

Riverside East Monitoring and Adaptive Management Pilot

Purpose and Objectives

Background

Large scale solar is relatively new; public lands are at the forefront

- Larger footprint than typical public land development
- New potential impacts

Background

Solar development will likely continue

- Continuing state and federal policy drivers
- Twenty BLM applications on file in California*
- Solar PEIS Solar Energy Zones

* First-in-line applications as of November 2013



Solar Programmatic EIS

- Identified Solar Energy Zones for prioritizing solar energy development
- Recognized need for monitoring to continually improve decision making
- Committed to developing and implementing:
 - Regional mitigation strategies
 - Monitoring and adaptive management strategies



Solar Programmatic EIS

- Both mitigation and monitoring strategies to be piloted and expanded to all SEZs
- Regional mitigation pilot: Dry Lake SEZ, NV
- Monitoring pilot: Riverside East SEZ, CA



Riverside East monitoring pilot

- Transparent process with public engagement
- Lessons from this process to inform future solar monitoring strategies
- Monitoring strategy should:
 - Be regional in scale, rather than project-by project
 - Inform status and trend of key resources and ecological processes
 - Leverage existing BLM/partner data collection
 - Provide timely information to inform future decisions
 - Be consistent with the BLM AIM Strategy
 - Reduce uncertainty of monitoring requirements

Riverside East monitoring pilot

- Prioritization is key
 - Can't monitor everything all the time
 - Long-term funding may be variable
- Should be complimentary with existing monitoring
 - Not duplicative of project-specific compliance monitoring



Riverside East monitoring pilot

Adaptive Management

- Information must feed back into decisionmaking process
 - Future siting decisions
 - Future mitigation decisions
 - Future best management practices and design features
- Future adjustments to monitoring objectives if needed

Outcome

Final strategy will cover:

- Management questions
- Monitoring objectives
- Indicators
- Sampling framework
- Data collection and management
- Funding mechanism
- Lessons learned



Photo courtesy NextEra Energy

Monitoring and Adaptive Management Strategy Framework

Monitoring Strategy Element

Common Element—Mitigation and Monitoring Plans

Frame the Issue

Identify Stakeholders

Understand the System

Develop Resource Objectives

Identify and Assemble Baseline Information

Develop Monitoring and Sampling Schema

Create and Finalize Monitoring Plan

Implement Data Collection and Management Plan

Analyze and Report Monitoring Results

Adaptive Management



Riverside East workshop #1

- Develop understanding of the SEZ landscape and resources present
- Potential impacts to resources in the SEZ analyzed in Solar PEIS
- Begin developing monitoring strategy
 - What potential impacts are most concerning?
 - What management questions must we answer?
 - What monitoring objectives should we use to answer them?



Riverside East workshop #1

Workshop goal: Build the foundation for developing a monitoring and adaptive management strategy for the SEZ

- Identify top potential impacts of concern
- Create monitoring objectives to help understand the extent and magnitude of those impacts

Long Term Solar Monitoring Strategy

Public Outreach Meeting
December 11-12, 2013
Palm Springs



Outline

- Sustaining Ecosystems
 - Including Ecosystem Services (Nature's Benefits)
- BLM Multiple-Use Mandate
- Information Needs
- BLM AIM Monitoring Strategy
- Key Attributes of Terrestrial Ecosystems
- Components for Successful Monitoring
- Data Uses
 - Decision Making
 - Public Information and Awareness
 - Design of Mitigation Measures

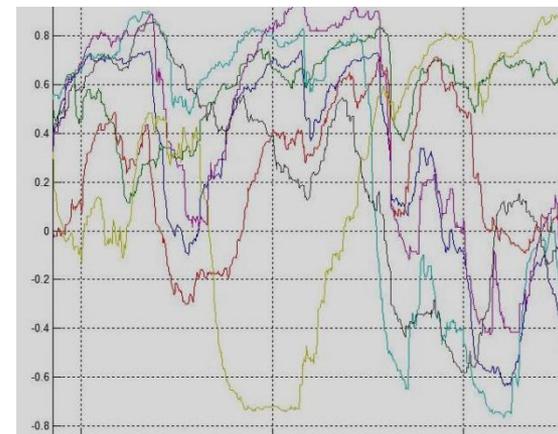
Sustaining Ecosystems

- Biota, Soils, Hydrology and Ecosystem Services



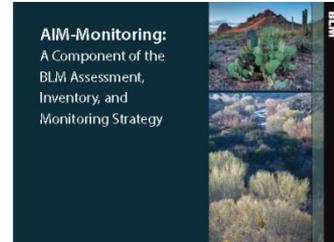
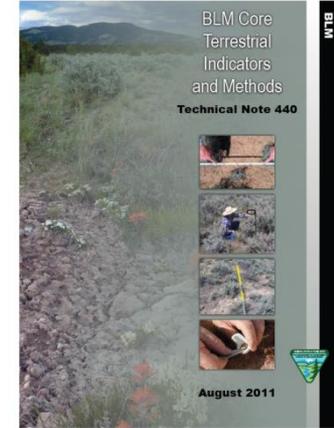
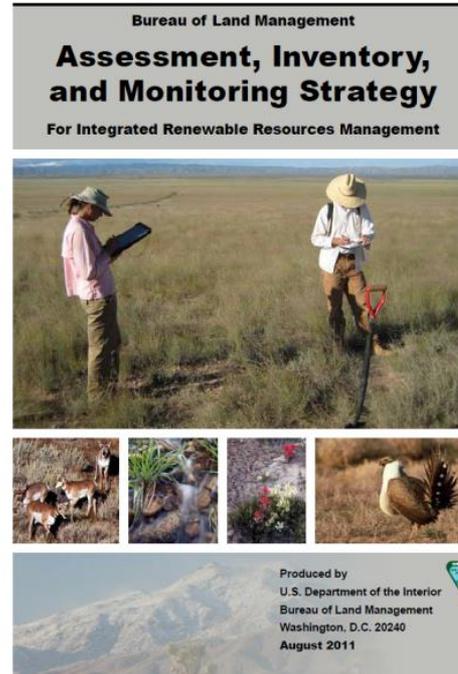
Information Needs

- Inventory - How much is there?
- Condition - What is the status?
- Trend - Is the status changing?
- Uses - What is left?
- Future - What is on the horizon?



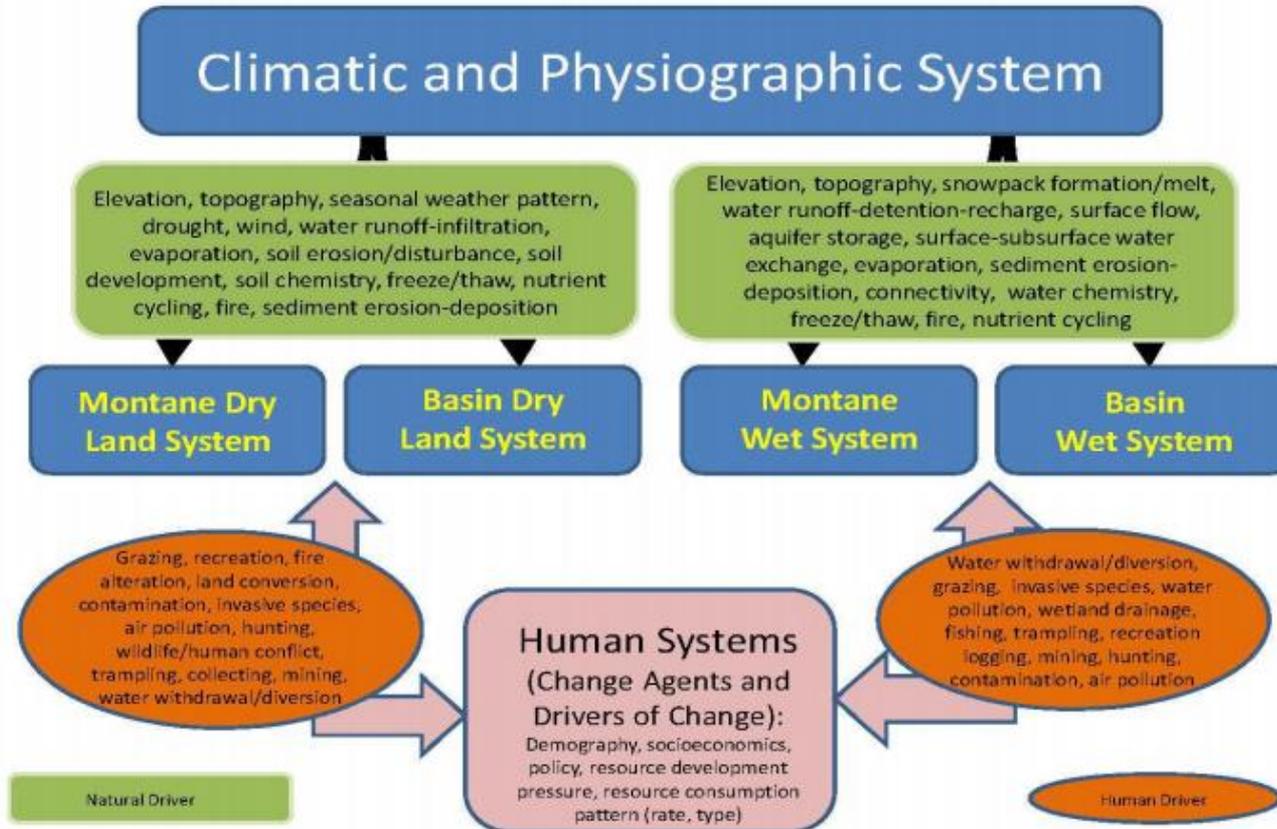
BLM Monitoring Strategy

- The Ecosystem
- Attributes
- Core Indicators
 - Supplemental
- Core Measurements
 - Supplemental
- Sample Design
- Remote Imagery
- Data Management
- Analysis and Reporting



Understand the System

Tier 1 Conceptual Model Mojave/Sonoran Ecoregion



BLM Terrestrial Core

■ Attributes of Terrestrial Ecosystem Health

Soil and Site Stability



Photo: Menke et al 2013

Biotic Integrity



Photo: <http://www.blm.gov/nstc/resourcenotes/rn16.html>

Hydrologic Function



Photo: Menke et al 2013

Landscape Metrics



Photo: Google maps

The Measurements

...standard, quantitative indicators and measurements

Photo: Emily Karchergis



Bare Ground
Plant Species of
Management Concern
Nonnative Invasive Species



Photo:
http://www.blm.gov/id/st/en/prog/grazing/management_grazing_in/monitoring_range_conditions.html

Plant Height

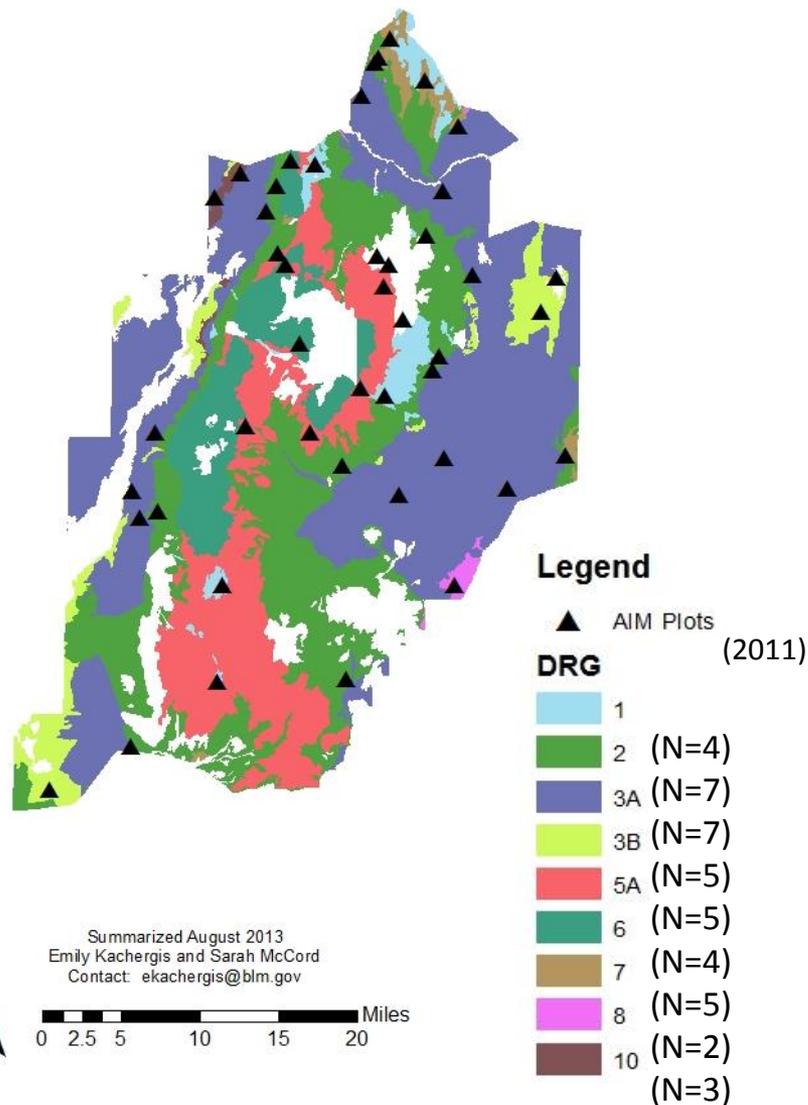


Photo: Herrick et al. 2005

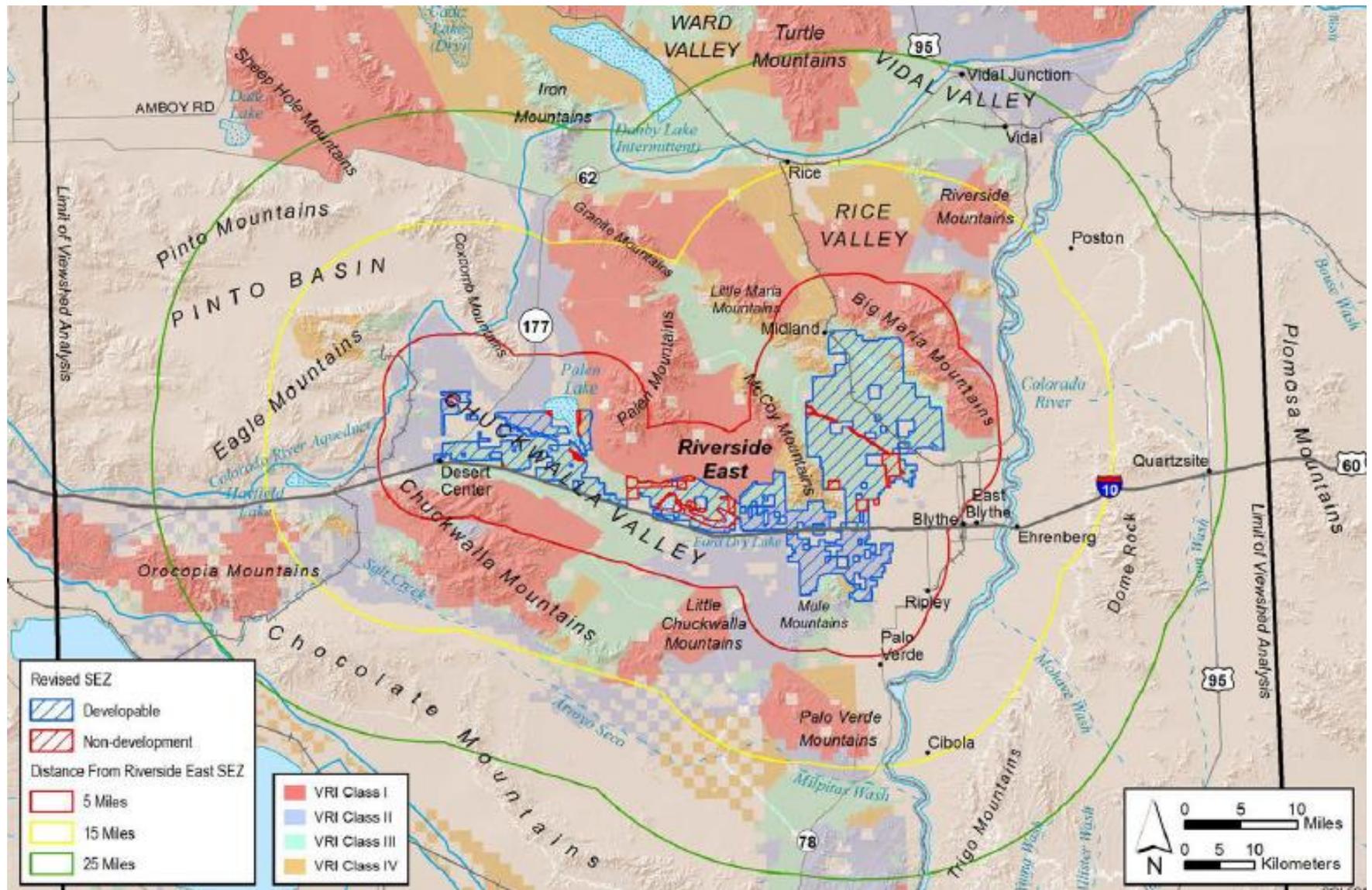
Inter-canopy Gaps

The Sample Design

...statistically
valid, scalable
sampling design



Monitoring Impacts



The AIM Strategy...

...integrates remote sensing technologies



The AIM Strategy...

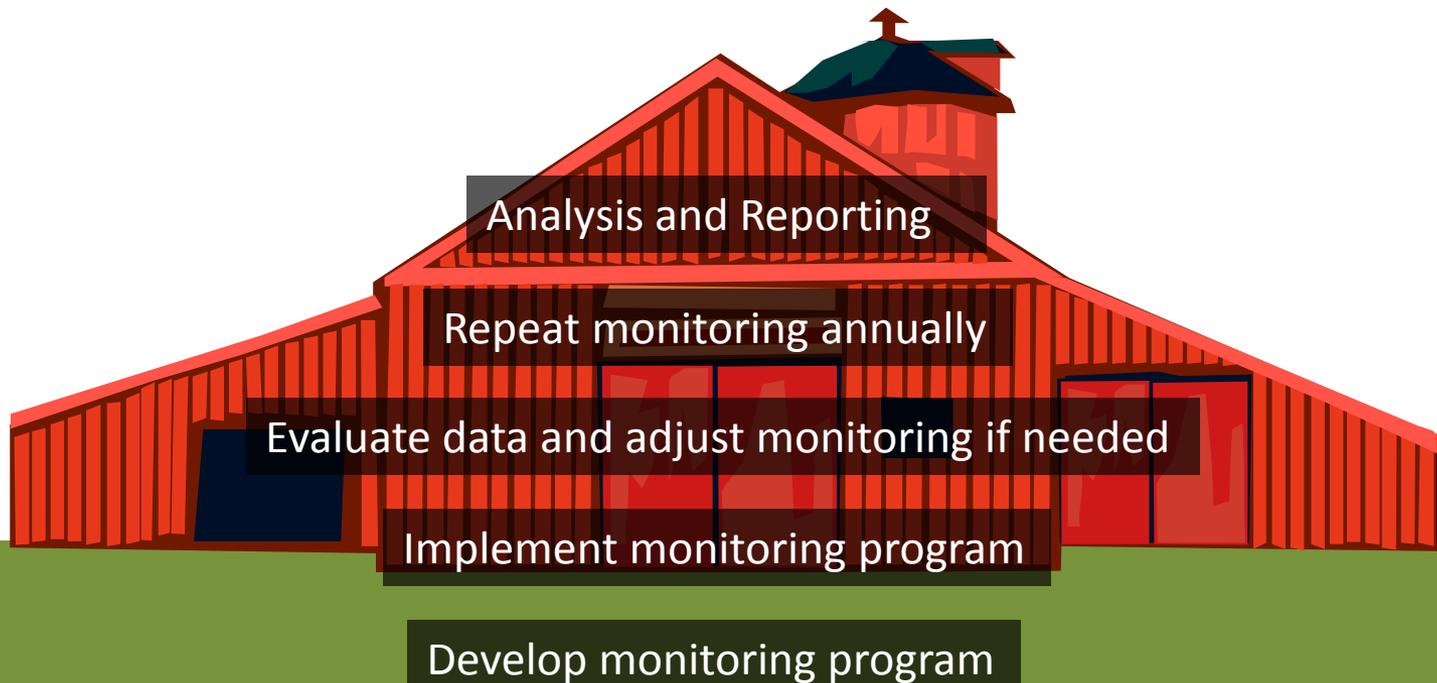
...incorporates good data management



BLM National Operations Center

The AIM Strategy...

...implements a structured approach to monitoring



The AIM Strategy is a...

- Structured information gathering and information use strategy that
- Informs decisions to respond to changing uses and conditions through
- Repeated annual monitoring of indicators
- As part of an efficiently designed monitoring program that
- Accommodates changing information needs from managers and publics

Next Steps

- Refine Solar Development Impacts
- Establish Monitoring Priorities
- Characterize System Responses
- Identify Potential Supplemental Indicators
- Develop a Long Term Solar Monitoring and Adaptive Management Strategy
- Facilitate Public Engagement Throughout the Process

Thank you and Questions

BLM

AIM – Assessment, Inventory, and Monitoring



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Photo: Menke et al 2013

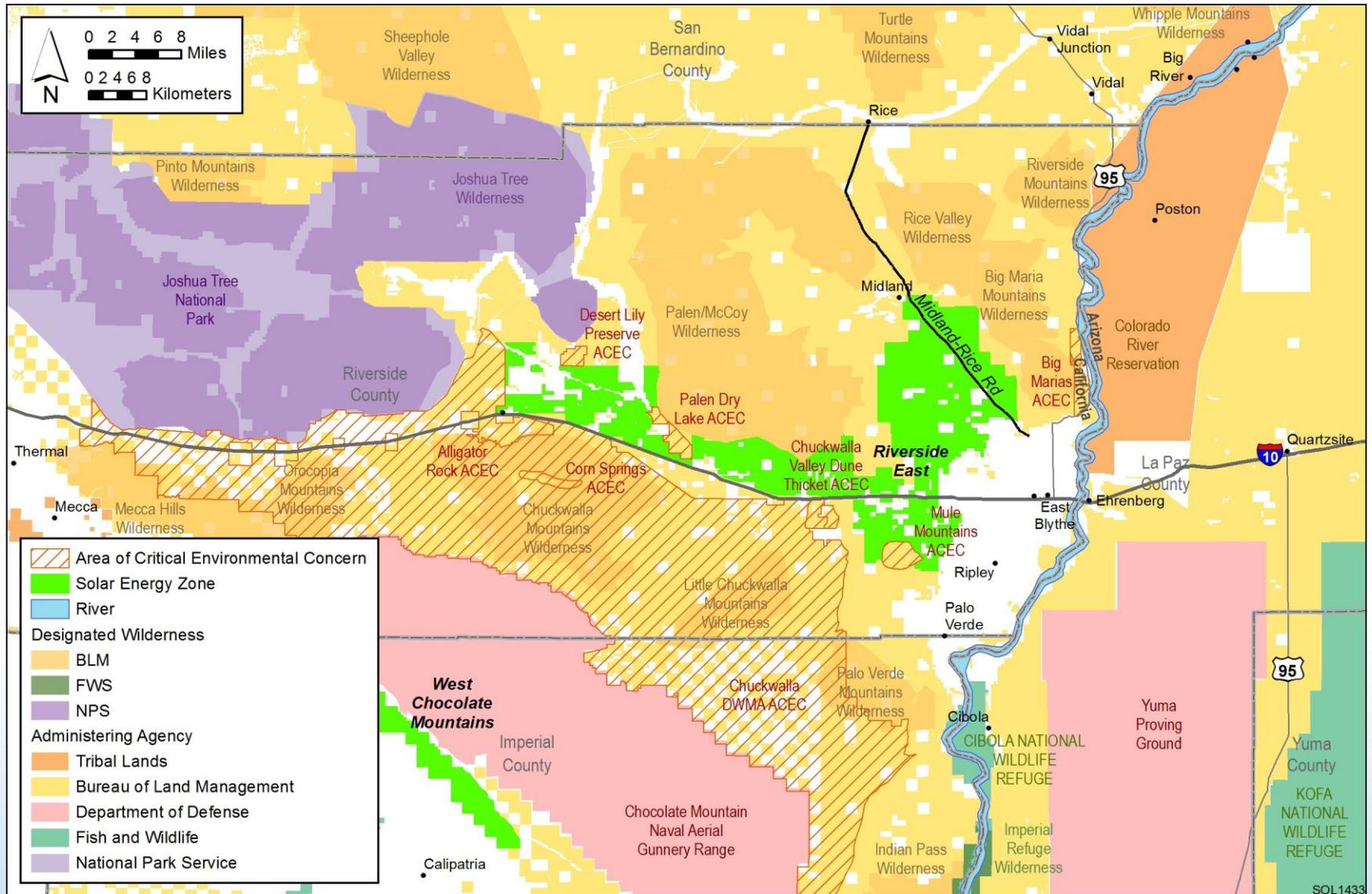


RIVERSIDE EAST SOLAR ENERGY ZONE VIRTUAL TOUR

Riverside East SEZ Monitoring and Adaptive Management Workshop
Palm Springs CA
December 11 -12, 2013



