Eventually, the collections, including an extensive butterfly collection, grew too large for the Heard House in McKinney. The museum opened to the public in October 1, 1967.

The sanctuary portion of the Heard Museum consists of diverse habitats over the 287-acre wildlife sanctuary with more than over five miles of interpreter-led or self-guided nature trails. There is a paved nature trail for wheelchairs. The habitats on the Heard Wildlife Sanctuary include bottomland, woodland, prairie, and wetlands. The Sanctuary is a haven for more than 240 species of birds, mammals, reptiles and amphibians and nearly 150 species of wildflowers and other plants. Fifty acres of wetlands feature an outdoor learning center with an observation deck, a floating study laboratory, and a boardwalk.

At the heart of the Heard Museum are its extensive natural science education programs. These programs are specific to special interest or ability groups and several age groups ranging from preschool to senior citizens groups. People develop an understanding and respect for the natural world around them.

The similarities between the Heard Museum and Mitchell Lake project are an education center coupled with a protected wildlife refuge and extensive education programs. These projects could be very close in scope and size, depending upon the degree of development that Mitchell Lake undergoes.

4. River Legacy Living Science Center

In February 1988, the River Legacy Foundation was organized by a group of Arlington, Texas citizens in collaboration with the Arlington Parks and Recreation Department. The mission of the foundation is to preserve and enhance the forest floodplain along the banks of the Trinity River as a natural educational and recreational amenity.

River Legacy Parks consists of 600 acres located along the Trinity River in North Arlington. The park was opened to the public in June 1990 complete with hiking/biking trails, nature trails, and multiple river overlooks. In 1996, construction was completed for the Living

Science Center to house the River Legacy Foundation's multi-faceted environmental education program. The Living Science Center is 12,000 square feet of terraria and aquaria, and contains interactive exhibits. The Living Science Center offers educational programs for students of all ages, as well as special family activities and presentations that help fulfill the educational goals of the Center.

The similarities between the Nature Center and the Living Science Center with the Mitchell Lake project are controlled access, emphasis on education, and its ties with the city infrastructure.

c) Provide Mitchell Lake visitor projections based on similar local and national facilities and trends

Table 1 lists actual visits to Mitchell Lake. The years 1995 and 1999 were not provided due to insufficient data. Also, it must be noted that visitor data prior to November 1997 includes only those visitors who voluntarily registered. At most, the data is conservative. Visitor data after November 1997 is actual, due to the requirement that all visitors sign a liability waiver. In addition, total visitation numbers are conservative since all visitors must be escorted if a volunteer is available.

Table 1: Mitchell Lake Visitors

	1996	1997	1998
Visitors	1176	1143	1465
% Increase - Decrease		-3%	28%

Table 2 is data presented by the American Birding Association (ABA) on participation of Christmas bird count festivals. Average growth per decade is 106% or 9% average growth per annum over a 60-year period and a 15% average annual increase from 1980 to 1990.

Table 2: Growth in Christmas Bird Count Participants

	1900	1930	1940	1950	1960	1970	1980	1990
Participants	27	679	2100	4600	8100	15,000	32,000	43,000
% Increase- Decrease			209%	119%	76%	85%	113%	34%

Table 3 shows ABA membership increases from 1970 through 1998. The average increase over the 18 periods from 1980 to 1998 is an average 18% per year.

Table 3: ABA Membership Figures

	1970	1975	1980	1985	1990	1995	1998
ABA							
Membership	100	2252	3159	6895	7000	15,012	20,456
% Increase- Decrease			40%	118%	15%	114%	36%

Table 4 includes data from an ABA report showing the number and percent changes of persons 16 years and older participating in bird watching. The average increase over the twelve-year period is 15% per annum.

Table 4: Bird Watching Participants

	1982-83	1994-95
Bird Watchers	21.2 Million	54.1 Million
% Increase		155%

In conclusion, based on the Christmas bird count participants of 15% average annual increases from 1980-1990, the ABA membership increases of an average 18% per year from 1980-1998, and the average increase in bird watching participants per year over the 1982/83-1994/95 period is 15%. A conservative estimate projection of Mitchell Lake visitors is 15% per annum and based on Mitchell Lake actual visits, the projected visitors are 1685 visitors -1999 and 1937 visitors -2000.

The 1999 projection can be compared with actual Mitchell Lake data available in January 2000. Table 5 summarizes this projection.

Table 5: Summary

	'96	'97	'98	'99	2000
Visitors	1176	1143	1465	1685	1937
% Increase (decrease)		3%	28%	15%	15%

d) Discuss how the influx of visitors may affect the Mitchell Lake area to also include the Mission del Lago area

What do traveling birders want? Taken from a survey sponsored by the American Birding Association, birders want the following:

1. Information
 - Birding guides
 - Up to date checklists with seasonal and habitat abundance information
 - A daily birding log
 - Informed interpreters
2. Access roads, trails, boardwalks, blinds, boats, etc.
3. Amenities-bathrooms, shade, escape from insects and extreme temperatures, drinks, food, lodging
4. Value

In addition, the ABA published a list of birding quick facts and birding as an economic asset. This data is a direct influence on the Mitchell Lake project.

Quick facts:

- Wildlife watchers spent \$18.1 billion in 1991. Birdwatchers form 80% of this group.
- \$14.4 billion spent by birdwatchers
- \$6 billion spent on trip-related expenses-food, lodging, and transportation.
- \$7.6 billion for equipment-special vehicles, bird food, feeders, baths and houses, photography, binoculars, scopes, clothing, packs, camping equipment.
- \$240 million for magazines
- \$560 million for membership dues

Fact Sheet: birding as an economic asset:

- In 1991 more than 24 million Americans took trips for the express purpose for watching birds versus 14 million hunters and 35 million anglers
- The average birder annually spends more than \$350 on travel and paraphernalia related to bird watching. Committed birders spend much more-on average. Active birders annually spend about \$2000 on bird watching, with half that amount being spent on travel.
- It's no secret that the best spots for bird watching usually are in rural areas. Less known, however, are details about the significant economic benefits provided to rural communities by birdwatchers and wildlife viewers. The effect of dollars spent by ecotourists is multiplied, as tourist dollars become profits, then wages, then

consumer income once again. In some regions, the multiplier effect may be close to 5:1. These examples follow:

- High Island Texas: In 1992, more than 6000 birders visited this small Gulf coast town. They spent \$2.5 million in the community and generated for the region a total economic impact of about \$6 million.
- Cape May, New Jersey: Each year more than 100,000 birders visit this area, contributing to the local economy a cumulative impact of nearly \$10 million. Based on 1997 figures, that number increased to more than \$31 million.
- Chincoteague National Wildlife Refuge, Virginia: The cumulative economic benefit provided to the community by wildlife viewers in 1994 was approximately \$80 million.

How does Mitchell Lake get the attention of traveling birders? Based on an ABA survey, the following are the answers.

- Bird finding guides and articles focusing on:
 - Rare or local species
 - Unusual congregation of birds
 - Unusually good viewing opportunities
 - A birding festival
 - A birding trail

In conclusion, the influx of visitors to the Mitchell Lake area will be a direct economic benefit to the area. High Island Texas, Cape May New Jersey, and Chincoteague NWR Virginia provide an example of how the effects of dollars spent by ecotourists are multiplied to provide economic benefit to the community. The projected economic affect of ecotourism on Mitchell Lake using a conservative multiplier affect (M.E.) of 2.5 (based on the High Island example) could be between \$1.5M to \$8.5M in 1999 and \$1.7M to \$9.8M in 2000. Table 6a and 6b summarizes this multiplier effect (M.E.).

Table 6a-Low Estimate-\$350 Spent per visit

Year	Visitors	\$/visit	Total Spent	X2.5 M.E.
1999	1685	\$350/visit	\$590K	\$1.5M
2000	1937	\$350/visit	\$680K	\$1.7M

Table 6b-high Estimate-\$2000 spent per visit

Year	Visitors	\$/visit	Total Spent	X5 M.E.
1999	1685	\$2000/visit	\$3.4M	\$8.5M
2000	1937	\$2000/visit	\$3.9M	\$9.8M

M.E.-Multiplier Effect

In addition, the direct effect to Mission del Lago of the influx of visitors is the increase of dollars spent for amenities such as drinks, food, and lodging as described in the section on what traveling birders want. Also, Based on a USDI survey, in 1991 thirty million Americans took trips for the express purpose of non-game wildlife appreciation. They spent \$7.5 billion on trip related expenses, with more than half of this amount (\$4.4 billion) on food and lodging.

Conclusion

The eco-tourism dollars that Mitchell Lake could potentially produce will have a significant impact on the local economy and will be a good complement to the existing attractions in San Antonio. Favorable comparisons with other facilities such as the Bosque del Apache, Laguna Atascosa National Wildlife Refuge, Heard Natural Science Museum, and River Legacy Living Science Center show the strong likelihood. Very recent studies published by the Texas Parks and Wildlife Department also point to strong potential and other side benefits of eco-tourism at Mitchell Lake. Those side benefits include increased visitation at existing attractions and therefore the additional moneys spent in San Antonio. The strong increase in birdwatchers throughout the United States also points to the strong potential for the eco-tourism at Mitchell Lake.

6. Implementation Options

A. Funding Opportunities Plan

Funding for the Mitchell Lake program elements should come from several sources, both public and private. Of course, San Antonio Water System, as the landowner, permit holder and operator of the lake, will have partial funding jurisdiction. However, many of the program elements contained within this report fall well outside of the typical functions of a water/wastewater utility. For this reason, and because of the special nature of Mitchell Lake, there should be many potential funding opportunities. In addition, other public entities such as the City of San Antonio and Bexar County should play an important role in funding surrounding street and infrastructure projects. Another opportunity lies with school districts and college/university systems that could assist in funding research and education components of the plan.

In researching potential funding opportunities for Mitchell Lake, both private foundations and public institutions were considered. A detailed list of these foundations and agencies is provided on page 74.

Private grants were researched at the University of Texas at Austin's HOGG Foundation, a facility that specializes in identifying nationally based-foundations that fund civic projects. Project elements present in the Mitchell Lake Implementation Plan were highlighted, such as environmental education, water quality improvements, and wetland restoration. A list of over 100 private foundations that have funded projects in Texas in the last several years was then checked. The foundations' areas of focus were crosschecked with Mitchell Lake program elements and a final list of potential donors was created. After the list was generated, several foundations were contacted to acquire further information concerning the scope of concentrations in which they focus, respective deadlines in applying for grants, and the amount of funding available. The private organizations listed herein represent those that are most likely to be interested in potentially funding the Mitchell Lake program elements.

Public grants were researched at the Texas Comptroller of Public Account's office. Their grant directory was reviewed to identify grant opportunities in such areas as: community development, education, environmental quality, natural resources, and regional development. After a preliminary survey of grants was completed, further research was conducted into the sponsoring institutions in an effort to learn more about the stipulations and requirements of each grant. The grants listed represent those that are most likely to be applicable to Mitchell Lake.

While extensive research has gone into identifying funding sources, the list should only be considered as a guide in conducting further research into each funding opportunity. Since the concentrations of each grant, both public and private, has been matched with corresponding program elements at Mitchell Lake, it becomes clear which organizations could potentially be the best to research further. Those grants that have the greatest number of matches with Mitchell Lake would be the most productive to

pursue. Furthermore, comparing the amounts of funding available from those organizations that have several matching concentrations will assist in narrowing down the search even further. The subsequent spreadsheets on pages 74 and 79 list potential donors and potential applicability to program elements.

