

State Water Resources Control Board

Cannabis Cultivation Policy

Staff Report

Appendix 1 Regional Descriptions

October 17, 2017

Table of Contents

1.0 REGIONAL DESCRIPTIONS.....6

1.1 Klamath Region6

 1.1.1 Climate and Precipitation6

 1.1.2 Hydrology8

 1.1.3 Geology8

 1.1.4 Anadromous Salmonid Population.....9

1.2 Upper Sacramento Region.....16

 1.2.1 Climate and Precipitation16

 1.2.2 Hydrology18

 1.2.3 Geology18

 1.2.4 Anadromous Salmonid Population.....18

1.3 North Coast Region24

 1.3.1 Climate and Precipitation24

 1.3.2 Hydrology25

 1.3.3 Geology25

 1.3.4 Anadromous Salmonid Population.....25

1.4 Middle Sacramento Region.....33

 1.4.1 Climate and Precipitation33

 1.4.2 Hydrology35

 1.4.3 Geology35

 1.4.4 Anadromous Salmonid Population.....35

1.5 South Sacramento Region.....42

 1.5.1 Climate and Precipitation42

 1.5.2 Hydrology44

 1.5.3 Geology44

 1.5.4 Anadromous Salmonid Population.....45

1.6 North Central Coast Region.....52

 1.6.1 Climate and Precipitation52

 1.6.2 Hydrology53

 1.6.3 Geology53

 1.6.4 Anadromous Salmonid Population.....54

1.7 South Central Coast Region61

1.7.1 Climate and Precipitation	61
1.7.2 Hydrology	62
1.7.3 Geology	62
1.7.4 Anadromous Salmonid Population.....	63
1.8 San Joaquin Region	70
1.8.1 Climate and Precipitation	70
1.8.2 Hydrology	72
1.8.3 Geology	72
1.8.4 Anadromous Salmonid Population.....	72
1.9 South Coast Region	79
1.9.1 Climate and Precipitation	79
1.9.2 Hydrology	80
1.9.3 Geology	80
1.9.4 Anadromous Salmonid Population.....	81
1.10 North East Desert Region	88
1.10.1 Climate and Precipitation	88
1.10.2 Hydrology	89
1.10.3 Geology.....	89
1.10.4 Anadromous Salmonid Population	89
1.11 Tahoe Region.....	95
1.11.1 Climate and Precipitation	95
1.1.2 Hydrology	97
1.1.3 Geology.....	97
1.1.4 Anadromous Salmonid Population	97
1.12 Mono Region.....	102
1.12.1 Climate and Precipitation	102
1.12.2 Hydrology	103
1.12.3 Geology.....	103
1.12.4 Anadromous Salmonid Population	103
1.13 Kern Region.....	109
1.13.1 Climate and Precipitation	109
1.13.2 Hydrology	111
1.13.3 Geology.....	111

1.13.4 Anadromous Salmonid Population	111
1.14 South East Desert Region	118
1.14.1 Climate and Precipitation	118
1.14.2 Hydrology	119
1.14.3 Geology	119
1.14.4 Anadromous Salmonid Population	119

List of Charts

- Chart A-1. Chart showing average annual patterns of temperature and precipitation in the Klamath Region, Klamath Mountains province
- Chart A-2. Chart showing average annual patterns of temperature and precipitation in the Klamath Region, Cascade Range and Modoc Plateau provinces.
- Chart A-3. Chart showing average annual patterns of temperature and precipitation in the Upper Sacramento Region, Cascade Range province.
- Chart A-4. Chart showing average annual patterns of temperature and precipitation in the Upper Sacramento Region, Modoc Plateau province.
- Chart A-5. Chart showing average annual patterns of temperature and precipitation in the North Coast Region.
- Chart A-6. Chart showing average annual patterns of temperature and precipitation in the Middle Sacramento Region, north of Red Bluff.
- Chart A-7. Chart showing average annual patterns of temperature and precipitation in the Middle Sacramento Region, south of Red Bluff.
- Chart A-8. Chart showing average annual patterns of temperature and precipitation in the South Sacramento Region, valley floor.
- Chart A-9. Chart showing average annual patterns of temperature and precipitation in the South Sacramento Region, Sierra Crest.
- Chart A-10. Chart showing average annual patterns of temperature and precipitation in the South Sacramento Region, east of Sierra Crest.
- Chart A-11. Chart showing average annual patterns of temperature and precipitation in the North Central Coast Region.
- Chart A-12. Chart showing average annual patterns of temperature and precipitation in the South Central Coast Region.
- Chart A-13. Chart showing average annual patterns of temperature and precipitation in the San Joaquin Region, valley floor.
- Chart A-14. Chart showing average annual patterns of temperature and precipitation in the San Joaquin Region, Sierra Crest.
- Chart A-15. Chart showing average annual patterns of temperature and precipitation in the South Coast Region.
- Chart A-16. Chart showing average annual patterns of temperature and precipitation in the North East Desert Region.
- Chart A-17. Chart showing average annual patterns of temperature and precipitation in the Tahoe Region, Sierra Mountains.
- Chart A-18. Chart showing average annual patterns of temperature and precipitation in the Tahoe Region, Nevada Desert.
- Chart A-19. Chart showing average annual patterns of temperature and precipitation in the Mono Region.

