



***Eglin Golf Courses
Environmental Management (GEM) Plan
Eglin AFB, FL***



June 2011



San Antonio, Texas



Eglin Golf Courses Environmental Management Policy

**In concert with the
Eglin 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.**

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Executive Summary

U. S. Air Force GEM Program

The U. S. Air Force Golf Courses Environmental Management (GEM) program is a proactive Air Force Center for Engineering & the Environment (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. Chapter 11.4 of AFI 32-7064 requires a GEM Plan as part of the Integrated Natural Resources Management Plan (INRMP).

GEM Program process

There are five steps in the GEM program process:

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision

Environmental Compatibility Quotient (ECQ) scores

The following is the summary of the environmental compatibility quotient (ECQ) scores for the site visit conducted in June 2011:

- **Actual ECQ = 74, Showing progress (Yellow)**
- **Potential ECQ = 95, Advanced (Green)**

Environmental challenges

The following environmental challenges were identified in compiling this document:

- Protected species
- Cultural resources
- Wetlands
- Erosion
- Invasive species

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.lackland.af.mil/gem>).



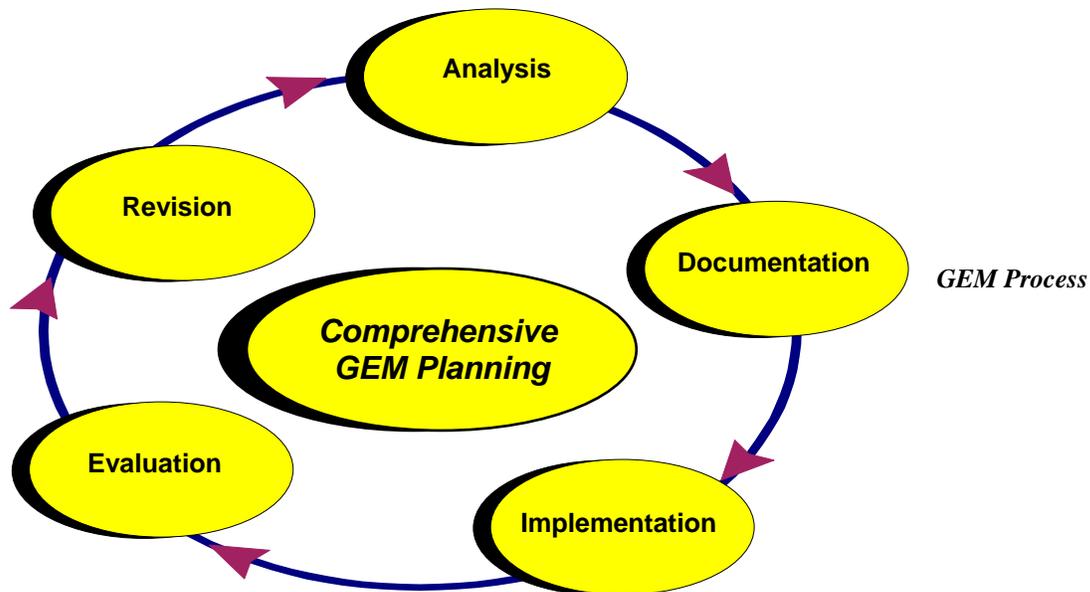
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Quality recreational resources can be found here.

The Draft Golf course Environmental Management (GEM) Plan is the initial step in creating a successful ecosystem-based comprehensive GEM Plan. The intent of the GEM Plan is to provide an efficient management tool that will enable course managers to devote more of their efforts to caring for their customers and the golf course. Properly designed and implemented, the GEM Plan will keep the entire golf facility in compliance with the constantly evolving environmental requirements while contributing to the local community.

The GEM Initiative

The goal of the GEM initiative is to facilitate the creation of an environmentally friendly approach to golf course management while protecting and promoting the great game of golf. AFCEE is dedicated to helping to identify ways that more rounds can be played on better-conditioned courses while minimizing or eliminating negative impacts to the environment. The comprehensive GEM planning process is the vehicle to document our successes while communicating directly with our customers, commanders, and local community.



The five steps of the GEM Process are based on continual improvement.

GEM Process

Efficient implementation is the most important aspect of any initiative where practices and procedures are examined and may undergo significant change. This is especially true of the comprehensive GEM planning process. The GEM Plan is derived from several diverse environmental regimes to include the National Environmental Policy Act and the ISO 14001 environmental management system.

There are five basic steps in the implementation of the GEM Planning process:

- Analysis
- Documentation
- Implementation
- Evaluation
- Revision

Analysis

Experienced environmental managers realize the importance of assembling all of the data relevant to a problem prior to determining its best solution. Comprehensive analysis is the most important task of the GEM process. Properly completing the analysis is paramount to the long-term compatibility of a golf course's management practices with the local community's natural resource and environmental management goals and objectives.

The site assistance visit accomplishes several important activities to include:

- Site visit, interviews, and data collection
- Courses specific analysis & miscellaneous facility review
- Compilation of the environmental compatibility quotient checklists
- Identification of potential environmental management challenges

Documentation

It is not enough just to know how to create a successful golf course environmental management program. There must be a written record documenting existing site data, maintenance practices, pesticide applications, and other historical golf course activities. By documenting what we know, we will be able to determine how to make better decisions in the future.

The completed GEM Plan will assist in the daily management of the course while providing a convenient vehicle to communicate to the community and customers alike the environmental issues that challenge golf course managers as well as their plans to deal with them. In order to reach established environmental stewardship goals the golf course staff must consistently employ only those management practices that minimize or eliminate potential negative impacts to the environment.

GEM PLAN COMPONENTS

The GEM Plan will be comprised of the following components:

- Map of the entire golf course facility grounds depicting locations of the significant environmental management challenges and the golf course facilities
- Booklet that describes the environmental management challenges depicted on the GEM Plan map
- Specific practices that will be employed by the golf course staff to deal with each environmental management challenge after coordination with and approval by the installation environmental staff
- Compilation of best management practices employed at the golf course in their implementation of the GEM initiative recommendations



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Course management believes in communicating with its customers.