Funding Sources

Donor Organization		Address and phone number	Amount	Deadlines	Concentrations
PRIVATE DONORS					
Arco Foundation	private	(213)486-3342	\$1,000 - \$50,000/project	none	education, land acquisition, birds, water quality/pollution
Armand G. Erpf Fund, Inc.	private	(212)758-9700	\$1,000 - \$63,500	none	environmental education
AT&T Foundation	private	(212)387-4801	\$10,000 - \$35,000/project	end of January, April, July and September	education, water quality/pollution
Jesse Ball duPont Religious Charitable and Education Fund	private	(904)353-0890	\$100,000 - \$143,000/project	none	environmental education, birds
Beldon Fund	private	(212)551-1130	\$1,000 - 105,000/project	none	Environmental education, water quality/pollution,
Beneficia Foundation	private	(215)887-6700	\$5,000 - \$35,000/project	January 31st	Birds
The Brown Foundation, Inc.	private	Martha Garcia (713)523-6867	\$55 million annual disbursements	Nov 1st, Jan, Mar, and April	education/conservancy
The Chevron Companies	private	(415)894-5447	\$5,000 - \$125,000/ project	March 1, July 1, November 1	Environmental education, birds Education, conservation, community development Generally most funding is give to communities in the Dallas Area, exceptions are made.
Communities Foundation of Texas	private	(214)826-5231	\$5,000 - \$30,000/project	Quarterly	
Cooper Industries Foundation	private	(713)209-8590	\$1,000 - \$20,000/project	none	Environmental education San Antonio-based. Every other year they rotate projects out of San Antonio. Mitchell Lake wouldn't be eligible for funding until 2001.
Diamond Shamrock	private	Jody Carlson (210)410-8628	up to \$200,000	early September, 2000	
Geraldine R. Dodge Foundation	private	(973)540-8442	\$10,000 - \$150,000/project	September10, June 10, December 10 (check for further information)	Water quality/pollution, environmental education, birds
Herbert H. and Grace A Dow Foundation	private	(517)631-3699	\$100,000 - \$2 million/project	none	environmental education
Ducks Unlimited Marsh Program	private	Ed Ritter (281)341-7968	1:1 matching funds, \$25,000 - \$100,000 but may be into the millions of dollars	February to March	Waterfowl habitat is their focus, but conservation in general and reestablishment of habitat
Ecolab Foundation	private	(612)293-2259	average \$20,000/project	July 31st	environmental education
The Educational Foundation of America	private	(203)226-6498	\$10,000 - \$225,000/project	none	water quality/pollution
Exxon Corporation	private	(972)444-1104	\$3,000 - \$897,000/project	none	environmental education/birds

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The Favrot Fund	private	(713)622-1442	\$5,000 - \$100,000/project	January - June end of March, August, and November	Water quality/pollution Land Acquisition, environmental education/science, Land Acquisition, center: education
Hillcrest Foundation	private	(214)508-1965 Paul H Harris	Average \$25,000/project \$12,500 - \$200,000/project	quarterly	Education, social services - primarily in Houston and Dallas but exceptions are made
The Hoblitzelle Foundation	private	(214)373-0462 Mrs. Kelly H Compton	\$5,000 - \$20,000/project and up to \$100,000	quarterly	Education, social services - primarily in Houston and Dallas but exceptions are made
The Hoglund Foundation	private	(214)526-6522	\$675,000 annual disbursements	November 1st - December 15th	environmental education
The Home Depot Corporate Contributions Program	private	(770)433-8211 Grant Department Houston Endowment, Inc. 600 Travis, Suite 6400 Houston, Texas 77002	\$45 million annual disbursements	Deadline: 4-6 months before funding is needed	education/environment
Houston Endowment, Inc.	private			March 15, June 15 or October 15	environmental education located somewhere in Pennsylvania
Harris and Eliza Kempner Fund	private	(409)762-5435	\$2,000 - \$7,600/project	none	San Antonio based
Richard King Mellon Foundation	private	(412)392-2843	Fiscal Year 1999 25 million	none	San Antonio based
Kronkosky Foundation	private	(210)475-9000	FY 99 15 million	none	San Antonio based
The Leland Fikes Foundation	private	(214)754-0144	\$15,000 - \$25,000/project	none	Land Acquisition
Levi Strauss Foundation	private	(415)501-6579	\$3,500 - \$10,000/project	contact	environmental education Water quality/pollution, Center: education, environmental education, birds
Liz Claiborne and Art Ortenberg Foundation	private	(212)333-2536	\$500 - \$150,000/project	none	Water quality/pollution, environmental education, birds
Lyndhurst Foundation	private	(423)756-0767	\$5,000 - \$835,000/project	contact	Water quality/pollution, environmental education, birds
The Meadows Foundation, Inc.	private	(214)826-9431	\$100 - \$750,000/project	contact	land acquisition, water quality/pollution, birds
Mobil Foundation, Inc.	private	(703)846-3381	\$1,000 - \$75,000/project	June 1st	environmental education, birds
Moody Foundation, Inc.	private	(409)763-5333	\$26,000 - 5.6 million/project	contact	water quality/pollution water quality/pollution, environmental education, healthy communities
The National Environmental Education and Training Foundation, Inc	private	(202)833-2933 ext 478	Maximum \$15,000	beginning of June	land acquisition, water quality/pollution, birds, species conservation, habitat protection, environmental education, natural resources management, habitat and ecosystem, rehabilitation and restoration
National Fish and Wildlife Foundation	private	(214)219-1432	\$25,000 - \$75,000, up to \$150,000	any time	land acquisition, water quality/pollution
The David and Lucile Packard Foundation	private	(650)948-7658	\$7,000 - 9.0 million/project	quarterly	Water quality/pollution, environmental education
Patagonia, Inc.	private	(805)667-4660	\$96 - \$75,504/project	April 30th, August 31st	Water quality/pollution, environmental education
James C. Penney Foundation	private	(212)463-6047	\$10,000 - \$20,000/project	contact	Water quality/pollution
The Plum Foundation	private	(818)766-8064	\$5,000 - \$10,000/project	April 1st - August 31st	land acquisition
Public Welfare Foundation, Inc.	private	(202)965-1800	\$15,000 -	none	water quality/pollution

			\$250,000/project		
RGK Foundation	private	Jami Hampton	\$5,000 - \$250,000/project	none	education and community
The Rapoport Foundation	private	(254)741-0510	\$1,000 - \$600,000/project	Oct 15th, April 15th	education/community building
Sid W. Richardson Foundation	private	(817)336-0494	\$5,000 - \$300,000/project	March 1st, September 1st	land acquisition
Rockwell Fund, Inc.	private	(713)629-9022	\$10,000 - \$25,000/project	Feb 1st, May 1st, Aug 1st, and Nov 1st	land acquisition
SBC Foundation	private	(210)351-2215	\$1,000 - \$30,000/project	none	Birds
Salisbury Community Foundation, Inc.	private	(704)376-9541	\$100 - \$1.9 million/project	Jan 31, April 30, July 31, October 31	Water quality/pollution, environmental education
San Antonio Area Foundation Discretionary Grants	private	Lydia Rodriguez (210)225-2243	\$1,500 - \$200,000/project	Middle of January	funding for projects in San Antonio and surrounding areas - arts and culture, education, wildlife and animals
Jesse Smith Noyles Foundation, Inc.	private	(212)684-6577	\$1,100 - \$75,000/project	none	water quality/pollution
The Summerlee Foundation	private	(214)363-9000	\$150 - \$23,750/project	none	land acquisition
Sid Richardson Foundation	private	(817)336-0494	\$1,000 - \$280,000	March 1st, September 1st	education grants, human services
Texaco Foundation	private	(914)253-4150	\$5,000 - \$150,000/project	none	birds
The Trull Foundation	private	(512)972-1109	\$1,000 - \$7,500/project	none	birds
Union Carbide Foundation, Inc.	private	(203)794-6942	\$1,500 - 10,000/project	February 1st, August 1st	water quality/pollution
Union Pacific Foundation	private		\$5,000 - \$10,000/project	January - October	birds
Unitarian Universalist Veatch Program @ Shelter Rock	private	(516)627-6576	\$20,000 - \$100,000/project	none	water quality/pollution
W.K. Kellog Foundation	private	(616)968-1611	\$90 - \$1.75 million/project	none	water quality/pollution
Water Environment Research Foundation Emerging Technologies Program (ETP)	private	(703)684-2470	>75,000/project	November 17th	water issues, check www.werf.org
The Winslow Foundation	private		\$150 - \$100,000/project	none	land acquisition, water quality/pollution, environmental education
Margaret Wray Charitable Lead Annuity Trust	private	(713)529-2229	\$500 - \$10,000/project	August 31st	Water quality/pollution, environmental education, birds
The Wray Trust	private	Ellen Leeman Grants Coordinator	average 3,000/project	August 31st	Environment, education, conservation

PUBLIC AGENCIES

Department of Housing and Urban Development Community Development Block Grant	public	Through City of San Antonio Economic Development (210)207-8117	\$20,000 - several million, avg. \$500,000	January - February	Benefit low to people of low to middle income, acquisition of property, education programs, recreation programs, urban renewal, planning and design activities, and economic development.
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EPA Five Star Restoration Program	public	John Pai (202)260-8076	avg. \$10,000/project	January	Budget not set yet, this could be leveraged with Fish and Wildlife's grants
EPA Wetlands Protection: Development Grants	public	Carmen Assunto (214)665-8185	\$1,500 - \$489,000/project	October	encourage wetlands program development, wetlands protection, restoration or management.
EPA Solid Waste Management Assistance	public	Anan Tanbouz (214)665-8195	\$14,000 - \$400,000/per project	End of August	Lake dredging
EPA Environmental Justice Through Pollution Prevention Grants	public	Olivia Balandran (214)665-7257	average \$100,000/project	April	minority groups, grass roots groups, projects addressing environmental justice, use pollution prevention as the proposed solution, direct impact on the communities.
EPA Environmental Justice Grants to Small Community Groups	public	Mary Settle (202)564-2515	\$15,000 - \$20,000	Beginning of March	Fairly broad and limited to communities predominantly populated by people of color, or low to middle income. Money has to be used to resolve a community issue.
EPA National Pollutant Discharge Elimination System (NPDES)	public	Alfred Lindsey (202)260-5854	25,000 - 500,000/project	Established by region	sewer overflow, pretreatment of sludge, measure the effectiveness of point source programs.
EPA Environmental Education Grants	public	Suzanne Saric (312)353-3209	require 25% matching funds >25,000 apply to national headquarters, <25k apply to the regional headquarters	November 22, 1999	Environmental Education
EPA Sustainable Development Challenge Grants	public	Diana Hinds (214)665-7561	\$30,000 - \$250,000/project	Early September 2001	Environment, community commitment, economic development
Federal Highway Administration Recreational Trails Program	public	Christopher Douwes (202)366-5013	average of 772,549/project	check with region	construction of new trails, acquisition of easements or property for trails
National Park Service Urban Park and Recreation Recovery Program	public	Dawn Godwin (202) 565-1181	\$8,438 - \$5,250,000/proje ct	none	rehabilitation of recreation areas and facilities, development of improved recreation planning, overall recreation system
National Park Service Outdoor Recreation Acquisition, Development and Planning	public	Ken Compton (202)565-1200	\$150 - \$5.5 million/project, average of 68,000/project	none	acquisition and development of outdoor recreation areas, inner city parks, bike trails,
Texas Natural Resources Conservation Commission EPA Non-Point Sources Program Grant Funds (section 319)	public	Carol Wittington (512)239-4547	\$90,000 - \$750,00 typical per project, up to \$2 - 3 million	March to April	Very broad scope concentrating on environmental rehabilitation.
National Fish and Wildlife Service Wildlife Partners	public	Tim Schumann 490-0057	\$1,000 - \$25,000/project	none	wetland redevelopment, water level controls in the polders, revegetation in prairie area
Texas Forest Service Federal Urban Forestry Grant Program	public	(409)845-2641	\$10,000/project phase	1st day of each quarter for the calendar year	expand forest cover, implement tree planting programs

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Texas Natural Resources Conservation Commission Clean Lakes Program	public	(512)239-0212	up to \$2 million for implementation projects	negotiated with EPA	Protect and Restore Publicly-owned Freshwater Lakes, EPA funding, conduct studies and create infrastructures
Texas Parks and Wildlife Indoor Recreation	public	(512)912-7124	\$500,000 maximum/project	July 31st	recreation facilities, nature programs or exhibits to serve the general public, nature centers, interpretive space, aquatics.
Texas Parks and Wildlife Outdoor Recreation Grants	public	(512)912-7124	\$500,000 maximum/project	January 31st and July 31st	fishing and hunting activities, aquatic facilities, trails, beautification, cultural and exhibit facilities, renovation or recreational facilities.
Texas Parks and Wildlife - Wildscapes program	public	(512)389-4974			
Tourism Product Development	public	(512)936-0216		N/A	could be a good source of information in creation, expansion, retention, and recruitment of tourism
		Standard Grants Program			
		Small Grants Program			
U.S. Fish and Wildlife	public		average \$50,000/project	June 1st, July 15th, 2000	Wetlands preservation/restoration
U.S. Fish and Wildlife Sport Fish Restoration	public	(703)358-2156	average of 4.8 million per project	none	Research more, doubtful that this applies to Mitchell Lake. Land acquisition, development.
U.S. Fish and Wildlife Service Partnership For Wildlife	public	Tom Taylor (703)358-1852	70 - 80,000 for large projects 5-10,000 for smaller projects	Early October, apply through regional office	1/3 federal dollars, 1/3 private, matched by 1/3 wildlife funds
U.S. Fish and Wildlife Service Small Grants Program	public	(703)358-1784 Keith Morehouse	>\$50,000/project		wetlands conservation and associated uplands, habitat restoration, protection and enhancement.
U.S. Fish and Wildlife Service Administrative Grants for Federal Aid in Sport Fish and Wildlife Restoration	public	(703)358-2156	average of 188,250/ project		sport fish and wildlife restoration
U.S. Fish and Wildlife Service North American Wetlands Conservation Fund	public	(703)358-1784	average \$423,000/project		for any public agency, wetland conservation, acquire real estate, restore manage or enhance wetland ecosystems and other habitat for migratory birds.
U.S. Fish and Wildlife Service Wildlife Conservation and Appreciation	public	(703)358-2156	average \$27,628/project	September 1st	for state fish and wildlife agencies, carry out conservation projects
U.S. Fish and Wildlife Service, Department of the Interior Wildlife Restoration	public	(703)358-2156	average \$2.75 million/project	none	for state fish and wildlife agencies, land acquisition, development, restore and manage wildlife populations
U.S. Forest Service Urban and Community Forestry Grants San Antonio	public	Mark Peterson (210)223-9963			

