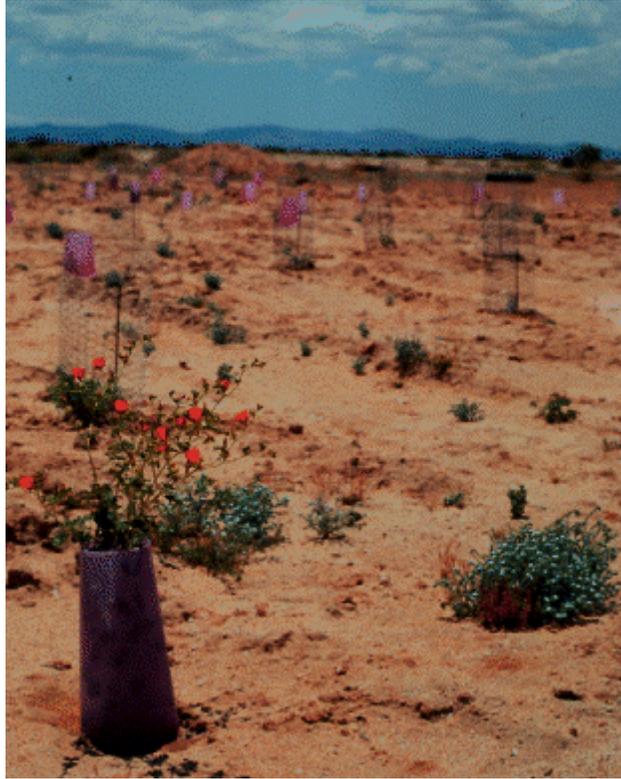


Natural Resources Management



Desert Restoration Research

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Multiple Land Use Management Plan (MLUMP)

The natural resources program at [MCAGCC](#) is guided by a Multiple Land Use Management Plan, which balances good stewardship of [Marine Corps'](#) lands with the Center's [training mission](#). The MLUMP 1996-2000 is the third and most comprehensive of the Center's natural resources management plans. The MLUMP was developed to aid natural resource managers and military/facility planners in their land use management decisions. It implements [Department of Defense](#) Instruction 4715.3 and MCO P5090.2, and establishes a five year plan of command objectives and goals for natural resources management. The Plan is available in hard copy and electronic form for ease of annual update, five year revision and incorporation of relevant plans and studies as appendices. The Plan utilizes an applied ecosystem management approach to natural resources, which integrates the traditional plan components of Land Management, Fish and Wildlife, Outdoor Recreation, etc. The text of the Plan, supported by three appendices, provides the following information:

- An outline of MCAGCC goals and policies in five general areas; stewardship, military readiness, quality of life, compliance, and program integration;
- Descriptions of MCAGCC's military mission (including potential impacts on natural resources); facilities; history; responsible or interested parties within DoD and regulatory agencies; climate, physical and natural resources; land base and management units;
- Ecosystem management sections entitled - Inventory and Monitoring; Protection and Damage Prevention; Soil, Water, and Vegetation management, Wildlife Population Management; Research; Enforcement; and Awareness;
- Additional sections which include Outdoor Recreation, Cultural Resources Protection, National Environmental Protection Act Implementation ([NEPA](#)), and Environmental Integration;
- The Implementation Section containing information on organization and manpower; a five year plan; and funding;
- (The five year implementation plan is laid out in a hierarchical fashion of must do, mission essential, mission sustaining and less important projects and programs. It thereby provides a clear set of goals to carry out the installations natural resources program.)
- Maps depicting range assets; topography; geology; vegetation; past desert tortoise survey sites, and training area boundaries;
- Appendices consisting of Sikes Act responsibilities and the tri-partite cooperative agreement; list of GIS databases; list of neotropical migratory birds for MCAGCC.

Cooperative Agreements

The interagency Cooperative Agreement for the management of fish and wildlife resources required by the Sikes Act, DoD Instruction 4715.3, and MCO P5090.2. is incorporated into the MLUMP. It is implemented by the endorsement of the current MLUMP by the [US Fish and Wildlife Service](#) and the [California Department of Fish and Game](#). There is no hunting allowed at the Center, because of safety issues as the Mainside cantonment area and in the training areas.