Implementation

Positive and decisive action is the only true measure of the success of the GEM Plan. By implementing new practices, whether to knowingly improve the course's role in the environmental stewardship of the installation or to just try new ideas to determine their value, will the golf staff and golfers benefit. The installation golf staff should consider adopting the GEM Initiative process and establish an environmental policy that minimizes or eliminates any and all potential negative environmental impacts.

Evaluation

In order to ensure the highest quality of customer service and environmental stewardship, there must be continual self-evaluation and improvement. There also should be consistent, on-going measurement of the reduction or elimination of environmental impacts the newly implemented practices have on the course. For example, documenting the reduced use of inputs such as fertilizers, pesticides, and irrigation can be used to demonstrate the increased environmental stewardship of the golf course management practices as well as the overall value of the GEM initiative. It is important for golf courses to show improvement over time. Improvements can be easily accomplished by regularly evaluating golf course maintenance methods, practices, and management approaches to day-to-day issues in concert with the desire and ability to change.

Revision

The very nature of a superior GEM Plan implies that all documents be regularly maintained to represent the most current conditions. Golf course managers and superintendents should be constantly looking for ways to improve their environmental stewardship. Acting on lessons learned is right behind initial implementation as the most important aspect of a successful GEM Plan. The GEM Plan should be kept as current as possible at all times. Ideally, it should be updated annually and completely rewritten on the same cycle as the Integrated Natural Resources Management Plan.

Course Specific Analysis

One of the most important tasks in the initial phase of the GEM process is the course specific analysis. From a general description of the course to the details of the course's history and makeup to the various observations on course playability, aesthetics and style of management, the course specific analysis establishes and communicates the context for the rest of the GEM Plan report.



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Eglin Golf Courses play on, over and through attractive and sensitive lands.

Courses Description

THE EAGLE COURSE

Originally constructed as an alleged winter retreat for Al Capone and his friends as the Chicago Country Club of Valparaiso, the Eglin Eagle Course has provided quality recreation for over 80 years. The most surprising attribute of the courses at Eglin is the continuous rise and fall of the land. It is hard to find this much topographic relief anywhere in the state of Florida. The Eagle Course is a joy to play as it gracefully embraces a large lake on several holes. Equitable for all levels of golfers, the course can yield low scores to the able and aggressive player. Due to a recent investment in the property, the greens and greens complexes were completely renovated.

THE FALCON COURSE

The Falcon is Eglin's newest course and just might be the most popular with regular customers. Relatively recently added, the Falcon course inhabits similar terrain as its sister course. Rather than large bodies of water there are streams that are home to the endangered Okaloosa darter. The course recently added a large irrigation pond which has improved aesthetics and increased the challenge for golfers while reducing overall environmental impacts to the sensitive Florida panhandle ecosystem in which Eglin AFB resides.

General Eglin Golf Course details

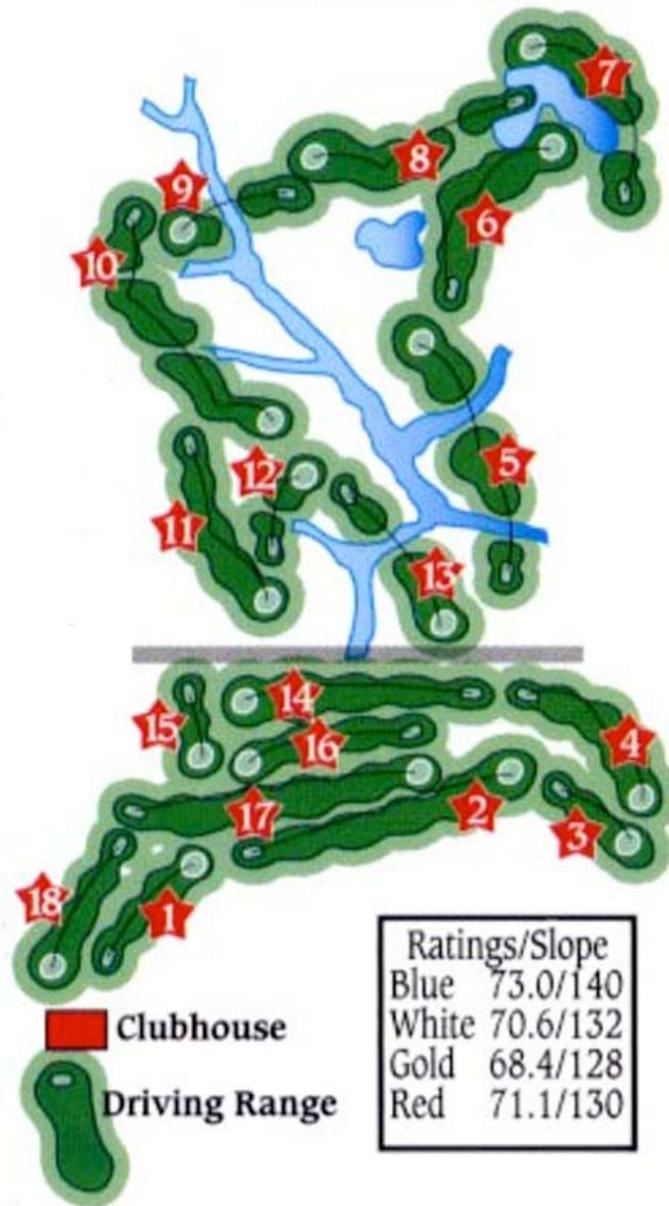
Climate	Hot and humid
Average annual precipitation	~62 inches
Average growing season	~300 days
Elevation	~150' ASL
Prevailing wind direction	Southwest
Total facility acreage	450 acres
Total actively maintained acreage	245 acres
Irrigation source/Sustainability rating	Recycled/runoff (non-potable) Green



The Eagle Course layout plan.

Eagle Course details

Architect	Unknown
Year constructed	1923
Par	36-36-72
Yardage/Rating/Slope	Blue- 6652/71.8/126 White- 6372/70.6/124 Gold- 5547/66.5/112 Red- 5200/69.2/116
Turfgrass	419 Bermudagrass
Tees-	Tifdwarf Bermudagrass
Fairways-	Tifdwarf Bermudagrass
Greens-	Common/mixed
Roughs-	



The Falcon Course layout plan.

