

Produced for the Mojave Desert Ecosystem Program Under
the United States Department of Defense Legacy Program
and in Cooperation with the Department of the Interior

Principal Collaborators

DoD Role on the MDEP



The Mojave Desert Ecosystem Program (MDEP) represents a Department of Defense (DoD) effort to meld together a shared scientific database that can be used to affect dynamic sustainable land management decisions. It is not itself a management process, but a tool to enable more accurate modeling of environmental factors that will facilitate data-driven management within the Mojave ecoregion. The program directly supports the military readiness in the region through provision of a framework for determining research strategies and mitigation measures, and designing enlightened, long-term resource planning to ensure ongoing activities including training mission objectives. It will provide all users (federal, state, local, and private) easy Internet access to georeferenced natural and cultural resource data for the entire ecoregion. The program is a model for the sharing and integration of data and expertise from a long list of participants including the National Training Center, Fort Irwin; Naval Air Weapons Station, China Lake; Air Force Flight Test Center, Edwards Air Force Base; Marine Corps Air Ground Combat Center, Twentynine Palms; and Marine Corps Logistics Base, Barstow.

DMG Role on the MDEP



The California Desert Managers Group (DMG) was formed to provide desertwide operational collaboration for ecosystem management, customer service, and organizational efficiency. The DMG was instrumental in the formulation, support, and guidance of the MDEP. Through its Science and Data Management team, a major role of the DMG has been to provide the link between the technological capabilities and the on-the-ground user requirements for a diverse array of agency missions and management directions. This overview provides the priorities for data collection, the encouragement for funding, and the coordination of input from ongoing science and research projects.

BLM Role on the MDEP



The Bureau of Land Management (BLM) provided the assistance representative for the project, who was also the focal point for all administrative activities. In this role the BLM provided the administrative oversight for the Task Order with Utah State University (USU), the Interagency Cooperative Agreement with the U.S. Geological Survey, and the Memorandum of Understanding (MOU) with the Department of Defense at Ft. Irwin. They cochaired the Legacy Management Oversight Group (LMOG) and assisted in facilitation needed to accomplish each of the four identified phases of the USU Task Order. The BLM provided extensive field data for the project and participated in recommending priorities to the USU Task Order. Each of the LMOG meeting's logistical support, agendas, and final minutes for the project were carried out by the BLM. The Bureau was also the focal point for all financial support functions of the project as it related to the above-mentioned agreements and MOU.

USGS Role on the MDEP



The U.S. Geological Survey (USGS) designed the Mojave Clearinghouse Network, provided much of the data, and served as science advisor for the program. The Mojave Clearinghouse Network was established with a main node at Ft. Irwin using Internet protocols compliant with National Spatial Data Infrastructure guidelines. Digital topographic, geologic, and soils data were interpreted and mosaicked to provide seamless regional coverages. This data, as well as digital cartographic and image data, and assistance with map production were provided to Utah State University for integration and distribution of data for the Task Order. USGS was represented on the LMOG, where they provided scientific advice.

USU Role on the MDEP



The College of Natural Resources at USU was given the lead role for the execution of the Mojave Desert Ecosystem Program. USU provided the technical expertise and management required to design, compile, and realize the MDEP. Collaboration with the U.S. Geological Survey, which was charged with the design and implementation phase of the network delivery system for the Mojave Clearinghouse Network, provided an integrated system to assemble, store, and deliver environmental data. USU was responsible for accomplishing the spatial data acquisition and assembly into unified seamless coverages. Data were made accessible through the creation of user interfaces that facilitate queries and data recovery.

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AVHRR Individual Band Data

AVHRR Frost-Free Period

AVHRR Geometric Data

AVHRR Duration of Greenness

AVHRR Onset of Greenness

AVHRR Peak of Greenness

AVHRR Land Use and Land Cover

AVHRR Normalized Difference Vegetation Index Data (NDVI)

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Digital Elevation Model (DEM, 30 meter)

Shaded Relief derived from Digital Elevation Model (DEM, 30 meter)

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ACKNOWLEDGMENTS

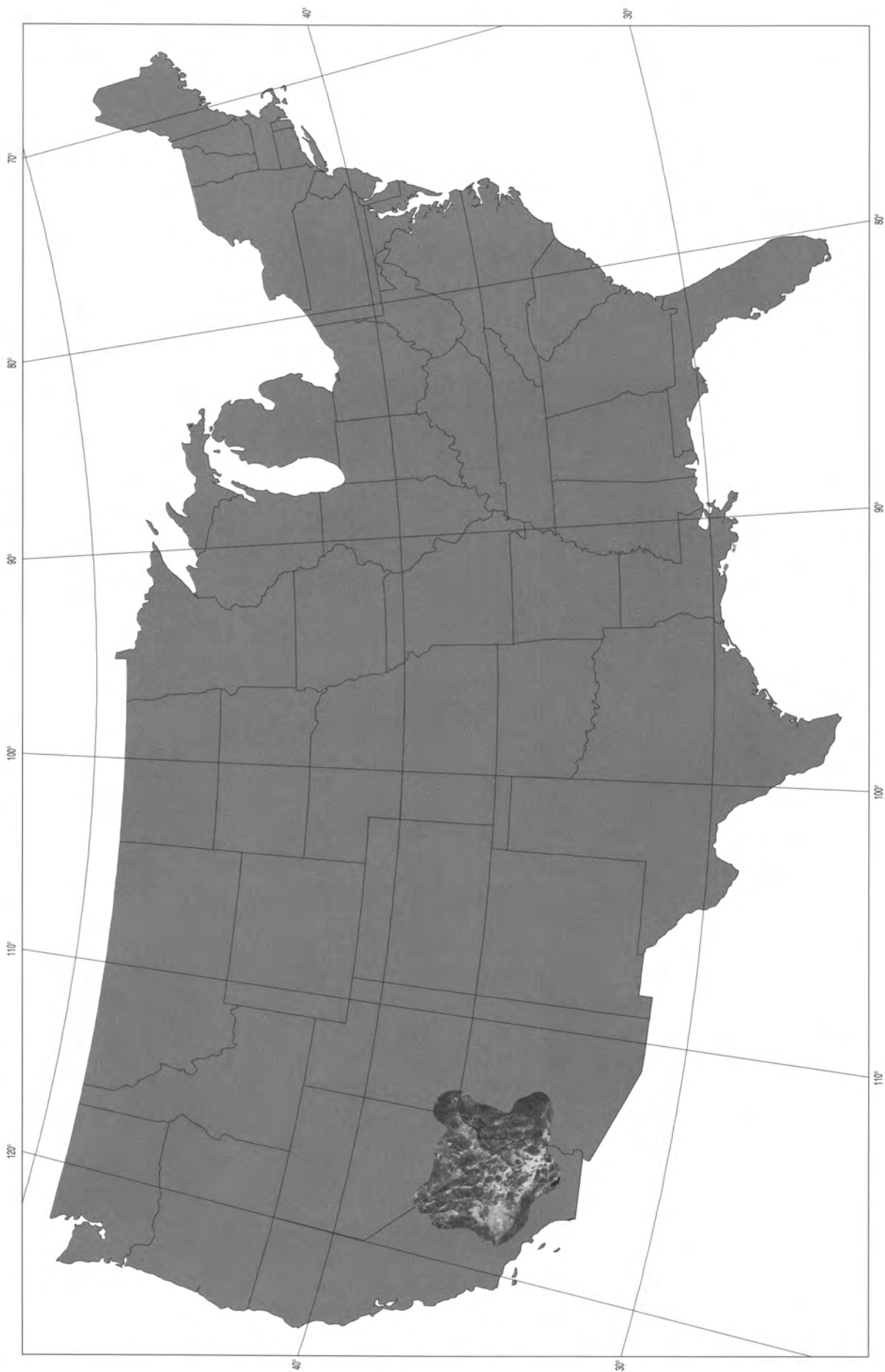
The Mojave Desert Ecosystem Program (MDEP) is a significant effort to compile and integrate a very large spatial database covering over 80,000 square miles. This project is the first of its kind to organize a detailed environmentally oriented digital geographic data set over an entire ecoregion. A great deal of thanks belongs to a number of individuals and organizations who have given their time and effort to bring this project to closure. The partnership between the Department of Defense, the U.S. Geological Survey, the Bureau of Land Management, and Utah State University has been an excellent exercise in interagency collaboration, and the individuals involved in this project deserve a great deal of praise.

A special note of thanks is given to Mr. Bruce Babbitt, Secretary of the Interior; Ms. Sherry Wasserman-Goodman, Deputy Under Secretary of Defense; and their respective staffs for making this project possible and for their guidance and initial vision of creating a database that all land managers in the Mojave Desert could exploit. The U.S. Geological Survey, who provided the majority of the spatial data and worked closely with Fort Irwin to establish the Internet links and initial World Wide Web home pages, provided their tremendous expertise in generating the maps that appear in this package, and the Bureau of Land Management, who provided administrative assistance and database information, both deserve significant recognition.

The project has been fortunate to receive help and expert advice from a wide variety of sources. Within the Department of Defense all of the services, their installations (the Marine Corps Air Ground Combat Center, Twentynine Palms; the Air Force Flight Test Center, Edwards Air Force Base; the National Training Center, Ft. Irwin; the Marine Corps Logistics Base, Barstow; the Naval Air Weapons Station, China Lake) and their respective headquarters were instrumental in getting the project off the ground. Members from each installation and participating headquarters provided expert direction and strong support during the accomplishment of the project. Members within the Department of Interior and its agencies (Bureau of Land Management, U.S. Geological Survey, U.S. Fish and Wildlife Service, National Park Service) were instrumental in providing a Department of Interior perspective for all challenges that arose and in providing excellent advice on the data needed for the project. A significant amount of help and collaboration was also provided by numerous federal, state, and local agencies, and academic institutions (found in the back of this booklet) in providing bibliographic resources to help populate the spatially referenced bibliography. Finally, a well deserved thanks goes to the staff, graduate students, and technicians at the Remote Sensing and GIS Laboratories at Utah State University.

The project was executed under the aegis of a number of formal agreements among Utah State University, the Bureau of Land Management, the National Training Center at Fort Irwin, and the U.S. Geological Survey. The administrative functions for the MDEP were carried out by the BLM Assistance Representative, the Utah State University College of Natural Resources Dean's Office, and the MDEP staff. Oversight for the project was provided by the Legacy Management Oversight Group, which was established to review and approve task order contents and any modifications, monitor task accomplishments, review final reports and products, coordinate partners, and evaluate final results of documented decisions, understandings, and agreements. It has been through the participation of all public land managers in each of the four states over which the Mojave Desert extends (Arizona, California, Nevada, and Utah) that the foundation for this comprehensive endeavor was achieved.

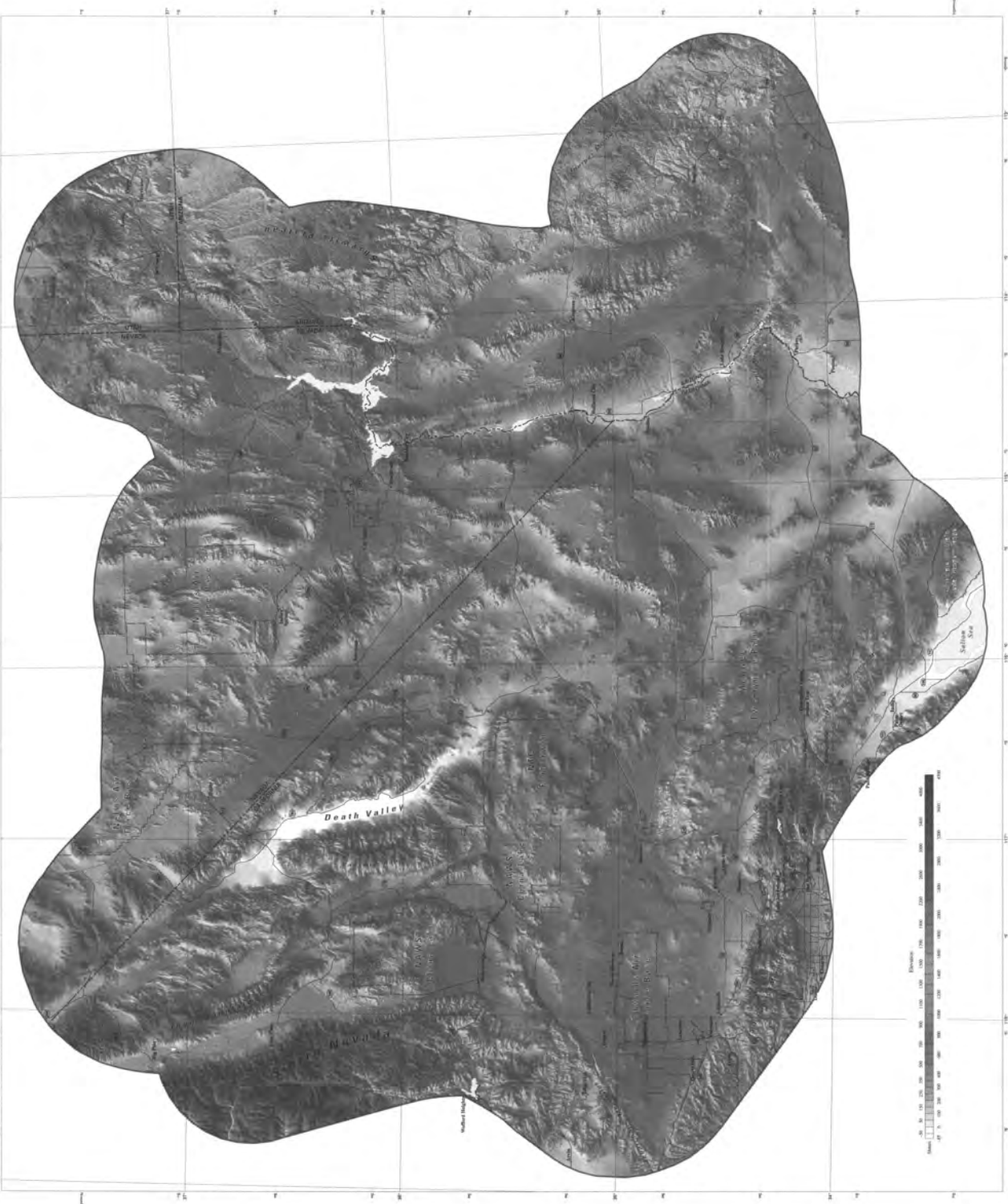
THE MOJAVE DESERT ECOREGION



Mojave Desert Ecosystem Program

Mojave Desert

Shaded Relief Map



Prepared for the Mojave Desert Ecosystem Program
 under the United States Department of Defense Program
 "Competition and Change Management for the Mojave"
 Department of Geomatics and Land Resources
 Utah State University
 Logan, Utah 84302-2100
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The shaded relief map is based on the 1:50,000 scale USGS 7.5-minute topographic sheets covering the area. The map was prepared using the 1:50,000 scale USGS 7.5-minute topographic sheets covering the area. The map was prepared using the 1:50,000 scale USGS 7.5-minute topographic sheets covering the area. The map was prepared using the 1:50,000 scale USGS 7.5-minute topographic sheets covering the area.

Legend:
 Major Road
 Minor Road
 Boundary
 Water
 Contour
 Elevation
 Shaded Relief

SCALE 1:50,000
 Distance: Meters
 Feet
 0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000

0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000

United States Map
 0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000



Produced for the Mojave Desert Ecosystem Program
 in cooperation with the Department of the Interior,
 Bureau of Land Management, and the Department of
 Agriculture, National Wildlife Federation, and the
 U.S. Geological Survey.

Copyright information and funding by U.S. Geological Survey 1986.

Map scale: 1:750,000
 Scale bar: 0 to 100 miles
 Legend:
 - Boundaries: State, County, National Preserve, National Forest, Other
 - Highways: Interstate, State, Other
 - Water: River, Lake, Reservoir, Other
 - Other: Other

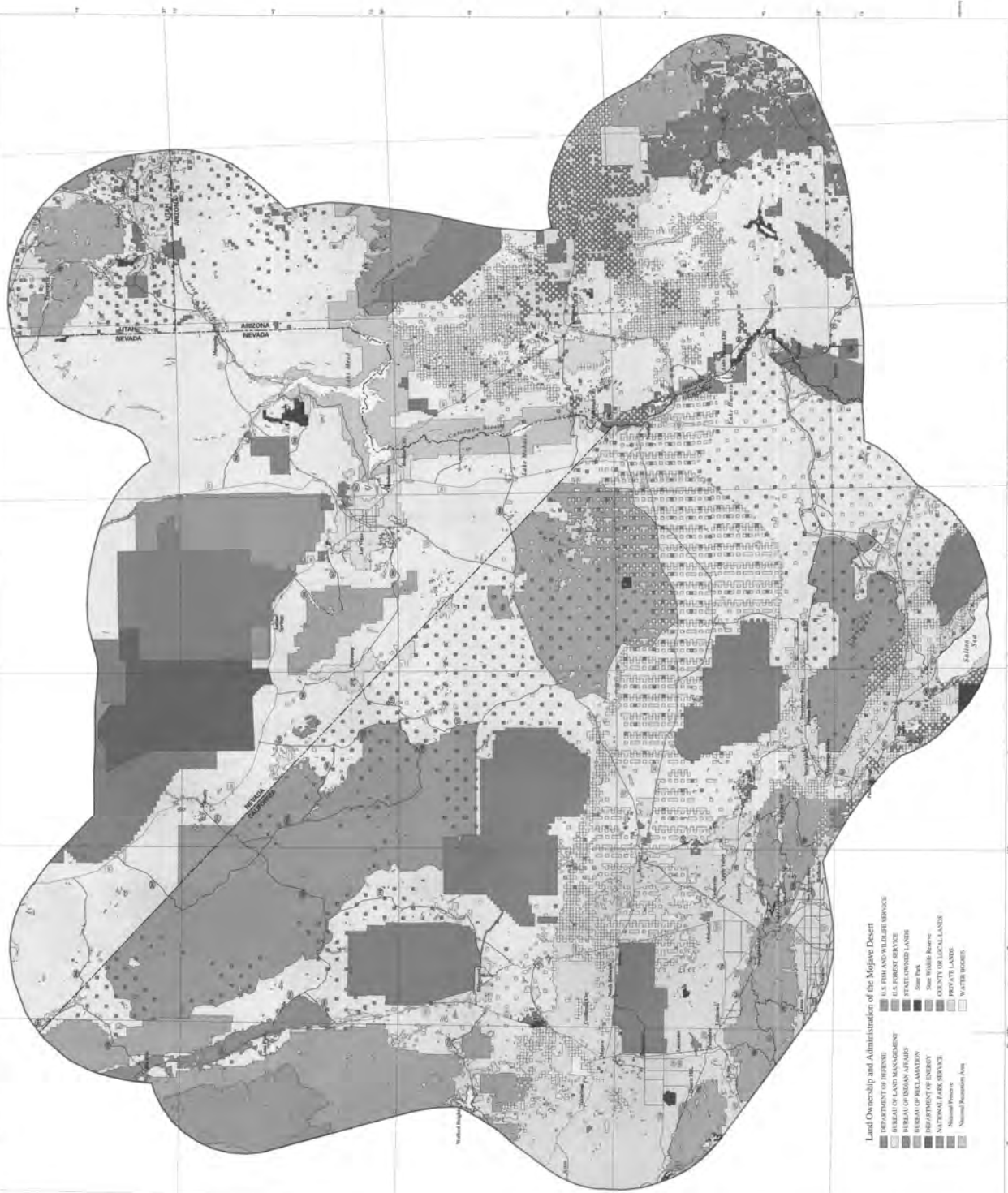
Map data provided from 1:250,000 scale maps, including:
 - National Topographic Series
 - National Wetlands Inventory
 - National Forest Inventory
 - National Wetlands Inventory
 - National Wetlands Inventory
 - National Wetlands Inventory

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 - National Topographic Series
 - National Wetlands Inventory
 - National Forest Inventory
 - National Wetlands Inventory
 - National Wetlands Inventory
 - National Wetlands Inventory

Mojave Desert Ecosystem Program

Mojave Desert

Land Ownership and Administration



- Department of Interior**
- BUREAU OF LAND MANAGEMENT
 - BUREAU OF INDIAN AFFAIRS
 - BUREAU OF RECLAMATION
 - DEPARTMENT OF ENERGY
 - NATIONAL PARK SERVICE
 - NATIONAL SECURITY AREA
- Land Ownership and Administration of the Mojave Desert**
- U.S. FISH AND WILDLIFE SERVICE
 - U.S. FOREST SERVICE
 - STATE OWNED LANDS
 - STATE PARKS
 - COUNTY OR LOCAL LAND
 - PRIVATE LANDS
 - OTHER

Scale: 1:100,000
 National Geographic Society
 Department of the Interior
 Bureau of Land Management
 Bureau of Indian Affairs
 Bureau of Reclamation
 Department of Energy
 National Park Service
 National Security Agency

INTRODUCTION

BACKGROUND

Land managers today are faced with multiple challenges. They must promote and restore natural ecological processes. They must, as a result of expanding economic pressures, become advocates for the sustainable use of natural systems while ensuring the integrity of these systems. The public and the courts are increasingly demanding objective and effective management strategies that balance multiple demands on fragile, exhaustible resources. Competition for Mojave Desert resources has increased dramatically over the last several years as diverse groups seek to achieve often conflicting goals. These goals include such things as establishing and expanding national parks, creating wilderness areas, protecting threatened and endangered plants and animals, developing recreational areas, conducting military training and testing to meet the nation's national defense needs, and expanding economic development. Given projections for a tripling of the population in the region over the next twenty years, competition among these interests will increase, resulting in fragmented conservation and development efforts. As a result, land managers must develop programs that evaluate, monitor, and predict system change including that caused by human impact. The task before land managers and scientists becomes one of more fully understanding the concepts of natural system processes, integrity, and sustainability, so that their goals and objectives promote true system management and strengthen the ties between the research, habitat management, and conservation efforts of all land management agencies.

To achieve this task, the theory and practice of ecosystem management becomes crucial to sustaining the health and productivity of the Mojave Desert ecoregion. Ecosystem level management is distinguished by its concern for characteristics of the whole system. Traditional resource management efforts do not necessarily provide for sustainability or productivity of the ecosystem. The focus of these efforts has been at the species level. This species-by-species approach is inefficient, expensive, and biased toward species with broad public appeal. These efforts also contribute to economic conflict because they fail to provide a reasonable planning framework for economic interests. Biological loss occurs at all levels; therefore, efforts to maintain biological integrity must be applied to all levels, not just the species level. Effective ecosystem management requires that species of special concern be examined in the context of the overall ecosystem and its surroundings. The importance of a particular species to a given planning area is best determined in light of the knowledge of the regional distribution of the species. In the greater scheme, it is important to note that an ecosystem approach to management is a complement to, not a substitute for, legally mandated protection of individual species. Maintenance of ecosystem integrity ensures against endangering additional species. If land managers are serious about managing for sustainability, they must raise their focus in management and planning to the ecosystem level.

To date, enormous amounts of ecosystem data have been gathered by a wide variety of federal, state, local, and private agencies. These data span a wide variety of issues and topics and have been collected at many different scales. However, complaints of inaccessibility and incompatibility are common and prevent widespread use of this data. Additionally, standards for data collection vary widely. Frequently, budget limitations, organizational structure, and personnel changes result in the loss of valuable information. A better understanding of ecosystem functions and interactions and more accurate and available data describing the dynamics of ecosystem processes will result in land managers' ability to choose appropriate management solutions that minimize unexpected and undesirable outcomes. Today, in an era of limited funding, advances in computer networking and information storage can provide a means to organize, access, and distribute large quantities of data. Federal, state, local, and private agen-

cies responsible for ecosystem data must commit to making this data available to all land managers on an equal basis, in a timely fashion, and in a form that is directly relevant and accessible to their management activities.

CONCEPT

MDEP was envisioned as a tool to enable informed decision making for sustainable land management across an entire ecoregion that spans over 80,000 square miles. Fostered by the Department of Defense (DoD) Legacy Resource Management program and championed by the Department of the Interior (DoI), MDEP has emerged as a multiagency cooperative effort that transcends both administrative and geopolitical boundaries. For the military, this endeavor serves to support the continued mission capability of the strategic DoD installations located within the Mojave Desert ecoregion to achieve military preparedness and readiness while facilitating prudent environmental management. For the Department of the Interior this presents an unprecedented opportunity to integrate the extensive resource data produced by its diverse bureaus and offices and to ensure public access to the decision making process. For state and regional land managers, as well as the general public, this program offers access to a state-of-the-art compilation of environmental resource data about the Mojave Desert ecoregion.

MDEP database represents the DoD's commitment to the utilization of peer-reviewed science to support ecosystem level land management decisions. The project goal is to develop and implement a database to facilitate collection, storage, transfer, sharing, and analysis of information regarding inventories, resource assessments, scientific documentation, and land management by all federal, state, and local agencies and other interested parties. Ultimately, a queryable computer database will be developed and deployed through the World Wide Web to provide land managers the ecosystemwide tools needed for informed decision making. As such it represents one of the first joint (DoD and DoI) attempts to create a regional scale database that can be utilized to affect dynamic, sustainable land management. The project emphasizes the importance of both maintaining and improving the native biological diversity and sustainability of ecosystems. Additionally, it recognizes the need to support sustainable human activities.

MDEP is important for several reasons. It is an attempt to provide uniform data coverage across an entire scientifically defined ecoregion, regardless of political or administrative boundaries. It is strictly about data collection, interpretation, documentation, and sharing, and it provides an important model for the sharing, integration, and use of data for management purposes by a broadly varied group of participants. As stated earlier, the joining of geographic information system (GIS) and Internet technologies has provided unique circumstances for expanding interaction among agencies. Attaining the level of data sharing implicit in this program required the development and implementation of a dynamic regionwide scientific database and electronic delivery system accessible to all federal, state, regional, and local entities entrusted with the responsibility for long-term resource planning. This has been accomplished through the innovative implementation of two basic components: (1) an interconnected distributed system, electronically linked using Internet resources; and (2) a series of comprehensive and fully integrated environmental spatial databases that span the Mojave Desert ecoregion. This system has broken new ground by extending the functionality of geospatial data server technology. Access to the database is via the World Wide Web using any standard Web browser. This environmental spatial data system resides on the Internet at <http://mojave.army.mil>.

The Mojave Desert Ecosystem Program in its current state, is not a management process but rather a tool to enable more accurate modeling of Mojave Desert ecological systems and facilitate decision making about their use and management. The project emphasizes two key aspects: the design and

development of a scientific database that can yield the data necessary for land management agencies to base their decisions on fact, and the implementation of the system in such a manner as to encourage stakeholder participation in the design and construction of the database, as well as use of the database in management decisions. Ultimately, the Mojave Desert Ecosystem Program is a collaborative process to create a database that can yield a thorough, multidisciplinary vision of ecosystem health upon which to base informed management decisions.

The MDEP has a strong record of involvement and collaboration with agency and organizational stakeholders. This element is particularly strong with regard to interservice collaboration among the DoD installations in the Mojave region. The list of official partners has grown over the duration of the project with the addition of the Bureau of Land Management, the U. S. Geological Survey, National Park Service, and numerous educational institutions. With regard to collaborative efforts, the most important aspect involves the contribution of the Mojave Desert Ecosystem Program in developing a vision of ecosystem health. In effect, this is the primary objective of the project in its present form.

