



Muroc Lake Golf Course
Environmental Management Plan
Edwards AFB, CA Jul 07



Muroc Lake Golf Course Environmental Policy

**In concert with the
Edwards AFB mission,
we pledge to employ
only those management practices
that minimize or eliminate the potential
for negative impacts to the environment
and the surrounding community,
ensure compliance with all appropriate regulations,
and to regularly reevaluate our processes
to achieve the highest standards
of environmental excellence.**



Executive Summary

U. S. Air Force GEM Program

The U. S. Air Force Golf Course Environmental Management (GEM) program is a proactive Air Force Center for Environmental Excellence (AFCEE) initiative to foster a better understanding of the environmental challenges facing our golf courses worldwide. Armed with the support and approval of the Air Force Services Agency golf program, AFCEE's goal is to facilitate the creation of an environmentally friendly golf course facility while supporting the installation mission. AFI 32-7064 requires a GEM Plan as part of the Integrated Natural Resources Management Plan (INRMP).

The primary tenets of the GEM Program are to minimize or eliminate potential negative environmental impacts, attain and maintain daily compliance with all appropriate regulations, and constantly examine all aspects of golf course management to achieve the highest standards of environmental excellence.

GEM Program process

There are five steps in the GEM program process.

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision



Environmental Compatibility Quotient

Actual ECQ	75
Potential ECQ	81

Final environmental challenges

The following environmental challenges were identified during the GEM Plan process:

- Water supply/conservation
- Proposed irrigation lakes project
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Threatened & endangered species
- Air quality
- Tree management & landscape development

Where do we go from here?

The true measure of a successful GEM program is how well is it executed in the field each and every day. The installation golf and environmental staffs should continue to analyze, document, monitor, evaluate, revise, and implement changes based on lessons learned. The GEM Plan should be updated annually and revised during the next INRMP iteration update. The entire GEM process can be found on the regularly improved AFCEE GEM program website (<http://www.afcee.brooks.af.mil/ec/golf/>).

Analysis

Course details

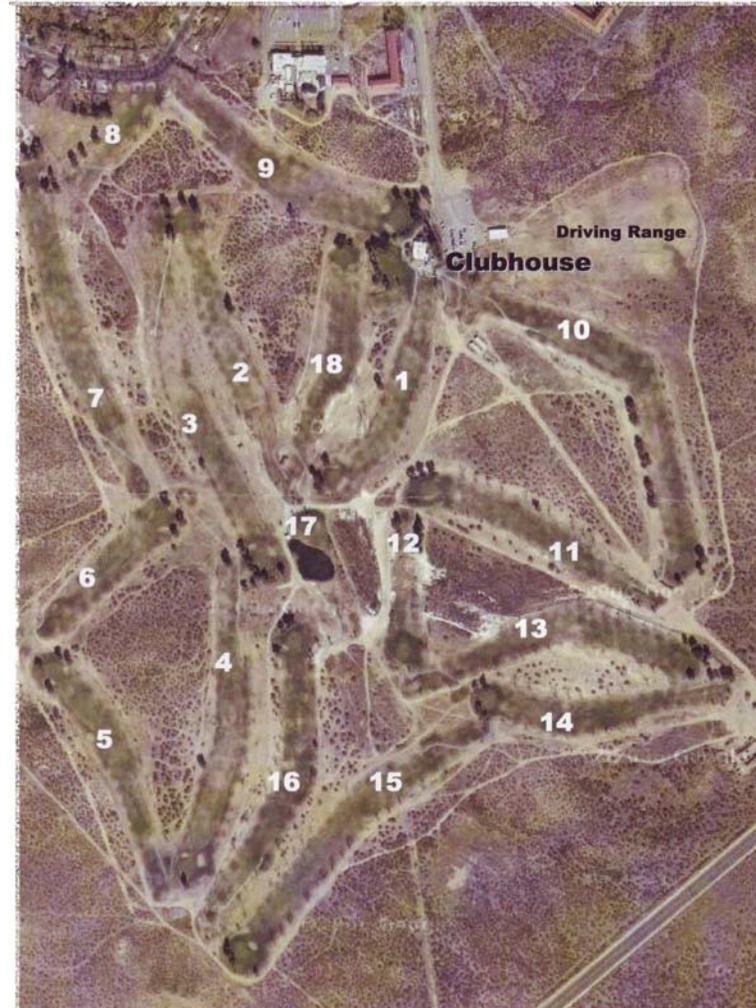
Architect	Billy Bell
Year constructed	1959/1967
Climate	Hot, dry, and very windy
Average annual rainfall	5 inches
Average growing season	300+ days
Winds/Prevailing Direction	West to Southwest
Total Facility Acreage	237 acres
Par	36-36-72
Yardage/Rating/Slope	Tee- Yards/Rating/Slope
	Blue- 6915/73.5/129
	White- 6446/71.3/125
	Red- 5561/72.2/123
Turfgrass	Common Bermudagrass
Tees-	Common Bermudagrass
Fairways-	Common Bermudagrass
Greens	Bentgrass/Poa annua
Roughs-	Common Bermudagrass