Falcon Course details

Architect	Unknown
Year constructed	1973/1984
Par	36-36-72
Yardage/Rating/Slope	Blue- 6864/73.0/140 White- 6182/70.6/132 Gold- 5703/68.4/128 Red- 5175/71.1/130
Turfgrass	419 Bermudagrass
Tees-	Tifdwarf Bermudagrass
Fairways-	Tifdwarf Bermudagrass
Greens-	Common/mixed
Roughs-	



Eglin Golf Courses, Eglin AFB, FL

Environmental Compatibility Quotient (ECQ) Checklists

Many diverse and complex aspects of golf course management have been revealed through the literature search conducted to compile this study. In order to simplify the process, these aspects have been summarized into eight main topics and incorporated into five distinct environmental compatibility categories.

- Planning & Compliance
- Operations & Maintenance
- Water Resource Management
- Conservation
- Pesticides & Pollution Prevention

The environmental compatibility quotient (ECQ) checklist questions have been compiled using examples from several environmental management resources and represent the best method currently available to determine the relative environmental compatibility of a golf course's management practices. The checklists can be used in many ways including:

- As a tool to establish a current snapshot or baseline of a golf course's relative environmental compatibility
- As a tool to identify areas for improvement or to demonstrate current successes
- As a self-assessment tool for the golf course manager and superintendent
- As documentation for an environmental award nomination
- As documentation for regulatory requirements or inquiries from customers, the media or the general public

Determining the Environmental Compatibility Quotient (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 relative status or quality of the environmental management program in regards to stewardship. Although several of the ECQ questions address compliance-related issues or practices, there are no formal requirements or mandates implied or actual connected to this process. The ECQ checklists establish two measures, or scores:

- **Actual ECQ-** the total percentage of "Yes" responses for all five 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 of the checklists. Maybe the most significant measure; the potential ECQ represents a level of compatibility that could be reached by fully implementing a particular practice or procedure.

The following ECQ checklists are a record of the interview conducted with the superintendent during the visit.

<u>Planning & Compliance</u>				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Has management demonstrated that environmental stewardship is an important part of their responsibilities by initiating the Comprehensive Golf course Environmental Management (GEM) Planning process?	✓		
2	Is the GEM Plan complete, updated regularly and readily available to employees and customers?		✓	
3	Has the golf course adopted and posted an environmental policy?	✓		
4	Is a map of the property highlighting environmental challenges posted for employees and customers?			✓
5	Does management conduct a comprehensive annual evaluation for each identified environmental challenge and its management approach, objective and target?	✓		
6	Does the course have a written Tree Management Plan?			✓
7	Is there a readily-available and regularly updated golf course-specific Integrated Pest Management Plan?	✓		
8	Is there a map of the course's areas that may require regular special care or attention?	✓		
9	Is there an up-to-date comprehensive golf course development plan or master plan that details the desired short- and long-term facility improvements?		✓	
10	Is there at least one project planned and funded for the next year that would increase the compatibility of the course's management program with comprehensive GEM planning goals and objectives?		✓	

Planning & Compliance Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Are all employees familiar with the GEM Plan and are they trained regularly on the importance of its overall goals and objectives?		✓	
12	Are environmental management issues regularly discussed during staff meetings?	✓		
13	Are the quantities and application rates of each pesticide or fertilizer used over the last year on the facility available in writing?	✓		
14	Has the golf facility maintained compliance with all environmental regulations over the past year (no notice of violations or enforcement actions)?	✓		
15	Are employees trained in their native language on GEM Plan and compliance with its intent and specific goals and objectives?	✓		
16	Does the golf manager and superintendent facilitate and assist with compilation and implementation of the GEM Plan and its inherent goals and objectives as a quantifiable portion of their daily activities?	✓		
17	Are there documented functional and/or aesthetic thresholds integrated into pest control decisions?	✓		
18	Is there a written comprehensive Golf Courses Water Resources Management Plan that describes the care for each of the course's water-related activities?		✓	
19	Are employees trained on what to do in case of a spill and have spill containment kits been provided at all appropriate locations?	✓		
20	Have all maintenance procedures been examined to determine their potential to impact the course's identified environmental challenges?		✓	
	Totals	12	6	2

<u>Operations & Maintenance</u>				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is there a written, regularly updated and readily-available comprehensive Turfgrass Management Plan for the entire facility?	✓		
2	Does the design and condition of the Maintenance Complex facility positively contribute to the stated installation environmental stewardship goals contained in the INRMP?	✓		
3	Are mowing heights maintained at levels that do not excessively stress important playing surfaces and increase chemical or fertilizer inputs?	✓		
4	Are aeration, topdressing and other drainage improvements regularly implemented to improve soil health and minimize or eliminate inputs of pesticides or fertilizers?	✓		
5	Are soil tests or plant tissue analysis regularly used to determine turfgrass nutritional requirements?	✓		
6	Is the information collected in soil tests and plant tissue analysis integrated into a regularly updated Nutrient Requirement Plan?	✓		
7	Is there at least one project planned and funded for the next year that would mitigate the potential for environmental impacts due to the course's operational or maintenance procedures?		✓	
8	Are all appropriate employees trained to be familiar with (national, federal, state, and OSHA) regulations that apply to storage and handling of potentially hazardous materials used on the property?	✓		
9	Have all aspects of the golf course property other than the course been examined for potential environmental impacts?	✓		
10	Have all employees received documented annual training that would increase their awareness of the stated installation GEM program policy and this Plan's goals and objectives?		✓	

Operations & Maintenance Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Are used oil containers in good condition, not leaking and clearly labeled?	✓		
12	Are golf course wash racks operating and maintained properly?	✓		
13	Are all golf course vehicles and equipment maintained and cleaned in a manner that would eliminate the potential for spreading of disease or other contamination?	✓		
14	Is electric motor-powered equipment or vehicles being utilized where appropriate and/or required due to air quality or other environmental concerns?	✓		
15	Are waste products such as oil, grease, tires and batteries stored and disposed of properly?	✓		
16	Are hand held GPS units to map golf course areas to assist the environmental management process?	✓		
17	Are energy efficiency ratings factored into equipment purchases for use throughout the facility?	✓		
18	Has the golf facility been studied to quantify and minimize solid waste streams?	✓		
19	Are at least 90% of restaurant/snack bar facility plates, cups and utensils reusable rather than disposable?			✓
20	Is a web-based, course management tool used for every day decision-making and recordkeeping?		✓	
Totals		16	3	1