Chart A-20. Chart showing average annual patterns of temperature and precipitation in the Kern Region, Sierra Mountains.

Chart A-21. Chart showing average annual patterns of temperature and precipitation in the Kern Region, valley floor.

Chart A-22. Chart showing average annual patterns of temperature and precipitation in the South East Desert Region.

List of Figures

- Figure A-1. Klamath Region- Hydrology
- Figure A-2. Klamath Region- Elevation
- Figure A-3. Klamath Region- Köppen Climate
- Figure A-4. Klamath Region- Average Annual Precipitation (1981-2010)
- Figure A-5. Klamath Region- Hydrologic Classification
- Figure A-6. Klamath Region- Special-Status Anadromous Salmonid Populations
- Figure A-7. Upper Sacramento Region- Hydrology
- Figure A-8. Upper Sacramento Region- Elevation
- Figure A-9. Upper Sacramento Region- Köppen Climate
- Figure A-10. Upper Sacramento Region- Average Annual Precipitation (1981-2010)
- Figure A-11. Upper Sacramento Region- Hydrologic Classification
- Figure A-12. North Coast Region Hydrology
- Figure A-13. North Coast Region- Elevation
- Figure A-14. North Coast Region- Köppen Climate
- Figure A-15. North Coast Region- Average Annual Precipitation (1981-2010)
- Figure A-16. North Coast Region- Hydrologic Classification
- Figure A-17. North Coast Region- Special-Status Anadromous Salmonid Populations
- Figure A-18. Middle Sacramento Region- Hydrology
- Figure A-19. Middle Sacramento Region- Elevation
- Figure A-20. Middle Sacramento Region- Köppen Climate
- Figure A-21. Middle Sacramento Region- Average Annual Precipitation (1981-2010)
- Figure A-22. Middle Sacramento Region- Hydrologic Classification
- Figure A-23. Middle Sacramento Region- Special-Status Anadromous Salmonid Populations
- Figure A-24. South Sacramento Region- Hydrology
- Figure A-25. South Sacramento Region- Elevation
- Figure A-26. South Sacramento Region- Köppen Climate
- Figure A-27. South Sacramento Region- Average Annual Precipitation (1981-2010)
- Figure A-28. South Sacramento Region- Hydrologic Classification
- Figure A-29. South Sacramento Region- Special-Status Anadromous Salmonid Populations
- Figure A-30. North Central Coast Region- Hydrology
- Figure A-31. North Central Coast Region- Elevation
- Figure A-32. North Central Coast Region- Köppen Climate
- Figure A-33. North Central Coast Region- Average Annual Precipitation (1981-2010)
- Figure A-34. North Central Coast Region- Hydrologic Classification
- Figure A-35. North Central Coast Region- Special-Status Anadromous Salmonid Populations
- Figure A-36. South Central Coast Region- Hydrology
- Figure A-37. South Central Coast Region- Elevation
- Figure A-38. South Central Coast Region- Köppen Climate
- Figure A-39. South Central Coast Region- Average Annual Precipitation (1981-2010)
- Figure A-40. South Central Coast Region- Hydrologic Classification
- Figure A-41. South Central Coast Region- Special-Status Anadromous Salmonid Populations
- Figure A-42. San Joaquin Region- Hydrology

Figure A-43. San Joaquin Region- Elevation
Figure A-44. San Joaquin Region- Köppen Climate
Figure A-45. San Joaquin Region- Average Annual Precipitation (1981-2010)
Figure A-46. San Joaquin Region- Hydrologic Classification
Figure A-47. San Joaquin Region- Special-Status Anadromous Salmonid Populations
Figure A-48. South Coast Region- Hydrology
Figure A-49. South Coast Region- Elevation
Figure A-50. South Coast Region- Köppen Climate
Figure A-51. South Coast Region- Average Annual Precipitation (1981-2010)
Figure A-52. South Coast Region- Hydrologic Classification
Figure A-53. South Coast Region- Special-Status Anadromous Salmonid Populations
Figure A-54. North East Desert Region- Hydrology
Figure A-55. North East Desert Region- Elevation
Figure A-56. North East Desert Region- Köppen Climate
Figure A-57. North East Desert Region- Average Annual Precipitation (1981-2010)
Figure A-58. North East Desert Region- Hydrologic Classification
Figure A-59. Tahoe Region- Hydrology
Figure A-60. Tahoe Region- Elevation
Figure A-61. Tahoe Region- Köppen Climate
Figure A-62. Tahoe Region- Average Annual Precipitation (1981-2010)
Figure A-63. Mono Region- Hydrology
Figure A-64. Mono Region- Elevation
Figure A-65. Mono Region- Köppen Climate
Figure A-66. Mono Region- Average Annual Precipitation (1981-2010)
Figure A-67. Mono Region- Hydrologic Classification
Figure A-68. Kern Region- Hydrology
Figure A-69. Kern Region- Elevation
Figure A-70. Kern Region- Köppen Climate
Figure A-71. Kern Region- Average Annual Precipitation (1981-2010)
Figure A-72. Kern Region- Hydrologic Classification
Figure A-73. Kern Region- Special-Status Anadromous Salmonid Populations
Figure A-74. South East Desert Region- Hydrology
Figure A-75. South East Desert Region- Elevation
Figure A-76. South East Desert Region- Köppen Climate
Figure A-77. South East Desert Region- Average Annual Precipitation (1981-2010)
Figure A-78. South East Desert Region- Hydrologic Classification