Funding Matrix – Private Sources

Ranking	Description	PROGRAM ELEMENTS												DONORS														
		Water Quality Improvements	Polder Water Level Controls	Re-Establishment of Bird Pond	Re-Establishment of Skip's Pond	Uplands Plant Enhancement	Procure Protection Buffers Adjacent to the Lake	Development Guidelines for Adjacent Properties	Fencing and Buffer Improvements Adjacent to Mission del Lago	Constructed Wetlands adjacent to the Shoreline	Procure Protection Buffers Adjacent to the Polders	Improvements to Polder Roads	Wildlife Refuge Center	Pleasanton Road Right of Way Acquisition and Improvements	Southside Sector Plan Pedestrian Trails with Overlooks, Towers, and Boardwalk (N of Ed. Ctr.)	Howard Road Realignment north of the Uplands	Primitive Pedestrian Trail around Bird Pond	Establish a Separate Mitchell Lake Research Facility	Establish a Management Foundation	Education Center on the East Side of the Lake	Watson Road Improvements between Pleasanton Rd and US 281	Hike & Bike Trails to Other Cultural Attractions	Neighborhood Park Adjacent to the Education Center	Detailed Economic Development Plan for Designated Commercial Nodes	Change the Name of Mitchell Lake	Fishing Piers		
1	Water Quality Improvements																											
2	Polder Water Level Controls																											
3	Re-Establishment of Bird Pond																											
4	Re-Establishment of Skip's Pond																											
5	Uplands Plant Enhancement																											
6	Procure Protection Buffers Adjacent to the Lake																											
7	Development Guidelines for Adjacent Properties																											
8	Fencing and Buffer Improvements Adjacent to Mission del Lago																											
9	Constructed Wetlands adjacent to the Shoreline																											
10	Procure Protection Buffers Adjacent to the Polders																											
11	Improvements to Polder Roads																											
12	Wildlife Refuge Center																											
13	Pleasanton Road Right of Way Acquisition and Improvements																											
14	Southside Sector Plan Pedestrian Trails with Overlooks, Towers, and Boardwalk (N of Ed. Ctr.)																											
15	Howard Road Realignment north of the Uplands																											
16	Primitive Pedestrian Trail around Bird Pond																											
17	Establish a Separate Mitchell Lake Research Facility																											
18	Establish a Management Foundation																											
19	Education Center on the East Side of the Lake																											
20	Watson Road Improvements between Pleasanton Rd and US 281																											
21	Hike & Bike Trails to Other Cultural Attractions																											
22	Neighborhood Park Adjacent to the Education Center																											
23	Detailed Economic Development Plan for Designated Commercial Nodes																											
24	Change the Name of Mitchell Lake																											
25	Fishing Piers																											

Funding Matrix – Private Sources

PROGRAM ELEMENTS	LOCAL GOVERNMENT	STATE	FEDERAL	NON-PROFIT	PRIVATE	OTHER	TOTAL
1 Water Quality Improvements							
2 Polder Water Level Controls							
3 Re-Establishment of Bird Pond							
4 Re-Establishment of Skip's Pond							
5 Uplands Plant Enhancement							
6 Procure Protection Buffers Adjacent to the Lake							
7 Development Guidelines for Adjacent Properties							
8 Fencing and Buffer Improvements Adjacent to Mission del Lago							
9 Constructed Wetlands adjacent to the Shoreline							
10 Procure Protection Buffers Adjacent to the Polders							
11 Improvements to Polder Roads							
12 Wildlife Refuge Center							
13 Pleasanton Road Right of Way Acquisition and Improvements							
14 Southside Sector Plan Pedestrian Trails with Overlooks, Towers, and Boardwalk (N of Ed. Ctr.)							
15 Howard Road Realignment north of the Uplands							
17 Primitive Pedestrian Trail around Bird Pond							
18 Establish a Separate Mitchell Lake Research Facility							
19 Establish a Management Foundation							
20 Education Center on the East Side of the Lake							
21 Watson Road Improvements between Pleasanton Rd and US 281							
22 Hike & Bike Trails to Other Cultural Attractions							
23 Neighborhood Park Adjacent to the Education Center							
24 Detailed Economic Development Plan for Designated Commercial Nodes							
25 Change the Name of Mitchell Lake							
26 Fishing Piers							

Funding Matrix – Public Sources

PROGRAM ELEMENTS		PUBLIC AGENCIES															
Ranking	Description	City of Mitchell	County of Lawrence	State of Kansas	Federal Government	U.S. Fish and Wildlife Service	U.S. Environmental Protection Agency	U.S. Department of Agriculture	U.S. Department of Energy	U.S. Department of Transportation	U.S. Department of the Interior	U.S. Department of Health and Human Services	U.S. Department of Education	U.S. Department of Justice	U.S. Department of Commerce	U.S. Department of Labor	U.S. Department of Housing and Urban Development
1	Water Quality Improvements																
2	Polder Water Level Controls																
3	Re-Establishment of Bird Pond																
4	Re-Establishment of Skip's Pond																
5	Uplands Plant Enhancement																
6	Procure Protection Buffers Adjacent to the Lake																
7	Development Guidelines for Adjacent Properties																
8	Fencing and Buffer Improvements Adjacent to Mission del Lago																
9	Constructed Wetlands adjacent to the Shoreline																
10	Procure Protection Buffers Adjacent to the Polders																
11	Improvements to Polder Roads																
12	Wildlife Refuge Center																
13	Pleasanton Road Right of Way Acquisition and Improvements																
14	Southside Sector Plan																
15	Pedestrian Trails with Overlooks, Towers, and Boardwalk (N of Ed. Ctr.)																
16	Howard Road Realignment north of the Uplands																
17	Primitive Pedestrian Trail around Bird Pond																
18	Establish a Separate Mitchell Lake Research Facility																
19	Establish a Management Foundation																
20	Education Center on the East Side of the Lake																
21	Watson Road Improvements between Pleasanton Rd and US 281																
22	Hike & Bike Trails to Other Cultural Attractions																
23	Neighborhood Park Adjacent to the Education Center																
24	Detailed Economic Development Plan for Designated Commercial Nodes																
25	Change the Name of Mitchell Lake																
26	Fishing Piers																

B. System Operational Plan

Implementation and management of the Mitchell Lake area will be a collaborative effort between five primary stakeholder groups. These groups include San Antonio Water System, the proposed non-profit Mitchell Lake Foundation, the City of San Antonio, Bexar County, and a designated university to manage the research facility. The following is a preliminary outline of elements that have been categorized with the groups needed to facilitate them.

San Antonio Water System

SAWS role in the operation of Mitchell Lake will center on water activities. This is in line with SAWS organizational identity and role within the community. Specific operational responsibilities should include the following:

- Monitor and maintain water flow to the lake. This includes making sure the water surface is maintained at the desired elevation and that water is available as needed.
- Monitor and maintain quality of lake water body as well as the lake discharge and water supply.
- Monitor and maintain permit compliance of the lake NPDES discharge permit. This is a significant task that must remain in SAWS's jurisdiction as long as the discharge permit is in place.
- Monitor and maintain dam integrity. At some point in the near future the dam will need to be reconstructed at considerable expense.
- Determine methods for funding, managing, developing, and operation proposed improvements and programs at Mitchell Lake.

City of San Antonio

The City has jurisdiction for most program elements that fall outside the property boundaries of SAWS and Bexar County. Specifically, the City should be responsible for access roadways, offsite trail systems and nearby cultural and recreational attractions.

Roles and responsibilities of the City, as related to Mitchell Lake, include the following:

- Pleasanton Road - Improvements and Maintenance: As the only public access point to the Mitchell Lake refuge area, improving Pleasanton Road is an important program element. The City will be responsible for funding and development of improvements to this roadway.
- Howard Road - Development, Alignment and Maintenance: The City must be responsible for the relocation of Howard Road on the current Major Thoroughfare plan. Ultimately, the City will be responsible for the development and maintenance of this future roadway.
- Directional Signage: Once some of the Mitchell Lake elements are in place, the City should provide directional signage along major roadways so that visitors may more easily access the sites.
- Neighborhood Park - Development, Maintenance and Operation: If the area develops as planned, then the proposed neighborhood park will become an important program element. The City should

include this park in future planning with their Department of Parks and Recreation taking a leadership role.

- Trail Systems: The City should be responsible for the maintenance of all trails both on and off the site. Development of off-site trails between various City attractions should also be the City's role.
- Security: The City Police Department is responsible for overall security for that portion of the area that falls within the City's limits

Bexar County

Bexar County is envisioned to maintain all county rights-of-way and county-owned facilities within them. The Watson Road alignment and improvements and the Pleasanton Road improvements are the major road enhancements. Along with the City of San Antonio, the county would be involved in the implementation of the proposed sector plan for the Mitchell Lake area and would also assist in providing security for the lake.

University/Research Facility

The university or universities that build and operate the research center in the uplands area could coordinate and report to SAWS. However, they would operate the facility.

C. Access Management Plan

The facilities at the Mitchell Lake Wildlife Refuge are for the general public, with the exception of the proposed university-level research facility. Nevertheless, general public access should not be confused with uncontrolled access. Since this is a wildlife refuge, access to the site must be controlled in a manner consistent with the refuge's mission. Access to the uplands and polders, access to Bird and Skip's Ponds, and access to the education center and associated facilities are all controlled so that activities there do not disturb the wildlife. The goal should be to optimize the educational opportunities while preserving and enhancing the natural resource.

The access to the uplands and polders is controlled by the Wildlife Refuge Center, which is housed in a building at the vehicular entrance off of Pleasanton Road. Visitors will be required to check in before traveling to the polders. Rules will be posted as well as up to date information about events at the refuge. People are required to stay in their cars in the polders except at designated points. Pedestrian/bicycle access or movement around the polders is prohibited.

Access to Bird and Skip's Ponds is controlled via the Wildlife Refuge Center as well. An unimproved trail around Bird Pond allows for limited pedestrian access for birders to watch and photograph wildlife.

The staff at the Wildlife Refuge Center could govern movement within the site, as well as access to the uplands and polders. Science-based management of the refuge will be the basis for the operation of the refuge; therefore the refuge may be closed infrequently during key events during which the wildlife may not be disturbed. The staff is responsible to the governing agency for operations and maintenance of the refuge. The primary users of the Wildlife Refuge Center, the uplands, and the polders are those people seeking to view wildlife within the habitat. Activities within the site should be regulated by that intention.

The staff at the education center could also control access to the Education Center, the wetland exhibits, and the trails. Access to the polders and upland areas must be governed by the staff and may close the Center during key events. The Education Center staff is responsible to the governing agency for the operations and maintenance of the center.

The only facility at the refuge without access for the general public is the proposed university-level research facility. Although that facility has not been programmed or planned, it can be anticipated that the laboratories and class facilities will be used at the discretion of the funding university.

All of the facilities at the Mitchell Lake Wildlife Refuge shall comply with applicable regulations for access, especially those provisions stipulated in the Americans with Disabilities Act (ADA). Regarding the trails, certain trails can be designated as challenge or unimproved trails, which may be viewed differently under the ADA regulations. For example, the pedestrian trails along the west side of the lake leading northward from the Education Center could be ADA accessible to the first tower, and be a challenge trail for the rest of the trail northward because of its length.