A separate cooperative agreement between the Center and CDFG for the management of the Nelson big horn sheep is also in place. It was signed in FY93, prior to the reintroduction of the sheep into their former range aboard the Center. Another important cooperative agreement with the [Natural Resources Conservation Service](#) (formerly the Soil Conservation Service) has allowed the Center to move forward with a installation wide Order 3 soil survey.

Although no formal agreement is in place with the [Joshua Tree National Park](#), information and equipment sharing has benefited both the Park and Center in regard to education programs and protection of the desert tortoise. Cordial relations are maintained with the [Bureau of Land Management](#) (BLM) who have significant land holding on MCAGCC boundaries. Informal coordination is conducted with the BLM for military personnel transiting public lands to access training areas.

Organization and Staffing

Prior to 1991, the natural resources program was managed by the Natural Resources and Environmental Affairs Division of the Installations and Logistics Directorate. In 1991, the Division became its own Directorate with an accompanying increase in funding and staff. Currently the NREA Directorate is composed of a Natural Resources Branch, an Environmental Affairs Branch and a Compliance Enforcement Branch.

The Natural Resources Branch is responsible for the day to day and long term management of both the natural and cultural resources at MCAGCC, the operation of the GIS Laboratory, and the implementation of NEPA. The branch is the central point of contact for all environmental reviews, coordinates the Environmental Impact Working Group (EIWG) and the Environmental Impact Review Board (EIRB) meetings, consults with federal regulatory agencies regarding threatened/endangered species and cultural resources, and provides liaison between MCAGCC and other Federal land owners. The Branch ensures that the MLUMP is reviewed, updated and implemented to ensure that the best scientific practices for management are carried out in order to meet regulatory requirements and sustain the military mission.

During the nomination period the original staff, composed of a Natural Resources Officer (NRO) and two Natural Resources Specialists was increased to its current personnel of a NRO, an Ecologist, an Archeologist, a NEPA Coordinator, a GIS Specialist and two supporting Environmental Protection Specialists. The staff have also received assistance from the natural resources personnel at the Southwest Division, Naval Facilities Engineering Command and volunteers.

Program Summary (FY94-FY96)

- MCAGCC's commitment to environmental management has allowed the NREA Directorate to grow in terms of funding and staff. Funding totals have increased each fiscal year. Natural resource project funding was approximately 700K in FY95 and 1511K in FY96. Staffing increases have allowed the hiring of degreed professionals, and upgraded the numbers of personnel in the Natural Resources Branch from three to seven.
- Equipment to support the program including hardware and software to establish a Geographical Information Systems (GIS) & Remote Sensing Laboratory, GPS units, and wildlife capture equipment for injured and/or dangerous animals were acquired for the Branch.
- The revision of MCAGCC's MLUMP was completed. The update uses an ecosystem based approach, and contains a five-year implementation plan.
- The natural resources program outlined in the MLUMP, was integrated with MCAGCC's Supporting Plan, the Directorate's Annual Operating Plan, and the Program Objective Memorandum (POM). The POM is the Marine Corps budgetary process to ensure that the program is adequately identified for legal compliance and funding. Funding needs were identified for the years 1996-2003.
- MCAGCC supported research and surveys to determine presence/absence, density/ distribution, sampling methodologies, and population dynamics of representative species aboard the Center. A list of species being researched or items being studied follows:
 - Neotropical Migratory Bird Surveys by the San Bernardino County Museum Bat Population Surveys by [University of California at Los Angeles](#) Bighorn Sheep Reintroduction by the California Department of Fish and Game
 - Desert Tortoise Radio Telemetry Study by USA [CERL](#) Line Distance Sampling Techniques for Desert Tortoise by USA CERL Identifying Desert Tortoise Burrows with Ground Penetrating Radar by DESA
 - Sensitive Plant Species Surveys by Tierra Data Systems in conjunction with [University of California at Riverside](#)

- A Desert Tortoise Management Plan (DTMP) and a Biodiversity Management Plan were completed. The DTMP is the foundation for a basewide biological assessment for MCAGCC's training activities and a programmatic biological opinion.



