



Figure 1. An FA-18 aircraft flying over the Lemoore Naval Air Station fields. In the back-ground are some of the agricultural lands of NAS Lemoore. The NR team manages the agricultural leases that provide a greenbelt for a safe air training mission.

STATION RESOURCE

Naval Air Station (NAS) Lemoore is the Navy's newest and largest aviation facility. Our Mission is "To support the U.S. Pacific Fleet and its mission to train, man, and equip West Coast Strike Fighter Squadrons so they may be ready to do the Nation's business anywhere in the world." We accomplished this through operational and infrastructure support for 300 FA-18 Hornets that train and operate from the base. We maintain and operate facilities and provide services and material support to the Commander, Strike Fighter Wing Pacific, four operational carrier air wings, 16 strike-fighter squadrons, and 49 tenant commands. We are the Navy's premier Master Jet Base and Hornet Center of Excellence.

NAS Lemoore is located in the perfect location for Naval Aviation. The installation is in an area that geologically was at the northern edge of the dry Tulare Lake with broad, nearly flat, interbedded alluvial fans of the Arroyo Pasajero and Los Gatos Creeks from the Coast Range to the west and that of the Sierra Nevada's to the east. The Station is located about 81 kilometers (km) inland from the Pacific, in the central part of California's San Joaquin Valley. NAS Lemoore offers a very high quality of life to its personnel and their families comprising of approximately 6,123 Sailors and

Marines, 4,100 family members, and 1,477 civilian employees.

The Station occupies approximately 7 600 hectares (ha) of what historically was Central Valley Grassland with some small areas of riparian forest, and seasonal wetland marsh along the eastern border. Historically, the lands occupied by the Station have seen cattle and sheep grazing, dry land farming, and, since the construction of the California Aqueduct, irrigated farming operations.

Establishing NAS Lemoore in the Central Valley of California served several purposes: it is close to established military training ranges and close enough to the Navy's seaport facilities for logistical support. At the same time it is distant enough from major population centers to protect the Station from suburban encroachment and to allow for possible expansion to accommodate rapidly advancing aviation technology. The Station is within an area that supports good agricultural practices, which minimize dust and foreign object damage (FOD) to jet engines. Separation of the aviation operations area and the administration and housing areas by roughly 8 km has made for an excellent noise buffer with no operational deterrents.

The installation's 7 600 ha under the scope of the Integrated Natural Resources Management Plan (INRMP) are divided between the aviation operations area 1 235 ha, administration and housing area 790 ha, agricultural out-lease lands 5 174 ha, and unimproved, natural lands 403 ha.

Diverse lands and management regimes at NAS Lemoore offer a varied range of habitats that support a broad array of floral and faunal populations. While most of the land at NAS Lemoore is under cultivation or has been developed, the remainder supports a variety of grasslands, windbreaks or woodlands and seasonal wetlands. Inventories and periodic wildlife and plant counts have confirmed the occurrence of 151 bird, 21 mammal, 5 reptile, 6 amphibian species, and 237 plant species on the Station. Several federally listed Threatened or Endangered Species are known

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to potentially occur in the vicinity of the Station, but only one mammalian species, the Fresno kangaroo rat (*Dipodomys nitrotoides exilis*) is known to be an inhabitant of the Station. Two species of birds that are federally listed as Threatened (the Aleutian Canada goose and the western snowy plover) and one that is listed as Endangered (the California least tern) are recognized as potentially occurring in the area. These are regarded as transients and only the California Least Tern has ever been recorded as having been sighted. Two federally listed endangered plant species are considered to potentially occur in the vicinity of the Station. They are the California jewel flower (*Caulanthus californicus*) and the San Joaquin wooly-threads (*Lambertia congdonii*). To date, neither of these has been recorded as occurring on the Station.

ACCOMPLISHMENTS

The Natural Resources Team (NR Team) is responsible for a wide array of significant resource related tasks onboard the installation in addition to management of natural resource projects, real estate leasing and implementation of the agricultural outlease program, pest management, cultural resources coordination, NEPA compliance, implementation of the Bird Aircraft Strike Hazard (BASH) Program, and serving as environmental resource planning and technical advisors to the Commanding Officer.

