Appendix D

OPPORTUNITIES AND CONSTRAINTS TECHNICAL STUDY

Renewable Energy General Plan Amendment

Opportunities and Constraints Technical Study

Prepared for

County of Inyo

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Aspen Environmental Group

1. Introduction

Inyo County (County) has initiated the development of a Renewable Energy General Plan Amendment (REGPA) to include policies for renewable energy development in the County's General Plan. The County prepared a Background Report for the REGPA in October 2013 and has held multiple stakeholder and public meetings in November and December 2013 to provide opportunities for public involvement in the process. The Background Report provides an overview of the County's previous and current efforts to include policies for renewable energy development in the General Plan and to provide a foundation to identify areas that may be appropriate for future renewable energy development (Inyo County, 2013). In 2011, the County worked on an update to the General Plan to provide policy direction for commercial scale renewable energy generation development. As part of this update, a General Plan Land Use Designation Overlay was created that identified where renewable energy projects, specifically solar and wind, might be developed. These areas identified places appropriate for further review for potential development and were not pre-selected sites for development (Inyo County, 2013).

Building off of the Background Report, the County has prepared this Opportunities and Constraints Technical Study (OCTS), which identifies the County's renewable energy resources and potential locations where development of these resources can most feasibly occur. This OCTS serves as the basis for a subsequent effort in which the County would develop a General Plan Amendment and complete the required environmental review under the California Environmental Quality Act (CEQA).

The OCTS combines resource and infrastructure requirements for renewable energy development with key environmental considerations within the County and readily available spatial information to document existing environmental conditions. This information is used to identify areas within the County suitable for future renewable energy development as well as available or most easily upgraded transmission and distribution lines that may be used to connect the renewable energy facilities to the power grid.

Similar to the 2011 General Plan Land Use Designation Overlay areas, the OCTS reviews the 2011 Designation Overlay areas and identifies areas with reduced constraints based on a set of criteria, where commercial scale renewable energy projects might be developed. The purpose of this analysis is to further refine the County's proposed Renewable Energy Development Areas (REDAs) and include them in the 2013 REGPA.

To the extent practicable, the OCTS evaluations:

- Spatially depict the County's renewable energy resource potential;
- Are in proximity to electric transmission/distribution and other infrastructure (e.g., roads, water, etc.); and
- Identify opportunities for renewable energy development that avoid or minimize impacts to sensitive resources. Where sensitive resources cannot be avoided, mitigation would be defined at a programmatic level in the Program Environmental Impact Report (EIR) for the REGPA.

The final REDAs will be used as a basis for the definition and delineation of a new Renewable Energy Land Use Designation Overlay. They will become a key part of the Project Description and alternatives in the Program EIR that will serve as the CEQA document for the REGPA.

The purpose of the OCTS is to identify locations in the County that would result in the development of renewable energy with the least environmental impacts, and so would present the best opportunities for streamlined processing of renewable energy development applications. These areas are illustrated by level of constraint: Least Constrained and Moderately Constrained.

The remainder of the study is organized as follows:

- **Section 2, Policy and Economic Drivers of Renewable Energy Development** provides an overview of both State and local policies and the economic drivers applicable to renewable energy;
- **Section 3, Renewable Energy Resources** provides background on the energy development requirements of the resources that exist in the County;
- **Section 4, Electric System Infrastructure** provides background regarding the transmission and distribution system in the County;
- **Section 5, Renewable Energy Areas** provides the conclusions of the OCTS and illustrates the results;
- **Section 6, Data Sources and References** provides a list of data sources and resources used to prepare the study;
- **Section 7, Figures** provides a large number of maps associated with the areas established by the OCTS with renewable energy requirements, and infrastructure.
- **Appendix A, Environmental Resource Analysis: Opportunities and Constraints** provides the detailed analysis supporting the environmental considerations that were used to define the areas of constraints and the environmental resources maps.

2. Policy and Economic Drivers of Renewable Energy Development

California and Inyo County have numerous policies designed to increase renewable energy development. State and County policies focus on encouraging appropriate development. Sections 2.1 through 2.4 provide a brief overview of these policies.

2.1 State Renewable Energy Policies

In California, a number of existing and proposed policies drive renewable energy development, the primary of which is California's Renewable Portfolio Standard (RPS).

Renewable Portfolio Standard

California's RPS was established in 2002, accelerated in 2006, and expanded in 2011; it is the most aggressive RPS in the country. It requires investor-owned utilities (IOUs), publicly owned utilities (POUs) and other electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33 percent by 2020. The RPS is the primary driver for new utility-scale renewable energy development in California (CPUC, 2013).

As of the end of 2012, the IOUs reported that they served 19.6 percent of their electricity with RPS-eligible generation in 2012 (CPUC, 2013). RPS procurement requires the utilities to achieve a target of 20 percent from 2011 to 2013. According to the California Public Utilities Commission (CPUC), California is on track to meets its interim requirement of 25 percent renewable by 2016 and well positioned to meet 33 percent by 2020 (CPUC, 2013). With California's utilities on track to meet the RPS, the development of new renewable energy could slow. In October 2013, California's Senate and State Assembly passed Assembly Bill 327. This bill removes the RPS upper limit thereby providing the potential to increase renewable generation to more than 33 percent. While the RPS has not yet been raised, AB 327 indicates the governor's willingness to exceed the current RPS which may continue to drive developer interest.

In addition to the California RPS goals, other programs encourage development of customer-side renewable energy. The California Solar Initiative[1] and Self-Generation Incentive Program[2] encourage customers to install renewable energy technologies to directly serve their electricity needs (or loads). This electricity may contribute to meeting California's RPS goals if a project meets the eligibility requirements established for the RPS. On-site projects also indirectly contribute to meeting the RPS by reducing the overall electricity demand in California.

Assembly Bill 32: Global Warming Solutions Act

In 2006, the Legislature passed the Global Warming Solutions Act which set into law the recommendation for reducing California's greenhouse gas emissions to 1990 levels by 2020. It directed the California Air Resources Board to begin developing actions to reduce greenhouse gases while preparing a Scoping

[1] The California Solar Initiative (CSI) is a solar rebate program that offers cash back to customers of the IOUs – Pacific Gas and Electric, Southern California Edison, and San Diego Gas & Electric. This program funds solar panels on existing homes, and on existing or new commercial, agricultural, governmental, and non-profit buildings. The CSI project has a goal to install approximately 2,000 MW of solar projects by 2016.

[2] The CPUC's Self-Generation Incentive Program (SGIP) provides incentives to support existing, new, and emerging distributed energy systems. The SGIP provides rebates for qualifying distributed energy systems installed on the customer's side of the utility meter.

Plan to identify how best to reach the 2020 limit. A key element of the Scoping Plan was to achieve a statewide renewables energy mix of 33 percent.

Distributed Generation Policies

In California, renewable energy projects are considered either distributed (i.e., 20 megawatts (MW) or less) or utility-scale (over 20 MW). Distributed generation (DG) is also defined as localized energy generation interconnected on site or close to load. DG is generally constructed quickly with no new transmission infrastructure required and minimal environmental impacts. In the *Clean Energy Jobs Plan,* Governor Brown established a goal of 12,000 MW of localized energy development in California (Brown, 2008). The Plan identified solar systems of up to 2 MW that would be installed on roofs and other projects up to 20 MW in size that would be located on public and private property throughout the State. Utility-scale renewable development is defined as projects that are greater than 20 MW in size.

Assembly Bill 327 (Electricity: natural gas: rates: net energy metering: California Renewables Portfolio Standard Program)

The cost of electricity has a major influence over DG and other small-scale renewable installations. One recent policy change, Assembly Bill (AB) 327 is specifically relevant to electricity rates, and is expected to directly influence and create opportunities for future solar development because it removes the net metering cap for IOUs and removes the RPS cap as noted above.

Under previously existing law, the CPUC had regulatory authority over public utilities, including electrical corporations. AB 327 is comprehensive rate reform legislation that provides the CPUC with the authority to address current electricity rate inequities, protect low-income energy users, and maintain robust incentives for renewable energy investments. It also requires the electric utilities to develop distribution infrastructure plans to ensure that ratepayer dollars are being used in the most efficient way possible.

AB 327 authorizes the CPUC to rewrite rules for solar power users selling excess power back to the grid and to require utilities to generate even more electricity from wind, solar, and other renewable sources. AB 327 also sets pricing tiers for electrical customers. People living in temperate climates will probably see higher bills. Meanwhile, those in warmer regions of the State, such as Inyo County, would get a rate decrease. Exactly how much rates would change would be left to the CPUC after it conducts a detailed technical investigation.

2.2 Financing Mechanisms for Renewable Energy Development

The economic feasibility of renewable energy projects is contingent on a willing purchaser of the energy. The most common market agreement is a Power Purchase Agreement (PPA). A PPA is a contract between an electricity generator and a purchaser of electricity. A renewable developer would be unlikely to develop a project without a purchaser for the energy. As California IOUs and POUs have moved closer to reaching the 33 percent RPS goal, the number of available PPAs has decreased.

Since 2009, the number of viable renewable projects has increased significantly, and these projects are competing for a decreasing RPS need (Douglas, 2012). The result is an increased number of solar photovoltaic (PV) installations and wind energy to the disadvantage of solar thermal technologies (Douglas, 2012). Because the number of viable renewable energy projects has increased since 2009, there is a decreasing RPS need, PPAs are becoming increasingly challenging to get. As a result, power purchasers are paying less for renewable energy.

In addition to PPAs, there are three primary market strategies for smaller energy projects called wholesale DG. Wholesale DG is considered to be electric generation between 1 and 20 MW produced for sale to utilities or other purchasers for distribution. The market strategies are the Renewable Auction Mechanism, IOU solar PV programs, and the Senate Bill 32 Feed-in-Tariff; summarized below.

- **Renewable Auction Mechanism (RAM).** In December 2012, the CPUC adopted the RAM to stimulate the development of wholesale renewable DG projects between 3 MW and 20 MW by lowering transaction costs. RAM is a streamlined contracting mechanism that uses an auction where renewable energy sellers that meet certain criteria can submit non-negotiable price bids. The buyer then selects winning sellers based on the lowest-priced bids and signs non-negotiable standard contracts with these sellers. RAM is intended to be the primary procurement means for projects in this size range.
- **IOU solar PV programs.** The CPUC authorized Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E) to own and operate solar PV facilities and execute solar PV PPAs with independent power producers through a competitive process. The three programs were supposed to yield up to 1,100 MW in total; however, the programs were revised downward after other market strategies came into fruition.
- **Feed-in Tariff.** Assembly Bill 1969 (2007) created a feed-in-tariff program for projects up to 1.5 MW to stimulate small-scale renewable DG by streamlining the process for generators to sell power wholesale to IOUs through a standard contract. In 2012, the CPUC adopted a revised, larger program.

2.3 Financial Incentives for Renewable Energy Development

Federal renewable energy plans and polices regarding financial incentives are wide ranging, from tax deductions to providing grants and loans to renewable developers. Several federal tax incentives can support siting of renewable energy facilities. In general the goal of tax incentives is to channel private capital to certain areas, such as distressed communities, or to achieve a desired investment outcome, such as renewable energy development. Examples include:

- *Business energy investment tax credits*: The federal government offers tax credit incentives to promote the development and deployment of renewable technologies.
- *Renewable energy bonus depreciation*: Many renewable energy projects are classified as “five-year property” under the IRS Modified Accelerated Cost Recovery System (MACRS), making total project costs depreciable over five years, with 50 percent “bonus” depreciation for eligible systems in the first year.
- *Property Tax Exemptions*: Section 73 of the California Revenue and Taxation Code allows a property tax exclusion for certain types of solar energy systems installed between January 1, 1999, and December 31, 2016 (DSIRE, 2013a).
- *Renewable Electricity Production Tax Credit*: The federal renewable electricity production tax credit is a per-kilowatt-hour tax credit for electricity generated by qualified energy resources (including wind) and sold by the taxpayer to an unrelated person during the taxable year. Originally enacted in 1992, it has been renewed and expanded numerous times, most recently by the American Taxpayer Relief Act of 2012 (H.R. 6, Sec. 407) in January 2013 (DSIRE, 2013b).
- *New Markets Tax Credits (NMTC)*: NMTCs were designed to stimulate investments and create jobs in distressed communities, often the location of brownfield properties.

More than two-dozen federal programs have been used to support brownfields redevelopment. These programs support the use of brownfield sites for renewable energy projects. The US Environmental

Protection Agency's (EPA) Brownfields Program may be used to supplement investment in renewable energy site planning, preparation, construction, or capital equipment purchases. Renewable energy projects could benefit during the early stages of project planning and development from EPA assessment grants (up to $200,000) and cleanup grants (up to $200,000, typically with a 20 percent cost share requirement); renewable energy project developers may also be able to partner with recipients of EPA Revolving Loan Funds (capitalized up to $1 million). These funds can be used to make the site "shovel ready" for a renewable energy project, potentially incorporating elements of the final site requirements.

2.4 Inyo County Renewable Energy Policies

The County has a long history of planning for renewable energy. Beginning in the early 20th century hydroelectric power plants were built for the purpose of constructing the Los Angeles Department of Water and Power (LADWP) Los Angeles aqueduct. Since this time, the County has developed several codes to address and facilitate the development of renewable energy.

Title 19: Geothermal Resource Development

In 1973, the County added Title 19, Geothermal Resource Development, to its County Code to provide regulations, procedures, and performance standards for the development of geothermal resources. The goal of Title 19 was to provide for geothermal development while providing protection for the public and general welfare and protection of the environment.

County Code Title 18: Chapter 18.79 Regulation of Small Wind Energy Conversion Systems

Chapter 18.79 of the County Code includes development standards applied to small wind energy systems. Small wind energy systems are those that supply energy solely for on-site use. It allows small wind conversion systems with a Conditional Use Permit in all County zones and sets standards with respect to the development of small wind energy systems. A Conditional Use Permit requires Planning Commission approval with a public hearing, as well as California Environmental Quality Act (CEQA) review. The requirements applying to small wind energy systems are primarily derived from aesthetic, noise, and safety concerns.

County Code Title 21: The Renewable Energy Ordinance

Noncommercial, small scale, photovoltaic (PV) systems for solar energy production are allowed in all Inyo County zoning districts and require building and electrical permits. To encourage these small scale, private, PV systems the County has created an expedited permitting process.

Title 21 provides standards for commercial scale wind and solar energy development. Under Title 21, the construction of any commercial solar thermal, photovoltaic, or wind energy power plant, or an electric transmission line associated with these types of power plants, requires the developer to either obtain a renewable energy permit or renewable energy impact determination or enter into a renewable energy development agreement with the County. Each choice is likely subject to CEQA review.

Depending on the scale of a project a renewable energy permit can be appropriate. The permit must be approved by the Planning Commission, which requires a public hearing. The specific development standards attached to a renewable energy permit are decided on a case by case basis and can address the same requirements found in the rest of the County's zoning code such as noise, light and glare, height, setbacks, and distance between structures.

A renewable energy impact determination is required for a commercial facility that is required to obtain a permit approval from a permitting authority other than the County such as the Energy Commission. The purpose of the renewable energy impact determination is to ensure that the development standards and/or mitigation measures that would otherwise be addressed in a renewable energy permit are to the extent possible, incorporated into any approval of the facility granted by a state or federal agency.

The last option, a renewable energy development agreement, is designed to encourage and support the development of renewable energy projects. These exempt developers from the requirement of obtaining a renewable energy permit or renewable energy impact determination and, instead, are tailored to each project and developed through negotiations with the County. The process for entering into a renewable energy development agreement with the County are specified in ICC Title 20 – Development Agreements. All commercial scale renewable energy developments, per Title 21, must also be consistent with the County's General Plan.

Small scale, private, wind or solar generation systems (rooftop and ground mount, onsite serving) are allowed in all County zoning districts. They only require building and electrical permits and the County has established an expedited permit process for small scale photovoltaic systems.

Ordinance No. 1158 to Encourage and Regulate Development of Renewable Energy Resources. Ordinance No. 1158 Amends Title 2, Section 2.40.070 of the Inyo County Code and adds to Section 20.08.120 to Title 20 of the Inyo County Code. The purpose of this ordinance is to support, encourage and regulate the development of solar and wind resources for the generation and transmission of clean, renewable electric energy. As stated in the General Provisions, development of any renewable energy facility requires a renewable energy permit from the County Planning Commission. Any exemptions from this provision would require a renewable energy impact determination from the County Planning Commission. The ordinance sets forth the minimum requirements necessary for a permit such as mitigation measures, development standards, and financial assurances.

2011 Renewable Energy General Plan Amendment

In 2010 the County began work on an update to the General Plan to provide policy direction for commercial scale renewable energy generation development. The Amendment was completed in April 2011 and was based on outreach to local, regional, State, Tribal and national stakeholders, government agencies, and the interested public. As part of this update, a General Plan Land Use Designation Overlay identified potential development areas appropriate for further review for renewable energy. The areas were identified based on a constraints analysis and would have permitted the County to consider applications for renewable energy projects within the Overlay based on site specific studies, environmental review, and permitting requirements pursuant to the Renewable Energy Ordinance and other applicable State, federal, and local laws. These overlay areas are used as a starting point for this OCTS, see Section 5.

The update to the General Plan consisted of additions to the language in the Land Use, Public Services and Facilities, Economic Development, Conservation and Open Space, and Public Safety Elements. The updates focused on: identifying the appropriate means to develop renewable wind and solar energy resources, provided that social, economic, and environmental impacts are minimized; offsetting costs to the County and lost economic development potential, and mitigation of economic effects; working to protect military readiness, and; considering conversions of lands utilized for agriculture, mining, and recreation. The 2011 General Plan Amendment was challenged by environmental groups and the County did not have the funds necessary to try to defend it in court and was subsequently rescinded.

3. Renewable Energy Resources

A number of renewable energy resources are available in Inyo County. The primary resources available in the County are solar, wind, geothermal, and hydroelectric, but other renewable technologies are available at a smaller scale. The County already has policies for geothermal and hydroelectric development, so this section focuses on solar and wind energy. The majority of the data summarized below is from the National Renewable Energy Laboratory (NREL) *Renewable Electricity Futures Study: Volume 2 Renewable Electricity and Storage Technologies.* Other citations are provided as relevant.

3.1 Solar Photovoltaic Technology

3.1.1 Technology Description

Solar photovoltaic (PV) technologies convert sunlight directly into electricity by allowing solar photons to heat electrons from their ground state, producing a freed electron and a "hole" pair. The electron and the hole are then separated by an electric field within the PV cell and pulled toward positive and negative electrodes, generating direct current (DC) electricity. Multiple PV technologies are currently in use and under development, and the most widely developed PV technology is based on crystalline silicon cells and thin-film cells, including amorphous silicon and cadmium telluride.[1]

A typical PV module or panel includes several PV cells wired together and encapsulated. PV modules are connected electrically into a PV array. PV arrays generate DC electricity that is converted to alternating current (AC) electricity using an inverter. PV projects can be mounted on existing structures such as rooftops or parking structures or can be ground mounted, that is to say, free standing. Ground-mounted solar PV projects can use a fixed-tilt or tracking structure. Ground-mounted PV structures range between 4 and 30 feet in height depending on the technology used.

Larger solar PV projects would typically require an area with a slope of under 5 percent, although some technologies can accommodate greater slopes and small projects can be built on very steep slopes if necessary. Slopes must face south or southeast to be appropriate for siting in North America. Solar PV would typically require between 7-10 acres per MW of energy produced. Solar PV systems do not require water during operations other than for panel washing which is minimal, less than 5 gallons/ megawatt-hour (MWh).

3.1.2 Solar PV Resources in Inyo County

The National Renewable Energy Laboratory (NREL), under the sponsorship of Department of Energy (DOE), created a data layer to illustrate the solar generation resources, called insolation, across the U.S., expressed

[1] PV modules contain hazardous materials such as cadmium telluride. Cadmium telluride is a lung carcinogen and long-term exposure can cause detrimental effects to kidney and bone tissues. PV modules do not fail the federal hazardous waste criteria for toxicity but may be hazardous waste by California standards. Since 2012, the Department of Toxic Substance Control (DTSC) has been drafting and revising potential regulatory language to address PV modules. After several public comment periods, the DTSC proposed to amend the California Code of Regulations to designate both hazardous waste solar modules and non-hazardous waste solar modules as universal waste. The Department's goal is to limit the number of modules in California's landfills by managing the waste stream and recycling activities of solar modules. The Office of Administrative Law disapproved the proposed regulations in October 2013. No further update regarding the status of PV modules is available at this time: see Proposed Regulations: Proposed Standards for the Management of Hazardous Waste Solar Modules.

in kilowatt-hours per square meter per day (kWh/m2/day).[2] This data was used to create a map of Inyo County's solar resources, see Figure 3-1. All figures are presented in Section 7. As shown in this figure, all of Inyo County is covered by areas with high kWh/m2/day with most of the County being covered with the highest kWh/m2/day (greater than 7.5). This indicates that the entire County has an extremely high solar resource capacity and could support solar PV generation. Commercial-scale solar PV technologies are most economic when sited on land that has less than 5 percent south-facing slope for maximum exposure to the sun.[3] Much of the County has a slope under 5 percent as seen in Figure 3-2. As part of the study, a map with only south-facing slope was created. After reviewing the map, it became clear that the direction of the slope varied substantially throughout large areas such that to have sufficient continuous land, a developer would likely have to incorporate some of the north facing locations and adjust the technology accordingly. As such, Figure 3-2 includes both south-facing and north-facing slope.

Photo credit: Emily Capello

[2] The solar resource data was produced with a satellite radiation model developed by the State University of New York/Albany's Richard Perez along with NREL, and other universities working for DOE. The model used to create the data takes hourly radiance images from geostationary weather satellites, daily snow cover data, and monthly averages of atmospheric water vapor, trace gases, and the amount of aerosols in the atmosphere, to calculate the hourly total insolation (sun and sky) falling on a horizontal surface. The insolation values represent the resource available to a flat plate collector, such as a photovoltaic panel, oriented due south at an angle from horizontal to equal to the latitude of the collector location. (NREL, 2013).

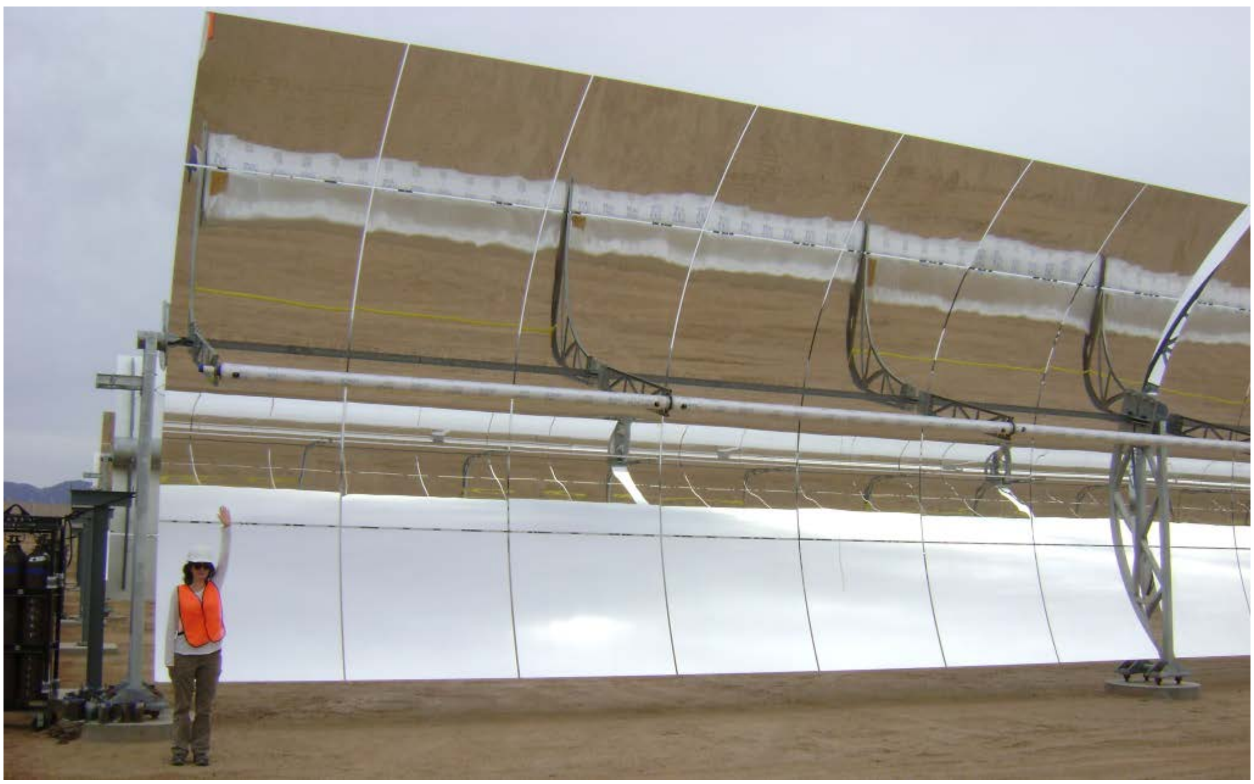
[3] Commercial-scale solar PV project can be sited on locations with greater than 5 degree slope or slopes that are not completely south facing. Steeper slopes or slopes that are not entirely south facing may require additional grading increasing the cost and potential impacts of the project. South-facing slopes are required for solar PV projects located in the northern hemisphere only because of the position of the sun relative to the solar project.