- Numerous in-house desert tortoise surveys and section 7 consultations were completed for MCAGCC actions to conform with the ESA and to support NEPA documentation.
- MCAGCC launched a program to begin assessing the status of training area lands by initiating a Land Condition Trend Analysis Program and the development of hardened sites for military activities.
- Updates of the range SOP, briefs for personnel participating in military training exercises and contract personnel, and the Request for Environmental Review Form, to aide in natural and cultural resources compliance.
- New educational materials were developed to assist in compliance with federal regulations and to foster an appreciation of MCAGCC natural and cultural resources. These materials include a natural resources video, desert tortoise alert cards, natural and cultural interpretive signs, a Marine Corps threatened and endangered species poster featuring the desert tortoise, an NREA handbook on environmental regulations, and a handbook on environmental issues for Earth Day.
- A significant devotion of manpower to participation in two interagency regional ecosystem initiatives, The [Mojave Desert Ecosystem Initiative](#) (MDEI) and the West Mojave Coordinated Management Plan (WMCMP), was made.

The MLUMP five year implementation plan contains sixty-two taskers. The natural resources program is on schedule for all (15) of the "must do" projects and programs. For the "mission essential" projects and programs, twenty out of twenty-two projects are on schedule. Eighteen of the nineteen "mission sustaining" projects/programs are underway and on schedule, and five out of six "less important" projects/programs are as well.

Accomplishments (FY94-FY96)

Overall Conservation Management

a. Revision of MCAGCC's Multiple Land Use Management Plan (MLUMP) -
Developed a MLUMP, which is available in text and in electronic form. The MLUMP takes an ecosystem approach and incorporates supporting plans such as the 1993 Natural Resources Management Plan and other significant plans and reports such as a Desert Tortoise Management Plan and a Biodiversity Plan. It has received very favorable reviews from other DoD installations and outside agencies. It is currently serving as a model for integrated natural resources management plans being prepared by other DoD installations in the Mojave.

b. Built a Geographic Information System and Remote Sensing Laboratory (GIS) -
In 1994, the NREA Directorate determined a GIS would help staff perform spatial analysis to assist in natural and cultural resources management. A GIS Specialist was hired to evaluate software and hardware configurations, and to run the system. After extensive research and consultation with other USMC Natural Resources entities, military commands (e.g., MCIA, Topo Platoons), and other DoD and Federal Departments, the ESRI suite of GIS software was selected (ArcInfo, ArcView, etc.) to run on Sun Microsystems UNIX computers. [This purchase was made through the NAVFAC CAD II Contract].

The next major step was to populate the GIS with appropriate up-to-date data. Numerous Federal, State, Local Agencies, and Educational Institutions were contacted regarding data availability. These liaisons insured data acquisition would prevent duplication of effort and save money. For example, data has been acquired from the [U.S. Army Topographic Engineering Center](#), [U.S. Geologic Survey](#), [California Teale Data Center](#), and [University of California, Riverside](#).

Another data acquisition and analyses potential is in MCAGCC's collaboration with the Mojave Desert Ecosystem Initiative (MDEI). This \$5 million DoD and DoI partnership is a scientific effort to understand the dynamics of the Desert. Not only does this include data compilation, but also access to the data over the Internet.

Data from past MCAGCC natural and cultural resource projects is being incorporated into the system. Current [geospatial data layers](#) include vegetation, soils, geology, precipitation, watershed and stream network, fault lines, sensitive biological areas, land use, digital terrain model, and Landsat TM data. New data generation and incorporation is ongoing. Two current examples are a NRCS project to perform a basewide soil survey and a Corps of Engineers aerial photography mission to create Digital Orthophotos and planimetric basemap.

The ability to perform spatial analysis and the publishing of the GIS data over the Center's Network helps in the decision making process to support the military missions of training, mission readiness, and environmental security. Sites with biological potential are surveyed and the results published online. Queries can be performed to help determine environmental impact. Newly designated off-limits areas or authorized routes through limited access areas can now be mapped and disseminated immediately.

Recently the Lab has been designated by HQMC as the Marine Corps Center of Excellence for GIS.



Ecosystem Management

a. Active participation in two regional ecosystem planning projects - DUSD(ES) announced the DOD Mojave Desert Ecosystem Initiative (MDEI) on Earth Day 1994. The purpose of MDEI is for DOD Mojave Installations to work with other Federal, State, and local entities to develop a framework for ecosystem wide planning and management of the Mojave Desert in California. The Initiative is key to maintaining a proactive approach that will ensure military preparedness and readiness while maintaining environmental security. The Mojave supports over 2/3 of the Marine Corps' training and lands and premier installations of the other Services. It contains unique species and cultural resources found nowhere else, and is currently the site of several new or expanded national parks and preserves. It contains critical habitat for federally listed species like the threatened desert tortoise. This same region is predicted to triple its population within the next 20 years.