Riverside East and Vicinity



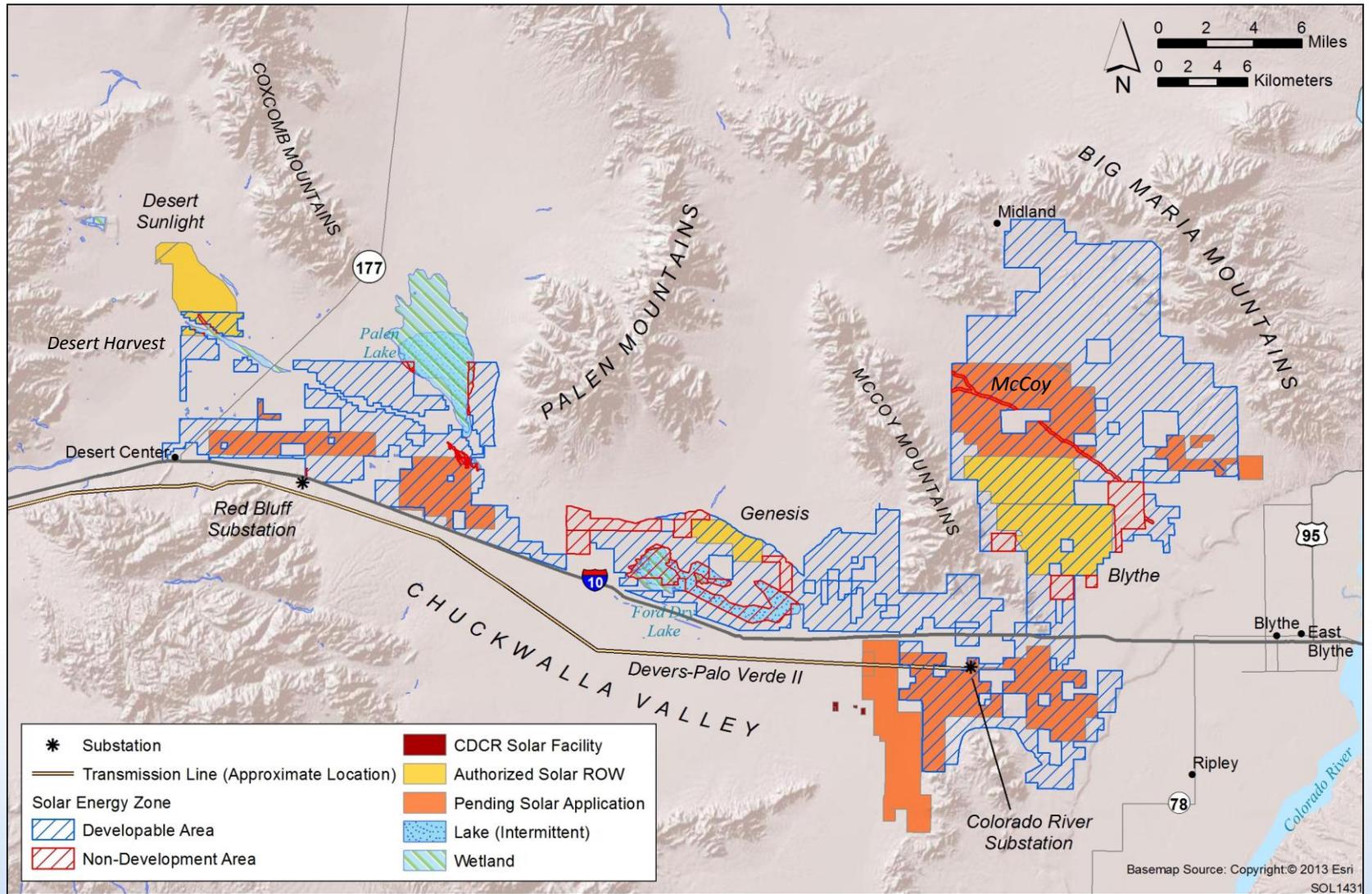
Current and Proposed Solar Energy Projects

Examples of authorized projects located within or partially within the SEZ:

Facility	MW	Acres
McCoy FPL Energy PV facility	750	7,754
Genesis Solar parabolic trough facility	250	1,952
Desert Harvest PV facility	150	1,198
Desert Sunlight	550	3,720

Seven pending solar project applications located within or partially within the SEZ with a combined area within the SEZ of about 50,000 acres

Existing and Proposed Solar Energy Projects



Solar Energy Projects In Place

- Desert Sunlight (550 MW)



Photos courtesy of www.firstsolar.com

Riverside East Solar Energy Zone - Long-Term Monitoring Pilot Project



Solar Energy Projects In Place

Genesis Solar (250 MW)



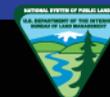
1,952 acre parabolic trough solar facility

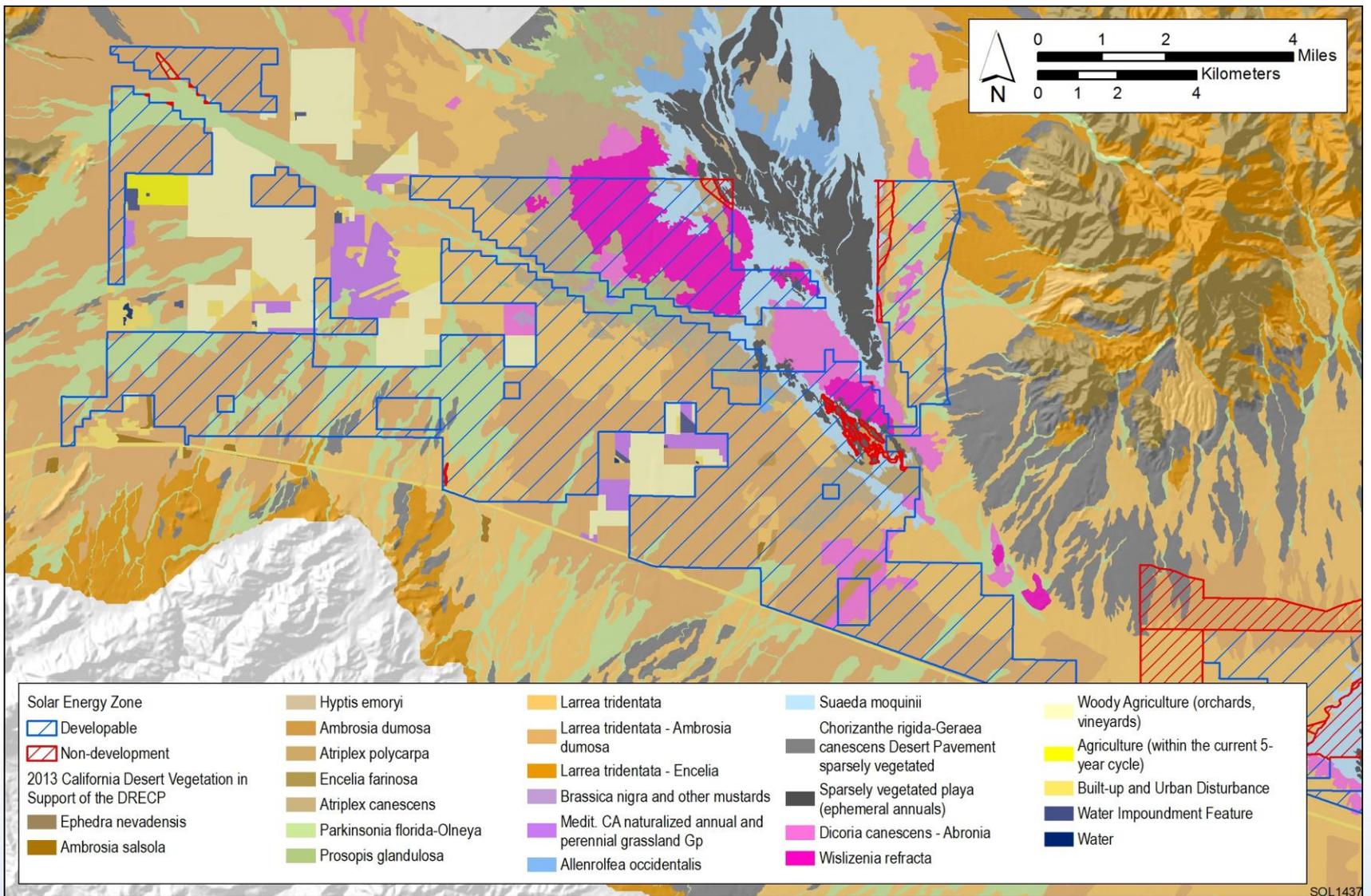
Photos courtesy of NextEra

Riverside East Solar Energy Zone - Long-Term Monitoring Pilot Project



Ecological Resources





Creosote bush, white bursage and blue palo verde-ironwood dominate landscape
 Annual herbaceous and bush seep-weed alliances, and the rare Jackass clover alliance associated with Palen Lake

Vegetation Communities

Creosote bush (*Larrea tridentata*) – white bursage (*Ambrosia dumosa*) scrub Alliance



Photos: Menke et al. 2013

Vegetation Communities

Blue palo verde (*Parkinsonia florida*) – ironwood (*Olneya tesota*) woodland Alliance



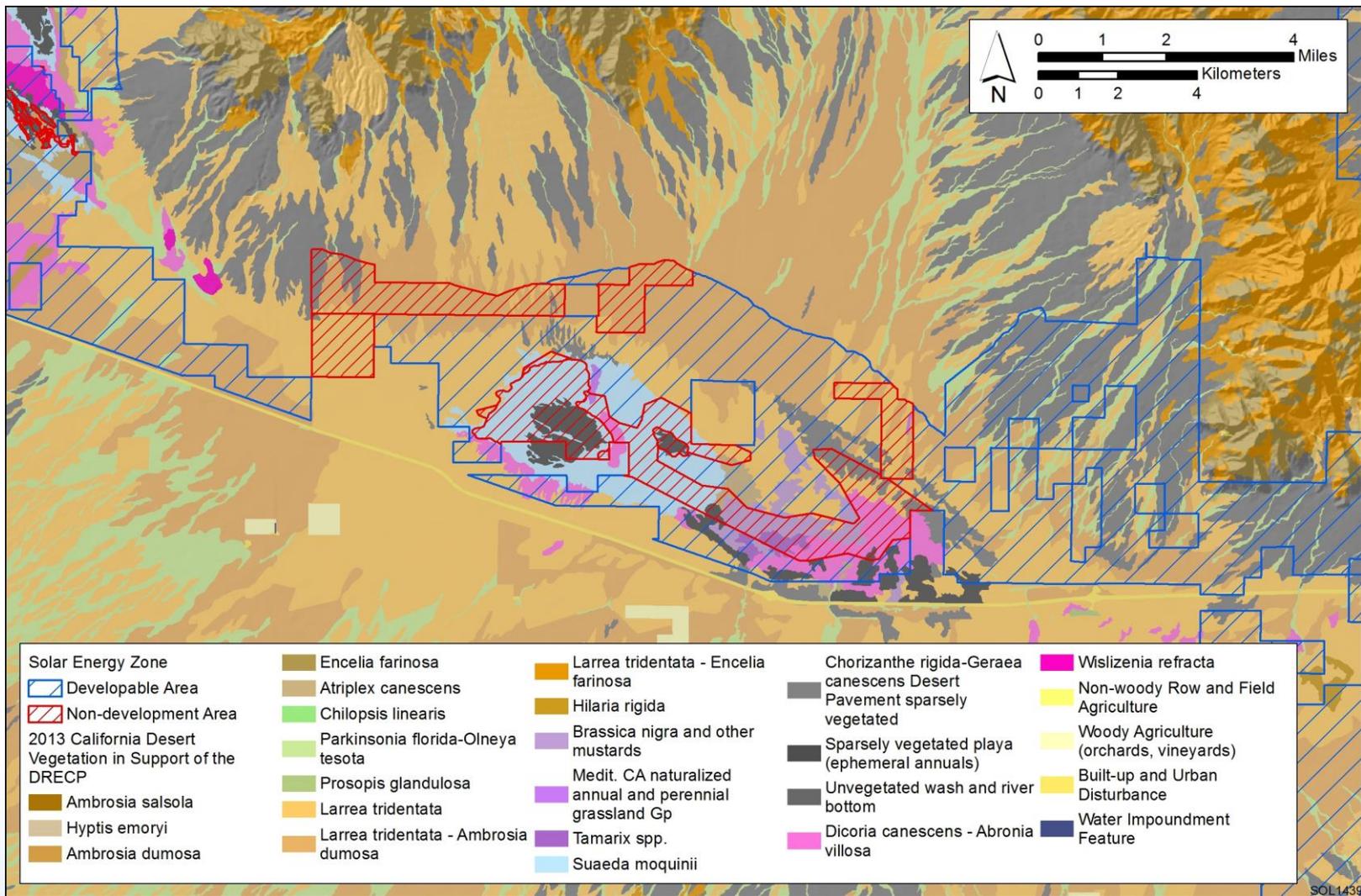
Photos: Menke et al. 2013

Vegetation Communities

Jackass clover (*Wislizenia refracta*)– Palen Dune



Photos: Menke et al. 2013



Creosote-white bursage, sparsely vegetated desert pavement, sunflower-desert sand verbena dominate landscape

Tamerix spp., Annual herbaceous, mustard, bush seep-weed are associated with Ford Dry Lake

Vegetation Communities

Sparsely Vegetated Desert Pavement Alliance



Photos: Menke et al. 2013

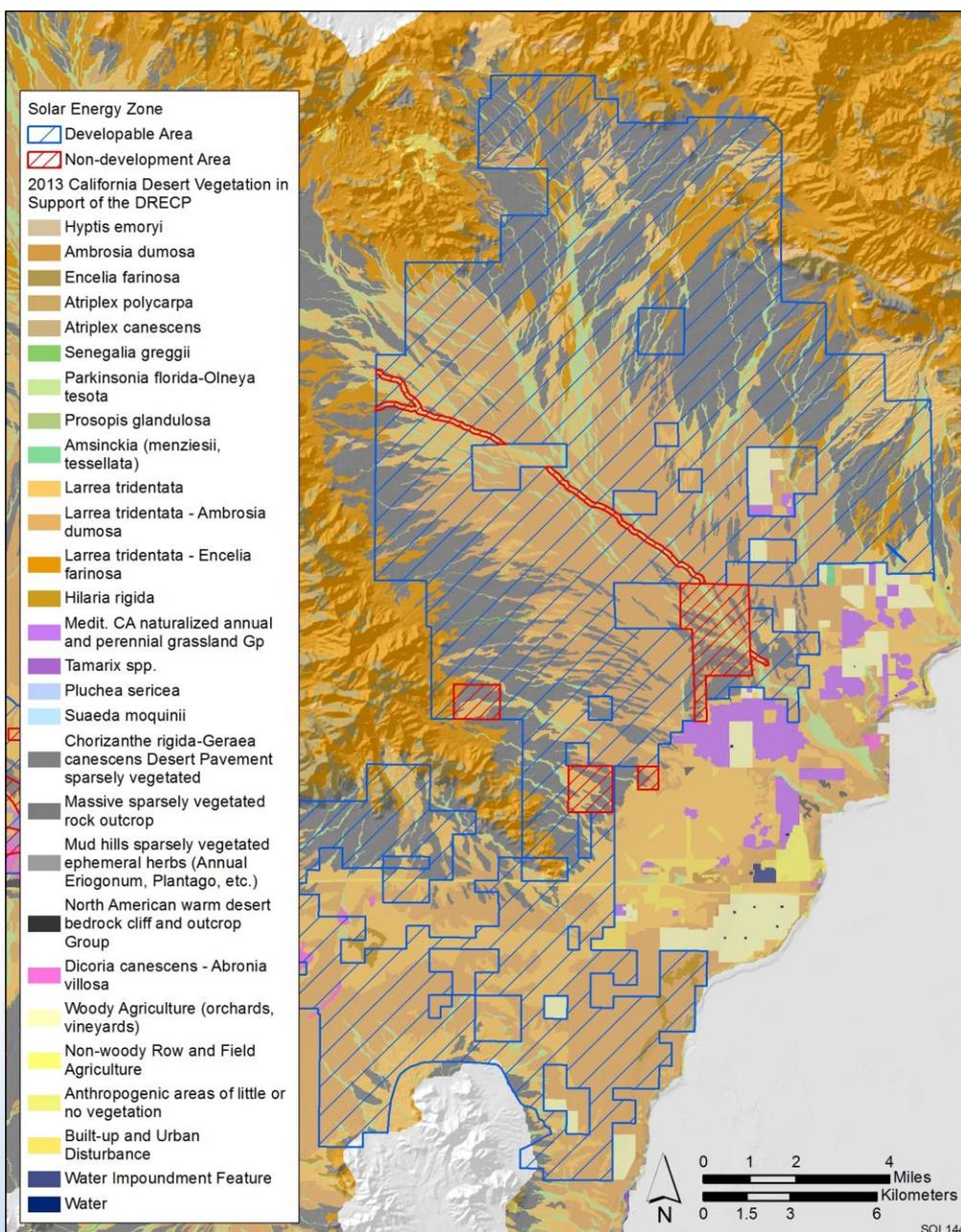
Vegetation Communities

Bush seepweed (*Suaeda moquinii*) scrub Alliance –Ford Dry Lake



Photos: Menke et al. 2013

Vegetation Communities



- Creosote-white bursage, sparsely vegetated desert pavement, spineflower-desert sunflower landscape
- Microphyll woodland
 - Blue Palo Verde – Ironwood Alliance

Vegetation Communities

Rare Vegetation Alliances in or near the SEZ

Saltbush Alliance

Honey mesquite Alliance

Iodinebush Alliance

Blue Palo Verde – Ironwood Alliance

Big galleta Alliance

Smoketree Alliance

Mojave seablite Alliance

Jackass Clover

Unusual Plant Assemblages

Unusual plant assemblages (UPAs) are those vegetation which can be recognized as extraordinary due to one or more factors including age, size, high cover or density, or disjunction from main centers of distribution.

Photos: Menke et al. 2013

Invasive Species

- Compete with native species
- Form monocultures
- Altering soils
- Altering fire intensity and frequency
- Impacts on special status species
- Economic impacts
- Outcompete wildflowers
- Carry crop viruses.
- Toxic to livestock

http://www.blm.gov/nv/st/en/prog/more_programs/invasive_species.print.html



Invasive Species



Russian thistle (*Salsola* spp.)

- Impede traffic, create fire hazards,
- Host for the beet leaf-hopper (*Circulifer tenellus*) that can carry crop viruses.
- Toxic to livestock



Source: http://www.blm.gov/ca/st/en/fo/hollister/noxious_weeds/nox_weeds_list/

Invasive Species



Sahara mustard (*Brassica tournefortii*)

- Fast growing; outcompetes native vegetation including wildflowers
- Fire hazard
- Primary nuisance invasive species in the SEZ

Photo: Stephen Laymon BLM and <http://www.desertmuseum.org/programs/images/Bratou31.jpg>

Special Status Species

Special Status Plants are those plants found on public lands administered by the Bureau of Land Management whose survival is of concern due to:

- 1) their limited distribution,
- 2) low number of individuals and/or populations, and
- 3) potential threats to habitat.

Includes:

- Federally listed or proposed species and Bureau sensitive species, which include both Federal candidate species and delisted species within 5 years of delisting.

Taxa	Special Status Species	BLM-S	ESA Listed
Plants	 <p data-bbox="386 391 1083 418">http://www.calflora.net/bloomingplants/alkalimariposalily.html</p>	9	None
Amphibian	 <p data-bbox="396 791 1093 818">http://www.nature.nps.gov/sound/assets/audio/index_Spadefoot.cfm</p>	1	None
Reptiles	  <p data-bbox="388 1125 587 1152">Desert tortoise</p> <p data-bbox="819 1125 1172 1152">Mojave Fringe- Toed Lizard</p> <p data-bbox="388 1159 1066 1190">http://www.blm.gov/nstc/resourcenotes/rn16.html</p> <p data-bbox="388 1198 1211 1229">http://www.californiaherps.com/lizards/pages/u.scoparia.html</p>	1	Desert tortoise

Taxa	Special Status Species	BLM-S	ESA Listed
Birds	 <p data-bbox="967 229 1174 268">Golden Eagle</p> <p data-bbox="382 486 1257 536">http://upload.wikimedia.org/wikipedia/commons/5/51/Aquila-chrysaetos-golden-eagle-0b.jpg</p>	4	None
Mammals	 <p data-bbox="1070 565 1238 604">Pallid bat</p> <p data-bbox="382 1033 929 1062">© 1999 Paul Barquist ASLDM Sonora Desert Digital Library</p>	8	None

Additional Species of Concern



Primary Threats:

Disease

Habitat loss

Vehicle collision

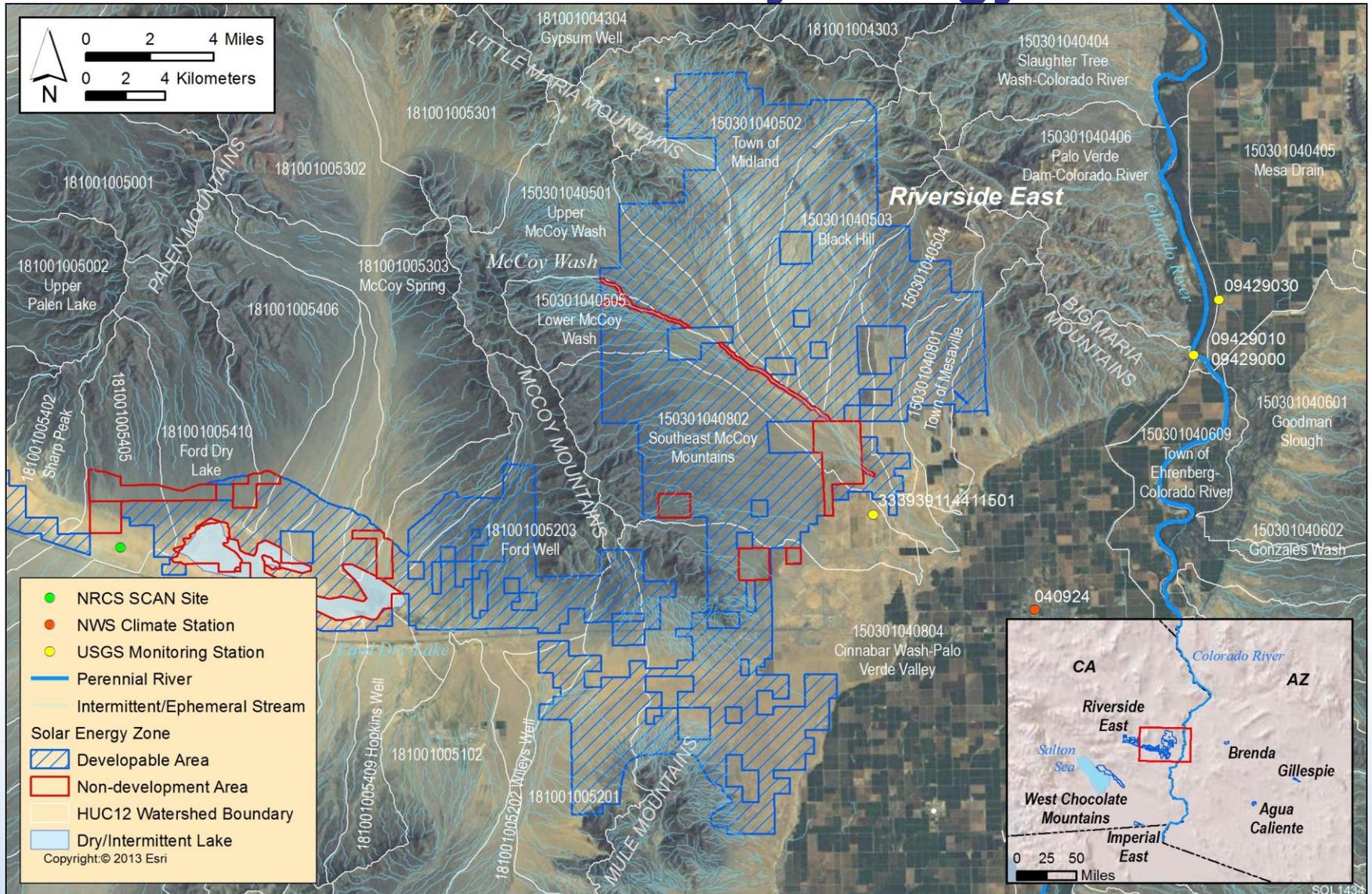
Source: <http://www.desertusa.com/dusablog/wp-content/uploads/2009/08/kit-fox.JPG>

Desert kit fox (*Vulpes macrotis arsipus*)