<u>Water Resource Management</u>				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are records of water quality monitoring activities, results and pollution control measures readily available and used to implement appropriate maintenance practices?	✓		
2	Are slow-release fertilizers and/or spoon-feeding techniques used to reduce the potential for runoff impacts and nutrient loading to water features?	✓		
3	Does the irrigation system use regularly calculated real-time evapotranspiration rates?		✓	
4	Is the golf course irrigation and plumbing systems regularly monitored and maintained?	✓		
5	Have low-flow water saving devices been installed wherever possible?	✓		
6	Are sterile triploid grass carp or similar fish species used to control unwanted aquatic vegetation in major water features?			✓
7	Is there at least one project planned and funded that would minimize or eliminate a potential water quality or erosion problem?	✓		
8	Are water features regularly monitored for algae, erosion and excessive aquatic plant growth?	✓		
9	Are low impact design (LID) principles such as using vegetative or drainage filters to cleanse parking lot runoff prior to leaving the property?	✓		
10	Are there signs appropriately located to warn golfers of the potential hazard of drinking recycled or otherwise non-potable water?	✓		

Water Resource Management Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Are accurate flow meters used to monitor total potable and non-potable water use?	✓		
12	Has the irrigation system or its components recently been upgraded to reduce or eliminate inefficiency and overall water use?		✓	
13	Is there a map of the watershed in which the golf course property resides and location(s) of floodplains and storm water drainage that exists on the property?	✓		
14	Is the quality of the irrigation water regularly checked to determine overall quality including parameters like pH, nutrient, salt or total suspended solids?		✓	
15	Is water quality data regularly collected to establish baseline conditions and maintenance procedures for all water features on the property?		✓	
16	Is at least 75% of the water used for irrigating the golf course property from recycled or other non-potable sources?	✓		
17	Is there at least one project planned and funded that would decrease the course's dependency on potable water use?	✓		
18	Have the property's Water Quality Management Zones been identified and mapped based on industry-standard risk factors?		✓	
19	Has the property's water features been studied to determine the aquatic and amphibious species population?	✓		
20	Has the property been examined for potentially significant wetlands or associated sensitive water-based habitats?	✓		
Totals		14	5	1

<u>Conservation</u>				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Is all motorized equipment maintained to minimize the potential of excessive air polluting emissions?	✓		
2	Has the entire golf course property been examined for critical habitats, species of concern and threatened or endangered species?	✓		
3	Are all manmade ponds or other large water features adequately lined to minimize or eliminate losses?		✓	
4	Are employees encouraged to minimize their trips around the course to conserve on the use of fossil fuels?	✓		
5	Have efforts been made to physically connect natural areas to facilitate wildlife movement through the course property?	✓		
6	Are required operating permits current, updated and adequately maintained?	✓		
7	Are recycling containers conveniently provided for customer and employee use throughout the golf course facility?	✓		
8	Has there been a study to determine the presence of invasive species on or near the course?	✓		
9	Is there a comprehensive and readily available Drought Management Plan for the entire golf course facility?		✓	
10	Are there records maintained and readily-available documenting a 2% annual reduction in potable water use as well as a 2% reduction in overall water use?		✓	

Conservation Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Has there been a demonstrated 2% annual reduction in irrigation water use starting in FY10?		✓	
12	Are a majority of plants used on the Approved Installation Plan List and are drought-tolerant native trees, shrubs, groundcovers, or their cultivars?	✓		
13	Are there areas appropriately designated and signed as "Environmentally Sensitive Zones" per The Rules of Golf?	✓		
14	Has a comprehensive energy audit been conducted for the entire golf course facility?		✓	
15	Is there a comprehensive Energy Management Plan compiled for the entire golf course facility demonstrating a 3% annual reduction?		✓	
16	Is petroleum product use being tracked to demonstrate a minimum of 2% annual reduction?	✓		
17	Is there an inventory of bird and mammal species documented, maintained and readily available?	✓		
18	Have all damaged or degraded habitats as result of construction projects or other work on or near the course been fully restored?	✓		
19	Has the entire property been adequately examined to protect potentially existing archaeological, cultural or historical resources?	✓		
20	Is the irrigation pump station an energy efficient, variable frequency drive?	✓		
	Totals	14	6	0

<u>Pesticides & Pollution Prevention</u>				
#	Environmental Compatibility Indicator	Yes	Partial	No
1	Are there established, documented and communicated fertilizer and pesticide application buffer areas around water features and/or sensitive landscapes?	✓		
2	Is the pesticide mixing location and spray equipment loading area adequately covered to eliminate collection of precipitation?	✓		
3	Does the chemical storage area have a sealed metal or concrete floor and are all pesticides handled over an impermeable surface?	✓		
4	Does the chemical storage area have a lip along the edges and does it have at least 150% of total storage volume secondary containment?	✓		
5	Are liquid products stored below dry products and are dry materials stored on pallets or shelves to keep them off the floor?	✓		
6	Has the least toxic pest control strategy been identified for each of the most common pests and is it always used first when an action threshold is reached?	✓		
7	Is equipment cleaned with compressed air or blowers on part of the course instead of, or prior to washing?	✓		
8	Are leachate potentials of pesticides considered in the integrated pest management process?	✓		
9	Does the fuel storage/delivery area comply with local, state, federal, or other applicable regulations?	✓		
10	Are written records maintained of all applications of pesticides to include: - the pest and treatment type (preventative/curative); - the location (specific area) of each pesticide used; - the area (SF/SM) & quantity of each pesticide used; - the chemical & common name of active ingredient(s); - the date, location, or purpose of the application?	✓		

Pesticides & Pollution Prevention Checklist (continued).