To implement MDEI a Legacy project was developed to create the Mojave Clearinghouse Network. The Network consists of a Geographic Information System, linked via the internet, that is accessible to DoD and the [Department of Interior](#) (DOI) agencies, and within certain limitations, to academic institutions and the public. The Network is being populated with an ecosystem wide data base that reflects the current knowledge on the Mojave Desert. Crucial gaps in that knowledge are being identified and are being filled as funding allows.

MCAGCC has played a significant role in the Initiative. MCAGCC has representatives participating throughout the hierarchy of MDEI. These representatives have attended at least 90% of all meetings. In 1995, four MCAGCC personnel received Vice Presidents Gore's Hammer Award for their participation in the MDEI.

The proposed West Mojave Coordinated Management Plan (WMCMP) is a comprehensive, interagency plan (32 different federal, state, and local agencies) being developed by the Bureau of Land Management (BLM) for the conservation of biological resources in the Western Mojave Region. The Plan is intended to function as a regional habitat conservation plan for meeting the requirements of the Endangered Species Act (ESA). The Plan also serves to fully satisfy the requirements and objectives of the Desert Tortoise Recovery Plan (U.S. Fish and Wildlife Service, 1994).

The five DoD installations located in the planning area (MCAGCC, China Lake, Edwards AFB, Ft Irwin and MCLB, Barstow) represent 28 percent of the lands identified in the Plan. NREA Directorate personnel along with the other DoD installation managers reviewed the draft Plan in July/August 1995. Comments and recommendations on the Plan were presented to the BLM, U. S. Fish and Wildlife Service (USFWS), and the California Department of Fish and Game (CDFG). Directorate personnel have continued to provide input as the development of the draft plan has continued.

b. Biodiversity Plan - The Center completed a Biodiversity Plan in FY96. The Plan was designed as a guide to identifying and protecting biodiversity at MCAGCC as well as implementing an ecosystem approach to wildlife management.

Land Use Management

a. MCAGCC Soil Survey - In the early 1990's it became apparent to several Federal and state agencies and resource conservation districts that only 10% of soils in San Bernardino County had been adequately mapped. Accurate soils information was required to answer basic questions like soil permeability and erodibility, vegetation and habitat associations, mine reclamation and desert restoration. Subsequently, MCAGCC entered into an agreement with the Natural Resources Conservation Service (formerly SCS) to complete a five year (1994-1998) installation wide soil survey. Soil information is being mapped and provided at an Order 3 intensity that includes possible effects of training on soils, species habitat interpretations and correlations, identification of where sedimentation or erosion problems may exist, possible noxious weed correlations, data for drainage/permeability studies, wind erosion control factors, revegetation potential.

Approximately 75 % of the Center has been mapped. Several new soil series have been described and some extremely old land surfaces, exposed through seismic faulting, have been discovered. Map products and soils data are being incorporated into the NREA Directorate GIS system. With incorporation of the data into the system, it becomes a layer that can be used as a base for other studies and modeling programs like the land condition trend analysis. The data from this survey will not only benefit MCAGCC but will become part of the soil survey for all of San Bernardino County. It will also serve as a reference for other researchers working within the Mojave Desert ecosystem.

b. Land Condition Trend Analysis (LCTA) Program - In FY96, MCAGCC received funding and initiated a LCTA Program. The Program consists of two components: the establishment of field monitoring plots and the development of a military training/land use compatibility model. The purpose of the 90 plots is to provide a biological baseline, a land use impact assessment, and an on-the-ground link to the model to support management decisions. The model will be used to analyze land uses, environmental tolerances and constraints, and regulatory environmental constraints; with the goal of identifying conflicts and opportunities among land uses, the lands ability to support those uses, and the determination of the impacts of natural and regulatory constraints on military training. The model will be based on current conditions, but will be designed to be readily modified to evaluate new land uses, new data sets, and new regulatory constraints. It is anticipated that this model will be an integral tool in natural resource planning.

c. Desert Restoration Research - Due to the harsh climatic conditions and the nature of the desert soils, disturbances from grazing, off-road vehicle use, mining, and other ground disturbing activities can take decades to recover naturally. The problem is

compounded by the proliferation of exotics within the disturbed areas, which further retards the return of the native vegetation. This loss of the natural communities leads to wind and water erosion and a reduction of biodiversity.