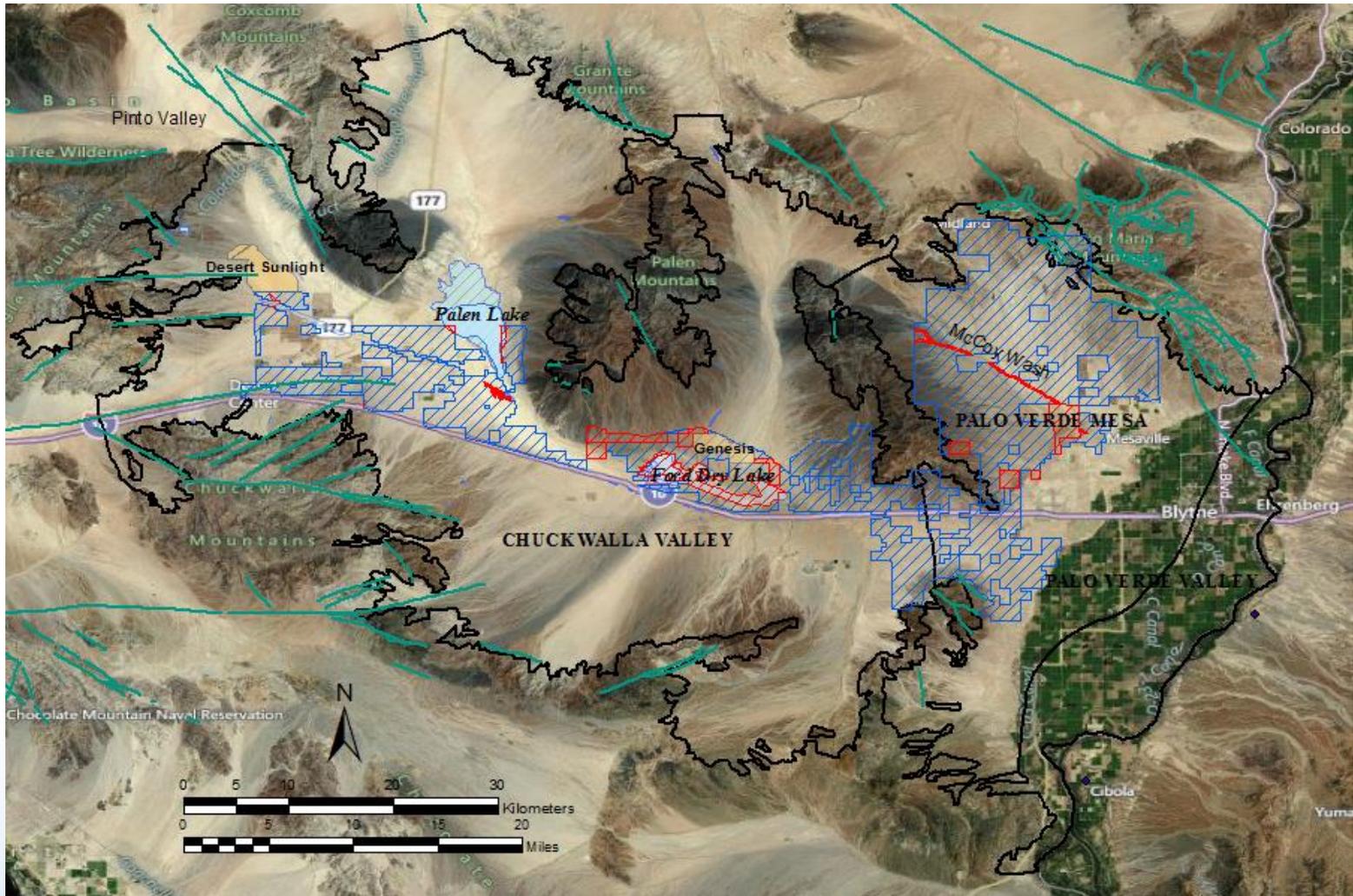
Water and Soils



Surface Hydrology

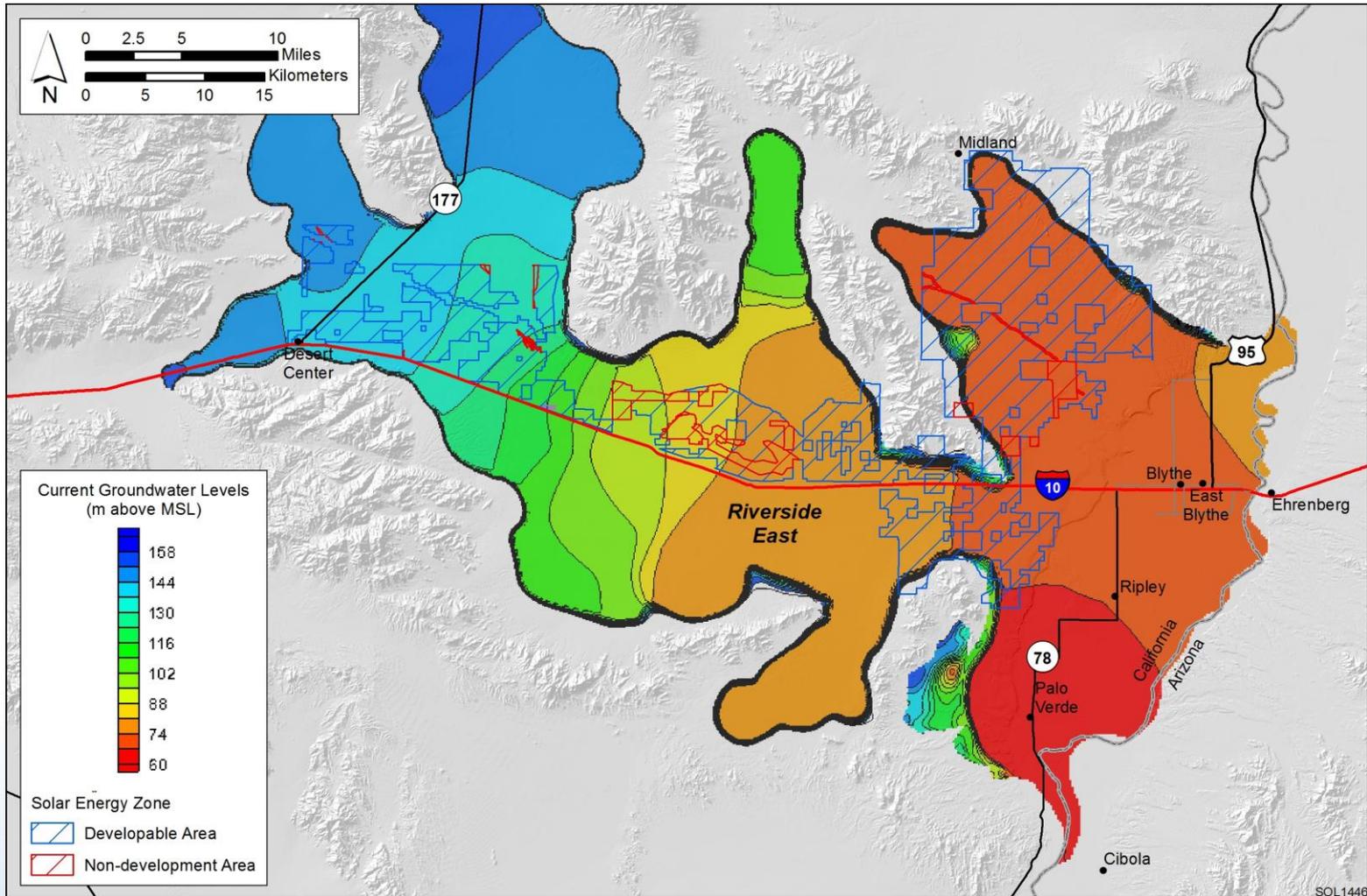


Groundwater



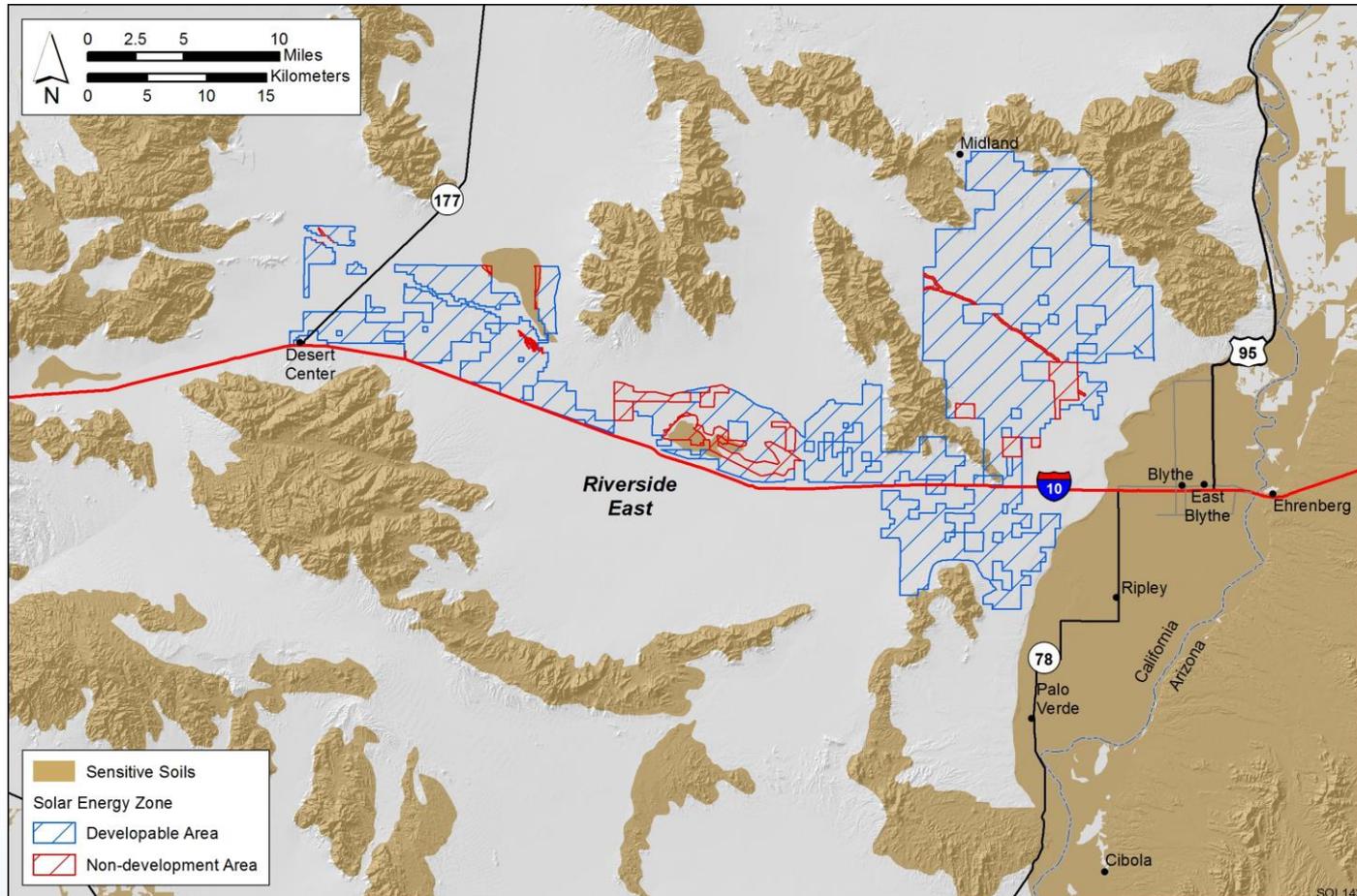
SEZ is located in the Chuckwalla Valley and Palo Verde Mesa groundwater basins
Groundwater typically flows eastward toward the Colorado River.

Groundwater



Groundwater levels lowest in urbanized and agricultural areas in the Eastern end of the SEZ

Soils



Several classes of Sensitive Soils in Sonoran Rapid Ecological Assessment:

- Droughty soils
- High risk of wind erodibility
- Hydric soils
- Saline soils
- Calcic soils
- Gypsiferous soils
- Shallow soils
- Acidic soils

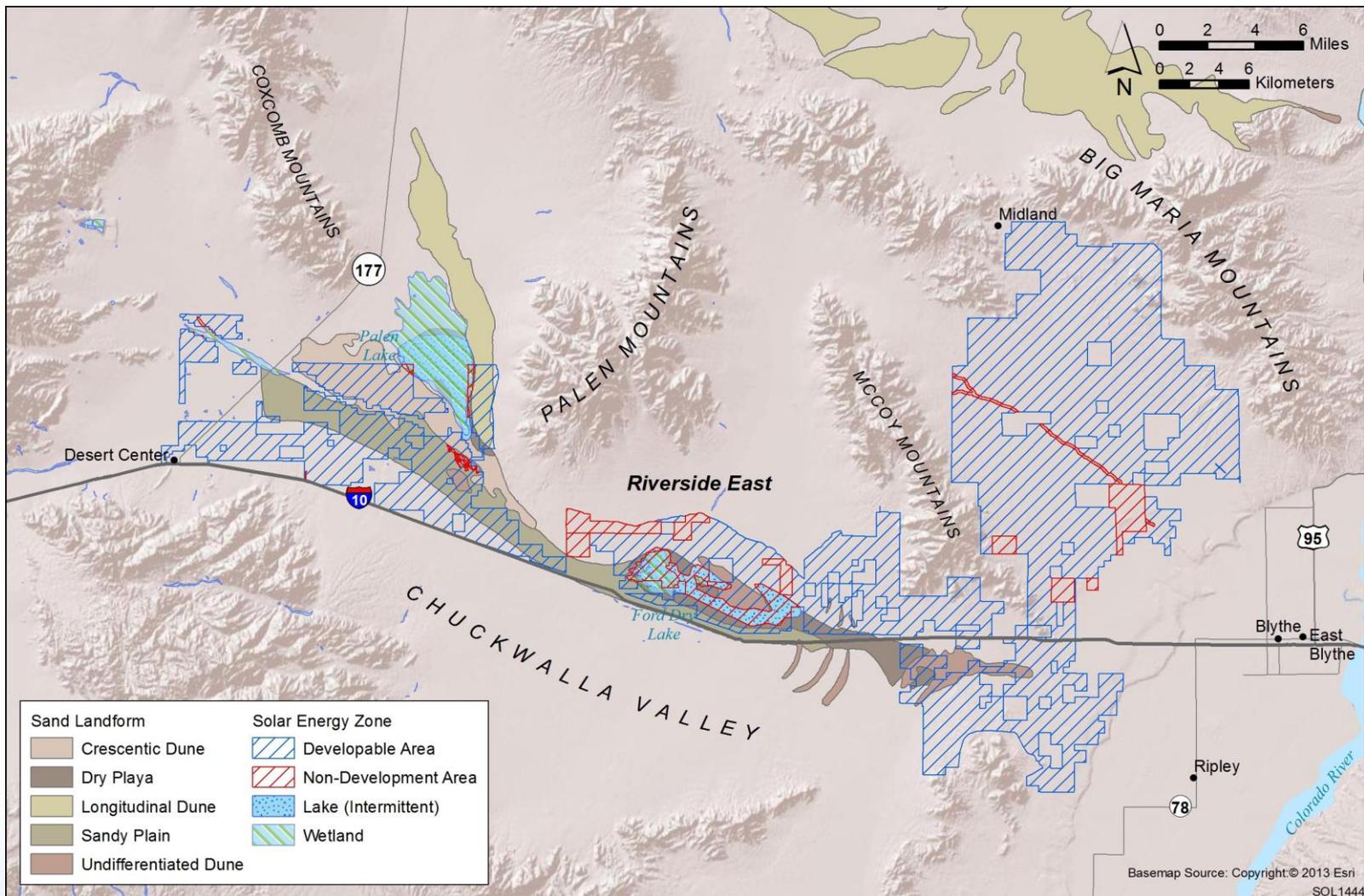
Desert Pavement



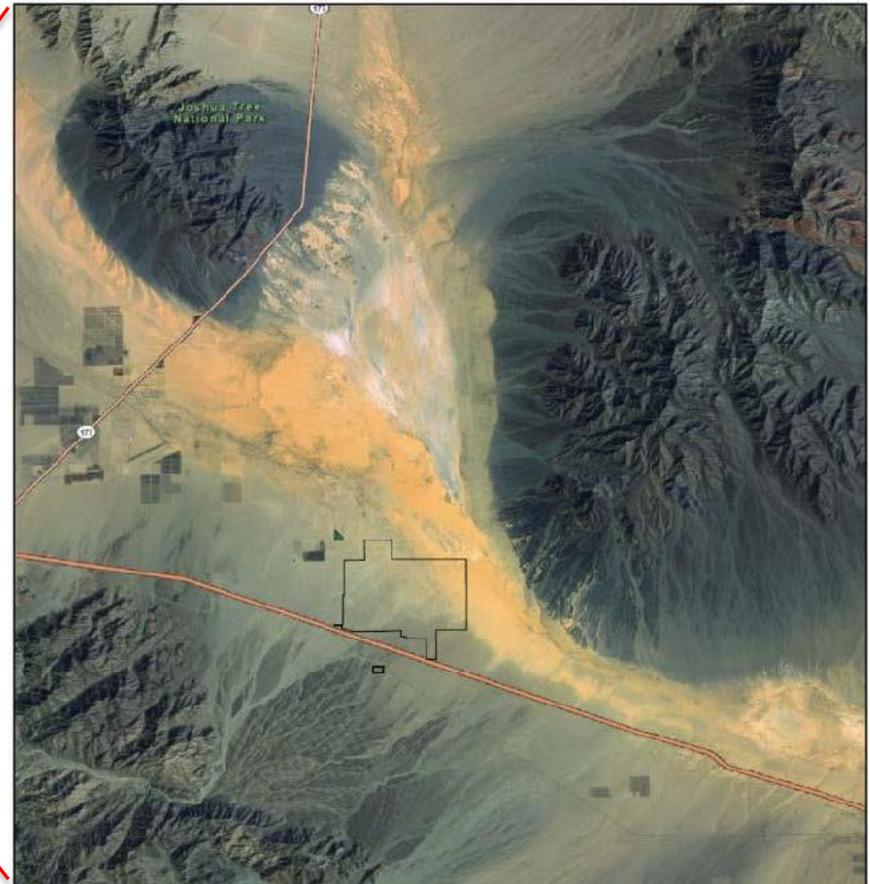
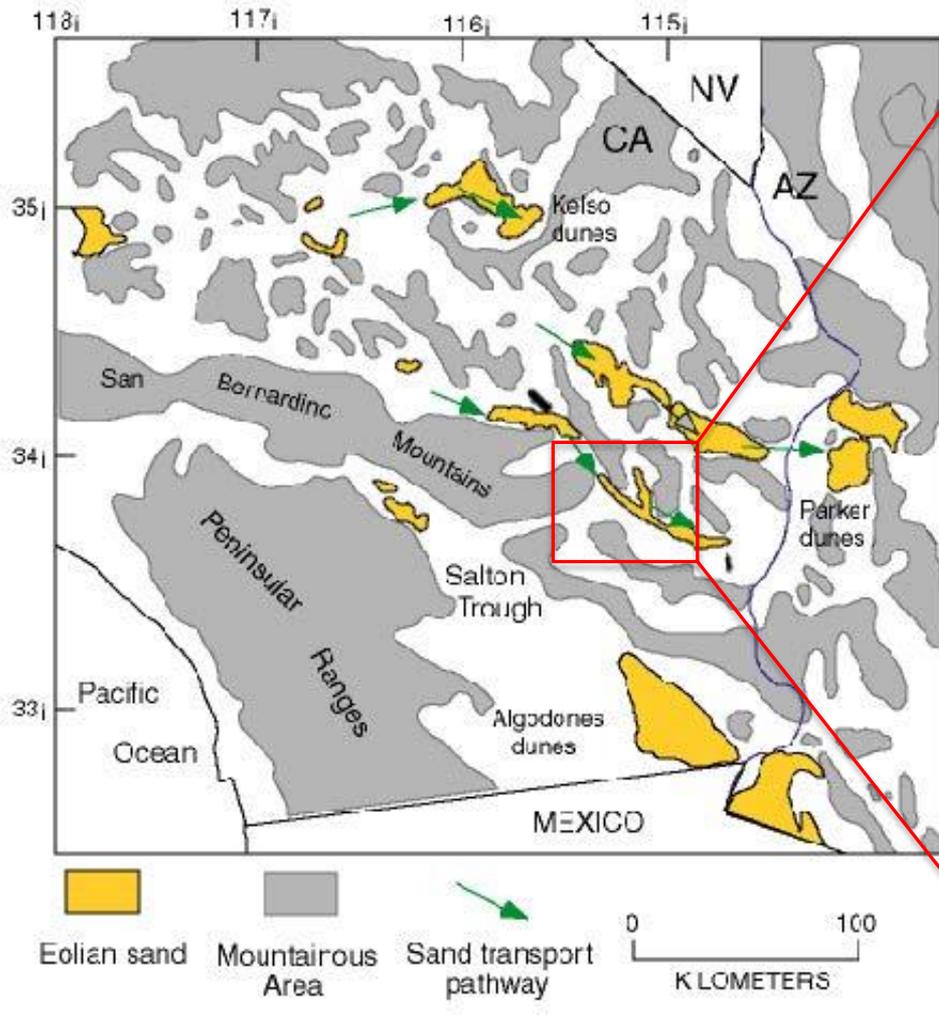
Photos: Menke et al. 2013

Riverside East Solar Energy Zone - Long-Term Monitoring Pilot Project

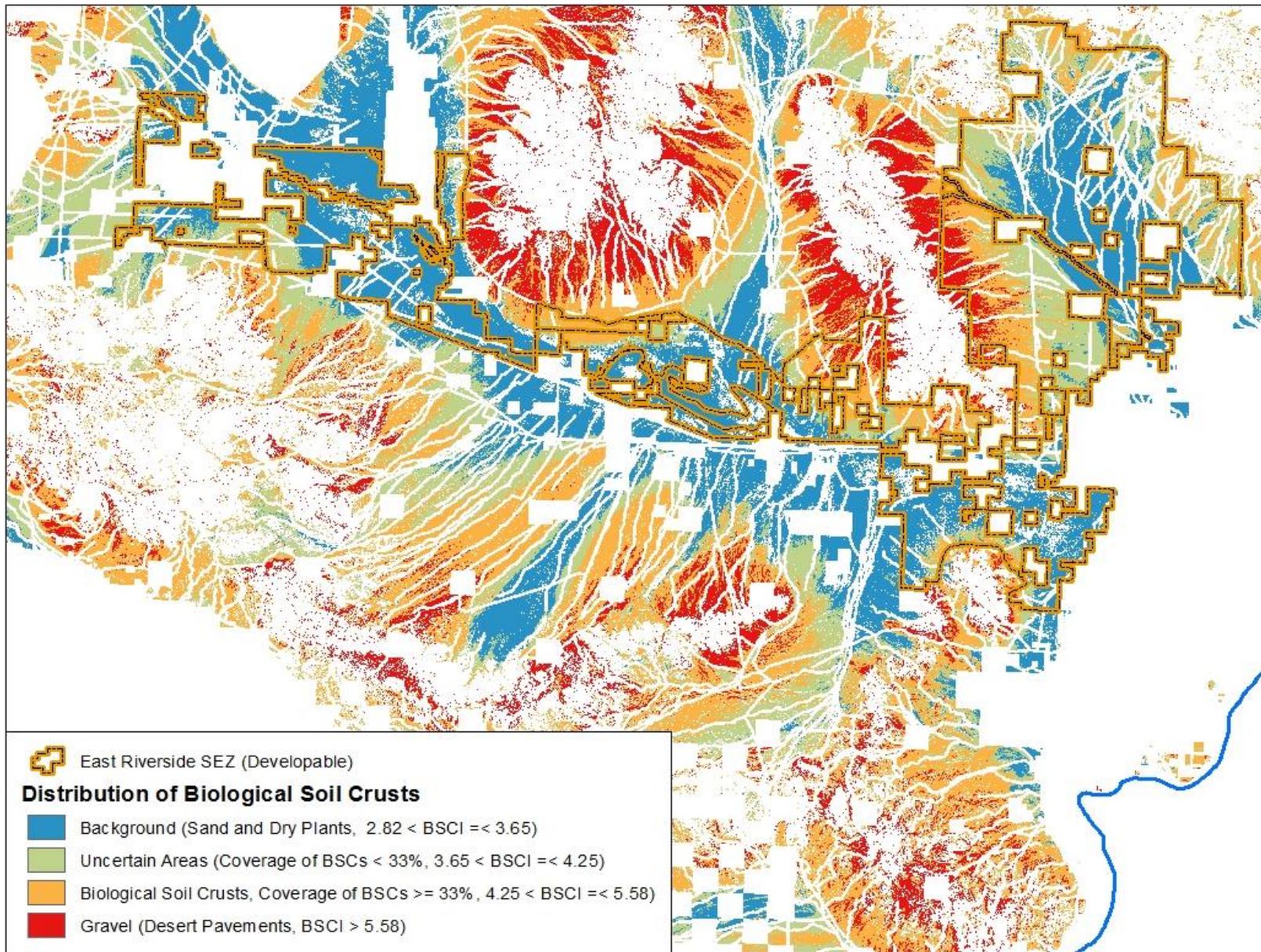




Sand dunes and sand transport are critical habitat features for Mojave fringe-toed lizard and rare plant communities like jackass clover (*Wislizenia refracta*)