The Desert Managers Group (DMG) and Science Data Management Team (a working group of the Desert Managers Group, SDMT) of the Department of Interior's Innovative Management Laboratory are the primary organizational mechanisms for collaborating on design of the database and efforts to make it useful and accessible to land managers. The MDEP does not have and is not designed to have management responsibilities. It is intended for use by those who do. The DMG and SDMT provide the linkage between the MDEP and actual land and resource managers that can utilize MDEP-generated information in decision making.

OBJECTIVES

The Mojave Desert Ecosystem Program currently focuses on identifying existing data and building a comprehensive, scientific database. The initial effort aims to develop the scientific base necessary to establish the ecosystem management process. The project objectives are to

1. Establish a broad-based partnership.
2. Foster cooperation and communication.
3. Reduce duplication of effort among all federal, state, and local agencies.
4. Leverage resources available in the ecoregion.
5. Enable sound, scientifically based decision making.
6. Sustain human enterprises as well as natural and cultural resources.
7. Become an NSDI Clearinghouse node.

To accomplish this, the project links a geographic information system network to the World Wide Web. This database is also accessible on CD-ROM with hard-copy print maps. The remainder of this booklet provides an overview of the data and the utility and technical documentation for each of the components that constitute this database.

COMPREHENSIVE ENVIRONMENTAL SPATIAL DATABASE

OVERVIEW

In addition to the design and installation of an Internet Map Server, a second component of the program was developed and implemented to deliver spatial data through the World Wide Web. The goal was to achieve a database that would support collection, storage, transfer, sharing, and analysis of resource data. This consists of a series of comprehensive spatial databases that are seamless and fully integrated. The coverages span the entire ecoregion as defined by Bailey (see Appendix I), covering some 44,000 square miles. An additional 50-km buffer around the perimeter has been included to accommodate broader interpretations of the ecoregion. Thus, the total area of coverage (Bailey ecoregion plus 50-km buffer) spans approximately 80,000 square miles. The explicit Federal Geographic Data Committee (FGDC) standards and well-defined parameters upon which these databases are constructed support their dynamic capacity ensuring the facile incorporation of new data.

The comprehensive spatial database that constitutes the foundation of the MDEP includes the Mojave Elevation Database with its derivative products of Shaded Relief, Slope, and Aspect. Integrated with this coverage are ancillary data sets for the Transportation Infrastructure, USGS Topographic Quadrangle Boundaries, Land Ownership Designations, and Place and Feature Names. Additional databases that are also fully integrated with the Elevation Database throughout the ecoregion include Vegetation, Bedrock Geology, Soils, Hydrology, Climate, and Mines–Prospects–Mineral Potential. Earthquake data are provided through Internet links. Remotely sensed imagery is available in three platforms and includes Landsat Thematic Mapper–Multi–Resolution Land Characteristics (TM–MRLC), Landsat Multi–Spectral Scanner–North American Land Characterization (NALC), and NOAA–Advanced Very High Resolution Radiometer (AVHRR) Composites.

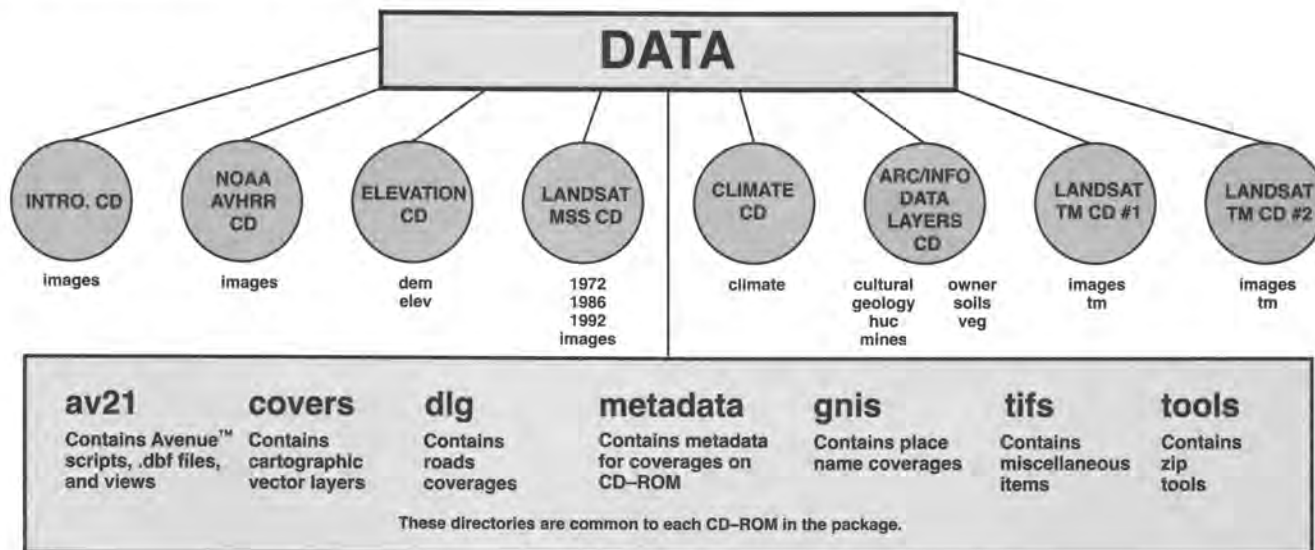
DATABASE ACCESS

The spatial database compiled for the Mojave Desert Ecosystem Program can be accessed in two ways. The first is through the World Wide Web by linking to the Mojave Desert Clearinghouse located at Ft. Irwin, California. The URL address is <http://mojave.army.mil>. This link provides access to the project description, links to the database, and an interactive mapper for users to generate maps of selected areas of the desert.

The second data access method is through the CD–ROMs located in this package. The database located on the CD–ROMs is formatted in two ways. The data directly accessible to users is predominantly a reduced resolution version of the much larger database. These reduced databases are directly accessible using the node-locked version of ArcView® Version 2.1 on the CD. The resolution reduction was done for space concerns and the speed at which these data display on the screen. However, the data in its full resolution also resides on the CD–ROM in compressed form. These compressed data are available if the user copies the file from the CD–ROM onto a hard disk with sufficient space and decompresses it using the widely available PKZIP or WINZIP programs. For some of the larger databases, approximately one gigabyte of storage should be available to decompress the file(s).

Instructions for mounting the CDs are located on the trifold package.

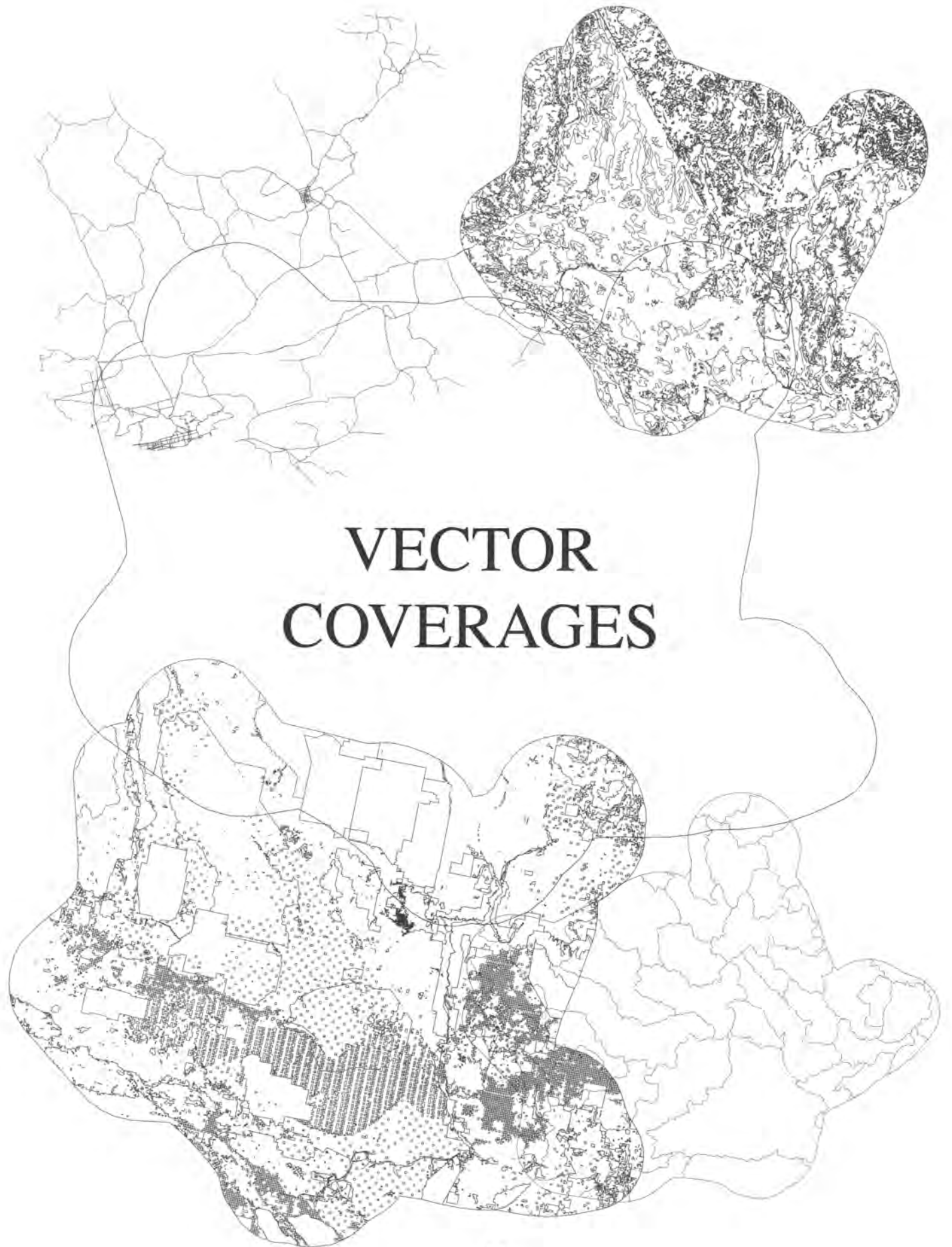
DATABASE STRUCTURE



CD-ROM Name	Description
Introductory	Introduction CD containing a subset of all data layers
ARC/INFO Data Layers	Contains full-resolution ARC/INFO® coverages
Climate	Daily normal minimum temperatures, maximum temperatures, precipitation, and potential evapotranspiration over a thirty-year period
NOAA-AVHRR	Ten-day composites covering five years of NOAA-AVHRR satellite data
Landsat MSS	Landsat MSS composites for 1972, 1986, and 1992.
Landsat TM-1	Disk 1 of 2 containing bands 1, 2, and 3 of a Landsat TM mosaic
Landsat TM-2	Disk 2 of 2 containing bands 4, 5, and 6 of a Landsat TM mosaic
Elevation	Digital elevation data consisting of elevation in meters, slope, aspect, and a shaded relief.

The following directories are common to all the accompanying CD-ROMs. A short file inventory follows each directory name.

- tools – Decompression utilities
- tifs – Images used with ArcView Version 2.1 for banners and other logos
- dlg – Contains general transportation networks
- gnis – Geographic name information system data
- covers – Basic cartographic coverages
- av21 – ArcView Version 2.1 views and supporting data
- metadata – Metadata associated with the spatial databases



VECTOR COVERAGES

VECTOR COVERAGES

BACKGROUND INFORMATION

BOUNDARIES

The Mojave Desert Ecoregion boundary was extracted from Robert G. Bailey's Ecoregions of the United States map produced at a scale of 1:7,000,000. Since Bailey's map was produced at a relatively coarse scale, the mapped area was buffered by 50 km to ensure that the entire ecoregion was included. All databases were compiled to this boundary except for some notable exceptions.

GEOLOGY

Provided by the USGS, this database is intended to provide information on bedrock materials for applications to ecosystem studies of a wide variety. The spatial reference for this database has been standardized to UTM zone 11, GRS1980 spheroid, and NAD83 datum in meters.

HYDROLOGY

USU mosaicked the hydrology data layer into an ecoregionwide coverage from the USGS 1:100,000-scale digital line graphs (DLGs). The hydrological units coverage was extracted from the USGS 1:2,000,000 Hydrologic Unit Coverage of the United States. The spatial reference for this database has been standardized to UTM zone 11, GRS1980 spheroid, and NAD83 datum in meters.

MINES-PROSPECTS-MINERAL POTENTIAL

This data set contains points converted from the Commodity Resource Information Board (CRIB) tabular database. The CRIB data has been developed over the years by many different agencies and is now maintained cooperatively by Utah Geological Survey (UGS), BLM, and USGS. The spatial reference for this database has been standardized to UTM zone 11, NAD83 datum, GRS1980 spheroid in meters.

NAMES (Place and Feature Names)

The Geographic Name Information System (GNIS), produced by the USGS, has been subset to the Mojave Ecoregion and provides a means to spatially search for mapped features and to generate maps with the standard USGS nomenclature for feature names. This database consists of feature names as they appear on the standard USGS 1:24,000-scale map sheets. The coordinate location is the location of the word or phrase on the map and not necessarily the exact location of the feature itself. This database provides a means to spatially search for mapped features and to generate maps with the standard USGS nomenclature for feature names. Within the MDEP study area there are over 11,600 feature names. Each feature name has been imported into ARC/INFO. The spatial reference for this database has been standardized to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters.

A database for Populated Place Names has also been prepared. The source for this database is the U.S. Bureau of the Census, but it originates from the GNIS database presented above. However, this database shows only populated places and is therefore a subset of the GNIS. There are 986 entries in this database. The spatial reference for this database has been standardized to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters.

LAND OWNERSHIP

The land ownership data layer distinguishes lands currently under public administration by each responsible agency or bureau from privately owned lands. USU merged land ownership data provided by the California office of the BLM, Nevada Gap Analysis, Utah Gap Analysis, and the Arizona Land Resource Information System (ALRIS) to generate this coverage. The source attribute information has been generalized into a common land ownership classification. Linkages have been built between this data layer and the original databases for consistency. Individual coverages for the Department of Defense and national parks were prepared from this database. Attributes were added to name the individual military installations and national parks, respectively.

SEISMIC ACTIVITY

Current and archival earthquake data are accessed through the following Internet links:

General information about earthquakes:

<http://www-socal.wr.usgs.gov/scsn.html>

Fort Irwin geologic hazards:

<http://wrgis.wr.usgs.gov:80/docs/geologic/Fort.Irwin.ES.web/FIhazards.html>

Eastern California:

<http://quake.usgs.gov/QUAKES/CURRENT/mammoth.html>

Southern California:

<http://quake.wr.usgs.gov/>

<http://quake.usgs.gov/cgi-bin/quake/scec.gps.caltech.edu/bd+usa/river+I>

<http://www-socal.wr.usgs.gov/>

Nevada and California:

<http://quake.usgs.gov/recenteqs>

Utah:

<http://www.seis.utah.edu/HTML/UtahSeismicityMaps.html>

SOILS

USGS Earth Resources Observation Systems (EROS) Data Center has provided interpretations of soil characteristics using NRCS State Soil Geographic Database (STATSGO) soils data. USU extracted approximately forty-three soil parameters from the original STATSGO database and presented them as thematic layers. They include bulk density, soil depth to water table, soil texture percentages, rock percentages, erodibility, permeability, pH, organic matter content, calcium carbonate content, gypsum content, sodium absorption ratio, and salinity.

TRANSPORTATION INFRASTRUCTURE

USU compiled from the USGS 1:100,000-scale digital line graphs the transportation network consisting of all mapped roads, railway lines, and airports. This database resides in two individual

ecoregionwide coverages. The spatial reference for all transportation layers has been standardized to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters.

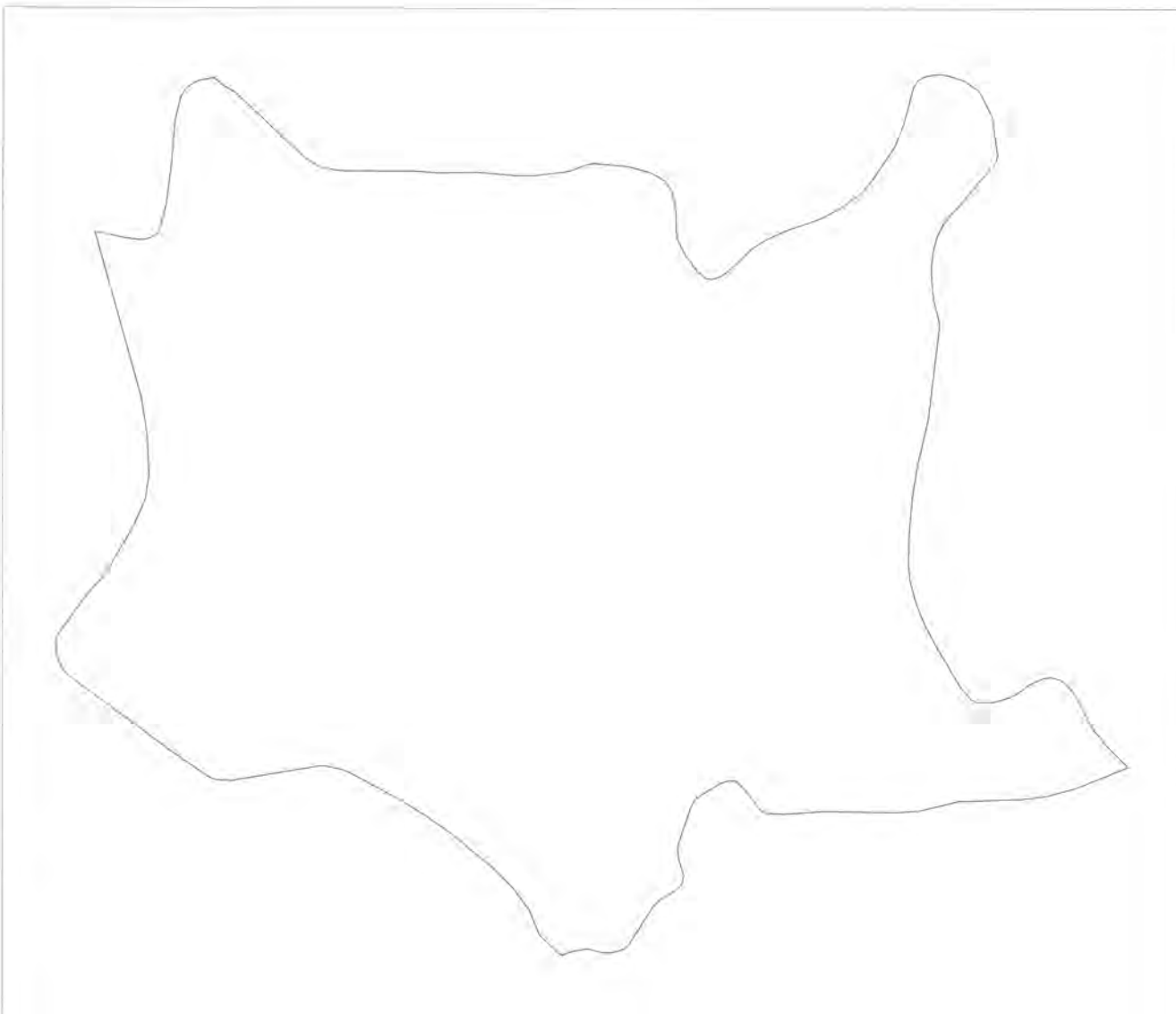
TOPOGRAPHIC QUADRANGLE BOUNDARIES

All USGS 1:24,000-, 1:100,000-, and 1:250,000-scale quadrangle boundaries have been included and act as a selection database similar to the GNIS database and as neatlines for map production. The spatial reference for all quadrangle layers has been standardized to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters.

VEGETATION

The vegetation database for the Mojave ecoregion required the unification of data derived from four separate state projects. Each state, Arizona, California, Nevada, and Utah, independently classified and mapped the vegetation within their respective boundaries under the USGS Biological Resources Division's National GAP Analysis Program. Each state had its own coding system, which presented a problem when joining the four databases into a single unit. Therefore, the vegetation for each state was recoded by USU according to vegetation descriptions in the National Vegetation Classification System (NVCS). The various codes from the four states were placed under a new standard code named "formation." A table with vegetation descriptions from the NVCS is provided on the accompanying CD-ROM.

MOJAVE DESERT ECOREGION BOUNDARY



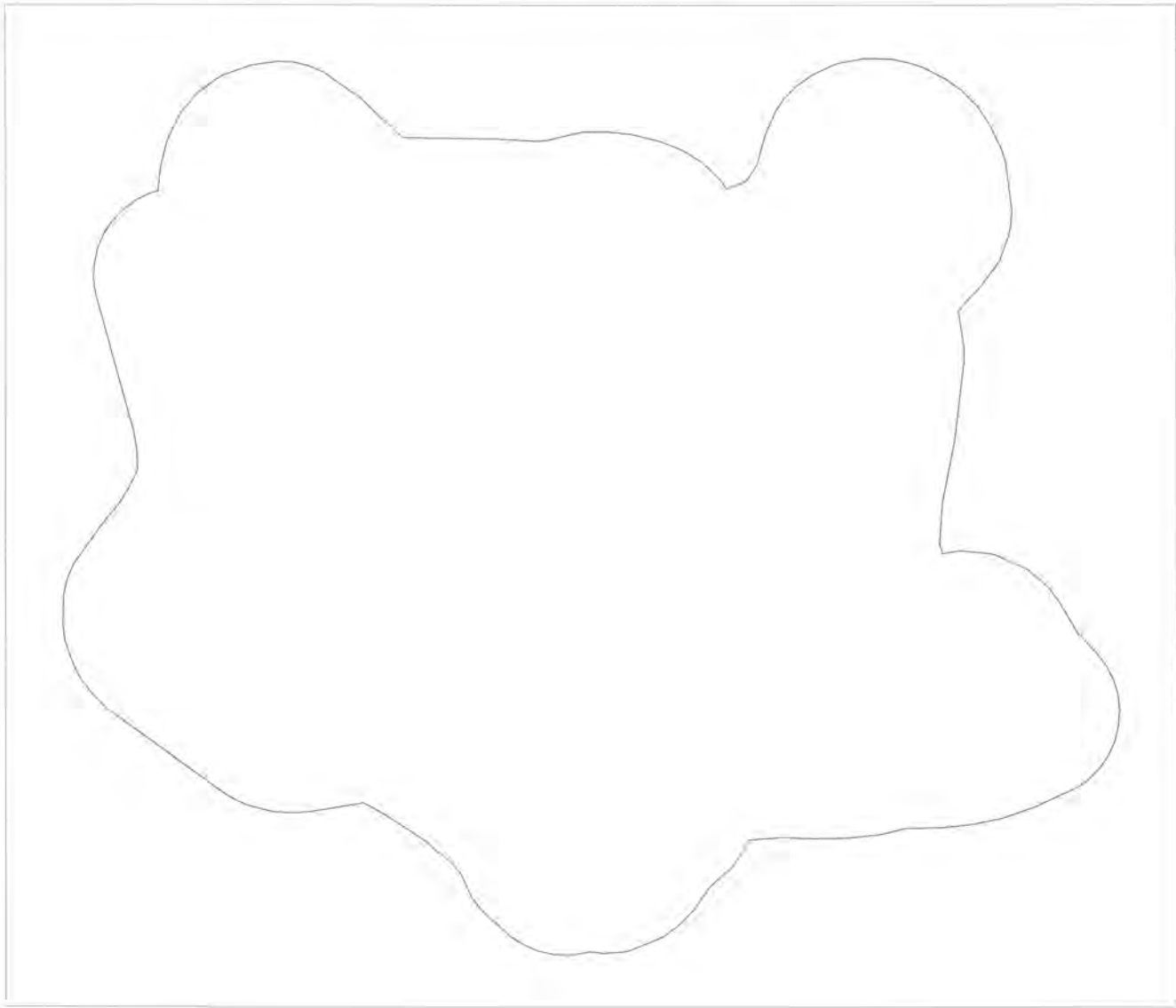
Abstract: This data set is a subset of a nationwide ecoregion map developed by Robert Bailey of the U.S. Forest Service. The delineation of the Mojave Ecoregion was made at a scale of 1:7,000,000. Therefore, the exact description of the ecoregion boundary is limited to that scale. This boundary coverage can be found on all the accompanying CD-ROMs in the covers directory under the file name of ba322a.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993).

Source: Robert G. Bailey, U.S. Forest Service.

Data Format: ARC/INFO polygons.

MOJAVE DESERT ECOREGION BUFFERED BOUNDARY



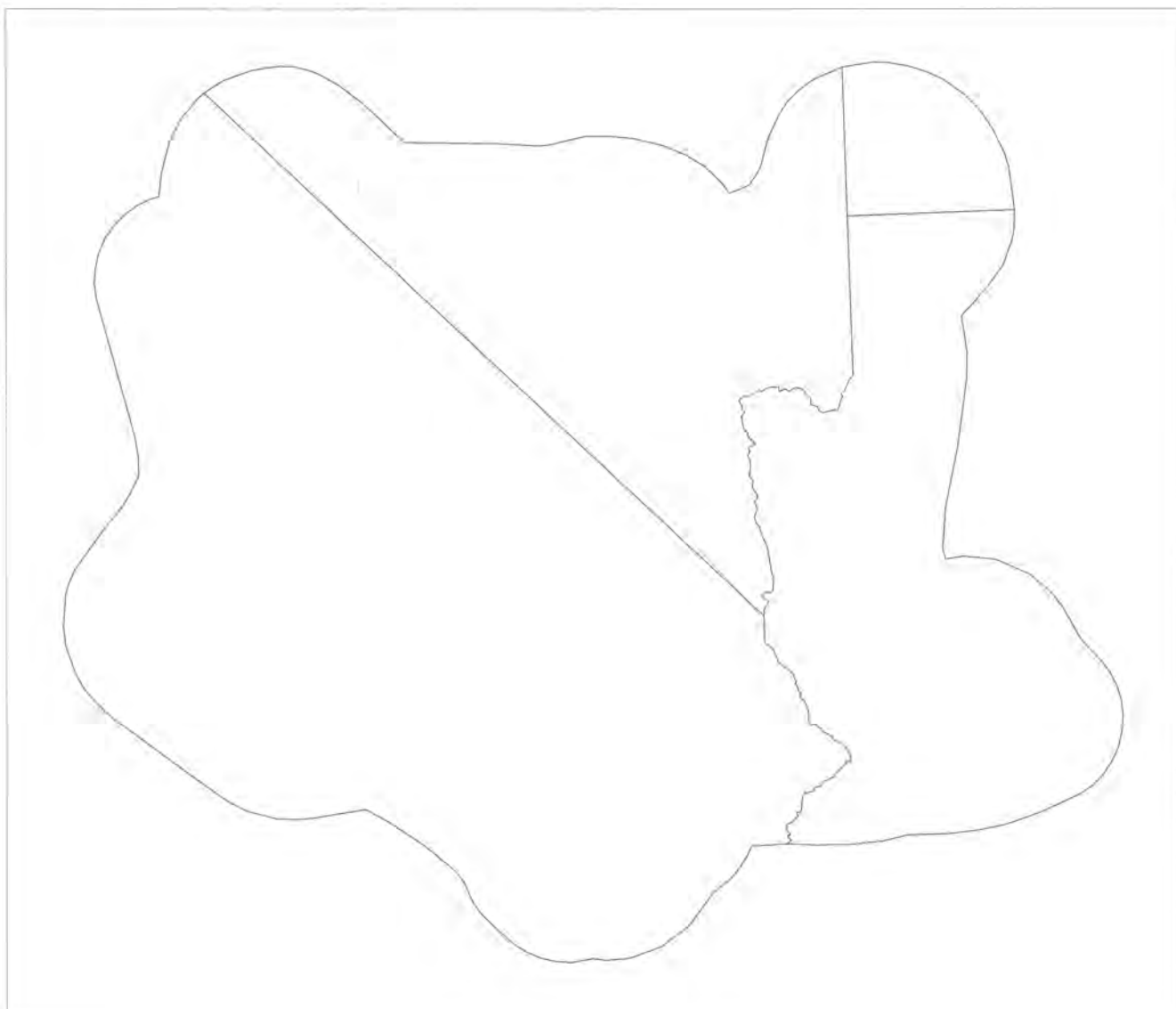
Abstract: This data set is a subset of a nationwide ecoregion map developed by Robert Bailey of the U.S. Forest Service. The delineation of the Mojave Ecoregion was made at a scale of 1:7,000,000. Therefore, the exact description of the ecoregion boundary is limited to that scale. A 50-km buffer has been added to this data set. This boundary coverage can be found on all the accompanying CD-ROMs in the covers directory under the file name of ba322abf.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: Robert G. Bailey, U.S. Forest Service.