During the reporting period, the NR Team maintained all of its regulatory compliance responsibilities, developed and implemented various environmental projects, and cooperated with the United States Bureau of Reclamation in providing professional expertise towards alleviating a water shortage situation for the agricultural outlease program that befell the installation during a time of extreme drought which was complicated by complex regulatory, judicial and political considerations.

Agricultural Outlease

NAS Lemoore has 5 340 ha of undeveloped land that is dedicated to agricultural purposes and mission enhancement. Of the 5 340 ha, 4900 ha

are divided into 60 parcels and leased for periods of 5 to 9 years to local producers. Agricultural lands that are leased pursuant to PL-321 permit the Secretary of the Navy to retain the lease rental receipts to cover the expenses of leasing and to finance multiple land-use management programs (i.e. natural resources projects).



Figure2. View of the dehydrator onion harvest being conducted on one of the agricultural leases on the installation. Onions are one of the annual crops that are produced at NAS Lemoore. Dehydrator onions are used primarily for dried food products due to the ability of the onion to retain its qualities through the dehydration process.

Prolonged restricted water availability in the region during FY2009 necessitated the Natural Resources (NR) team with assistance from NAVFAC SW Desert IPT team and Real Estate to implement a number of lease extensions for an additional year. The NR Team successfully maintained the agricultural outlease parcels with active lessee's guarantees for care of the land resource. If the Navy were to maintain all the lands of the station to the same level as the area around the airfield, it would cost in excess of \$3 million in management oversight and maintenance including Level II mowing each year. Leasing this land to local producers permits the Navy to enjoy the benefits of a greenbelt area on and adjacent to the air field, which helps maintain health and safety attributes without compromising our air mission. Income from these leased lands of nearly \$2 million also provides support of the Navy's Natural Resource Program and revenue for our annual \$1 million mortgage payment to Westland's Water District (WWD) for our supplemental 12.3 million cubic

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meters (Mm³) of water.

The station's agricultural lessees have historically produced cotton, wheat, alfalfa, tomatoes, barley, onions, and corn. During FY2009 the U.S. Bureau of Reclamation (BOR), the federal agency responsible for allocating Central Valley Project (CVP) water deliveries to the station, shifted water allocation priorities due to legislative and judicial actions, from crop production to wildlife protection, thereby reducing available irrigation and impacting mission needed ground cover. These shifting priorities resulted in less safety, stability, changing crop patterns and a 55 percent fallowed resource on the station. While unable to farm all of the land under active leases in FY2009, agricultural producers worked with the NR Team to maintain their leases at the installation by altering established cropping plans and rescheduling of planting and the timing and location of water deliveries to maximize the potential of bringing a marketable crop to harvest.

Continued negotiations throughout the FY2009 and FY2010 growing seasons with the BOR regarding the need to maintain safe air operations and to provide for resident health and safety highlighted the need for a dedicated minimum allocation of irrigation water to NAS Lemoore. Redoubled efforts to secure a permanent allocation of surface irrigation water for the station through legislative support and continued collaboration with the BOR and WWD are making progress. The NR Team was instrumental in providing vital technical advice to the Commanding Officer, NAS Lemoore and the Commanding Officer, NAVFAC Southwest which facilitated negotiations with the BOR, resulting in a 24.7 Mm³ allocation of irrigation water to sustain the installations 5 340 ha of agricultural land and the agricultural outlease program through the 2009 and 2010 growing seasons.

The allocation allowed agricultural producers to continue farming operations of land around the base airfield to maintain our mission critical greenbelt.

A higher degree of safety was afforded to base residents by a reduction in the risk of respiratory

illnesses (i.e. Valley Fever) resulting from localized dust storms. Pilot safety was improved by minimizing the amount of fallowed land onboard the installation, thereby reducing potential for bird aircraft strikes.

As a result of a combination of factors, including the aforementioned lease extensions, NAS Lemoore's agricultural outlease program was confronted with the prospect of re-authorizing leasing on 45 of the station's 60 lease parcels at the end of FY2010. NASL's NR team worked closely with NAVFAC SW Realty, Natural Resources personnel, producers and NGO's in increasing advertising and marketability of the Station's lands. These efforts helped the station realize a substantial increase in interested bidders as well as higher proposed rentals and water revenues than had previously been received.