3.2 Solar Thermal Technology

3.2.1 Technology Description

Solar thermal technologies use mirrors or lenses to focus sunlight onto a receiver that contains a working fluid such as an oil-based heat transfer fluid, molten salt, or water. This fluid transfers the thermal energy to a heat engine that drives an electrical generator. There are multiple types of solar thermal technologies. Developers in California are constructing and operating solar trough and solar power tower projects. Solar trough projects include a parabolic trough concentrator that uses a 1-axis tracking receiver to collect concentrated sunlight. Solar power towers use an array of tracking flat mirrors (heliostats) to focus sunlight onto a fixed central receiver. Additional technologies such as the Linear Fresnel system[4] and dish concentrators[5] have been proposed in California in the past, but are no longer being commercially pursued as of 2013.

Solar thermal technologies can have storage integrated into the system such that energy captured during the daytime can be used in the evening or when needed. Solar thermal technologies with over 7 hours of storage are operating in Spain (Andasol 1 and 2). Solar thermal technologies can be developed



Solar trough. Photo credit: Dr. Joel Pagel, USFWS

4 A linear Fresnel system uses long rectangular, curved mirrors that reflect the sunlight on the receiver tube. In a linear Fresnel system, one receiver tube is positions above several mirrors to allow the mirrors greater mobility in tracking the sun (NREL, 2012).

5 A dish/engine system uses a mirrored dish similar to a large satellite dish that directs and concentrates sunlight onto a thermal receiver that absorbs and collects the heat and transfers it to the engine generator. The most common type of heat engine is the Stirling engine (NREL, 2012).

Solar power tower. Photo credit: Susan Lee

at the DG level, although the majority of the solar thermal projects proposed in California have been at a utility scale. Solar thermal technologies have a variety of slope requirements, from less than 2 percent (solar trough) to up to 3 percent (solar power tower). As with solar PV, solar thermal technologies require a minimum of 7 acres per MW of electricity generated. Solar thermal technologies can vary in height from 30 feet (solar trough) to hundreds of feet tall (solar power tower).

Solar thermal technologies require water consumption for cooling (both wet- and dry-cooled) projects. Water consumed for wet-cooled solar thermal projects ranges from 800 to 1,000 gal/MWh. The use of dry-cooling or hybrid wet-dry cooling can reduce water by up to 97 percent based on system design and location.

3.2.2 Solar Thermal Resources in Inyo County

As highlighted above for solar PV technologies, almost all of Inyo County is covered by the highest solar kWh/m2/day (greater than 7.5). Much of this area has appropriate slope considerations for solar thermal development. This indicates that the entire County has an extremely high solar resource capacity and could support solar thermal generation.

3.3 Wind Generation Technology

3.3.1 Technology Description

Wind turbines, like windmills, are mounted on a tower to capture the most energy from the resource (NREL, 2012a). Turbines catch the wind's energy with their propeller-like blades; usually two or three blades are mounted on a shaft to form a rotor. The wind's force against the blade causes the rotor to spin like a propeller, and the turning shaft spins a generator to make electricity. Wind turbines can be used as stand-alone applications (e.g., for water pumping or communications), or can be combined with a PV system. For utility-scale applications, large numbers of wind turbines are built in various configurations in the same general area to form a wind farm. Small wind systems have potential as distributed energy resources. Utility-scale turbines range from 50 kW to over 5 MW; the average wind turbine in the U.S. is rated at 1.5 MW (AWEA, 2012), but 2- and 3-MW turbines are also being used more frequently.

The electrical power output of a wind turbine is a function of wind speed. Wind speeds at 3-5 meters/second (m/s) can be captured to produce energy. Wind turbines generally produce energy best at wind speeds of between 12-15 m/s. Wind turbines are typically designed to shut down at speeds above 25-30 m/s to prevent damage to the generator.

3.3.2 Wind Resources in Inyo County

Inyo County wind resources are depicted in Figure 3-3. Most of the County has poor or marginal wind resource potential. Pockets of good to superb wind resource potential are found along the Sierra Nevada Mountains near the western border of the County and near Pearsonville along US-395. Very minor amounts of excellent to superb wind resource are located along the peaks of the Panamint Range, the Amargosa Range, and the Funeral Mountains.

3.4 Energy Storage

Energy storage devices store energy during periods of low demand and discharge this energy during periods of high demand. In order to improve the reliability of renewable energy in Inyo County, storage could be added to renewable energy development, such as solar thermal development, or included in addition to the renewable energy projects.

Photo credit: Emily Capello

In October 2013, the CPUC established an energy storage target of 1,325 MW for PG&E, SCE, and SDG&E. As stated by the CPUC, the benefits of storage include optimizing the grid by reducing the peak load, contributing to reliability of the grid, or deferring transmission and distribution upgrade investments (see Section 4); aiding in the integration of renewable energy; and aiding to reduce the greenhouse gas emissions to 80 percent by 2050 per California's goals (CPUC, 2013b).

There are many types of energy storage products ranging from multiple types of battery storage to compressed air or pumped-storage hydropower. Batteries provide an uninterrupted supply of electricity and can also increase power quality and reliability. Lead-acid batteries are currently the standard battery type used in energy storage applications, but many other types of batteries are near commercial readiness (Energy Commission, 2013d).

Compressed air energy storage uses pressurized air as an energy storage medium. An electric motor–driven compressor pressurizes the storage reservoir using energy during off-peak or low-use times and then the air is released from the reservoir through a turbine during on-peak or high-use hours to produce energy (Energy Commission, 2013d). Ideal locations for large compressed air energy storage reservoirs are empty aquifers, abandoned conventional hard rock mines, and abandoned hydraulically mined salt caverns (Energy Commission, 2013d).

Pumped-storage includes storing energy by pumping water from a lower elevation reservoir to a higher elevation reservoir using pumps that run during off-peak times. During high electricity demand times, the stored water is released through turbines that produce electricity.

3.5 Conclusions: Renewable Resources in Inyo County

While a number of renewable energy types are potentially feasible in Inyo County, the largest resource available is solar energy. Table 3-1 provides a summary of the information presented in Section 3 for the renewable resources available in the County, including the siting requirements.

Table 3-1. Summary of Renewable Energy Technologies and Requirements

Technology	Siting Requirements	Land Use Requirements	Potential Locations	Potential Sizes
Solar PV	▪ Insolation ▪ Slope	▪ 7 to 10 acres per MW	▪ Throughout the County	▪ From rooftop or parking lot to several thousand acres
Solar Thermal	▪ Insolation ▪ Slope	▪ 7 to 10 acres per MW	▪ Throughout the County	▪ Generally greater than 500 acres (50 MW)
Wind	▪ Wind Speed	▪ Up to 40 acres per MW ▪ Ground disturbance is much lower	▪ Along the peaks of the Sierra Nevada, Panamint, Amargosa, and Funeral Ranges ▪ Near Pearsonville	▪ Small to medium-sized wind projects

4. Electric System Infrastructure and Demand

The electric system consists of the transmission and distribution networks. The distribution system of lines (conductors) interconnects homes, buildings, and other customer locations to the bulk electrical transmission system, which ties together power plants. The function of the system is to provide reliable service to all customers or end-users of electricity. Electricity customers may be customer-generators, often with renewable generation facilities that serve on-site, offsite, or both on-site and offsite loads. California's electric service providers, including SCE and LADWP, are obligated by the Public Utilities Code to provide reliable service at a reasonable cost.

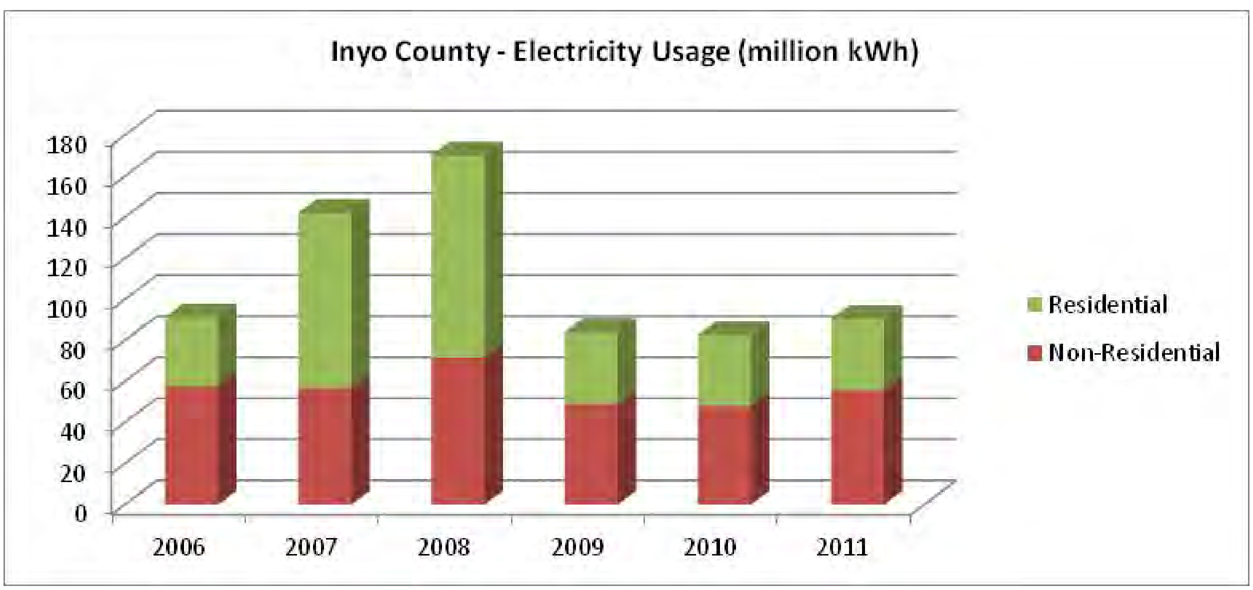
At the retail customer level, the two electric service providers (SCE and LADWP) cover portions of the County, as described in more detail below. Valley Electric Association, a rural electric cooperative of Nevada, provides retail electric service within a small northeastern corner of the County, and development near the Nevada state line will likely find the Valley Electric Association network more accessible than those of SCE and LADWP.

4.1 Energy Demand

Demand for reliable electric service dictates the nature and extent of electric system infrastructure. The infrastructure must be built with sufficient capacity to serve peak load for all customers including high demand users, with redundancies to ensure continuous service even during maintenance or accidental outages of portions of the system. Peak load is the maximum capacity demand (e.g., MW) at any instant, whereas electrical energy is quantified as the amount of power delivered over time (e.g., kWh).

Customers within Inyo County use about 0.03 to 0.06 percent of all of California's total electricity demand. The Inyo County Electricity Use is shown in Graph 4-1. As with much of the State, Inyo County's use decreased after 2008 with the slowing of the economy.

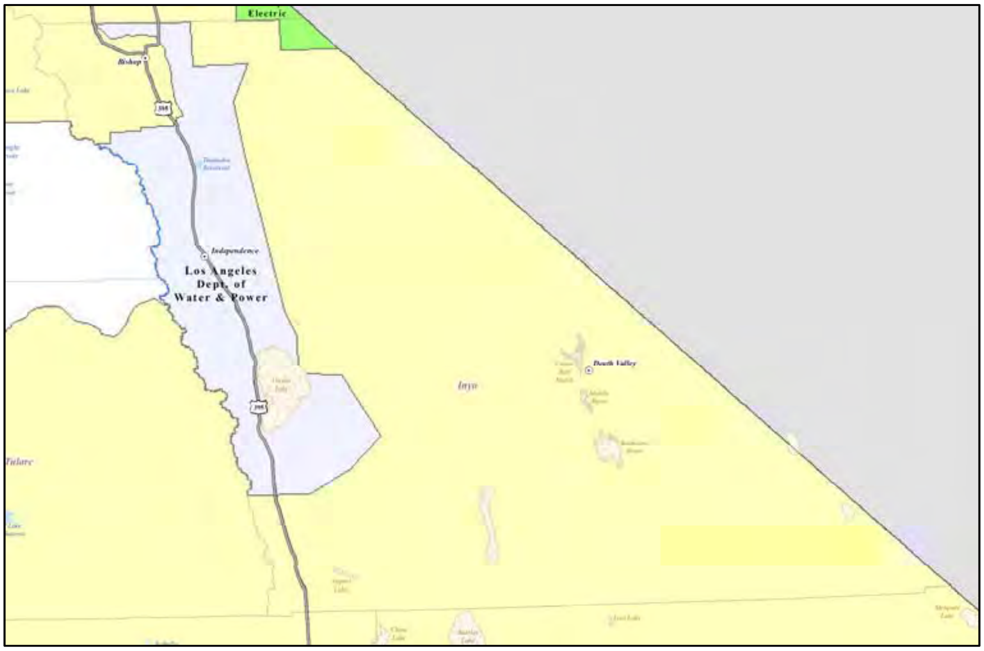
Graph 4-1. Electricity Usage in Inyo County



Source: Energy Commission, Energy Almanac 2013.

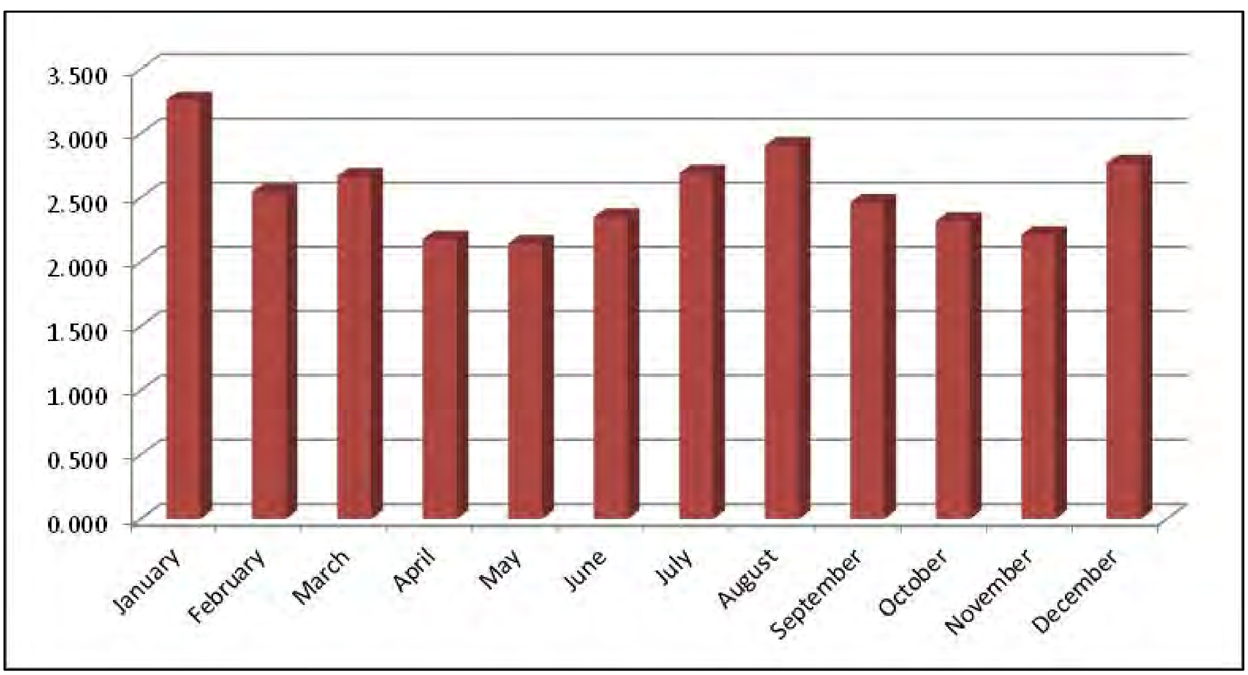
Both LADWP and SCE provide electricity to portions of the County. LADWP provides electricity service to the towns and cities along U.S. Route 395 including Bishop, Independence, Lone Pine, Keeler, and Big Pine, as shown below. LADWP's approximate load for Inyo County is 29 MW. SCE provides electricity service to the remaining portion of the County. Exhibit 4-1 illustrates the LADWP territory in gray and the SCE territory is shown in yellow. Graph 4-2 illustrates the residential usage in SCE's territory in 2012.

Exhibit 4-1. California Electric Utility Service Areas: Inyo County



Source: Energy Commission, California Energy Maps 2011a.

Graph 4-2. Unincorporated Inyo County (SCE Territory) – 2012 Residential Usage (million kWh per month)



Source: CPUC, Residential Consumption Data 2013.

Local Generation and Power Plants

The existing generation facilities in Inyo County are hydropower and geothermal generation. The primary hydroelectric resources are located along the Owens River Gorge and the headwaters of Bishop Creek. The Coso geothermal field is located north of Pearsonville within the Naval Air Weapons Station at China Lake. Table 4-1 summarizes the current hydro and geothermal generation in the County.

Table 4-1. Inyo County Power Plants

Power Plant Name	Fuel	Service Territory	Online Year	Online Capacity (MW)
Coso Finance Partners, Unit 1-3	Geothermal	SCE	1987	102.43
Coso Energy Developers, Unit 4-6	Geothermal	SCE	1989	99.99
Coso Energy Developers, Unit 7-9	Geothermal	SCE	1988	99.99
LADWP Control Gorge	Hydroelectric	SCE	1952	37.5
Bishop Creek 2	Hydroelectric	SCE	1908	7.3
Bishop Creek 3	Hydroelectric	SCE	1913	7.84
Bishop Creek 4	Hydroelectric	SCE	1905	7.95
Bishop Creek 5	Hydroelectric	SCE	1919	3.8
Bishop Creek 6	Hydroelectric	SCE	1913	1.6
LADWP Haiwee 1-2	Hydroelectric	SCE	1927	5.6
LADWP Pleasant Valley	Hydroelectric	SCE	1958	3.2
LADWP Big Pine	Hydroelectric	LADWP	1925	3.2
LADWP Cottonwood 1-2	Hydroelectric	LADWP	1908	1.5
LADWP Division Creek	Hydroelectric	LADWP	1909	0.65
Desert Power Co.	Hydroelectric	SCE	1983	0.95
Cinnamon Ranch	Hydroelectric	SCE	1986	0.155
Deep Springs College	Hydroelectric	SCE	1988	0.1

Source: Energy Commission, Power Plant Database, 2013.

Small-scale solar[1] is deployed and being developed, but larger distributed generation projects and utility-scale solar[2] proposals have not yet been realized. Several utility-scale solar projects have been proposed or are under environmental review. These include:

- The LADWP Southern Owens Valley Solar Ranch is a 200 MW solar PV project located on approximately 1,200 acres six miles southeast of the town of Independence that would tie into the LADWP's existing 230 kV Inyo-Rinaldi transmission line. LADWP published a Draft EIR for this project in September 2013 and has an anticipated construction schedule that would begin in 2014 and end in 2019 (LADWP, 2013a).
- The Northland Power Independence, LLC Solar Project is an estimated 140 to 200 MW solar PV project located on approximately 1,280 acres five miles east of the town of Independence. The solar project proposes to tie into the LADWP's existing 230 kV transmission line. The County has prepared an Initial Study for the project (Inyo County, 2013).
- The Bright Source Hidden Hills Solar Electric Generating System is a 500 MW solar power tower project located on approximately 3,280 acres located near the residential community of Charleston

[1] The small-scale projects are all primarily smaller than 1 MW and are used to supply the existing load at the site.

[2] Utility-scale projects are generally considered greater than 20 MW and are interconnected to the California grid system at the transmission level. Distributed generation ranges up to 20 MWs.

View adjacent to the Nevada border. The project would interconnect to the Valley Electric Association system, a system in Nevada that is part of the California Independent System Operator (CAISO) operational system. In April 2013, the project was suspended for a year (Energy Commission, 2013).

Additionally, many solar projects of 5 MW or less are proposed or under construction throughout the County, as highlighted in the REGPA Background Report.

The County has no thermal power plants that produce electricity from fossil fuels such as coal or natural gas, and there are no cogeneration facilities in the County. Biomass is not used for energy in Inyo County. The county does not have any grid-connected wood or agricultural waste burning power plants or electric facilities powered by digester gas or landfill gas.

4.2 Transmission Planning

State and federal agencies and utilities in California have completed many transmission planning processes, primarily focusing on the transmission needed to integrate large amounts of renewable energy. Inyo County has participated in a number of these planning procedures as discussed in the County Background Report. The transmission planning processes indicate that the high level upgrades needed across the state to meet the RPS goals by 2020 do not target upgrades in Inyo County. The DRECP's Transmission Technical Group looked at the development of 20,000 MW of renewable energy in the California desert by the year 2040 and identified a specific transmission upgrade of about 64 miles between Owens Dry Lake and LADWP's Barren Ridge Substation in Kern County. The Renewable Energy Transmission Initiative, West-wide Energy Corridor Programmatic Environmental Impact Statement, the California Transmission Planning Group, and transmission planning in the State of Nevada have also evaluated the need for additional transmission through Inyo County.

Electric Transmission Corridor Designation Under SB 1059

In 2006, Senate Bill (SB) 1059 (Escutia and Morrow, Chapter 638, Statutes of 2006) was passed and signed into law by the governor. This law established an electric transmission corridor designation process to link electric transmission planning processes with transmission permitting to assure the timely permitting and construction of needed transmission facilities. The law grants the Energy Commission the authority to designate electric transmission corridors to help assure that California can develop a robust and reliable high-voltage electric transmission system that will meet future electricity needs, reduce congestion costs, integrate renewable resources into the state's energy mix, and meet the state's critical energy and environmental policy goals. Corridors could be proposed by a utility, a state or local agency, or by the Energy Commission itself.

When enacted, SB 1059 created a new chapter to the Public Resources Code (PRC), starting at PRC Section 25330 titled, "Chapter 4.3. Designation of Transmission Corridors." The regulations developed pursuant to this chapter are in the California Code of Regulations, Title 20, Sections 2320 through 2340. SB 1059 provides entities such as Inyo County the opportunity to work with the Energy Commission to propose and evaluate locations that may be appropriate for designation as an electric transmission corridor.

West-Wide Energy Corridor Programmatic Environmental Impact Statement

Section 368 of the Energy Policy Act of 2005, Public Law 109-58 (H.R. 6), directed the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior to designate under their respective authorities corridors on federal land in 11 Western States, including California, for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (energy corridors). As part of that effort, the US Forest Service and BLM evaluated designated potential energy corridors on federal lands in a Programmatic EIS. The result was the designation of specific corridors across the 11 western states. After publications of the Record of Decision, multiple organizations filed a Complaint that raised challenges to the Agencies' Records of Decisions. The BLM, US Forest Service, Department of Energy, and the Department of Justice worked collaboratively with the plaintiffs to develop a settlement to mutually resolve the challenges in the Complaint. The settlement required the agencies to complete a Memorandum of Understanding addressing period corridor reviews; update agency guidance; update agency training; and complete a corridor study. The BLM, US Forest Service, and DOE executed a Memorandum of Understanding on July 8, 2013 that includes a work plan for the Regional Periodic Reviews and approved a work plan for the corridor study. In December 2013, the 368 Working Group released a 2013 annual report as required by the settlement. A subgroup has been formed to designate regions and prioritize the top three regions to be studied.

Within Inyo County, the PEIS defined a corridor on BLM lands near Highway 395 and within the Bishop Resource Management Plan area. The corridor (Corridor 18-23) was designated as 1,320 feet wide within the Bishop Resource Management area and as 10,560 feet wide within the CDCA (BLM, 2009).

Renewable Energy Transmission Initiative

The Renewable Energy Transmission Initiative (RETI) was a statewide initiative to help identify the transmission facilities needed to accommodate California's renewable energy goals, support future energy policy, and facilitate transmission corridor designation and transmission and generation siting and permitting. RETI was a collaborative process between the CPUC, Energy Commission, CAISO, publicly-owned utilities, PG&E, SDG&E, SCE, renewable energy developers, the Natural Resources Defense Council, Department of Ratepayer Advocates, and Native American tribal representatives, among others.

RETI developed and evaluated Competitive Renewable Energy Zones (CREZs) in California and identified where renewables could be most cost effective and least environmentally constrained. RETI analyzed 3,750 MW of potential development in the Owens Valley CREZ and determined transmission upgrades and a new transmission right-of-way would be needed access this CREZ and to transport this energy to a load center. RETI determined that the Owens Valley CREZ's environmental score was below (i.e. had fewer impacts than) the median environmental score but its economic score was much higher than the median score. The Owens Valley CREZ was ranked the second most costly in-state renewable energy zone (RETI, 2010a).