MCAGCC along with other installations and agencies are conducting research to develop methods of economically restoring disturbed areas. This is particularly important to MCAGCC, because the disturbances caused by the on-the-ground training mission can lead to a loss of realism in training, which is mission essential. Since 1994, MCAGCC has conducted two desert restoration studies. One located at an abandoned air field, known as the VSTOL. The second at the main route for tank traffic accessing and departing from the Mainside cantonment area. Both studies are showing the importance of restoring proper soil chemistry and biological organisms. This can be encouraged by the proper soil amendments. Other factors include establishing the correct planting and watering regime, reducing soil compaction to the appropriate degree, reducing herbivory during establishment, and utilizing plants from the correct regional genetic stock. Seedling utilized for these studies are from the nursery located at the Joshua Tree National Park, which propagates locally collected seeds. Direct seeding of the tank trail has not yet shown to be successful; however, if perfected this would be the most economical alternative to restoration.

d. Wood Canyon Project - Another soil and vegetation restoration study was funded and initiated in 1995 for the Wood Canyon wash and watershed, located in the Gypsum Ridge training area. Wood Canyon wash is one of the largest examples of desert riparian habitat at MCAGCC. Only about 1% of MCAGCC's acreage contains this type of habitat which is especially important to migratory birds, native wildlife, and rare desert plants. Baseline ecological surveys to support the study are underway. The study will design and develop a monitoring program to determine the impacts of military activities on the ecology of Wood Canyon and will recommend restoration strategies. Maintenance of the vegetation is essential to the cover and concealment training that is conducted in the wash as well as important to wildlife. This project will be incorporated into the LCTA program.

e. Water Resources Assessment and Conservation - During the nomination period three major projects to protect existing groundwater sources were initiated and are nearing completion. The projects are a Water Resource Management Plan developed by USGS to model the groundwater of Surprise Springs, Deadman, and Mainside aquifers. This model will show MCAGCC how much drinking water we have, how to best manage and utilize all three basins. A Water Conservation Plan to minimize the use of potable water by conservation and maximization or utilization of other groundwater or treated wastewater for industrial purposes such as washracks and dust control. The development of a Comprehensive Stormwater Management Plan to protect the "Water of the US" or dry lakes/playas. By preventing industrial stormwater from entering the playas, immense O&M costs will be reduced, as well as permit requirements.

Wildlife

a. Desert Tortoise Surveys, Studies, and Plans - The recently completed Desert Tortoise Management Plan reviews past survey work and recommends additional surveys to fill gaps in MCAGCC's knowledge of desert tortoise density and distribution aboard the Center. It provides basic management recommendations for protection of the tortoise and regulatory compliance. The DTMP will serve as the foundation document for the preparation of a base-wide biological assessment for military training activities. The biological assessment will be forwarded to USFWS in 1997 to initiate formal consultation for a programmatic biological opinion. This will save time and manpower that is currently being expended on consultations for individual actions.

As part of a larger Legacy project called the Legacy Resource Management Program MC-9 Technology Demonstration, MCAGCC in conjunction with the Defense Evaluation Support Activity (DESA) conducted a pilot project. The project had two objectives: to determine if ground penetrating radar (GPR) could first detect and classify the underground burrows of desert tortoises and secondly if it could detect tortoises in their burrows. The project met with limited success. Desert tortoise burrows could only be accurately identified 80% of the time and the researchers were not able to develop a unique radar signature for tortoises. Traditional sampling techniques for desert tortoise surveys only provide relative numbers with a wide variance. If the project had met with success it would have proved a very useful tool.

Finding an accurate sampling technique for surveying the desert tortoise still remains a problem. Without reliable numbers compliance and recovery goals cannot be met. In 1994, MCAGCC funded US Army Construction Research Engineering Laboratories (CERL) to test a promising experimental sampling design called line distance sampling. This method has been shown to have a higher reliability than traditional survey methods. It is currently being considered by USFWS as the standard protocol for long term monitoring of desert tortoise populations throughout the California Mojave Desert. The study provided accurate information on the density and distribution of the Sand Hill Training Area, which has alerted MCAGCC to potential compliance problems.