Data Format: ARC/INFO polygons.

STATE BOUNDARIES



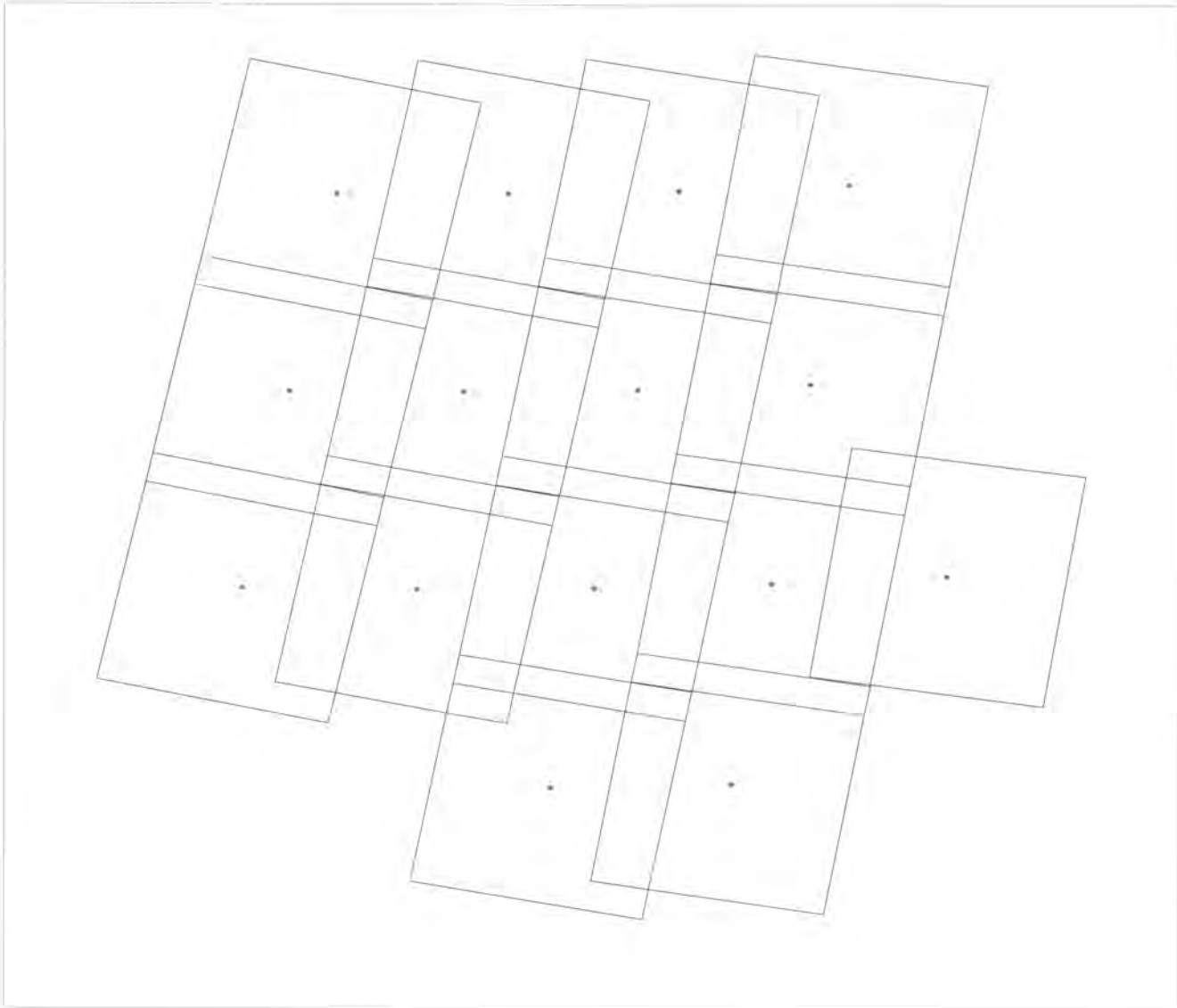
Abstract: This coverage identifies the state boundaries within the Mojave Ecoregion. The state boundary layer was generated from a 1:100,000-scale base layer provided by USGS. It is in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on all the accompanying CD-ROMs in the covers directory under the file name of statebnd.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: U.S. Geological Survey.

Data Format: ARC/INFO polygons.

TM SCENE BOUNDARIES AND CENTER POINTS



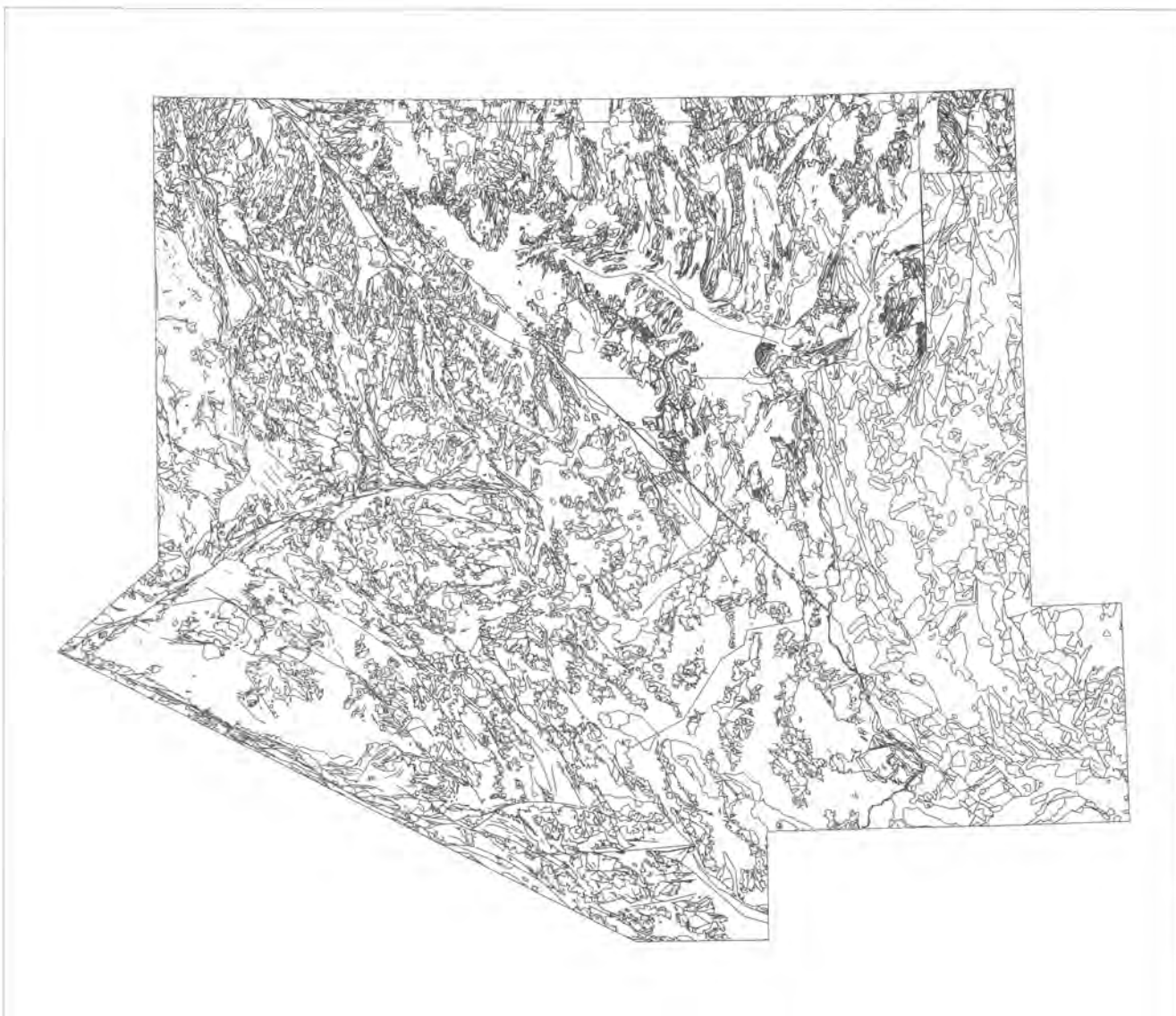
Abstract: This data set provides information on the Landsat Thematic Mapper Scene boundary lines and center points. It is in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters at a scale of 1:2,000,000. These data can be found on all accompanying CD-ROMs in the covers directory under the file names of tmbnd and tmpt, respectively.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer with additional areas.

Source: ArcUSA™ CD-ROM (1:2,000,000 scale).

Data Format: ARC/INFO points, lines.

GEOLOGIC DATA



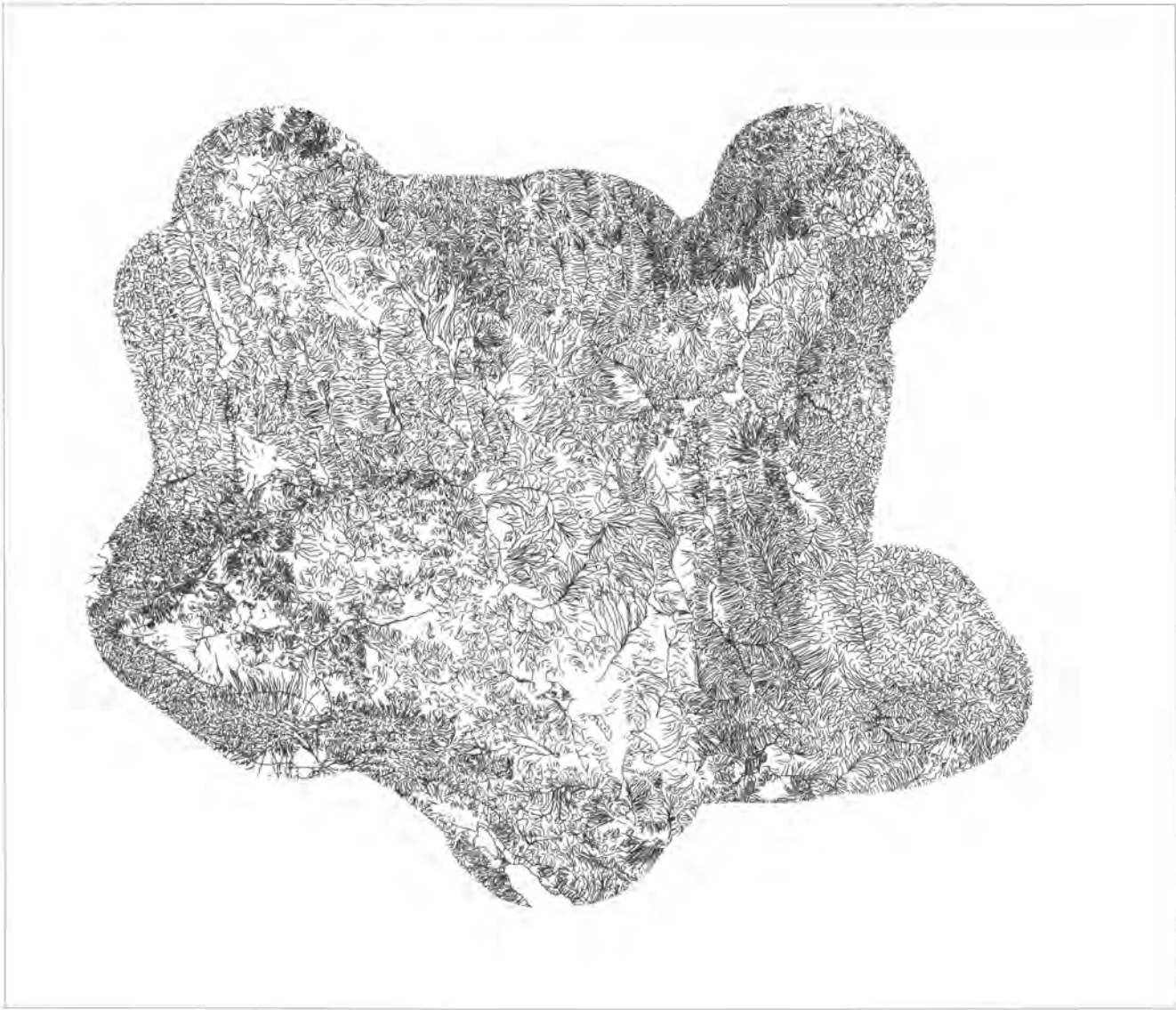
Abstract: This data set is intended to provide information on fault zones, bedrock, and/or surficial materials for applications on a wide variety of ecosystem studies. It was compiled at a scale of 1:500,000 with state geological maps from Arizona, California, Nevada, and Utah. It is in ARC/INFO format and is projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on the Introductory and ARC/INFO Data Layers CD-ROMs in the geology directory under the file name of mojgeol.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) with additional areas.

Source: U.S. Geological Survey.

Data Format: ARC/INFO polygons, lines.

HYDROLOGIC DIGITAL LINE GRAPH (DLG) MOSAIC



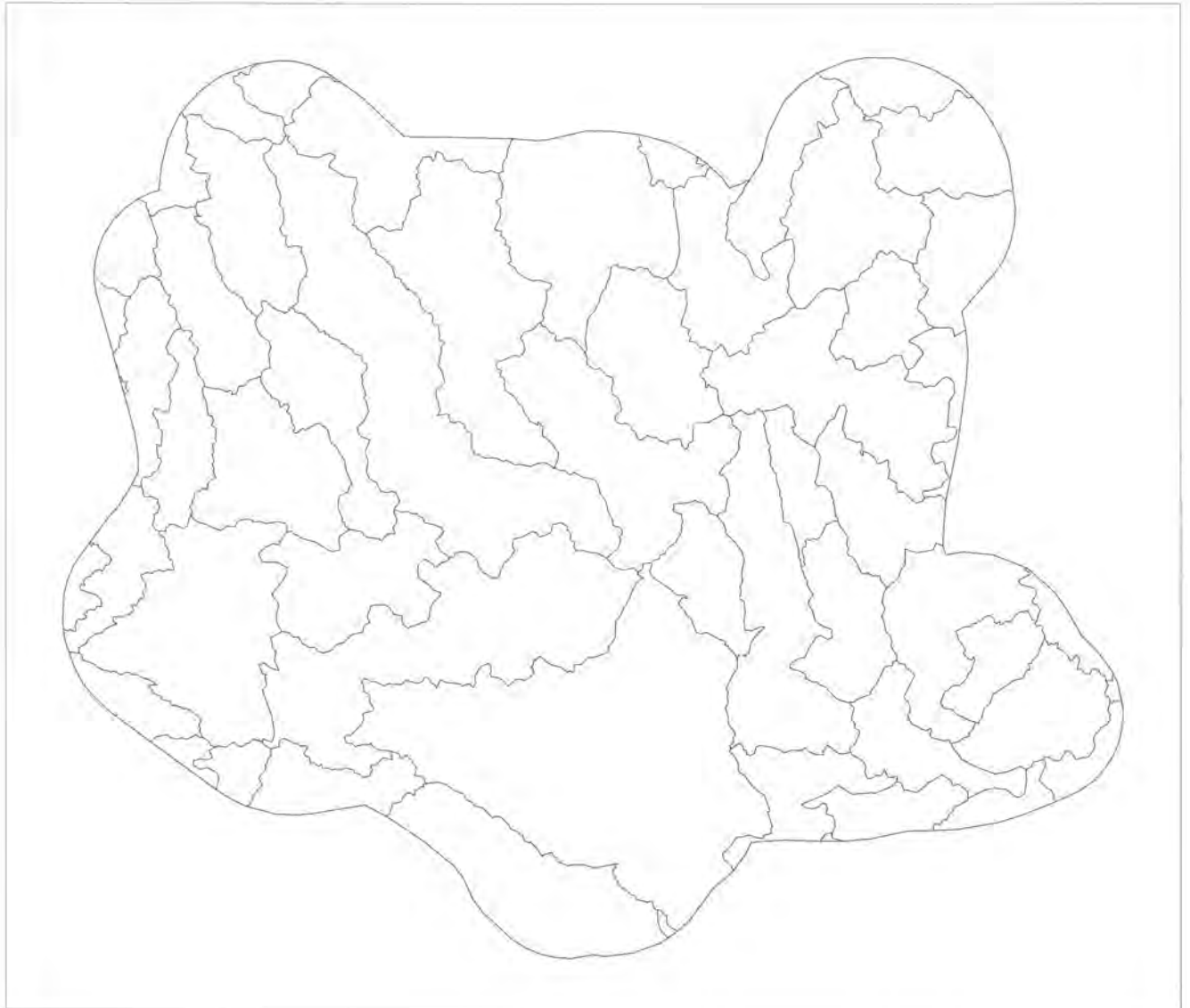
Abstract: This data set was prepared from the 1:100,000-scale materials associated with the USGS Topographic Map Series. They have been compiled into a mosaic from the original USGS digital line graphs by Utah State University. The data are in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on the ARC/INFO Data Layers CD-ROM in the dlh/hyf directory under the file name of mojhyf.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: U.S. Geological Survey.

Data Format: ARC/INFO lines.

WATERSHED BOUNDARIES



Abstract: This is a subset of the national 1:2,000,000-scale hydrologic unit map of the conterminous United States. Its purpose is to delimit areas of unique hydrologic character over the Mojave Ecoregion. They are in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on the Introductory and ARC/INFO Data Layers CD-ROMs in the huc directory under the file name of mojhuc.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: U.S. Geological Survey.

Data Format: ARC/INFO polygons.

MINES, PROSPECTS, AND MINERAL POTENTIAL

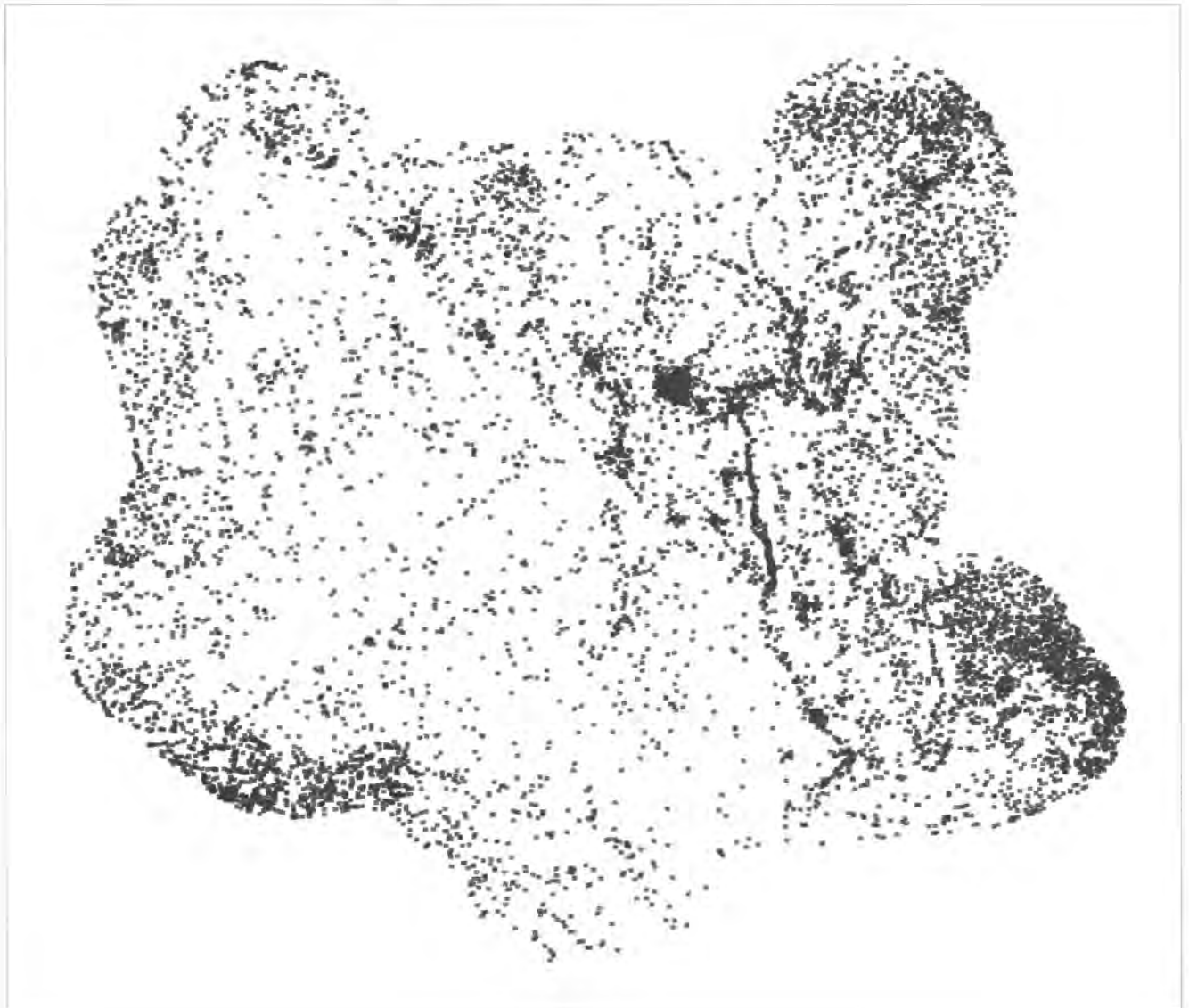


Abstract: This data set contains points converted from the Commodity Resource Information Board (CRIB) tabular database. The CRIB data has been developed over the years by many different agencies and is now maintained cooperatively by the UGS, BLM, and USGS. It is in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on the ARC/INFO Data Layers CD-ROM in the mines directory under the file name of mojmines.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993).

Source: CRIB, U.S. Geological Survey.

Data Format: ARC/INFO points.



Abstract: This data set was gathered from USGS Geographic Name Information System (GNIS) databases for California, Nevada, Arizona, and Utah. Data points represent the location where the feature is labeled on a 1:24,000-scale map. It is in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on all the accompanying CD-ROMs in the gnis directory under the file name of mojgnis.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: U.S. Geological Survey, GNIS.

Data Format: ARC/INFO points.

POPULATED PLACES (cities and towns)



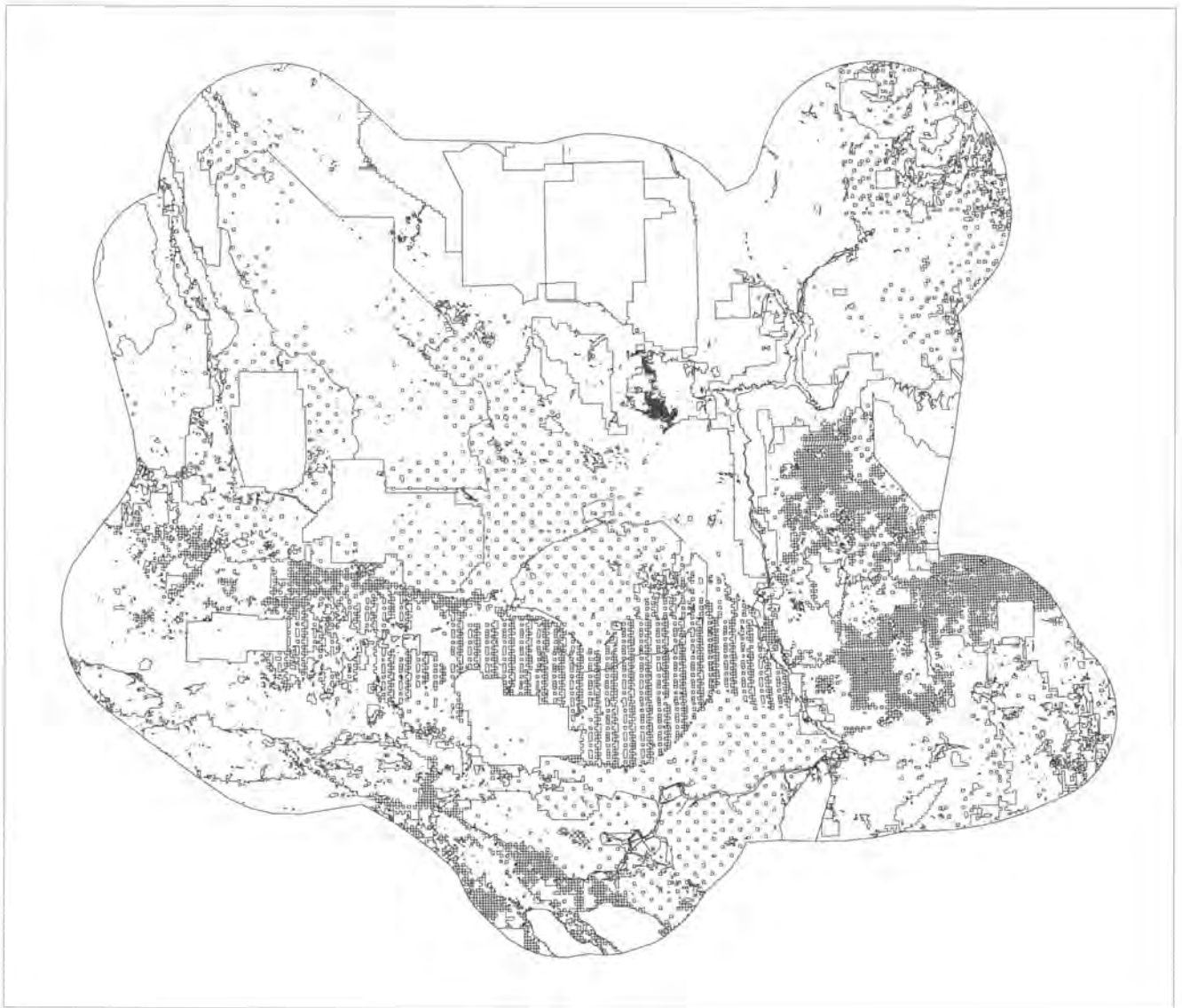
Abstract: This database was generated from the USGS GNIS Populated Place database. Data points represent the location where the feature is labeled on a 1:24,000-scale map. It is in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on all the accompanying CD-ROMs in the gnis directory under the file name of mojpoppl.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: U.S. Geological Survey, GNIS.