California Independent System Operator and the California Transmission Planning Group

The California Transmission Planning Group (CTPG) conducts joint transmission planning studies and allows for coordination between members' transmission planning activities. The primary objective is to provide a foundation for a statewide transmission plan that identifies the infrastructure needed to meet California's RPS by 2020. In the CTPG's most recent transmission plan, the Phase 3 of the 2011 Statewide Transmission Plan, the CTPG used multiple inputs to determine "high" and "medium" potential transmission upgrades. No such upgrades were determined in Inyo County (CTPG, 2012). Some of the earlier CTPG studies (2010 CTPG Draft Phase 4 Study Report) did identify a need for upgrades in Owens Valley if additional renewable energy were to be located here.

The CAISO prepared a 2012/2013 Conceptual Statewide Transmission Plan Update for the 2013/2014 Transmission Planning Cycle that drew on the efforts of the CTGP. The conceptual plan focused on the transmission upgrades across the state needed to meet the state's RPS goal by 2020. No projects were identified in Inyo County but some upgrades in the southern Nevada Eldorado area were identified to bring energy into the state from southern Nevada (CAISO, 2013).

Nevada Conceptual Renewable Energy Zone Transmission Plan

As part of the requirements defined in Nevada Assembly Bill 387 and NAC 704.9385.6, Nevada Power Company and Sierra Pacific Power Company prepared a Conceptual Renewable Energy Zone Transmission Plan. The plan was for informational purposes only and focused on renewable energy zones in Nevada. The S-1 solar resource zone was located along the Nevada/California border near the Amargosa Valley. The Study anticipated that an estimated 5 – 15 mile long interconnection line would be needed to access renewable energy in this area with an estimated $13.2 to 12.8 million (2009 USD cost; Nevada Power Company, 2012). This solar resource zone is in proximity to the southeast corner of Inyo County and expanded transmission capacity in this region would likely provide potential access opportunities for renewable development in Inyo County to be delivered to California and Nevada markets.

Nevada Transmission Initiative Routing Study

The Transmission Initiative Routing Study (February 2012) was prepared for the Nevada Energy Assistance Corporation to evaluate the viability of high voltage transmission lines for the benefit of renewable energy development and export out of Nevada. One of the preferred corridor opportunities would exit Nevada to the south, cross the northeastern corner of Inyo County, then follow the Highway 395 corridor south until Ridgecrest where it would head southwest until reaching the Antelope Substation near Lancaster. The project was analyzed as a 290-mile 500 kV transmission line with a cost of $595 million dollars (2012 USD). It also considered a potential substation near Ridgecrest that could accommodate California resources if requested. This substation was not included in the cost of the project. A second route through the southeastern corner of Inyo was also considered as part of the study but was found to be constrained by established BLM wilderness and wilderness study areas and was determined to have limited feasibility.

Desert Renewable Energy Conservation Plan

In January of 2012, the REAT agencies created the Transmission Technical Group to develop conceptual information about the transmission upgrades likely to be required to serve the various alternatives being studied to develop renewable energy in the DRECP Plan Area.

The DRECP allocated between 70 to 237 MW (depending on the alternative) of renewable energy in the Owens River Valley. The transmission study considered the need to deliver this energy to load centers like the Los Angeles basin. The report concluded that a single-circuit 230 kV line would be needed for up to 237 MW. This line would join a new substation near the Owens Valley Dry Lake with the existing LADWP Barren Ridge Substation (in northern Kern County).

4.3 Electric Transmission Infrastructure in Inyo County

The transmission network in the County is split between two different balancing authorities. The CAISO[3] controls power flows on the transmission lines owned by SCE. LADWP is a separate balancing authority in control of its own transmission lines. These systems generally run to the load centers of southern

[3] CAISO is a nonprofit public benefit corporation that manages the flow of electricity across the high-voltage, long-distance power lines that make up 80 percent of California's and a small portion of Nevada's power grid.

California. Although some Nevada electric transmission lines allow delivery to the County, no electric transmission facilities cross the Sierra Nevada range into the County from central California.

Transmission versus Distribution

The two electric service providers own separate transmission and distribution networks. Service voltages on distribution lines vary by utility and location across California. In Inyo County, the SCE high-voltage transmission network operates at 115 kV and 55 kV and is controlled by the CAISO. In Inyo County, the LADWP transmission lines operate at 230 kV. LADWP owns a separate 500 kV DC system that passes through Inyo County without a local connection.

The distribution network is the remainder of the system that delivers energy to the end user, or any part of the grid owned and controlled by the utility at a service voltage below 55 kV (typically 33 kV or 12 kV in the County).

Both transmission and distribution systems lose electricity as energy passes along the line. The amount of energy lost depends on the specific conductors, the electric current flowing through the line, the length of transmission, and air temperature. The Energy Information Administration estimates that annual electricity transmission and distribution losses average about 7% of the electricity that is transmitted in the United States (EIA, 2012). The Energy Commission has estimated an average of 5.4 to 6.9 percent system loss in California between 2002 and 2008 (Energy Commission, 2011b). Because renewable energy developed in Inyo County would be a large distance from load centers, transmission losses would be at the higher end of the typical range.

SCE Transmission System

The northernmost portion of the SCE service territory is in Inyo and Mono counties. SCE's main north-south corridor along Route 395 provides access to geothermal and hydroelectric energy sources in Inyo and Mono counties, while serving SCE's portion of the local load, see Figure 4-2, presented in Section 7.

The SCE system in Inyo County is isolated from the remainder of central and coastal California and is only weakly connected to Nevada. SCE's transmission system through Inyo County includes an intertie to the northeast through the Silverpeak (55 kV) transmission line to Esmeralda County, Nevada. The intertie to Silverpeak, Nevada occurs along SCE's main north-south 115 kV system at SCE's Control Substation in the hydro-rich headwaters of the Bishop Creek, west of Bishop. SCE's Control Substation is connected to SCE's Inyokern Substation to the south with two 125-mile low capacity and high impedance 115 kV lines (SCE, 2008). It is also connected to the LADWP system through a single 3-mile 115 kV line that is tied to a phase shifting transformer bank (SCE, 2008). Due to the weak system connections, a special protection system[4] (also called a Remedial Action Scheme) is in place to mitigate reliability issues in the area under specific outage conditions.

In 2007, SCE published a conceptual transmission report for integrating renewable resources (SCE, 2007). The report concluded that a number of upgrades to the existing substations and transmission lines would

[4] A system protection scheme uses a set of fast and automatic control actions, protection relays, and a telecommunications network to ensure the most reliable and safest power system performance following critical outages on a transmission network. They are used to mitigate problems following the loss of one or more transmission lines in a transmission corridor. The primary function is to monitor load flows on critical transmission lines, detect outages, take pre-planned actions to reduce the problems, and to signal system operators. (Wang and Rodriguez, no date).

be needed to export renewable energy from Mono and Inyo counties. It noted that renewable resources located in the Inyo County region of study (Cluster 8, Control Substation) would require upgrades to the Control and Inyokern Substations and a new 230 kV transmission line between Control and Inyokern (SCE, 2007). More recently, in November 2013, SCE provided a Technical Assessment for Generation Interconnection in the Bishop region (SCE, 2013a). This report was for development in the Mammoth Lakes area and reiterated the need for upgrades to the SCE system to interconnect renewable energy in the region that would cost between $43 and $449 million.[5]

Exporting energy from the Inyo County region on the existing SCE system is possible and it has been studied by SCE for renewable energy in the County region, but it would require substantial upgrades to the existing SCE system. Such upgrades are costly and time consuming but may offer a potential long-term solution for future renewable energy export.

LADWP Transmission System

LADWP's system includes the 230 kV Inyo-Rinaldi Transmission System from the Owens River Gorge substation to the Rinaldi Receiving Station in the San Fernando Valley, see Figure 4-2 (LADWP, 2013a.) The Inyo-Rinaldi System is a 230 kV line with a rated capacity of about 450 MW (although a substantial upgrade to the line's capacity is scheduled to occur in the segment between the Barren Ridge Switching Station, in Kern County and the Rinaldi Switching Station). LADWP holds entitlement to the entire 450 MW capacity of the existing line that has approximately 240 MW of excess carrying capacity. The LADWP-proposed Southern Owens Valley Solar Ranch project has priority position for future interconnection to this existing line[6] (LADWP, 2013a). According to LADWP, the interconnection of the proposed 200 MW project would require relatively minor work at the project site, but no upgrades to the transmission line itself.

As noted in the LADWP 2012 Power Integrated Resource Plan, potential Owens Valley solar projects may require upgrades to the Inyo–Barren Ridge segment of the Inyo-Rinaldi transmission line, and an additional new transmission line may be required depending on the solar build-out. As part of the Desert Renewable Energy Conservation Plan[7] (DRECP), LADWP and SCE studied the potential transmission needs to

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[5] SCE's study noted that substantial upgrades would be necessary to interconnect as few as 30 to 35 MW of new renewable generation under an Energy Only Interconnection status and would require new substation infrastructure, telecommunications, and a phase shifting transformer to mitigate thermal overload and stability problems for an outage on the Control-Inyo 115 kV line or a loss of the Inyo 115 kV phase-shift transformer of Inyo 115/220 kV A-Bank service LADWP (SCE, 2013a). This upgrade was estimated to cost over $43 million.

[6] The majority of LADWP's transmission assets are located outside of the Los Angeles Basin. They were originally constructed to supply lower cost electricity to LADWP's customers and maintain lower electricity rates. LADWP considers these assets as important to meetings the 33 percent RPS goal by 2020. According to LADWP "Excess transmission capacity is sold on a non-discriminatory basis in a wholesale market under an open-access transmission tariff largely conforming to FERC Order 890." (LADWP, 2012).

[7] The County General Plan Update is being done through a grant from the California Energy Commission (CEC) that was authorized by AB 113 Perez, and consists of funds from the Renewable Resource Trust Fund. These funds were made available to the County because of its participation in the DRECP. The DRECP was established in May 2010, by an agreement between the California Department of Fish and Wildlife (CDFW), the CEC, U.S. Bureau of Land Management (BLM), and the US Department of Fish and Wildlife Service (USFWS) to guide renewable energy development in tandem with a multispecies conservation plan for the Mojave and Colorado Desert regions. Counties located within the DRECP area were invited to participate in the DRECP efforts. Inyo County has been active in the DRECP since its inception and in March 2013 entered into a Memorandum of Understanding (MOU) with the CEC. The MOU provides the framework for a cooperative relationship between the CEC and Inyo County that focuses on effective planning and promotion of renewable energy development.

export renewable energy from the Owens Valley Area. The December 2012 DRECP Transmission Technical Report concluded that exporting renewable energy would require a new single circuit 230 kV transmission line between the Owens Valley and the Barren Ridge Substation. It is possible that LADWP could upgrade the Inyo-Rinaldi system rather than constructing a new transmission line; however, there is no indication at this time that such upgrades are planned.

Valley Electric Association

Projects located near the state line and in the southeastern portion of the County, could interconnect with the Nevada transmission system. In January 2013, the Valley Electric Association became a part of the California grid as a participating member and part of the CAISO. The proposed Hidden Hills Solar Electric Generating System planned to interconnect to the Valley Electric Association system. This would require analysis by the Valley Electric Association and approval by the CAISO. The studies performed for the Hidden Hills project concluded that the Valley Electric Association system could interconnect the 500 MW project to its existing Pahrump Bob Tap 230 kV line (Energy Commission, 2013). This would require a new substation and either a re-conductoring of existing 230 kV line or a new 230 kV line between the new substation and the existing SCE Eldorado substation near Boulder City, Nevada (Energy Commission, 2013).

4.4 Electric Distribution System

The distribution system is fed by the statewide bulk transmission system. As noted above, both LADWP and SCE own and manage portions of the distribution system in Inyo County. Because of the size of the load in Inyo County, the distribution system and substations are small. It is generally possible for circuits on the distribution system to physically accommodate power plants up to about 20 MW. In Inyo County, the distribution system would accommodate less energy because it would be constrained by the amount of energy serving the customer load and the capability of the generation to be properly designed for safe interconnection.

LADWP has a Feed-In Tariff program that studied the capacity of their system in the Owens Valley to interconnect distributed projects. LADWP concluded that up to 4 MWs of distributed generation could interconnect with its distribution system.

Similarly, SCE has performed studies of the SCE system pertinent to distributed generation developers who are interested in interconnecting with SCE’s distribution system. SCE would typically consider projects of less than 10 MW to be viable for interconnection to SCE’s distribution system. SCE identifies “preferred” and “not preferred” areas of the distribution system for DG interconnection. Preferred areas are high load density areas that currently have low DG penetration levels which would minimize the cost of interconnection to the SCE system (SCE, 2013b). Not preferred areas are areas with a low load density and/or high DG penetration. These areas are identified because the cost of interconnection would likely be higher and could take longer. Most of SCE’s distribution system in Inyo County is not preferred because there is no available capacity on SCE’s distribution system (SCE, 2013b). A portion of the SCE distribution system in the Bishop region is preferred for distributed generation (SCE, 2013b). This portions includes a substation that has an estimated 19 MW of available capacity on the outskirts of Bishop (SCE, 2013b).

4.5 Inyo County Renewable Transmission Infrastructure Needs

In order to plan for renewable development, Inyo County has estimated the amount of energy (in MW) likely to be developed in each REDA, using the 2013 designation overlays. The designation of energy capacity is provided for both solar and wind and is presented in phases, as shown in Table 4-2.

Phase 1 corresponds to the energy estimated to require fewer and less costly transmission upgrades. Phase 2 corresponds to energy development where transmission upgrades would be more challenging and more costly.

Table 4-2. Energy Distribution in Inyo County REDAs

REDA	Group	Base Case Solar Phase 1 (MW)	Base Case Solar Phase 2 (MW)	Base Case Wind Phase 1 (MW)	Base Case Wind Phase 2 (MW)	Total Phase 1 (MW)	Total Phase 2 (MW)	Total (MW)
Laws	Western	20	20	0	0	20	20	40
Fish Lake Valley	Western	20	20	0	30	20	50	70
Deep Springs	Western	30	30	0	20	30	50	80
Owens Valley	Western	400	0	0	0	400	0	400
Owens Lake	Western	50	100	0	100	50	200	250
Centennial Flat/Darwin	Western	50	100	0	100	50	200	250
Rose Valley	Western	100	100	0	100	100	200	300
Pearsonville	Western	50	50	200	0	250	50	300
Group Subtotal	Western	720	420	200	350	920	770	1,690
Panamint	Southern	100	200	0	0	100	200	300
Trona	Southern	100	200	0	400	100	600	700
Group Subtotal	Southern	200	400	0	400	200	800	1,000
Death Valley Junction	Eastern	100	100	0	100	100	200	300
Chicago Valley	Eastern	50		0	0	50	0	50
Charleston View	Eastern	500	250	0	0	500	250	750
Sandy Valley	Eastern	100	100	0	0	100	100	200
Group Subtotal	Eastern	750	450	0	100	750	550	1,300
County Total		1,670	1,270	200	850	1,870	2,120	3,990

Source: Inyo County.

Transmission Requirements for Each REDA Group

Table 4-2 shows three groups of REDAs within Inyo County. The transmission requirements for each group are presented below.

Western Group REDAs. In order to carry 920 MW of solar and wind from the western REDAs in Phase 1, upgrades to the existing SCE 115 kV or LADWP single circuit 230 kV line would be needed. As highlighted in Section 4.2, the SCE line is fully subscribed, but the LADWP could carry an additional 240 MW. Therefore, transmission would be needed to carry about an additional 700 MW of electricity.

As part of the RETI process, a 230 kV line was defined that could carry 500 MW from the Control Substation (near Bishop) to the Kramer Substation (near Kramer Junction in Kern County). This line was assumed to have the capacity for 500 MW, but could carry up to 1,000 MW. RETI assumed a new 230 kV line could carry 500 MW for single conductor and 1,000 MW for bundled conductors. The cost of this line was estimated at $655.5 million (in 2010 USD; RETI, 2010b). Similar transmission would be needed to carry the Phase 1 generation (700 MW) in the Western REDAs.

An alternative to constructing a completely new line would be to upgrade the existing SCE 115 kV line and the existing LADWP 230 kV line, most likely requiring new towers and new lines due to the age of the existing infrastructure. Upgrading these two lines would allow them to carry additional energy. SCE's Technical Assessment for Generation Interconnection in the Bishop region for a geothermal project noted that replacing the existing 115 kV line with a new Control-Inyokern 115 kV line would allow the line to carry additional load. SCE estimated the cost of replacing the line with a new line, expanding the infrastructure and installing a new communication system at over $449 million (SCE, 2013a). Upgrades to the existing LADWP 230 kV line to a new 230 kV line or 500 kV line would likely be as or more costly and would also likely require replacing the existing line.

Phase 2 would add an additional 770 MW of renewable generation in this area. If a new 500 kV line were built along the Highway 395 corridor from the Control Substation to Kramer Substation, it would likely be able to carry the total generation from Phase 1 and 2 developments (1,690 MW). The typical rating for a 500 kV line is 1,200 to 2,500 MW (RETI, 2010b).

Southern Group REDAs. Exporting 400 MW in Phase 1 from the southern REDAs (Panamint and Trona), would require a new transmission line, because there are no existing transmission lines in this area of the County; only distribution to local residences now exist. This new line could parallel the existing SCE distribution line and be built at either 115 kV or 230 kV. Building this line could be both costly and time consuming to permit due to public resistance and because it would require CEQA and NEPA review as it crosses BLM-administered land. Exporting an additional 600 MW in Phase 2 would require a new line if the first line was not built as a 230 kV line. While there is substantial potential for renewable energy in this area, no planning documents or completed processes (e.g., RETI or DRECP) discuss specific transmission upgrades to the Panamint Valley area. Renewable energy development could replace existing diesel generators at the Briggs Mine and be used onsite.

Eastern Group REDAs. Exporting 750 MW in Phase 1 from the eastern REDAs would likely require a transmission interconnection into Valley Electric Association, already part of the California grid. As noted in Section 4.2, the Nevada Conceptual Renewable Energy Zone Transmission studied the area of Nevada that is just east of the state line for potential development, and concluded that up to 4,000 MW of solar energy could interconnect to a new Amargosa 500 kV substation at a cost of $13.2 million (2009 USD) and new Amargosa 230 kV substation at a cost of $12.8 million (2009 USD). New substations and transmission interconnections would be necessary to export the 750 MW in Phase 1 although the length of interconnection and subsequent cost would be greater. Exporting an additional 550 MW would have similar upgrade requirements.

4.6 Conclusion

Because the Inyo County load is small, large-scale renewable energy would serve load outside of the County. Exporting energy would require the use of an existing or upgraded transmission system to deliver the energy. Renewable energy developers of large-scale projects could request transmission service from either the SCE system, the LADWP system, or Nevada's Valley Electric Association. LADWP has priority for use of its transmission system. For the SCE and LADWP systems, the transmission interconnection request would establish a queue position for each new project and initiate the study process that specifies the scope of the transmission upgrades necessary to serve the project. All systems would require substantial and costly upgrades in order to deliver large amounts of energy, interconnection to the existing capacity on the existing LADWP 230 kV line and to the Valley Electric Association system would be the least costly. The upgrades would require a significant time to plan, permit, and construct.

5. OCTS Evaluation Areas

This section presents the methodology used to identify areas in the County by levels of constraints for potential renewable energy development and the conclusions of the OCTS. It identifies and spatially illustrates these areas by high renewable energy resource availability, access to infrastructure, and reduced environmental conflicts. Section 5.1 summarizes the detailed analysis provided in Appendix A. Section 5.2 provides the results of the environmental opportunities and constraints analysis, defining those resources that are most likely to dictate where renewable energy can be developed and that are quantifiable. Using this information, Section 5.3 defines the resulting areas and Section 5.4 presents the study's conclusions.

5.1 Summary of the Environmental Resource Analysis

Appendix A provides a detailed analysis of the environmental resources that were used to identify the opportunities and constraints for renewable development in Inyo County. Key quantifiable data was used to map the sensitive resources throughout the county. This data was then used to identify locations that were more or less sensitive based on the available data. The data sources and the findings are summarized below.

Aesthetics. The OCTS maps (see Appendix A, Figure A.1-1) use the designated scenic highways, the 2011 REGPA scenic designation, as well as the federal lands Visual Resource Management classifications to illustrate the most sensitive aesthetic resources in the County. The Death Valley National Park was also identified as a sensitive resource due to its purpose to conserve scenery. Views within 0-1 miles (foreground views) of a sensitive resource, such as a scenic highway were mapped to provide a buffer to the viewers. Views within 1-3 miles (middleground view), were mapped but were found to be less sensitive as the views of development diminish as the distance to them increases. Because commercial-scale renewable energy can be readily viewed from some distance, locations furthest from these sensitive visual resources were identified as potential opportunities and locations near the sensitive resources as potential constraints.

Biological Resources. For the biological resources analysis, categories were selected to serve as proxies for areas of high biological sensitivity. Each category was mapped using publically available data. These categories include:

- Designated critical habitat for species listed under the Endangered Species Act (ESA)
- Available occurrence data for special-status species, including those listed under ESA and California Endangered Species Act
- Sensitive vegetation and habitats, including waters and wetlands
- Migratory and movement corridors for wildlife, including important migratory bird stopovers
- Habitat Conservation Plans (HCPs) and other biological considerations.

Publicly available spatial datasets were obtained from various sources including the CDFW, Inyo County, FWS, CEC, and DataBasin.org. Datasets were grouped according to the biological sensitivity categories identified above and maps were developed to identify the geographic extent of each resource, as applicable (see Appendix A, Figures A.2-1 through A.2-6). The report also identified areas that are off-limits to renewable energy development because they are protected (in full fee or through conservation easements) specifically to preserve habitat or agricultural land. The biological resources data were assessed in terms of sensitivity, and a ranking system was developed that uses a subset of these data (see Appendix A, Figure A.2-7). The ranking system is intended to roughly identify areas of moderate and low sensitivity for renewable energy development, with respect to biological resources.

Cultural Resources. The OCTS discusses three kinds of cultural resources, prehistoric, historic, and built-environment. Most cultural resources have a site specific nature. That is, the identification and evaluation of cultural resources can only be accomplished through pedestrian survey of the project area because each and every cultural resource site is unique in its location, preservation of artifacts and features, and extent of its boundaries. However, in order to predict the potential for cultural resources, the study used available datasets to highlight areas of potential sensitivity, including named streams, water bodies, wetlands and playas/dry lakes; ecotone boundaries[1]; obsidian and Fine-grained Volcanic toolstone sources; and slope. This is because access to water and other natural resources was an important consideration for prehistoric population settlements. The study then used the data sets to map where the individual data overlapped highlighting the areas of the County that are most likely to be sensitive for cultural resources (see Appendix A, Figures A.3-1 and A.3-2). In addition, the historic and built-environment areas were mapped to show sensitive locations (see Appendix A, Figure A.3-3).

The OCTS also considered cultural landscapes, or geographic areas associated with a historic event, activity, or person exhibiting other cultural or aesthetic values. Landscapes are understood and documented by conducting ethnographic research that identifies the contributing elements or attributes of the landscape. Contributing elements can include both cultural and biological resources, climate and landforms, subsistence, religion, economy and the built environment. In Inyo County several cultural landscapes have been identified by state agencies, primarily in the southeast corner of the County, in the Panamint Valley, and along the Inyo and White Mountain ranges east of the Owens River Valley. This is not to say that cultural landscapes are not extant in other portions of the County as well, but that thus far these regions are known to have culturally important landscapes. Renewable energy resources may affect cultural landscapes and would be addressed in the programmatic environmental review.

Geology and Soils. Geologic features were mapped where the data was available (see Appendix A, Figure A.4-1). In addition, the overall geologic stability of the County was researched and considered. As with much of California, Inyo County has an extensive fault system that can result in impacts to sub-surface conditions resulting in liquefaction, seismic settlement or other effects. While the geologic features were mapped and considered, renewable energy development can generally mitigate for seismic concerns through appropriate engineering. Commercial-scale renewable energy development facilities are not themselves habitable structures so are not required to conform to the California Building Code.

Hazards and Hazardous Materials. Siting renewable energy on contaminated land can provide an economically viable reuse for sites with significant cleanup costs or low real estate development demand that would otherwise lay idle, providing additional tax revenue. As part of this study, brownfield sites that have renewable energy potential were mapped using the Rural Desert Southwest Brownfields Coalition data and the EPA Renewable Energy Mapper data. This EPA tool makes it possible to view information about renewable energy potential on federal- and State-identified contaminated lands, landfills, and mine sites. All of EPA's RE-Powering Mapper sites have been designated as viable for off-grid solar PV development. Additionally, of the sites that have been designated as viable for large-scale and/or utility level solar PV and wind development for grid integration, all but one are located within land under County jurisdiction along the Route 395 corridor (see Appendix A, Figure A.5-1).