1.0 REGIONAL DESCRIPTIONS

This appendix to the Cannabis Cultivation Policy (Policy) Staff Report provides an overview of the 14 regions for which instream flow Requirements and associated gage implementation plans have been developed. Maps and figures for each region are located at the end of each regional description and include maps of the regional areas, elevation, climate, precipitation, hydrologic classifications, and anadromous fish distribution, and graphs of monthly average temperature and precipitation patterns.

For the purposes of the Policy, the term special-status refers to species or distinct populations that are federally listed as threatened or endangered, listed as threatened or endangered by the state of California, listed as a species of concern by the National Marine Fisheries Service (NMFS), or listed as species of special concern by the California Department of Fish and Wildlife (CDFW)¹. The presence of special-status anadromous salmonid populations within the nine cannabis policy regions was determined based on anadromous salmonid population distribution information obtained from the University of California, Davis (UC Davis) PISCES database, a compilation of data describing California's native fishes (Santos et al. 2014).

1.1 Klamath Region

The Klamath Region covers approximately 10,897 square miles in northern California and southern Oregon (Figure A-1). Elevations in this region range from sea level to over 7,500 feet in the Klamath Mountains and Trinity Alps, and over 14,000 feet at the peak of Mount Shasta (Figure A-2). The region includes the major watersheds of the Smith River, as well as the Klamath River and its main tributaries, the Trinity, Salmon, Scott, and Shasta Rivers. Although the Klamath Region spans portions of northern California and southern Oregon, only the portion of the Klamath Region located in California will be subject to this cannabis policy.

1.1.1 Climate and Precipitation

The climate of the Klamath Region varies according to the two major terrain types: mountains and plateau. The western portion of the Klamath Region is generally characterized by a Mediterranean climate, and the eastern portion of the Klamath Region is generally characterized by a Cool Interior climate (Figure A-3). The western portion of the Klamath Mountains are characterized by a Mediterranean climate with cool summers, coastal areas and the lower Smith River watershed are characterized by a Mediterranean climate with summer coastal fog, and the upper Trinity River watershed is characterized by a Mediterranean climate with hot summers. The Modoc Plateau geomorphic province and the mountain ranges flanking the Scott River watershed are characterized by cool continental climates with dry summers. Temperatures patterns vary within the Klamath Region, and inland areas tend to exhibit more significant temperature extremes compared to coastal areas. The lower Klamath and Trinity River watersheds exhibit average annual maximum temperatures above 75 degrees Fahrenheit, while the Modoc Plateau and coastal areas in this region remain cooler, with average annual maximum temperatures of 60 degrees Fahrenheit in most locations, or 40 degrees Fahrenheit at high elevations. Average annual minimum temperatures near the Klamath Region coast and in low lying areas are tempered by the ocean influence and remain above freezing, while average annual minimum temperatures further inland and at high elevations drop below freezing.

¹ No California salmonids were federally proposed for listing as threatened or endangered or designated as a State Candidate for threatened or endangered listing by the state of California at the time of the preparation of this report (CDFW 2017b).

Precipitation patterns also vary within the Klamath Region, and the Klamath Mountains tend to receive a much larger amount of precipitation annually compared to the Modoc Plateau. The Klamath Mountains tend to receive an average of over 120 inches of precipitation annually, while the Modoc Plateau tends to receive an average of less than 15 inches of precipitation annually (Figure A-4). The Modoc Plateau receives a significant portion of precipitation as snowfall, and snow also falls in high elevation areas in the central Klamath Mountains. Precipitation generally falls in the Klamath Mountains from October to May, and peaks in December and January (Chart A-1). Precipitation generally falls in the Modoc Plateau from November to March (Chart A-2). (WRCC 2016)