At the same time, researchers from CERL placed radio transmitters on thirty-six desert tortoises for a home range study. The MCAGCC home range study was conducted simultaneously with a similar study at Joshua Tree National Park. The goal of the study was to learn more about the activity patterns of tortoises at MCAGCC and compare them with the Park's population. Ultimately the data will be used to draw conclusions about habitat use, site fidelity, predation, disease, and population viability.

b. Reintroduction of the Nelson's Big Horn Sheep - In 1983, The Plan For Desert Bighorn Sheep In California, published by the California Department of Fish and Game (CDFG) identified the Bullion Mountains as a historic range for big horn sheep. In 1989, the CDFG approached MCAGCC, as a possible reintroduction site for the Nelson

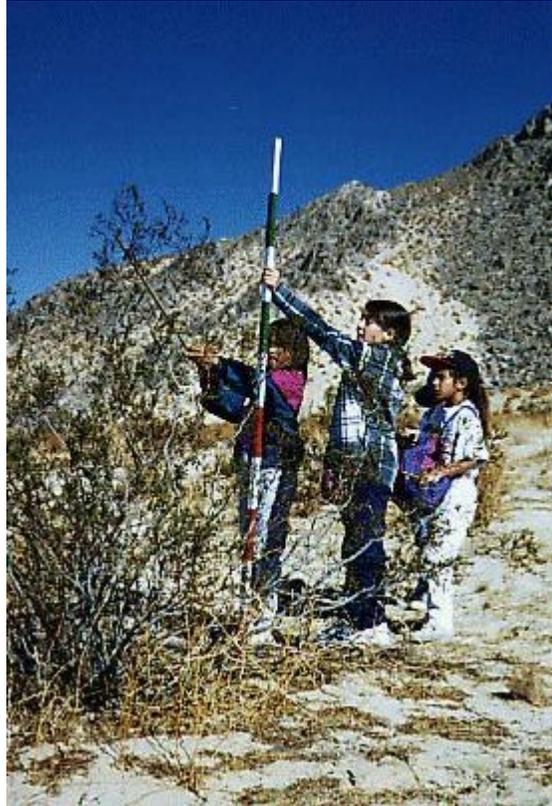
bighorn sheep (*Ovis canadensis nelsoni*). MCAGCC was considered a highly desirable location due to the security and the lack of competing uses such as recreation and grazing. Prior to introduction, a big game guzzler was installed to provide a permanent water source. Then in FY93, 15 ewes and 5 rams were radio collared and released in the mountains of the Bullion and America Mine Training Areas. Since the reintroduction, MCAGCC in partnership with the CDFG has used overflights to monitor the status of the collared animals. Overflights indicate some mortality with the collared animals; however, lost individuals are being replaced through reproduction and all indications are that the population is continuing to thrive.

c. Bat Survey - Bat populations are declining throughout the Southwest. Bats are particularly important to the desert ecosystem as they play a very large role in plant pollination and seed dispersal. The rugged terrain and over forty abandoned mines at MCAGCC makes it an attractive area for bats. A baseline survey to identify species composition and abandoned mine use was initiated in 1993. A literature review and professional interviews indicated that seventeen bat species could potentially occur at MCAGCC. To date, a total of ten resident or transient species have been identified. Three of these, the greater western mastiff bat (*Eumops perotis californicus*), California leafnose bat (*Macrotis californicus*), and Townsend's big-eared bat (*Plecotus townsendii* t.) are state species of concern and were formerly listed as candidate 2 species under the ESA. Six abandoned mines have been identified for protective gating, to prevent disturbance of important maternity roosts and hibernaculum. A large maternity roost of California myotis (*Myotis californicus*) in the Spring Mine is especially significant. The gates will allow the bats ingress and egress while removing a significant safety hazard for military personnel. Funding for the gates has been programmed and a USFWS gate design completed.