7. Appendices

A. Sample Rating Ballot

	PROGRAM ELEMENT			PROGRAM ELEMENT	
		Ranking			Ranking
1.	Water Quality Improvements (based on previous & future studies)		14.	Pedestrian (only) Trails with Overlooks/Towers and Boardwalks (connects to Education Center)	
2.	Polder Water Level Controls (for the water quality & bird habitat)		15.	Education Center on east side of the lake	
3.	Re-establishment of Bird Pond (for water quality & bird habitat)		16.	Small neighborhood-scale park adjacent to entry to Education Center	
4.	Re-establishment of Skip's Pond (for wq & bird habitat)		17.	Wildlife Refuge check-in and Meeting Facility (adjacent to Pleasanton Road)	
5.	Howard Road Realignment (north of the uplands)		18.	Improvements to Polder Roads: stabilization, pull-offs, post & cable edges	
6.	Watson Road Improvements (between Pleasanton & Hwy 281)		19.	Uplands plant enhancement (for habitat)	
7.	Southside Sector Plan (jointly with City and County)		20.	Primitive Pedestrian Trail around Bird Pond	
8.	Development Guidelines for Adjacent Properties		21.	Fencing and Buffer Improvements adjacent to Mission Del Lago	
9.	Change the name of Mitchell lake		22.	Pleasanton Road Improvements (from Loop 410 to proposed Watson Road)	
10.	Procure Protection Buffers adjacent to the lake (purchase or easement)		23.	Detailed Economic Development Plan for the Watson and Howard Road Intersections at Pleasanton and Hwy 281	
11.	Procure Protection Buffers adjacent to polders (purchase or easement)		24.	Establish a Management Foundation (to operate non-water elements separate from SAWS)	
12. *	Constructed Wetlands along the Shoreline of Mitchell Lake (for bird habitat)		25.	Establish a separate Mitchell Lake Research Facility for University Level Study	
13.	Hike and Bike Trails to other cultural attractions		26. *	Establish Fishing Piers (pedestrian access only after water quality and aquatic habitat are improved)	

* PROGRAM ELEMENTS # 12 & 26 CANNOT BE RANKED HIGHER THAN PROGRAM ELEMENT #1.

B. Ballot Analysis

Element	Land Owner 6	Task Force 5	Stakeholders 4	Southside	Interested	Aggregate score	Aggregate Ranking
				Resident 3	Citizens 2		
1	1	1	2	1	1	1.1	1
2	3	2	1	2	2	2	2
3	5	4	3	13	4	5.2	3
4	6	5	4	10	3	5.4	4
5	10	12	17	19	20	13.6	16
6	20	18.5	20.5	14	22	18.1	21
7	13.5	13.5	19	6	12	12.7	14
8	13.5	8	9	3	15	9.3	7
9	16	26	26	26	26	21.9	24
10	19	3	6	5	7	8.7	6
11	21	6	5	12	8	10.9	9
12	18	7	7	16	5	10.9	10
13	26	22	20.5	20	13	20.7	22
14	15	10	10	24	9	12.9	15
15	25	13.5	14	17	11	16.5	20
16	23	24	24	18	23	21.6	23
17	8	15	13	7	18	11.0	12
18	7	16	12	9	17	11.0	11
19	4	11	8	8	6	7.0	5
20	11	17	16	21	19	15.0	17
21	9	9	11	15	16	10.5	8
22	2	23	18	4	24	12.3	13
23	24	21	23	25	21	21.8	25
24	17	18.5	15	22	10	16.2	19
25	12	20	22	11	14	15.3	18
26	22	25	25	23	25	22.7	26

- Notes:
1. Aggregate score was calculated based on weighted average ranking.
 2. Aggregate ranking is based on sequential order of the aggregate scores.
 3. Consultant votes were utilized for tie-breaking purposes only and are not listed here.

C. Cost Estimate

PROGRAM ELEMENTS							Budget Totals
Ranking	Title	Parts	Description	Quantity	Unit Cost		
1	Water Quality Improvements						\$ 5,076,500
			Reroute LCWRC Pipeline to North of Polders				
		A.	21" Gravity Pipeline	1	Lump Sum	\$ 288,400	\$ 308,400
		B.	Pump Station Improvements	1	Lump Sum	\$ 110,000	\$ 120,000
		C.	Pressure Pipeline	1	Lump Sum	\$ 110,000	\$ 120,000
		D.	Additional Pumps	1	Lump Sum	\$ 44,000	\$ 51,600
			Water Quality Treatment Studies				
		E.	Sediment Evaluation	1	Lump Sum	\$ 150,000	\$ 150,000
		F.	Prepare Mechanistic Model for Lake Ecosystem	1	Lump Sum	\$ 300,000	\$ 300,000
		G.	Permit Compliance Study and Post-Lake Treatment Study	1	Lump Sum	\$ 100,000	\$ 100,000
		H.	Dam Improvements	1	Lump Sum	\$ 3,515,000	\$ 3,515,000
		I.	Design	1	Lump Sum	\$ 411,500	\$ 411,500
2	Polder Water Level Controls						\$ 1,618,045
		A.	Level Controls	1	Lump Sum	\$ 70,300	\$ 70,300
		B.	Dike Flow Conduits	1	Lump Sum	\$ 19,200	\$ 19,200
		C.	Baffle Berms	1	Lump Sum	\$ 131,800	\$ 131,800
		D.	Wetland Planting	1	Lump Sum	\$ 350,700	\$ 350,700
			System/Planting	1	Lump Sum	\$ 559,500	\$ 559,500
			30% Contingency	1	Lump Sum	\$ 339,450	\$ 339,450
			Design	1	Lump Sum	\$ 147,095	\$ 147,095
3	Re-Establishment of Bird Pond						\$ 286,000
			Water Level Controls and Connection to Skip's Pond	1	Lump Sum	\$ 100,000	\$ 100,000
		B.	Contouring and Grading	1	Lump Sum	\$ 75,000	\$ 75,000
		C.	Wetland Planting	1	Lump Sum	\$ 25,000	\$ 25,000
		D.	30% Contingency	1	Lump Sum	\$ 60,000	\$ 60,000
		E.	Design	1	Lump Sum	\$ 26,000	\$ 26,000
4	Re-Establishment of Skip's Pond						\$ 193,000
		A.	Water Level Controls and Connection to Polders	1	Lump Sum	\$ 70,000	\$ 70,000
		B.	Contouring and Grading	1	Lump Sum	\$ 25,000	\$ 25,000
		C.	Wetland Planting	1	Lump Sum	\$ 25,000	\$ 25,000
		D.	30% Contingency	1	Lump Sum	\$ 51,000	\$ 51,000
		E.	Design	1	Lump Sum	\$ 22,000	\$ 22,000
5	Uplands Plant Enhancement						\$ 6,552,000
		A.	Killing non-native grasses	390	Ac	\$ 9,000	\$ 3,510,000
		B.	Planting/Seeding Native Species	390	Ac	\$ 3,000	\$ 1,170,000
		C.	30% Contingency	1	Lump Sum	\$ 1,404,000	\$ 1,404,000
		D.	Design	1	Lump Sum	\$ 468,000	\$ 468,000
			Demonstration Project Total (5 Yr Plan)				\$ 84,000
		A.1	Killing non-native grasses	5	Ac	\$ 9,000	\$ 45,000
		B.1	Planting/Seeding Native Species	5	Ac	\$ 3,000	\$ 15,000
		C.1	30% Contingency	1	Lump Sum	\$ 18,000	\$ 18,000
		D.1	Design	1	Lump Sum	\$ 6,000	\$ 6,000
6	Procure Protection Buffers Adjacent to the Lake						\$ 131,425
			Procuring 100' wide buffer along 22,900 l.f. of shoreline (excludes MDL buffer)	52.57	Ac	\$ 2,500	
7	Development Guidelines for Adjacent Properties						\$ 275,000
			No construction costs associated with this item. Staff/Consultant time only, and this is difficult to predict without determining a scope of service.	1	Lump Sum	\$ 275,000	

C. Cost Estimate

PROGRAM ELEMENTS							Budget Totals
Ranking	Title	Parts	Description	Quantity		Unit Cost	
8	Fencing Adjacent to Mission del Lago						\$ 644,700
		A.	6' Ht. Black vinyl-coated chain link fence along lake & polders, buried in a conc footer (7' fabric total), no top rail	15350	LF	\$ 20	\$ 307,000
		B.	Misc. Grading & Planting Improvements along lake & polders	15350	LF	\$ 10	\$ 153,500
		C.	30% Contingency	1	Lump Sum	\$ 138,150	\$ 138,150
		D.	Design	1	Lump Sum	\$ 46,050	\$ 46,050
9	Constructed Wetlands adjacent to the Shoreline						\$ 9,163,000
		A.	Grading and Planting for Wetlands	77	Ac	\$ 85,000	\$ 6,545,000
		B.	30% Contingency	1	Lump Sum	\$ 1,963,500	\$ 1,963,500
		C.	Design	1	Lump Sum	\$ 654,500	\$ 654,500
			Demonstration Project Total (5 Yr Plan)				\$ 9,163,000
		A.1	Grading and Planting for Wetlands	5	Ac	\$ 85,000	\$ 425,000
		B.1	30% Contingency	1	Lump Sum	\$ 127,500	\$ 127,500
		C.1	Design	1	Lump Sum	\$ 42,500	\$ 42,500
10	Procure Protection Buffers Adjacent to the Polders		Procuring 100' wide buffer along 2,200 l.f. of polder buffer (excludes MDL buffer); happens only on west side	5.05	Ac	\$ 2,500	\$ 12,625
11	Improvements to Polder Roads						\$ 1,702,222
		B.	Gravel Roads	60000	SY	\$ 5	\$ 300,000
		C.	Geo Fabric	60000	SY	\$ 4.50	\$ 270,000
		D.	Grading	15000	CY	\$ 10	\$ 150,000
		E.	Edge Restraints	60000	LF	\$ 4	\$ 240,000
		F.	Restoration	4	Ac	\$ 15,000	\$ 60,000
		G.	Drainage	1	Lump Sum	\$ 10,000	\$ 10,000
		H.	Signage	1	Lump Sum	\$ 10,000	\$ 10,000
		I.	Mobilization & General Conditions	1	Lump Sum	\$ 155,265	\$ 155,265
		J.	30% Contingency	1	Lump Sum	\$ 357,110	\$ 357,110
		K.	Design	1	Lump Sum	\$ 154,747	\$ 154,747
12	Wildlife Refuge Center						\$ 700,700
		A.	Construction of Buildings and Exhibits	3000	SF	\$ 150	\$ 450,000
		B.	Off-site Utilities	1	Lump Sum	\$ 40,000	\$ 40,000
		C.	30% Contingency	1	Lump Sum	\$ 147,000	\$ 147,000
		D.	Design	1	Lump Sum	\$ 63,700	\$ 63,700
			Alternative Method of Construction				\$ 343,200
		A.	Move Existing Building onto Site (similar to 3,000 s.f size)	1	Lump Sum	\$ 50,000	\$ 50,000
		B.1	Remodeling Allowance	3000	SF	\$ 50	\$ 150,000
		B.	Off-site Utilities	1	Lump Sum	\$ 40,000	\$ 40,000
		C.	30% Contingency	1	Lump Sum	\$ 72,000	\$ 72,000
		D.	Design	1	Lump Sum	\$ 31,200	\$ 31,200
13	Pleasanton Road Right of Way Acquisition and Improvements						\$ 5,257,423
			City of San Antonio	9600	LF		
		A.	R.O.W. Acquisition	1.8	Ac	\$ 20,000	\$ 36,000
		B.	Pavement Demolition	28000	SY	\$ 5	\$ 140,000
		C.	Grading & Clearing	30000	CY	\$ 10	\$ 300,000
		D.	Base Work	70400	SY	\$ 10	\$ 704,000
		E.	Concrete Curb	38400	LF	\$ 7	\$ 268,800
		F.	4' Concrete Walk on ea. Side	76800	SF	\$ 2	\$ 153,600
		G.	HMAC Pavement (48' width)	51200	SY	\$ 8.50	\$ 435,200
		H.	Traffic Control	1	Lump Sum	\$ 50,200	\$ 50,200
		I.	Drainage	1	Lump Sum	\$ 46,500	\$ 46,500
		J.	Signage	1	Lump Sum	\$ 25,000	\$ 25,000
		K.	Restoration/Landscaping	4	Ac	\$ 15,000	\$ 60,000
		L.	Mobilization & General Conditions	1	Lump Sum	\$ 327,495	\$ 327,495