#	Environmental Compatibility Indicator	Yes	Partial	No
11	Are all pesticide applications performed by licensed personnel and are they recorded and mapped?		✓	
12	Other than the superintendent, are there trained scouts on staff to monitor turf and plant health and pest problems?	✓		
13	Are there scouting forms utilized and are they collected and organized into a report or guide for use in future pest control decisions?	✓		
14	Is there an established aesthetic or functional threshold for each of the course's most common pests that may help reduce pesticide and fertilizer inputs?	✓		
15	Are current copies of all Material Safety Data Sheets (MSDS) for all chemicals used anywhere on the golf course property maintained and readily available?	✓		
16	Are fertilizers and pesticides stored in separate facilities?	✓		
17	Is the chemical storage structure/area locked, well-ventilated and fire-resistant and is access limited to appropriate personnel?	✓		
18	Are all fertilizer applications performed by licensed or certified personnel and are they recorded and mapped to guide future actions?			✓
19	Are golfers adequately notified in the pro shop and on the first and tenth tees about planned application of any chemical or fertilizer?	✓		
20	Are there readily-available written pest profiles for common regional pests that include potential alternative control measures?	✓		
Totals		18	1	1



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All that you need is available in the pro shop.

Environmental Compatibility Quotient Summary			
Environmental Compatibility Category	Yes	Partial	No
Planning & Compliance	12	6	2
Operations & Maintenance	16	3	1
Water Resource Management	14	5	1
Conservation	14	6	0
Pesticides & Pollution Prevention	18	1	1
Totals	74	21	5

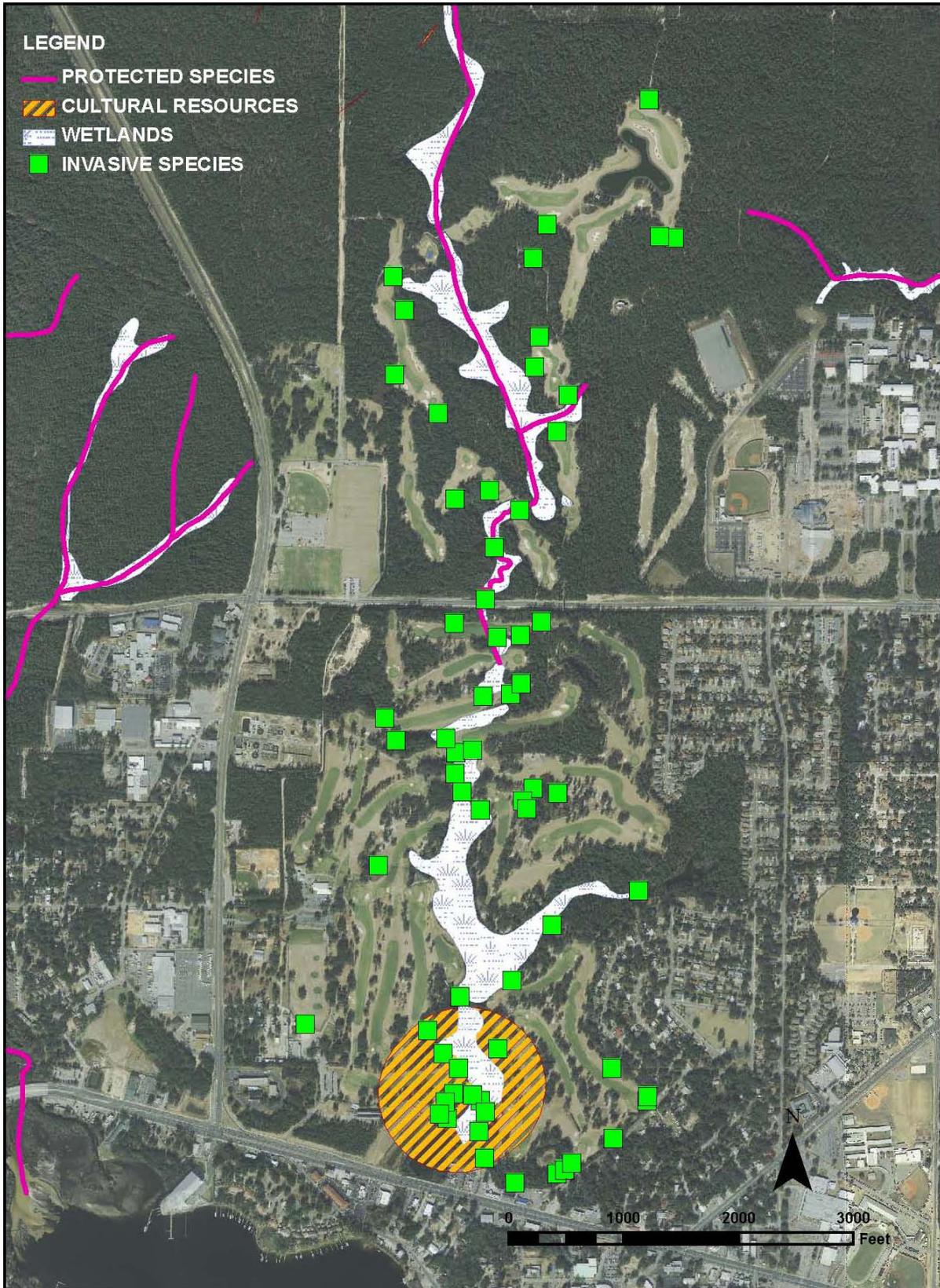
Key to checklist responses

- **Yes** = Practice is complete or ongoing and can be verified
- **Partial** = Practice has been initiated yet is not completed
- **No** = Practice is not in place

June 2011 - Eglin Golf Courses ECQ:

- Actual ECQ = 74, Showing progress (**Yellow**)
- Potential ECQ = 95, Advanced (**Green**)