Data Format: ARC/INFO points.

LAND OWNERSHIP MOSAIC



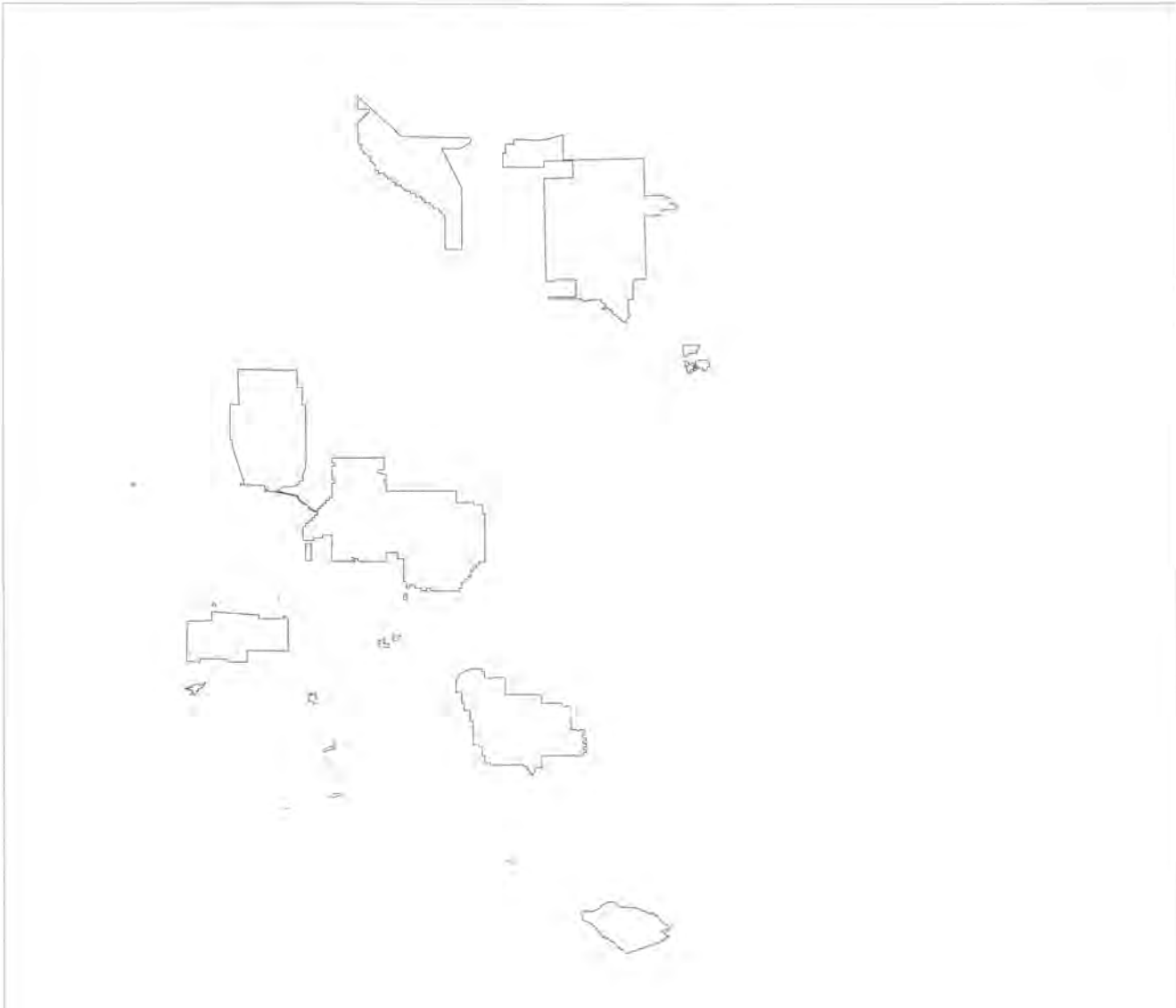
Abstract: This data set is a modification of BLM Land Ownership data at a scale of 1:100,000, which does not include state boundaries or other owned lands within a military reservation. It consists of the following land ownership categories: BLM, Bureau of Reclamation, Department of Defense, Department of Energy, National Forest Service, National Park Service, Fish and Wildlife Service, Native American Reservation, State and County agencies, and private. It is in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on the Introductory and ARC/INFO Data Layers CD-ROMs in the owner directory under the file name of moowner.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: California BLM office, Utah and Nevada GAP Analysis Programs, Arizona State GIS Office.

Data Format: ARC/INFO polygons.

DEPARTMENT OF DEFENSE OWNERSHIP



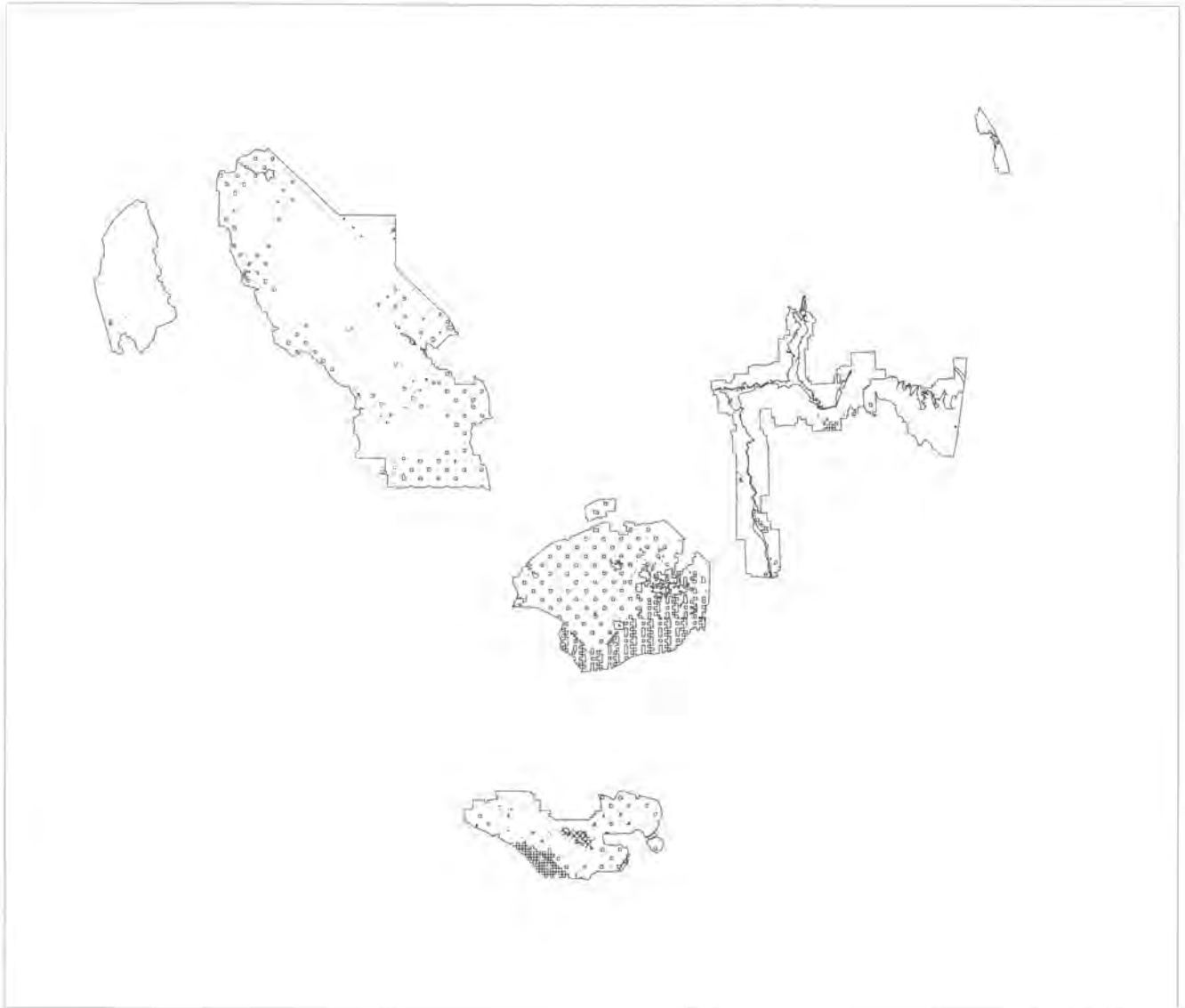
Abstract: This data set is a subset of the land ownership mosaic showing only Department of Defense withdrawn land at a scale of 1:100,000. It is in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on all the accompanying CD-ROMs in the covers directory under the file name of dodown.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: California BLM office, Utah and Nevada GAP analysis, Arizona State GIS Office.

Data Format: ARC/INFO polygons.

NATIONAL PARKS, PRESERVES, AND RECREATION AREAS



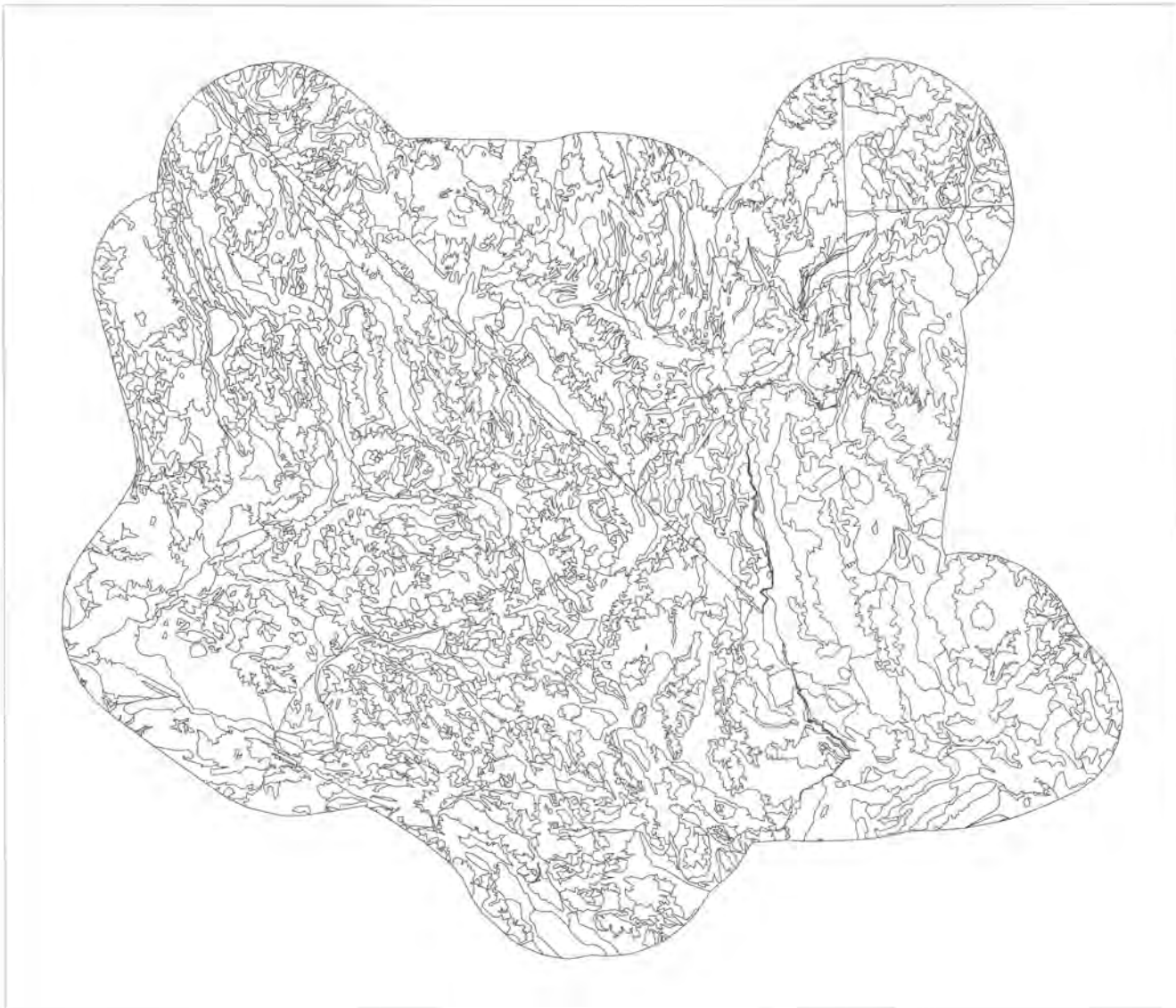
Abstract: This coverage was reselected from the land ownership mosaic to include only those lands identified as parks, preserves, and recreation areas at a scale of 1:100,000. It is in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on the ARC/INFO Data Layers CD-ROM in the owner directory under the file name of fedparks.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: California BLM office, Utah and Nevada GAP analysis, Arizona State GIS Office.

Data Format: ARC/INFO polygons.

SOILS DATA



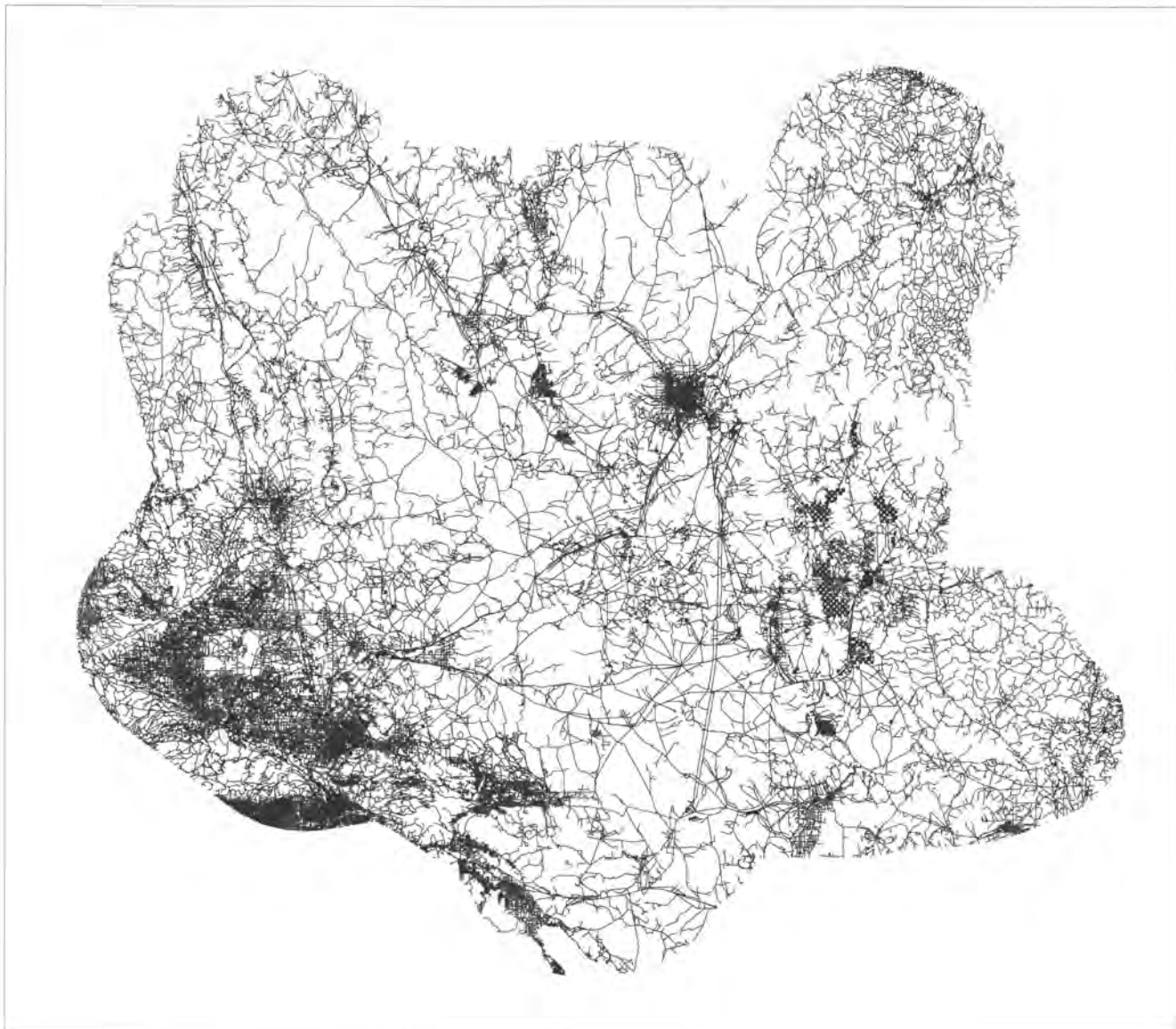
Abstract: This data set represents a compilation and interpretation of the Natural Resources Conservation Service (NRCS) STATSGO soils database from California, Nevada, Arizona, and Utah. All four states were appended; then the area representing the Mojave Desert Ecosystem with a 50-km buffer was extracted. The database consists of five coverages at a scale of 1:250,000, each containing attributes interpreted by the USGS from the original database. It is in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on the Introductory and ARC/INFO Data Layers CD-ROMs in the soils directory under the file names of soils1, soils2, soils3, soils4, and soils5.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: Natural Resources Conservation Service.

Data Format: ARC/INFO polygons.

TRANSPORTATION DIGITAL LINE GRAPH (DLG) MOSAIC



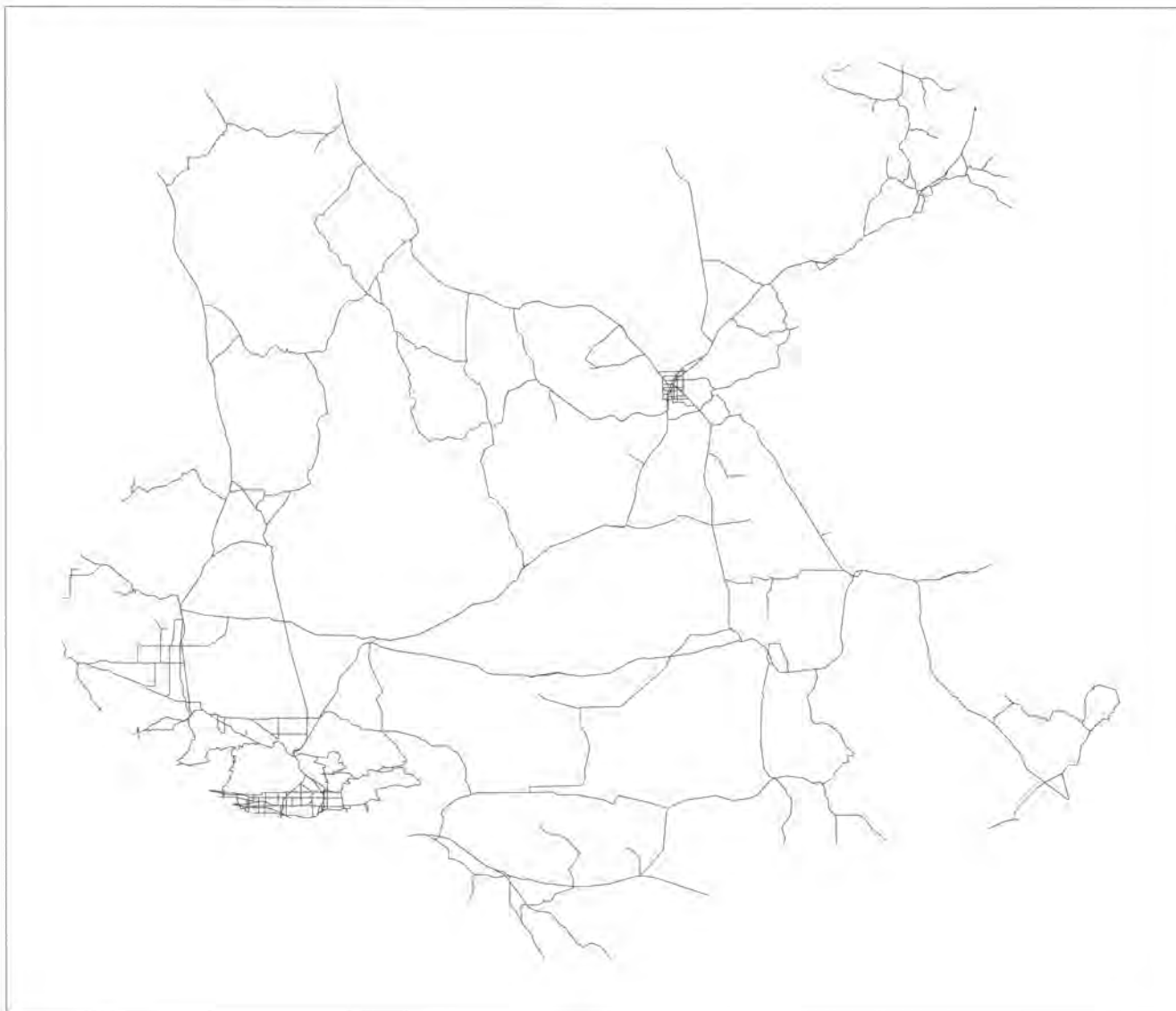
Abstract: This data set was prepared from the 1:100,000-scale materials associated with the USGS Digital Line Graph Series. The original data sets have been mosaicked from the original USGS digital line graphs by Utah State University. They are in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on the ARC/INFO Data Layers CD-ROM in the `dlg/rdf/mosaic` directory under the file name of `mojrdf`.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: U.S. Geological Survey.

Data Format: ARC/INFO lines.

MAJOR ROADS DIGITAL LINE GRAPH (DLG) MOSAIC



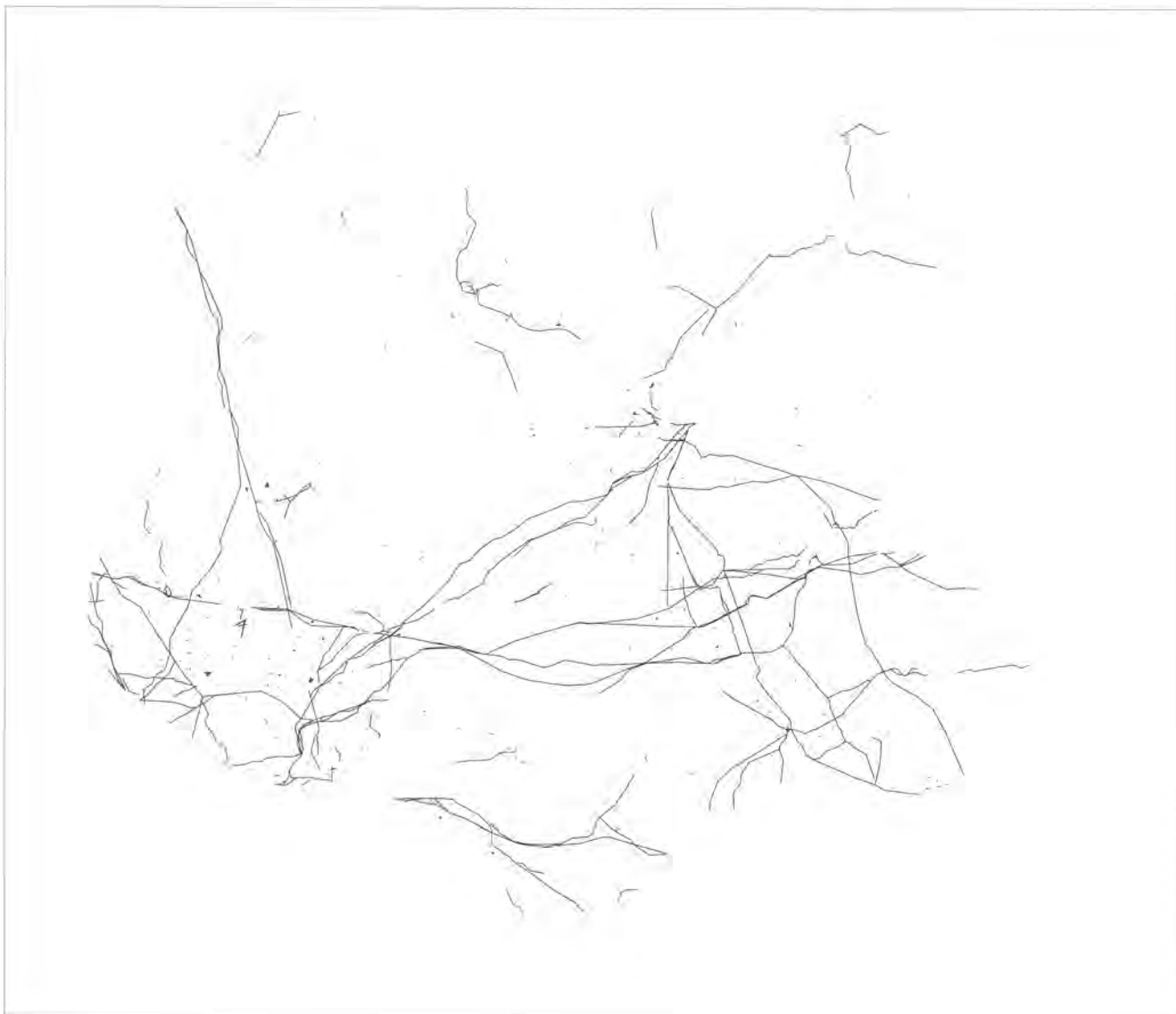
Abstract: These data were prepared from the 1:100,000-scale materials associated with the USGS Digital Line Graph Series. The original data sets have been mosaicked from the original USGS digital line graphs by Utah State University. All roads except for interstates and other main highways have been eliminated. They are in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on all the accompanying CD-ROMs in the dlgrdf/mosaic directory under the file name of mainrdf.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: U.S. Geological Survey.

Data Format: ARC/INFO lines.