C. Cost Estimate

PROGRAM ELEMENTS							Budget Totals
Ranking	Title	Parts	Description	Quantity	Unit Cost		
		J.	Signage	1	Lump Sum	\$ 25,000	\$ 25,000
		K.	Restoration/Landscaping	4	Ac	\$ 15,000	\$ 60,000
		L.	Mobilization & General Conditions	1	Lump Sum	\$ 327,495	\$ 327,495
		M.	30% Contingency	1	Lump Sum	\$ 654,990	\$ 654,990
		N.	Design	1	Lump Sum	\$ 316,579	\$ 316,579
			Bexar County	5700	LF		
		A.	R.O.W. Acquisition	0	Ac	\$ 20,000	\$ -
		B.	Pavement Demolition	0	SY	\$ 5	\$ -
		C.	Grading & Clearing	13000	CY	\$ 10	\$ 130,000
		D.	Base Work	27500	SY	\$ 10	\$ 275,000
		E.	Concrete Curb	22800	LF	\$ 7	\$ 159,600
		F.	4' Concrete Walk on ea. Side	45600	SF	\$ 2	\$ 91,200
		G.	HMAC Pavement (48' width)	30400	SY	\$ 8.50	\$ 258,400
		H.	Traffic Control	1	Lump Sum	\$ 29,800	\$ 29,800
		I.	Drainage	1	Lump Sum	\$ 28,500	\$ 28,500
		J.	Signage	1	Lump Sum	\$ 25,000	\$ 25,000
		K.	Restoration/Landscaping	4	Ac	\$ 15,000	\$ 60,000
		L.	Mobilization & General Conditions	1	Lump Sum	\$ 158,625	\$ 158,625
		M.	30% Contingency	1	Lump Sum	\$ 364,838	\$ 364,838
		N.	Design	1	Lump Sum	\$ 158,096	\$ 158,096
14	Southside Sector Plan		No construction costs associated with this item. Staff/Consultant time only, and this is difficult to predict without determining a scope of service.	1	Lump Sum	\$ 275,000	\$ 250,000
15	Pedestrian Trails with Overlooks, Towers, and Boardwalk (N of Ed. Ctr.)		Trail and boardwalk combination. Assume 80% trail and 20% boardwalk	7300	LF		\$ 1,559,434
		A.	Grading & Clearing	6759	CY	\$ 10	\$ 67,593
		B.	8' width Trail (granite gravel or concrete)	46720	SF	\$ 3	\$ 116,800
		C.	6' width Boardwalk	8760	SF	\$ 38	\$ 332,880
		D.	Observation Towers, ADA accessible	1	Ea	\$ 230,000	\$ 230,000
		E.	Observation Towers, at end of trail	1	Ea	\$ 130,000	\$ 130,000
		F.	Electrical utilities to the ADA accessible tower	1600	LF	\$ 35	\$ 56,000
		G.	Signage	1	Lump Sum	\$ 15,000	\$ 15,000
		H.	Mobilization & General Conditions	1	Lump Sum	\$ 142,241	\$ 142,241
		I.	30% Contingency	1	Lump Sum	\$ 327,154	\$ 327,154
		J.	Design	1	Lump Sum	\$ 141,767	\$ 141,767
16	Howard Road Realignment north of the Uplands			9300	LF		\$ 3,962,303
		A.	R.O.W. Acquisition	19	Ac	\$ 20,000	\$ 380,000
		B.	Grading & Clearing	30000	CY	\$ 10	\$ 300,000
		C.	12" Base Work	68200	SY	\$ 10	\$ 682,000
		D.	Concrete Curb	37100	LF	\$ 7	\$ 259,700
		E.	4' Concrete Walk on ea. Side	74400	SF	\$ 2	\$ 148,800
		F.	3' HMAC Pavement (48' width)	49600	SY	\$ 8.50	\$ 421,600
		G.	Traffic Control	1	Lump Sum	\$ 100,000	\$ 100,000
		H.	Drainage	1	Lump Sum	\$ 50,000	\$ 50,000
		I.	Signage	1	Lump Sum	\$ 20,000	\$ 20,000
		J.	Restoration/Landscaping	8	Ac	\$ 15,000	\$ 120,000
		K.	Mobilization & General Conditions	1	Lump Sum	\$ 315,315	\$ 315,315
		L.	30% Contingency	1	Lump Sum	\$ 839,225	\$ 839,225
		M.	Design	1	Lump Sum	\$ 325,664	\$ 325,664
17	Primitive Pedestrian Trail around Bird Pond		Primitive 6' trail	3300	LF		\$ 28,322
		A.	Grading & Clearing	1222	CY	\$ 10	\$ 12,222
		B.	Signage	1	Lump Sum	\$ 5,000	\$ 5,000
		C.	Mobilization & General Conditions	1	Lump Sum	\$ 2,583	\$ 2,583
		D.	30% Contingency	1	Lump Sum	\$ 5,942	\$ 5,942
		E.	Design	1	Lump Sum	\$ 2,575	\$ 2,575

C. Cost Estimate

PROGRAM ELEMENTS							Budget Totals
Ranking	Title	Parts	Description	Quantity		Unit Cost	
18	Establish a Separate Mitchell Lake Research Facility		Depends largely on what the ed. Instit. Wants to use at Mitchell Lake. This is a budget number only.				\$100,000 to \$2,000,000
19	Establish a Management Foundation		Requires some up-front legal fees and an initial per annum stipend to get foundation running				\$ 350,000
20	Education Center on the East Side of the Lake						\$ 12,636,487
		A.	Education Center Building and Displays	13000	SF	\$ 215	\$ 2,795,000
			Trail and boardwalk combination. Assume 25% trail and 75% boardwalk	6000	LF		
		B.	Grading & Clearing	5556	CY	\$ 10	\$ 55,556
		C.	Grading and Planting for Wetlands	26	Ac	\$ 85,000	\$ 2,210,000
		D.	8' width Trail (granite gravel or concrete)	12000	SF	\$ 2	\$ 24,000
		E.	8' width Boardwalk	36000	SF	\$ 38	\$ 1,368,000
		F.	Weirs beneath Boardwalk and Water Level Controls	2500	LF	\$ 65	\$ 162,500
		G.	Signage	1	Lump Sum	\$ 35,000	\$ 35,000
			Access Road and Parking				
		H.	R.O.W. Acquisition	0	Ac	\$ 20,000	\$ -
		I.	Demolition	7300	SY	\$ 5	\$ 36,500
		J.	Grading & Clearing	10000	CY	\$ 10	\$ 100,000
		K.	12" Base Work	13700	SY	\$ 10	\$ 137,000
		L.	3" HMAC Pavement	10600	SY	\$ 8.50	\$ 90,100
		M.	Drainage	1	Lump Sum	\$ 10,000	\$ 10,000
		N.	Signage, Walls, and Gate	1	Lump Sum	\$ 150,000	\$ 150,000
		O.	Restoration/Landscaping	25	Ac	\$ 35,000	\$ 875,000
		P.	Mobilization & General Conditions	1	Lump Sum	\$ 788,048	\$ 788,048
		Q.	30% Contingency	1	Lump Sum	\$ 2,651,011	\$ 2,651,011
		R.	Design	1	Lump Sum	\$ 1,148,772	\$ 1,148,772
			Beginning Phase Costs				\$ 5,596,717
		A.	Education Center Building and Displays	13000	SF	\$ 215	\$ 2,795,000
			Trail and boardwalk combination. Assume 25% trail and 75% boardwalk	1000	LF		
		B.	Grading & Clearing	926	CY	\$ 10	\$ 9,259
		C.	Grading and Planting for Wetlands	3	Ac	\$ 85,000	\$ 255,000
		D.	8' width Trail (granite gravel or concrete)	2000	SF	\$ 2	\$ 4,000
		E.	6' width Boardwalk	4500	SF	\$ 38	\$ 171,000
		F.	Weirs beneath Boardwalk and Water Level Controls	1000	LF	\$ 65	\$ 65,000
		G.	Signage	1	Lump Sum	\$ 10,000	\$ 10,000
			Access Road and Parking				
		H.	R.O.W. Acquisition	0	Ac	\$ 20,000	\$ -
		I.	Demolition	7300	SY	\$ 5	\$ 36,500
		J.	Grading & Clearing	10000	CY	\$ 10	\$ 100,000
		K.	12" Base Work	13700	SY	\$ 10	\$ 137,000
		L.	3" HMAC Pavement	10600	SY	\$ 8.50	\$ 90,100
		M.	Drainage	1	Lump Sum	\$ 10,000	\$ 10,000
		N.	Signage, Walls, and Gate	1	Lump Sum	\$ 15,000	\$ 15,000
		O.	Restoration/Landscaping	2	Ac	\$ 35,000	\$ 70,000
		P.	Mobilization & General Conditions	1	Lump Sum	\$ 145,929	\$ 145,929
		Q.	30% Contingency	1	Lump Sum	\$ 1,174,136	\$ 1,174,136
		R.	Design	1	Lump Sum	\$ 508,792	\$ 508,792



C. Cost Estimate

Ranking	Title	Parts	Description	Quantity		Unit Cost	
21	Watson Road Improvements between Pleasanton Rd and US 281			6500	LF		\$ 2,847,085
		A.	R.O.W. Acquisition	13	Ac	\$ 20,000	\$ 260,000
		B.	Grading & Clearing	21000	CY	\$ 10	\$ 210,000
		C.	12" Base Work	48000	SY	\$ 10	\$ 480,000
		D.	Concrete Curb	26000	LF	\$ 7	\$ 182,000
		E.	4' Concrete Walk on ea. Side	52000	SF	\$ 2	\$ 104,000
		F.	3" HMAC Pavement (48' width)	35000	SY	\$ 8.50	\$ 297,500
		G.	Traffic Control	1	Lump Sum	\$ 100,000	\$ 100,000
		H.	Drainage	1	Lump Sum	\$ 50,000	\$ 50,000
		I.	Signage	1	Lump Sum	\$ 15,000	\$ 15,000
		J.	Restoration/Landscaping	5.5	Ac	\$ 15,000	\$ 82,500
		K.	Mobilization & General Conditions	1	Lump Sum	\$ 228,150	\$ 228,150
		L.	30% Contingency	1	Lump Sum	\$ 602,745	\$ 602,745
		M.	Design	1	Lump Sum	\$ 235,190	\$ 235,190
22	Hike & Bike Trails to Other Cultural Attractions		Hike/Bike Trail to AASHTO standards (13' width). Excludes TEA-21 trail along Pleasanton Road. Excludes bridges.	31000	LF		\$ 1,896,764
		A.	R.O.W. Acquisition	25	Ac	\$ 2,500	\$ 62,270
		B.	Grading & Clearing	28704	CY	\$ 10	\$ 287,037
		C.	13' width Trail (concrete)	403000	SF	\$ 2	\$ 806,000
		D.	Signage	1	Lump Sum	\$ 10,000	\$ 10,000
		E.	Mobilization & General Conditions	1	Lump Sum	\$ 165,456	\$ 165,456
		F.	30% Contingency	1	Lump Sum	\$ 399,229	\$ 399,229
		G.	Design	1	Lump Sum	\$ 166,772	\$ 166,772
23	Neighborhood Park Adjacent to the Education Center		budgetary number				\$ 450,000
24	Detailed Economic Development Plan for Designated Commercial Nodes		No construction costs associated with this item. Staff/Consultant time only, and this is difficult to predict without determining a scope of service.	1	Lump Sum	\$ 125,000	\$ 125,000
25	Change the Name of Mitchell Lake		no cost associated with this item unless Foundation decides to commission a marketing study				
26	Fishing Piers		2 fishing piers (ped access only)				\$ 686,400
		A.	Foundation - conc piers & bents	40	Ea	\$ 6,000	\$ 240,000
		B.	Wooden structure, platform, railing, and seats	12000	SF	\$ 20	\$ 240,000
		C.	30% Contingency	1	Lump Sum	\$ 144,000	\$ 144,000
		D.	Design	1	Lump Sum	\$ 62,400	\$ 62,400

NOTES:

1. EACH OF THE TOTALS IN BOLD INCLUDES A 30% CONTINGENCY ADDED INTO THE TOTAL.
2. THESE COSTS ARE BASED UPON 1999 CONSTRUCTION COSTS, WHICH WE HAVE USED TO THE BEST OF OUR ABILITY.
3. THESE ARE ROUGH BUDGETARY NUMBERS, AND SHOULD BE TREATED ACCORDINGLY.