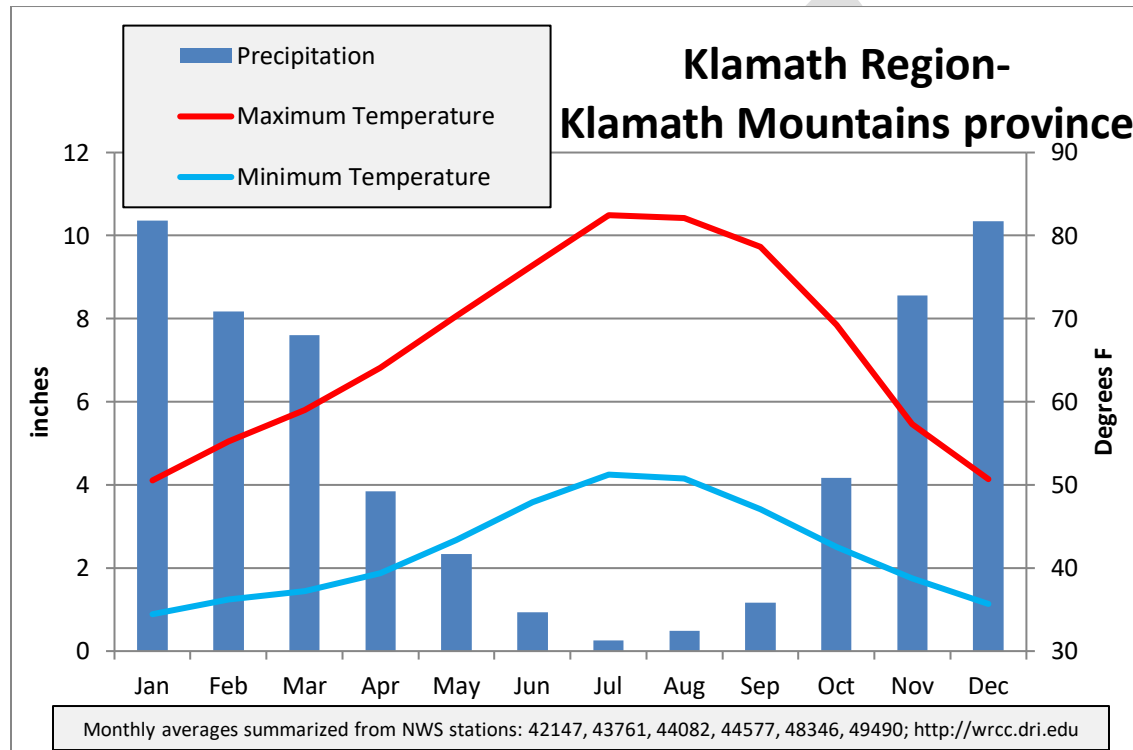


Chart A-1. Average annual patterns of temperature and precipitation in the Klamath Region, Klamath Mountains province.