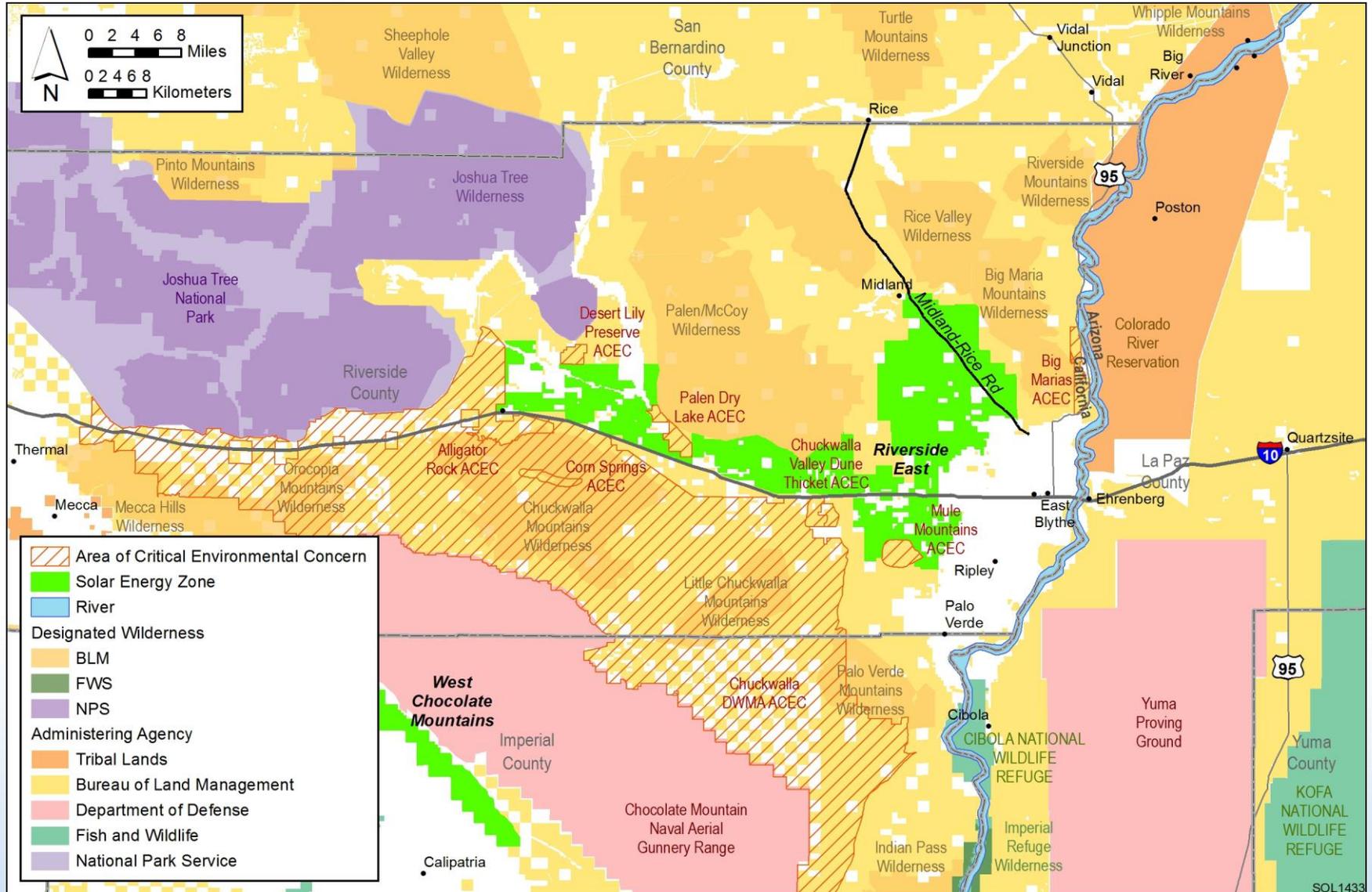


Andy Collison citing Muhs et. al. 2003



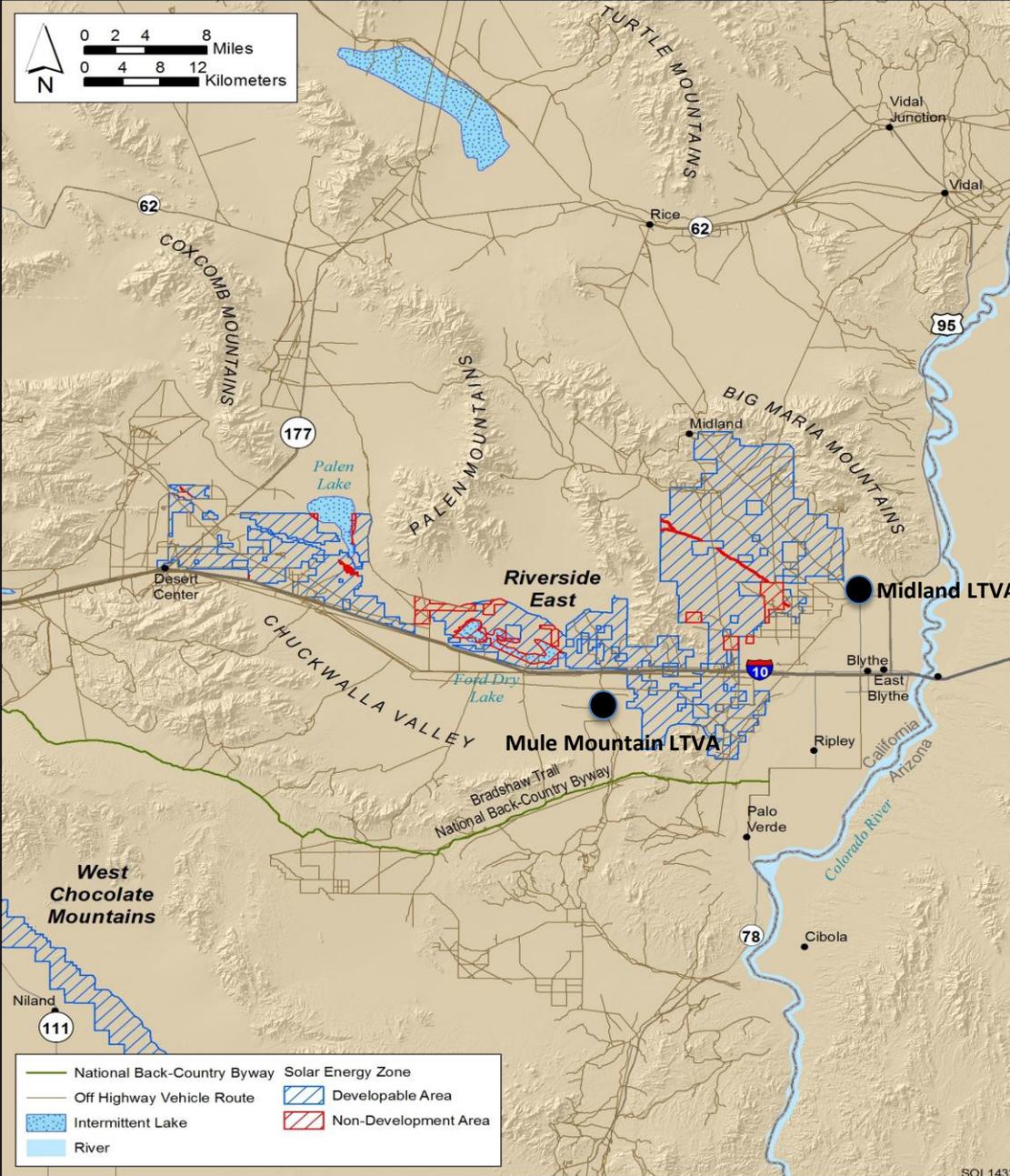
Data courtesy of NASA Ames Research Center

Specially Designated Areas

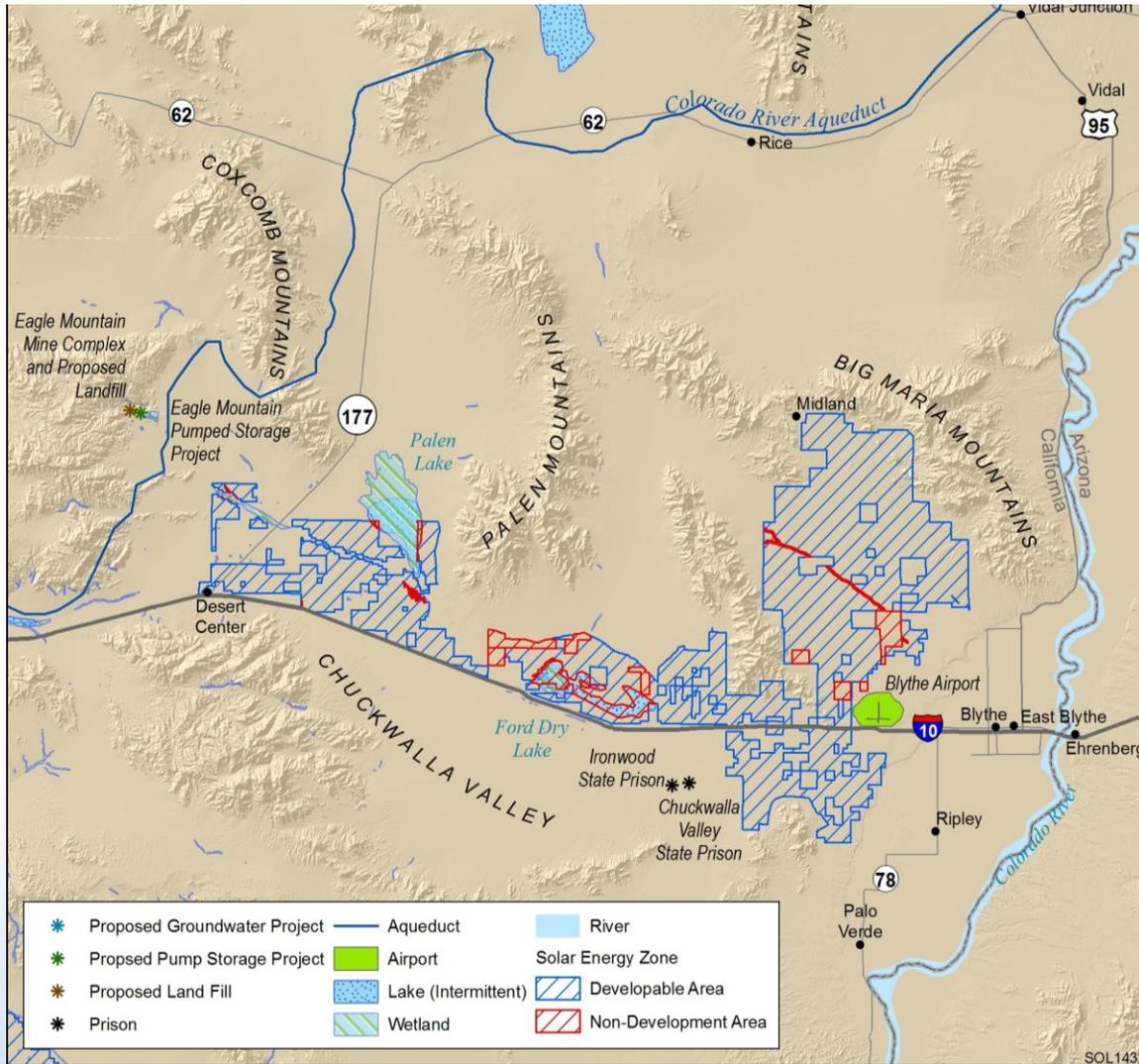


Recreation

- OHV routes
- Midland Long Term Visitor Area (LTVA)
- Mule Mountain LTVA (Coon Hollow and Wiley's Well campgrounds)
- Meccacopia Special Recreation Management Area



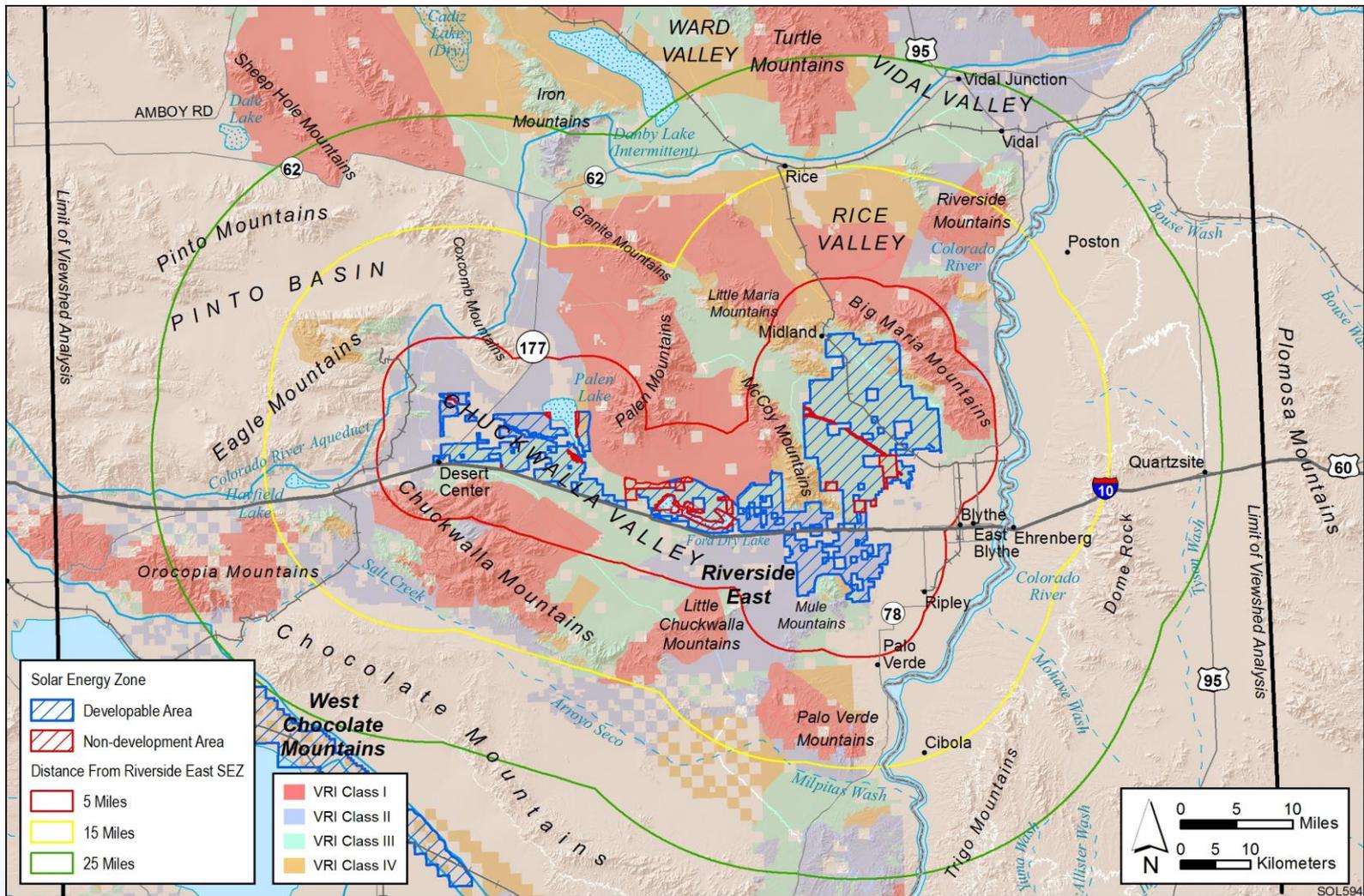
Other Land Uses



- Eagle Mountain Pumped Storage Project
- Ironwood State Prison
- Chuckwalla Valley State Prison
- Blythe Airport
- Colorado River Aquaduct

Visual Resources





- Classes I highest - Class IV lowest value
- Mountain areas lands and lands near Joshua Tree NP of highest value
- Class II area in the southeastern portion of the SEZ due to heavy recreational use, historic trails, wilderness areas and ACECs

Panoramas

(<http://blmsolar.anl.gov/sez/ca/riverside-east/>)



Cultural Resources



Rock art photo from Corn Spring ACEC



Camp Coxcomb Historic Marker



Historic Can Scatter

Photos courtesy of Konnie Wescott, Argonne National Laboratory

Cultural Resources



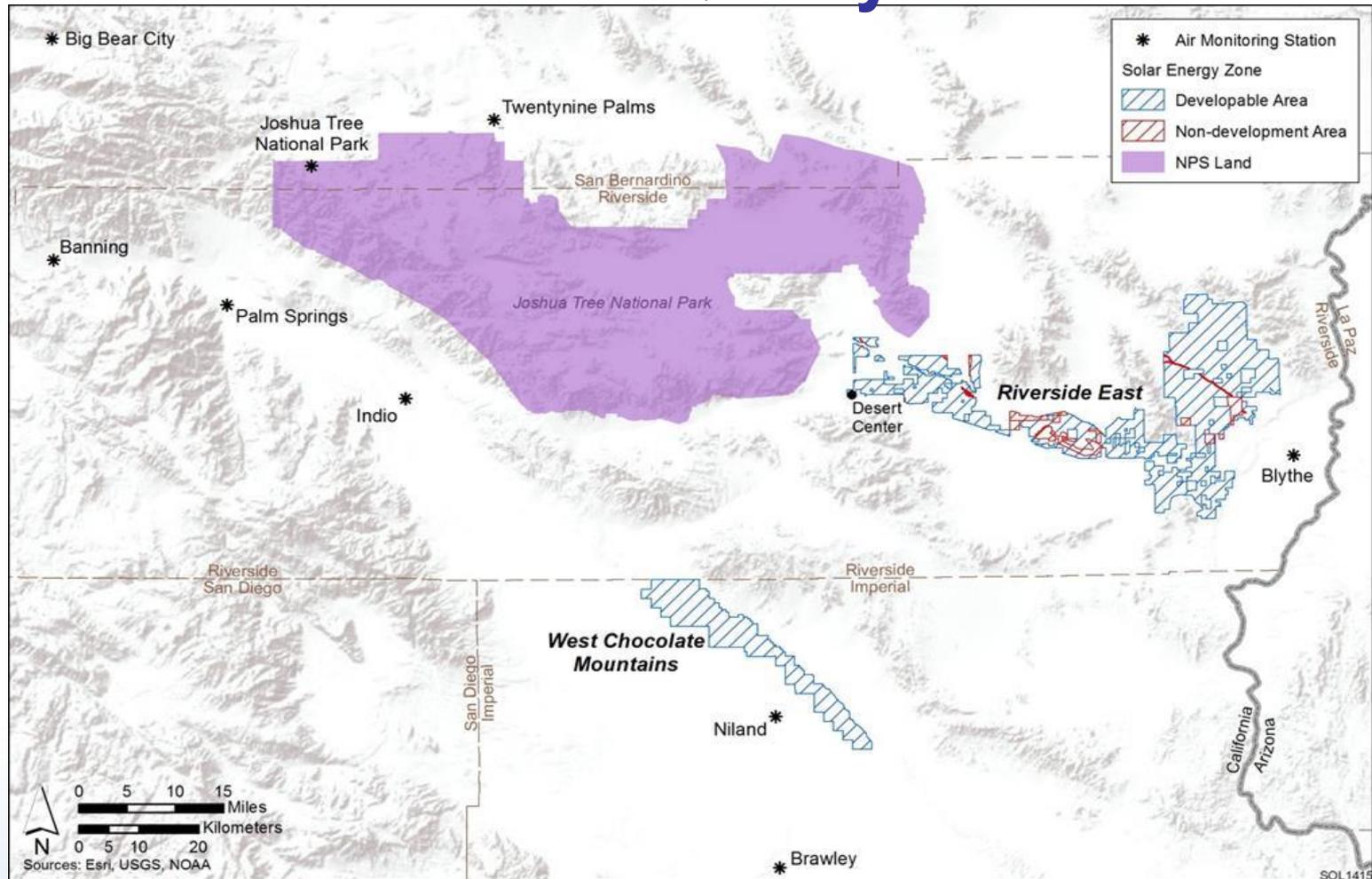
Photos courtesy of George Kline

Cultural Resources



Photos courtesy of George Kline

Air Quality



Air Monitoring Stations in the Vicinity of the Riverside East SEZ
Joshua Tree National Park is a Class I Area for air quality under the Clean Air Act

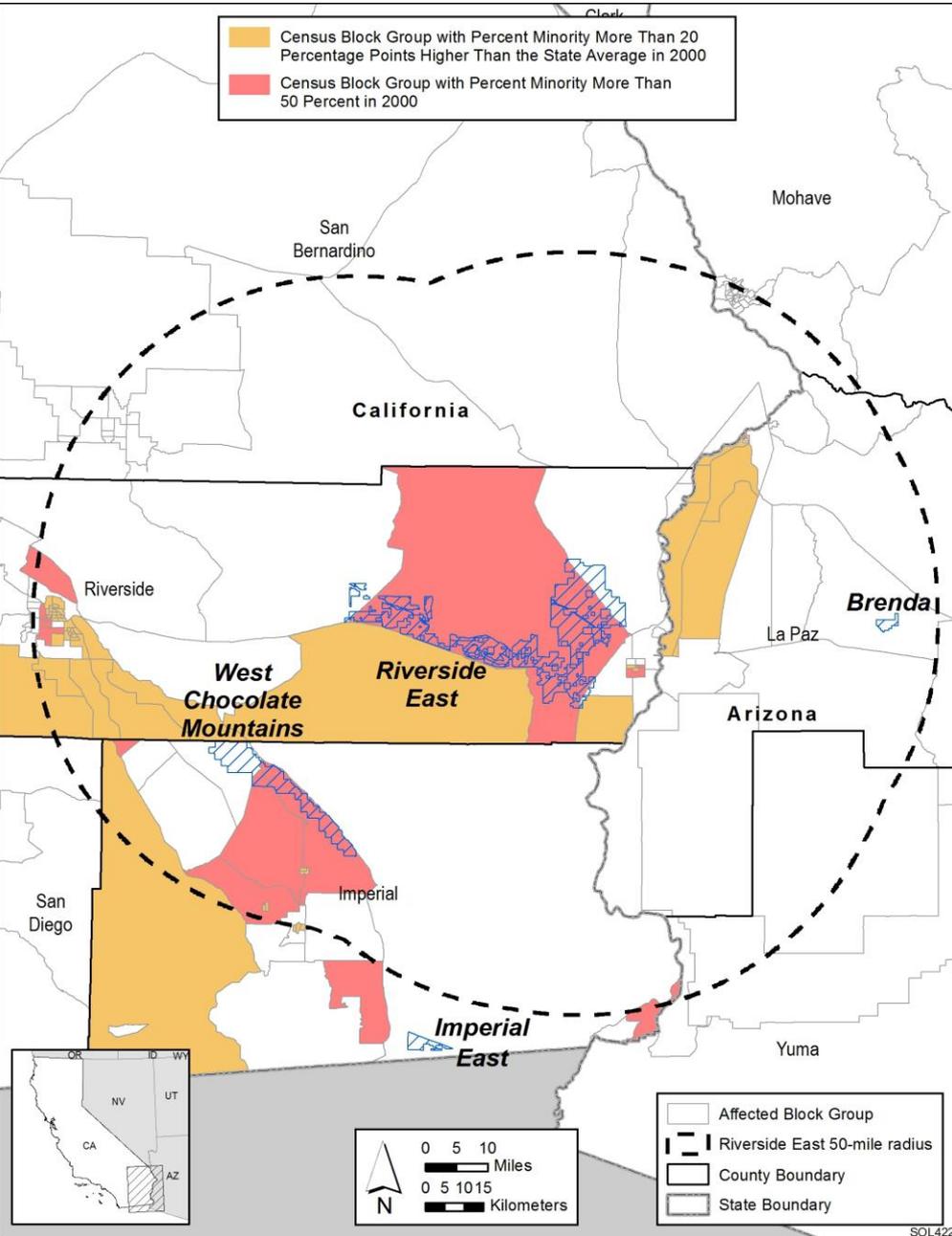
Socioeconomic



Census Block Group with Percent Minority More Than 20 Percentage Points Higher Than the State Average in 2000
 Census Block Group with Percent Minority More Than 50 Percent in 2000

Minorities more than 50% of the population

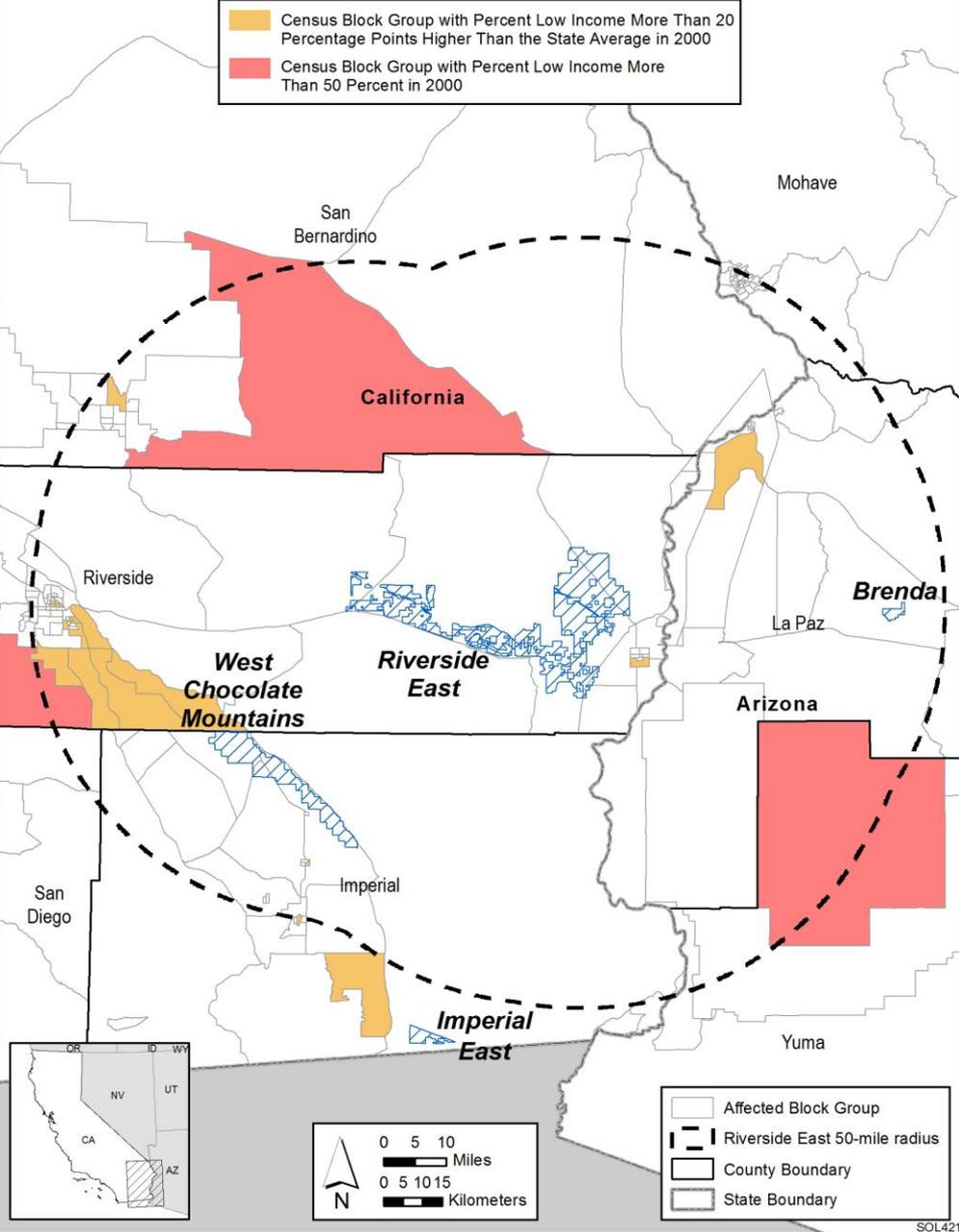
- City of Blythe and surrounding areas;
- Vicinity of Desert Hot Springs;
- Vicinity of Calipatria and Westmoreland;
- Fort Yuma Indian Reservation;
- Western portion of Riverside County;
- Colorado River Indian Reservation;
- City of Parker;
- Twentynine Palms;
- To the northeast of Yuma
- lower Coachella Valley such (Mecca and Indio)