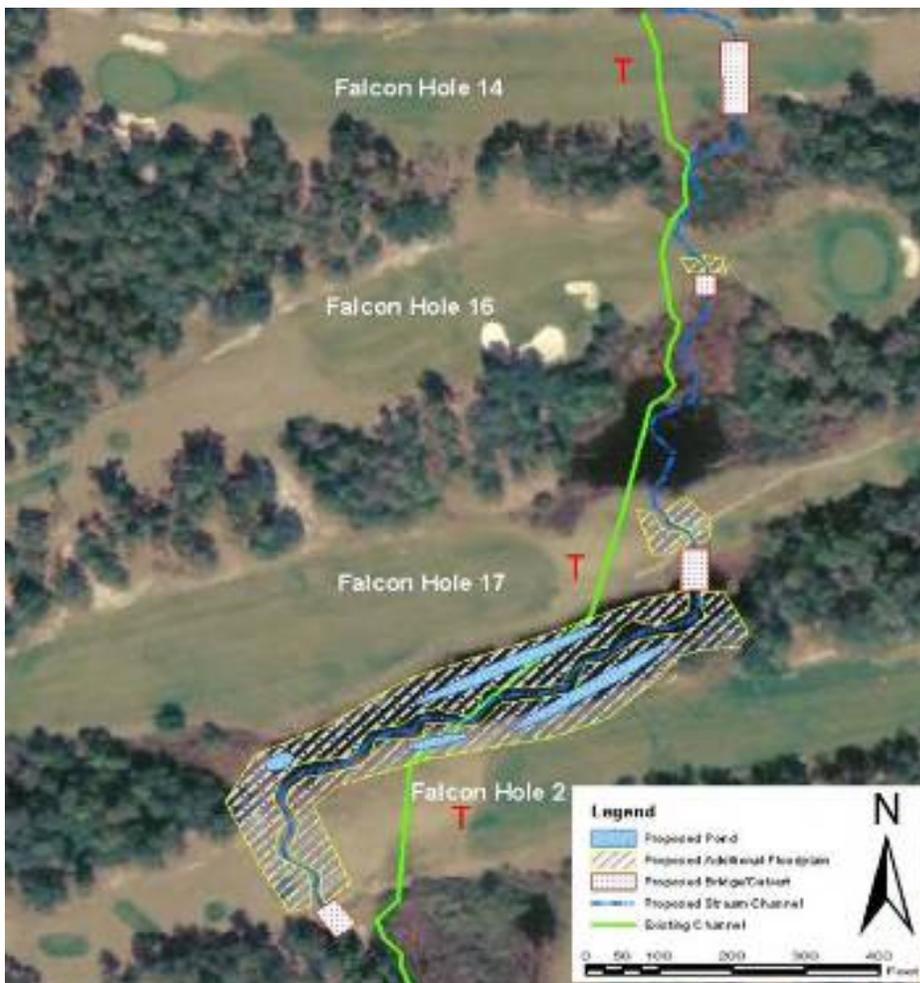
Environmental Compatibility Quotient Scoring Scale	
Total Yes or Partial Responses	Environmental Compatibility Level
90-100%	Advanced (Green)
70-89%	Showing progress (Yellow)
69% or less	Just started (Red)



Environmental Challenges Map

Environmental Challenges

One of the important results of the GEM process is the identification of significant environmental challenges to be addressed in the GEM Plan. Challenges are defined as “things that are bigger than the course”. Some of the reasons behind a particular challenge are important to recognize and understand. Ideally, the golf staff will address their management approach to each challenge to accomplish course and local community environmental management objectives while still attaining acceptable levels of course playability and customer satisfaction. Along with the newly established baseline, the GEM Plan consists of a map and description of the final environmental challenges and the prescribed approach to their management.



*Eglin Golf Courses
Eglin AFB, FL*

*Photo credit:
Mill Creek Restoration
Project Environmental
Assessment*

Solutions to even the most grave of potential impacts are possible with teamwork.

Identified environmental challenges

The following environmental challenges were identified during the GEM process:

- Protected species
- Cultural resources
- Wetlands
- Invasive species



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The Falcon may be the most challenging of the two courses at Eglin.

Assessing environmental challenges

The assessment of the environmental challenges is probably the most crucial as it provides a prioritized list of coordinated actions significant to the long-term success of the golf facility. The finalized GEM Plan will include the description, driver or requirement, management practice, objective, and target:

DESCRIPTION

Once the challenge has been identified, a short description and a few historical or statistical details assist greatly in understanding the key factors in devising management practices.

DRIVER/REQUIREMENT

A driver or requirement may be a local, regional, or national law, regulation, or initiative that creates the requirement to protect species, habitat, or preserve a resource such as open space or unique ecosystems.

OBJECTIVE

Objectives are the overall goals for environmental performance focusing specifically on management activities associated with each challenge and the potential for impacts. The objective should directly relate to the environmental policy.

MANAGEMENT APPROACH

A course's approach to managing environmental challenges in accordance with the driver or requirement, environmental policy (see page 2), and established objectives and targets is the heart of the GEM Plan.

TARGET

The target is the time frame and/or quantifiable unit of measure to achieve the established objectives.



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Wetlands and creeks support the Okaloosa darter. Installation environmental and golf course staffers have managed to get the darter down listed – an amazing feat.

PROTECTED SPECIES

In contrast to many environmental stories dealing with golf courses and their management, the Eglin Golf Courses can hold their collective heads high. The Falcon Course is bisected by Mill Creek, home to the endangered Okaloosa darter. Efforts by the golf maintenance staff to ensure that pesticide and fertilizer application buffers have been established and utilized have been successful for this species that “lives only in six fresh water creeks of Okaloosa County and [occurs] nowhere else in the world”. The darter is recovering and may be headed for down listing or delisting from endangered species lists. Working with the U.S. Fish and Wildlife Service, installation environmental staffers are poised to claim victory for the darter. Further work is planned that will affect the course.

In addition, the courses provide habitat for the red-cockaded woodpecker, gopher tortoise, Sherman’s fox squirrel, Florida black bear, alligator snapping turtle, green sea turtle, loggerhead sea turtle, Ashe’s magnolia, golden aster, panhandle lily, Gulf coast lupine, yellow fringed orchid, orange azaleas, and whit-topped pitcher plant.

The Mill Creek restoration project impact analysis document states there is “one federally listed fish species, the Okaloosa darter (*Etheostoma okaloosae*), occurs within the project area. Darter spawning occurs from March to October, with the greatest amount of activity taking place during April. The spawning occurs in beds of clean, current-swept macrophytes (large aquatic plants). The entire global population of this species is found in the tributaries and main channels of Toms, Turkey, Mill, Swift, East Turkey, and Rocky Creeks, which drain into two bayous of Choctawhatchee Bay. These seepage streams have persistent discharge of clear, sand-filtered water through sandy channels, woody debris, and vegetation beds. Eglin AFB has management responsibility for 90 percent of the 457-square kilometer

(176 square miles) drainage area. The remaining portions of the watershed are within the urban areas of Niceville and Valparaiso.