Groundwater Monitoring Study

The NR Team provided logistical support to the United States Geological Service (USGS) in conducting tests on three of the agricultural outlease irrigation wells as part of the Groundwater Ambient Monitoring and Assessment (GAMA) Program, California's comprehensive groundwater quality



Figure3. View of a research crew from the United States geological Survey acquiring water samples on one of the agricultural wells on the installation. The study is part of the states Groundwater Ambient Monitoring and Assessment (GAMA) Program. The groundwater is monitored to determine groundwater quality in the Western San Joaquin study unit.

monitoring program. The Priority Basin Project of the GAMA program is a statewide project

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conducted by the U.S. Geological Survey (USGS) and funded by the California State Water Resources Control Board. The purpose of the GAMA Priority Basin Project is to provide a statewide assessment of the quality of ground water in aquifers used for public supply in California, to increase availability of information about ground-water quality to the public, and to foster collaboration among federal, state, and local agencies involved in managing groundwater resources. The NR Team assisted in tests of select wells to determine a range of constituents not regularly sampled, including volatile organic compounds, pesticides, emerging contaminants, trace elements and major ions, nutrients, radioactivity, isotopic tracers, and ground-water age dates. NAS Lemoore was part of the sixty samples collected from wells in the Western San Joaquin study unit in the spring of 2010.

Hydrology Study

During FY2009 and FY2010 when project funding was limited, the NR team with the assistance of the NAVFAC SW Desert Team was able to acquire \$205,000 in funding to initiate a hydrology study of the Tulare Lake hydrologic basin. This study is being conducted concurrent to a U.S. Geological Service (USGS) regional study of the basins subsidence issues. The focus of the hydrology study being conducted by hydrology scientists from the University of California, Davis will serve to determine groundwater recharge to the basin, the ability of groundwater levels to recover over time, and determine a “safe yield” of groundwater pumping from the basins aquifer. Establishing a safe yield will serve as a guide for potential well locations and provide vital information for the NR team in management decisions regarding the agricultural outlease program at the installation. Concern about the potential for land subsidence that would negatively impact the installation infrastructure led the NR Team to initiate a request for the study. Preliminary results of the hydrology study are anticipated by December 2010.

Bird Aircraft Strike Hazard (BASH) Program

Bird aircraft strikes are a major concern of the U. S. aviation community. While NAS Lemoore does not experience BASH related incidents at the same magnitude as other naval aviation facilities near many coastal locations, the station’s BASH incidence rate has increased 300 percent over the last three years. In an effort to mitigate BASH risk to the greatest degree possible the NR Team has implemented a Wildlife Hazard Assessment (WHA) study of the base airfield, adjacent agricultural leases and surrounding lands. The results of this two-year study will be used to update the current BASH plan that base personnel use to facilitate safe flight operations.

The agricultural outlease program is an essential component for maintaining safe conditions for flight operations at NAS Lemoore. Agricultural production around the Operations Area helps provide safe conditions for flight operations by decreasing the potential for foreign object damage (FOD) to aircraft and opportunities for BASH incidences. The NR Team integrates research information to help determine best management practices (BMP’s) such as cropping patterns and weed control programs around the airfield to reduce the potential of bird aircraft strikes.

The NR Team has obtained a depredation permit from the U.S. Fish and Wildlife Service to authorize legal measures to prevent bird aircraft strikes and to protect public safety as part of its Integrated Wildlife Damage Management Program, by redirecting migratory bird activity onboard the station through a series of nonlethal hazing techniques.

Raptor Management Program

The NR Team received permits from the USGS Bird Banding Laboratory and the California Department of Fish and Game to allow the team to initiate an in-house program for capturing and

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banding hawks and owls. The NR Team proposes to study raptors at the Lemoore Naval Area Station.

This in-house research will result in a cost-savings to the Navy for management of raptor species found at the installation. The research will involve the capture and banding of migratory and nesting raptors, in addition to the study of habitat and home range, natal dispersal, breeding dispersal, site fidelity of adults, migration, and survivorship. Benefits of this program will include information shared with the ongoing Wildlife Hazard Assessment study, currently in progress, as well as providing a basis for assessing population dynamics of the various birds of prey found at and around NAS Lemoore.