Other Natural Resources

a. Initiation of a Sensitive Plant Species Survey - Early localized botanical surveys found rare plant species aboard MCAGCC and indicated that there was potential for other species in the high elevation areas. Surveys for these species is problematic due the sporadic rainfall and the infrequent blooming of these species. To circumvent these problems in FY96, MCAGCC contracted to do comprehensive fall and spring surveys over three years, with an optional year in case of drought conditions. To further ensure success, MCAGCC is bringing in a team of acknowledged agency and academic experts and using the newly established GIS system to target areas of highest, medium and low probability. In addition to documentation of rare species, the researchers will gather general information on the flora encountered at all sites, and will collect herbarium specimens for common species. These herbarium specimens will be maintained at MCAGCC for educational purposes.

Conservation Education/ Community Relations



a. Earth Day - MCAGCC hosts an annual earth day celebration that has been well received by military and civilian personnel and the community of Twentynine Palms. Participation from other Federal, State, and local agencies and communities has been high. The 1997 Earth Day Celebration had 65 displays and 4000 visitors. The Morongo Unified School District was invited to participate in a poster contest, and 200 posters were submitted by grades K-12 for judging.

b. NREA Handbook/MCAGCC Environmental Handbook - Two educational handbooks were produced during the nomination period. The Natural Resources and Environmental Affairs Pocket Handbook on Environmental Regulations was produced by the Directorate for dispersal to on-base personnel, contractors, and military personnel participating in the CAX training. It contains information on federal regulations, natural and cultural resources aboard MCAGCC, hazardous waste guidelines, spill reporting, restricted areas, and special rules for CAX training. The Our Environment, What Can You Do? was produced by the Directorate as an Earth Day handout and addresses more generic environmental concerns.

c. Interpretive Panels - Twelve (12) interpretive panels have been designed for highly visited areas of the Center. The intention of the panels is to highlight the uniqueness of the Mojave Desert and show how the U.S. Marine Corps is protecting the environment at the installation. The panels cover ecology, archeology, conservation, pollution and other important topics. Each panel is being produced in full color on a high quality porcelain surface, and will last a minimum of 25 years. What makes this project unique is the specific connection between each sign and it's designated location:

A panel designed for children at the Youth Activities Center How Native Americans obtained food, to be placed at the Commissary, How animals and plants "keep fit" in the desert, to be placed at a gymnasium/fitness centers, A panel on "Night Life" for one of the nightclubs on base.

Plus each and every panel has been designed with a particular audience in mind, unlike other areas where a "one sign for all audiences" focus is pervasive. Placement in "high traffic" areas will ensure the widest possible exposure and will provide educational opportunities for years to come.

d. Development of a new USMC Threatened/Endangered Species Poster - MCAGCC in coordination with Headquarters Marine Corps and the USFWS began designing a new USMC poster highlighting protection of the threatened desert tortoise.

e. Design of Wildlife Viewing Area - As part of storm water retention project a wildlife viewing area was designed to take advantage of the many shore bird and waterfowl already using three retention ponds. The design calls for the joining of the three ponds with a variety of depths and a large shoreline shelf. Around the ponds a walking path and five ramadas will be constructed. Three ramadas will have viewing blinds and two will have large display boards. Other interpretive signage will be placed along the path to educate viewers on the birds, plants and wildlife of the area. The area will be xeroscaped utilizing mesquite, desert willow, palo verde, saltbush and other native plant species. This area will be primarily used by MCAGCC personnel, but will be accessible to the community during public on open gate days.

f. Creosote Study - A study of the creosote, one of the most common shrubs in the Mojave Desert, is being conducted in conjunction with the local elementary school. The joint study is introducing the first, second and fifth grades to basic concepts of scientific research. The students have learned about the metric system, transects, keeping field notes, displaying your results with graphs, and about desert plant biology.

g. OP Articles and Base TV interviews - During 1996 the Directorate exceeded its goal of providing a natural or cultural resources article to the MCAGCC Newspaper, The Observation Post, at least once a month. Topics included the desert tortoise, revegetation projects, identification of snakes, breeding birds, creosote study, history of Surprise Spring, Fox Trot Petroglyph Site, Earth day, and Historic Preservation Week. MCAGCC's Archeologist was interviewed on the MCAGCC TV channel in 1996 as well.

She provided a general overview of the cultural and natural resources programs at the Center.

h. Natural Resources Video - A video highlighting the natural resources and compliance issues aboard base was completed in 1994. This video is shown to military personnel before CAX training and contractors prior to construction activities.