Course description

Muroc Lake Golf Course is truly a jewel of the desert. Edwards AFB is in the high, extremely dry Mohave Desert. Although the area historically averages 4 inches precipitation per year, Muroc Lake had not received any measurable rains for nearly 14 months. The course features a real test for all regardless of its length on the card as the wind rarely dips below a Mohave sirocco.

In addition, the course has really improved over the last several years due to the diligence and

professionalism of the course’s superintendent. With new the Director of Golf lending an experienced hand focused on customer satisfaction; the facility is on its way to become one of the U.S. Air Force’s finest.



Muroc Lake Course Layout



Muroc Lake Golf Course Aerial Photo

Determining the Baseline (ECQ)

The following is a brief compilation of some of the responses in each of the ten Environmental Compatibility Quotient (ECQ) categories obtained in an interview with the superintendent and the manager conducted during the site visit.

ECQ Categories

- Overall Management Philosophy & Documentation
- Safety, Training, And Awareness
- Compliance
- Pesticide Use, Storage, & Handling
- Pollution Prevention
- Conservation Practices
- Water Resources
- Maintenance Practices
- Customer Relations & Education
- Miscellaneous Special Projects & Activities

Key to checklist responses

- **Yes** = Practice is complete or ongoing and can be verified.
- **Partial** = Practice has been initiated but needs further attention and improvement.
- **No** = Practice is not in place.

ECQ Checklists

The Environmental Compatibility Quotient (ECQ) checklists are a convenient method of assessing the overall performance, implementation, and completeness of an installation's Golf Course Environmental Management Plan. The checklists can be used in many ways including:

- As an analytical tool while compiling a Golf Course Environmental Baseline Assessment like this one.
- As a self-assessment tool for the golf course manager or superintendent.
- As an award nomination evaluation by a Golf Course Assessment Team (GCAT).



Interpreting the ECQ

The ECQ compiled for an installation's course is a snapshot of the overall performance and compliance with the GEM Plan. There are two measures obtained as a result of using the ECQ checklists to determine the status or quality of the environmental management program: 1) determining the actual and; 2) potential environmental compatibility quotients.

- **Actual ECQ-** the total percentage of "Yes" responses for all ten checklists. This number represents the current level of the golf course management practice compatibility with the environment
- **Potential ECQ-** the total percentage of "Yes" responses plus the total percentage of "Partial" responses for all ten checklists. Maybe the most significant measure; the potential ECQ represents a level of compatibility that could be reached by finalizing or fully implementing a particular practice or procedure.

ECQ Scoring Scale

Percent Responses Yes or Partial per Category	Level
90-100%	Advanced (Green)
70-89%	Showing progress (Yellow)
69% or less	Getting started (Red)



Nearly constant winds affect irrigation coverage and tree growth.