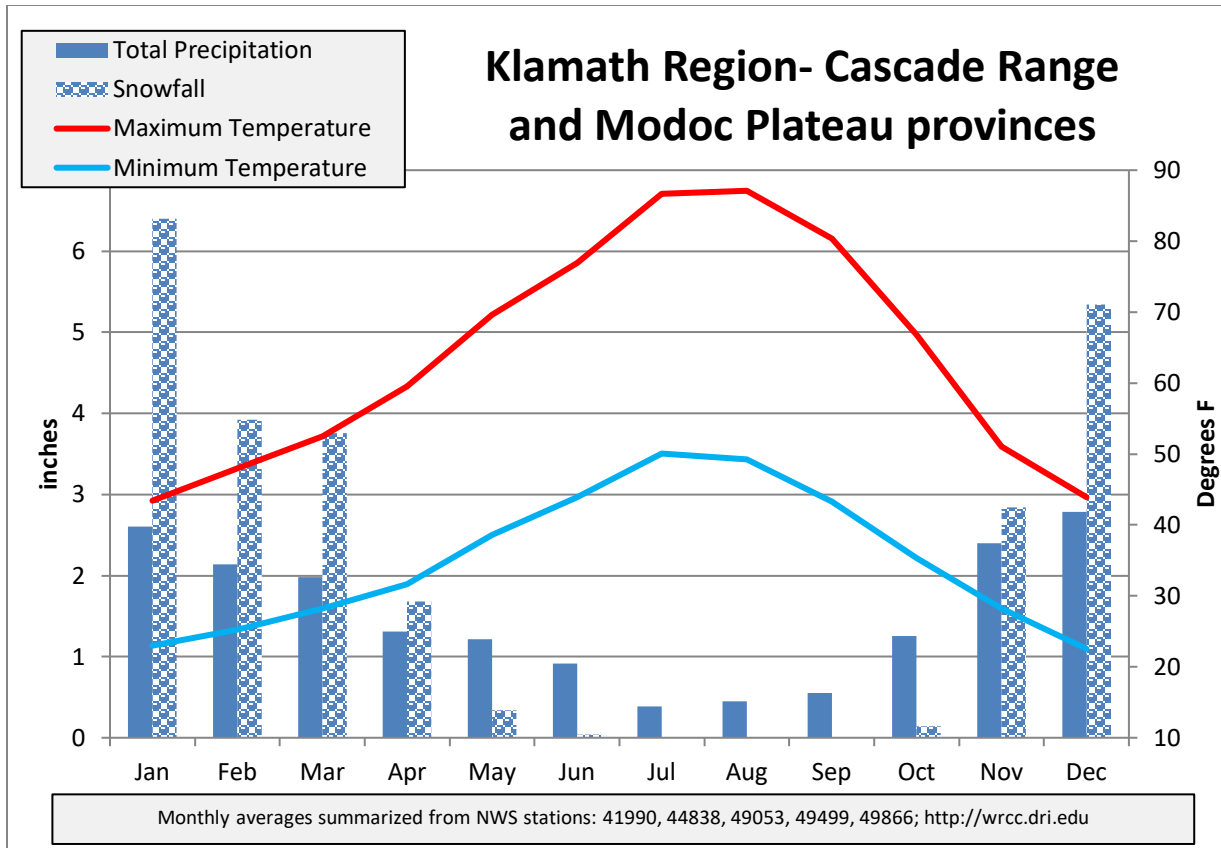


Chart A-2. Average annual patterns of temperature and precipitation in the Klamath Region, Cascade Range and Modoc Plateau provinces.

1.1.2 Hydrology

The hydrology of Klamath Region streams varies greatly from west to east, and several UC Davis hydrologic classifications exist for stream reaches in this region (Lane et al 2016). Many stream reaches located near the coast, within the Smith and lower Klamath River watersheds, are primarily classified as Winter Storm (WS) systems. Further inland, most tributaries to the Klamath River are classified as Low-Volume Snowmelt and Rain (LSR) systems. The mainstem Trinity River, located in the southern portion of the Klamath Region, is classified as High-Volume Snowmelt and Rain (HSR) system, and some tributaries in the Trinity River watersheds are classified as Perennial Groundwater and Rain (PGR) systems. Most stream reaches on the Modoc Plateau are classified as High Elevation and Low Precipitation (HELP) systems; however, Modoc Plateau streams generally exhibit low stream densities due to the Modoc Plateau’s underlying porous volcanic geology.

Please refer to Figure A-5 for a stream classification map of the Klamath Region.

1.1.3 Geology

The Klamath Region is predominantly located in the Klamath Mountains, Cascade Range, and Modoc Plateau geomorphic provinces. The Klamath Mountains and Cascade Range are rugged mountain ranges, and the Modoc Plateau is an elevated volcanic plateau located in the northeastern corner of California. The western portion of the Klamath Mountains are underlain by marine sedimentary units with areas of igneous intrusive units, the central Klamath

Mountains are underlain primarily by metamorphosed sedimentary and volcanic rock, and the upper Trinity, Scott and Salmon watersheds are underlain by intrusive igneous rock. The portion of the Cascade Range located in the Klamath Region contains the stratovolcano Mount Shasta. The Cascade Range is generally underlain by igneous rock, including lava flows, pyroclastic flows, and alluvium eroded from volcanic features. The Modoc Plateau is a volcanic table land consisting of lava flows, tuff beds and small volcanic cones. Significant subterranean streamflows occur through porous volcanic features in the Modoc Plateau (CGS 2002).