MISCELLANEOUS INFRASTRUCTURE DIGITAL LINE GRAPH (DLG) MOSAIC



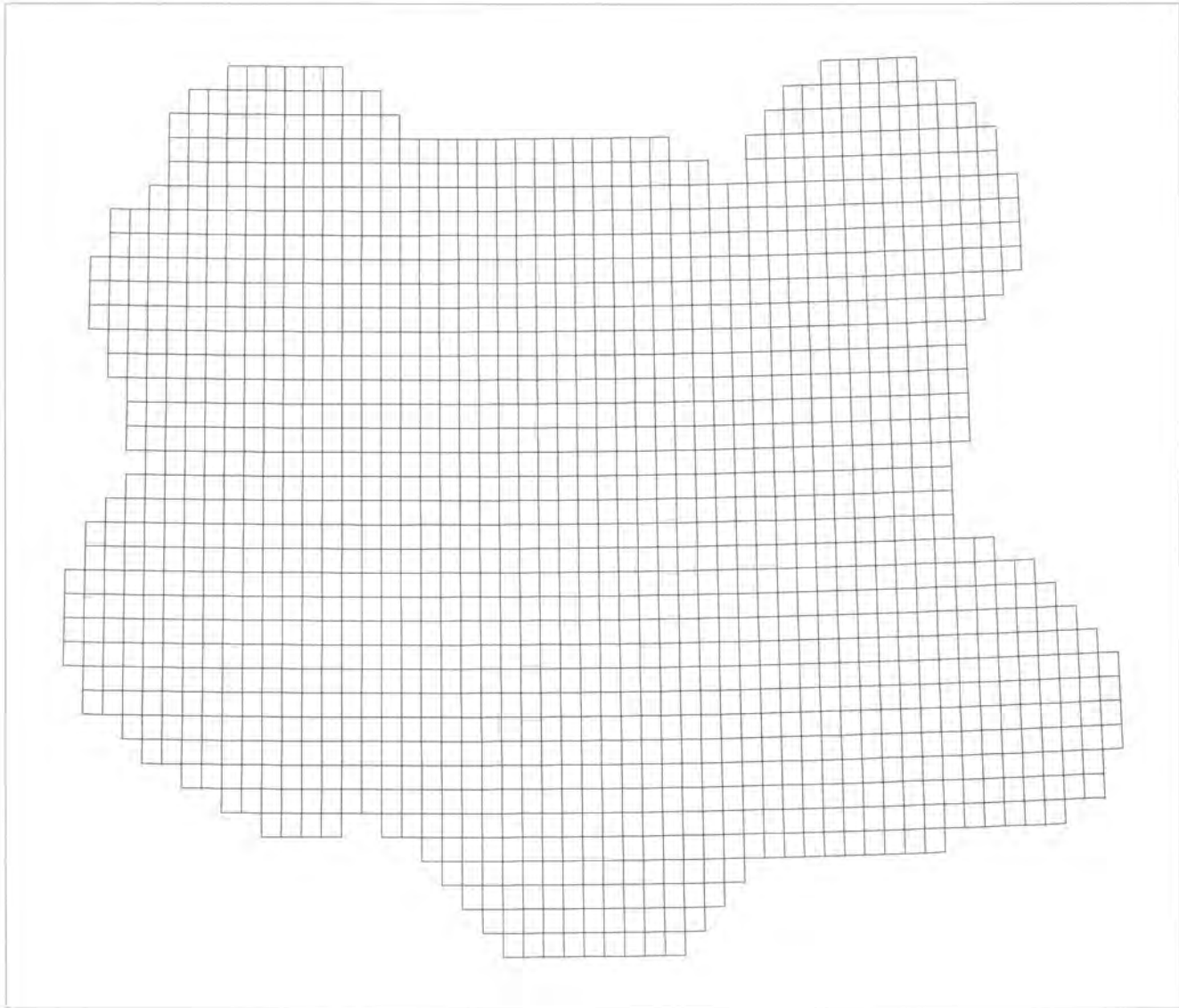
Abstract: This data set was prepared from the 1:100,000-scale materials associated with the USGS Digital Line Graph Series. The original data sets have been mosaicked from the original USGS digital line graphs by Utah State University. Types of items included in this coverage are railroad lines, transmission lines, pipelines, telephone lines, substations, pumping stations, landing strips, aqueducts, and sewage lines. A full list is provided in the metadata. They are in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on the ARC/INFO Data Layers CD-ROM in the dlj/mtf/mosaic directory under the file name of mojmtf.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: U.S. Geological Survey.

Data Format: ARC/INFO lines.

TOPOGRAPHIC QUADRANGLE BOUNDARIES—1:24,000 SCALE



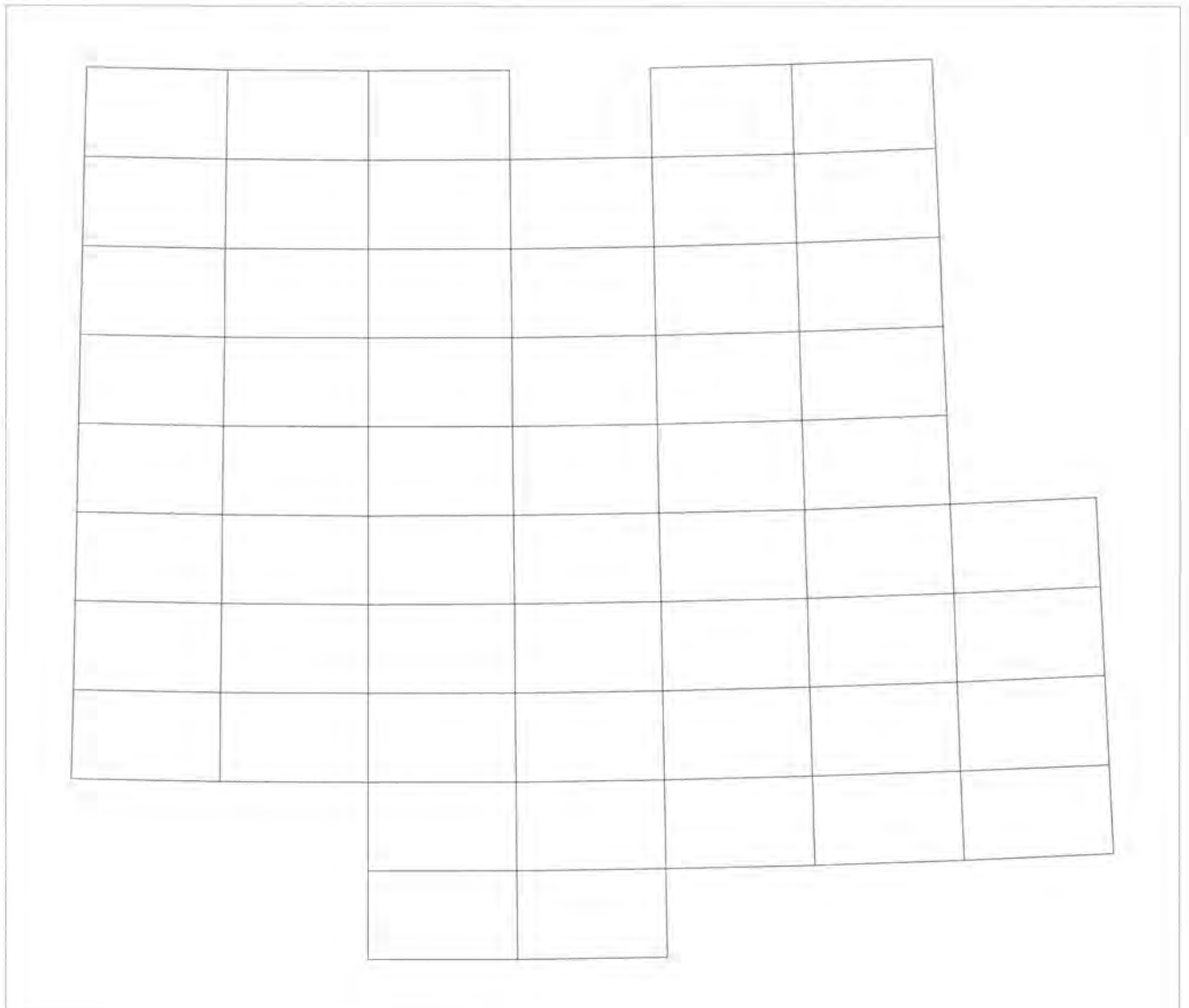
Abstract: This data set consists of 1:24,000-scale topographic quadrangle boundaries. They are in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on all the accompanying CD-ROMs in the covers directory under the file name of q24k.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer, and portion of quadrangles that fall just outside the ecoregion.

Source: U.S. Geological Survey.

Data Format: ARC/INFO polygons.

TOPOGRAPHIC QUADRANGLE BOUNDARIES—1:100,000 SCALE



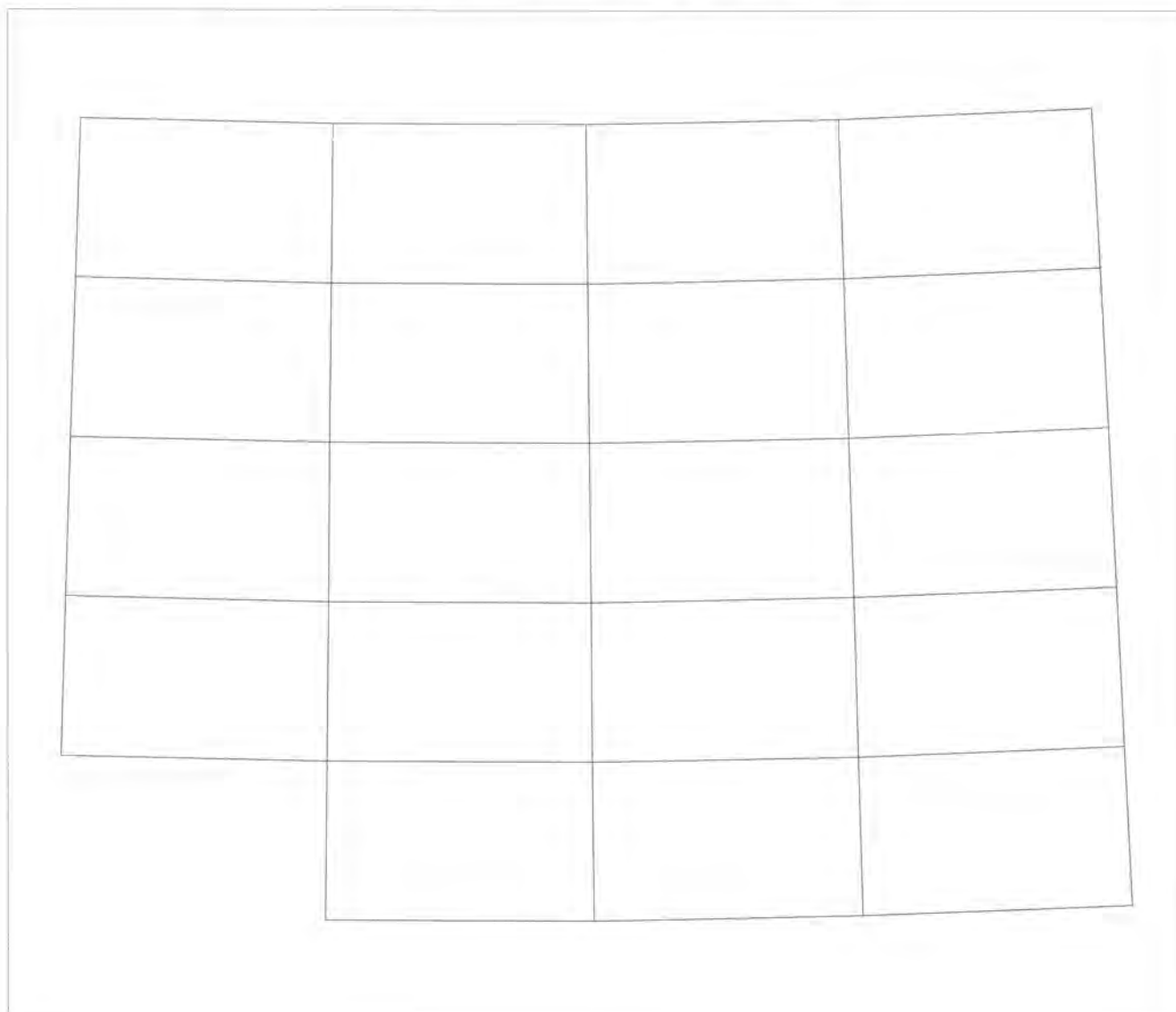
Abstract: This data set consists of 1:100,000-scale topographic quadrangle boundaries. They are in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on all the accompanying CD-ROMs in the covers directory under the file name of q100k.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer and portion of quadrangles that fall just outside the ecoregion.

Source: U.S. Geological Survey.

Data Format: ARC/INFO polygons.

TOPOGRAPHIC QUADRANGLE BOUNDARIES—1:250,000 SCALE



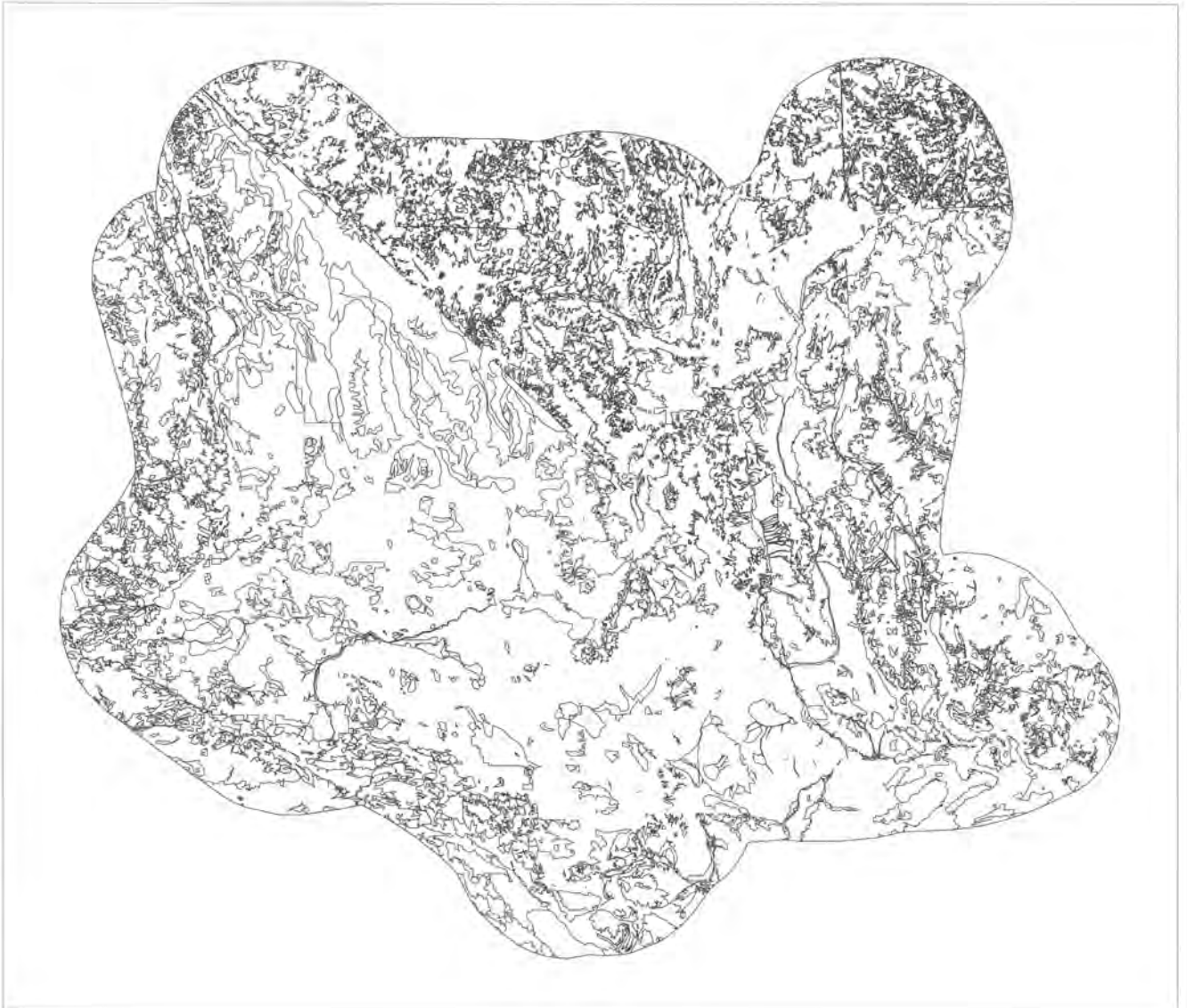
Abstract: This data set consists of 1:250,000-scale topographic quadrangle boundaries. They are in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on all the accompanying CD-ROMs in the covers directory under the file name of q250k.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer and portion of quadrangles that fall just outside the ecoregion.

Source: U. S. Geological Survey.

Data Format: ARC/INFO polygons.

VEGETATION MOSAIC (GAP)

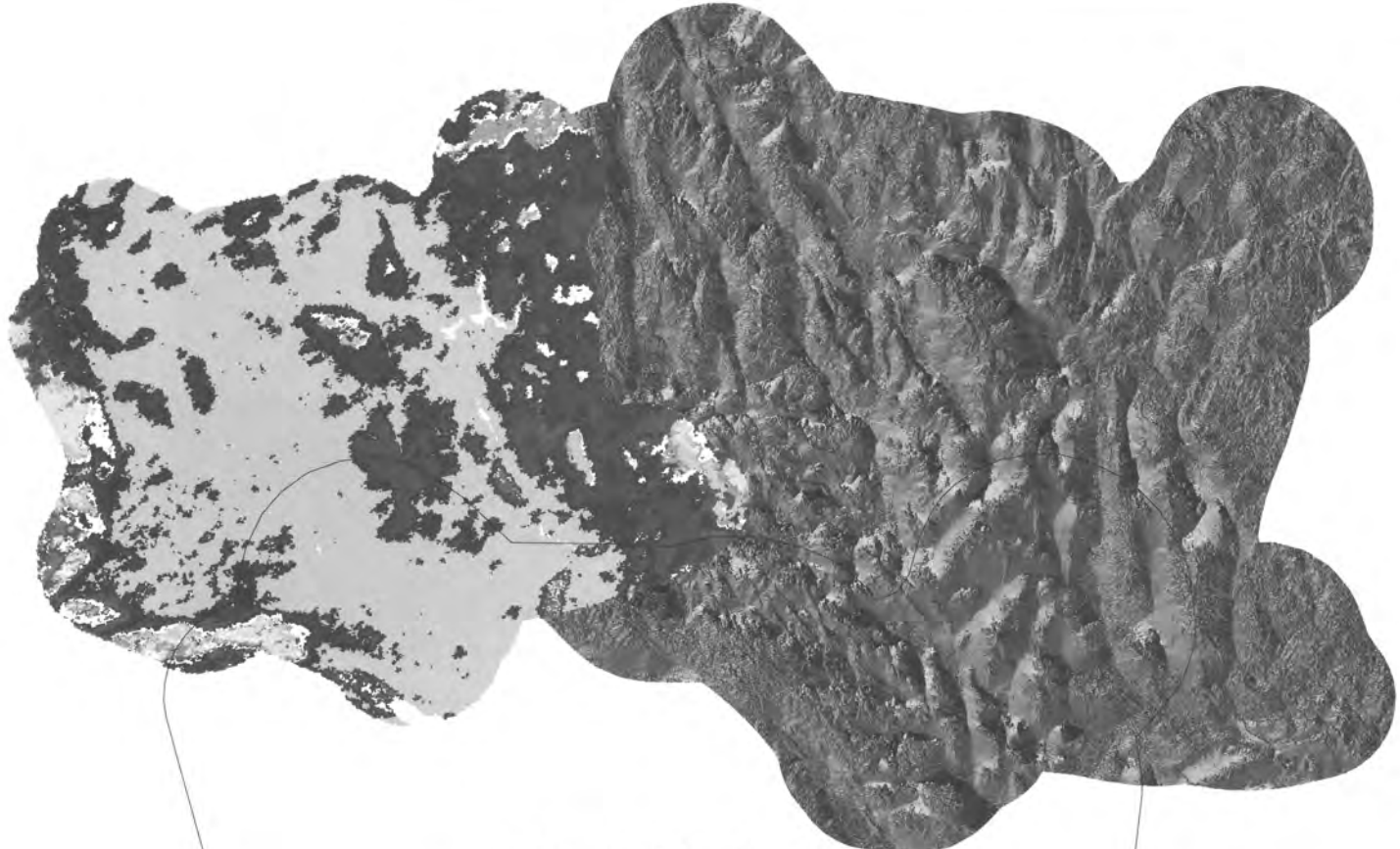


Abstract: This data set represents a compilation of the USGS Biological Resource Division's GAP Vegetation database from California, Nevada, Arizona, and Utah. Vegetation data was recoded according to vegetation descriptions in the National Vegetation Classification System at a scale of 1:250,000. All four states were appended, and the Mojave Desert Ecosystem with a 50-km buffer was extracted. It is in ARC/INFO format projected to UTM zone 11, NAD83 datum, and GRS1980 spheroid in meters. This coverage can be found on the Introductory and ARC/INFO Data Layers CD-ROMs in the veg directory under the file name of mojveg.

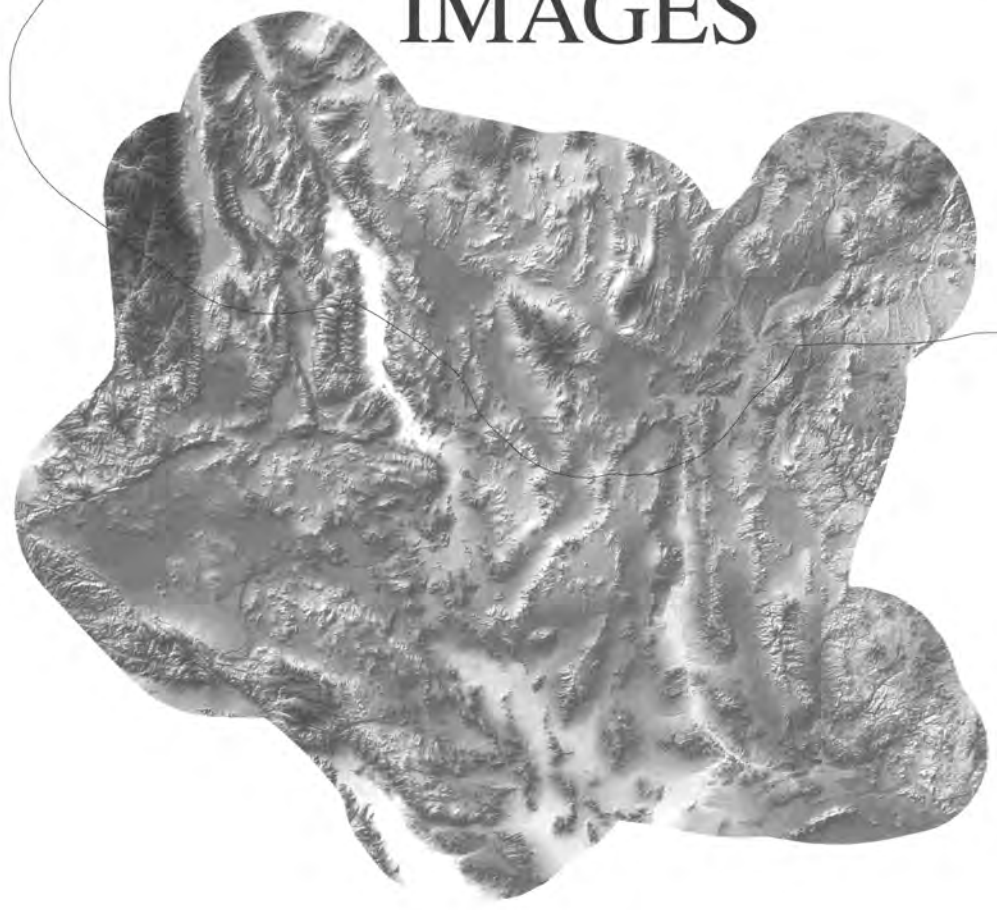
Extent: Mojave Desert Ecoregion plus 50-km buffer.

Source: USGS Biological Resource Division.

Data Format: ARC/INFO polygons.



RASTER IMAGES



RASTER IMAGES

BACKGROUND INFORMATION

REMOTELY SENSED IMAGERY

Image-based data are available from three platforms: Landsat Thematic Mapper (TM), Landsat Multispectral Scanner (MSS), and NOAA Advanced Very High Resolution Radiometer (AVHRR). These data are described in the following section. Metadata information for each image has been modified from generic USGS metadata records. Each image has associated metadata specific to that particular frame. The majority of the abstract and dialog information comes directly from USGS metadata sources.

NOAA-AVHRR TEN-DAY COMPOSITES

The MDEP database includes six years of the NOAA-AVHRR ten-day composites generated by the USGS. The biophysical data available includes individual band information, frost-free days, greenness length, greenness onset, greenness peak, and AVHRR land cover. These data are available for download through the Web and is available in the CD product. The spatial reference for all images has been standardized to UTM zone 11, GRS1980 spheroid, and NAD83 datum. Image resolution is 1.1 kilometers.

CLIMATE

The climate database was assembled at USU by the Utah Climate Center including climate factors such as daily maximum and minimum temperature, precipitation, and potential evapotranspiration. Data records were compiled from NOAA weather stations throughout the Mojave ecoregion. Climate records were also provided for various military installations within the Mojave ecoregion.

MOJAVE ELEVATION DATABASE

The Mojave Elevation Database consists of multiple layers of data. The core consists of digital elevation models (DEMs) and derivative products organized in a seamless roam-around view of a digital shaded relief model. It has been constructed from the best available DEM data currently in the National Digital Cartographic Database (NDCDB). The terrain elevation data are in a geographic projection with a one-arc second cell spacing (approximately 25 meters) and the elevation units are in meters. The database consists primarily of 30-meter 7.5-minute DEMs. Where this level of resolution is unavailable, 1:100k DEMs or 1:250k three-arc second DEMs are substituted. The spatial reference for the databases has been standardized to UTM zone 11, NAD83 datum, and GRS 1980 spheroid in meters.

LANDSAT MSS-NALC

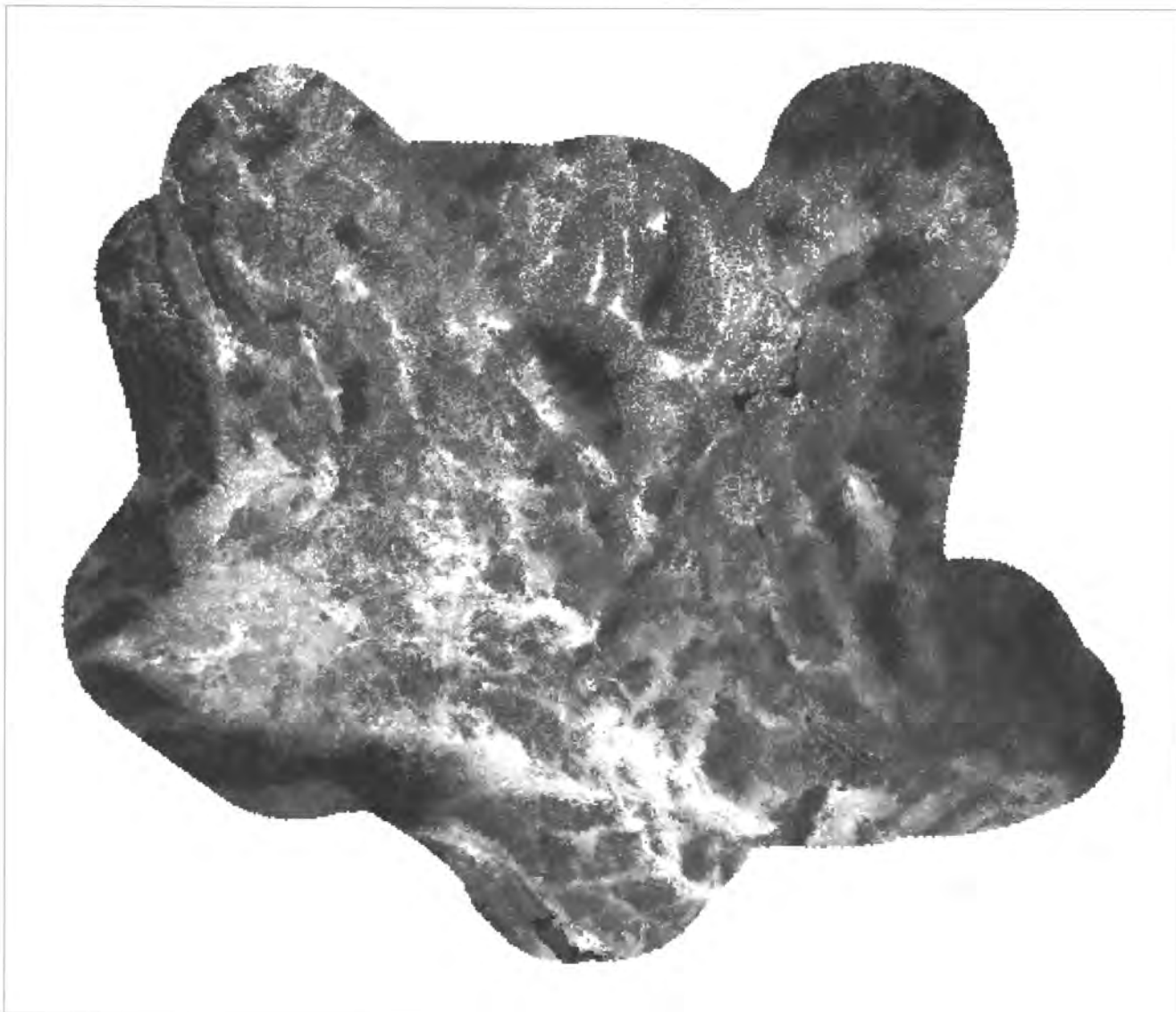
The North American Land Characterization (NALC) data sets consist of standardized remotely sensed data; that along with standardized analytical methods can support the investigation of changes in land cover over time and the locational inventory of terrestrial carbon stocks and carbon cycling dynamics. Images for the Mojave Ecoregion are coregistered Landsat MSS triplicates covering a twenty-year time span. Each image covering the Bailey defined ecoregion plus the 50-km buffer is available in original format and in radiometrically standardized format for use in change detection studies. USU generated radiometrically standardized mosaics of the ecoregion from these data. The spatial reference

for all images has been standardized to UTM zone 11, GRS1980 spheroid, and NAD83 datum. Image resolution is 60 meters.