Muroc Lake's snack bar usually does a brisk lunch business.

Overall Management Philosophy & Documentation				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Has installation environmental and golf management demonstrated that the environment is an important part of their responsibilities by initiating the GEM Planning process?	✓		
2	Has the golf course adopted and posted an Environmental Policy?			✓
3	Is the GEM Plan underway or completed, available, and updated regularly?		✓	
4	Is a map of the property highlighting identified environmental challenges available, used in the environmental management decision-making process, and is it posted for customers?			✓
5	Are environmental challenges and their management method, target, and objective, and overall golf course GEM program goals evaluated at least annually and are they regularly communicated to employees, customers, management, and the local community?			✓
6	Are written records of water quality monitoring activities, results, and control measures collected and readily available?	✓		
7	Is there an inventory of bird and mammal species maintained and readily available?	✓		
8	Is there a general understanding of how course management practices may positively enhance or adversely impact the environment?	✓		
9	Are the environmental impacts of pest control measures considered prior to their use as part of the course environmental management planning process?	✓		
10	Are records of pest treatments and their effectiveness maintained and used to guide future pest control decisions?	✓		
	Point totals for each column	6	1	3

Safety, Training, & Awareness				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are all golf course employees familiar with the GEM program and are they trained on the importance of environmental compliance with the goals and objectives of the program as it applies to their specific duties?			✓
2	Are all appropriate employees trained to be familiar with U. S. Air Force, federal, state, and OSHA regulations that apply to the storage, handling, and disposal of all chemicals potentially used on the property?	✓		
3	Are all employees aware of the potential risks to human health and the environment of chemical use, storage, and disposal?	✓		
4	All appropriate employees receive documented training on practices that may adversely impact worker health, on- and off-site water quality, and wildlife species and their habitats?	✓		
5	Is a current copy of Material Safety Data Sheets (MSDS) for all chemicals used anywhere on the golf course property maintained and readily available for use by regularly trained employees?	✓		
6	All employees receive regular, documented training on all potential OSHA issues associated with their specific duties?	✓		
7	Are all golf course pesticide applicators active participants in a respiratory and pulmonary testing program?	✓		
8	Are all pesticides, fertilizers, and other chemicals stored on appropriate shelving in an approved storage facility?	✓		
9	Are golfers notified in the pro shop and on the first and tenth tees about the planned or recently completed spraying of any chemical or fertilizer that may potentially be hazardous to human health or general public safety?	✓		
10	Are key staff members trained regarding water quality and conservation issues pertinent to the course and their particular duties?	✓		
	Point totals for each column	9	0	1

Compliance				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are the fuel storage/delivery area and associated equipment managed in accordance with federal, state, and local regulations?	✓		
2	Are installation environmental staff members regularly consulted on pertinent course management discussions and plans?	✓		
3	Are there golf course staff meetings where environmental management issues are regularly discussed with all employees?			✓
4	Do the director of golf and the superintendent attend all internal and external ESOHCAMP in-briefings and out-briefings?	✓		
5	Do the director of golf and/or the superintendent coordinate their input on the various management plans that affect or include the golf course with installation environmental staff?			✓
6	Have all environmental challenges been physically identified and mapped to aid the golf staff's daily management efforts?			✓
7	Has appropriate impact analysis (NEPA) been performed on all proposed actions on or affecting the golf course property?	✓		
8	Are oil containers used to collect old oil in good condition and correctly labeled?	✓		
9	Has the golf course staff assisted the installation environmental staff with the required Golf course Environmental Management Plan requirements?	✓		
10	Were there less than two major golf course facility-related findings during the last official ESOHCAMP visit?	✓		
Point totals for each column		7	0	3