1.1.4 Anadromous Salmonid Population

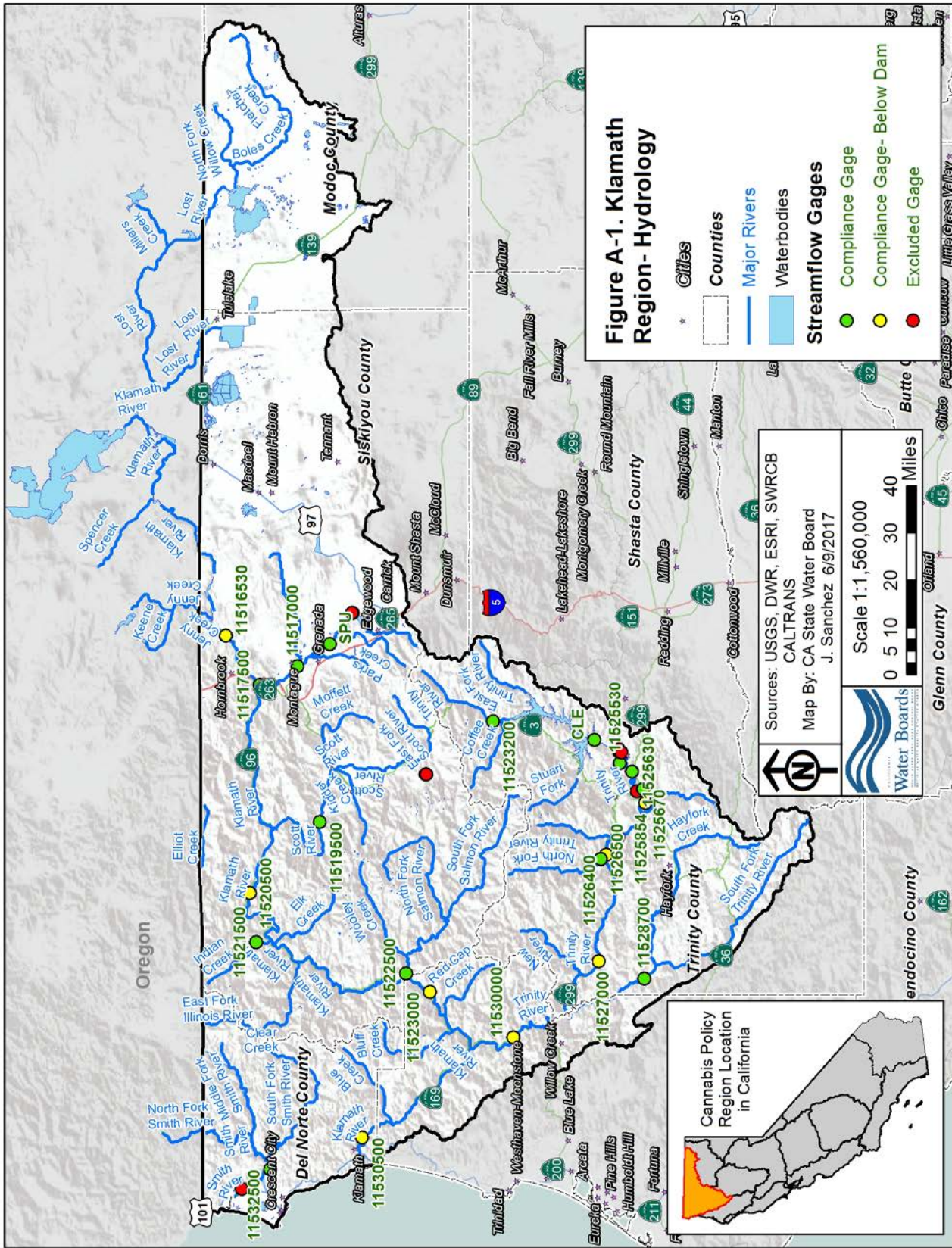
Five special-status evolutionarily significant units (ESUs), distinct population segments (DPSes), or distinct taxonomic entities² (DTEs) are currently extant within the Klamath Region (Figure A-6):

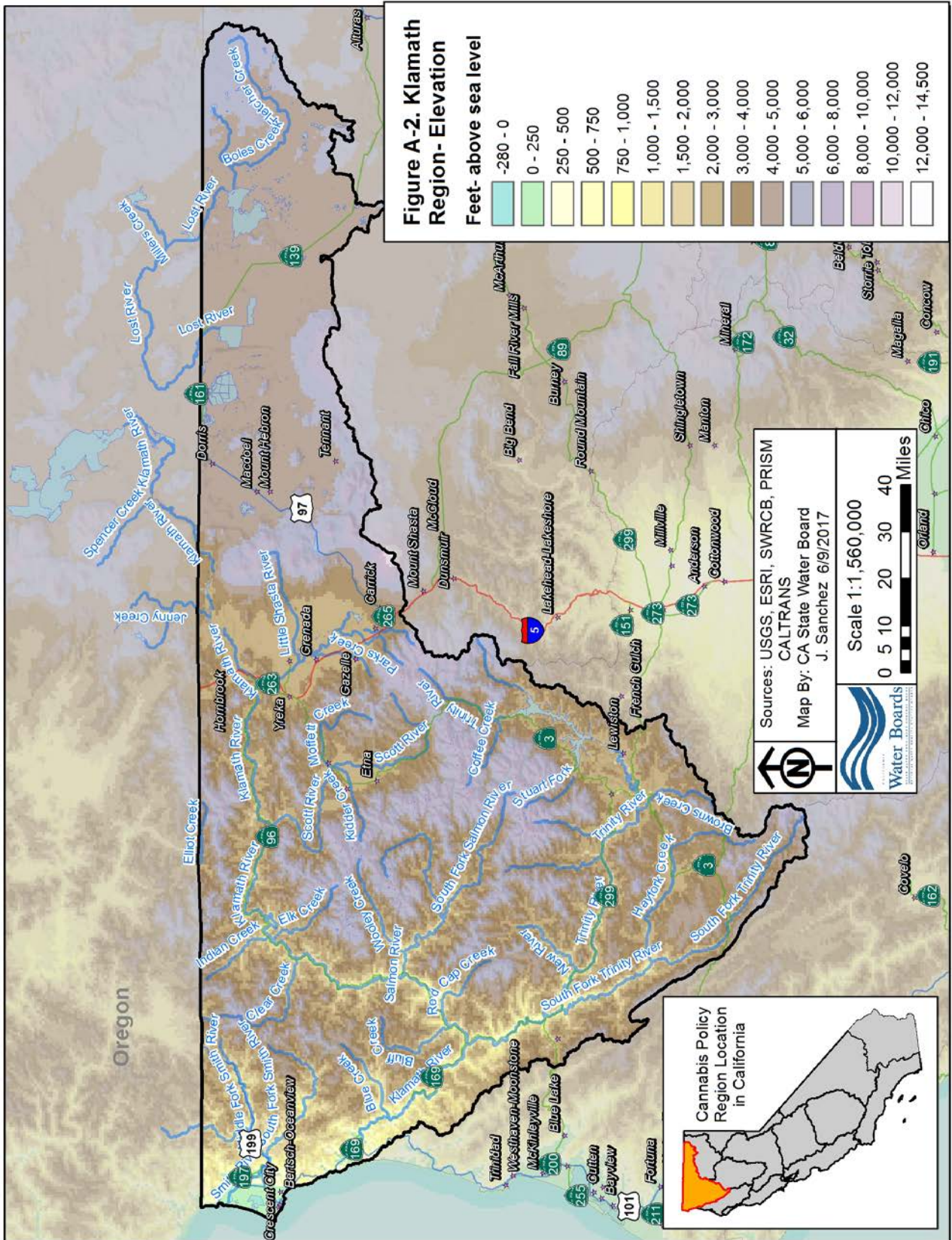
- the Southern Oregon/Northern California Coastal (SONCC) Chinook salmon ESU,
- the Upper Klamath-Trinity fall-run (UKTR FR) Chinook salmon DTE³,
- the Upper Klamath-Trinity spring-run (UKTR SR) Chinook salmon DTE,
- the Klamath Mountains Province (KMP) steelhead DPS, and
- the Southern Oregon/Northern California Coast (SONCC) coho salmon ESU.