Hydrology and Water Quality. As described in Appendix A, the study considered the County groundwater basins as well as the surface water (see Appendix A, Figures A.6-1 through A.6-3). Some renew-

[1] An ecotone boundary is the boundary between two different vegetation zones.

able energy technologies, such as wind and solar PV, have very minimal water requirements while others, such as solar thermal technologies, require more water resources for operational purposes. Groundwater in Inyo County is governed by a number of documents including the 1991 Inyo County/Los Angeles Water Agreement that designates some groundwater basins as On and others as Off. Groundwater basins with an On status provide potential opportunities for siting renewable energy developments with a higher water footprint, such as solar thermal technologies. Because some technologies have very minimal water requirements beyond construction, the groundwater basins were not used as a siting criteria for the REDAs (see Section 5.2). Flood hazard areas were identified and would constrain the amount of renewable energy development potential in such areas.

Land Use. The OCTS considers what land uses within Inyo County would be appropriate for commercial-scale renewable development. Land uses such as public facilities and institutional uses, industrial land uses, airports, and agriculture were identified spatially (see Appendix A, Figure A.7-2). Much of Inyo County is under federal or state jurisdiction. These areas were also mapped to identify sensitive areas under the appropriate jurisdictional land use plan (see Appendix A, Figure A.7-1). Existing land uses, zoning, and regulatory and policy constraints were considered because land use constraints associated with renewable development are typically associated with such concerns.

Mineral Resources. Mineral resources provide both an opportunity and a constraint for renewable energy siting. While siting of renewable energy on active or potential future mine sites must be done carefully to avoid interference with active operations, renewable energy can coincide with mining operations or be a profitable reuse option for former sites. Many existing mines would potentially provide opportunities for development of renewable energy either in conjunction with the active running of the mine or as a potential part of remediation of the mine site (see Appendix A, Figure A.8-1).

Socioeconomic Factors. While socioeconomic factors would not dictate the most appropriate locations for renewable energy, they are important for the County to consider when making policy decisions. County costs vary in the disparate regions due to the relative costs of providing infrastructure and services. The existing level of services in some areas of the County, such as the south and southeast locations, are low compared with other areas such as the Owens Valley. Future renewable energy project development would directly and indirectly result in socioeconomic (employment, etc.) and fiscal (tax and other County revenue) opportunities and constraints.

5.2 Results: Environmental Screening and Infrastructure

Appendix A of this report presents an analysis of environmental resources, identifying the opportunities and constraints of nine technical resources for areas where renewable energy generation could be sited. A subset of the environmental resources analyzed in Appendix A was then defined as those with most relevance for identifying opportunities and constraints for renewable development. For some resources, no constraints or opportunities were quantifiable such that they would help identify locations where renewable energy development would be most appropriate. For example, while geology would be an important feature to consider when engineering a project, it is not a factor that would affect the County's actions in either precluding or encouraging development. Geologic features such as active faults would be addressed via adequate project-level engineering.

After consideration of all environmental resources and evaluation of potential assessment methodologies, the following resources were selected as being the most valuable for identifying opportunities and constraints for renewable energy development: aesthetics, biological resources, cultural resources and land uses. Also, the location of existing available electric transmission and distribution lines has also been included in the consideration of opportunities and constraints.

The REDA maps (presented in Section 7) and the REDA descriptions in this section are intended to be used together. Based on the opportunities and constraints identified for each of the important resource areas (see Appendix A), the County has been divided into the following three ratings for renewable energy development:

- Least Constrained (identified as blue on maps)
- Moderately Constrained (identified as yellow on maps)
- Areas with the most constrains are not highlighted in a color.

These ratings are applied to each resource. The factors used to determine the ratings are discussed in detail for each resource considered in developing the REDAs.

Aesthetics

The results of the aesthetics analysis are shown on Figure 5-1, Overview of Aesthetics Resources (presented in Section 7) and described below.

Least Constrained. For visual resources, the locations where renewable installations would be less visible were found to be least constrained. Much of the County is designated as visually sensitive so these areas were avoided in this designation.

Moderately Constrained. The Route 395 middleground corridors were considered a potential opportunity for development. While some of the scenic corridors may be sufficiently sensitive such that they would not be appropriate for development, many of the areas may provide opportunities for development at a further distance as with the middleground corridors.

Most Constrained. The locations designated by the BLM as sensitive visual resource management classes, Death Valley National Park, and the locations identified as visually sensitive on the U.S. Forest Service lands were identified as not appropriate for renewable energy development at a large scale. These locations have been designated as having high visual sensitivity and the contrast with renewable energy development would be great.

Biological Resources

The results of the biological resources analysis are shown on Figure 5-2, Overview of Biological Resources. Much of the County has one or more potential constraints for renewable energy development, from a biological resources perspective. Portions of the County have sensitive biological resources that may not preclude development of renewable energy, but would require biological surveys, permitting, and mitigation.

Least Constrained. Areas with non-native vegetation types, including areas mapped as Barren, Cropland, Irrigated Hayfield, and Urban were identified as potential opportunities for development. Additionally, LADWP Zone I Areas were identified as opportunities for LADWP properties in the Owens Valley because they were screened by LADWP for vegetation types, sensitive wildlife and plant communities, wetland, riparian areas and springs and found to be the best opportunities for renewable energy development.

Moderately Constrained. Areas with moderate biological sensitivity would potentially be available for renewable energy development, but would likely require additional surveys and mitigation, so are not likely to be appropriate for streamlined development.

Most Constrained. Areas that have been identified as having high sensitivity or been identified for preservation for unique biological values would be less available or not open to renewable energy development.

Cultural Resources

Cultural resources were evaluated in detail in this study, but were not included as a factor in the development of REDAs because most cultural resources are site specific. There is no available data at the County scale that would allow development or prohibit at specific sites. Figure 5-3 illustrates the locations of potentially sensitive archaeological areas overlain by the 2011 REGPA Overlays for informational purposes. However, without completion of site surveys, it is not possible to know the specific locations of most cultural resources and it would not be possible to rank these locations. Best management practices and pre-construction surveys to ensure avoidance will be recommended in the Program EIR to reduce any impacts to cultural resources.

In Inyo County several cultural landscapes have been identified by state agencies, primarily in the southeast corner of the County, in the Panamint Valley, and along the Inyo and White Mountain ranges east of the Owens River Valley. This is not to say that cultural landscapes are not extant in other portions of the County as well, but that thus far these regions are known to have culturally important landscapes. Renewable energy resources may affect cultural landscapes and would be addressed in the programmatic environmental review.

Land Use

The OCTS considers what land uses within Inyo County would be appropriate for commercial-scale renewable development. The results of the land use analysis are shown on Figure 5-4.

Least Constrained. Areas currently being used for Agriculture, General Industrial, Heavy Commercial, Light Industrial, or Public Service Facilities would be most appropriate for renewable energy development because they are already disturbed. Some of these areas, such as existing industry, would be available for renewable energy at a smaller scale because of the existing use but would potentially also provide a load center for the renewable energy. Brownfield sites (as identified by EPA) would also be available for development, but any cleanup of potentially contaminated sites would need to be considered. LADWP lands were also identified as appropriate for renewable energy development based on the LADWP Area Narrowing Study performed in 2013.

Moderately Constrained. Locations where the land use would potentially be compatible with renewable energy development were identified. These included areas that were neither disturbed nor protected under a specific policy.

Most Constrained. Renewable energy development would not be appropriate on wilderness and tribal lands (unless proposed by the tribe). For these locations, renewable energy development would be contrary to the purposes for which such lands are used and designated (i.e., areas with natural environment not intended for human use). In Areas of Critical Environmental Concern, renewable energy development may be prohibited or constrained depending on the stipulations the BLM designates for the area.

BLM-administered grazing allotments are also shown on Figure 5-4, but were not used in the ranking system. The BLM management plans provide an overview of acceptable uses in grazing allotments. These plans would need to be considered when proposing renewable energy on grazing allotments. Wind energy may be compatible with grazing whereas solar energy would likely require the removal of the grazing allotment. Prior to any development on such land, the effects to grazing allotments would need to be considered and mitigated.

Energy Infrastructure

The existing County energy infrastructure is shown on Figure 4-1 and discussed in Section 4. Both SCE and LADWP have existing transmission lines that run north-south along the Route 395 corridor and energy developers could also interconnect with the Nevada transmission system. For the use of any of these transmission systems, substantial upgrades would be required. LADWP's existing 230 kV Inyo-Rinaldi Transmission System has capacity for approximately 240 MW of renewable energy at this time. LADWP has stated that the Southern Owens Valley Solar Ranch has a priority position for future interconnection to this existing line. If this project is not completed, this capacity would be potentially available for a different project. For projects located in the southeastern portion of the County, existing transmission would be available via the Nevada transmission system. Upgrades along the Valley Electric Association system would also be required.

For distributed commercial generation some capacity is available in the Bishop area on the SCE distribution system. SCE has stated that in general it considers projects of less than 10 MW as the appropriate size to interconnect with their distribution system.

5.3 Description of OCTS Areas by Constraints

Having established resource-specific opportunities and constraints as described in Section 5.1 (and analyzed in Appendix 6), those data were then used to determine the REDAs throughout the County, as shown on Figure 5-5. The methodology used to determine the REDAs is as follows:

- As a starting point, the entire County is considered potentially available for renewable energy development. This analysis then eliminated all areas that were considered ***challenging for renewable energy development,*** i.e., all areas left unshaded.
- The analysis then identified locations where development could ***potentially be appropriate for renewable energy development***, i.e., locations identified as moderately constrained and identified as yellow for each environmental consideration.
- Locations not eliminated or identified as potentially available for renewable energy development were then identified as likely to be ***open for renewable energy development***, i.e., locations identified as least constrained and identified as blue in Section 5.1.

The analysis identified multiple areas with varying sensitivity levels for each environmental resource. Where sensitivities were conflicting, the most conservative designation (i.e., most protective of the resources) was used for the area. The analysis then included brownfield sites as identified by the U.S. EPA RE-Powering data and the Owens Valley Dry Lake. The EPA RE-Powering data identifies locations that are already disturbed and potentially feasible for renewable development. The LADWP is considering renewable energy development on portions of the Owens Valley Dry Lake as potential mitigation for dust emissions resulting from the Dry Lake.

The 2011 REGPA General Plan Land Use Designation Overlay areas have been included in Figures 5-5a through 5-5o. This is because the County has already performed studies on the 2011 REGPA General Plan Land Use Designation Overlay and there is potential development interest in these locations. However, the OCTS is not limited to these regions and presents areas covering the entire County.

The DRECP Development Focus Areas are also shown on Figures 5-5a through 5-5o. The DRECP Development Focus Areas are locations where renewable energy development would be focused and where renewable projects could receive incidental take permits[2] under the DRECP. The DRECP presented seven alternatives in the *Description and Comparative Evaluation of Draft DRECP Alternatives*, published December 2012. The County Background Report Map 10 illustrates the Draft DRECP Development Focus Areas based on the seven alternatives. The OCTS figures show the Development Focus Areas from Alternative 5 because this alternative had the largest number of acres of Development Focus Areas in Inyo County and would represent the most conservative analysis in the CEQA document.

Table 5-2. REDA Acres by General Plan Land Use Designation Overlay

2011 Overlay Name	Moderately Constrained Acres	Least Constrained Acres
Centennial Flat–Darwin	72,126	0
Charleston View	30,419	0
Chicago Valley	6,453	0
Death Valley Junction	67,664	3
Deep Springs	6,897	0
Fish Lake Valley	13,479	0
Laws	3,064	3,672
Owens Lake–Keeler	0	77,014
Owens Valley	29,568	7,240
Panamint Valley	76,495	0
Pearsonville	7,198	0
Rose Valley	48,226	0
Sandy Valley	3,115	
Tecopa	39	1
Trona	19,530	944
Total	381,234	88,869

Overall, as identified within Table 5-2, the OCTS analysis concludes that within the 2011 REGPA overlays, the County has

- Over 93,000 acres of areas most appropriate for renewable development;
- Over 60,000 acres of land potentially appropriate for renewable development; and
- Over 400,000 acres of land least appropriate for renewable development.

Some of the 2011 overlay areas, such as the Chicago Valley, Deep Springs, Fish Lake Valley, and Panamint Valley are identified in this report as ***potentially subject to constraints*** for renewable development because of sensitive biological or visual resources. Other 2011 General Plan Land Use Designation Overlay areas such as Owens Valley, Owens Lake–Keeler, and Charleston View would ***potentially be appropriate*** for renewable energy development.

As can be seen on Figure 5-5, some locations outside of the 2011 REGPA overlay areas would be likely or potentially appropriate for renewable energy development and portions of the DRECP DFAs are located outside of the 2011 REGPA overlay areas. There are over 24,000 of least constrained acres outside of the overlays that would be potentially appropriate for renewable energy development and almost 800,000 of moderately constrained acres outside of the overlays that would be potentially appropriate for renewable energy development. Most of this area is in and around the Owens Valley Route 395 corridor and near the Laws overlay area. However, it should be noted that some of the cultural landscapes overlap with these areas, so they may be less appropriate from a cultural resource perspective.

[2] The Endangered Species Act prohibits the "take" of listed species through direct harm or habitat destruction. In the 1982 ESA amendments, Congress authorized the U.S Fish and Wildlife Service (through the Secretary of the Interior) to issue permits for the "incidental take" of endangered and threatened wildlife species. Thus, permit holders can proceed with an activity that is legal in all other respects, but that results in the "incidental" taking of a listed species.

The DRECP DFAs coincide with much of the Charleston View overlay area, portions of the Owens Lake-Keeler overlay area, portions of the Owens Valley overlay area, portions of the Pearsonville overlay area, and portions of the Rose Valley overlay area. The DRECP Alternative 5 DFAs cover almost 68,000 acres in Inyo County. There are approximately 4,500 acres of the Development Focus Areas outside of the moderately and least constrained areas that would be potentially appropriate for renewable energy development

5.4 Conclusion

Based on the spatial analysis of the county, there are a total of over 88,000 acres of land in the County 2011 Overlay areas that have the least constraints and over 381,000 acres of land that have moderate constraints that may be appropriate for renewable energy development. The majority of the most or potentially appropriate areas for renewable energy development are located along the Route 395 corridor near existing LADWP and SCE transmission. Some REDAs are located near the Nevada/California border near the Valley Electric Association. As discussed in Section 4.4, both the LADWP and SCE transmission systems would require substantial upgrades to carry large amounts of renewable energy that would be costly and time consuming.

The County could revise the 2011 REGPA overlay areas based on all or some of the information provided in the OCTS and the development focus areas identified in the DRECP. In many instances, this would entail revising the boundaries of REGPA overlay areas but in some instances the County could consider whether to eliminate an overlay area. Because substantial upgrades would be needed to export the energy, the County could work with LADWP, SCE, the Energy Commission, and the CPUC to consider how to encourage upgrades that would be most beneficial to all parties involved.

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Table 6-1. Data Sources Used in Biological Resources Screening Assessment

Data Layer	Source	Data Obtained From	Summary	Rationale for Inclusion
Critical habitat	USFWS	USFWS ECOS website: http://ecos.fws.gov/ecos/home.action#	All available designated critical habitat for federally listed species as of November 2013.	Critical habitat supports listed and other rare species; regulatory constraints and environmental sensitivity warrant avoidance to the extent possible
CNDDB	CDFW	CNDDB professional subscription	Occurrence records for special-status species and sensitive vegetation communities submitted to the CNDDB; current as of 11/2013.	Identifies known occupied areas for special-status species, and sensitive vegetation occurrences that have been submitted to CNDDB.
Modeled Desert Tortoise Habitat	Nussear, K. E., T. C. Esque, R. D. Inman, Leila Gass, K. A. Thomas, C. S. A. Wallace, J. B. Blainey, D. M. Miller, and R. H. Webb. 2009. Modeling habitat of the desert tortoise (*Gopherus agassizii*) in the Mojave and parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona: U.S. Geological Survey Open-File Report 2009-1102, 18 p.	USGS: http://pubs.usgs.gov/of/2009/1102/	Quantitative habitat model for the desert tortoise using an extensive set of field-collected presence data. Habitat is rated from lowest to highest quality on a scale of 0-1.	Identifies the higher quality modeled habitat (ranked 0.6-1.0) in Inyo County for the desert tortoise, a State- and federally listed species.
GAP vegetation data	Davis, F. W., D. M. Stoms, A. D. Hollander, K. A. Thomas, P. A. Stine, D. Odion, M. I. Borchert, J. H. Thorne, M. V. Gray, R. E. Walker, K. Warner, and J. Graae. 1998. The California Gap Analysis Project--Final Report. University of California, Santa Barbara, CA.	http://www.biogeog.ucsb.edu/projects/gap/gap_data2.html	Land-cover/land use data compiled for the California Gap Analysis Project. It contains vegetation attributes for landscape scale map units, including canopy dominant species, canopy density, presence of regional endemic species, and inclusion of wetland habitats.	Provides County-wide vegetation data, including sensitive vegetation where development should be minimized and disturbed habitats where vegetation should be focused
LADWP Type A Vegetation Management Areas and Zone 1 areas	LADWP	Inyo County	A study of vegetation was conducted for the Long Term Water Agreement between Inyo County and the LADWP. Type-A management areas are non-groundwater dependent and were identified as areas to be explored for renewable energy development early in the process. LADWP then screened its properties in the Owens Valley for potential sites for solar energy development, and Zone 1 areas are the locations identified as best opportunities for renewable energy development.	Identifies potential opportunities for renewable energy development on LADWP-owned lands in the Owens Valley.

Table 6-1. Data Sources Used in Biological Resources Screening Assessment

Data Layer	Source	Data Obtained From	Summary	Rationale for Inclusion
NHD streams and waterbodies	USGS	USGS: http://nhd.usgs.gov/data.html	The National Hydrography Dataset (NHD) is a comprehensive set of digital spatial data that contains information about surface water features such as lakes, ponds, streams, rivers, springs and wells. Within the NHD, surface water features are combined to form "reaches," which provide the framework for linking water-related data to the NHD surface water drainage network.	Streams and waterbodies are sensitive habitats/landforms
Missing Linkages in California's Landscape	SC Wildlands: Penrod, K., R. Hunter, and M. Marrifield. 2001. Missing Linkages: restoring connectivity to the California landscape. California Wilderness Coalition, The Nature Conservancy, US Geological Survey, Center for Reproduction of Endangered Species, and California State Parks.	CDFW BIOS: ftp://ftp.dfg.ca.gov/BDB/GIS/BIOS/Public_Datasets/	Data was created to assist land managers, planners, scientists, regulators, and conservation organizations working on connectivity issues in California. For more details, the full report is available at www.scwildlands.org	Habitat linkages are sensitive because they can support biological connectivity between otherwise fragmented habitat blocks
Natural Landscape Blocks, Essential Habitat Connectivity Areas, and Interstate Connections	Spencer, W.D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi, and A. Pettler. 2010. California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration	CDFW BIOS: ftp://ftp.dfg.ca.gov/BDB/GIS/BIOS/Public_Datasets/	Caltrans and CDFW commissioned the California Essential Habitat Connectivity Project because a functional network of connected wildlands is essential to the continued support of California's diverse natural communities in the face of human development and climate change. The Essential Connectivity Map depicts large, relatively natural habitat blocks that support native biodiversity (Natural Landscape Blocks) and areas essential for ecological connectivity between them (Essential Connectivity Areas). This coarse-scale map was based primarily on the concept of ecological integrity, rather than the needs of particular species. Interstate Connections were identified to recognize the need for connectivity into neighboring states (Arizona, Nevada, and Oregon).	Natural landscape blocks are sensitive because they are large, relatively intact natural habitats that support native biodiversity, and Essential Habitat Connectivity Areas maintain connectivity between them. Interstate Connections are placeholders for future modeling efforts, ideally in collaboration with the neighboring states.

Table 6-1. Data Sources Used in Biological Resources Screening Assessment

Data Layer	Source	Data Obtained From	Summary	Rationale for Inclusion
Desert Tortoise Connectivity Areas	USFWS Desert Tortoise Recovery Office	BLM: http://solareis.anl.gov/maps/gis/	The FWS Desert Tortoise Recovery Office performed this landscape-scale modeling exercise to identify priority habitat linkages between and among desert tortoise conservation areas (as defined in USFWS, 2011) and define other large blocks of habitat with important value to recovery of the desert tortoise. Based on FWS current understanding, the combination of linkages and existing desert tortoise conservation areas represents the basis for a conservation network for the Mojave desert tortoise. Priority 1 lands are potential habitat linkages between existing conservation areas that have the best chance of sustaining connectivity for desert tortoise populations, and are priority areas for conservation of desert tortoise population connectivity. Priority 2 lands are other blocks of habitat with the greatest potential to support populations of desert tortoises, outside least cost corridors, and may also have important value to recovery.	Identifies modeled habitat linkages for the listed desert tortoise; a species of high conservation priority in the California deserts.
Connectivity Linkages and Condition, DRECP	Conservation Biology Institute; DRECP; SC Wildlands, Kristeen Penrod; Brian Croft, US Fish and Wildlife Service, San Bernardino, CA - 909-382-2677 John M. Taylor, US Fish and Wildlife Service, Palm Springs, CA - 760-322-2070 Ken Corey, US Fish and Wildlife Service, Palm Springs, CA - 760-322-2070Pete Sorensen, US Fish and Wildlife Service, Palm Springs, CA - 760-322-2070Cat Darst, US Fish and Wildlife Servie, Desert Tortoise Recovery Office, Ventura, CA - 805-644-1766 University of Redlands, Redlands, CA	DataBasin.org	These data represent linkages where maintenance or restoration of ecological connectivity is essential for conserving biological diversity within the DRECP area.	Identifies modeled habitat linkages for wildlife in the DRECP planning area, and includes current condition of linkages.