LANDSAT TM-MRLC

The Multi-Resolution Land Characteristics (MRLC) images provide land cover data from local to regional scales that is based upon Landsat TM data. These 30-meter images serve as the basis of a system for obtaining baseline multiscale environmental characterizations as well as a mechanism for monitoring and assessing environmental change at the regional level. The Landsat TM-MRLC database consists of fifteen individual images that cover the Mojave Desert Ecoregion as defined by Bailey plus the 50-km buffer zone imposed by USU. All images are available in original format and in ERDAS IMAGINE® format that can be converted to ARC GRID® software. Another version of this database has been radiometrically corrected and standardized in preparation for possible change detection use by users. The spatial reference for all images has been standardized to UTM zone 11, GRS1980 spheroid, and NAD83 datum. Image resolution is thirty meters with all six reflective bands present.

AVHRR INDIVIDUAL BAND DATA



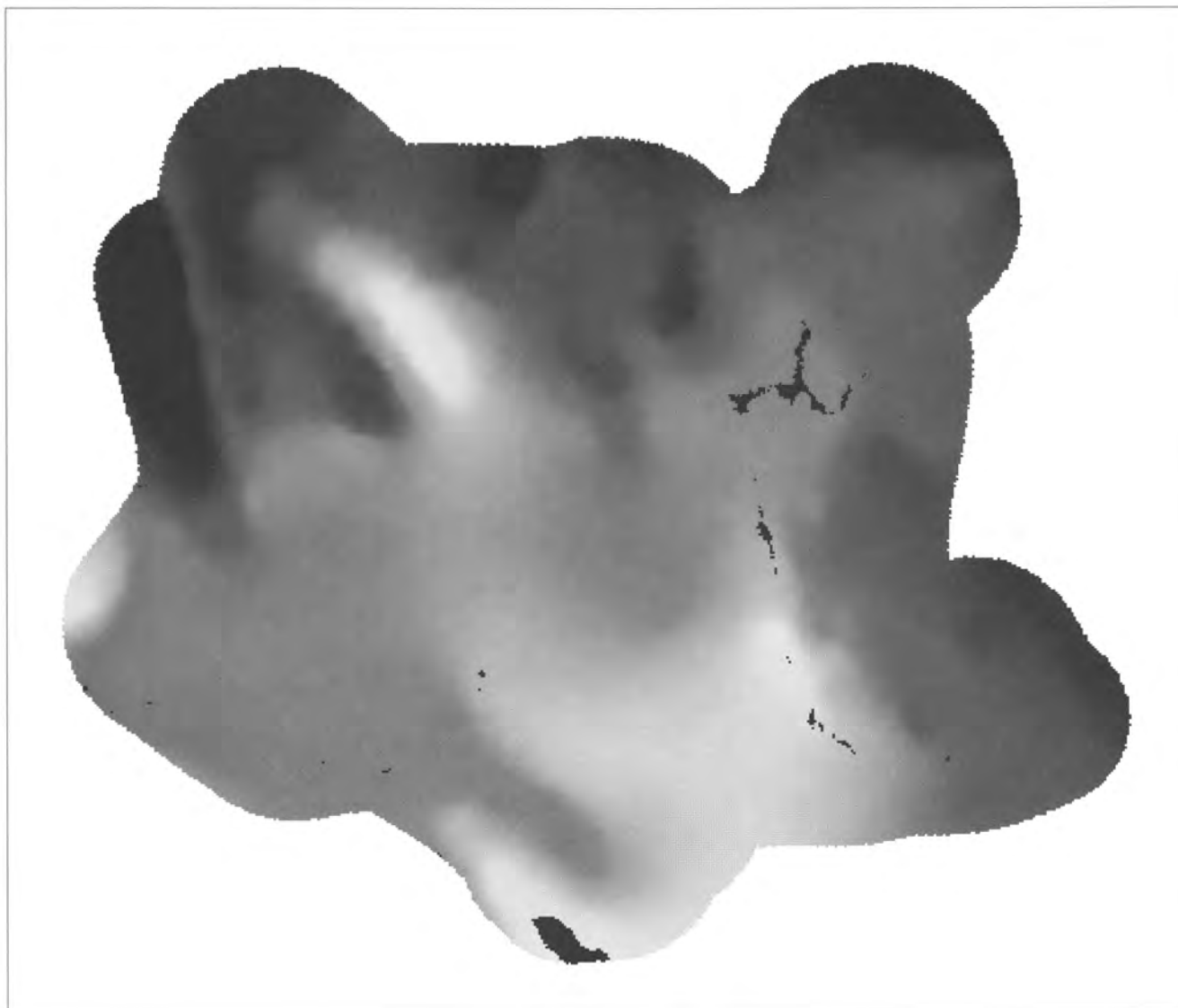
Abstract: This data set contains bi-weekly individual band information as acquired by the NOAA–AVHRR sensor. The data range is scaled to 8 bit (0-255). Band 1 data is acquired at 580-680 nm, band 2 data is acquired at 725-1,100 nm, band 3 data is acquired at 3,550-3,930 nm, band 4 data is acquired at 10,300-11,300 nm, and band 5 data is acquired at 11,500-12,500 nm. These data were subset at Utah State University from the Conterminous US AVHRR composite images. These data are contained on the NOAA–AVHRR CD–ROM under numerous file names in the images/<year>/bands subdirectory.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID raster.

AVHRR FROST-FREE PERIOD



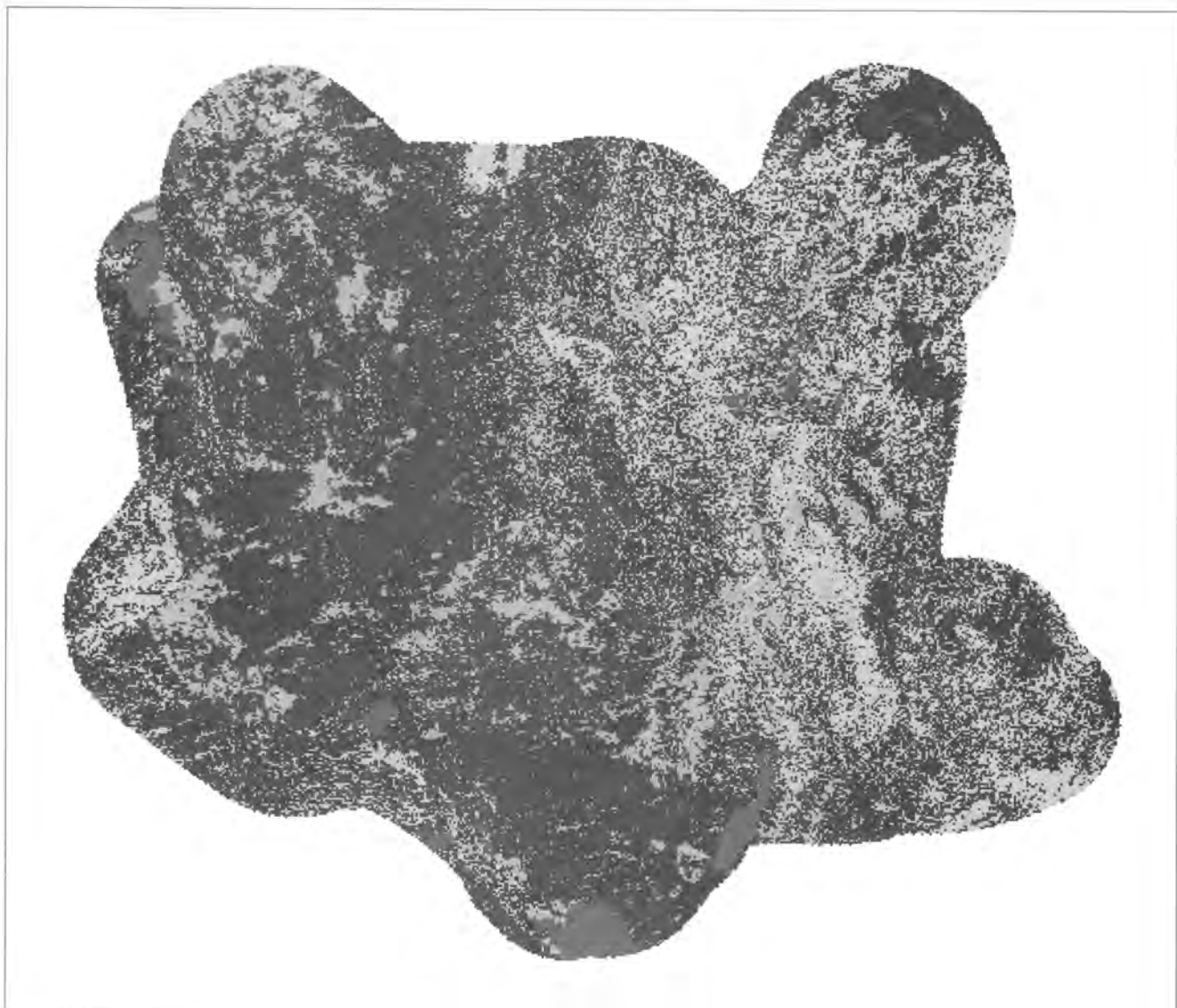
Abstract: Data defining the number of frost-free days were digitized from a national climate atlas of long term records of temperature and precipitation (NOAA, 1979). Digitized isoline data were subsequently interpolated to a raster image. These data were subset at Utah State University from the 1990 prototype land cover characteristics database. This data is contained on the NOAA-AVHRR CD-ROM in the images directory under the file name of frstfree.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID raster.

AVHRR GEOMETRIC DATA



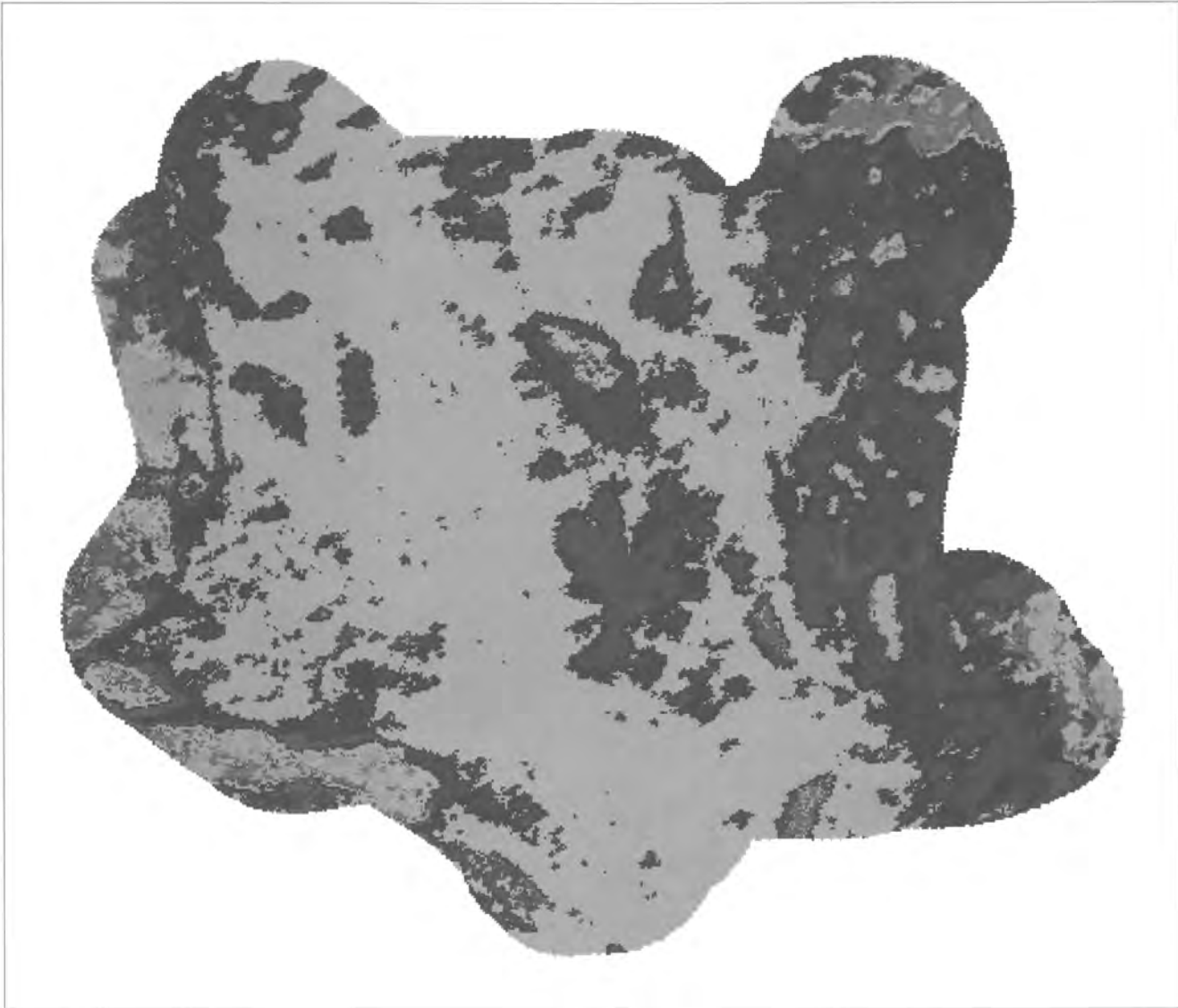
Abstract: This data set contains date, satellite zenith, solar zenith, and relative azimuth angle information for all the pixels in the AVHRR composite images. These data were subset at Utah State University from the Conterminous U.S. AVHRR composite images. These data are located on the AVHRR CD-ROM for six different years. These data are contained on the NOAA-AVHRR CD-ROM under numerous file names in the images/<year>/geom subdirectory.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID raster.

AVHRR DURATION OF GREENNESS

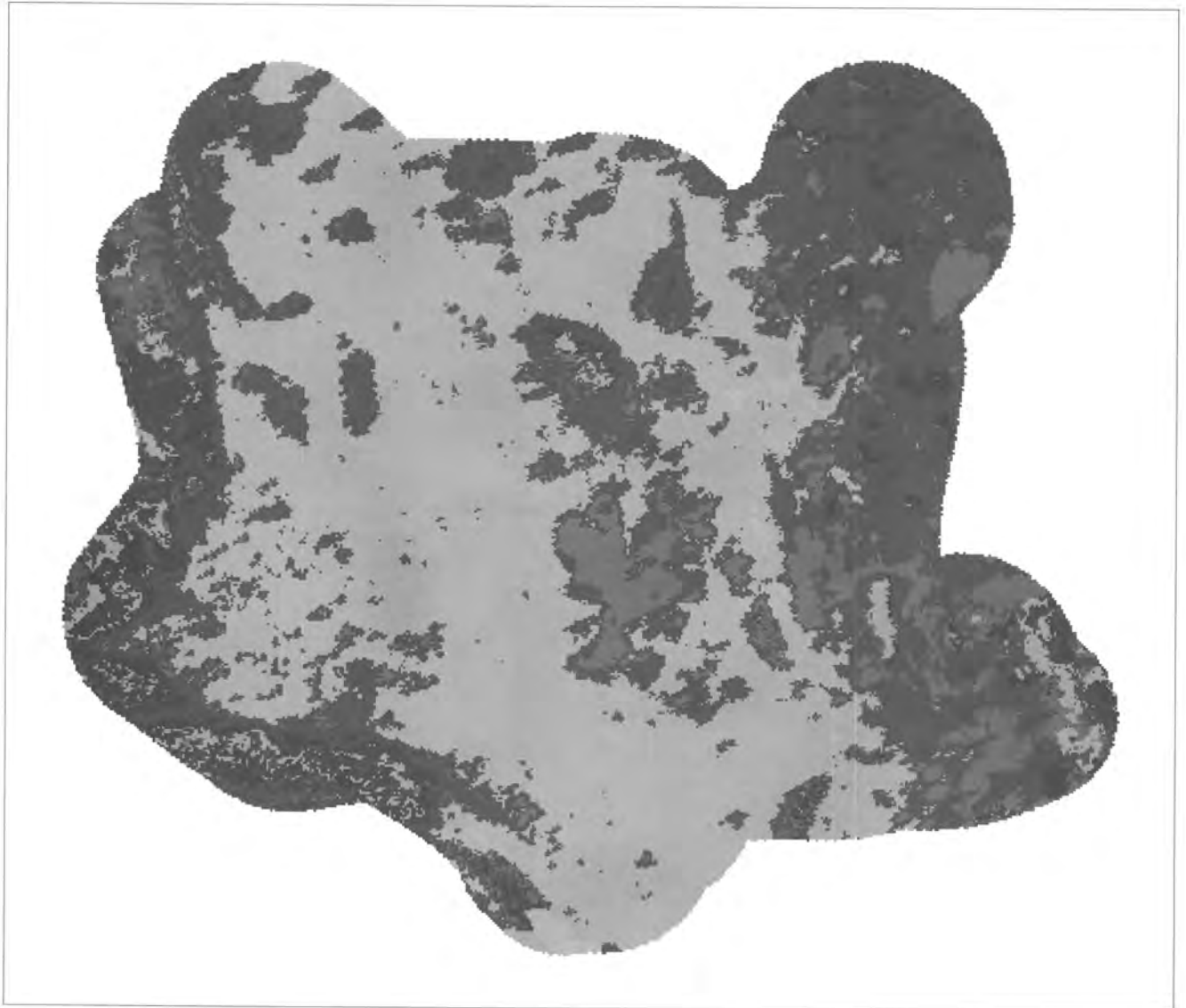


Abstract: This image represents the duration of greenness in 1990. It was produced by determining the biweekly period in which NDVI dropped to a seasonal low and subtracting this date from the date of the period of onset of greenness. These data were subset at Utah State University from the 1990 prototype land cover characteristics database. These data are contained on the NOAA-AVHRR CD-ROM in the images directory under the file name of grnlgth.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID raster.



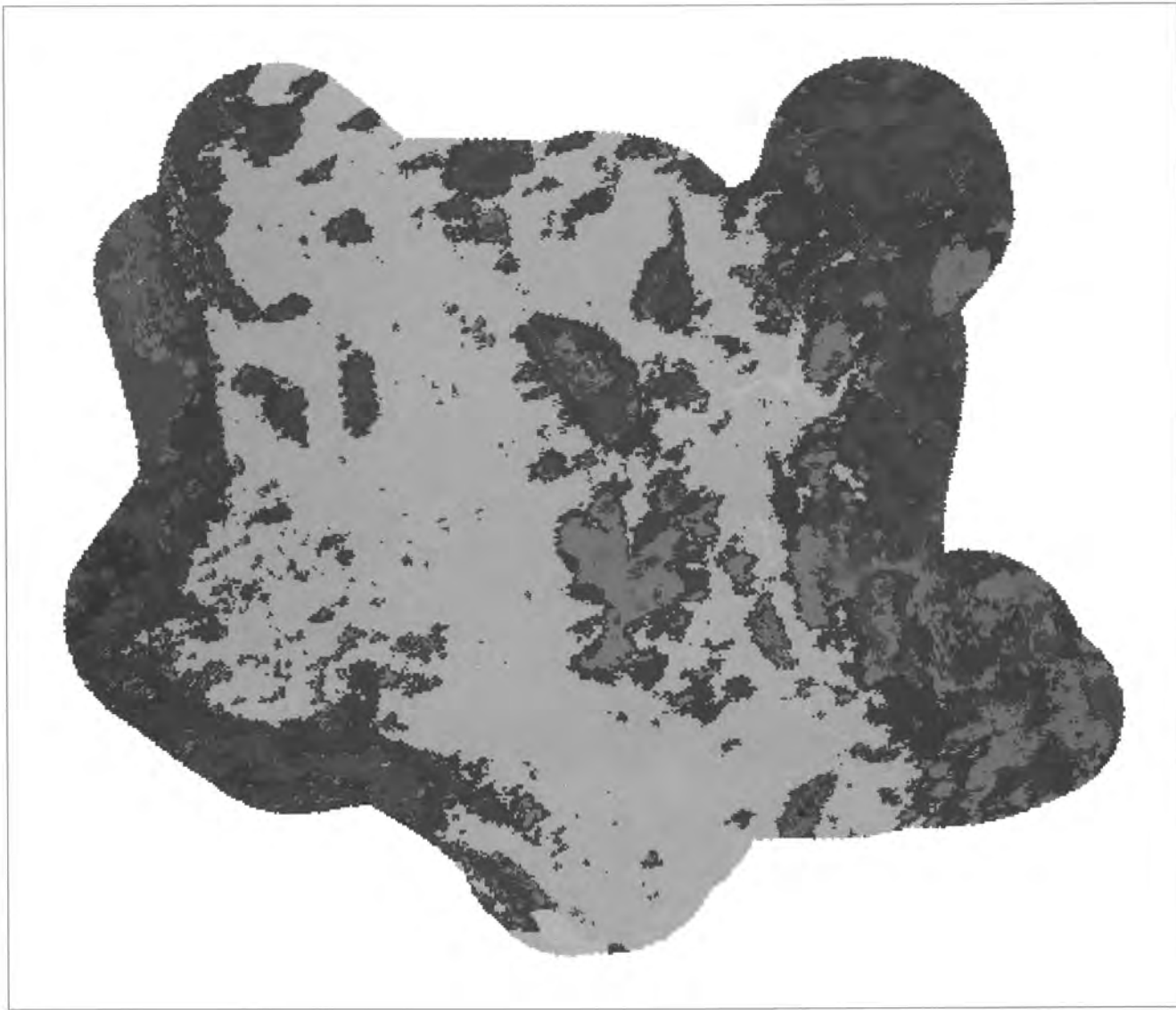
Abstract: This image represents the 1990 biweekly period in which significant development of standing green biomass started. Onset is defined as the period in which there is a significant increase of NDVI values from a seasonal low level. These data were subset at Utah State University from the 1990 prototype land cover characteristics database. These data are contained on the NOAA-AVHRR CD-ROM in the images directory under the file name of grnonset.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID raster.

AVHRR PEAK OF GREENNESS



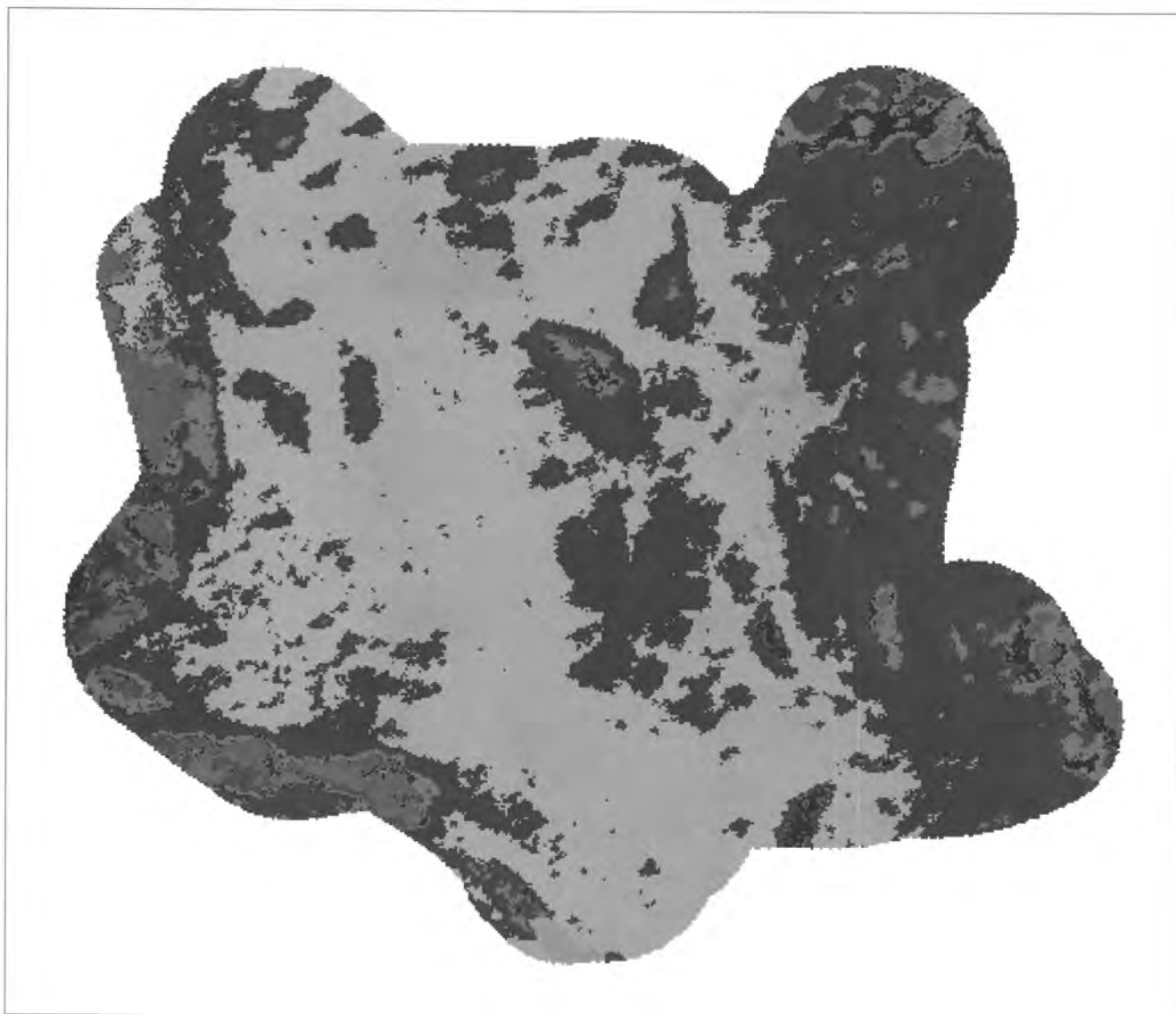
Abstract: This image displays the biweekly period in which the highest level of greenness (NDVI) was recorded in 1990. It was developed by identifying the time of the maximum NDVI mean value for the biweekly period. These data were subset at Utah State University from the 1990 prototype land cover characteristics database. These data are contained on the NOAA-AVHRR CD-ROM in the images directory under the file name of grnpeak.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID raster.