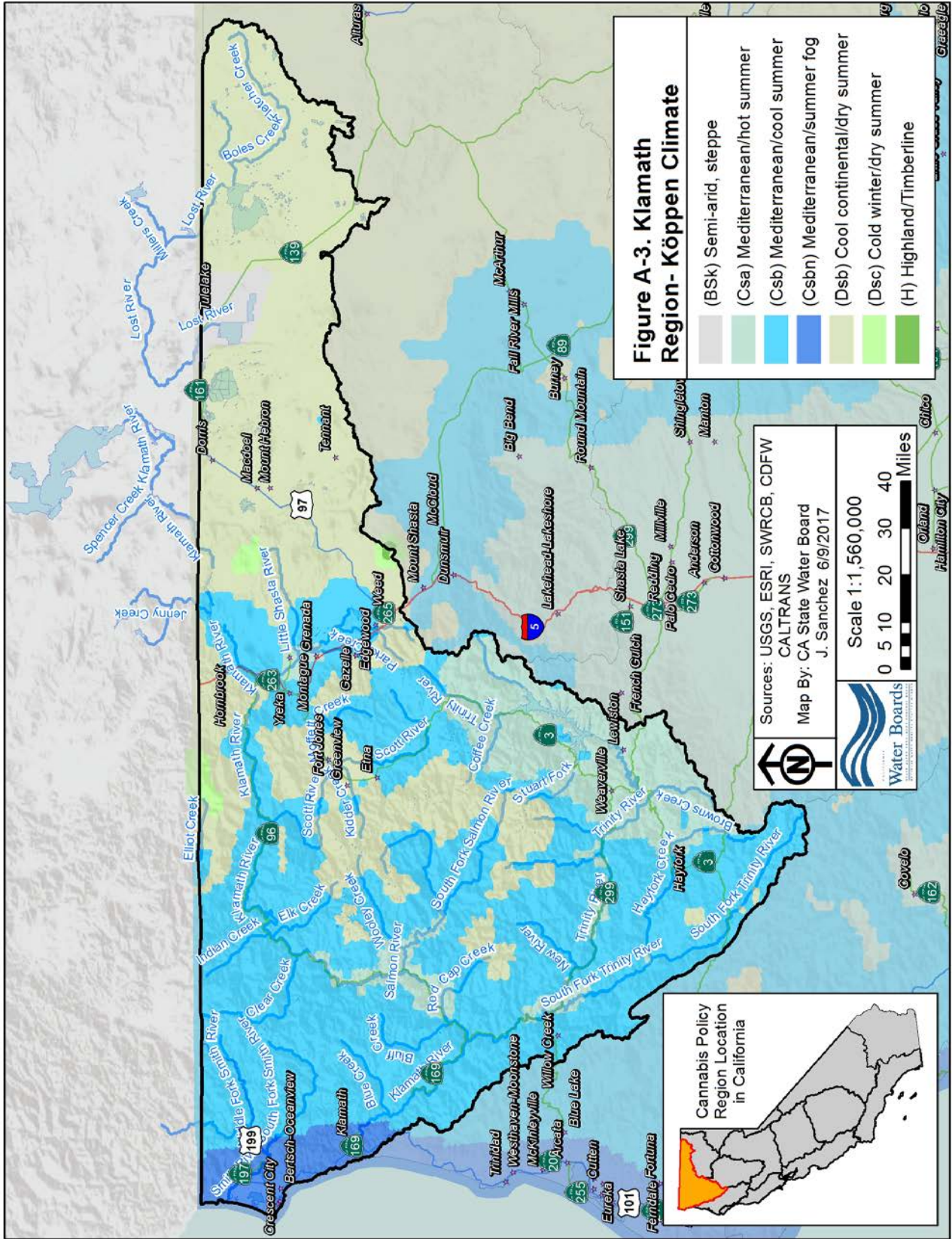
The SONCC coho salmon ESU is currently listed as threatened under the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA) (CDFW 2017b). The SONCC Chinook salmon, UKTR FR Chinook salmon, UKTR SR Chinook salmon, and the KMP steelhead populations are listed as species of special concern by CDFW (Moyle et al. 2015).