Census Block Group with Percent Low Income More Than 20 Percentage Points Higher Than the State Average in 2000
 Census Block Group with Percent Low Income More Than 50 Percent in 2000

More than 50% of the population low Income in:

- Twentynine Palms;
- To the northeast of Yuma;
- Mecca



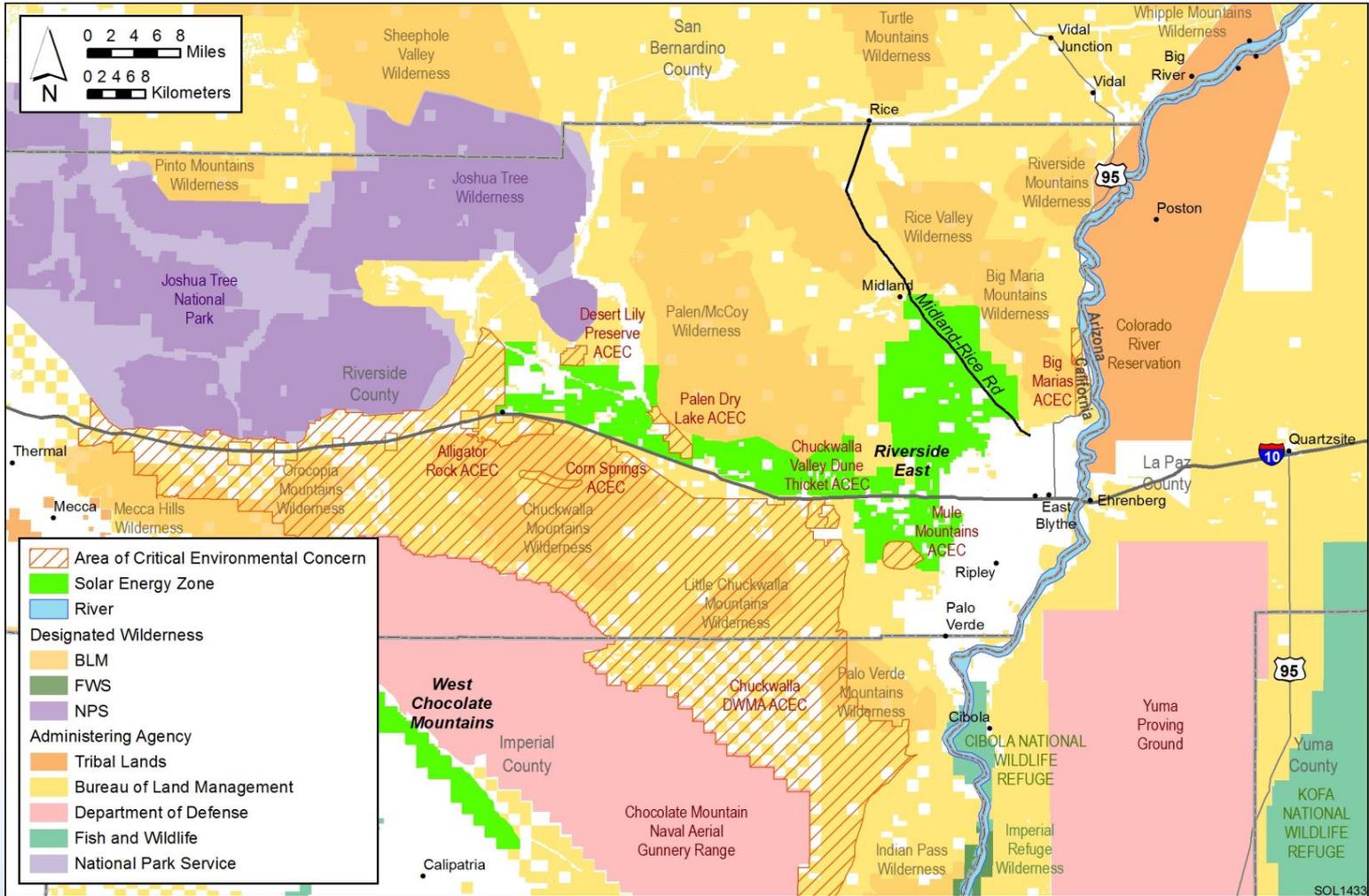
Potential Impacts of Solar Development

Presented by:

Heidi Hartmann and Konnie Wescott, Argonne National Laboratory
Monitoring and Adaptive Management Workshop
Palm Springs CA
December 11 -12, 2013

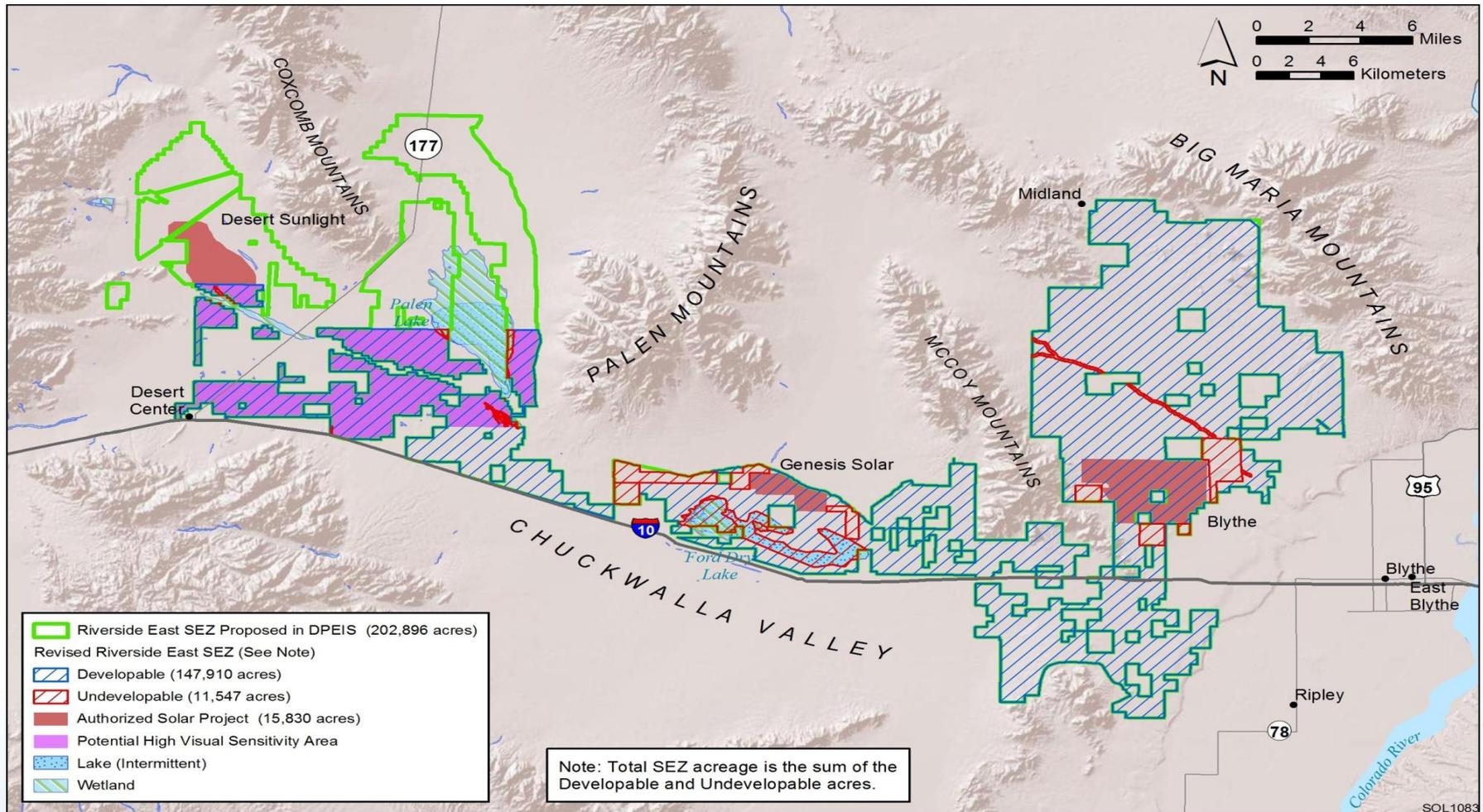


Riverside East SEZ Location



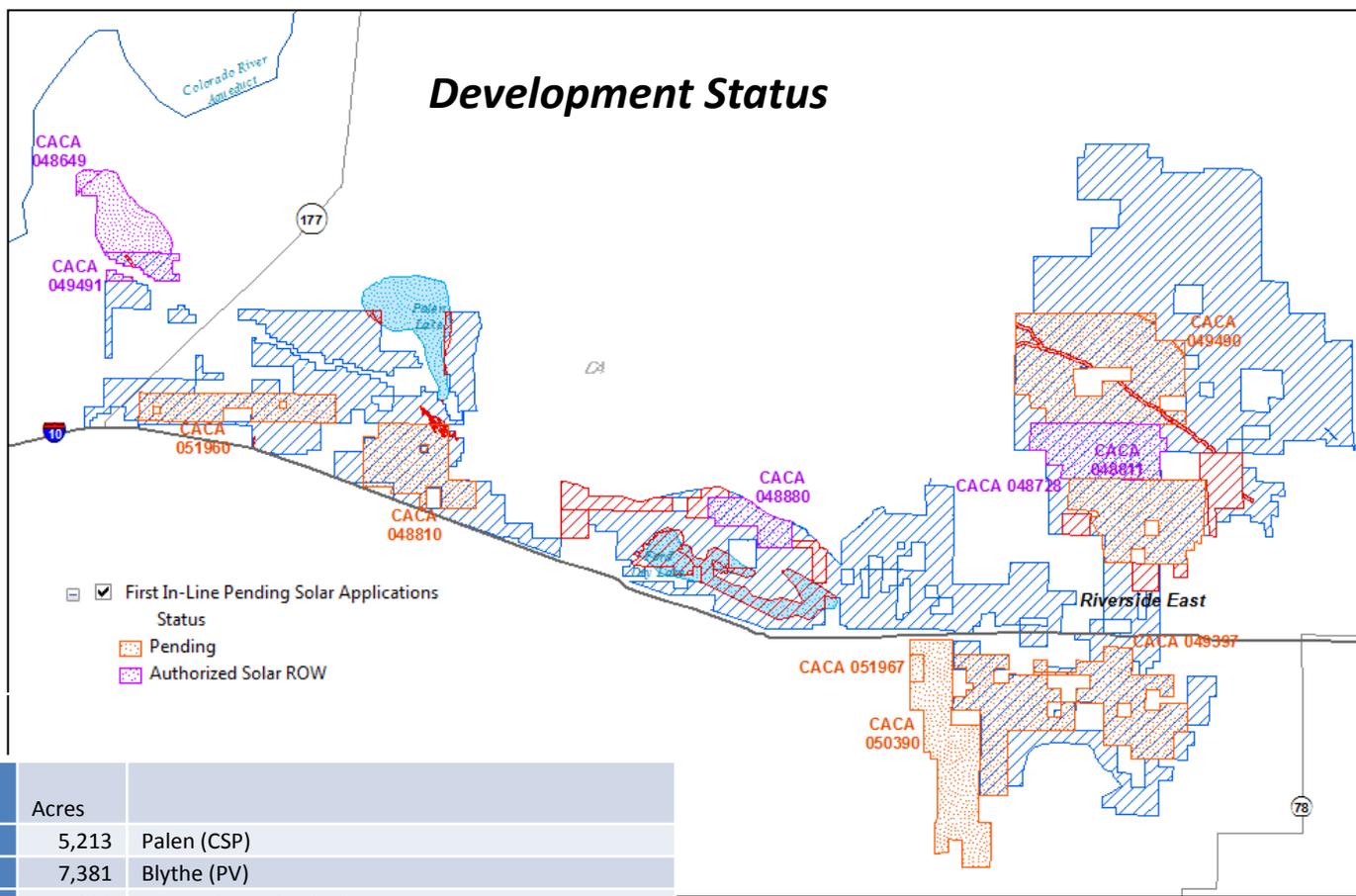
About 58 miles North of Imperial Valley SEZ; 25 mi northeast of West Chocolate Mountains SEZ

Riverside East SEZ



- Supplement to Draft Solar PEIS: Eliminated the northwest portion (43,439 acres) of the SEZ to minimize impacts to Joshua Tree NP.

Development Status



As of November 2013:

Pending Applications		
	Acres	
CACA48810	5,213	Palen (CSP)
CACA48811	7,381	Blythe (PV)
CACA49397	5,838	Desert Quartzite (PV)
CACA49490	12,837	McCoy (CSP)
CACA50390	7,724	Mule Mountain III (CSP)
CACA51960	4,099	Chuckwalla Solar (CSP)
CACA51967	6,921	Sonoran West SEGS (CSP)
Authorized Projects		
	Acres	
CACA48728	5,440	750 MW McCoy, PV
CACA48880	1,952	250 MW Genesis , CSP trough (under construction)
CACA49491	1,198	150 MW Desert Harvest, PV
Total Area	49,600	About 34% of the SEZ developable area

Note: Solar PEIS impact assessment assumes full build out of the SEZ (i.e., 80% of the area will be developed with solar facilities; 5-9 MW/acre)

The Solar PEIS examined 20 resource areas:

Lands and Realty	Geology and Soils	Air Quality and Climate	Acoustic Environment
Specially Designated Areas/ Wilderness Characteristics	Mineral Resources	Visual Resources	Socioeconomics
Recreation	Vegetation	Paleontology	Environmental Justice
Rangeland Resources	Wildlife and Aquatic Biota	Cultural Resources	Transportation
Military and Civilian Aviation	Special Status Species	Native American Concerns	Cumulative Impacts



Lands and Realty

- Assuming 80% of the SEZ would be developed, full development of the SEZ would disturb up to 118,328 acres, and support generation of between 13,148 to 23,666 MW of electricity
- Roads and trails that cross the SEZ could be closed to public use
- Partial overlap with Section 368 energy corridor along southern boundary
- Programmatic Design Features (Final PEIS Section A.2.2.1):
 - Early consultation with BLM to identify conflicts
 - Siting should avoid, minimize, and/or mitigate impacts on BLM land use planning designations
- SEZ-Specific Design Features: None

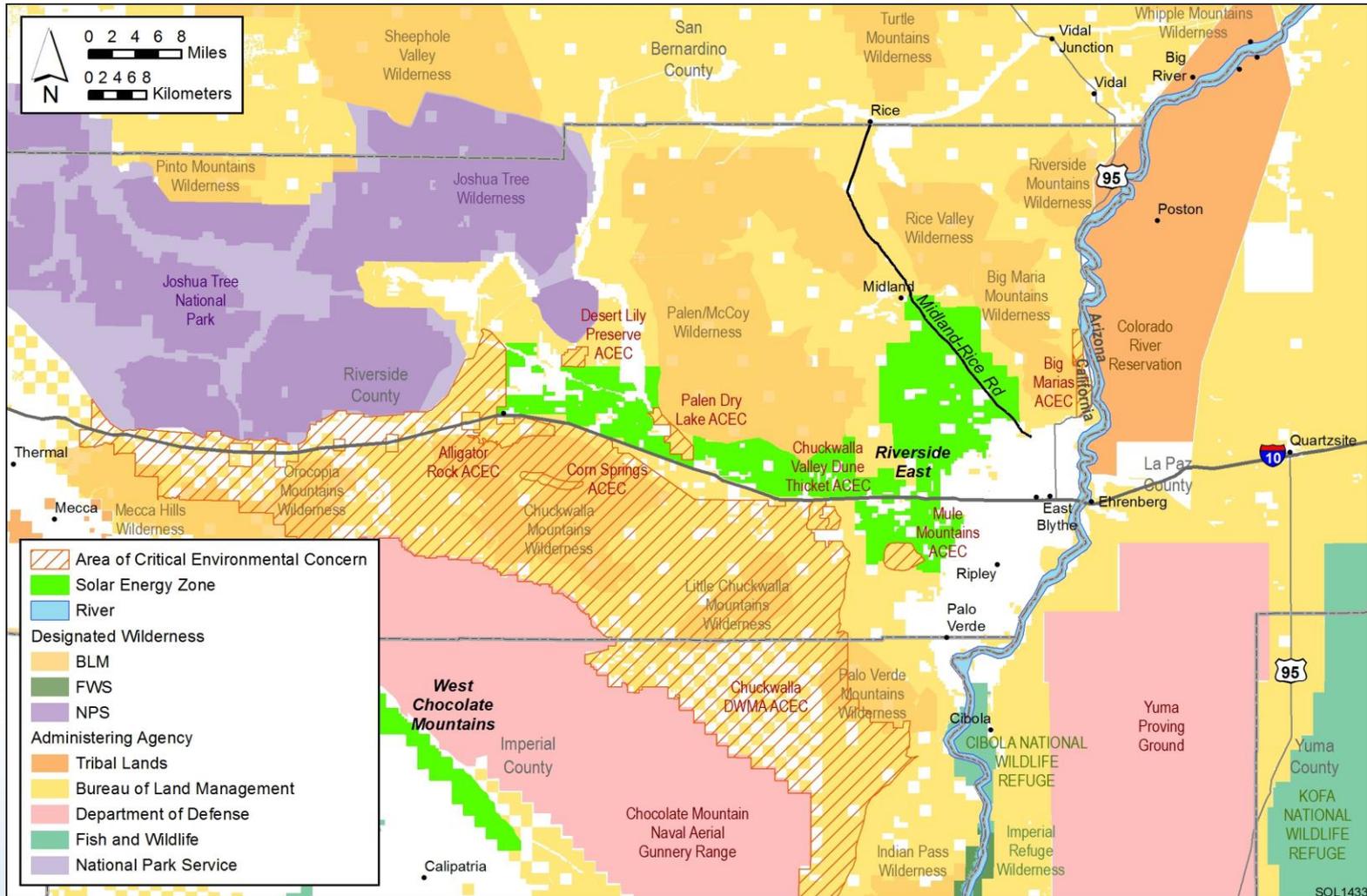
Photo: Solar Energy PEIS



Specially Designated Lands

- Joshua Tree NP, seven Wilderness Areas (Joshua Tree, Big Maria Mountains, Chuckwalla Mountains, Little Chuckwalla Mountains, Palen-McCoy, Palo Verde Mountains, Rice Valley), and eight Areas of Critical Environmental Concern (ACECs).
- Programmatic Design Features (Final PEIS Section A.2.2.2):
 - Protection of existing values shall be evaluated during the environmental analysis for solar energy projects.
- SEZ-specific Design Features:
 - BLM will monitor whether there are increases in human traffic to the eight ACECs in and near the SEZ and determine whether additional design features are required to protect the resources in these areas.

Specially Designated Areas Near to Riverside East

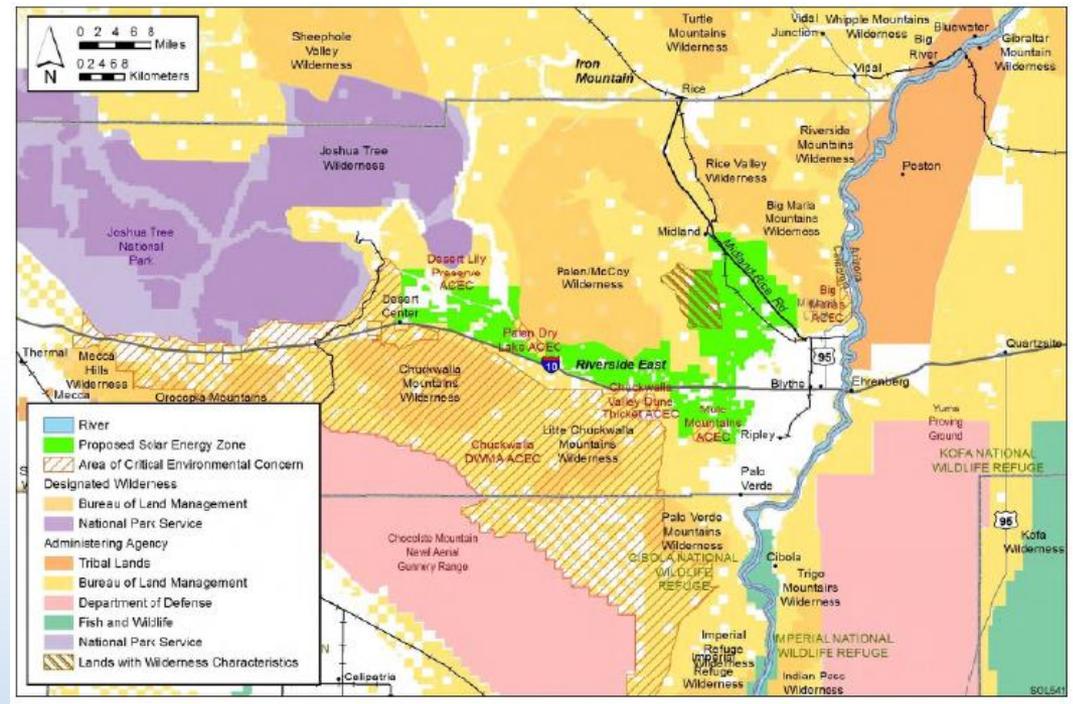


Joshua Tree National Park, Wilderness Areas, and ACECs

Lands with Wilderness Characteristics

- FLPMA requires BLM to maintain an inventory of public lands with wilderness characteristics (WC). Four criteria are evaluated:
 - Size over 5,000 acres of continuous roadless BLM lands
 - Naturalness
 - Outstanding Opportunities for Solitude or Primitive Recreation
 - Supplemental Values (e.g., ecological, geological, scenic)

- SEZ development could adversely affect about 20,000 acres that possess WC – area adjacent to McCoy Mountains



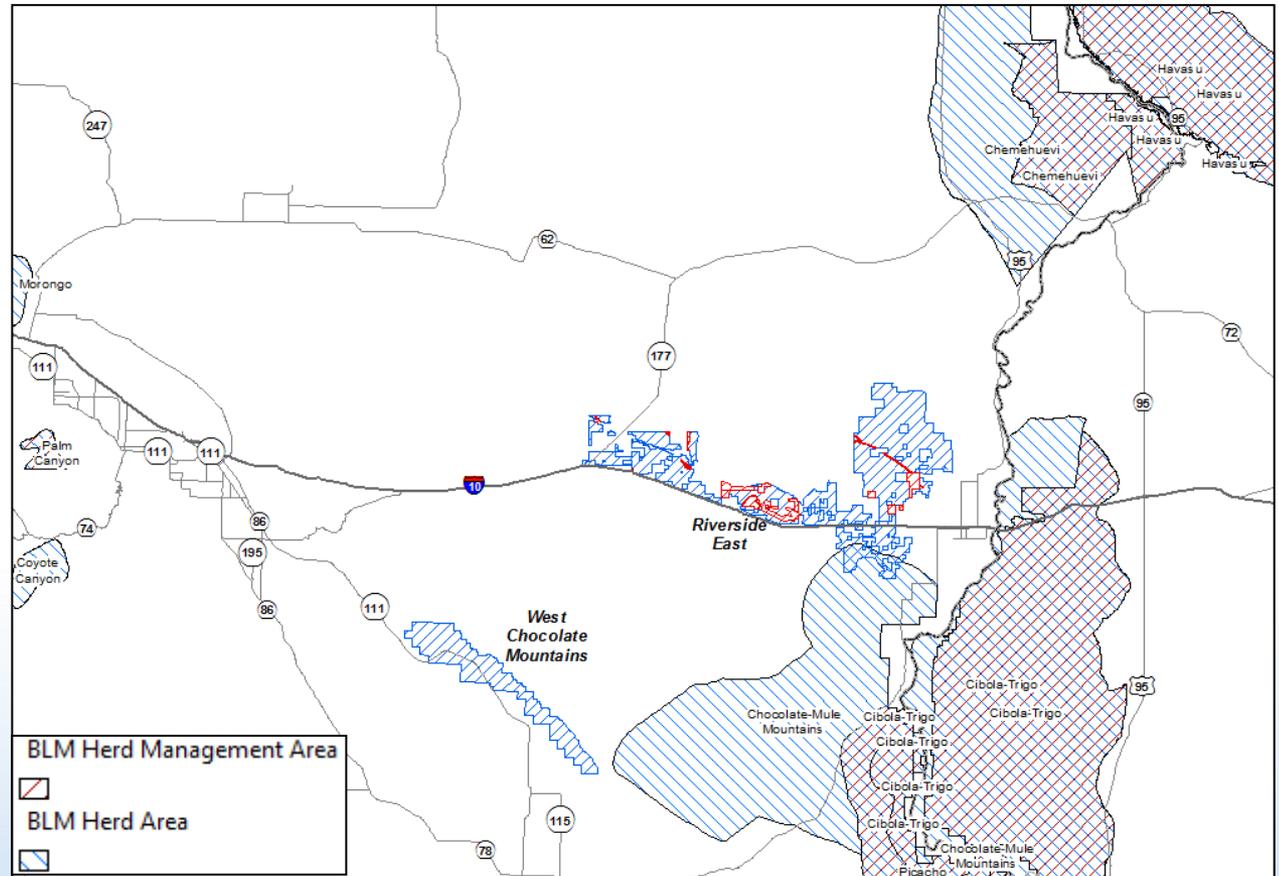
Rangeland Resources

Livestock and Grazing

- There are no grazing allotments in the SEZ; therefore, no impacts to livestock and grazing