Wetland Construction

Several NAS Lemoore Ag-Outlease parcels have earthen tail-water sumps. For the most part, these are merely tail water catchment basins, holding irrigation tail water until it can be pumped back to the head of the field for re-use by the producer.



Figure 4. View of a constructed wetland on one of the agricultural outleasements. The wetland was constructed in late 2008 and planted with appropriate vegetation in FY2009. The wetland makes use of an existing irrigation tail water return system on the parcel.

One of these catchment basins was identified as being well removed from flight path, for the most part, and posed little risk of interfering with airfield operations. Selection of the pond to be enhanced required that it be well removed from the airfield

flight path to prevent concurrently creating an increased bird-strike hazard, while providing an alternate use for unused irrigation water from the parcel. A plan for the enhancement of this structure was developed by the NR Team with cooperation of the Natural Resources Conservation Service (NRCS) Office in Visalia, CA and a contract being let through NAVFAC SW in the spring of 2008 construction activities began in FY 2009.

The original sump area was enlarged and deepened with soil material removed from the core of the pond being used to construct several small berms on the pond's margin and several small island structures to enhance wildlife habitat in the pond.

Sensitive Species Management

Kangaroo Rats were first identified at NAS Lemoore during an environmental survey in 1982. The Station hosts a remnant population of a subspecies of kangaroo rats known as the Fresno kangaroo rat (*Dipodomys nitratoides exilis*), a species listed as Endangered by both the Federal government and the State of California.

The species had historically been prevalent throughout the central valley of California. Due to municipal and agricultural development of the area, however, the species has been confined to smaller and smaller pockets of remnant habitat today. Tumbleweed Park (TWP) at NAS Lemoore is one of these pockets. The population of kangaroo rats found in TWP is believed to be one of few if not perhaps the last remaining isolated population.

Severe environmental conditions, such as drought and the development over time of a dense growth of thatch from nonnative invasive annual plant species, reduced availability of appropriate habitat conditions for this species. Based on observed habitat conditions, the NR Team determined that a prescription burn on the area was required. A burn was planned, permitted and conducted during the summer of 2010, to reduce the dense growth and thatch of the nonnative annual vegetation. Cal Fire, Kings, County Fire department, and the LNAS Fire



Figure 5. View of Cal Fire, Kings County, and the NAS Lemoore Fire Departments conducting a prescribed burn at the Tumbleweed Park area of the installation. The burn served as a wildfire suppression training exercise for these units. Periodic burns and modification of ground cover are an essential component for kangaroo rat survival.

Department concurrently used the burn for wildfire suppression training purposes. The installation's Emergency Operations Center staff assisted NR Team personnel in coordinating fire, security and air field operations during the training exercise.



Figure 6. Aerial view of the location of the prescribed burn at the Tumbleweed Park area. The unburned areas represent locations where kangaroo rats are observed to be present. Firebreaks were constructed around these locations prior to the burn.

Preliminary assessments following the prescribed burn indicate the burn is making a positive impact on the K-Rat survivability. Evidence of new burrowing activity found in burned areas during post-burn assessments conducted shortly after the burn is interpreted to confirm observations that the species tends to benefit from surface disturbances

Encroachment Prevention

The NR team has been instrumental in helping prevent encroachment within the sphere of influence of NAS Lemoore by coordinating efforts of federal, state, and local agencies and nongovernmental organizations to identify areas suitable for agricultural and/or conservation easements. The NR team has provided professional expertise to the NAS Lemoore Commanding Officer and installation tenant commands regarding potential easements to sustain the mission of NAS Lemoore.

During FY 2010, NAS Lemoore implemented three studies to establish baseline data to assist in developing sustainable strategies for the base's land, water and wildlife resources that are compatible with our air mission. The focus of these studies will be to 1) establish a monitoring program of the shallow saline aquifer underlying the area, 2) provide a baseline wildlife and migratory bird assessment of the station and surrounding area and 3) an inventory assessment of the naturally occurring plant community and recommended plant species that may be more compatible with our mission.

These studies will also serve to provide valuable information to the base's efforts in working with other agency and NGOs desiring to improve conservation easements along the eastern perimeter adjacent to the base while assisting in the Navy's efforts to suppress the impact from the onset of encroachment.