Driver/requirement

- Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543)
- USAFI 32-7064, Integrated Natural Resources Management, 21 October 1996
- Air Force Policy Directive (AFPD) 32-70, Environmental Quality, 20 July 1994
- Rule 68A-27.011 of the State of Florida Wildlife Code (Chapter 68A, F.A.C.)

Objective

Never allow a management practice to negatively impact a known protected species on or near the golf course.

Management approach

- Ensure that the maintenance practices for all identified potential protected species habitats are regularly coordinated with installation environmental staff
- Continue to contribute to the recovery of protected species by continuing to protect, restore and maintain their populations utilizing the precepts of ecosystem management

Target

Regularly request a site assessment and review of current management practices from the appropriate installation environmental manager.



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Quality interpretive signage ensures Eglin's customers are informed and aware.



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The only historically-significant site on the golf property is located nearby the 17th teeing area on the Eagle Course.

CULTURAL RESOURCES

The lands now occupied by the Eglin Golf Courses have been in use for hundreds of years. An archaeological survey for the Eagle course has been completed and one site with potential historical significance was identified that was once a lumber operation near the current 17th teeing area. This archaeological site is reportedly the location of Boggy Mill where two mill stones were found during golf course construction. Therefore, this area should be avoided to the most practical extent possible. If avoidance is not possible and ground disturbance is necessary, a site investigation would be required and State Historic Preservation Officer (SHPO) concurrence received prior to the project actually starting. 96CEG/CEVSH recently conducted an evaluation of the entire Eagle Course and structures situated there for National Register of Historic Places (NRHP) eligibility determinations. The results are expected to be presented in a report due later this year.

Driver/requirement

- Archaeological and Historical Preservation Act (16 U.S.C. 469)
- National Historic Preservation Act of 1966, as amended
- Air Force Policy Directive (AFPD) 32-70, Environmental Quality
- AFI 32-7065, Cultural Resources Management
- AFPD 84-1, Historical Information, Property, and Art
- Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines, 48 Federal Register 44716-44742, September 29, 1983
- Archaeological Resources Protection Act (ARPA), 16 U.S.C., 470aa-470mm Cooperative Agreements for Management of Cultural Resources, 10 U.S.C. §2684
- Curation of Federally-Owned and Administered Archaeological Collections, 36 CFR § 79

- DoD Directive 4710.1, Archaeological and Historic Resources Management, June 21, 1994
- DoD Instruction 4715.3, Environmental Conservation Program, May 3, 1996
- Native American Graves Protection and Repatriation Act (NAGPRA), Pub. L. 101-601, 25 U.S.C. 3001 et seq., 104 Stat. 3048
- Florida's Unmarked Burial law

Objective

Comply at all times with the prescribed practices enclosed in the Integrated Cultural Resources Management Plan (ICRMP).

Management approach

- Regularly consult with installation cultural resource manager to ensure constant compliance with the Integrated Cultural Resources Management Plan (ICRMP)
- Report any inadvertent discovery of cultural resources encountered in construction or maintenance work to the Cultural Resource Manager (CRM) and protect them from damage or theft. (Stop all work in the area and protect the resources until a determination has been made by 96CEG/CEVSH)
- Submit forms AF-103, *Work Clearance Request*, and AF-332, *Work Request*, DoD 1391, *Military Construction Project Data*, and USFJ form 22, *Host Nation Project Documentation*, to 374 CES/CEV for timely review and approval prior to commencing project work
- Submit AF Form 813, Environmental Impact Analysis request
- Coordinate with the Cultural Resources section to ensure that any surveys or investigations are conducted as necessary prior to the beginning of management activities that may have the potential to impact cultural resources
- Ensure the CRM is consulted in developing any erosion control plan for identified sites or in areas of the course that may have the potential to directly or indirectly impact cultural resources
- Request a cultural resources surveys prior to conducting significantly different management activities that have the potential to impact cultural resources
- Assist in developing an erosion control plan for identified sites
- If unexpected discoveries, such as Native American graves or lost historic cemeteries are encountered, guidelines set forth in Chapter 872, F.S. (Florida's Unmarked Burial law) must be followed. If human remains or unexpected discoveries are encountered during mission activities, work should cease and Eglin's Cr Section must be contacted (850-882-8459 or 850-883-5201). They will notify the Florida SHPO within 24 hours at (850) 245-6333 to begin procedures that are outlined in Chapter 872, F.S.

Target

Ensure that there are no impacts to cultural amenities attributable to the golf course staff or its management practices.

Continue to work closely with cultural resources manager as required to realize environmental challenge objective.



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Wetland areas abound on the golf course property.

WETLANDS

The INRMP states that “The Eglin Reservation supports an average of 65,350 acres, of wetlands influenced by seasonal fluctuations in direct precipitation, overland or near surface flow, shallow groundwater, or some combination of these processes. While the majority of Eglin’s wetlands are in good condition, some are degraded due to fire suppression or erosion of sediment from roadways, old borrow pits.” Wetlands therefore comprise roughly 14% of the installation property. Protection of this valuable resource is imperative to the success of the mission.

Driver/requirement

- Clean Water Act, Section 404
- National Pollutant Discharge Elimination System (NPDES)
- Executive Order 11990, Protection of Wetlands
- AFI 32-7041, Water Quality Compliance 10 Dec 03
- Secretary of the Air Force Order 780.1 Wetlands
- North American Wetlands Conservation Act (16 U.S.C. 4401-4414)

Objective

Ensure that all water bodies continue to be free of pollutants potentially attributable to a golf course management practice.