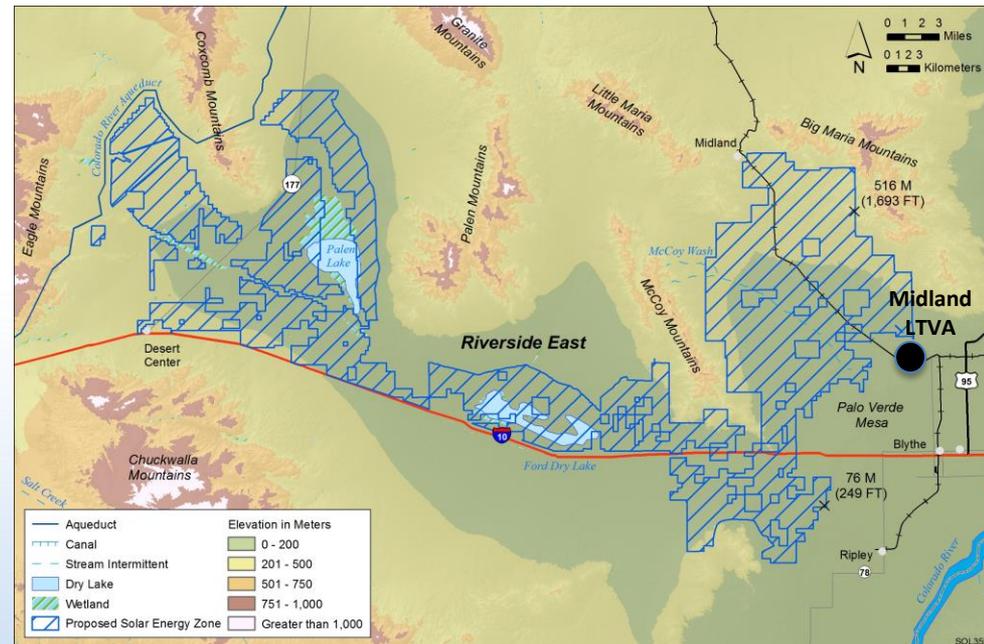
Wild Horses and Burros

The closest Herd Management Area is located 9 miles from the SEZ; the Chocolate-Mule Mountains herd area overlaps the southern part of the SEZ



Recreation

- Lands are believed to support limited dispersed recreation:
 - Climbing in nearby Wilderness Areas, OHV touring and access to campsite and hiking opportunities may be important
 - The Midland Long-Term Visitor Area is located in the eastern part of the SEZ.
- Development on the SEZ would eliminate future recreation activities from portions of the SEZ
- Programmatic Design Features (Final PEIS Section A.2.2.6):
 - Consultation with BLM early in project planning
 - Facilities should not be sited in areas of important recreation resources
- SEZ-specific Design Features: A buffer area will be established between the LTVA and solar development to preserve the setting of the LTVA



Geologic Setting and Soil Resources

- Soils within the SEZ are predominantly gravelly loams (67%) and dunes (20%)
- Ground disturbance would be the greatest impact on soil resources
- Disturbance to desert pavement leads to soil loss from wind erosion
- Impacts: soil compaction; soil horizon mixing; soil erosion and deposition by wind, water, and surface runoff; sedimentation; possibly soil contamination
- Programmatic Design Features (Final PEIS Section A.2.2.8):
 - Avoid, minimize, and/or mitigate potential impacts and geologic hazards, including measures to avoid erosion and stabilize disturbed areas
- SEZ-specific Design Features:
 - Avoid ground disturbance in areas with biological soil crusts and desert pavement



Desert Pavement
& Geoglyph
Near Blythe

Photo: Photo by Andrew Alden (2008)

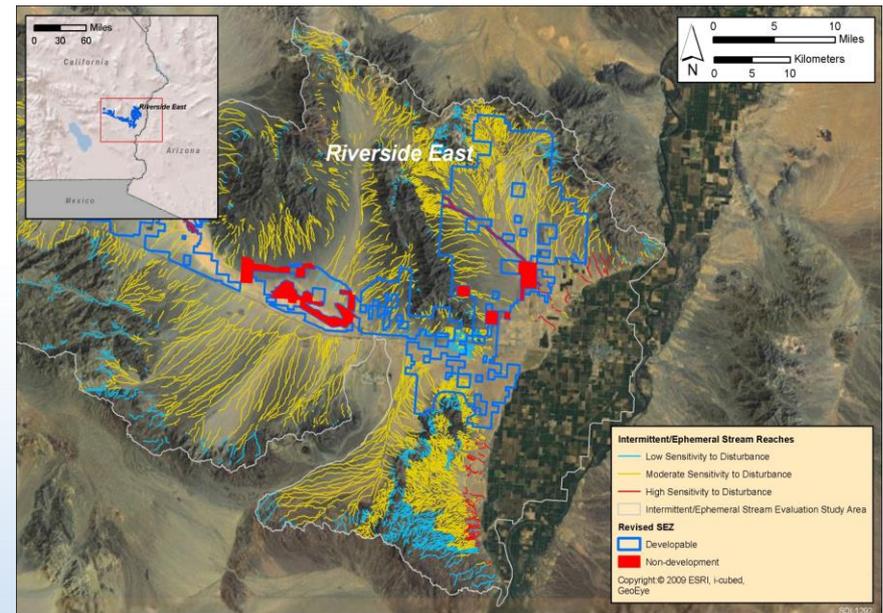
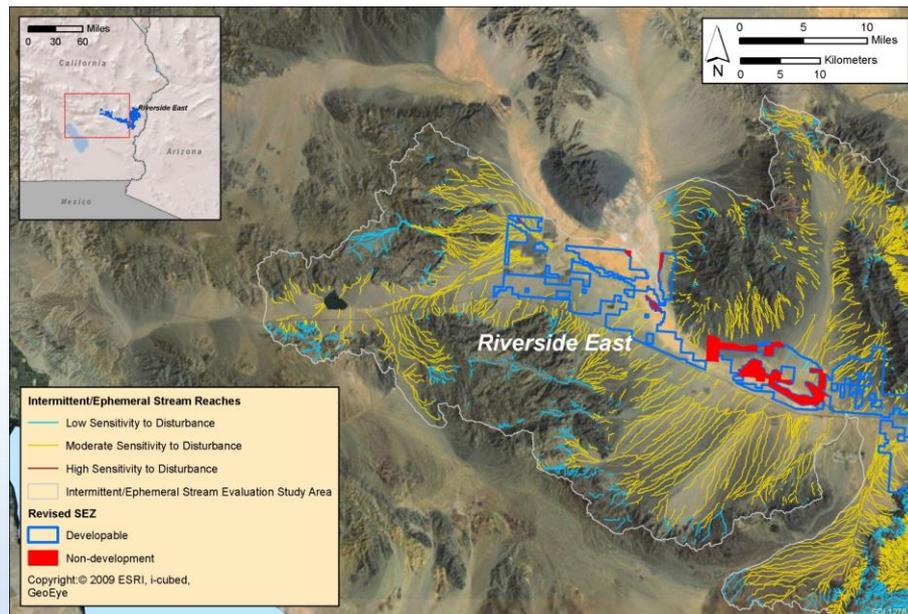
http://geology.about.com/od/sediment_soil/ig/desertpave/blyheart.htm

Minerals (fluids, solids, and geothermal)

- There are three existing mining claims located within the SEZ. Solar development in these area may be precluded
- Mineral potential assessment is available
- Some oil and gas development beneath the SEZ is possible; also sale of sand and gravel
- SEZ is withdrawn from receiving new solid mineral claims for 20 years
- Programmatic Design Features (Final PEIS Section A.2.2.9):
 - Consultation with BLM early in project planning
 - BLM retains right to issue oil and gas or geothermal leases with a stipulation of No Surface Occupancy
 - Projects shall be located to minimize conflicts with existing mineral rights
- SEZ-specific Design Features: None

Water Resources

- No known perennial surface water features within the SEZ
- The intermittent McCoy Wash, the Palen and Ford Dry Lake playas, and wetlands within the SEZ have been identified as non-development areas
- Within the study area, 16% of the intermittent/ephemeral stream channels had low sensitivity, 82% had moderate sensitivity, and 2% had high sensitivity to land disturbance



Water Resources (cont.)

- Depending on technologies used and extent of build-out, groundwater needs for development on the SEZ could be high
- Programmatic Design Features (Final PEIS Section A.2.2.10):
 - Control project drainage and runoff
 - Conduct pre-development hydrologic studies
 - Coordinate with regulatory agencies early
 - Avoid/minimize impacts on existing surface water features and groundwater resources
 - Compliance with terms and conditions for water resource mitigation; adaptive management
 - Minimize impacts and restore hydrologic processes during reclamation
- SEZ-specific Design Features:
 - Proposed alterations to surface water features require coordination/permitting from the CDFW
 - Full build-out of dry- and wet-cooled technologies is not feasible

Vegetation

- Sensitive habitats include desert dry wash woodlands, desert chenopod scrub/mixed salt desert scrub, sand dune and playa communities
- Potential Impacts: non-native weed infestations, loss of vegetation cover, adverse impacts from dust deposition and lowered groundwater levels
- Programmatic Design Features (Final PEIS Section A.2.2.11):
 - Control spread of invasive/noxious plant species
 - Early coordination and compliance with regulations
- SEZ-specific Design Features:
 - Avoid sensitive habitats and rare species associations (Alverson's foxtail cactus) and minimize indirect impacts to those habitats
 - Utilize engineering controls and buffers
 - Limit groundwater withdrawals

Wildlife and Aquatic Biota

- Species that may occur in the affected area of the SEZ:
 - >15 amphibians and reptiles
 - Large number of bird species occur in the SEZ, including shorebirds, passerines, raptors, and upland gamebirds
 - Large number of mammals, including big game, furbearers and small game, and small non-game species
- Impacts associated with direct mortality, habitat loss/alteration, loss of corridors. Heat injury for power towers

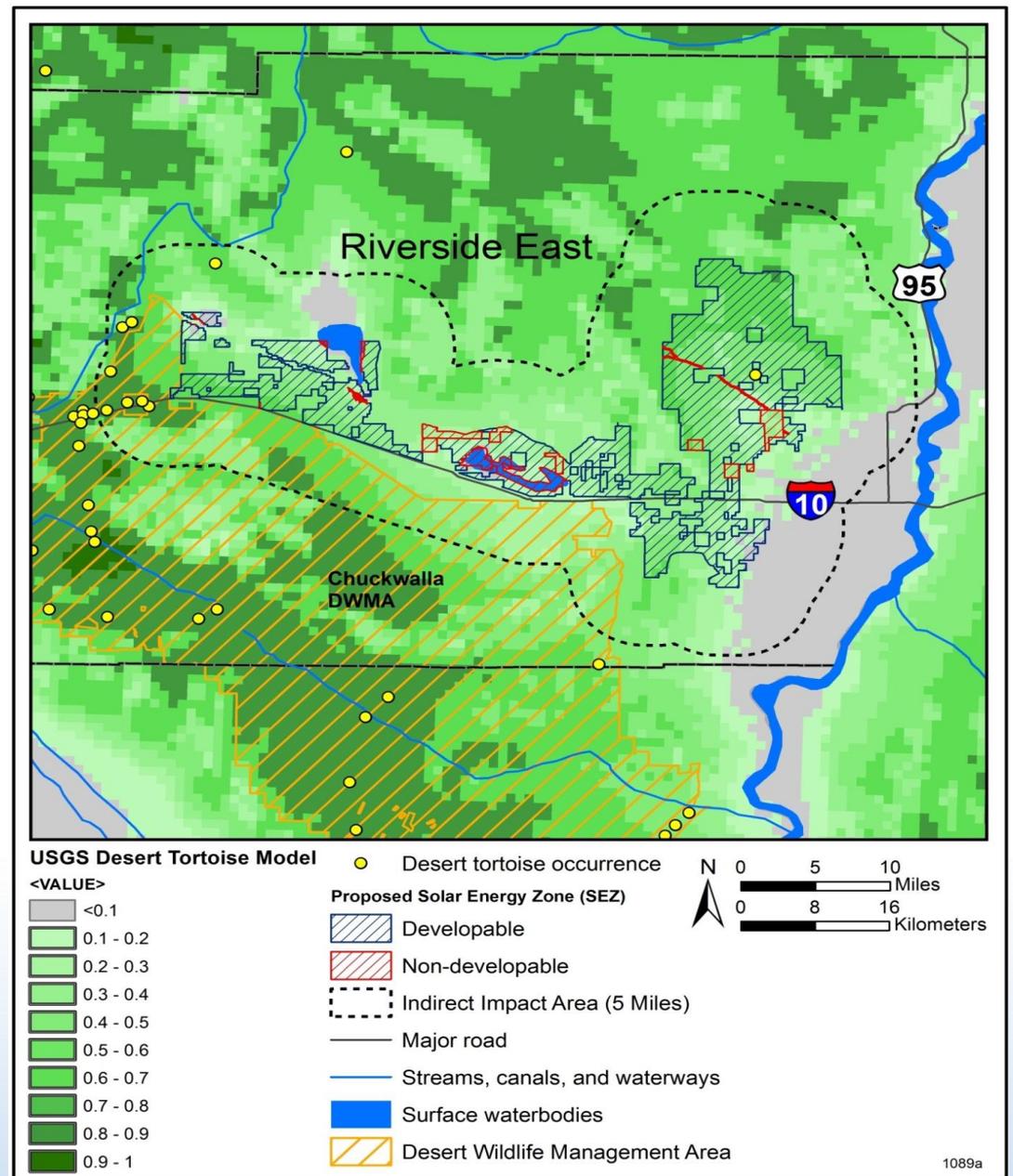
Wildlife and Aquatic Biota (cont.)

- Programmatic Design Features (Final PEIS Section A.2.2.11):
 - Several programmatic design features for ecological resources will avoid, minimize, or mitigate impacts to wildlife
 - Pre-disturbance surveys, monitoring plans, coordination with regulatory agencies required
- SEZ-specific Design Features:
 - Avoid disturbing and removing plant species beneficial to birds
 - Maintain 2 wildlife corridors through the SEZ
 - Fencing around the development should not block the free movement of mule deer between the Colorado River and the mountains
 - Avoid disturbance of delineated ephemeral wetlands
 - Utilize engineering controls to minimize impacts on major dry lakes and washes

Special Status Species

- Habitat for special status species occurs within 5 miles of the SEZ:
 - 9 BLM-sensitive plants could be moderately impacted
 - 14 BLM-sensitive animal species could be moderately impacted (and 1 federally threatened [ESA-listed] species, desert tortoise)
- Most of the SEZ is suitable habitat for the desert tortoise; FWS has identified parts that provide connectivity between areas with greater habitat suitability north and south of the SEZ
- Potentially-suitable habitat for golden eagle in the SEZ region (50-mi radius) of the SEZ could be lost. It is a California fully-protected species and is protected under the Bald and Golden Eagle Protection Act

Special Status Species (cont.): Desert Tortoise Occurrence



Special Status Species (cont.)

- Programmatic Design Features (Final PEIS Section A.2.2.11):
 - Required monitoring plans and ESA consultation with FWS
- SEZ-specific Design Features:
 - Conduct pre-disturbance surveys for all identified species with suitable habitat in the SEZ
 - Avoid occupied and sensitive habitats (playa, desert wash, sand dunes, woodlands)
 - Completely avoid occupied habitats of California Fully Protected Species (e.g., Golden Eagle)
 - Maintain 2 wildlife corridors through the SEZ
 - Consult/coordinate with FWS and CDFW on desert tortoise impacts
 - Translocate individuals from areas of direct effects if avoidance is not possible (or compensatory mitigation may be used)

Air Quality and Climate

- Prevailing wind direction is from the south. Annual average temperature of 74°F. Very low annual precipitation of about 3.5 inches
- Background particulate matter (PM) levels high; construction would generate additional elevated PM
- Severe weather events (thunderstorms, tornadoes) in the vicinity of the SEZ occur on average less than once per year. Flash flooding events and dust storms occur more frequently. Both have resulted in crop damage; flash flooding has resulted in deaths

Air Quality and Climate (cont.)

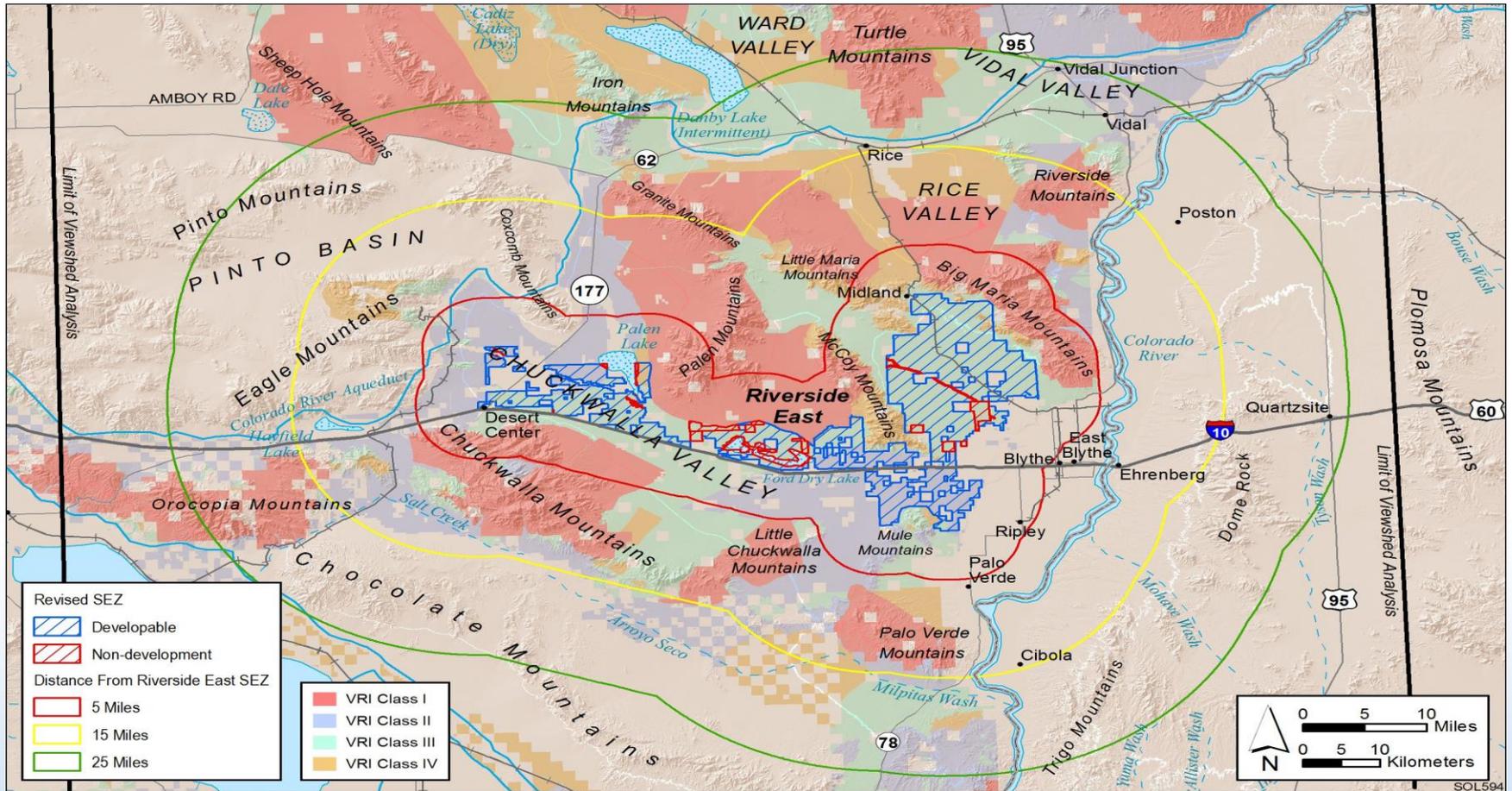
- Programmatic Design Features (Final PEIS Section A.2.2.12):
 - Consultation with BLM early in project planning; compliance with terms and conditions
 - Facilities should be designed, sited, and operated to minimize impacts to air quality
 - Dust suppression measures will be implemented during construction and operations
- SEZ-specific Design Features:
None



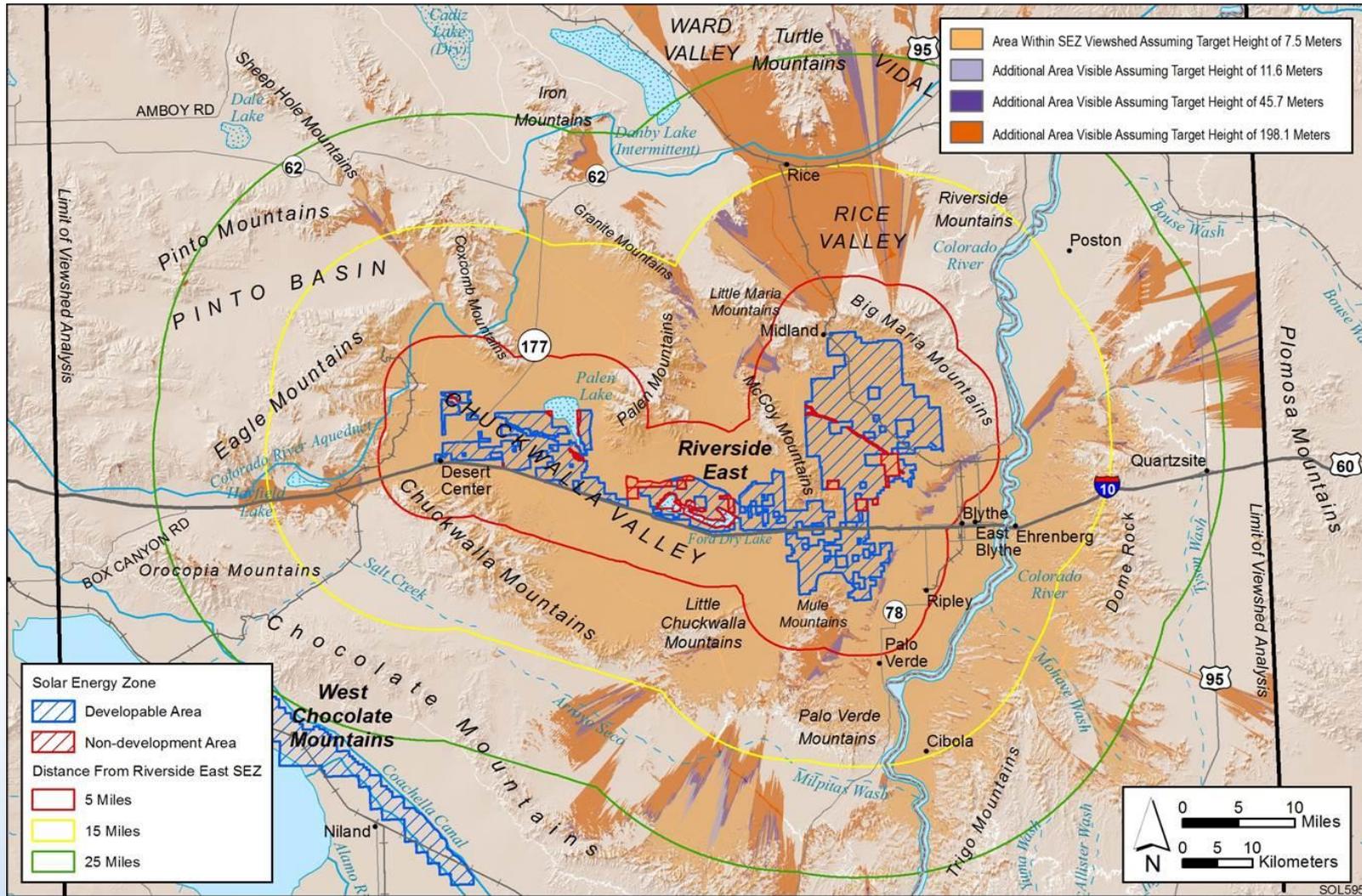
Photo: <http://marlimillerphoto.com/wind.html>.

Visual Resources

- Scenic quality of the SEZ is mixed, with most of the SEZ having a Visual Resource Inventory (VRI) value of III (moderate), remainder is VRI II (high value). SEZ borders many specially designated areas with VRI values of I (highest value)



Visual Resources (cont.) – Viewshed Analysis



Visual Resources (cont.)