Table 6-1. Data Sources Used in Biological Resources Screening Assessment

Data Layer	Source	Data Obtained From	Summary	Rationale for Inclusion
Important Bird Areas	Audubon California. 2008. Mapping California's Important Bird Areas. National Audubon Society unpub-lished report. 65 p.	Audubon California: http://ca.audubon.org/california-important-bird-areas-gis-data-and-methods	Important Bird Areas (IBAs) identify essential sites that provide habitat for (i) rare, threatened or endangered birds, (ii) exceptionally large congregations of shorebirds, or (iii) exception-ally large congregations of waterfowl. In an effort to promote conservation and awareness of these areas, Audubon California set out to define and map the geographic boundaries of all IBAs in California using a Geographic Information System (GIS). The GIS data are current as of October 2013.	Identifies general areas important for migrating and breeding birds.
Conservation Easements – NCED Version 3, July 2013	National Conservation Easement Database (NCED)	DataBasin.org	The NCED is a collaborative venture to compile easement records (both spatial and tabular) from land trusts and public agencies throughout the United States in a single, up-to-date, sustain-able, GIS compatible, online source. The goal of the NCED is to provide a comprehensive picture of the privately owned conservation easement lands, recognizing their contribution to America's natural heritage, a vibrant economy, and healthy communities. Conservation easements are legal agreements voluntarily entered into between landowners and conservation entities (agencies or land trusts) for the express purpose of protect-ing certain societal values such as open space or vital wildlife habitats. In some cases land-owners transfer "development rights" for direct payment or for federal and state tax benefits.	Identifies conservation easements in Inyo County
Wildlife Conservation Board (WCB) approved projects	Wildlife Conservation Board	CDFW BIOS: ftp://ftp.dfg.ca.gov/BDB/GIS/BIOS/Public_Datasets/	A comprehensive set of Wildlife Conservation Board projects from board inception in 1949 to present (8/23/2013 publication date)	Identifies conservation easements and ecological reserves in Inyo County

Table 6-1. Data Sources Used in Biological Resources Screening Assessment

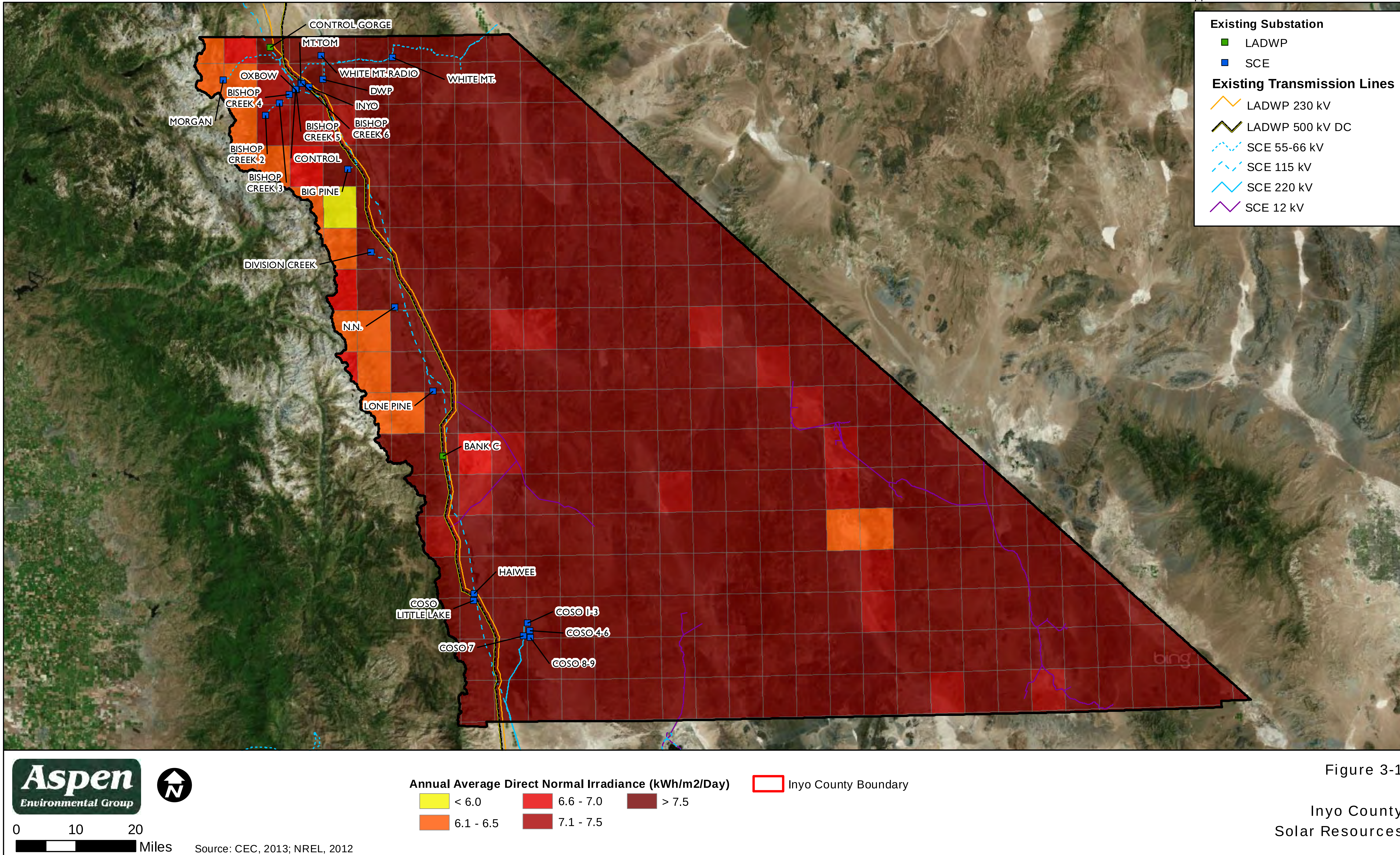
Data Layer	Source	Data Obtained From	Summary	Rationale for Inclusion
IMS Mitigation Target Areas – 2010	CDFW	CDFW BIOS: ftp://ftp.dfg.ca.gov/BDB/GIS/BIOS/Public_Datasets/	Mitigation Target Areas (MTA) were developed by the CDFW for the Interim Mitigation Strategy (IMS) in 2010. The MTAs are an identification of generalized target sub-areas for initial priority acquisition under the IMS. The MTAs were developed through collaboration between desert land trust experts, BLM, and CDFW biologists. These sub-areas were known to contain high-quality habitat with parcels that may potentially be available for acquisition under the provisions of SB 34. The selected MTAs are intended only for habitat acquisition under the provisions of SB 34 and do not necessarily correspond with mitigation areas yet to be defined after more detailed analyses under the DRECP Conservation Strategy. However, it is anticipated that the DRECP Conservation Strategy conservation areas will include portions of the areas designated here as IMS MTAs.	Identifies areas of conservation priority due to high biological value.
Mohave Ground Squirrel Management Area	BLM	Inyo County	The Mohave Ground Squirrel (MGS) Management Area is a BLM-designated Desert Wildlife Management Area (DWMA) under the WMP. Along with the desert tortoise, MGS is a target species of conservation concern for the WMP. This area was designated to protect MGS habitat in a core area of its current distribution, but applies only to BLM lands.	Identifies a conservation area on BLM lands for the listed MGS; a species of high conservation priority in the California deserts.
Protected Areas – California, October 2012 (PAD-US Version 2)	Conservation Biology Institute	DataBasin.org	PAD-US (CBI Edition) Version 2 is a national database of protected fee lands in the United States. This dataset is a subset showing fee lands in California.	Protected Areas have been set aside in perpetuity to preserve functioning natural ecosystems, act as refuges for species, and maintain ecological processes.
Conservation Plan boundaries, HCP and NCCP	CDFW	CDFW BIOS: ftp://ftp.dfg.ca.gov/BDB/GIS/BIOS/Public_Datasets/	Habitat Conservation Plan (HCP) and Natural Community Conservation Plan (NCCP) boundaries in California.	Designated for sensitive resources; development restricted or prohibited

Table 6-1. Data Sources Used in Biological Resources Screening Assessment

Data Layer	Source	Data Obtained From	Summary	Rationale for Inclusion
Environmental yellow areas (RETI)	Energy Commission	CDFW BIOS: ftp://ftp.dfg.ca.gov/BDB/GIS/BIOS/Public_Datasets/	Environmentally sensitive "Yellow" areas were generated by Black and Veatch and are general zones of sensitivity for renewable energy projects due to environmental sensitivity and other land use/management constraints. See "Phase 1B Proposed Final Report" at http://www.energy.ca.gov/reti/documents/index.html for more details. Yellow Areas are areas where existing restrictions are intended to limit potential renewable development. The following are considered Yellow Areas although some lands have restrictions unique to each area: BLM Areas of Critical Environmental Concern; USFWS designated Critical Habitat for federally listed endangered and threatened species; Special wildlife management areas identified in BLM's West Mojave Resource Management Plan i.e., Desert Wildlife Management Areas and Mojave Ground Squirrel Conservation Areas; Lands purchased by private funds and donated to BLM, specifically the California Desert Acquisition Project by The Wildlands Conservancy; and "Proposed and Potential Conservation Reserves" in HCPs and NCCPs.	Environmentally sensitive areas identified through the RETI process

Section 7

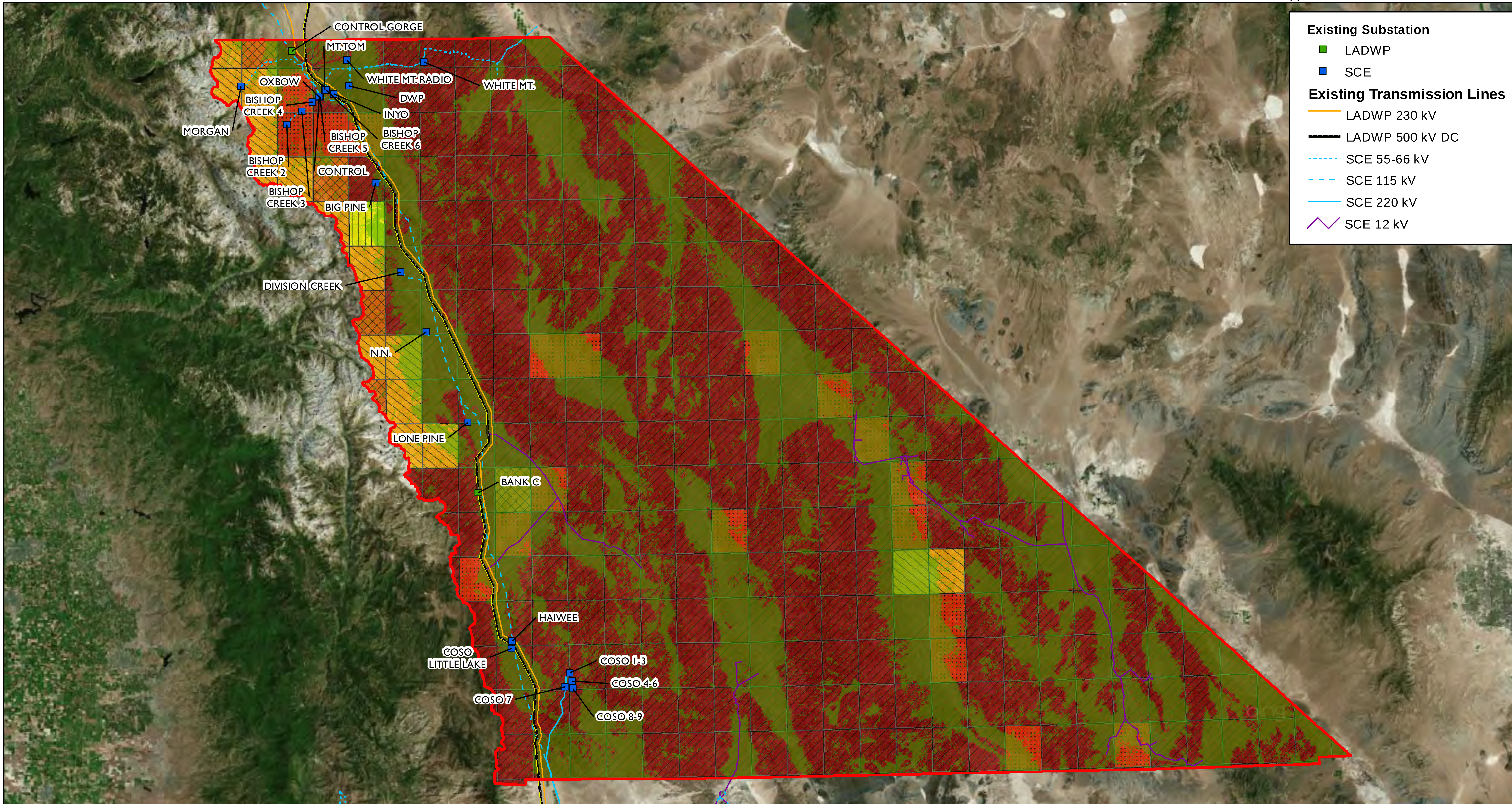
Figures



Source: CEC, 2013; NREL, 2012

Figure 3-1

Inyo County
Solar Resources

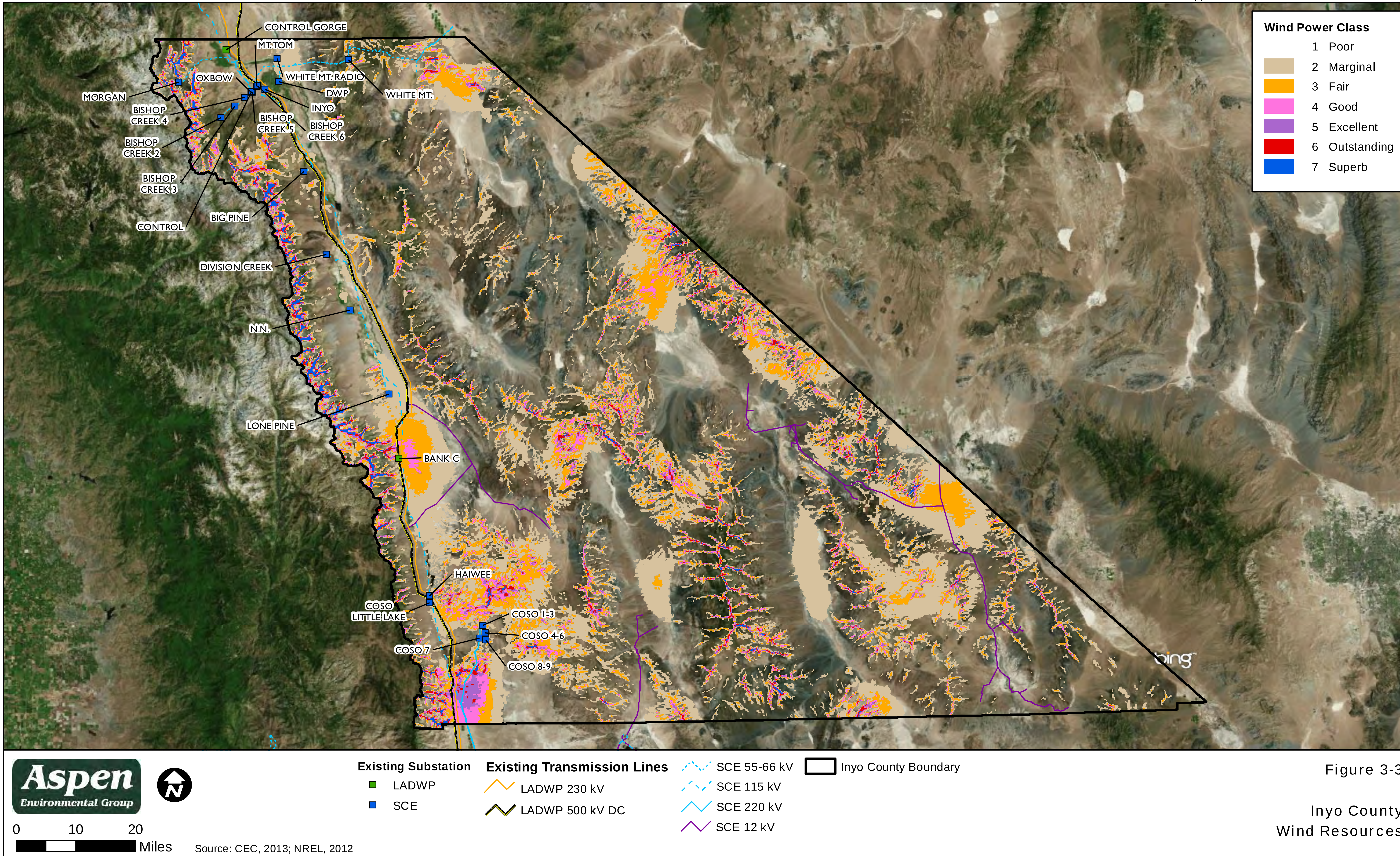


Aspen Environmental Group

Source: CEC, 2013; NREL, 2012; Inyo County, 2013

Figure 3-2

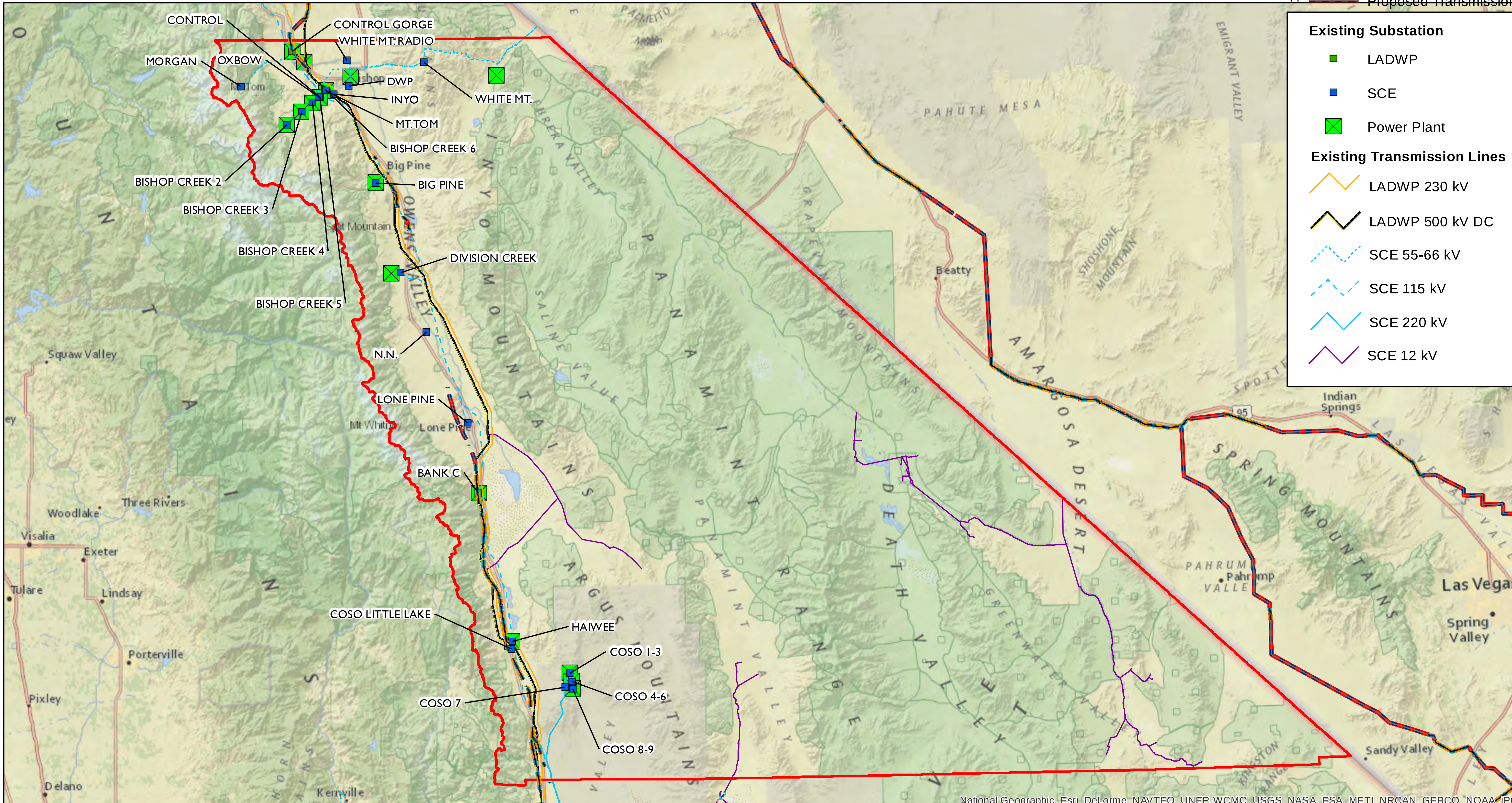
Inyo County
Solar Resources and Slope



Source: CEC, 2013; NREL, 2012

Figure 3-3

Inyo County Wind Resources



Aspen Environmental Group

0 10 20 Miles

Source: CEC, 2013; Inyo County, 2013

Existing Transmission Lines
Proposed Transmission Lines
Inyo County Boundary

Figure 4-1

Inyo County Transmission System

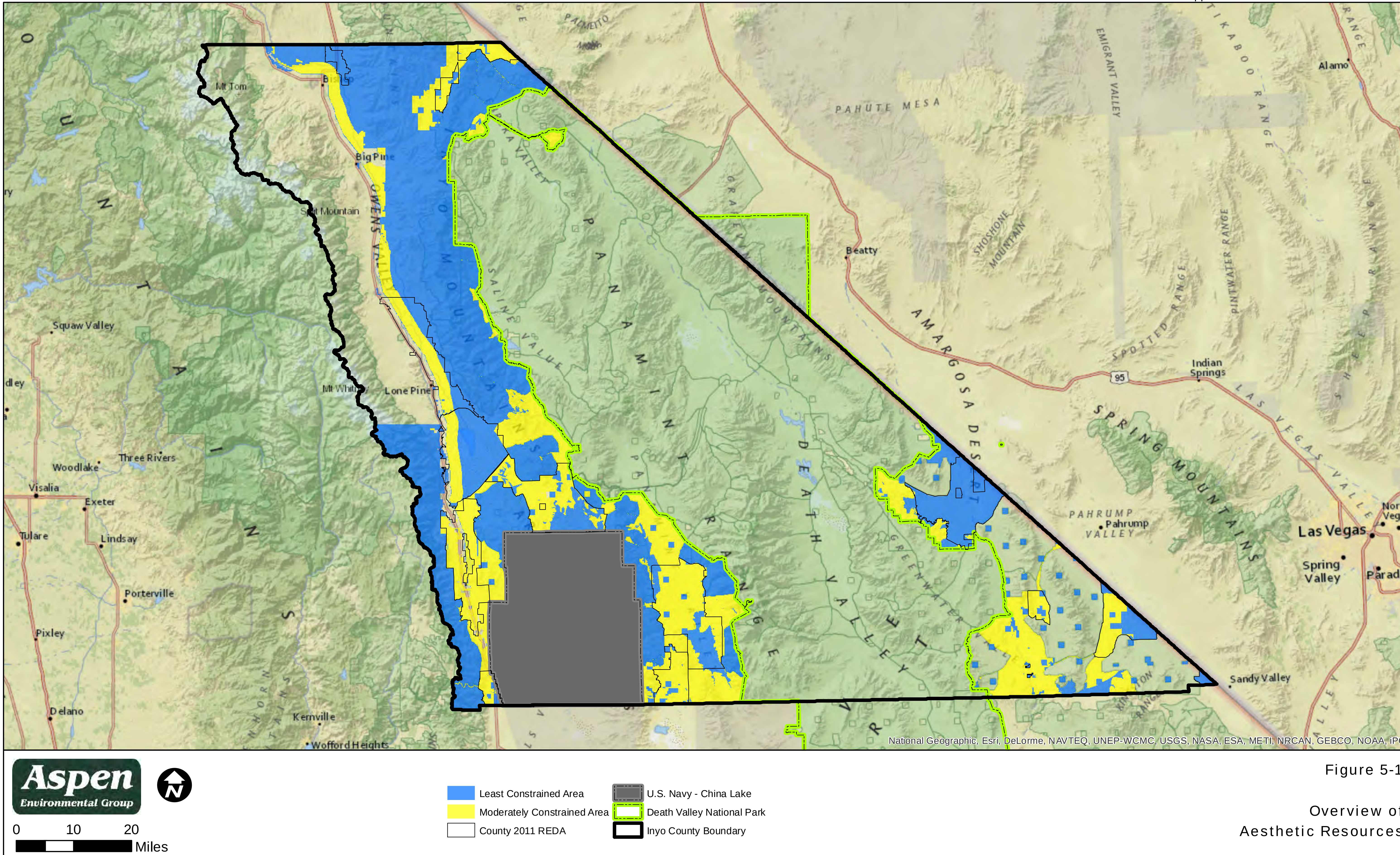
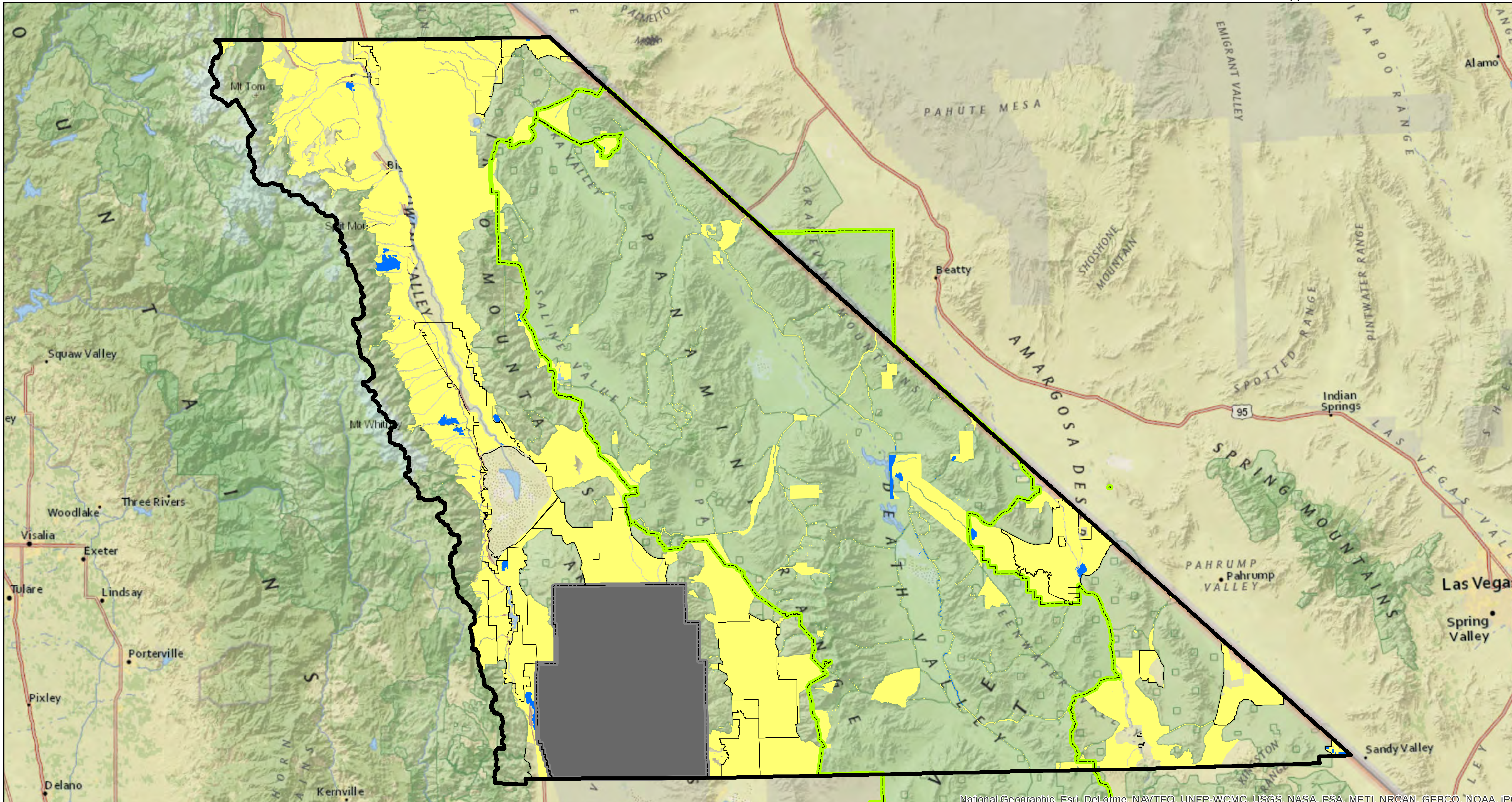