D. Thematic Sketches



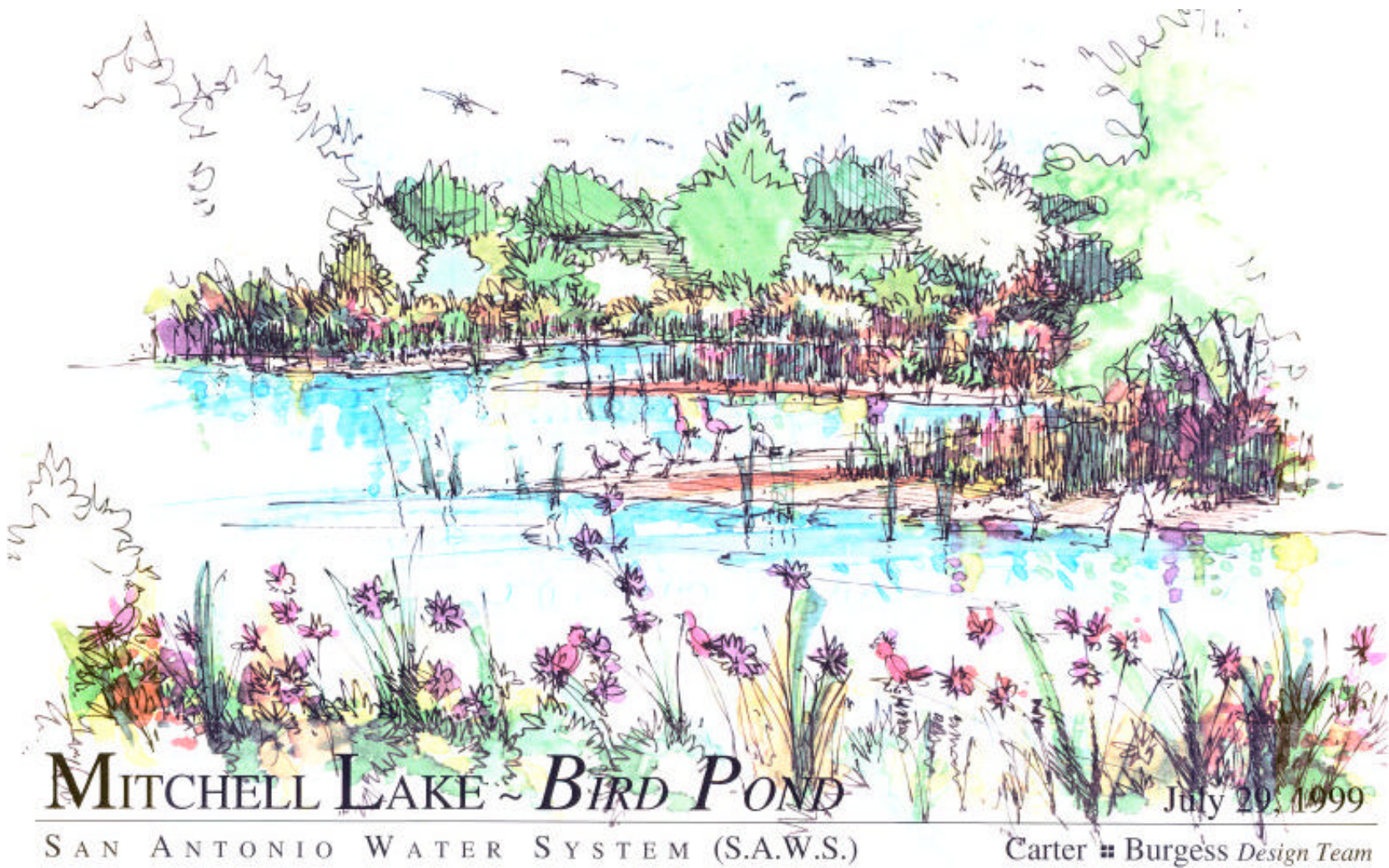
MITCHELL LAKE ~ *BLIND WITH BERM*

SAN ANTONIO WATER SYSTEM (S.A.W.S.)

July 29, 1999

Carter ■ Burgess Design Team

D. Thematic Sketches



D. Thematic Sketches



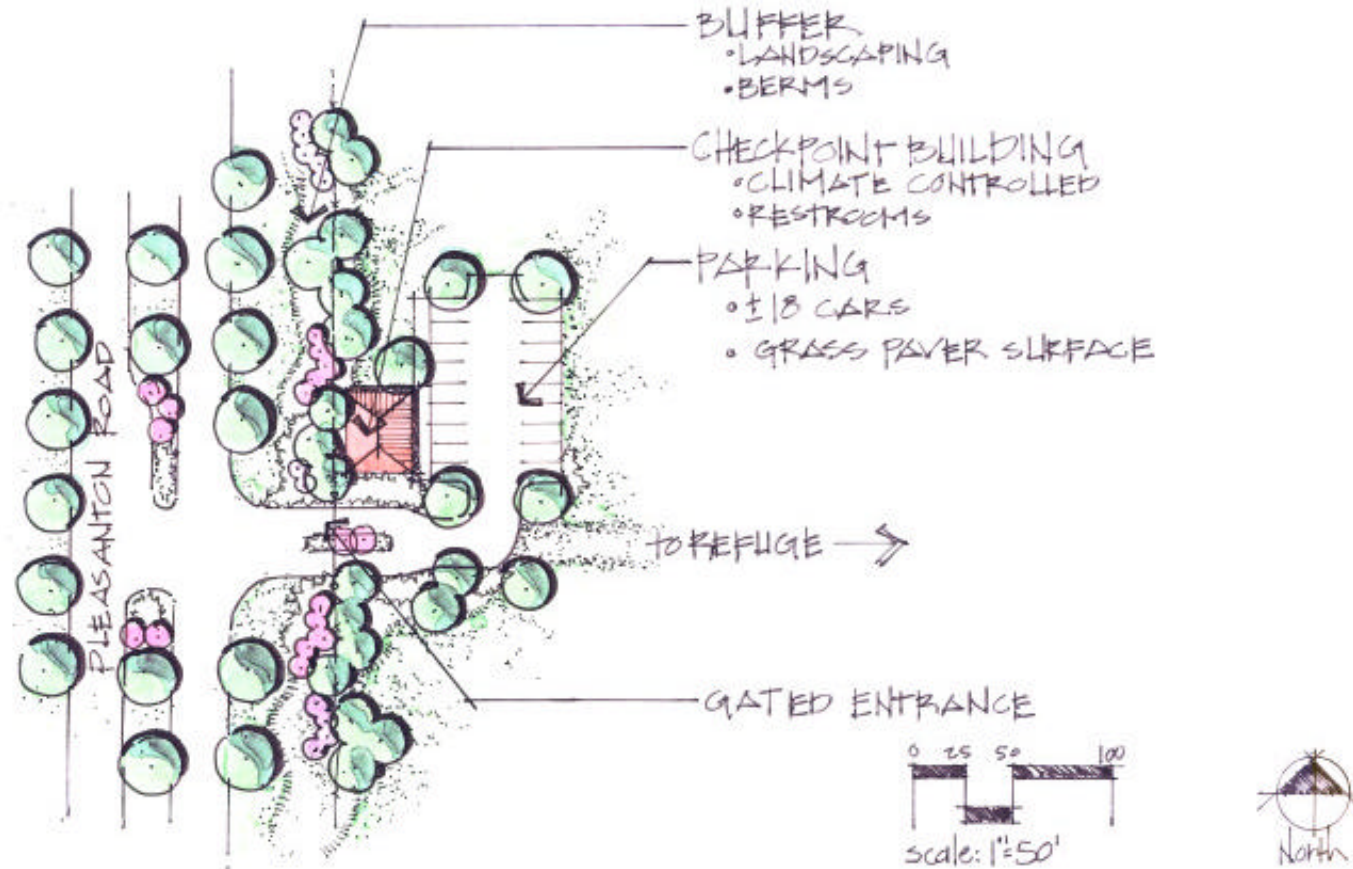
MITCHELL LAKE ~ *BLIND WITH BERM*

SAN ANTONIO WATER SYSTEM (S.A.W.S.)

July 29, 1999

Carter ■ Burgess Design Team

D. Thematic Sketches



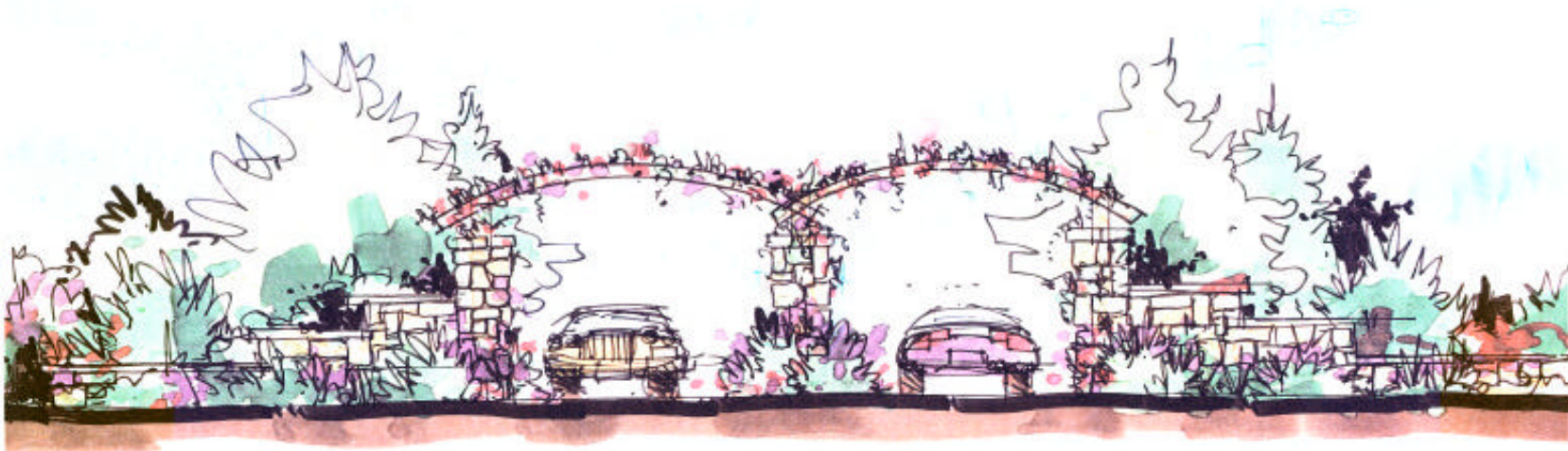
MITCHELL LAKE ~ REFUGE CHECKPOINT

July 29, 1999

SAN ANTONIO WATER SYSTEM (S.A.W.S.)

Carter ■ Burgess Design Team

D. Thematic Sketches



MITCHELL LAKE ~ *ENTRY WAY*

SAN ANTONIO WATER SYSTEM (S.A.W.S.)