- Programmatic Design Features (Final PEIS Section A.2.2.13):
 - Consultation with BLM early in project planning; compliance with terms and conditions
 - Design and siting of solar facilities to minimize glint and glare, night-sky effects, and visual dominance
- SEZ-specific Design Features:
 - Special visual impact mitigation for development in specific SEZ areas visible from and in close proximity to Joshua Tree NP and the Palen-McCoy Wilderness Area

Photo: BLM Solar Energy PEIS



Approximately 120° Panoramic View of the Northeastern Portion of the Proposed Riverside East SEZ from McCoy Wash Facing Northeast, Including Big Maria Mountains

Acoustic Environment

- Assumes three projects could be under construction at any one time (3,000 acres each)
- Noise levels from construction and operation of CSP facilities with energy storage could exceed 55 dBA (EPA's guideline level) up to 0.5 mi (0.8 km) from the SEZ boundary, but would be lower in Joshua Tree NP. Noise levels from large dish engine facilities could be even higher
- Construction and operations could cause short-term and long-term noise impacts on neighboring communities
- Programmatic Design Features (Final PEIS Section A.2.2.14):
 - Facilities must be located far enough away from residences, or include engineering and/or operational methods to meet county regulations for noise
 - Limiting hours of daily activities, construction of noise barriers, and coordination with nearby residents will be done to minimize noise impacts
- SEZ-specific Design Features: None

Paleontological and Cultural Resources

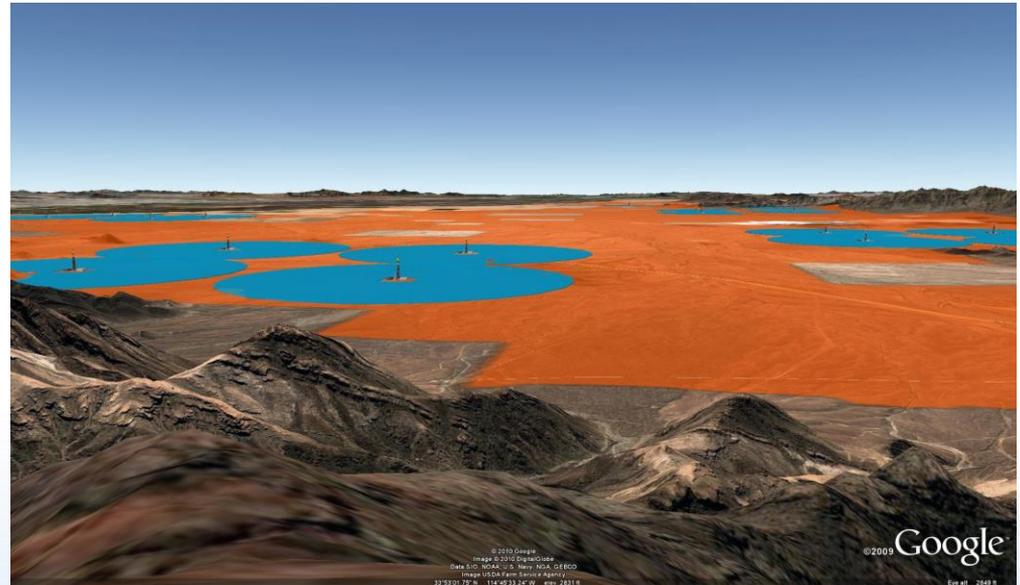
- Potential for paleontological impacts is high in the older alluvial fans and areas of alluvial valley deposits; surveys needed
- Direct and indirect impacts on significant cultural resources could occur: Desert Training Center/CA-AZ Maneuver Area; Salt Song Trail, parts of Cocmaricopa and *Xam Kwatchan* trails; ACECs
- Programmatic Design Features (Final PEIS Sections A.2.2.15 and A.2.2.16):
 - Consultation with BLM early in project planning
 - BLM will be notified immediately upon discovery of fossils , and work will be halted
- SEZ-specific Design Features
 - Significant resources clustered in specific areas which retain sufficient integrity will be avoided
 - MOAs developed to address eligible properties
 - Monitoring required in sand sheet and colluvium environments (for buried sites)



Photo: Konnie Wescott, Argonne National Laboratory

Native American Concerns

- Expected impacts on resources of concern in three major categories:
 - impacts on spiritual and culturally important landscapes
 - impacts on prehistoric and historic archaeological sites
 - impacts on local resources, such as vegetation, wildlife, and hydrological systems of traditional importance
- The Agua Caliente, Quechan, and Chemehuevi Tribes have expressed specific concerns over the potential visual effects and physical impacts on cultural resources and landscapes.
- The Soboba Band of Luiseno Indians and the Quechan have expressed concerns over highly sensitive areas within their Traditional Use Areas.
- The Colorado River Indian Tribes recommended dropping the Riverside East SEZ from BLM's Solar Program due to impacts on cultural resources.



Google Earth Visualization of the SEZ (shown in orange tint) and Surrounding Lands, as Seen from a Viewpoint in the Big Maria Mountains within the Rice Valley WA

Native American Concerns (cont.)

- Programmatic Design Features (Final PEIS Section A.2.2.17):
 - Consultation with tribes; compliance with NHPA
 - Solar facilities should be designed and sited to minimize impacts to Native American resources
 - Known human burial sites and rock art (panels of petroglyphs and/or pictographs) will be avoided
 - Visual intrusion on sacred sites will be avoided to the extent practicable
 - Springs and other water sources that are or may be sacred or culturally important will be avoided to the extent practicable. Culturally important plant and wildlife species will be avoided to be extent practicable
- SEZ-specific Design Features:
 - None identified in the PEIS
 - To be determined during consultation

Socioeconomics

- Positive and negative potential impacts:
 - Construction: from 1,181 to 15,633 temporary jobs; \$70 to 927 million annual income
 - Operations: from 258 to 8,501 permanent jobs; \$12 to 309 million annual income
 - Availability of housing for construction workers may be a problem; possible strain on community services
- Programmatic Design Features (Final PEIS Section A.2.2.18):
 - Consultation with BLM; identify and minimize impacts
- SEZ-specific Design Features:
 - None

Environmental Justice

- There are minority populations within 50 miles of the SEZ. Impacts to these populations could occur as a result of any adverse impact from development on the SEZ
- Programmatic Design Features (Final PEIS Section A.2.2.19):
 - Consultation with BLM; identify and minimize impacts
- SEZ-specific Design Features: None

Transportation

- Primary impacts would be from commuting worker traffic - up to additional 6,000 vehicle trips per day during construction (multiple projects); could represent an increase in traffic of about 25% on I-10
- Programmatic Design Features (Final PEIS Section A.2.2.17):
 - Consultation with BLM and other agencies on measures such as planned site access locations, road improvements, staggered work schedules, and ride-sharing programs
- SEZ-specific Design Features:
 - Local road improvements, staggered shifts



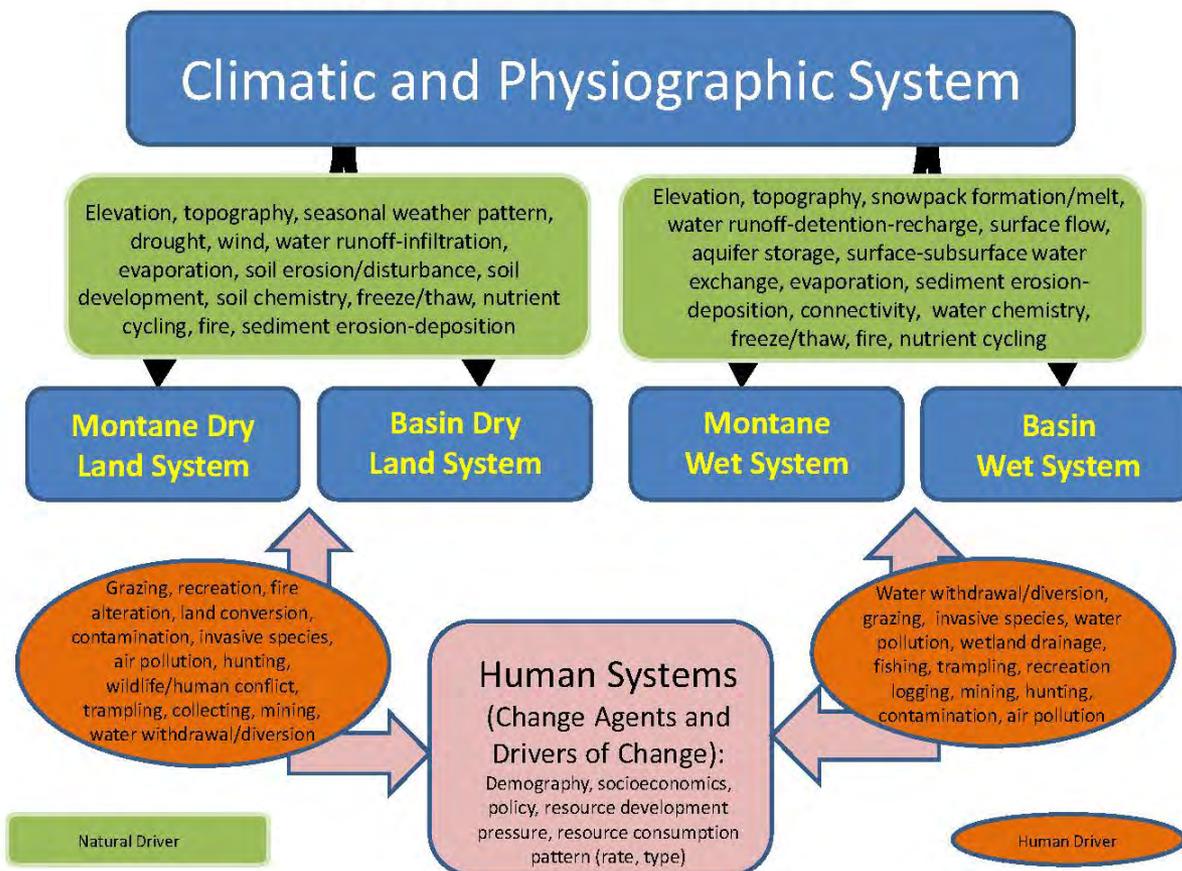
Cumulative Impacts

- Geographic extent of cumulative impacts analysis varied by resource
 - Ecological: 50-mile radius
 - Visual: viewshed within a 25-mile radius
 - Acoustic environment: adjacent areas
- Ongoing and reasonably foreseeable actions within or near the SEZ:
 - Solar: 3 facilities within SEZ authorized, Desert Sunlight 550 MW PV facility under construction at northwest boundary; Quartzsite 100 MW tower facility authorized 20 mi east; West Chocolate Mountains SEZ 20 mi southwest
 - New transmission lines
 - Eagle Crest Hydroelectric Plant, near northwest part of SEZ
 - Marine Corps Air Ground Combat Center Expansion (29 Palms) – may involve acquisition of ~170,000 acres, including Mojave Desert Tortoise habitat, and loss of OHV area

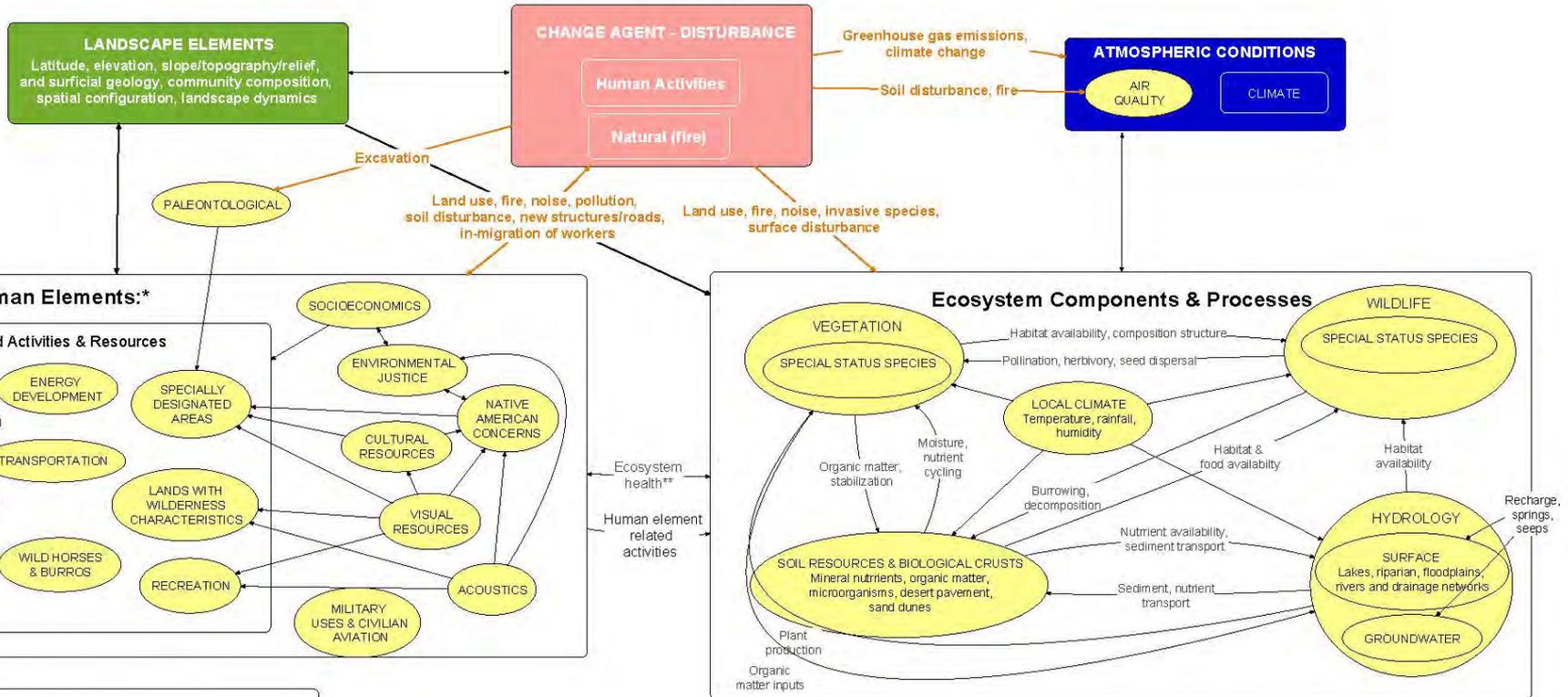
Riverside East Conceptual Model



Tier 1 Conceptual Model Mojave/Sonoran Ecoregion



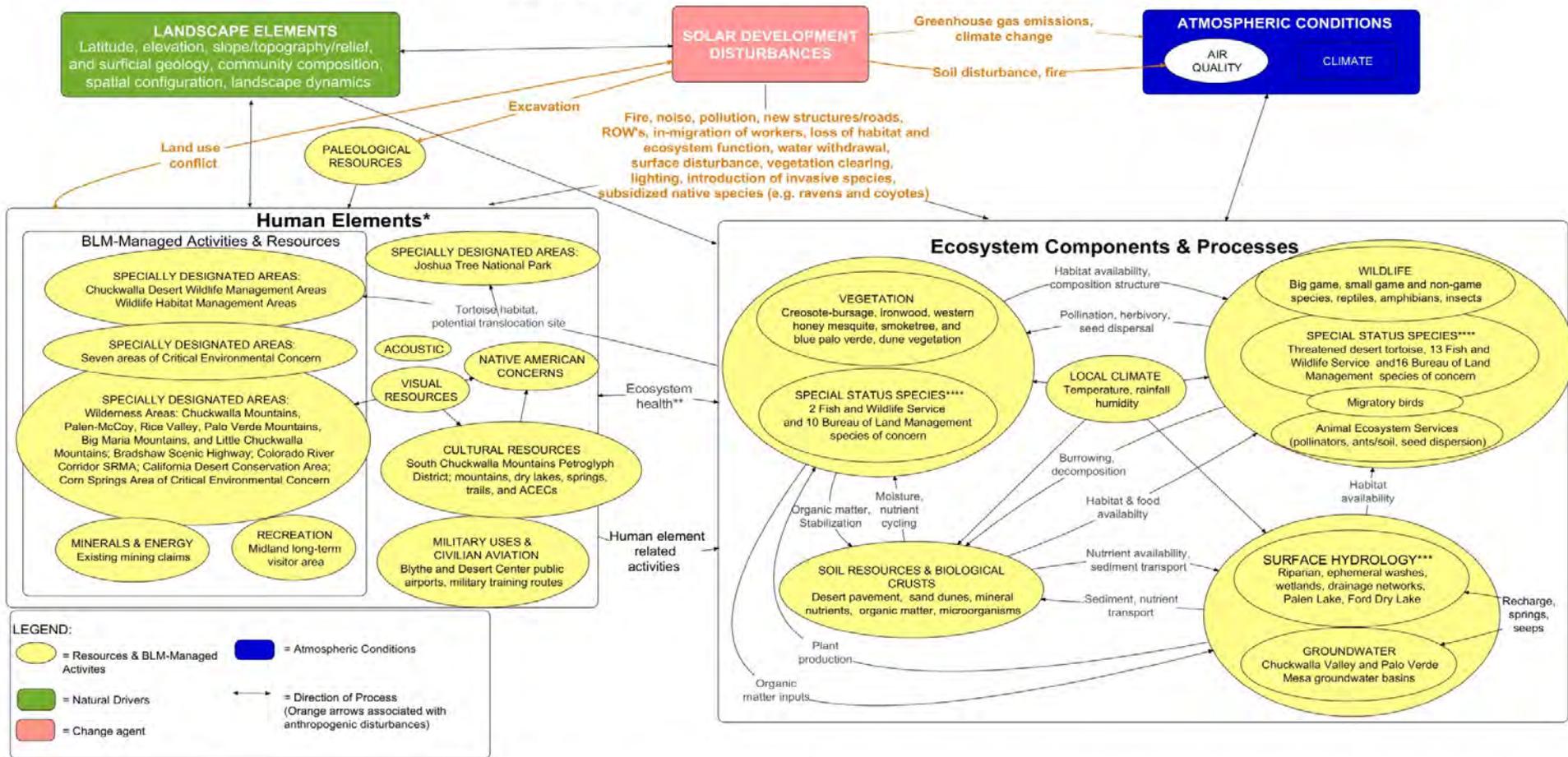
Tier 2 Conceptual Model Resource-Based Model



* Human Elements includes the human concerns and related resources for which impact evaluation was included in the Solar PEIS. These are activities and resources with (or requiring) human engagement in one of the following ways: 1) requires active participation in management of a resource or activity (e.g., lands and realty, specially designated areas, transportation, grazing, mineral development, recreation, military uses); 2) addresses the perspective or perception of a resource (e.g., visual resources, acoustics, lands with wilderness characteristics, cultural); and/or 3) addresses human-specific values (e.g., cultural resources, Native American concerns, socioeconomics, environmental justice).

**Ecosystem health is referred to as the degree to which the integrity of the soil and the ecological processes of the ecosystem are sustained (BLM Handbook H-4180-1). Ecosystem health can influence Native American concerns, visual resources, specially designated areas, and recreation. Human elements can also influence ecosystem components (e.g., recreation can compact soils, hunting can impact species, etc.).

Tier 3 Conceptual Model Riverside East SEZ Solar Development Model



* Human Elements includes the human concerns and related resources for which impact evaluation was included in the Solar PEIS. These are activities and resources with (or requiring) human engagement in one of the following ways: 1) requires active participation in management of a resource or activity (e.g., lands and realty, specially designated areas, transportation, mineral development, recreation, military uses); 2) addresses the perspective or perception of a resource (e.g., visual resources, acoustics, lands with wilderness characteristics, cultural); and/or 3) addresses human-specific values (e.g., cultural resources, Native American concerns, socioeconomic, environmental justice).

**Ecosystem health is referred to as the degree to which the integrity of the soil and the ecological processes of the ecosystem are sustained (BLM Handbook H-4180-1). Ecosystem health can influence Native American concerns, visual resources, specially designated areas, and recreation. Human elements can also influence ecosystem components (e.g., recreation can compact soils, hunting can impact species, etc.).

***Unavoidable hydrologic impacts may occur due to changes in drainage and recharge patterns. Potential impacts to water availability will be mitigated on-site through the implementation of a net neutral use policy (water rights must be purchased).

****Special status plant and animal species can be found in an appended table.

Note: All the elements of Tier 2 carry over to Tier 3; however, space constraints limit the number of Human Elements that can fit within the present design.



Riverside East – Status and Trends



Riverside East – Status and Trends

Rapid Ecoregional Assessments (REAs):

- Landscape approach to land and resource management integrating available scientific data
- REAs use existing data, modeling, and geographic information system (GIS) analyses to answer a broad range of management questions.
- Identifies at risk resources that could potentially be monitored

Conservation Elements: renewable resources of high conservation interest.

Change Agent: An environmental phenomenon or human activity (e.g. development and climate change) that can alter or influence the future status of resource condition.

Source: Strittholt et al., 2012

Riverside East – Status and Trends

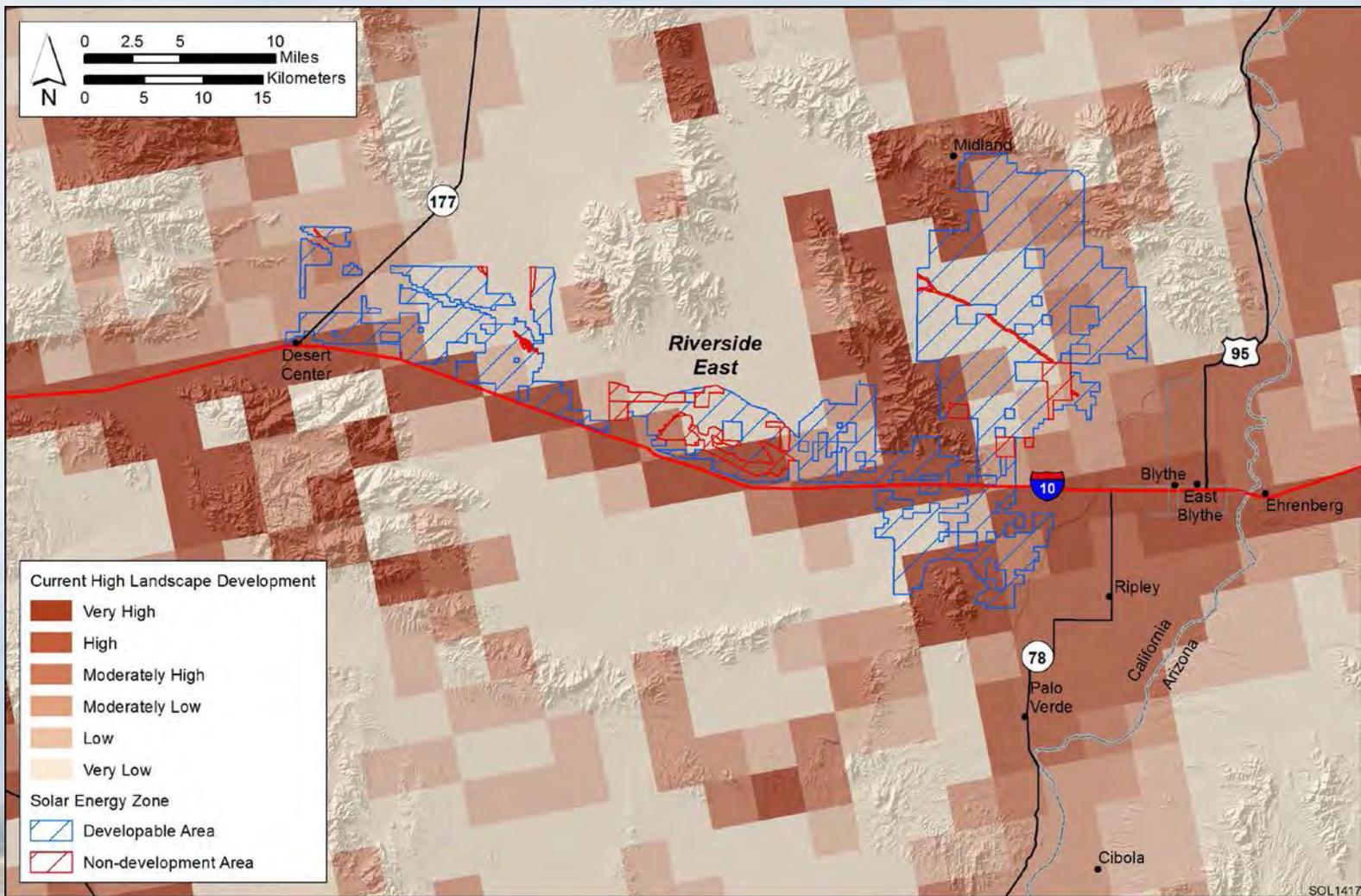
Projecting Future Condition: REAs evaluate the potential of change agents—including wildland fire, invasive species, development, and climate change—to affect ecoregion condition.

Modeled trends in future condition will be used by the BLM and its partners to assist with land use planning, developing best-management practices, authorizing uses, and establishing conservation and restoration priorities.

Planned updates to rapid ecoregional assessments will serve as a monitoring and evaluation process for the effectiveness of adaptive management.