AVHRR LAND USE AND LAND COVER



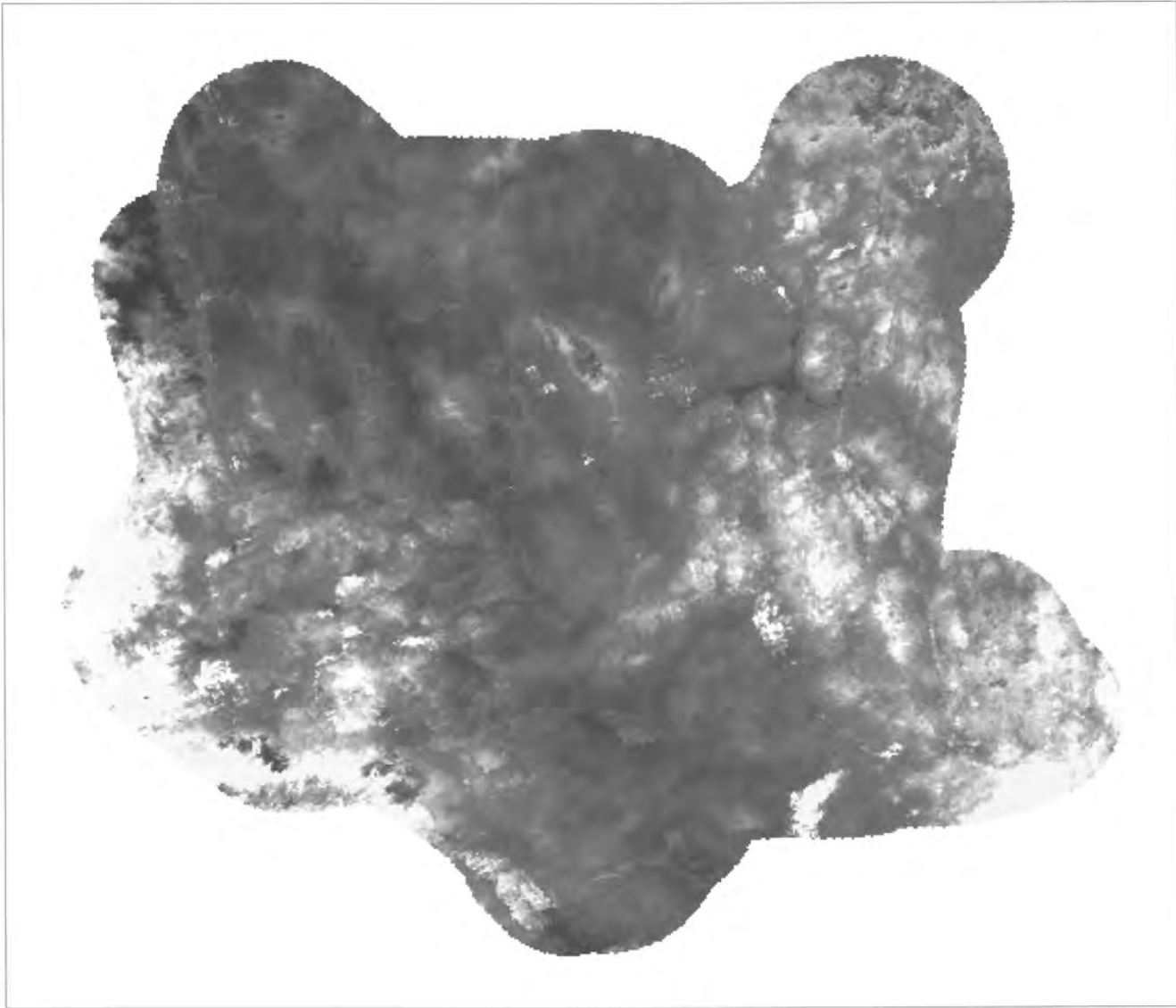
Abstract: This is a prototype land cover characteristics database derived from the classification of 1990 AVHRR time-series data, with postclassification refinement based on other digital earth science data sets including topography, climate, soils, and ecoregions. These data represent Anderson Level II Land Use and Land Cover classes (Anderson et al., 1976). These data are contained on the NOAA-AVHRR CD-ROM in the images directory under the file name of landcvr.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID raster.

AVHRR NORMALIZED DIFFERENCE VEGETATION INDEX DATA (NDVI)



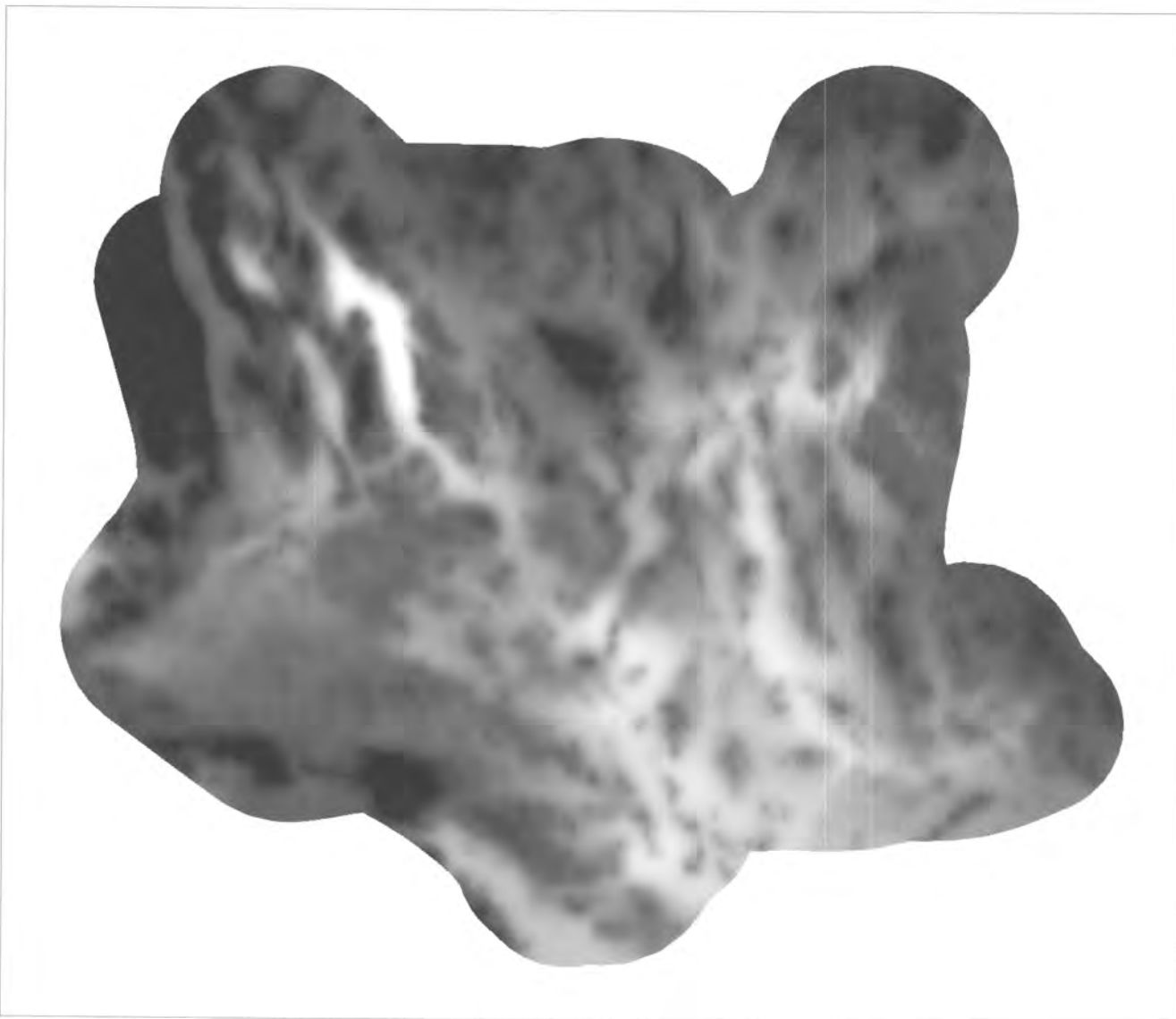
Abstract: This data set contains biweekly NDVI information as derived from bands 1 and 2 of the NOAA AVHRR sensor, and provides a comprehensive growing season profile useful for assessing seasonal variations in vegetation condition. These data were subset at Utah State University from the Conterminous U.S. AVHRR composite images. These data are contained on the NOAA-AVHRR CD-ROM in numerous file names under the images/<year>/ndvi subdirectory. These data are also contained on the Introductory CD-ROM under numerous file names in the images/avhrr/<year>/ndvi subdirectory.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID raster.

CLIMATE



Abstract: The Climate data set includes precipitation, minimum and maximum temperature, and potential evapotranspiration data generated from thirty-year normals. A minimum curvature algorithm was used to surface individual climate stations. A 500-meter elevation grid was used to impose topographic effect with a 5.4 degree (F)/1,000 ft. environmental lapse rate. The data set included in the Climate CD-ROM has been resampled to 1,000 meters to conserve space (the above file is tmin208). The complete data set can be found on the Climate CD-ROM in the climate directory and the monthly averages can be found on the Introductory CD-ROM also in the climate directory. The 500-meter database is available though the MDEP home page at <http://mojave.army.mil>.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: Utah State University Climate Center.

Data Format: ARC GRID raster.

ASPECT derived from DIGITAL ELEVATION MODEL (DEM, 30 meter)



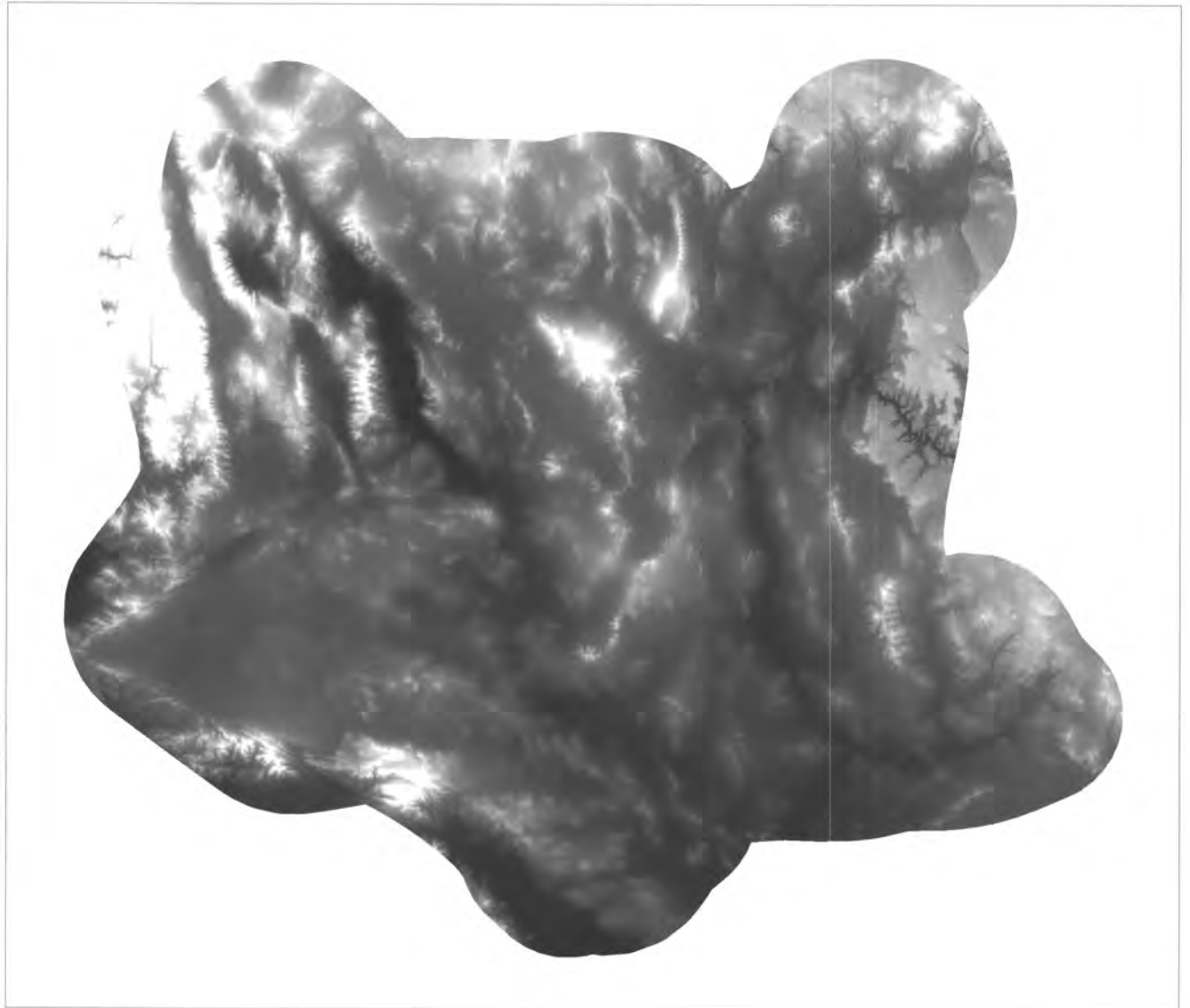
Abstract: This database was prepared from the USGS Digital Elevation Model data and contains terrain aspect data in a digital raster form, with each raster cell measuring 30 meter x 30 meter. The aspect is the compass direction that a slope faces. The full-resolution image (1 arc second, 30 meter) can be found on the Elevation CD-ROM in the dem directory under the file name of aspbil.gz and must be uncompressed using utilities found in the tools directory. A roam-around version is also included on the Elevation CD-ROM in the elev directory under the file name of aspct120. The lower resolution (3 arc second, 93.218 meter) version is on the Introductory CD-ROM in the elev directory under the file name of mojaspct.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID Raster.

DIGITAL ELEVATION MODEL (DEM, 30 meter)



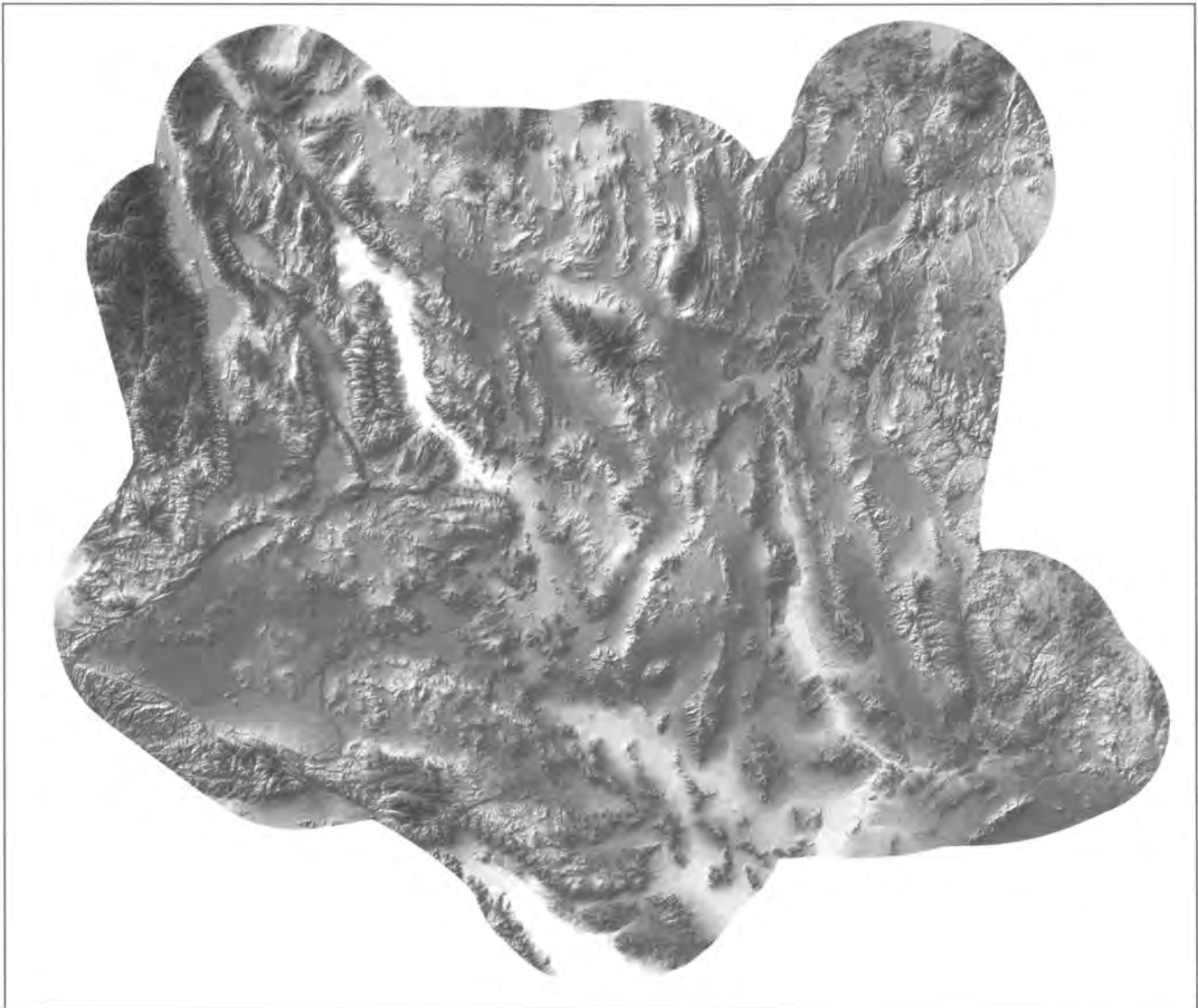
Abstract: This database was prepared from the USGS Digital Elevation Model data and contains terrain elevation data in a digital raster form, with each raster cell measuring 30 meter x 30 meter. The full-resolution image (1 arc second, 30 meter) can be found on the Elevation CD-ROM in the dem directory under the file name of dembil.gz and must be uncompressed using utilities found in the tools directory. A roam-around version is also included on the Elevation CD-ROM in the elev directory under the file name of dem120. The lower resolution (3 arc second, 93.218 meter) version is on the Introductory CD-ROM in the elev directory under the file name of mojdma.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID Raster.

SHADED RELIEF derived from DIGITAL ELEVATION MODEL (DEM, 30 meter)



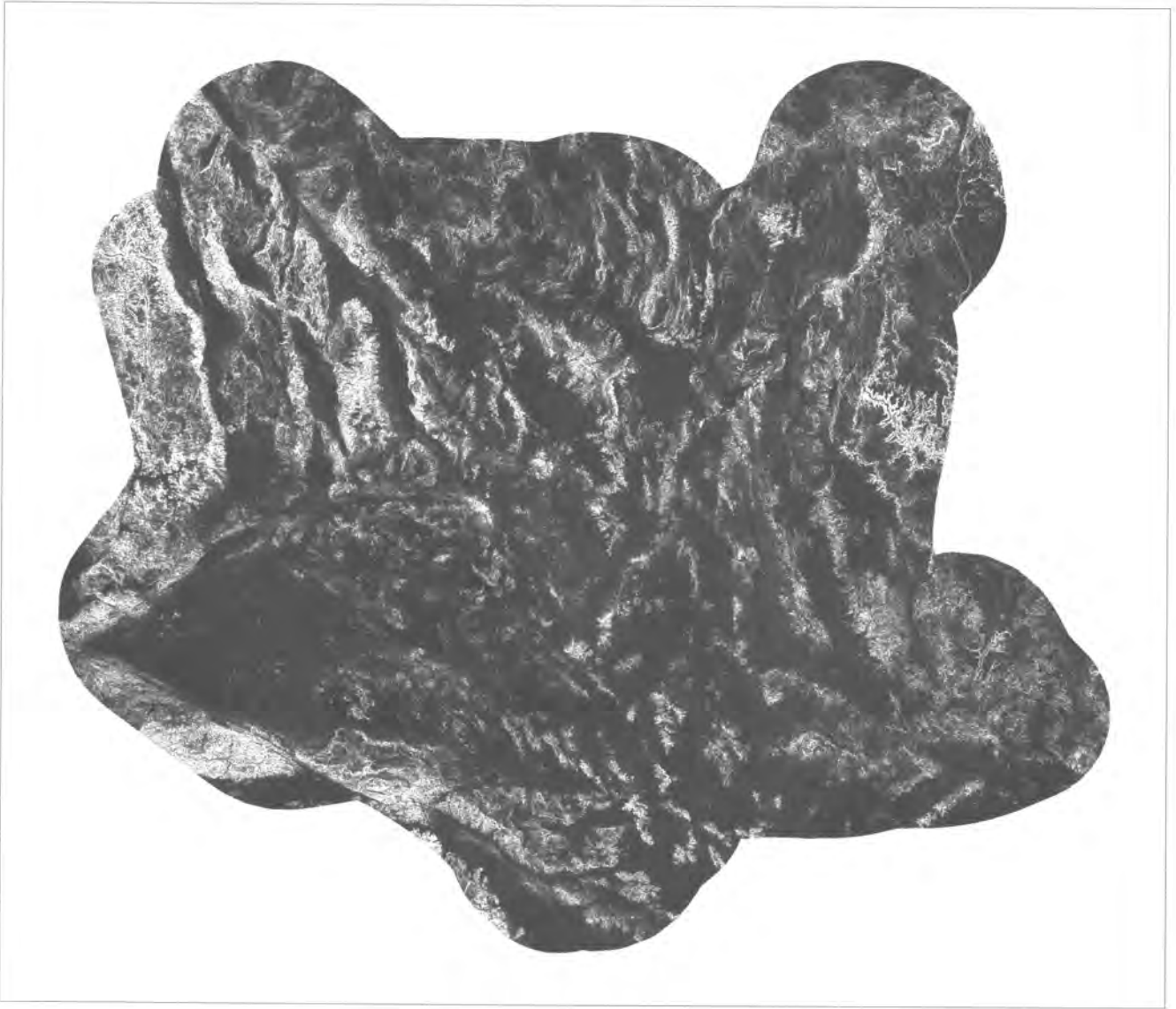
Abstract: This database was prepared from the USGS Digital Elevation Model data and consists of digital terrain elevation data in a digital raster form. The parameters are solar elevation: 25°, azimuth: 315°, exaggeration: 5x, and ambient light: 0.5. A color roam-around version is included on the Elevation CD-ROM in the elev directory under the file name of mojsr125.tif. The 3 arc second, 93.218 meter version is on the Introductory CD-ROM in the elev directory under the file name of mojrel.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID Raster.

SLOPE derived from DIGITAL ELEVATION MODEL (DEM, 30 meter)



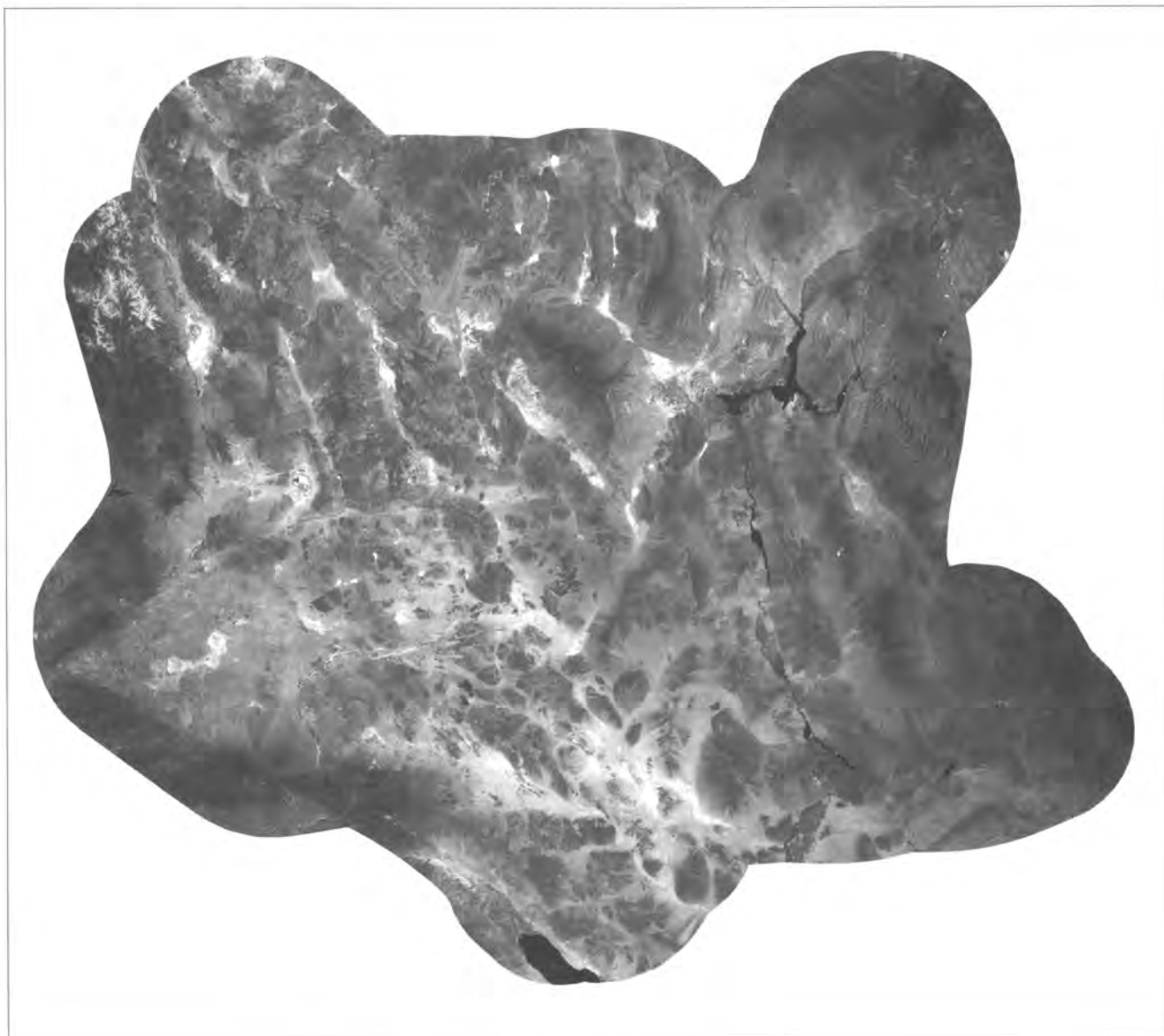
Abstract: This database was prepared from the USGS Digital Elevation Model data and contains terrain slope data in a digital raster form, with each raster cell measuring 30 meter x 30 meter. The full-resolution image (1 arc second, 30 meter) can be found on the Elevation CD-ROM in the dem directory under the file name of slpbil.gz and must be uncompressed using utilities found in the tools directory. A roam-around version is also included on the Elevation CD-ROM in the elev directory under the file name of slp120. The lower resolution (3 arc second, 93.218 meter) version is on the Introductory CD-ROM in the elev directory under the file name of mojslope.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ARC GRID Raster.