July 29, 1999

Carter ■ Burgess Design Team

D. Thematic Sketches



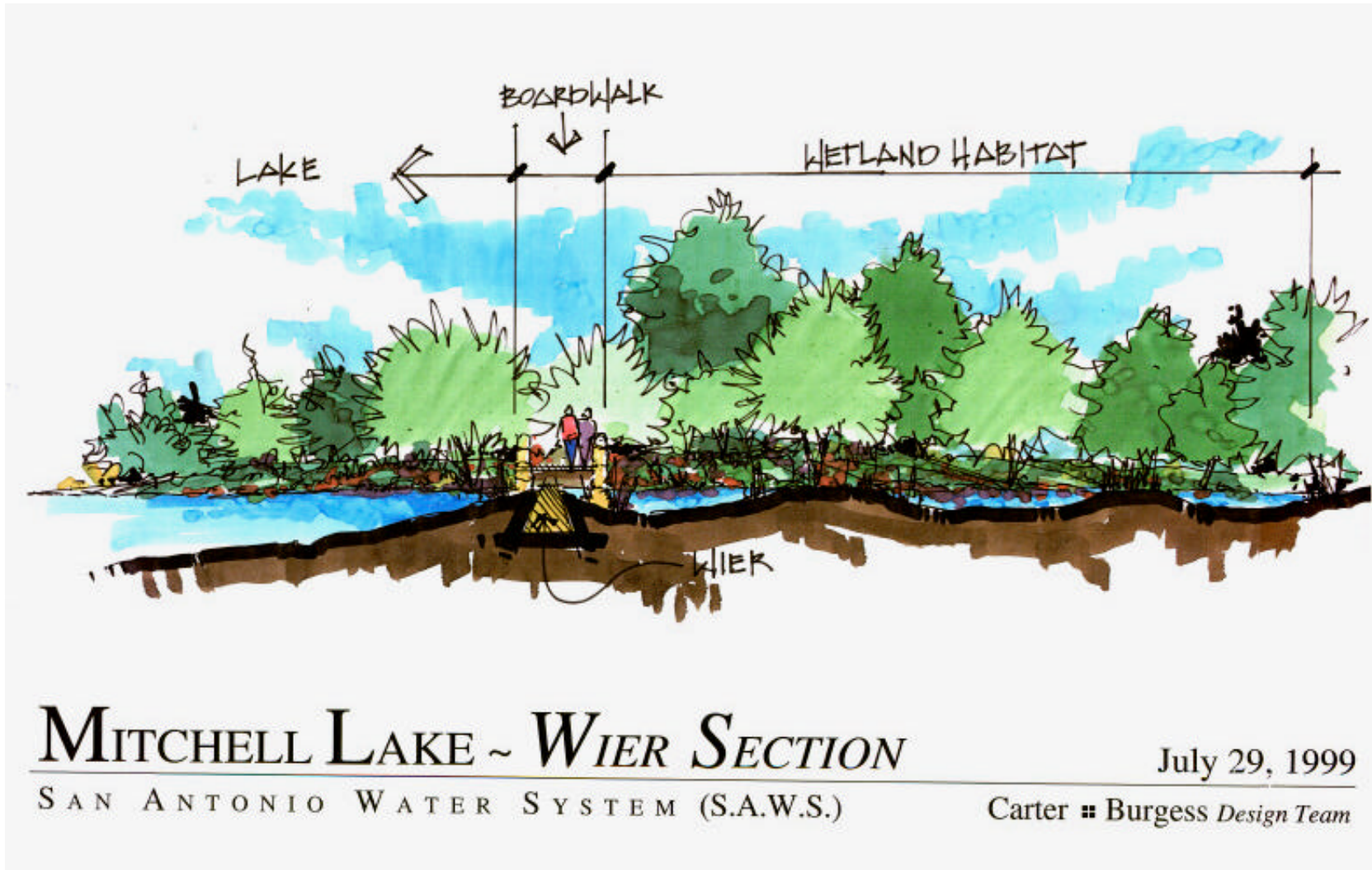
MITCHELL LAKE ~ VIEWING RESEARCH

July 29, 1999

SAN ANTONIO WATER SYSTEM (S.A.W.S.)

Carter ■ Burgess Design Team

D. Thematic Sketches



E. Dam Assessment Letter

L. David Givler, MSCE, PE

107 Sheffield Place
San Antonio, Texas 78213

February 14, 2000

Mr. Brad Davis, PE
Carter & Burgess
911 Central Parkway North, Suite 175
San Antonio, Texas 78232

Re: Condition of Mitchell Lake Dam

Dear Mr. Davis:

As you requested, I have reviewed all the documents that I could find last week concerning Mitchell Lake Dam, which is located south of San Antonio on Cottonmouth Creek. As we discussed, I have not been able to visit the dam. This letter summarizes my understanding of the dam's condition based on what I have read and my limited, prior knowledge.

I reviewed the following documents:

- *Texas Water Rights Commission Interoffice Memorandum* by Larry G. Hada, December 18, 1975
- *Texas Department of Water Resources Permits Division Inspection Report on Existing Dam* by David Stolpa, August 6, 1981
- *Field Inspection of Mitchell Lake Dam* by Hensley-Schmidt, Inc., February, 1990
- *Mitchell Lake Dam Investigation Preliminary Engineering Report for the City of San Antonio* by W.E. Simpson, Inc. *et al*, August, 1990
- Excerpts from *Mitchell Lake Dam Reconstruction Phase B Drainage Report* by W.E. Simpson, Inc. *et al*, April 2, 1992

Mitchell Lake Dam is an earthen structure, 12 or 13 feet high and approximately 3,200 feet long with an intermediate size classification and a low hazard rating. The dam has a 55-foot-long concrete spillway with eight 36-inch-diameter gate valves at the crest and a 250-foot-long stone and mortar outfall channel. It appears that the dam is in need of modification. Any proposed projects that depend on the existence of the dam should take into consideration the possibility that it may wash out under existing conditions, that it currently does not meet state requirements and that significant modifications are required.

Unprotected earthen dams should not be overtopped. The Phase B Report establishes that, under state regulations, the dam is required to pass 29% of the Probable Maximum Flood without overtopping. The dam will not safely pass the design flood or the 100-year flood. My review did not find a direct indication of what flood event would overtop the dam under existing conditions. However, I was able to deduce that a flood magnitude somewhat smaller than the 15-year flood could cause overtopping, assuming the normal water level is to be kept somewhere near the level of the existing spillway crest. Further study would be required to determine whether the 2-, 5-, or 10-year floods would cause overtopping.

Phone/Fax: (210) 342-3991

E-mail: givler@freewweb.com

E. Dam Assessment Letter

Mr. Brad Davis, PE
February 14, 2000

Page 2 of 2

In any case, the dam does not have an adequate level of safety from overtopping. This point is underscored at least three ways. The state reports conclude that the dam does not meet Texas requirements for a structure of its class. An erosion gully has been observed on the downstream slope, suggesting overtopping has been occurring. And the dam is reported to have already breached once in the 1940s, flooding the downstream area and washing out part of a railroad embankment. A new spillway system should be constructed or, at least, the dam should be protected with some kind of armoring system for overtopping conditions.

The dam is covered with trees and brush, which should be removed. Such vegetation can cause desiccation of the clay embankment and possible cracking. Decaying root systems can leave voids, which become conduits for water. Rotting or damaged trees along the downstream toe may fall over, pulling up root systems and creating exit points for water in the embankment. All three mechanisms may promote leakage and dam failure.

Trees should also be removed from the emergency spillway to allow for its full capacity to be maintained. Reduced capacity of the spillway will increase the chances of overtopping.

Several other items, although somewhat less important, also require attention. A regular inspection program should be implemented. Moist areas at the toe of the dam should be observed regularly to ensure that piping is not occurring. Areas along the toe should be graded to prevent standing water. The existing piezometers should be monitored regularly. A cavity behind the east spillway retaining wall should be repaired if the spillway is not replaced. The outlet channel, which has been undercut in the plunge pool, may need repair.

It is clear that future projects at Mitchell Lake, which depend on maintaining a certain water level behind the dam, should take the state of the dam into consideration. Appropriate modifications and repairs should be implemented in order to assure that the mission of future projects is not jeopardized. The details of the required modifications will depend on the specifics of the project goals, state regulations, and the desired lake level.

I hope that I have given you a clear picture of the situation. Please do not hesitate to contact me if I can help establish an inspection program, help with a further detailed analysis, or if I can answer any further questions.

Sincerely,


L. David Givler, MSCE, PE



02/14/00

F. Supplementary Eco-Tourism Information

a) Mitchell Lake's relationship to other national eco-tourism opportunities. Describe and compare similar facilities:

1. Bosque del Apache

Bosque del Apache is known as one of the most spectacular refuges in North America. Each autumn, tens of thousands of birds including Sandhill Cranes, Arctic geese and ducks make the refuge their winter home. Bosque del Apache National Wildlife refuge was established in 1939 to provide a refuge and breeding grounds for migratory birds and other wildlife as well as to develop wintering grounds for greater Sandhill Cranes which were then endangered. The goals of the refuge are as follows:

- To provide habitat and protection for endangered species.
- To provide habitat and protection for migratory birds during the winter with special emphasis on Sandhill Cranes, snow geese, dabbling ducks, and Canada geese.
- To provide habitat and protection for resident animals.
- And to provide the general public with an opportunity to see and understand wildlife and provide visitors with a high quality wildlife and educational experience.

Bosque del Apache is located on the northern edge of the Chihuahuan desert. The refuge straddles the Rio Grande approximately twenty miles south of Socorro, New Mexico. The heart of the refuge is 7000 acres of flood plain. The remaining portion of the refuge is made up of arid foothills and mesas, which rise to the Chupadera Mountains to the west and to the San Pascual Mountains to the east. Most of these arid lands are preserved in three wilderness areas.

Other important attributes that Bosque del Apache provides to avid bird watchers and wildlife conservationists are a 15-mile auto tour route, picnic areas, and nature trails. The city of Socorro, New Mexico provides tourists with 11 Motels, 31 restaurants, 2 bed and breakfasts and 2 RV parks. Bosque del Apache is located 8 miles from San Antonio, NM and 18 miles from Socorro, NM. Within a 70-mile radius are 6 camping areas, within a 350-mile radius are 13 national parks, and within a 300-mile radius are 5 national wildlife refuges.

There are two items where Bosque del Apache relates well to Mitchell Lake. Even though the size of this refuge is much larger than Mitchell Lake (57,191 acres versus 1,200 acres respectively) the 7000 acres of flood plain where the waters of the Rio Grande have been diverted to create extensive wetlands are comparable. In addition, very similar to what is planned at Mitchell Lake, a visitor center is located on New Mexico Highway 1 that provides current information on wildlife sightings, exhibits, videos, and books.

2. Laguna Atascosa National Wildlife Refuge

Laguna Atascosa is considered a hotspot by several birding guidebooks. Its location near the southern tip of Texas is the northern extreme of the range of many southern species and the southern extreme of many northern species resulting in unusual levels of biodiversity.

The 45,187-acre coastal plain refuge is essentially flat landscape interspersed with lakes, shallow wetlands, slow creeks, and low ridges. These features create several diverse habitats. The refuge is home to 5 endangered and 2 threatened species. In addition, the refuge offers a 15-mile auto tour route, a visitor center, and several trails.

The city of Harlingen and Brownsville are in close proximity to the refuge. Both cities provide ample restaurants and hotels to accommodate tourists. The regional chamber of commerce actively promotes the area to winter Texans and birders. An annual birding festival draws about 1,500 people each year.

Laguna Atascosa is a non-consumptive/passive use refuge. People watching wildlife and using the trails recorded over 100,000 visitor days. Ninety-seven percent of the visitors to Laguna Atascosa are non-resident non-consumptive/passive users. It is indeed a birding destination hotspot.

Based on a publication created by the Laguna Atascosa NWR, non-residents spent more than \$3.5M related to their visits to the refuge. Through the multiplier effect (the effect of dollars spent by eco-tourists is multiplied as tourist dollars become profits then wages, then consumer income once again) \$3.2M in new economic activity is thus created, generating 79 new jobs and \$1.3M in payroll.

There are several items where Laguna Atascosa National Wildlife Refuge relates well to Mitchell Lake. The auto tour route, wildlife refuge center, and the trails network are comparable to what is planned for Mitchell Lake. The wide, shallow wetlands of Laguna Atascosa are comparable to the existing polders and the future constructed wetlands, as well.

3. Heard Natural Science Museum & Wildlife Sanctuary

The Heard Museum is located in McKinney, Texas. Its founder, Bessie Heard, collected butterflies, nature prints, and other nature artifacts. Eventually, the collections, including an extensive butterfly collection, grew too large for the Heard House in McKinney. The museum opened to the public in October 1, 1967.

The museum is dedicated to preserving a portion of Collin County land, with its native wildlife and vegetation, in as natural a condition as possible. The Heard Museum also houses Miss Heard's extensive collections. An important element of the Heard Museum and similar to the Mitchell Lake project is the emphasis on education programs for youth. The

program is designed to enhance a child's appreciation and understanding of nature, conservation and art.

The sanctuary portion of the Heard Museum consists of diverse habitats over the 287-acre wildlife sanctuary with more than over five miles of interpreter-led or self-guided nature trails. There is a paved nature trail for wheelchairs. The habitats on the Heard Wildlife Sanctuary include bottomland, woodland, prairie, and wetlands. The Sanctuary is a haven for more than 240 species of birds, mammals, reptiles and amphibians and nearly 150 species of wildflowers and other plants. Fifty acres of wetlands feature an outdoor learning center with an observation deck, a floating study laboratory, and a boardwalk.

The Heard Natural Science Museum and Wildlife Sanctuary is the most highly attended museum in Collin County Texas, with annual public participation exceeding 100,000 people. The Museum is a 25,000 sq. ft. science museum, a 287-acre wildlife sanctuary, a new 4000 sq. ft. Raptor Rehabilitation Center and a 3750 sq. ft. environmental center and outdoor aquatic laboratory. The purpose "to create, preserve and utilize a healthy environment through teaching people to understand and appreciate their surroundings" is carried out in every project, program and exhibition associated with the Museum.