Pesticide Use, Storage, & Handling				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there trained scouts on staff other than the superintendent to monitor turf and plant pest populations that notify management include findings into a report or guide for future use?	✓		
2	Are there written pest profiles of common pest species with a variety of potential control measures including cultural, biological, physical, and mechanical controls prior to treating the problem on the course?	✓		
3	Are there established, documented, and utilized aesthetic and functional thresholds for effective management of pests that may also reduce chemical use?		✓	
4	Is there a specially designed pesticide mixing area where all mixing is performed by appropriately trained personnel?	✓		
5	Has a current list of all pesticides and other chemicals stored or used at the golf facility recently been provided to the appropriate Fire Department(s)?	✓		
6	Is there a written, readily available, and regularly updated Integrated Pest Management Plan for the entire golf course facility?	✓		
7	If personal protective equipment is required for pesticide use, storage, or handling, is it available for use by trained individuals?	✓		
8	Are written and readily available records maintained of all applications of pesticides made by certified applicators, including the following? - the quantity of each pesticide used; - the chemical or common name of the active pesticidal ingredient(s); - the pest or purpose for which the pesticide was applied; and the date and place of application.	✓		
9	Is the chemical storage structure/area well ventilated, fire resistant, and locked with access limited to select personnel?	✓		
10	Are there designated and documented "no spray" areas around pond, river, stream, or lake edges and have they been communicated to pesticide applicators?	✓		
	Point totals for each column	9	1	0

Pollution Prevention				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there designated and documented "minimally-maintained" or natural vegetative buffer areas around pond, river, stream, or lake edges and have they been communicated to mower operators and pesticide applicators?	✓		
2	Is there a readily available copy of the Installation Spill Plan that includes the golf course facility and is there a spill containment kit at each required location with spill containment procedures in place?		✓	
3	Does the chemical storage area have a sealed metal or concrete floor and are all liquid pesticides handled over an impermeable surface?	✓		
4	Does the chemical storage area have a lip along the edges to contain spills?	✓		
5	Are liquid products stored below dry products and are dry materials stored on appropriate pallets or shelves to keep them off the floor?	✓		
6	Do all golf facility employees regularly receive documented and approved HAZCOM and safety and health training?	✓		
7	Are grass clippings removed from equipment with compressed air instead of or prior to washing?	✓		
8	Are gasoline, motor oil, brake and transmission fluid, solvents, and other chemicals used to operate or maintain equipment and vehicles prevented from directly or indirectly entering water bodies?	✓		
9	Has the watershed in which the course resides and contributes runoff to been identified and mapped to aid the golf course staff?	✓		
10	Are appropriate quantities of fertilizers applied during weather conducive to reducing the potential for leaching and runoff?	✓		
	Point totals for each column	9	1	0

Conservation Practices				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are recycling containers conveniently provided for customer and employee use throughout the golf course facility?			✓
2	Are there appropriately designated and mapped minimally maintained areas on the golf course facility grounds?	✓		
3	Has the irrigation system or its components recently been upgraded to reduce inefficiency, malfunction, and overall water use?	✓		
4	Has all “non-target” irrigation (ponds, natural, or out of play areas, etc.) been eliminated or minimized?	✓		
5	Have irrigation system meters been installed to monitor water use and detect potential waste?	✓		
6	Has the entire golf course facility property been examined for landfills, critical habitats, threatened or endangered species, wetlands, floodplains, and historical/cultural resources or other environmentally sensitive features?	✓		
7	Are employees encouraged to minimize their trips around the course to conserve on the use of fossil fuels and minimize potentially harmful exhaust emissions?	✓		
8	Do the restaurant and/or snack bar utilize reusable plates and silverware for use by customers throughout the facility’s operating hours?			✓
9	Have the annual maintenance practices for the officially designated “minimally-maintained” or natural areas been coordinated with the installation Bird/Wildlife Aircraft Strike Hazard (BASH) officer and installation environmental management personnel?	✓		
10	Are all motorized golf course equipment regularly checked for excessive air polluting emissions?	✓		
Point totals for each column		8	0	2