Figure 5-1

Overview of Aesthetic Resources



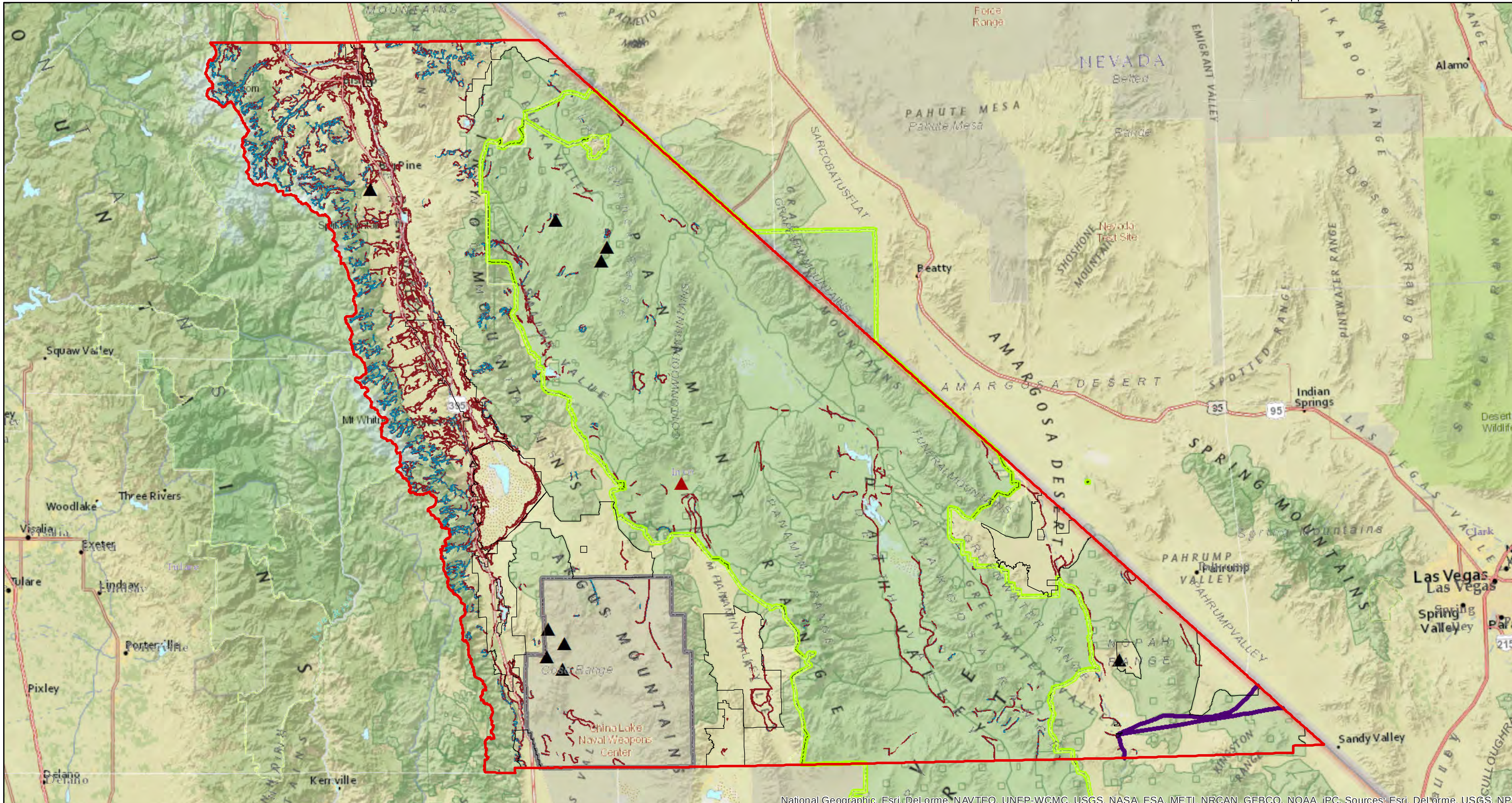
Aspen Environmental Group

0 10 20 Miles

Least Constrained Area (56,396 ac)
Moderately Constrained Area (2,142,050 ac)
County 2011 REDA
U.S. Navy - China Lake
Death Valley National Park
Inyo County Boundary

Figure 5-2

Overview of Biological Resources



Aspen Environmental Group

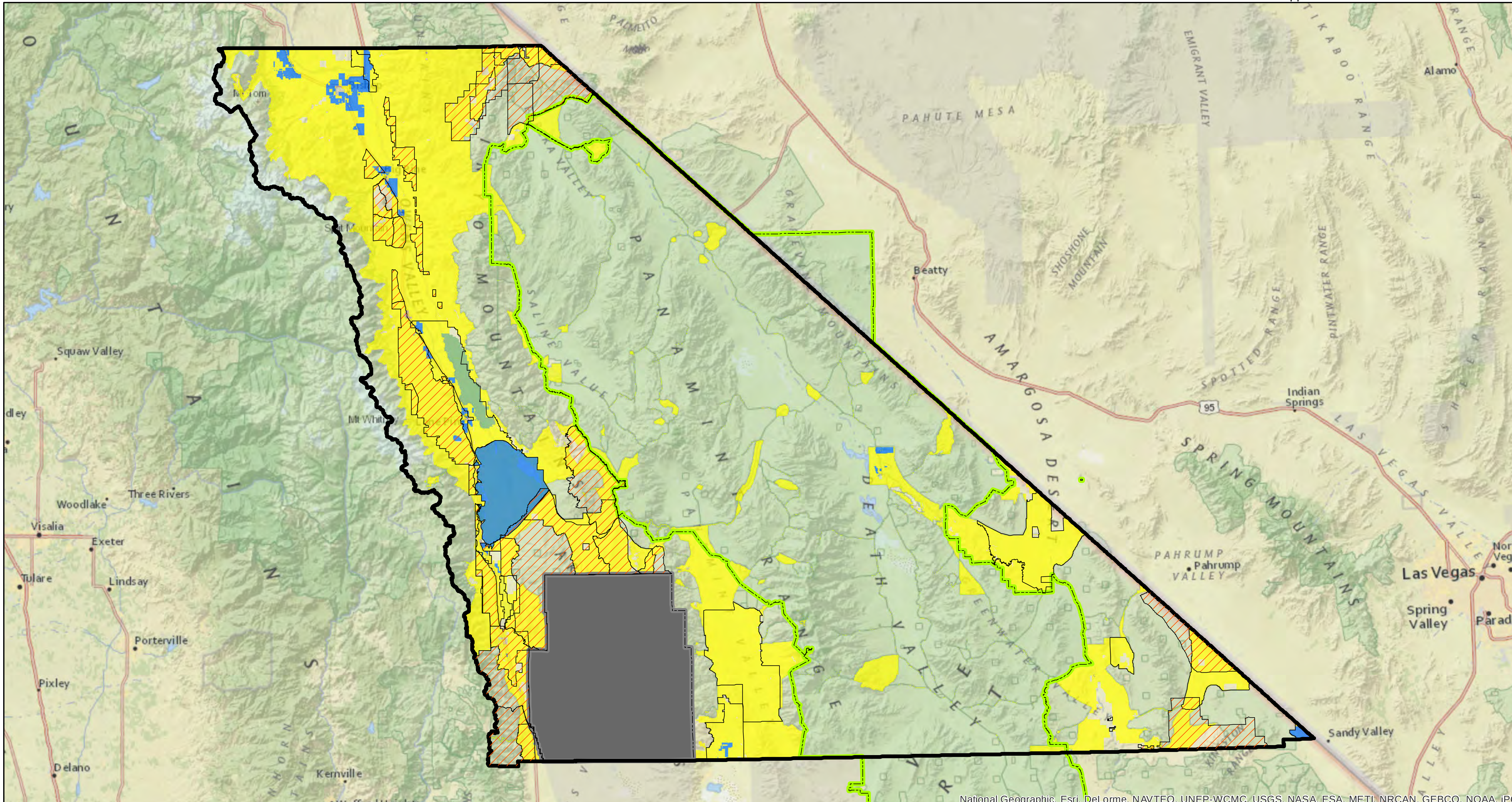
0 10 20 Miles

- Obsidian Source
- Fine-grained Volcanic Source
- Old Spanish National Historic Trail
- Areas of Prehistoric Cultural Sensitivity
- Ecotone - Waterbody Intersect
- County 2011 REDA
- U.S. Navy - China Lake
- Death Valley National Park
- Inyo County Boundary

Source: Aspen 2013, Northwest Research Obsidian Studies Laboratory 2011, Inyo County 2013; National Park Service, 2013

Figure 5-3

Overview of Cultural Resources



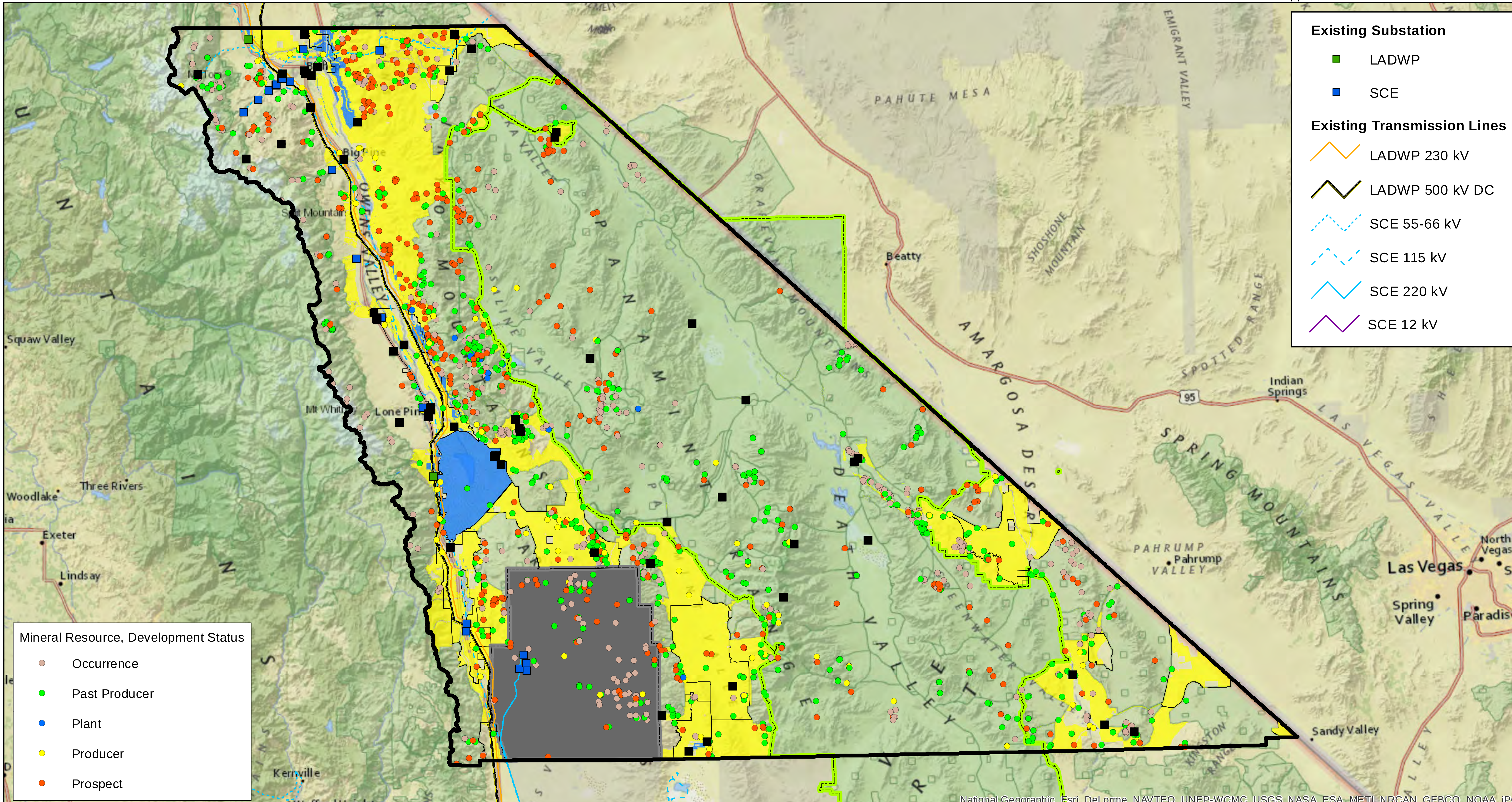
Aspen Environmental Group

0 10 20 Miles

BLM Grazing Alloment
LADWP Zone I
Most Likely Appropriate for Renewable Energy Development Exploration
Potentially Appropriate for Renewable Energy Development Exploration
County 2011 REDA
U.S. Navy - China Lake
Death Valley National Park
Inyo County Boundary

Figure 5-4

Overview of Land Use



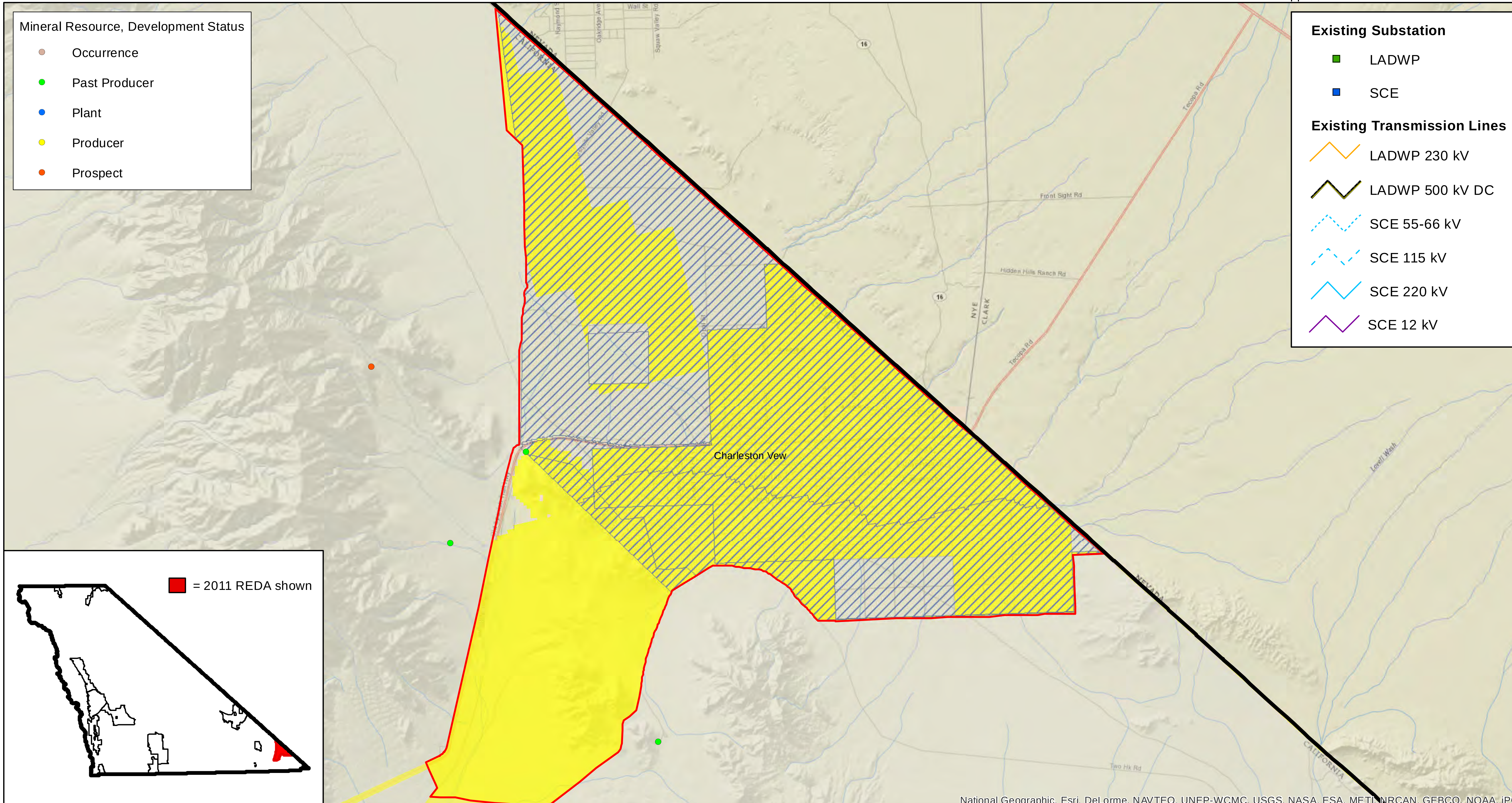
Aspen Environmental Group

0 10 20 Miles

- Re-Powering Mine Site
- Least Constrained Area (112,987 ac)
- Moderately Constrained (1,178,883 ac)
- County 2011 REDA
- U.S. Navy - China Lake
- Death Valley National Park
- Inyo County Boundary

Figure 5-5

Renewable Energy Development Areas - County Wide



Aspen Environmental Group

0 1.5 3 Miles 1:100,000

Least Constrained
Moderately Constrained
County 2011 REDA
DRECP DFA (Alt 5)
U.S. Navy - China Lake
Death Valley National Park
Inyo County Boundary