Management approach

- Establish, document and communicate fertilizer and pesticide application buffers to all appropriate employees or service providers
- Consult with environmental staff prior to any changes in creek bed or pond bank maintenance
- Comply with all requirements included in the approved installation SWPPP

- Ensure all spill prevention procedures and spill kits are in place and all pertinent employees are adequately trained to correctly and promptly perform required actions in an emergency situation
- Compile a comprehensive Water Resource Management Plan for the entire golf course facility
- Consult with installation environmental staff to ensure that golf course maintenance practices are fully compliant with complex regulations

Target

Eliminate the potential for degradation of the water resources at the golf course by establishing, documenting and communicating all pesticide and fertilizer application buffers to appropriate personnel prior to the end of the year.

Maintain positive relationship with civil engineering and environmental staffers to attain and maintain compliance without delay on all water-related regulations and requirements.



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Allowing a vegetative buffer to occur along important wetlands or water features is an important management approach.



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Many areas of the golf course property are amenable to invasive species taking hold.

INVASIVE SPECIES

Many of our favorite plants are not native to where we live. Some of these plants (and animals too) are so good at adapting to their surroundings that they have out-competed native species. These exotics become invasive when they are fast growing, have tasty fruits, or are particularly attractive in the landscape. Several exotic invasive species of note include Chinese tallow, cogon grass, Japanese climbing fern, hedge privet, honeysuckle, lantana, nandina, china berry and camphor trees.

Driver/requirement

- Federal Noxious Weed Act of 1974
- National Invasive Species Act (1996)
- Plant Protection Act (2000)
- Federal Noxious Weed Act of 1976 (7 U.S.C. 2801)
- Executive Order 13112, Invasive Species, February 3, 1999
- EO on Invasive Species (revised February 4, 1999), Source: Federal Interagency Committee for the Management of Noxious and Exotic Weeds
- Policy on Invasive Exotic Plants, CNPS, adopted September 1996

Objective

Prevent introduction and establishment of invasive species to reduce their impact on the environment, economy and health of the United States.

Management approach

- Develop an installation-coordinated golf course program to minimize or eliminate the introduction of exotic plants and animal species
- Never knowingly install a listed or potentially invasive species

- Regularly inspect likely areas for invasives to establish themselves
- When possible, restore native species and habitat conditions
- Train all appropriate employees on the latest invasive species identification and control measures
- Restore disturbed areas dominated by invasive species to natural vegetation where practical and consistent with mission requirements
- Utilize native or non-invasive indigenous plant materials whenever possible

Target

Regularly assist the environmental staff with the compilation of an invasive species survey and completion of an approved plan. Complete an approved plan using integrative pest management techniques to reduce or eliminate invasive species on the Eglin Golf Course prior to the end of FY14.



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Eglin AFB, FL*

*Photo credit:
Mark Atwater*

Cogon grass is an invasive species of note from Texas to Florida.

Implementation

No plan is worth the time it took to compile it if it does not generate or include active implementation in the field. The golf course management staff should use the following goals and objectives as the roadmap for their future. The GEM Plan is an example of the quality a cooperative effort can produce. Let's get something done and better take care of the environment, our community and our customers.

GEM Plan goals & objectives

Goals are defined as actions or results that should be accomplished within the next year.

- Post a map highlighting environmental challenges for both customers and employees
- Use regularly calculated, real time evapotranspiration rates
- Upgrade the irrigation system and/or its components to reduce or eliminate inefficiency and overall water use

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

- Compile and implement a Tree Management Plan
- Complete a comprehensive Golf Course Development Plan that details short- and long-term facility improvements
- Compile and implement a Golf Course Water Resource Management Plan to include a Drought Management Plan
- Maintain readily-available records of water use to document water use reductions in compliance with Executive Order 13514 mandates
- Regularly check irrigation water quality and collect test results to establish baseline conditions and maintenance procedures on the golf course property
- Identify and map the course's Water Quality Management Zones based on industry-standard risk factors
- Ensure that all fertilizer applications are recorded, mapped and performed by licensed or certified personnel



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Safety, environmental and other information is shared in the maintenance complex.

Conclusion

The U. S. Air Force Golf Courses Environmental Management (GEM) program is a proactive Air Force Center for Engineering & the Environment (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. Chapter 11 of AFI 32-7064 requires a GEM Plan as part of the Integrated Natural Resources Management Plan (INRMP).

Sustainable installations are possible with a coordinated and concerted effort by all. Implement the GEM program, as it embraces continual improvement and environmental stewardship while steadfastly supporting the missions of the installation and the U.S. Air Force.

The gallery

On the following pages are some of the more revealing photographs of challenges, maintenance practices, and other areas of the golf course facility.



Water birds are everywhere in Florida.



Minimally-maintained areas help eliminate labor.



Darters get light in pipes under fairway.



Installing a potable water line saves hours every day.



Chemicals are secure behind barbed-wire and locks.



A courteous and friendly staff is a highlight at Eglin.

Civil Engineering & Force Support Squadrons



Several areas are available to share information.

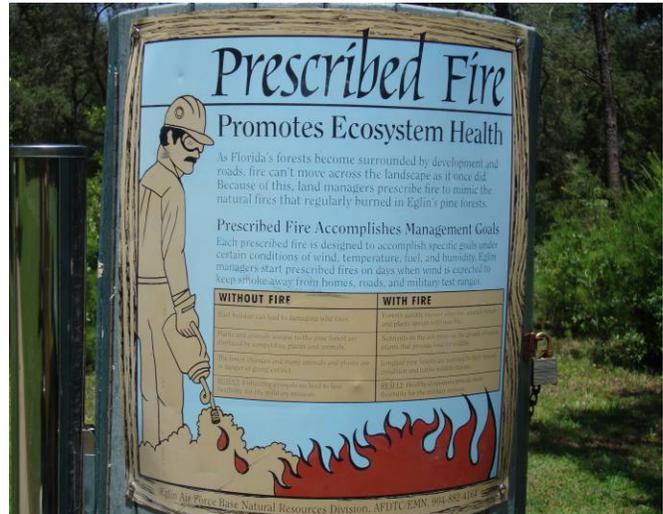
Environmental & Golf Staffs



Low maintenance natives eliminate trimming.



Crystal clear water in darter creeks is proof of success.



Education of customers and employees alike is continuous.



Natural design approach is noteworthy.



Courses are attractive and well-maintained.

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Please visit our Golf Courses Environmental Management Program website:
<http://www.afcee.lackland.af.mil/gem>