Water Resources				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are water features regularly monitored for algae, erosion, excessive aquatic plant growth, fish kills, and sedimentation?	✓		
2	Are equipment wash or wastewater kept from directly entering surface water and are they recycled or allowed to filter through a vegetative area?	✓		
3	Are outdoor irrigation of non-golf course landscape areas regularly monitored and maintained for leaks and efficient performance?	✓		
4	Has the golf course staff coordinated with the installation’s environmental staff on potential storm water management planning requirements?	✓		
5	Have part circle irrigation heads been installed where possible to preserve water resources and reduce maintenance while minimizing potential negative impacts to surrounding minimally maintained, natural, or water feature areas?	✓		
6	Are all water feature maintenance tasks coordinated with the installation Bird/Wildlife Aircraft Strike Hazard (BASH) officer and installation environmental management personnel?	✓		
7	Has the irrigation system been completely checked for proper water distribution in all irrigated areas and are water leaks fixed in a timely manner?	✓		
8	Are moving water bodies that pass through the golf course such as streams or creeks regularly monitored both upstream and downstream of the course for overall water quality?	✓		
9	Does the facility have an approved written and readily available Drought Management Plan if, or when irrigation restrictions may be required by the community or the installation?			✓
10	Is there a comprehensive, up to date, and readily available written Water Feature Management Plan for the entire golf course facility?			✓
Point totals for each column		8	0	2

Maintenance Practices				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is there a written, regularly updated, and readily available Golf Course Maintenance Plan?	✓		
2	Does the Maintenance Plan include individual plans such as Integrated Pest Management, Tree Management, and Hazard Communication?			✓
3	Are green, tee, and fairway mowing heights maintained at reasonable levels that do not unduly stressing turf or requiring additional chemical inputs?	✓		
4	Are there regular and documented procedures in place to continually improve overall course soil health such as topdressing, organic amendments, aeration, and drainage improvements?	✓		
5	Is there an up to date and readily-available map of the course's "hot spots", or those areas requiring special care or regular attention?			✓
6	Is all maintenance equipment maintained and cleaned in a manner that minimizes or eliminates the potential for spreading of pest or disease contamination?	✓		
7	Has there been a complete examination of all aspects of the golf course facility operation (including the snack bar and grill, clubhouse, pro shop, cart storage facility, and maintenance complex) for potential negative environmental impacts?	✓		
8	Is contour mowing used to conserve fuel and increase playability and aesthetics?	✓		
9	Have all playing surfaces been inventoried and mapped for potentially agronomically challenging soil types?	✓		
10	Are soil tests and plant tissue analysis used to determine nutritional requirements?	✓		
Point totals for each column		8	0	2

Customer Relations & Education				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are the course manager and superintendent involved in an on-going and documented customer environmental management educational program?			✓
2	Is there a highly visible location at the course or clubhouse where golf course environmental management notices and informational messages are regularly posted for the education and enjoyment of customers?	✓		
3	Do the course manager and superintendent actively communicate with customers to determine their points of view?	✓		
4	Is there documented, regular communication by course management with installation civil engineering, environmental, and leadership on GEM program issues or concerns?		✓	
5	Does the golf staff regularly survey their customers on how they rate the various elements of the golf course facility?	✓		
6	Is there consistent and attractive signage around the course and grounds that would increase the awareness of the average golfer to the environmental management practices employed?		✓	
7	Are there signs appropriately located to warn golfers of hazards around or near recycled or otherwise non-potable water?	✓		
8	If applicable, have areas of the course been designated "Environmentally Sensitive Zones" per USGA rules?	✓		
9	Are course staff members regularly trained on how to improve their dealings with customers?	✓		
10	Are there clinics provided to teach beginning golfers the basics of the game to include the rules as well as the environmental challenges faced by the golf staff at their facility?	✓		
	Point totals for each column	7	2	1