Figure 5-5a

Renewable Energy Development Areas -
2011 County REDA: Charleston View

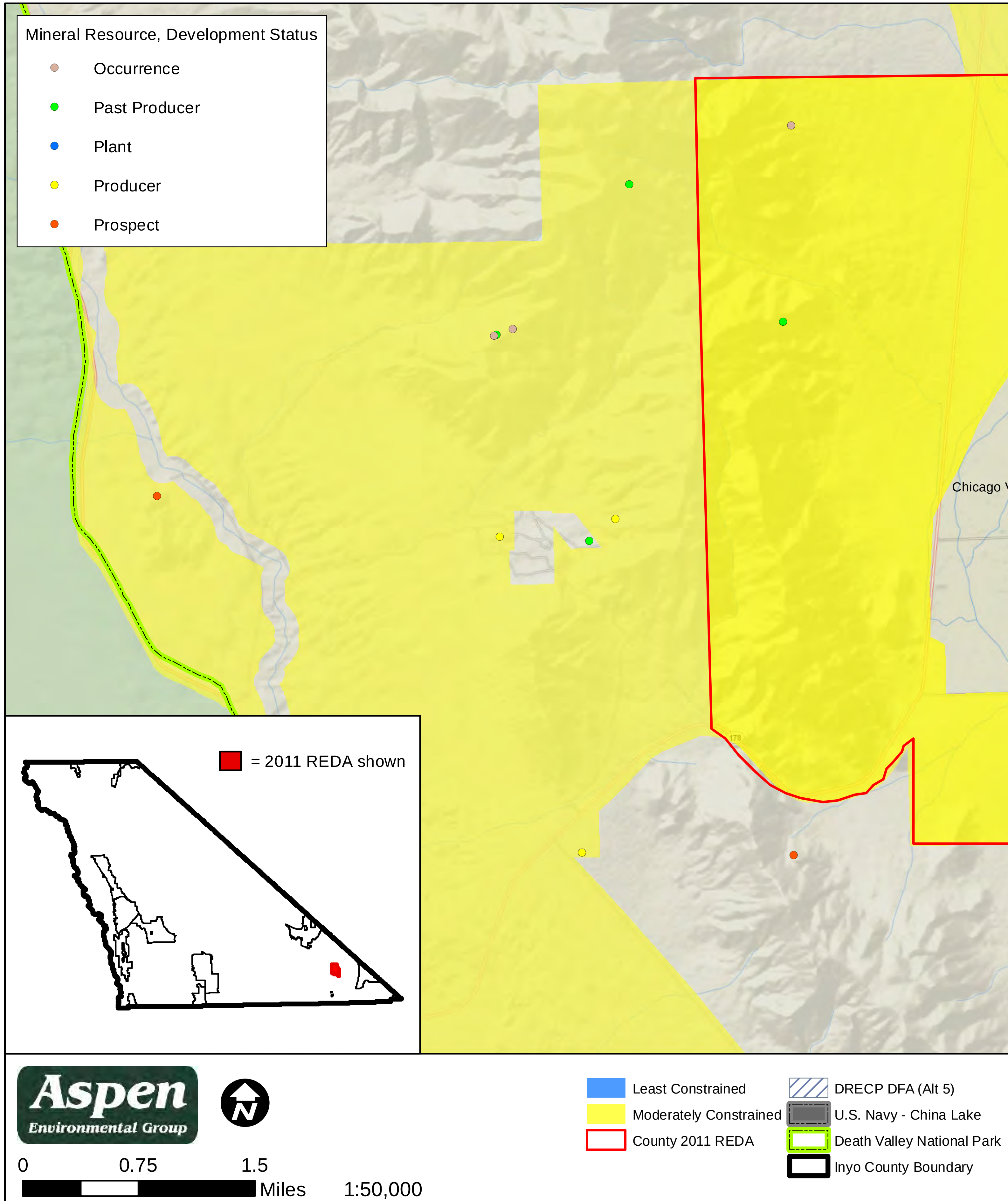


Figure 5-5b

Renewable Energy Development Areas -
2011 County REDA: Chicago Valley

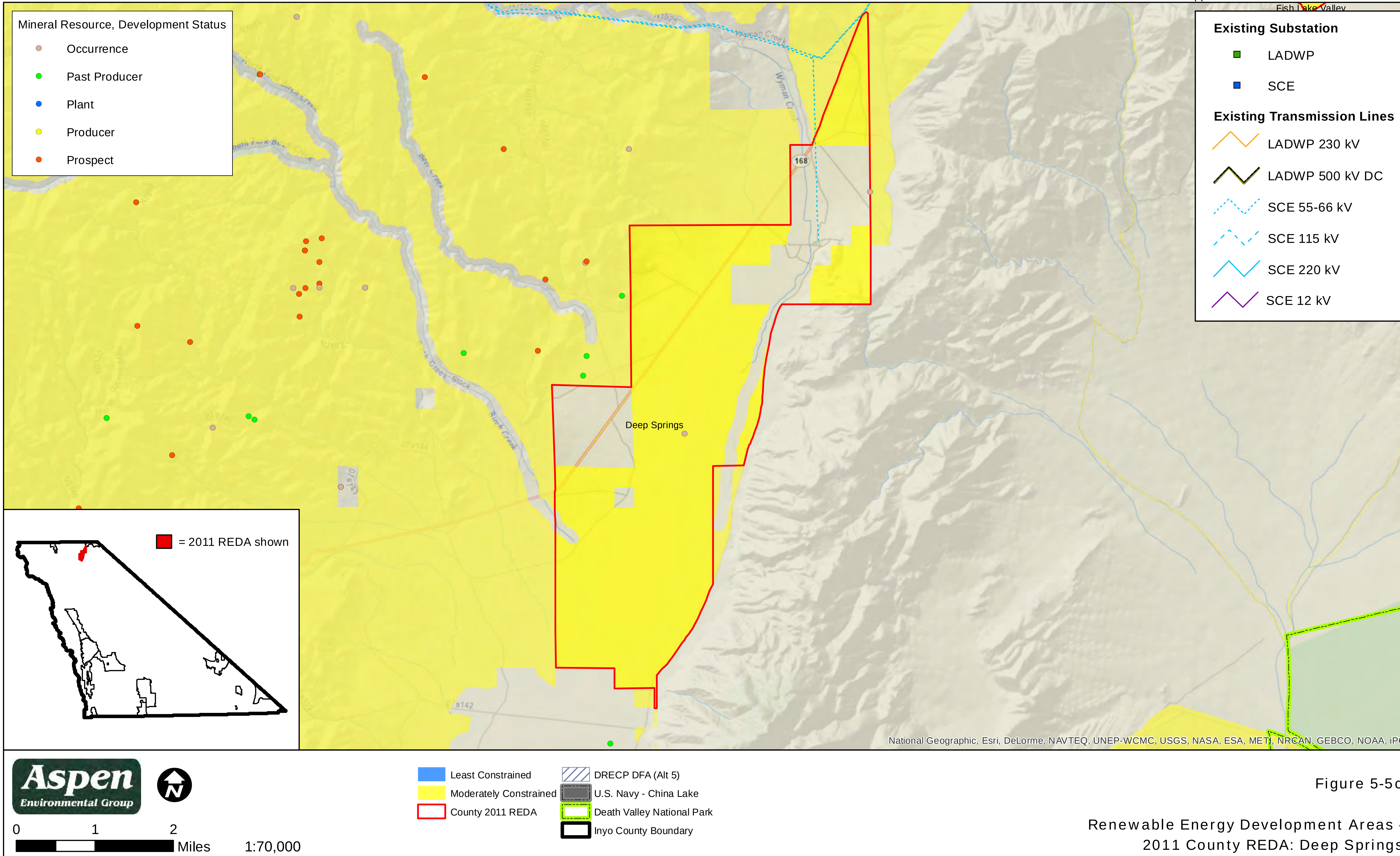


Figure 5-5c

Renewable Energy Development Areas -
2011 County REDA: Deep Springs

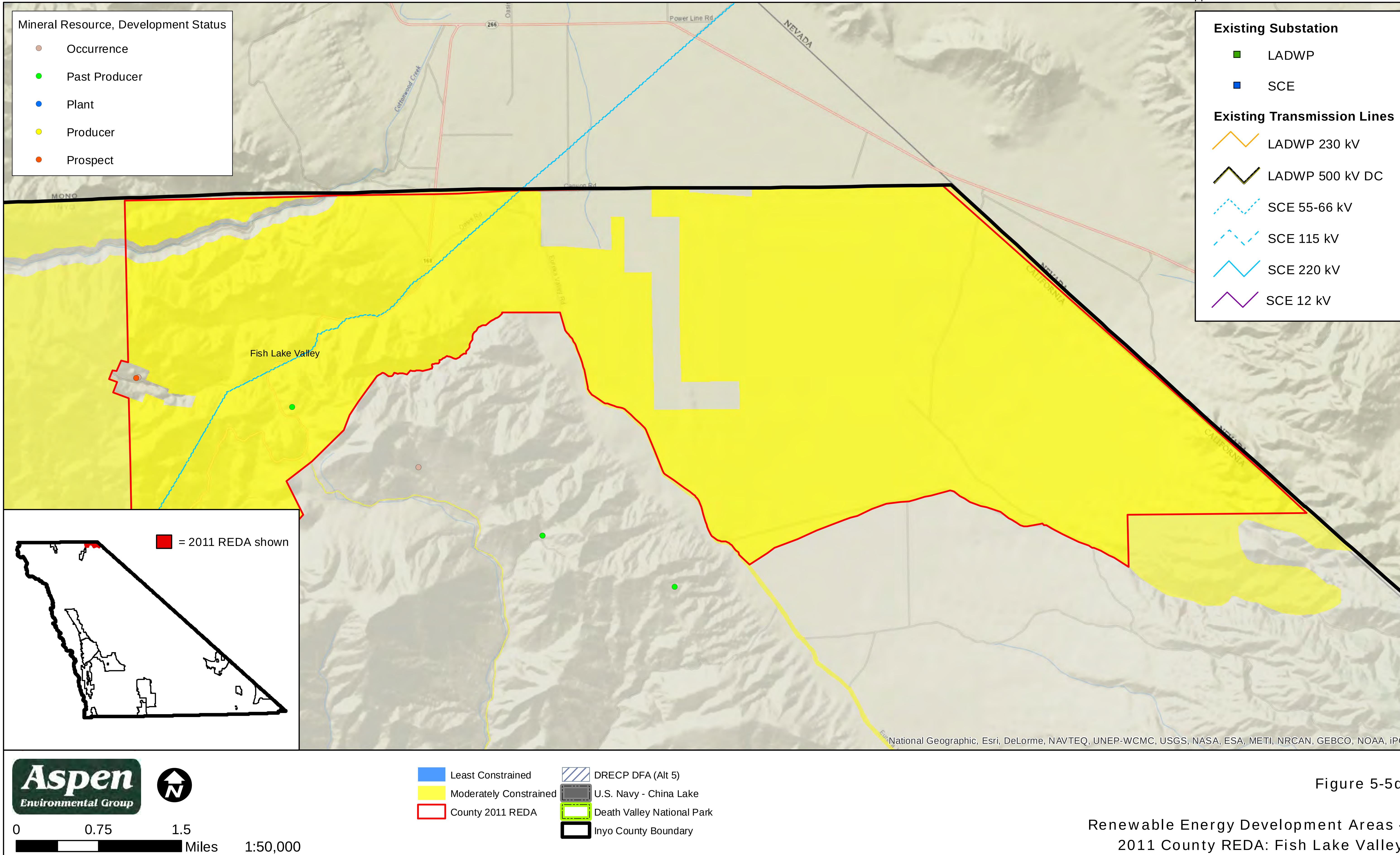
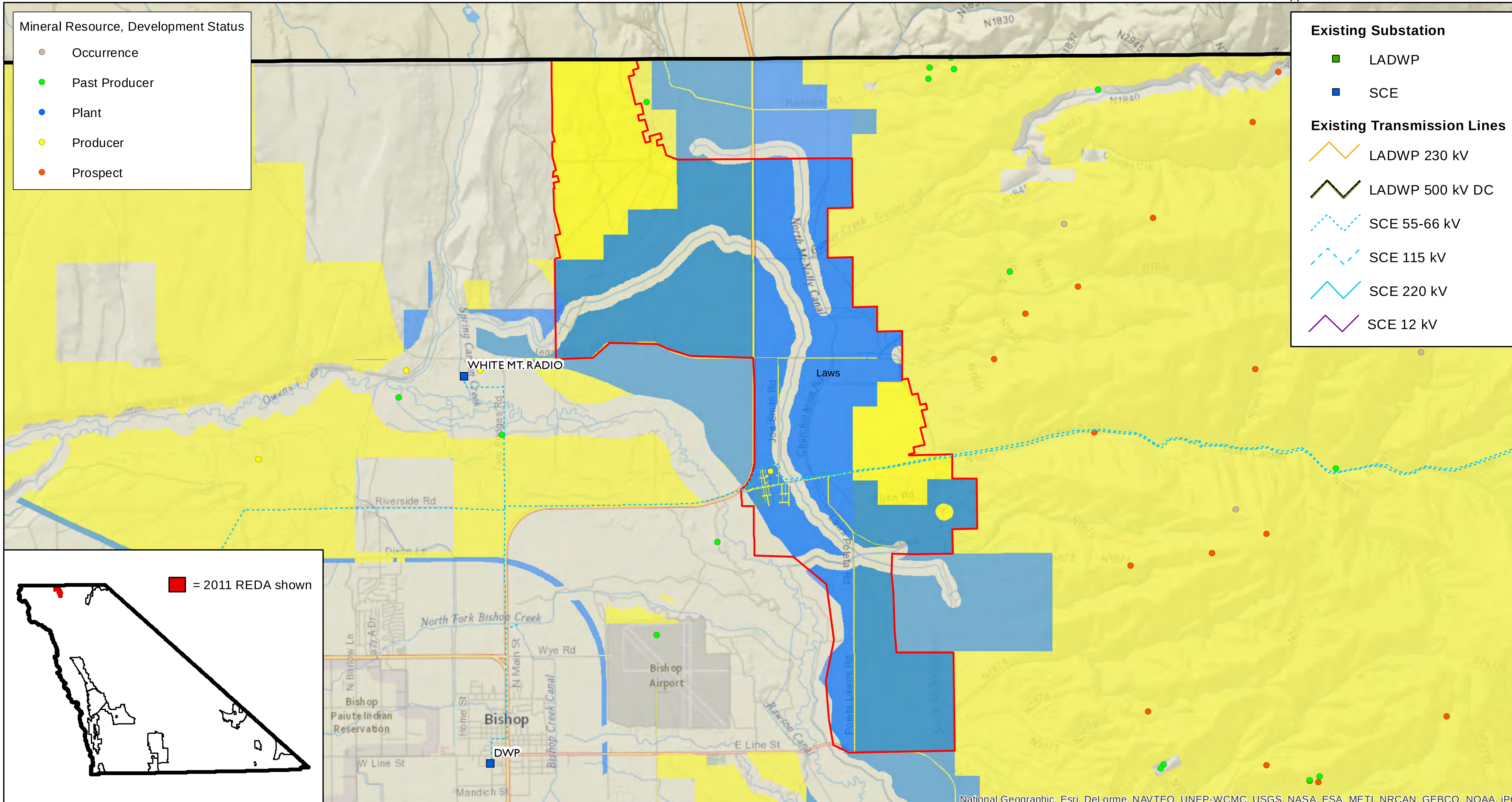


Figure 5-5d

Renewable Energy Development Areas -
2011 County REDA: Fish Lake Valley



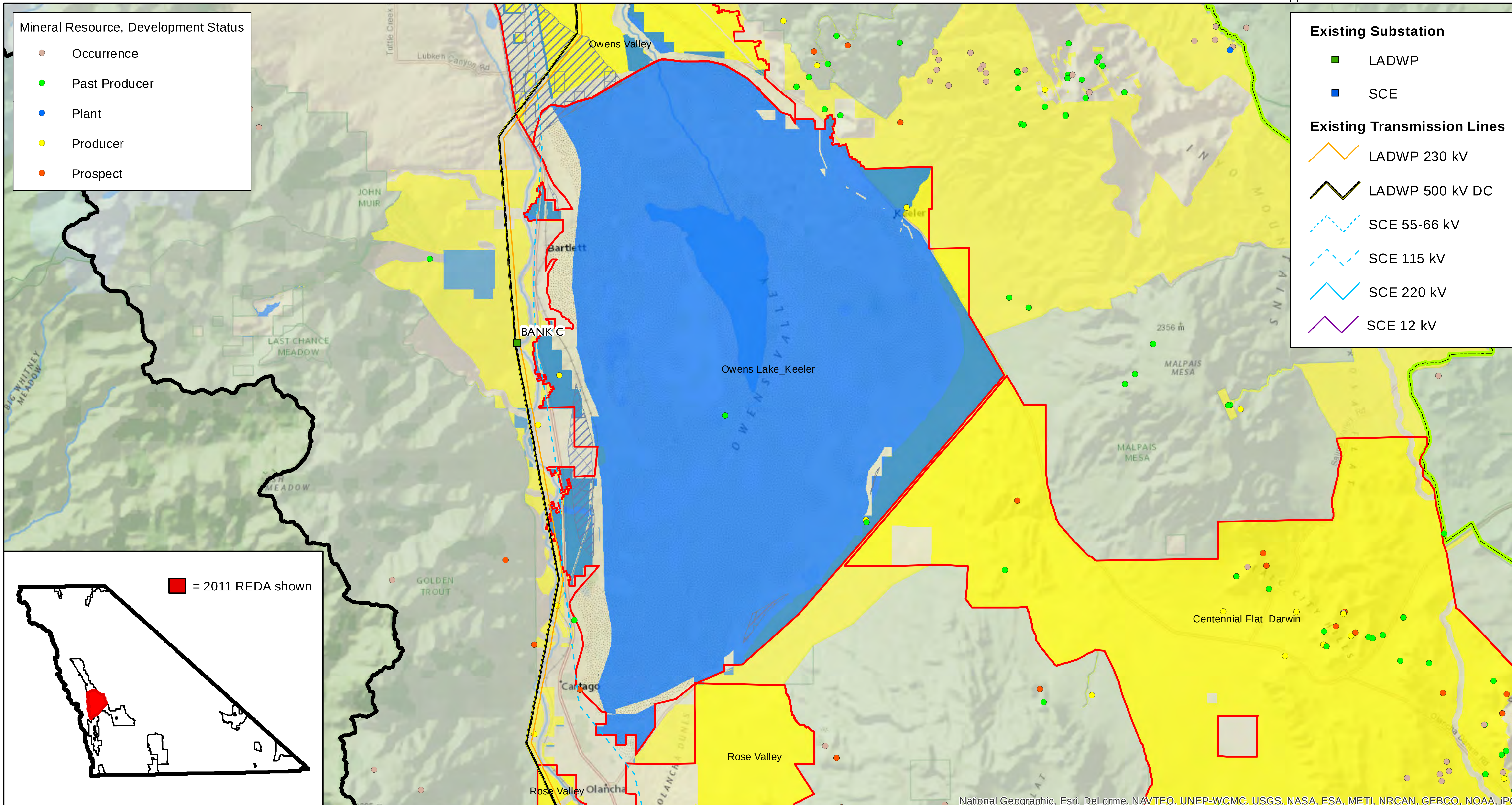
Aspen Environmental Group

0 0.9 1.8 Miles 1:60,000

Least Constrained
Moderately Constrained
County 2011 REDA
DRECP DFA (Alt 5)
U.S. Navy - China Lake
Death Valley National Park
Inyo County Boundary

Figure 5-5e

Renewable Energy Development Areas -
2011 County REDA: Laws



Aspen Environmental Group

0 2 4 Miles

1:150,000

Least Constrained
Moderately Constrained
County 2011 REDA
DRECP DFA (Alt 5)
U.S. Navy - China Lake
Death Valley National Park
Inyo County Boundary

Figure 5-5f

Renewable Energy Development Areas -
2011 County REDA: Owens Lake - Keeler

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January 2015

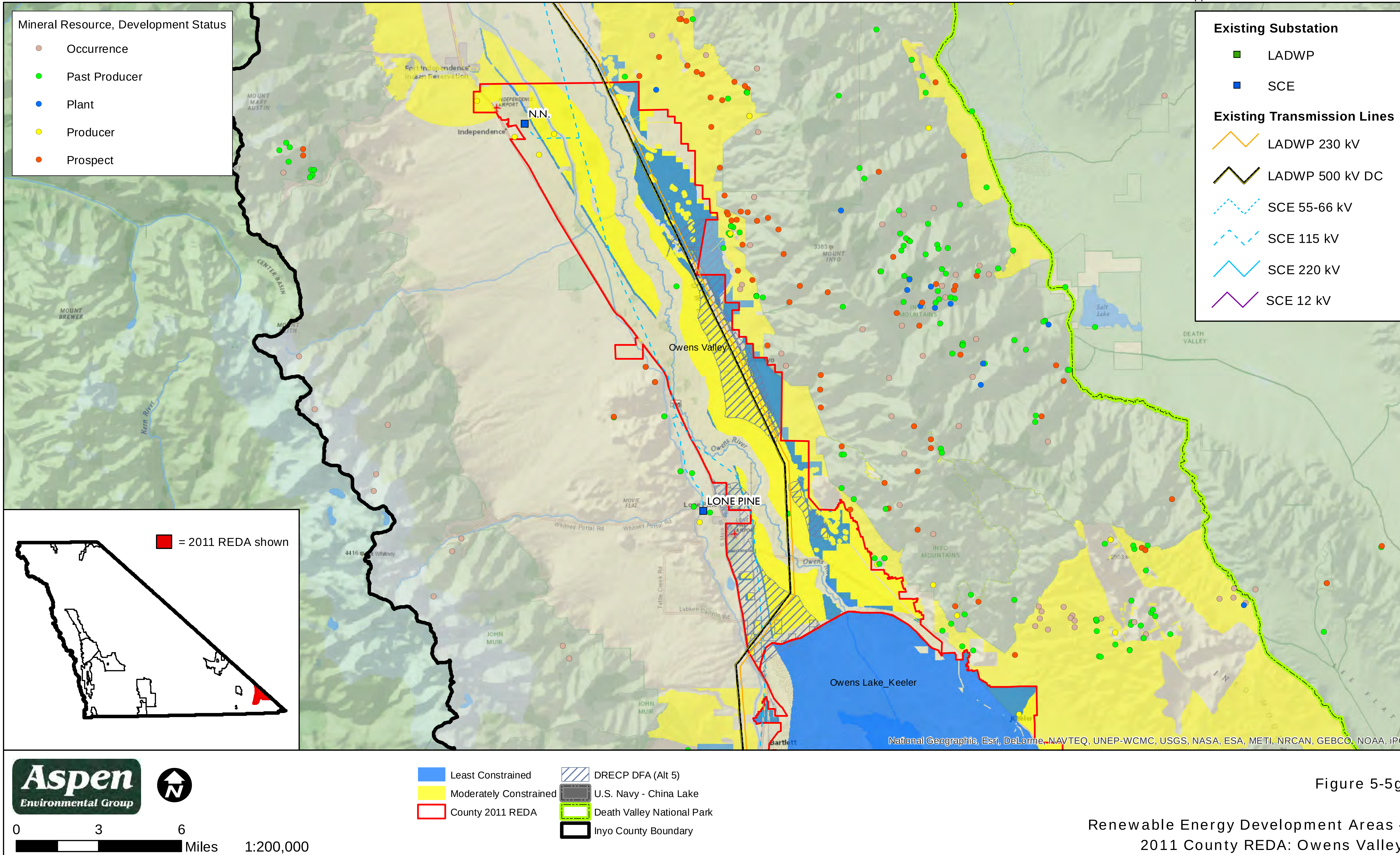

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Figure 5-5g

Renewable Energy Development Areas - 2011 County REDA: Owens Valley

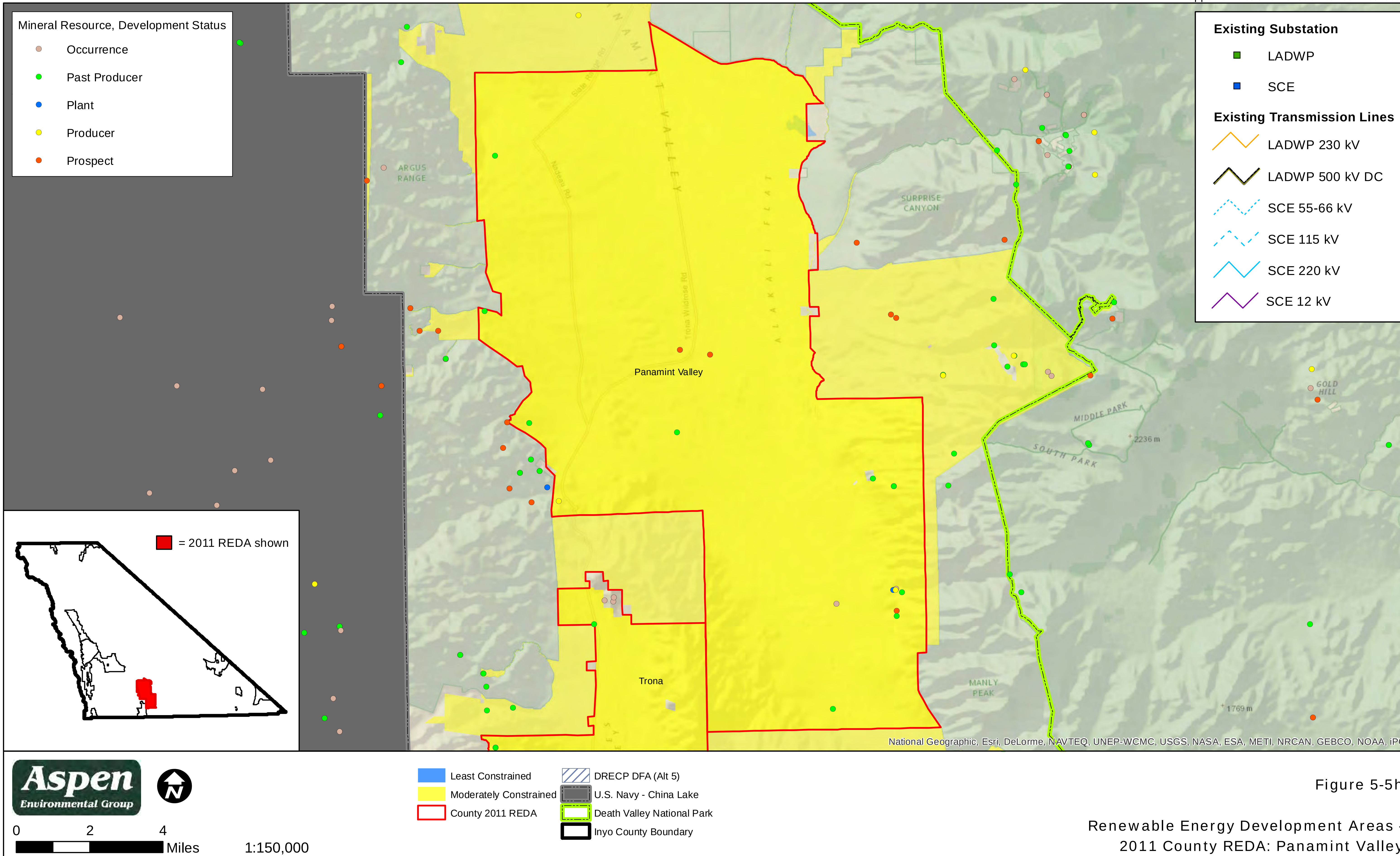
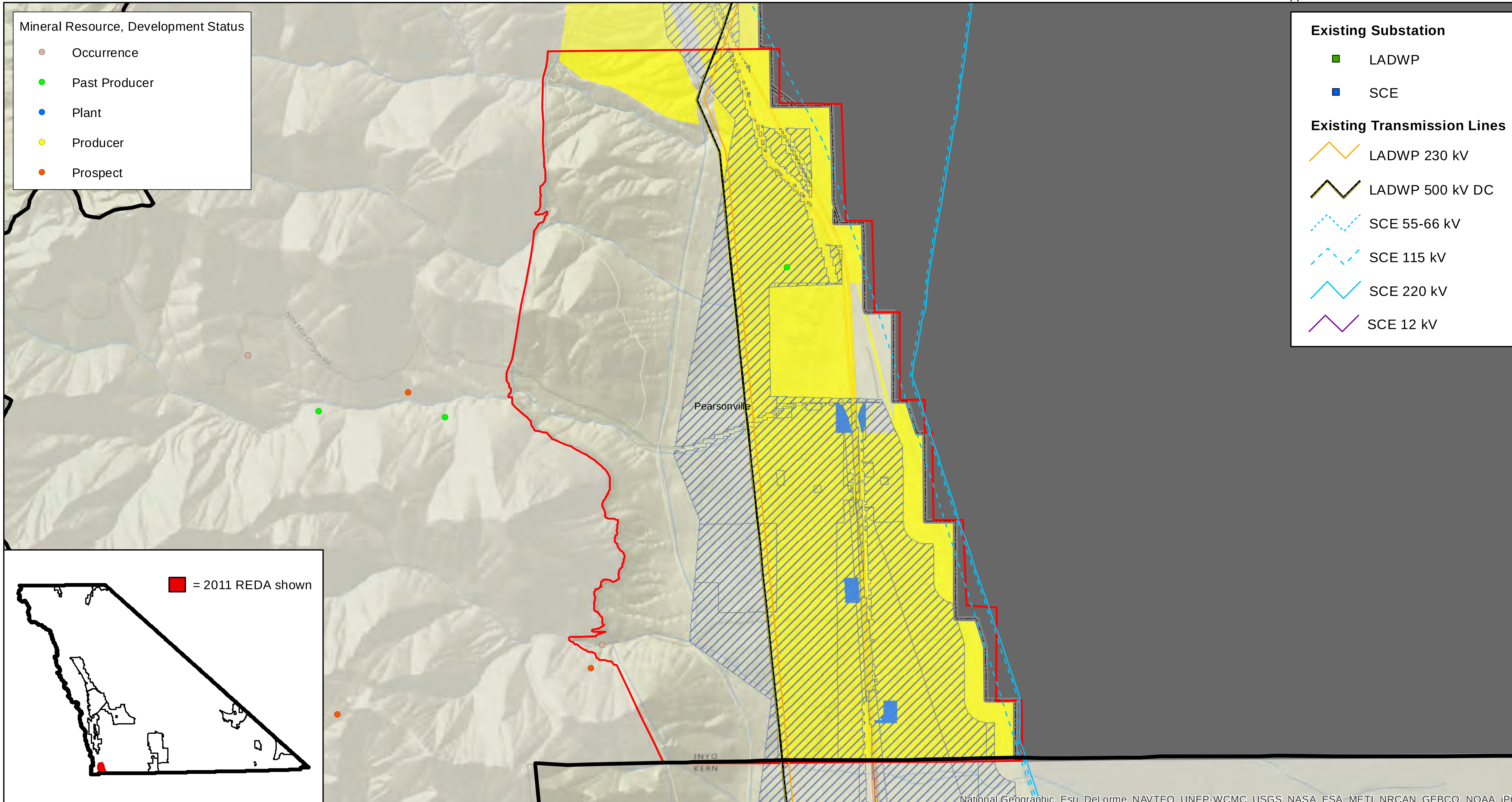