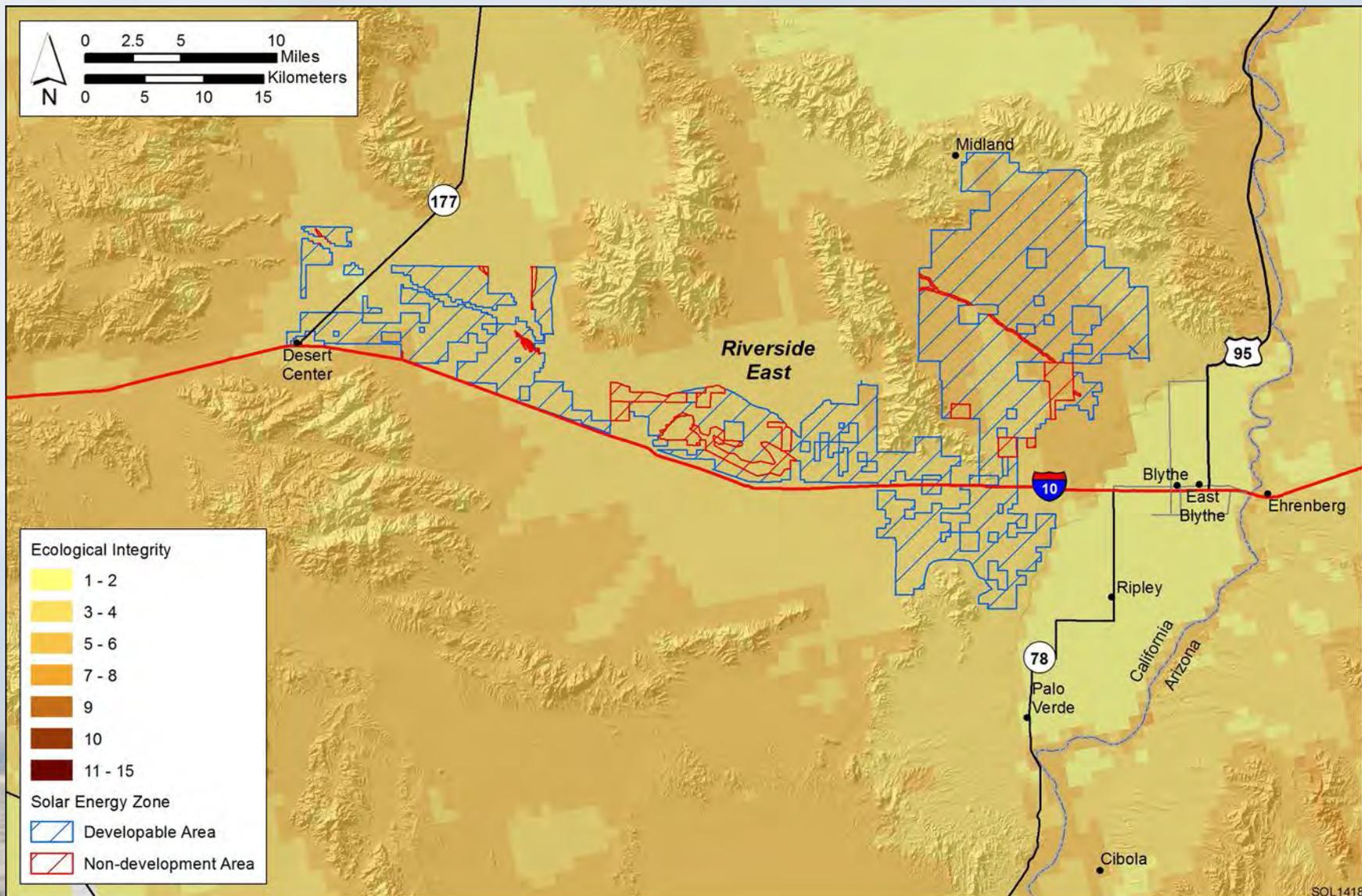


Source: Strittholt et al., 2012

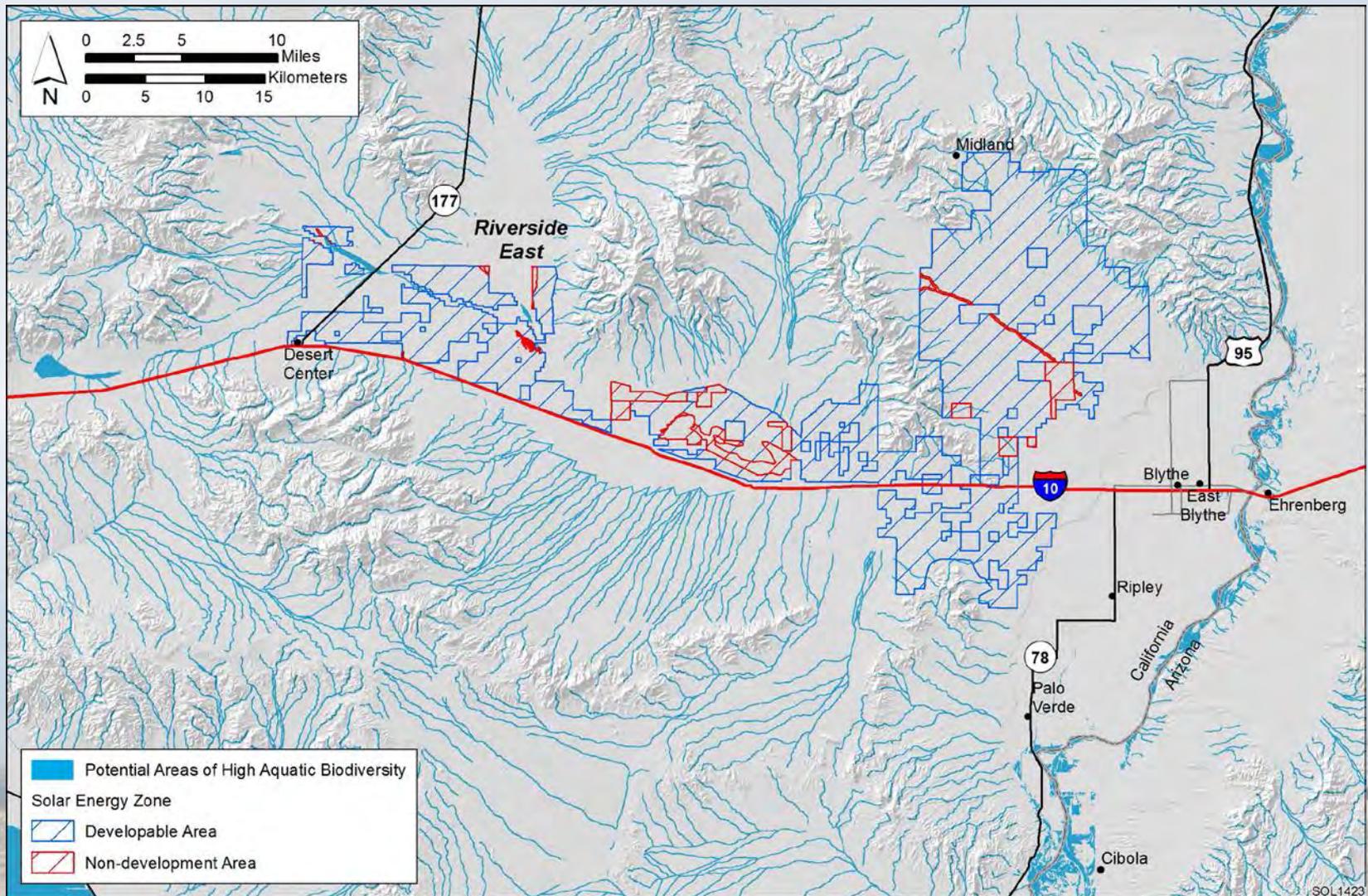


Landscape Development model included energy development, urbanization\infrastructure, agriculture, and recreational development metrics

Solar energy development is not the only impact in the region

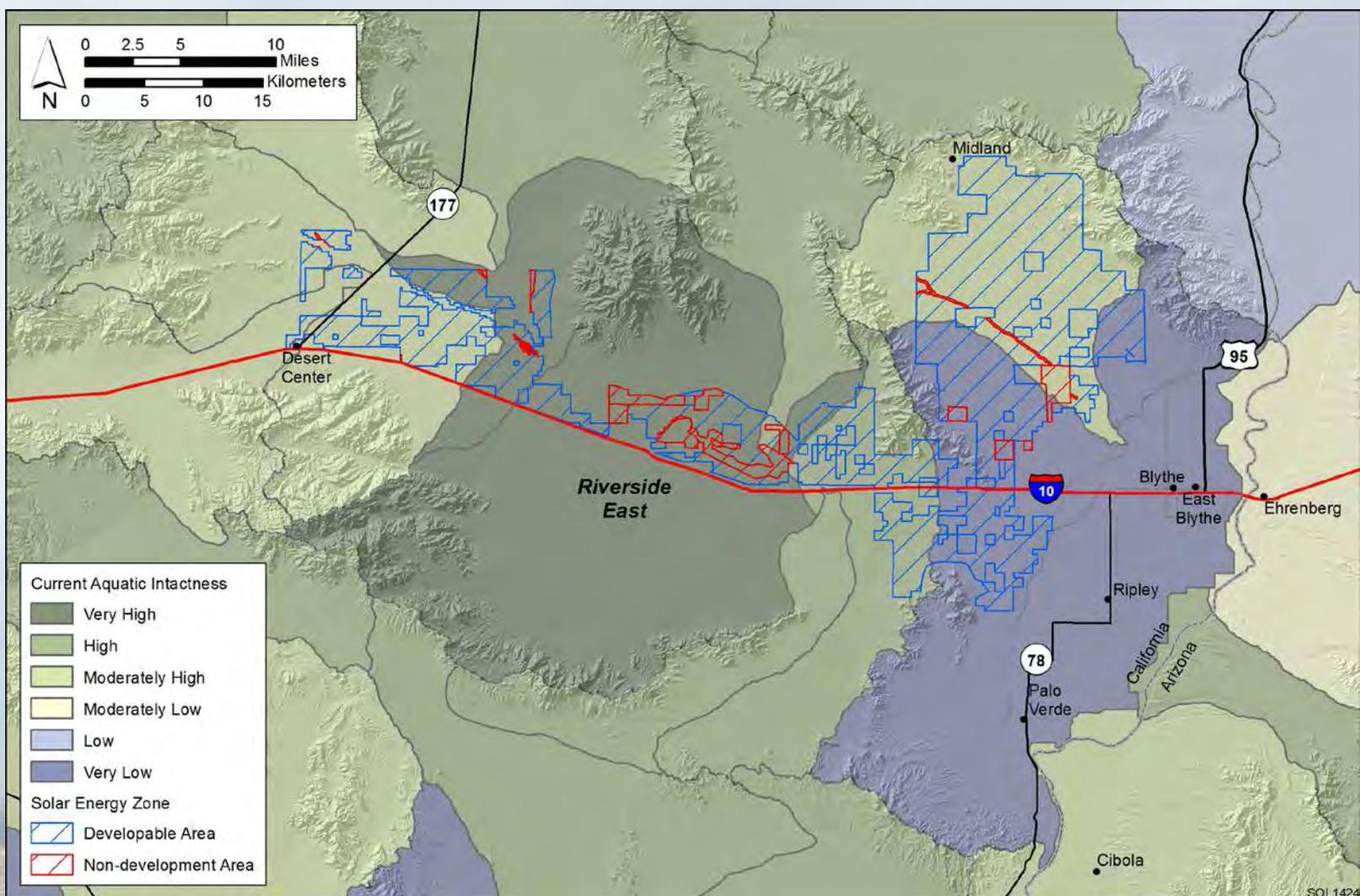


**Based on species counts, ecosystems, and intactness (1 Km resolution)
 Lowest ecological integrity near areas of highest human impacts**

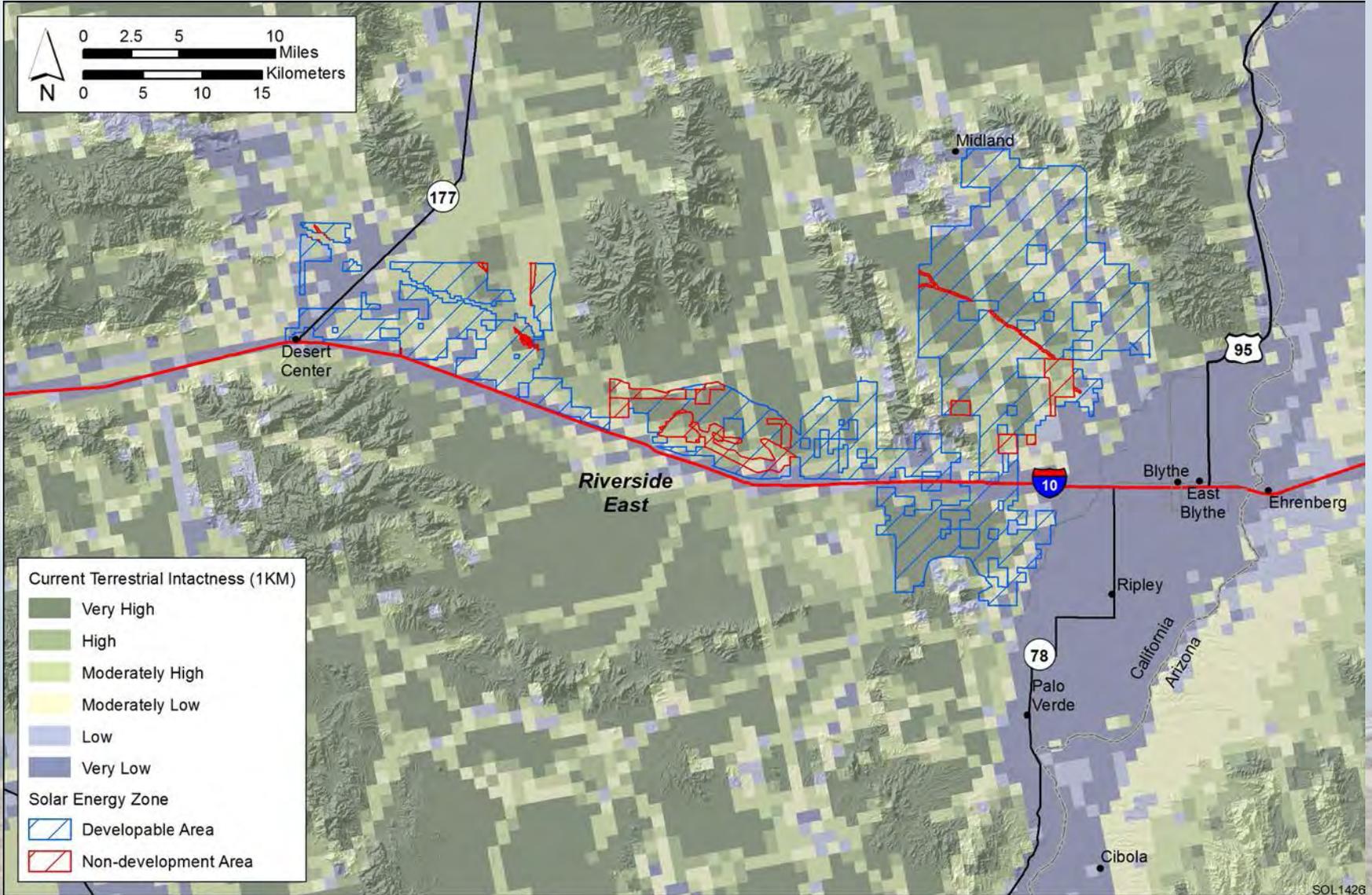


Streams and wetlands that fell in highly-protected lands or within TNC conservation portfolio areas

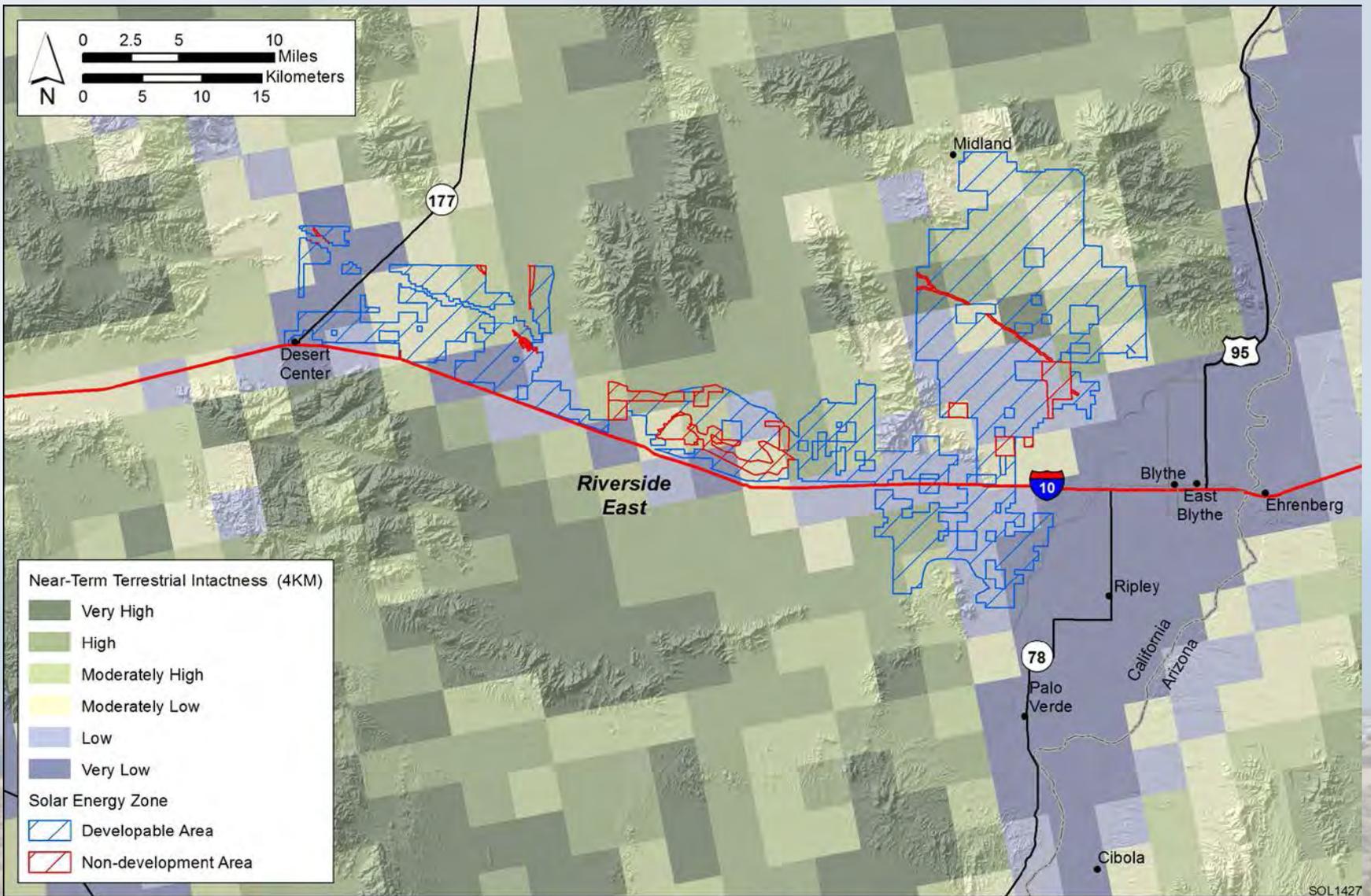
No systematic assessment of aquatic biodiversity is available for the ecoregion



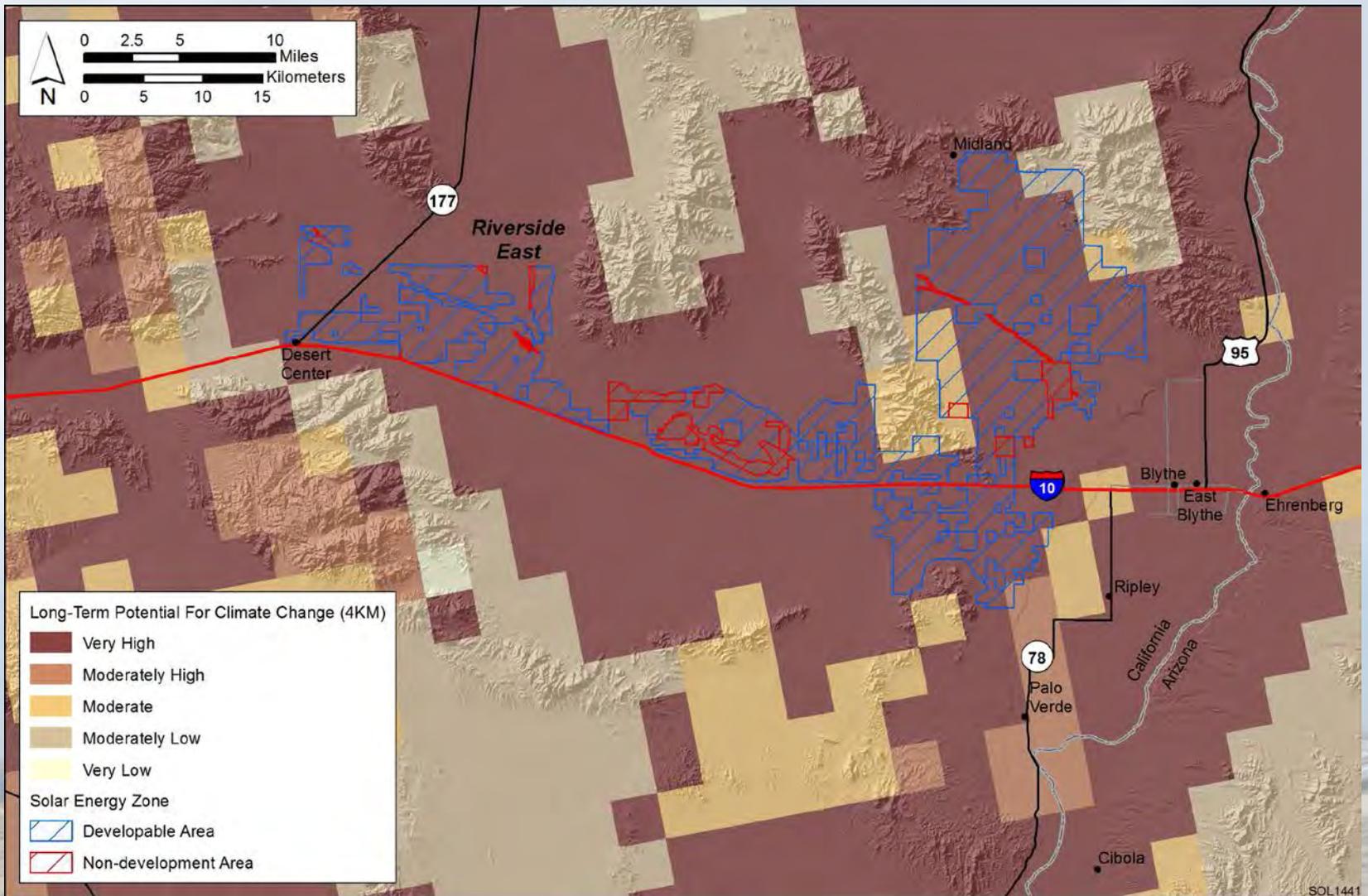
Estimate of current aquatic intactness based on a logic model that integrates land use, road impacts, and hydrologic impacts like dams
 Urbanization and flash flood berms that divert flows from the south through channels underneath I-10



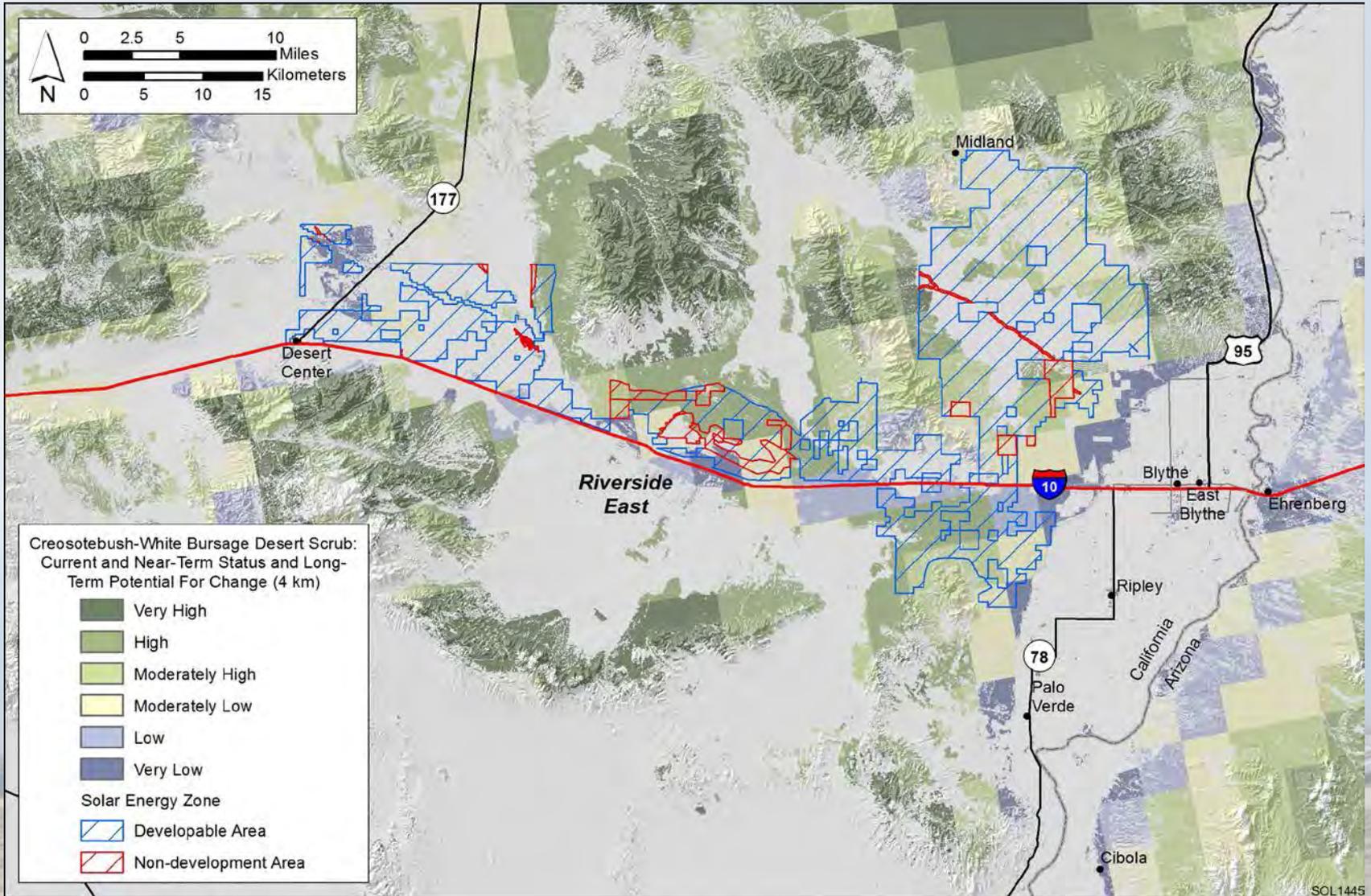
Terrestrial Intactness based on fire regime, invasive species, land use, energy development, habitat fragmentation models



Projected near-term terrestrial intactness suggests habitat quality declines for Sonoran-Mojave Creosotebush-White Bursage Desert Scrub along solar development areas



Model incorporates projected changes in temperature, runoff, precipitation, and vegetation. Very high potential for change in and around the SEZ which must be considered in monitoring plans



Consequently, very high potential for change in intact Creosote-bursage communities

Low potential for change along disturbed areas like I-10

Riverside East Monitoring and Adaptive Management Pilot

Management Questions

Management questions, management goals, and monitoring objectives are key components of a long term monitoring strategy.



Management Questions

- The “why monitor” step in the AIM strategy
- Specific questions about potential impacts that decision-makers need answered
- Derived in part from existing land use plans

Example:

“What is the habitat condition of special status species in and near the SEZ? Are they deteriorating relative to control sites?”

Management Goals

- Desired outcomes for particular resources
- Driven in part by legal requirements and BLM resource/land health goals

Example:

“Recover desert tortoise populations according to Desert Tortoise Recovery Plan”

Monitoring Objectives

- The “what to monitor” step in the AIM strategy. What we plan to monitor to answer the management questions.
- Should specify a measurable indicator over a specific area
- May address multiple management questions

Example:

“Detect changes in habitat quality and connectivity for special status species of more than X% within X mi of SEZ”