Miscellaneous Special Projects & Activities				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there projects planned and funded for execution in the near future that would demonstrate the compatibility of the course's management methods with GEM program initiatives?	✓		
2	Are there projects planned and funded to reduce the course's potential negative environmental impacts?	✓		
3	Are there tournaments or other events planned that may educate customers on the environmental challenges faced by the golf staff?			✓
4	Are there regular field trips hosted at the course for local students or other community groups?			✓
5	Are there projects planned to eliminate or minimize a potential erosion problem?			✓
6	Does the course have a native tree installation program complete with planting plan and maintenance schedule?	✓		
7	Are any of the local schools or universities involved in educational or research activities at your course?			✓
8	Are there special facility-wide recycling programs underway?	✓		
9	Is your course an active participant in the USAF Golf Environmental Management Program?	✓		
10	Has your facility been nominated by your MAJCOM for the golf course environmental management award in the last 3 years?			✓
	Point totals for each column	5	0	5

ECQ Summary

#	Environmental Compatibility Quotient Category	Yes	Partial	No
1	Overall Management Philosophy & Documentation	6	1	3
2	Safety, Training, & Awareness	9	0	1
3	Compliance	7	0	3
4	Pesticide Use, Storage, & Handling	9	1	0
5	Pollution Prevention	9	1	0
6	Conservation Practices	8	0	2
7	Water Resources	8	0	2
8	Maintenance Practices	8	0	2
9	Customer Relations & Education	7	2	1
10	Miscellaneous Special Projects & Activities*	5	0	5
	Composite point total/response percentage	76	5	19

Jul 07 - Muroc Lake Golf Course, Edwards AFB, CA

- Actual ECQ (# of “Yes”) = **75** (“Showing progress” - Yellow)

- Potential ECQ (Actual ECQ plus “Partial”) = **81** (“Showing progress” - Yellow)

* = Category requires improvement or attention

Environmental challenges

One of the important results of the GEM process is the identification of potential environmental challenges to be addressed in the long-term GEM Planning process. After determining the relative significance and validation of each potential environmental challenge, the installation golf and environmental staffs should determine the set of final challenges that will be actively managed in the GEM Plan. Armed with the list of final environmental challenges, the golf staff has determined the best management approach that satisfies the goals of the golf facility from the course playability and customer satisfaction perspectives. These management practices have been coordinated with the installation's environmental staff.

The entire GEM process can be viewed at the GEM website (<http://www.afcee.brooks.af.mil/ec/golf/>).

The following potential environmental challenges were identified during the GCEBA process:

- Environmental Compliance and Management Program (ECAMP)
- Pesticide Use & Integrated Pest Management
- Natural resource management
- Water use
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Threatened & endangered species
- Proposed maintenance facility
- Tree management & landscape development



Turfgrass thrives only where irrigated in the brutal Mohave Desert.

FINAL ENVIRONMENTAL CHALLENGES

The following final environmental challenges were identified during the GEM Plan process:

- Water supply/conservation
- Proposed irrigation lakes project
- Bird/Wildlife Aircraft Strike Hazard (BASH)
- Threatened & endangered species
- Air quality
- Tree management & landscape development



Muroc Lake Golf Course Environmental Challenges



At Muroc Lake Golf Course, efficient water use may be the highest priority outside of customer satisfaction.

WATER SUPPLY/CONSERVATION

Like most of the western United States to include all of southern California, Edwards AFB is severely limited by its lack of natural precipitation. The area averages only 5 inches annually. Combine this with the omnipresent winds that constantly desiccate everything outdoors, Muroc Lake Golf Course is extremely challenged by their water supply. The wastewater treatment plant currently treats an average of 1.3 million gallons daily of Edwards AFB's sewage and pumps it to the golf course storage pond. From there the pump house delivers the tertiary treated water via the irrigation system to the course.

Driver/requirement

- Limited water supply in an extremely dry region

Objective

Use only as much water as required to maintain a playable and successful golfing experience.