Figure 5-5h

Renewable Energy Development Areas -
2011 County REDA: Panamint Valley



Aspen Environmental Group

0 0.75 1.5 Miles 1:50,000

Least Constrained	DRECP DFA (Alt 5)
Moderately Constrained	U.S. Navy - China Lake
County 2011 REDA	Death Valley National Park
	Inyo County Boundary

Figure 5-5i

Renewable Energy Development Areas -
2011 County REDA: Pearsonville

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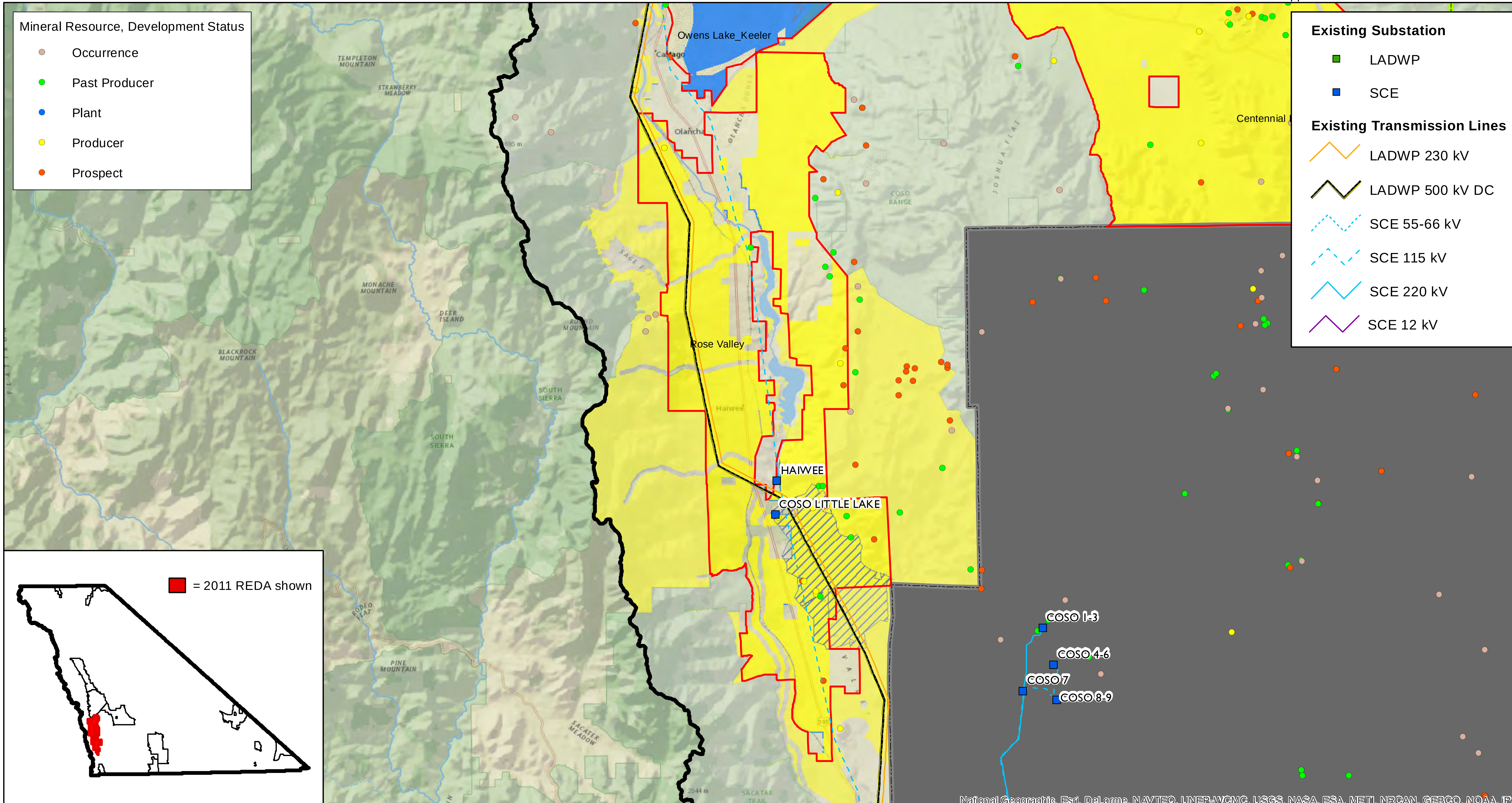


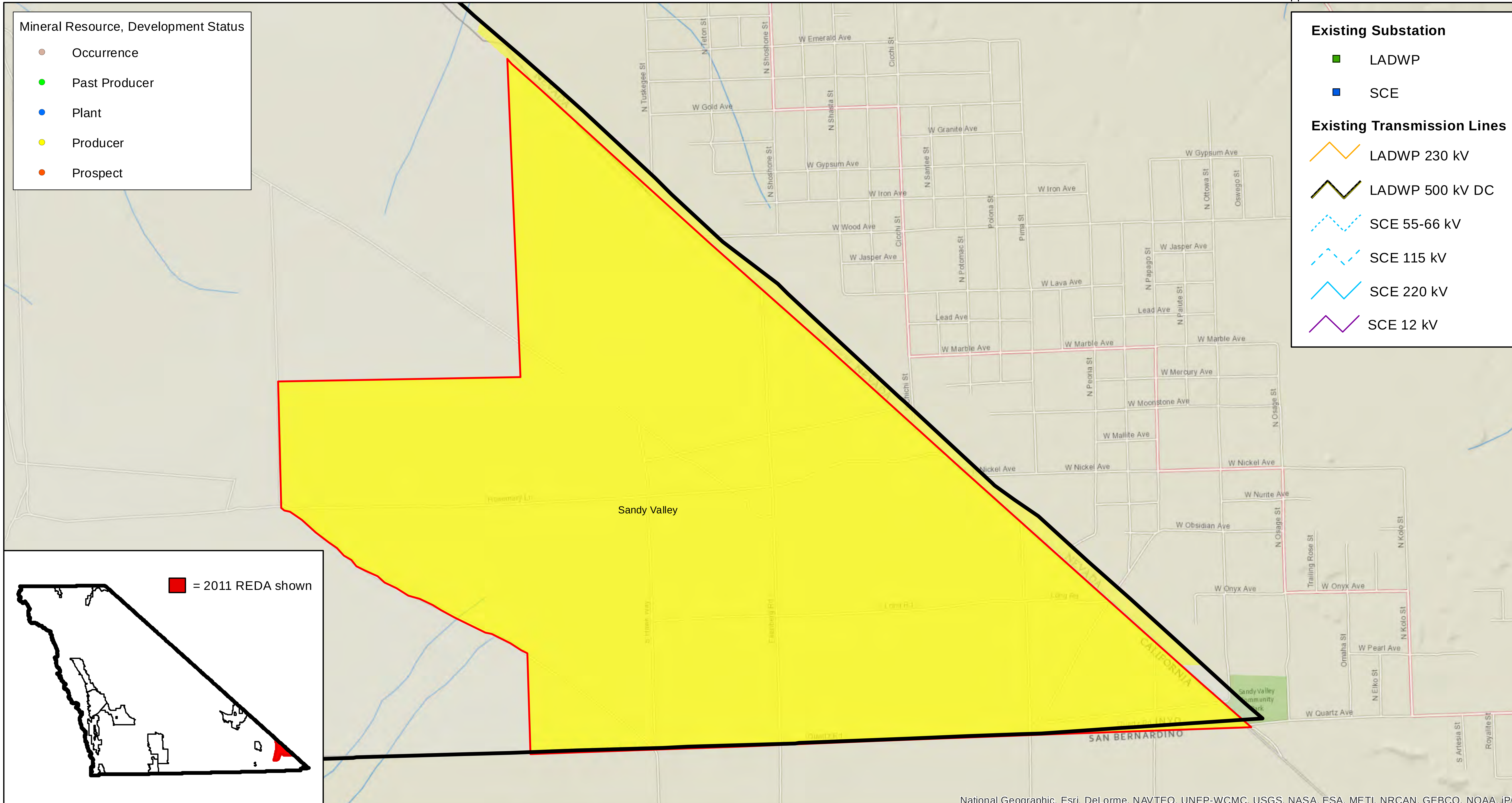
Aspen Environmental Group

0 3 6 Miles 1:200,000

Least Constrained
Moderately Constrained
County 2011 REDA
DRECP DFA (Alt 5)
U.S. Navy - China Lake
Death Valley National Park
Inyo County Boundary

Figure 5-5j

Renewable Energy Development Areas - 2011 County REDA: Rose Valley



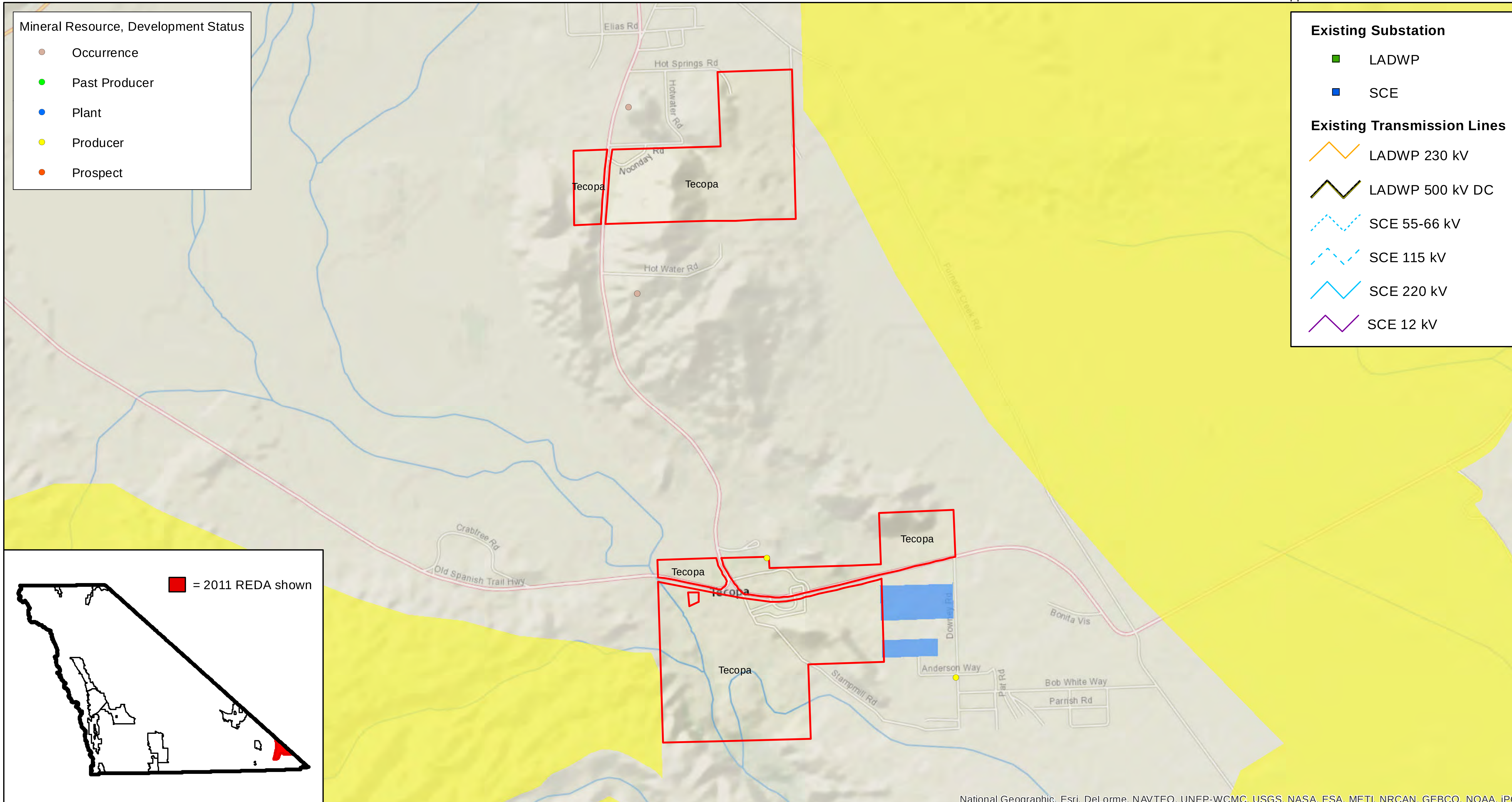
Aspen Environmental Group

0 0.35 0.7 Miles 1:24,000

Least Constrained
Moderately Constrained
County 2011 REDA
DRECP DFA (Alt 5)
U.S. Navy - China Lake
Death Valley National Park
Inyo County Boundary

Figure 5-5k

Renewable Energy Development Areas -
2011 County REDA: Sandy Valley



Aspen Environmental Group

0 0.3 0.6 Miles 1:20,000

Least Constrained
Moderately Constrained
County 2011 REDA
DRECP DFA (Alt 5)
U.S. Navy - China Lake
Death Valley National Park
Inyo County Boundary

Figure 5-5l

Renewable Energy Development Areas - 2011 County REDA: Tecopa

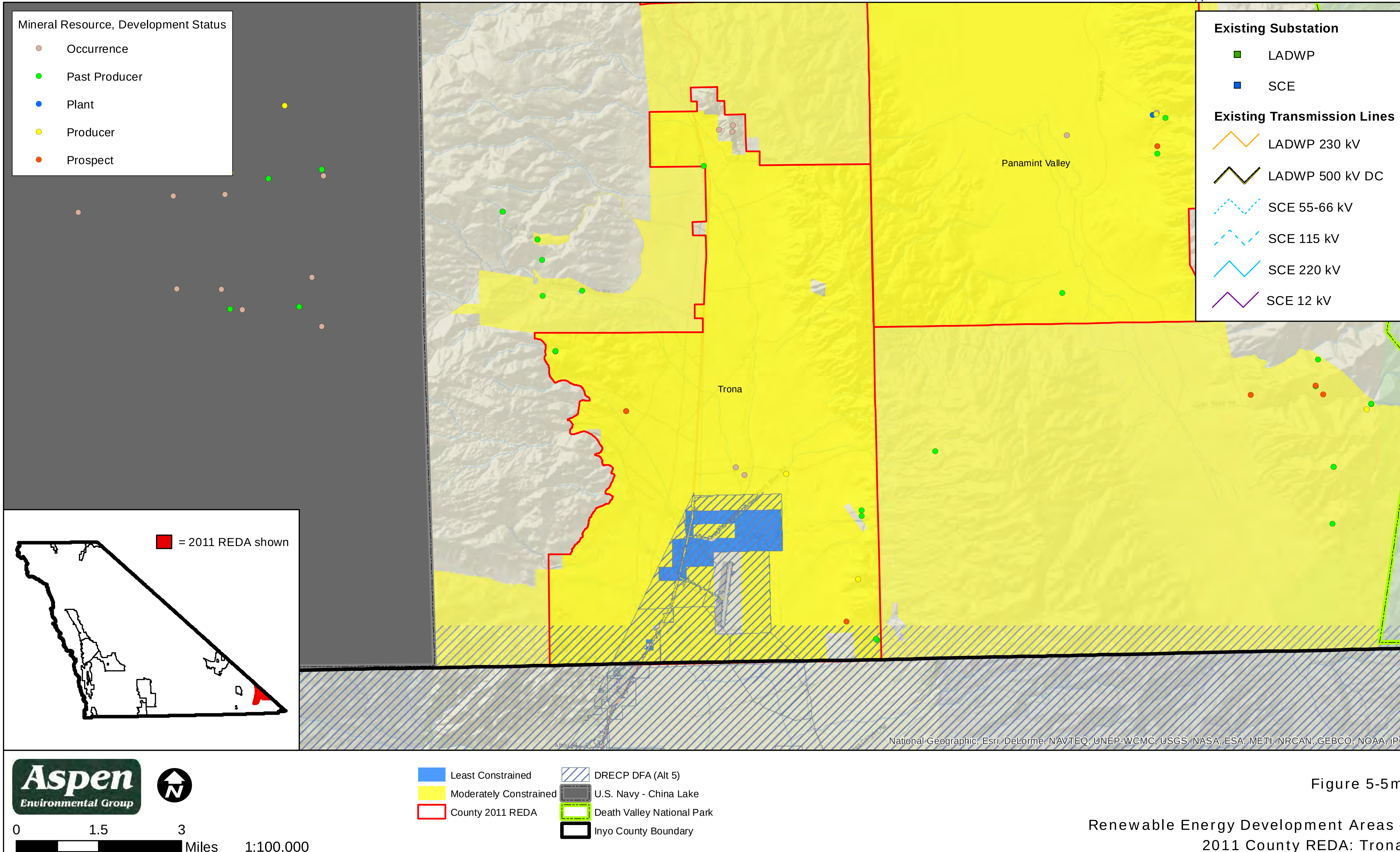
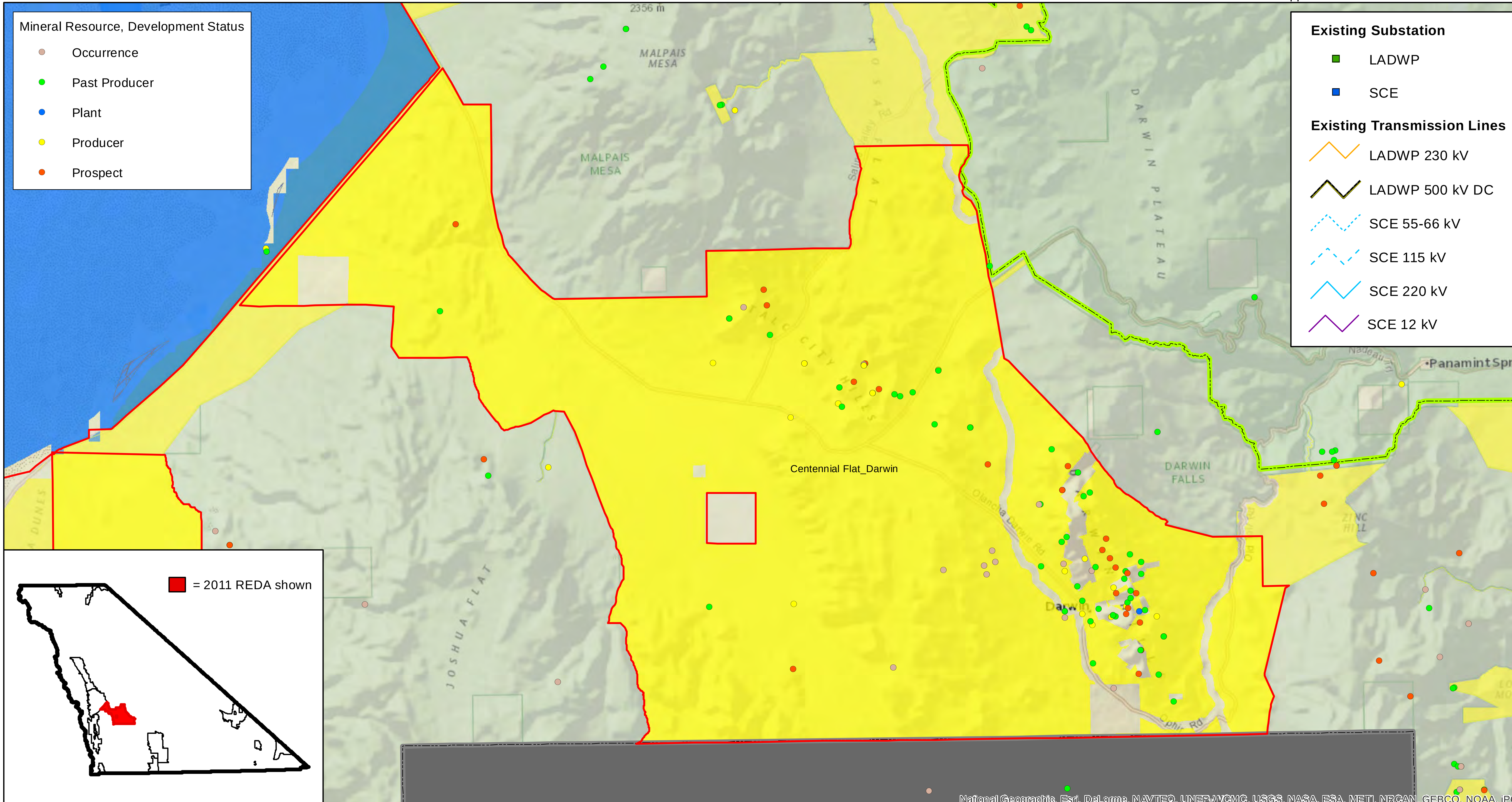


Figure 5-5m

Renewable Energy Development Areas - 2011 County REDA: Trona



Aspen Environmental Group

0 1.5 3 Miles

1:120,000

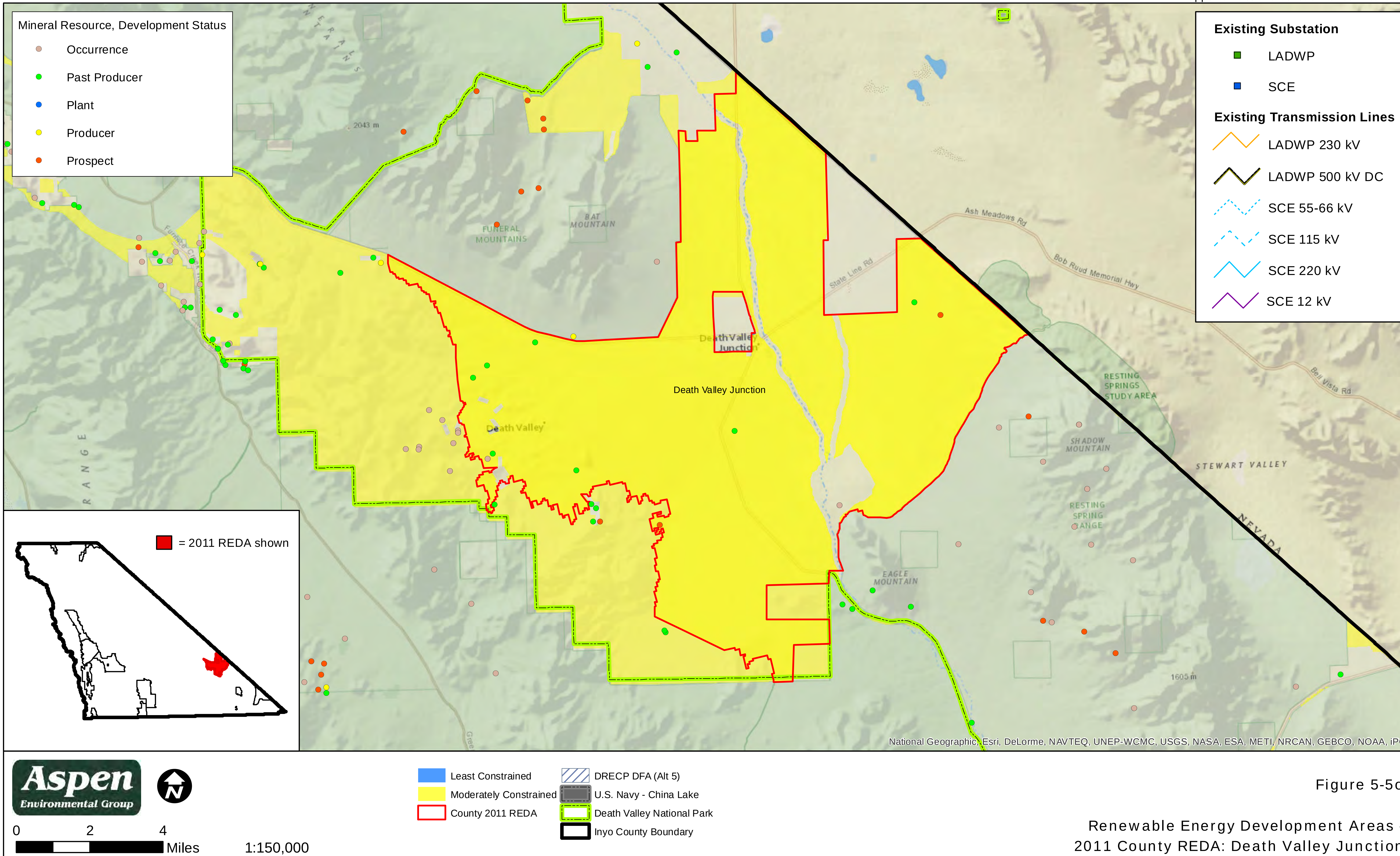
Least Constrained
Moderately Constrained
County 2011 REDA
DRECP DFA (Alt 5)
U.S. Navy - China Lake
Death Valley National Park
Inyo County Boundary

Figure 5-5n

Renewable Energy Development Areas -
2011 County REDA: Centennial Flat - Darwin

Draft

January 2015



Aspen Environmental Group

Figure 5-5o

Renewable Energy Development Areas -
2011 County REDA: Death Valley Junction