The Museum has over one dozen permanent exhibit areas covering a realm of diverse subjects. These include live animal exhibits inside and outside the museum, and separate portions dedicated to specific purposes such as the Native Plant Garden, the Raptor Rehabilitation Center and a Research Program. The Research Program covers the full range of natural projects but concentrates on restoration efforts to encourage native plant and animal communities particularly those threatened by extinction. This amplifies the portion of the Heard Museum Mission and that of most plant and wildlife refuges, which are to ensure future generations a natural area to observe, appreciate, and understand local natural heritage.

At the heart of the Heard Museum are its extensive natural science education programs. These programs are specific to special interest or ability groups and several age groups ranging from preschool to senior citizens groups. People develop an understanding and respect for the natural world around them.

The Heard Museum also sponsors special interest groups. These are listed in the Appendix and are provided as examples of other types of organizations that could be associated with Mitchell Lake.

The similarities between the Heard Museum and Mitchell Lake project are an education center coupled with a protected wildlife refuge and extensive education programs.

4. River Legacy Living Science Center

In February 1988, the River Legacy Foundation was organized by a group of Arlington, Texas citizens in collaboration with the Arlington Parks and Recreation Department. The mission of the foundation is to preserve and enhance the forest floodplain along the banks of the Trinity River as a natural educational and recreational amenity.

River Legacy Parks consists of 600 acres located along the Trinity River in North Arlington. The park was opened to the public in June 1990 complete with hiking/biking trails, nature trails, and multiple river overlooks. In 1996, construction was completed for the Living Science Center to house the River Legacy Foundation's multi-faceted environmental education program. The Living Science Center is 12,000 square feet of terraria and aquaria, and contains interactive exhibits. The Living Science Center offers educational programs for students of all ages, as well as special family activities and presentations that help fulfill the educational goals of the Center.

In addition, the River Legacy Foundation is launching a Nature Center project. The vision is to integrate with existing remote metroplex nature centers and to serve as a hub for natural and ecological education in the area. This center will provide a wide range of environmental education programs aimed at all levels and groups while collaborating with other facilities. The Nature Center site is adjacent to the River Legacy Parks entrance. A large pond and winding trails are part of the layout along with a 60-vehicle parking lot.

The similarities between the Nature Center and the Living Science Center with the Mitchell Lake project are controlled access, emphasis on education, and its ties with the city infrastructure.

b.) Mitchell Lake's potential effect on Mission del Lago property values

The existence of open space may affect the surrounding land market. In 1919 the landscape architect Frederick Law Olmstead, Jr. observed that "It has been fully established that a well-located school and play-ground, or even a site for the same, ... adds to the value of all the remaining land in the territory to be served by the school more than the value of the land withdrawn for the purpose, just as a local park ... adds more to the value of the remaining land in the residential area which it serves than the value of the land withdrawn to create it." (as cited in Weiss 1987, p. 60). For the purpose of this discussion, we refer to this value of open space as enhancement value.

Evidence of enhancement value is commonly found in real estate advertisements that feature proximity to open space amenities. Federal income tax law also explicitly recognizes it. U.S.

Treasury regulation Sec. 14(h)(3)(i) requires the valuation of a conservation easement take into account (i.e., be offset by) any resulting increase in the value of other property owned by the donor of the easement or a related person. Section 14(h)(4) cites as an example a landowner who owns 10 one-acre lots and donates an easement over eight of them. "By perpetually restricting development on this portion of the land, (the landowner) has ensured that the two remaining acres will always be bordered by parkland, thus increasing their fair market value..." (Small 1990).

Several empirical studies have sought to measure the enhancement value of various types of open space such as neighborhood and large urban parks, greenbelts, bodies of water and wetlands. Some examples are given below.

1. An early study of a 10-acre neighborhood park in Lubbock, Texas found that within a two-and-one-half block area around the park, land values declined with distance from the park (Kitchen and Hendon 1967). The study did not find a significant correlation between distance from the park and property (house and land) sales prices, perhaps, as the authors suggest, because only the land values were sufficiently homogeneous for the correlations to be revealing.
2. Another study of five parks in Columbus, Ohio found that where properties sided on open space, a positive impact (7 to 23 percent) was reflected in property values (Weicher and Zeibst 1973). The effects were insignificant or negative where the property backed onto a park, or where the view was of an intensively used recreation facility such as a ball field or playground. Properties facing a park sold for \$1,130 more than similar properties one block away; properties backing onto a park sold for about the same; and those facing intensively used recreational facilities sold for about \$1,150 less during the period 1965-69.
3. A 1974 study of land values surrounding 1,294-acre Pennypack Park in northeast Philadelphia found a statistically significant rise in land value with proximity to the park, when controlling for other factors (Hammer et al. 1974). The park accounted for 33 percent of the land value at 40 feet, 9 percent at 1,000 feet, and 4 percent at 2,500 feet. The authors concluded that each acre of parkland generated a value of \$2,600 in location rent (or, as used in this paper, enhancement value).
4. Correll et al. (1978) found in Boulder, Colorado, the existence of greenbelts (linear open space features such as trails or stream corridors) had a significant impact on adjacent residential property values. While controlling for other variables, they found properties adjacent to greenbelts in the three neighborhoods studied to be worth an average of 32% more than those 3,200 walking feet away. The relationship was linear: a \$4.20 decrease in the price of residential property for each foot away from the greenbelt. In one of the neighborhoods the aggregate property value was approximately

\$5.4 million greater than it would have been without the greenbelt, resulting in potential additional annual neighborhood property tax revenue of \$500,000.

5. An interesting policy finding of the Boulder study is that the effect of open space on neighborhood property values depended critically on how well the open space was integrated into the neighborhood. Open space had a greater positive effect on property values in the neighborhood where it was purchased prior to construction and included in the neighborhood design than it did where it was purchased after construction and separated from the neighborhood by a major limited access highway.
6. Nelson (1985) examined how greenbelts influence regional land values including urban, greenbelt, and exurban areas. He found empirical evidence in the literature that greenbelts increase the value of urban land in proximity, and theorized that this effect also extends to the exurban land market where people will locate and commute through the greenbelt to employment locations in the urban area. Within the greenbelt itself, land values are reduced where large-lot zoning as opposed to the purchase of development rights or conservancy zoning creates the greenbelt, and also reduced along the urban fringe as restrictions on agricultural practices reduce farm value.
7. Parsons (1992) found land use restrictions in Maryland designed to protect Chesapeake Bay caused a considerable increase in housing prices. These ranged from 14 to 27 percent for houses within the Critical Zone (1000 feet inland from the Bay and major tributaries) to between 4 and 11 percent for houses up to 3 miles away. Unfortunately, his analysis was not able to distinguish between price increases due to limitations on the supply of land available for development and increases due to the enhancement value of open space capitalized into the value of the land (and subsequently housing prices).
8. Thibodeau and Ostro (1981) utilized two methods to estimate the enhancement value of 8,535 acres of wetlands in Massachusetts's Charles River basin. A multivariate regression analysis found that properties abutting the wetlands were worth \$400 more than non-abutting properties, and that each acre of wetland added \$150 in value to adjacent properties. A survey of 15 appraisers and realtors yielded the estimate that each acre of wetlands contributes \$480 to the value of an abutting parcel of property.
9. Lacy (1990) analyzed property value appreciation rates (as measured by resale over time) for open space or "cluster" subdivisions in Concord and Amherst, Massachusetts. In Concord, properties in an open space subdivision appreciated 167.9% between 1980 and 1988, compared to 146.8% for the town as a whole. In Amherst, houses in an open space subdivision appreciated 462% between 1968 and 1989 while houses of similar size and price in a conventional subdivision appreciated 410% during the same period. Market value and enhancement value of open spaces correlate strongly with development risk and land scarcity. In rural areas where most land is open space and

likely to remain so (or at least is perceived to be at low risk for development) both market and enhancement value will be low. However, in urban or urbanizing areas where open space is scarce or diminishing (or in rural areas with unique amenities such as scenic views) market and enhancement value will be high. For advocates of open space protection, enhancement value is important because it offsets the negative effects of removing the market value of the open space itself (which is usually tax-exempt or taxed at a low rate) from the local property tax base.

Although the effects of real estate appreciation are complex, the examples provided demonstrate that the property values in Mission del Lago due to its proximity to Mitchell Lake will appreciate. Based on the example of Maryland housing and the proximity to the Chesapeake Bay it can be estimated that Mitchell Lake property values could appreciate by 14%.

c.) Bibliography

River Legacy Foundation (RLF)

Arlington Texas River Legacy Living Science Center
 History of River Legacy Parks and the River Legacy Foundation
 RLF River Legacy Parks (F) & (Paper)
 Nature Center -River Legacy Parks (Paper)
 Project Overview- Nature Center Project
 RLF- Nature School (F)
 RL Parks (Paper)
 RLF- General Information (F)
 RL-Living Science Center (Event Bulletin)
 Living Science Center (F)
 RL Parks- Event Flyer
 RLF- Country Music Revue

Heard Natural Science Museum & Wildlife Sanctuary (HNSMWS)

Science Resource Center at HNSMWS (5Pages)
 The Heard Nature Store (1 pg.)
 About Us- Museum & Wildlife Sanctuary (5pgs.)
 Annual Report
 FAQ- (4Pgs.)
 Native Plant Garden
 Raptor Rehabilitation Center
 Research Projects
 Special Events

Laguna Atascosa National Wildlife Refuge

U.S. Fish & Wildlife Service Bulletin (Shows similarity to Mitchell Lake)

Laguna Atascosa NWR - Watchable Wildlife List

Excerpt from U.S.FWS Publication- "Banking on Nature"

U.S. FWS -Laguna Atascosa NWR (6 Pgs.)

Other Laguna Atascosa NWR Information

- Field Trips (2 Pgs.)
- GORP Sheet (1 Pg.)
- South Texas Birds (2 Pg.)
- Birding in Harlingen Area (3 Pg.)
- Eco-Tourism (3 Pg.)
- Summary of Facts Sheet (1 Pg.)

Bosque del Apache National Wildlife Refuge

Bosque del Apache NWR Pamphlet from U.S. FWS

Friends of the Bosque del Apache NWR (F)

Information from U.S. Department of the Interior (3 Pg.)

Welcome to Socorro, New Mexico (1 Sheet)

The Economic Value of Open Space: A Review & Synthesis; Charles J. Fausold & Robert J. Lillieholm (27 Pg.)

Mitchell Lake Visits: 1995-1999; From Ernest Roney, San Antonio Audubon Society

Birding Sites in and around San Antonio (6 Pg.)

The Growth of Birding, and the Economic Value of Birders; Parts 1-4, & 6-9 (28 Pg.)
An American Birding Association Publication

Avitourism in Texas; Fermata, Inc. (106 Pg.)

Banking on Nature; The Economic Benefits to Local Communities of National Wildlife Refuge Visitation; Div. of Economics, U.S. FWS (119 Pg.)

d.) Eco-Tourism Appendix

Heard Museum Special Interest Groups from section IA3:

Collin County Archaeology Society

The Archaeology Society is a group of avocational archaeologists who meet to identify and share fossil relics and artifacts and participate in area “digs.”

Collin County Chapter of the Native Plant Society of Texas

The Native Plant Society of Texas was formed to promote conservation, research, and utilization of the native plants and plant habitats of Texas, through education, outreach, and example.

The Collin County Chapter of the NPSOT was formed in 1991 to encourage local residents to use native plants and to educate residents on native plant benefits.

Collin County Hobby Beekeepers Association

The beekeepers purpose is to provide fellowship and sharing of information among beekeepers and those interested in bees, promote the art of beekeeping, and encourage the use of honey. It also protects the industry of beekeeping and honey bees, and cooperates with County Extension Services, USDA, TBA, and other organizations promoting beekeeping information.

Heard Nature Photographers Club

This is a group of photo enthusiasts of all skill levels, who love nature and photography. The purpose of the group is to bring together people who share this common love and to learn more about nature photography, not only photographic technique but also the natural world of plants, flowers, mammals, minerals, etc. to share experiences and techniques.

Prairie and Timbers Audubon Society

The Audubon Cause is to conserve native plants and animals and their habitats, protect life from pollution, radiation, and toxic substances, further the wise use of land and water, seek solutions to global problems involving the interaction of population, resources, and the environment and to promote rational strategies for energy development and use, stressing conservation and renewable energy sources.

Membership includes AUDUBON MAGAZINE, published by the National Audubon Society six times per year and Audubon sanctuaries are open to members.

Heard Museum Volunteers Guild

The purpose of the Guild is to stimulate public interest in the Heard Natural Science Museum and Wildlife Sanctuary and to provide volunteers to help with Museum activities.