Management Practice

- Utilize best available technology to ensure efficient use of limited natural resource

Target

Analyze entire irrigation system to determine components that may require updating and compile a Drought Management Plan by the end of CY2008.



Irrigation pond only holds around 400,000 gallons of water.



Close up of the concept drawing for expanding the irrigation pond.

PROPOSED IRRIGATION LAKES PROJECT

The nearby city of Rosamond, California has approached the installation commanders with a proposal to send all of its wastewater to Edwards AFB for treatment. In exchange, the installation would be able to utilize a large quantity of water. The golf course only has about one-half day’s supply of water at any time due to the limited size of its irrigation lake. The severe climate of the region demands that at least a 30-day supply be available for use at the course. AFCEE has provided a conceptual plan for expansion of the main irrigation pond as well as other systematically connected ponds that would not only increase the storage capacity but would also increase the aesthetics and playability of the Muroc Lake Golf

Course. This could be the most important project ever for the golf course and the installation.

Driver/requirement

- Need to increase long-term water supply at an economical rate

Objective

Ensure that all new ponds will be constructed to minimize or eliminate the potential for waterfowl.

Management approach

- Continue to monitor status of project

Target

Continue to work with local communities to secure long-term supply.



Coots are just one of the species that concerns airfield managers.

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH)

The INRMP states that “While BASH issues are always a concern, by comparison with other Air Force bases; there are relatively few BASH events at Edwards AFB. Revegetation of disturbed areas is expected to minimize the long-term availability of open foraging habitat for the species between runways and taxiways resulting in a decrease in their numbers in these areas”. The INRMP names the horned lark as the most prevalent BASH species for Edwards AFB.

Even though the installation may have fewer BASH concerns, one of the actual concerns is probably the golf course and its ponds. If properly implemented, the proposed irrigation lake project would increase the surface area of the ponds while decreasing the number of birds through the elimination of existing and potential vegetation.

Driver/requirement

- Installation BASH Plan

Objective

Never allow a golf course practice to create or exacerbate a known BASH concern.

Management Practice

- Coordinate all water feature maintenance procedures with installation environmental and airfield management personnel

Target

Attain and maintain positive relationships with installation environmental and airfield managers to ensure compliance in the management of this important environmental challenge.



Vegetation in the irrigation pond naturally attracts birds to the course.



The desert tortoise is the only year round resident protected by the Endangered Species Act at Edwards AFB.

THREATENED & ENDANGERED SPECIES

In the threatened and endangered species chapter, the INRMP grandly states that “The purpose of this plan is to allow fulfillment of the Edwards AFB mission while assisting in species recovery. This will be accomplished through ecosystem management, cooperation with regulatory agencies, education, compliance with federal laws and regulations that protect species listed under the ESA [Endangered Species Act], and an increased understanding of the natural resources on base”.

The INRMP lists only one species protected under the ESA. The desert tortoise can live up to 100 years and somehow thrives in the harsh Mojave Desert climate. The installation also has other non-listed yet still protected species to include the Mojave ground squirrel, mesquite bosques, and the desert cymopterus.

Driver/requirement

- Endangered Species Act of 1973

Objective

Ensure there are no impacts to the desert tortoise or other protected species as a result of golf course management practices.

Management practice

- Train all maintenance employees on appropriate procedures when a desert tortoise is encountered on the golf course

Target

Complete training all maintenance personnel prior to the end of CY08.

AIR QUALITY

Edwards AFB and the surrounding area are in moderate non-attainment status for both ozone and PM10. Accordingly, any excessive air emissions are a detriment to the region's air quality as well as the installation's ability to perform its mission over the long haul.

In addition, the state's Phase II rules focus largely on non-road emissions and particularly on small engines. Every piece of golf course equipment from string trimmers and larger will need to be examined for long-term compliance with the new laws and regulations.