Mission Enhancement

The Center's natural resources program has made substantial contributions to enhancing the military mission at MCAGCC. The expansion of in-house staff within the NREA Directorate, has allowed the Center to develop a comprehensive integrated natural resources program. The program builds on surveys and evaluations to provide sound management and compliance with the ESA, NEPA, Sikes Act, Migratory Bird Treaty Act, and the Clean Water Act.

By utilizing the POM process MCAGCC has insured that legal requirements and management needs are identified for funding through the year 2003. Yet the POM process is flexible enough to be modified in response to new information, regulations and training scenarios.

The larger staff has been able to complete several in-house desert tortoise surveys in quick response to training needs, including a new Forward Ammunition Supply Point and a WISS and Strafe Range, at a great savings in time and money. Since 1995 four in-house Environmental Assessments and numerous categorical exclusions have been completed at an approximate savings of half a million dollars.

The GIS & Remote Sensing Lab works in close relationship with many military organizations including: the Commandants Warfighting Lab in support of the Hunter/Warrior Advance Warfighting Experiment, USN & DESCIM's Unexploded Ordnance software program, and GATF projects. The GIS Laboratory provides data and new map products to the Operations & Training Directorate and the Installations & Logistics Directorate to assist in mission requirements. The development of multiple data layers and models is putting the NREA Directorate in a position to provide mission sustaining natural resources management for years to come. Of particular importance will be the LCTA model. If the MCAGCC's training mission is to continue into the next century, the training lands must be maintained.

The Center continues to enhance the mission by upgrading its educational efforts. Given the volume of new military personnel trained every year, quality briefings and materials are particularly important to ensuring compliance with Federal regulations.

Natural Resources Compliance Program

a. Interaction with regulators, inspectors, auditors - In 1993, USFWS suggested that a portion of the Sunshine Peak Training Area had the potential to be designated critical habitat. Surveys conducted in FY94 revealed that the study area did not contain a sufficient density of tortoises to support the designation. The proposal to designate the area was dropped; however, BLM lands adjacent to the MCAGCC boundary were designated as critical habitat. As the result of a gap analysis conducted jointly by USFWS and MCAGCC a set of surveys and the Desert Tortoise Management Plan was completed. The goal was to acquire enough baseline information to bring the military training program into full compliance with Section 7 of the Endangered Species Act. The Plan will act as the foundation for the basewide Biological Assessment to be completed in 1997. During this time period MCAGCC has been operating under interim guidelines approved by USFWS to avoid take. For those individual actions with "no effect" or that were "not likely to adversely affect" desert tortoises, MCAGCC has completed informal Section 7 consultations. For those actions where there was a possibility of an adverse affect, formal consultations have been completed.

A planning level study to identify, characterize, and provide management recommendations for waters regulated under the Clean Water Act was completed in 1994. The study entitled Identification and Characterization of "Waters of the United States" at the Marine Corps Air Ground Combat Center, Twentynine Palms, California was completed by US Army Corps of Engineers Waterways Experiment Station. The study failed to identify any three parameter wetlands as defined by the 1987 wetland delineation manual; however, it did identify 58,146 acres of jurisdictional "waters of the united states" regulated under Section 404. Permit applications are made for filling, grading, leveling, ditching in the dry playa beds.

b. Budget data - Through the CompTRAK System MCAGCC has identified 34 natural resource projects, which are tied to the MLUMP's five year implementation plan. Funding for these projects have been identified through the POM budget process for FY96-FY03. Funding levels have increased each fiscal year during the nomination period, with funding for projects alone being 700K in FY95 and 1511K in FY96. The NREA Directorate has requested funding for FY97 projects at approximately 1600K.

c. Natural Resources damage assessment efforts - To minimize habitat loss and to prevent damage to training lands, MCAGCC is moving toward the use of hardened sites for field activities such as Forward Ammunition Resupply Points and Forward Logistic Bases. In conjunction with O&T the NREA Directorate have identified 50-150 acres parcels in individual training areas, which have historically received heavy use and have no cultural or biological concerns. These areas have been mapped and with regulatory agency approval will be designated for permanent use. This will avoid damage to

previously undisturbed areas, which occurs from random placement of these activities. It is estimated that a minimum of 1500 acres per year could be protected in this manner.

It is expected that the LCTA will provide the baseline data needed to continue damage assessment of the soils and vegetation in the training areas.