LANDSAT MSS 1986 MOSAIC



Abstract: This data set consists of three mosaics (Landsat MSS 1972, 1986, and 1992) of NALC MSS triplicate images covering the Mojave Desert Ecoregion. This raster data is acquired in four bands and scaled to 7-bit (0-127) digital numbers. A roam-around version is on the Introductory CD-ROM in the images/mss/1986/mosaic directory under the file name of 1986mss.tif. There are other roam-around versions on the Landsat MSS CD-ROM in the images/mss/<year> directory under the file names of 1972mss.tif, 1986mss.tif, and 1992mss.tif, respectively. There are three full-resolution mosaics on the Landsat MSS CD-ROM in the <year> directories under the file names of 1972img.gz, 1986img.gz, 1992img.gz. They must be uncompressed using utilities found in the tools directory.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ERDAS IMAGINE Image.

LANDSAT THEMATIC MAPPER (TM) MOSAIC



Abstract: This dataset consists of a mosaic of TM-MRLC images covering the Mojave Desert Ecoregion. This raster data is acquired in six bands of the electromagnetic spectrum and scaled to 8-bit (0-255) digital numbers. The tiles of the mosaic can be found on the Introductory CD-ROM in the images/tm/images directory under numerous file names. The full resolution mosaic of bands 1-3 can be found on Landsat TM CD-ROM #1 and bands 4-6 are on Landsat TM CD-ROM #2 in the tm directory. These files must be uncompressed using utilities found in the tools directory. A roam-around mosaic is located on both CDs in the images/tm directory under the file name of tm120.tif.

Extent: Mojave Desert Ecoregion as defined by Bailey (1993) plus a 50-km buffer.

Source: EROS Data Center, Sioux Falls, SD 57198, 605-594-6151.

Data Format: ERDAS IMAGINE Image.

SPATIALLY REFERENCED BIBLIOGRAPHY (Web only)

Conceptual Design

An inventory of the physical, biological, and cultural resources data pertinent to the Mojave Ecoregion was assembled and is included in the World Wide Web version of this database (<http://mojave.army.mil>). What sets this inventory apart as exceptional is an innovative spatial bibliographic search engine developed at Utah State University. In addition to the standard text methods of searching using author, title, keywords, etc., this bibliography will retrieve all records associated with any location within the ecoregion merely by selecting a point on a map.

Methods

This data inventory was generated from electronic online catalog searches, data records submitted by cooperators, and a review of unpublished reports and data held by the multiple land management participants in the region. All records were formatted to a standard bibliographic database structure that conforms with Online Computer Library Center, Inc. (OCLC), and U.S. Machine Readable Card Catalog (USMARC) standards. A geographic descriptor has been established for each record. A small percentage of the electronic records obtained were accompanied by explicit geographic information in the form of latitude/longitude coordinates; however, the majority were assigned a spatial coverage through a derivational process.

Results

The number of records that constitute the spatially annotated bibliography exceeds 18,000. This set represents merely an initial core and is acknowledged as incomplete. With this in mind, the online bibliographic database has been designed to incorporate new records. Additions to the bibliography can be submitted via an online tool accessible within the bibliographic database. Submissions will be subjected to a verification procedure before being incorporated into the bibliography.

Metadata

Bibliographic Data Acquisition: Published Records

Electronic Search Strategy

January 1996

- Set 1 Mojave
- Set 2 California within five words of desert
- Set 3 Sonora or Sonoran
- Set 4 (set 2 and set 3)
- Set 5 (set 1 and set 4)
- Set 6 (set 1 or set 2) not set 3
- Set 7 (set 5 or set 6)
- Set 8 Remove all duplicates of set 7

October 1996

“Mojave or Mohave”

Electronic Databases Searched:

Electronic databases were initially searched using K-R Dialog, a commercial vendor service. The databases included in this search were

- TRIS (Transportation Research Information Services)
- GPO Monthly Catalog
- GEOREF (American Geological Institute)
- Agricola (Bibliography of Agriculture)
- NTIS (National Technical Information Service)
- Energy, Science, and Technology
- Biosis (Biological Abstracts)
- Ei Compendex (Engineering Index)

Subsequent searches included these databases:

- Abstracts in Anthropology
- Anthropology Abstracts
- CAB International
- Dissertation Abstracts
- Environmental Periodicals Bibliography
- Federal Research in Progress
- Fisheries Worldwide
- History Abstracts
- Illinet Online (Illinois State-wide network online combined catalog)
- Library of Congress Online Catalog
- Melvyl (University of California combined catalog)
- MLA Bibliography
- TREECD
- University of Nevada–Las Vegas Online Catalog
- University of Nevada–Reno Online Catalog
- Water Resources Abstracts
- Wildlife Worldwide

Search Dates:

Date of First Search: January 1996

Date of Last Search: October 1996

Format Standardization:

Records obtained from electronic databases were reformatted to conform to a single standardized bibliographic data structure.

Bibliographic Data Acquisition: Published Maps

Electronic Search Strategy

Search Terms:

Clark County
Coconino County
Esmeralda County
Inyo County
Kern County
La Paz County
Lincoln County
Los Angeles County
Mohave County
Nye County
Riverside County
San Bernardino County
Yavapai County

and

Geology
Soils
Vegetation
Desert
Map

Electronic Databases: Melvyl (University of California combined catalog)

Search Dates:

Date of First Search: September 1996

Date of Last Search: November 1996

Bibliographic Data Acquisition: Unpublished Records

Participants: Agencies and military installations that provided electronic databases or access to their unpublished reports and records include

Department of Defense

Ft. Irwin National Training Center
Marine Corps Air-Ground Combat Center, Twentynine Palms, CA
China Lake Naval Weapons Center
SW Division, Naval Facilities Engineering Command

Department of Interior

Bureau of Land Management
California Desert District Office
Barstow Resource Area Office
Needles Resource Area Office
Palm Springs Resource Area Office
Ridgecrest Resource Area Office
Las Vegas Field Office
Dixie Field Office
Arizona Strip Field Office

Kingman Field Office
Havasu Field Office

National Park Service

Joshua Tree National Park
Death Valley National Park
Mojave National Preserve
Lake Mead National Recreation Area
National Archaeological Database

USGS, Biological Resources Division

Riverside, California, Office
Palm Springs, California, Office
Las Vegas, Nevada, Office

State of California

California Department of Parks and Recreation
California Department of Transportation
California Department of Fish and Game
California State Historic Preservation Office
University of California

Miscellaneous:

Arizona State Museum, Tucson
Desert Research Institute, Nevada
Museum of Northern Arizona, Flagstaff
National Park Service National Archaeological Database
University of Nevada, Las Vegas

Acquisition Methods:

Survey questionnaires distributed by USU identified the quantity and the locational dispersion of data throughout the region. The site visit destination points were established jointly with the MDEP point-of-contact at Ft. Irwin. USU staff traveled to the designated installations and agencies for the purpose of cataloging the pertinent data retained at each. Guidance regarding the data to be included in the inventory was provided by the onsite staff at each designated repository. Data were recorded using a standardized format. Additional inventories were provided in digital format from a variety of sources.

Data Verification:

Data inventory records cataloged during site visits were provided to the site of origin for data verification and editing.

Acquisition Dates:

June 1996–September 1997



APPENDIX I

MOJAVE DESERT ECOSYSTEM SECTION

Arid regions of southeastern California, southern Nevada, and western Arizona within the American semidesert and desert province of the tropical/subtropical desert division of the dry domain (Bailey, 1995)

Description:

Land-surface form – Extensive plains from which isolated mountains rise abruptly. Alluvial fans and bajadas surround the mountains, which terminate in dry washes and lakes in the basins.

Climate – Long and extremely hot summers. The highest temperature ever recorded in the western hemisphere was 134°F in 1913 in Death Valley. Summer rains are almost completely lacking and plants must be able to endure the extreme heat without water. There are occasional recorded periods of as much as twenty-four months without precipitation.

Vegetation – The vegetation of the lower levels is mostly creosote bush (*Larrea divaricata*), which grows in low, open, and very uniform stands. The desert mountains are exceptionally barren. Along the upper edges of the section is a belt in which Joshua tree (*Yucca brevifolia*) is prominent. At still higher levels is a belt of junipers and pinyon pines (*Juniperus-Pinus*).

Soils – Interior basins are characterized by shallow playa lakes. The soils near these lakes contain alkali, the quantity varying with distance from the edge of the lake. The result is a zonation of vegetation dependent on the ability of the plants to withstand salts.

Boundaries:

West – At or near the southeastern front of the Sierra Nevada.

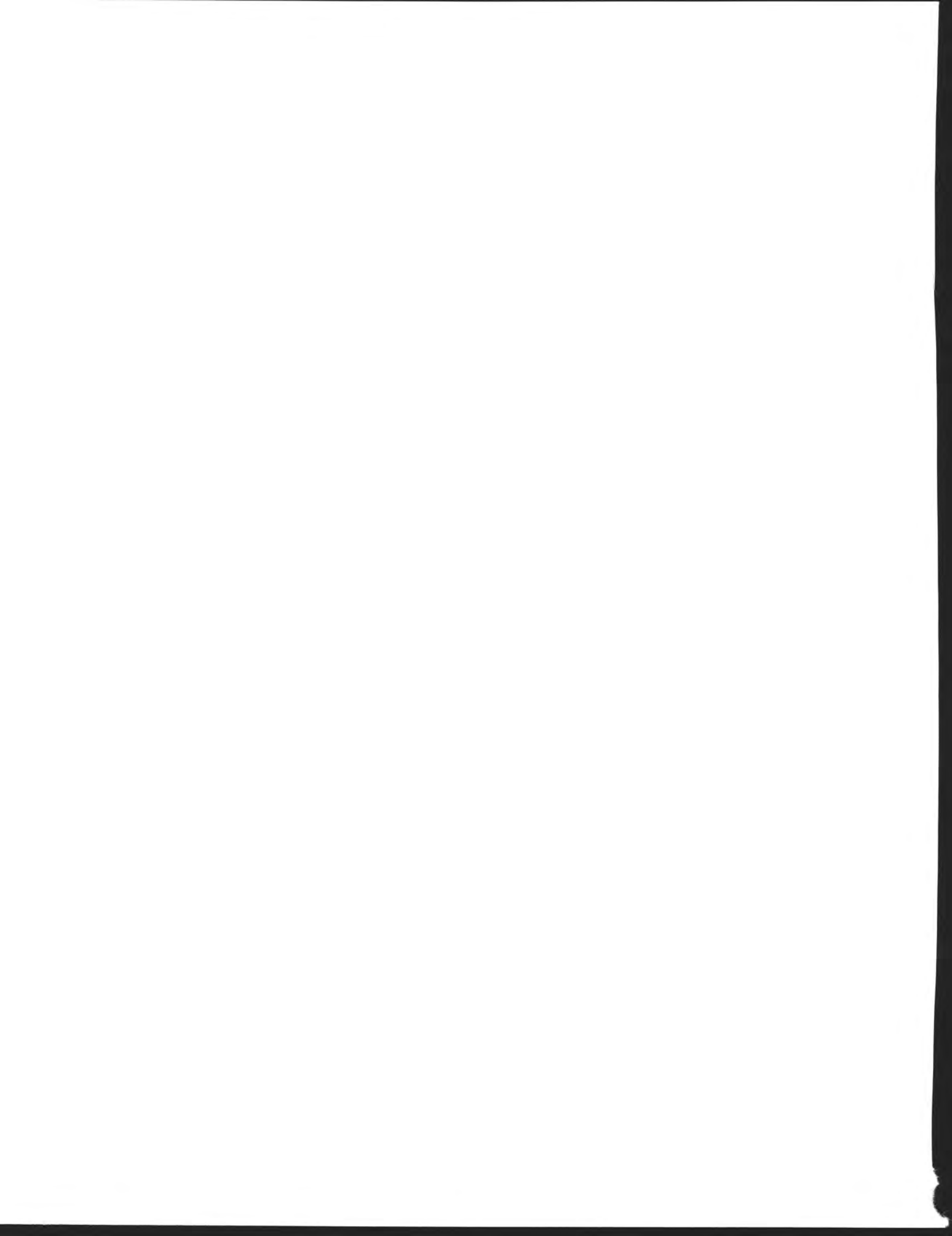
South – Along the San Andreas and related faults at or near the foot of the San Gabriel and San Bernardino mountains, extending east to the Colorado Plateau. The southern border of the Mojave Desert has been described by Shreve (1942, p. 226): “The transition to the Sonoran Desert takes place within a remarkably narrow belt. The change is from a treeless to an arboreal desert, from one in which succulents are rare to one in which they are abundant, from one in which *Yucca* is widespread to one in which it is of restricted occurrence, from a region with a monotonous and uniform plant cover to one with diversified vegetation.” The southern boundary is sinuous, and may be taken as corresponding to the southern limit where creosote bush (*Larrea divaricata*), in the sense of Kuchler (1970), is the dominant association. Along this zone, the Mojave Desert is dominated by creosote bush and the Sonoran Desert interfinger, with creosote bush and bur sage (*Franseria dumosa*) in the basins and paloverde-cactus shrub (*Cercidium-Opuntia*) on the slopes of the ranges. The boundary is drawn where the dominant associations of the two ecoregions cover approximately equal areas.

North – The northern boundary, like the south, is very sinuous, with frequent reversions, and may be taken as corresponding with the northern limit of Mojave creosote bush (*Larrea divaricata*), in the sense of Kuchler (1970). Along this zone, the Intermountain Desert is dominated by sagebrush (*Artemisia*) and Mojave Desert interfinger, with sagebrush and pinyon juniper woodland (*Juniperus-Pinus*) on the slopes of the ranges and creosote bush in the basins. The boundary is drawn where the dominant associations of the two ecoregions cover approximately equal areas.

East – Along the western edge of the Colorado Plateau.

References:

- Bailey, R.G. 1995. *Description of the Ecoregions of the United States*. 2nd ed. Misc. Publ. 1391. Washington, D.C.: USDA Forest Service. 108 pp. with separate map at 1:7,500,000.
- Kuchler, A.W. 1970. “Potential Natural Vegetation.” *National Atlas of the United States of America*. Washington, D.C.: U.S. Geological Survey.
- Shreve, F. 1942. “The Desert Vegetation of North America.” *Botanical Review*. 8:195-246.



APPENDIX II

GLOSSARY

browser – Software interface with the World Wide Web.

digital elevation model (DEM) – Digital records of terrain elevations for ground positions at regularly spaced horizontal intervals that are developed from stereo models or digital contour line files derived from USGS topographic quadrangle maps.

digital line graph (DLG) – Feature information in digital vector form; for line data such as roads and streams; digitized from USGS topographic maps, with a full range of attribute codes; are topologically structured.

DoD Legacy Program – The Legacy Resource Management Program is a multiyear, multimillion dollar program enacted by U.S. Congressional legislation in 1991 to provide the U.S. Department of Defense both guidance and funding for identifying and protecting its significant natural and cultural resources.

domain – A large subdivision of the Internet Protocol address space such as .mil for military or .com for commercial sites.

Federal Geographic Data Committee (FGDC) – Comprises fifteen federal agencies that coordinate the development of the NSDI.

Gbytes – Gigabytes; one billion bytes.

Geographic information system (GIS) – An organized collection of computer hardware, software, and geographic data designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information.

Geographic Name Information System (GNIS) – The official federal database containing information about physical and cultural geographic features in the United States.

geospatial data – Information about the location and shape of, and relationships among, geographic features, usually stored as coordinates and topology.

GRS1980 – The reference ellipsoid for NAD83.

metadata – Describes the content, quality, condition, and other characteristics about data.

NAD83 – North American datum 1983 is the basis for the North America planar coordinate system.

National GAP Analysis Program – The program of the Biological Resources Division of the USGS which provides state, regional, and national assessments of the conservation status of indigenous vertebrate species and land cover types in the United States.

National Information Infrastructure (NII) – Phrase coined by the government to describe the convergence of telecommunications, information technology, and the entertainment industry that is expected to provide for the integration of hardware, software, and skills that will make it easy and affordable to connect people with each other, with computers, and with a vast array of services and information resources.

National Spatial Data Infrastructure – Encompasses policies, standards, and procedures for organizations to cooperatively produce and share geographic data.

neatline – A border line commonly drawn around the extent of a map.

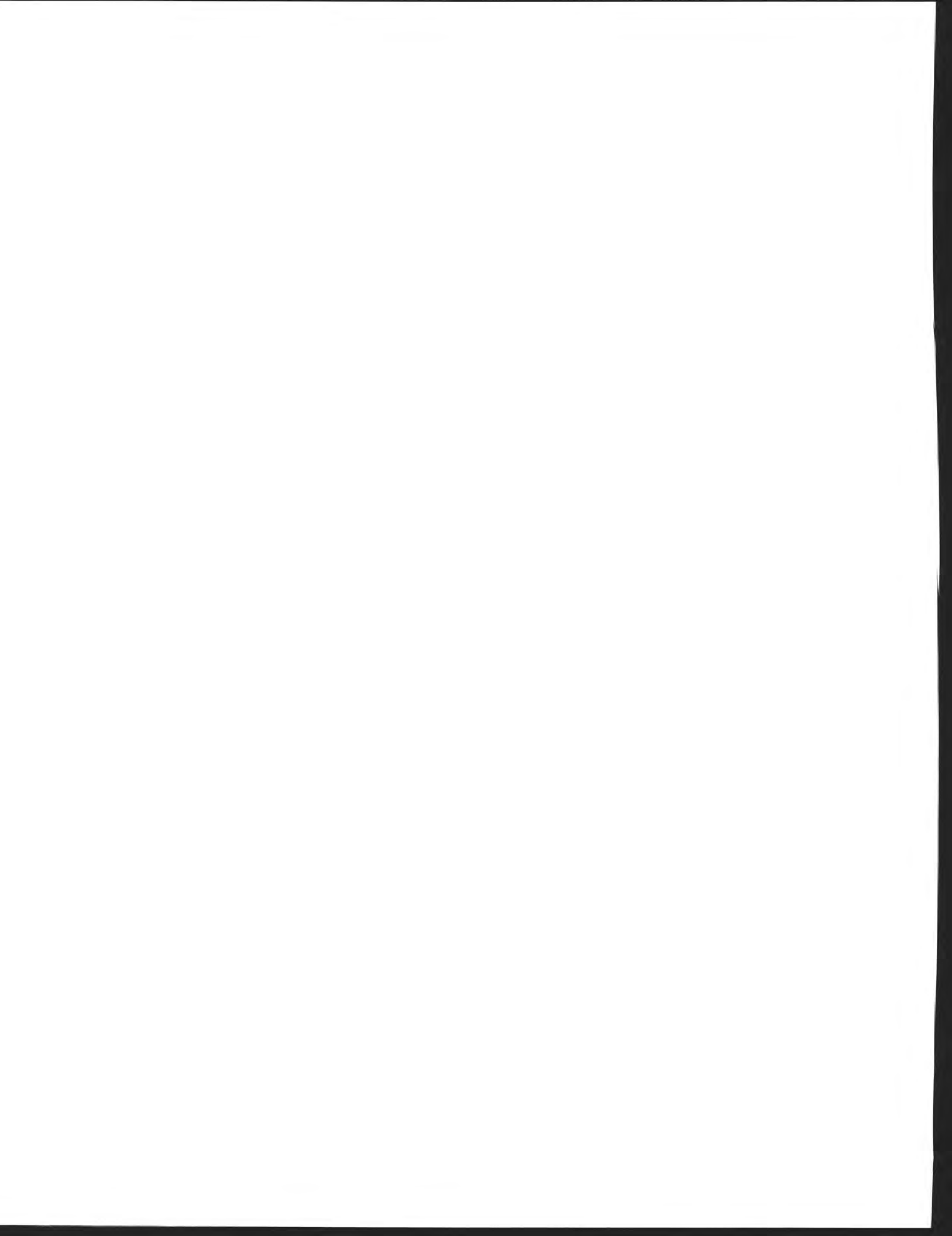
remotely sensed imagery – Photo products derived from airborne and satellite sensor data.

router – Hardware that allows connection of computers or networks to the Internet; can filter traffic that comes through.

thematic layers – Data layers that show information about a specific topic.

Transmission Control Protocol/Internet Protocol (TCP/IP) – The protocol used to connect computers on the Internet, allowing transfer of data and other services.

UTM – Coordinate system based upon the Universal Mercator Projection.



APPENDIX III

PARTICIPANTS

DEPARTMENT OF DEFENSE

Edwards Air Force Base, CA
Marine Corps Air-Ground Combat Center, Twentynine Palms, CA
Marine Corps Logistics Base, Barstow, CA
National Training Center, Fort Irwin, CA
Naval Air Weapons Station, China Lake, CA
SW Division, Naval Air Facilities Engineering Command, San Diego, CA
Tri-Service CADD GIS Technology Center, Vicksburg, MS

DEPARTMENT OF INTERIOR—U.S. GEOLOGICAL SURVEY

Ames Research Center, Moffett Field, CA
EROS Data Center, Sioux Falls, SD
National Center, Reston, VA
Southern California Water Resources Division, San Diego, CA
Geologic Division, Mineral Resources Program

DEPARTMENT OF INTERIOR—U.S. GEOLOGICAL SURVEY—BIOLOGICAL RESOURCES DIVISION

Colorado Plateau Research Station, Flagstaff, AZ
Desert Tortoise Research Project, Las Vegas, NV
California Science Center, Davis, CA
Palm Springs Field Station, CA
Endangered Species Field Station, Riverside, CA
Las Vegas Field Station, NV
St. George Field Station, UT

DEPARTMENT OF INTERIOR—BUREAU OF LAND MANAGEMENT

ARIZONA

State Director's Office, Phoenix
Public Land Survey System-Geographic Coordinates Database Managers Office
Arizona Strip Field Office
Kingman Field Office
Lake Havasu Field Office

CALIFORNIA

State Director's Office, Sacramento
Public Land Survey System-Geographic Coordinates Database Managers Office
Desert District Office, Riverside
Barstow Resource Area Office
El Centro Resource Area Office
Needles Resource Area Office
Palm Springs Resource Area Office
Ridgecrest Resource Area Office

IDAHO

Idaho State Office, Branch of Administrative Services
Idaho State Office, Budget and Finance Team

NEVADA

State Director's Office, Reno
Public Land Survey System-Geographic Coordinates Database Managers Office
Las Vegas Field Office

UTAH

State Director's Office, Salt Lake City
State Director's Special Projects Office, Boise, Idaho
Public Land Survey System-Geographic Coordinates Database Managers Office

Dixie Field Office
Salt Lake City Field Office

DEPARTMENT OF INTERIOR—NATIONAL PARK SERVICE

Western Region Office, San Francisco, CA
Death Valley National Park
Joshua Tree National Park
Lake Mead National Recreation Area
Mojave National Preserve
National Archaeological Database Program

DEPARTMENT OF INTERIOR—FISH AND WILDLIFE SERVICE

Regional Director's Office, Portland, OR
California State Supervisor's Office, Sacramento, CA
Barstow Field Station, CA
Ventura Field Station, CA

DEPARTMENT OF INTERIOR—BUREAU OF RECLAMATION

Yuma Projects Office, AZ

DEPARTMENT OF AGRICULTURE—FOREST SERVICE

Pacific Southwest Regional Office, San Francisco, CA
Remote Sensing Laboratory, Sacramento, CA
Spring Mountains National Recreation Area, NV
Sequoia National Forest, Kernville, CA

DEPARTMENT OF AGRICULTURE—NATURAL RESOURCE CONSERVATION SERVICE

U.S. ENVIRONMENTAL PROTECTION AGENCY

CALIFORNIA RESOURCES AGENCY

California Environmental Resources Evaluation System (CERES)

CALIFORNIA DEPARTMENT OF FISH AND GAME—NATURAL HERITAGE DIVISION

Natural Diversity Database Program
Lands and Natural Areas Program
Significant Natural Areas Program
San Diego, Imperial, and Riverside Counties Field Office
Chino Field Office

CALIFORNIA DEPARTMENT OF PARKS AND RECREATION

Natural Heritage Division, Sacramento
Service Center South Office, San Diego
Mojave Sector Office, Lancaster

CALIFORNIA DEPARTMENT OF PARKS AND RECREATION—STATE HISTORIC PRESERVATION OFFICE

State Historic Preservation Office, Sacramento
San Bernardino Archaeological Information Center, Redlands
San Joaquin Valley Archaeological Information Center, Bakersfield

CALIFORNIA DEPARTMENT OF TRANSPORTATION

Environmental Analysis and Planning Division, Sacramento
Environmental Analysis and Planning Division, San Diego District

CALIFORNIA COUNTY GOVERNMENTS and MISCELLANEOUS AGENCIES

County of San Bernardino Transportation and Flood Control Dept.
San Bernardino County Museum, Redlands
Mojave Water Agency

STATE OF NEVADA

Nevada State Lands

STATE OF ARIZONA

Arizona State Lands Dept.
Arizona State Parks

STATE OF UTAH

Automated Geographic Reference Center (AGRC), Salt Lake City
Utah State Geological Survey

ACADEMIC INSTITUTIONS**ARIZONA INSTITUTIONS**

Arizona State University, Tempe
Museum of Northern Arizona, Flagstaff
University of Arizona Library, Special Collections, Tucson

UNIVERSITY OF CALIFORNIA

UC Reserve System: Sweeney-Granite Mountains Desert Research Center
Alexandria Digital Library Project, UC Santa Barbara
UC Santa Barbara, Library, Special Collections
UC Davis Library, Special Collections
UC Irvine Library, Special Collections
UC San Diego, University Libraries, Special Collections

CALIFORNIA STATE UNIVERSITY

CSU Northridge, Delmar T. Oviatt Library
CSU, Desert Studies Center Library, Baker
CSU, Bakersfield Library, Biology Dept.
CSU Fresno, Henry Madden Library
CSU San Marcos, Library

OTHER CALIFORNIA INSTITUTIONS

Pepperdine University Library Archives
Azusa Pacific University
College of the Desert, Copper Mountain Campus, Joshua Tree
Stanford University Libraries, Special Collections
Sierra Nevada College
University of San Diego, Helen K. & James Copley Library
Lassen College Library
Claremont Colleges Libraries, Special Collections

NEVADA INSTITUTIONS

University of Nevada, Las Vegas, Department of Biological Sciences, Herbarium
University of Nevada, Las Vegas, Desert Research Institute Library
University of Nevada, Reno, Desert Research Institute
University of Nevada, Reno, Noble H. Getchell Library, Special Collections

UTAH INSTITUTIONS

Weber State University Library
Brigham Young University, Harold B. Lee Library, Special Collections
Brigham Young University, Monte L. Bean Life Science Museum
Utah State University, Quinney Natural Resources Research Library
Utah State University, College of Natural Resources

SPECIAL INTEREST ORGANIZATIONS

The Nature Conservancy Kern River Preserve, Weldon, CA

INDUSTRY GROUPS

Circle Mountain Biological Consultants, Wrightwood, CA
Hidden Valley Resources, Bakersfield, CA
Tierra Madre Consultants, Riverside, CA