Driver/requirement

- Clean Air Act

Objective

Ensure that no controllable golf course management practice contributes to the air quality problem of Edwards AFB and the surrounding community.

Management practice

- Continue to maintain equipment motors to operate at peak efficiency
- Encourage all employees to minimize their trips around the course

Target

Complete regular engine maintenance per prescribed schedule.



A lone Joshua tree stands guard in the center of the 18th fairway.

TREE MANAGEMENT & LANDSCAPE DEVELOPMENT

Muroc Lake Golf Course is located in the Mojave Desert. The Mojave's indicator plant is the Joshua tree, a distinctive twisted, multi-armed arboreal yucca. According to the INRMP, the "Joshua tree woodland understories include saltbush, or creosote bush; Joshua trees provide an important vertical habitat component for wildlife. The understory supports a high diversity of annual plant species, including the native desert dandelion (*Malacothrix glabrata*), pincushion (*Chaenactis* sp.), and fiddleneck (*Amsinckia tessellata*)".

This is where the real problem lies – there are few desirable native trees that would contribute to the aesthetics and playability of the golf course. At least in the traditional sense of what trees normally provide – green leaves, some form of wide, upright canopy, and shade.

Driver/requirement

- Mission support
- Community benefit
- Decreased maintenance costs.

Objective

Assist the installation with stated goal of promoting xeriscape/desert-compatible species to reduce stress on water resources by ensuring that only approved species are planted on the golf course facility grounds.

Management Practice

- Coordinate all proposed landscape development on the golf course grounds with installation environmental staff
- Utilizing the installation plant list, develop a golf course-specific tree management plan and use only those species determined appropriate for use on the course

Target

Utilize 100% native plant materials (or other installation environmental management-approved plants) for all future landscape development.



Water-loving cottonwood trees were planted some time ago with limited success.

GEM Plan goals & objectives

Goals are defined as actions or results that should be accomplished in the next year. A detailed description of these should be inserted here.

- Familiarize all golf course employees with the GEM program and train them on the importance of environmental compliance as it applies to their specific duties

Objectives are defined as actions or results that are desired to be accomplished prior to the next INRMP update.

- Implement a facility-wide recycling program
- Initiate an on-going and documented customer environmental management educational program
- Map the course's "hot spots"

GEM Plan best practices

Best practices are defined as any action, method, practice, or result that has proven its value and worth over time. The GEM program has been designed to create a body of scientific data to share with all U.S. Air Force installation golf and environmental staff members.

- Currently taking aggressive steps toward securing a long-term golf course irrigation water supply through creative and innovative means

Please see the AFCEE GEM program website (<http://www.afcee.brooks.af.mil/ec/golf/>) for more information.



Muroc Lake Golf Course is high desert golf at its finest.



Conclusion

The Civil Engineering Squadron’s unit environmental coordinator program should provide the key oversight to assist in improving the ability of the golf and environmental staffs to work together to better support the Edwards AFB mission. In addition, conserving precious water supplies through the application of science, engineering, and demonstrated environmental stewardship may be the only other major issue facing the Edwards AFB environmental and golf staff members.

The gallery

This section of the report will be where some of the more revealing photographs (of the literally hundreds taken during the site visit) of pests, maintenance practices, and other areas where improvements may be made to create the best possible golf facility within the limited budget and support of the mission.



At Muroc Lake Golf Course, efficient water use may be the highest priority outside of customer satisfaction.



Syringing is a regular chore at Muroc Lake.



This area would be greatly improved with the proposed lake project.



Desert scrub, in this case, creosote, dominates the non-irrigated areas.



Some species of pines actually do well in turf situations.



The clubhouse is appropriately located at the course's highpoint.



Some "environmentally sensitive" areas really aren't....



Desert scrub, in this case, creosote, dominates the non-irrigated areas.



Migratory birds and raptors like this hawk are protected by law.



Most of this reports' photos were kindly provided by Mr. Rick Boehm, HQ AFSVA.

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