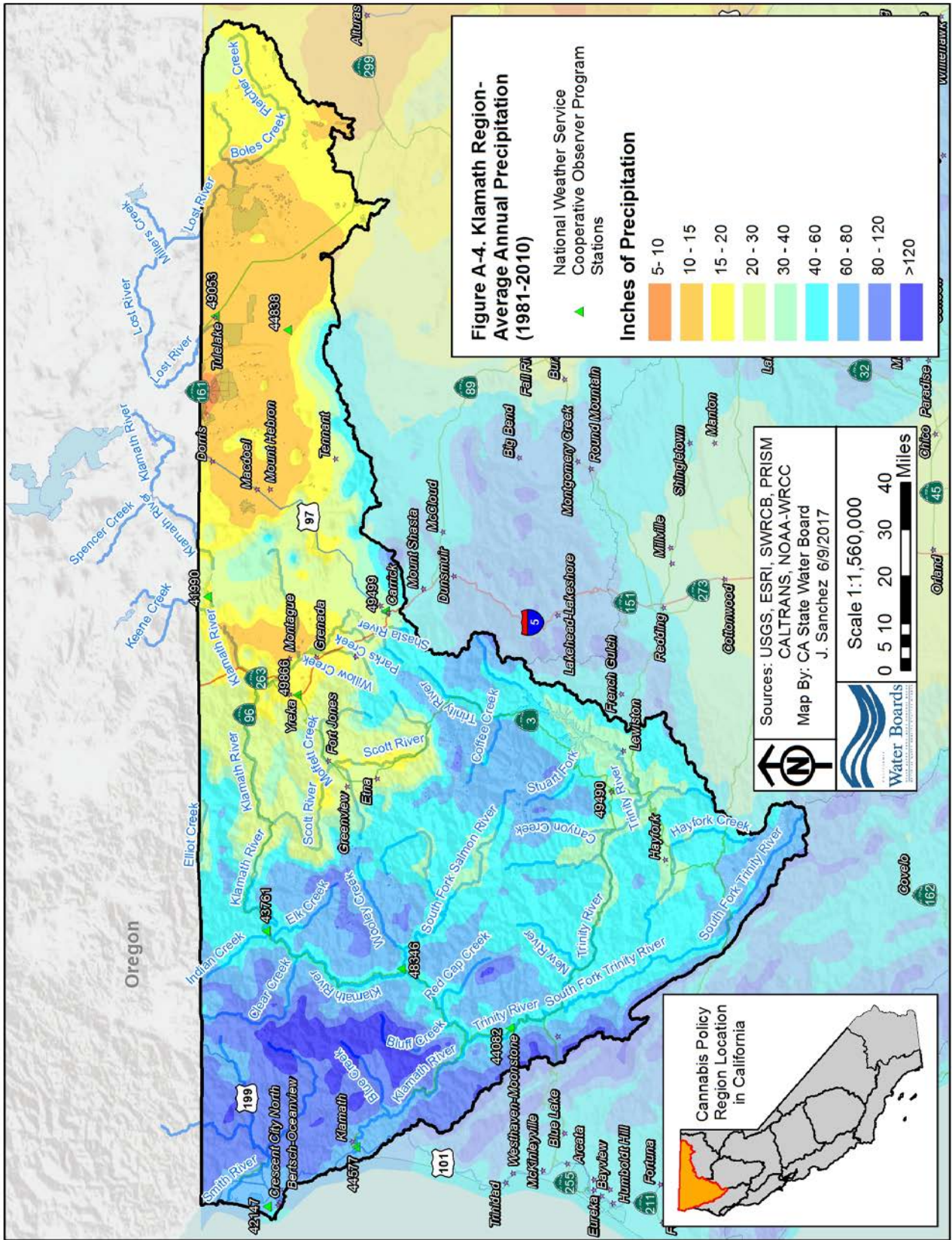
² The term Distinct Taxonomic Entity (DTE) is applied in this document in reference to salmonid populations given consideration by CDFW as distinct, or separate, taxa, but that are not currently designated as individual ESUs or DPSes by NMFS.

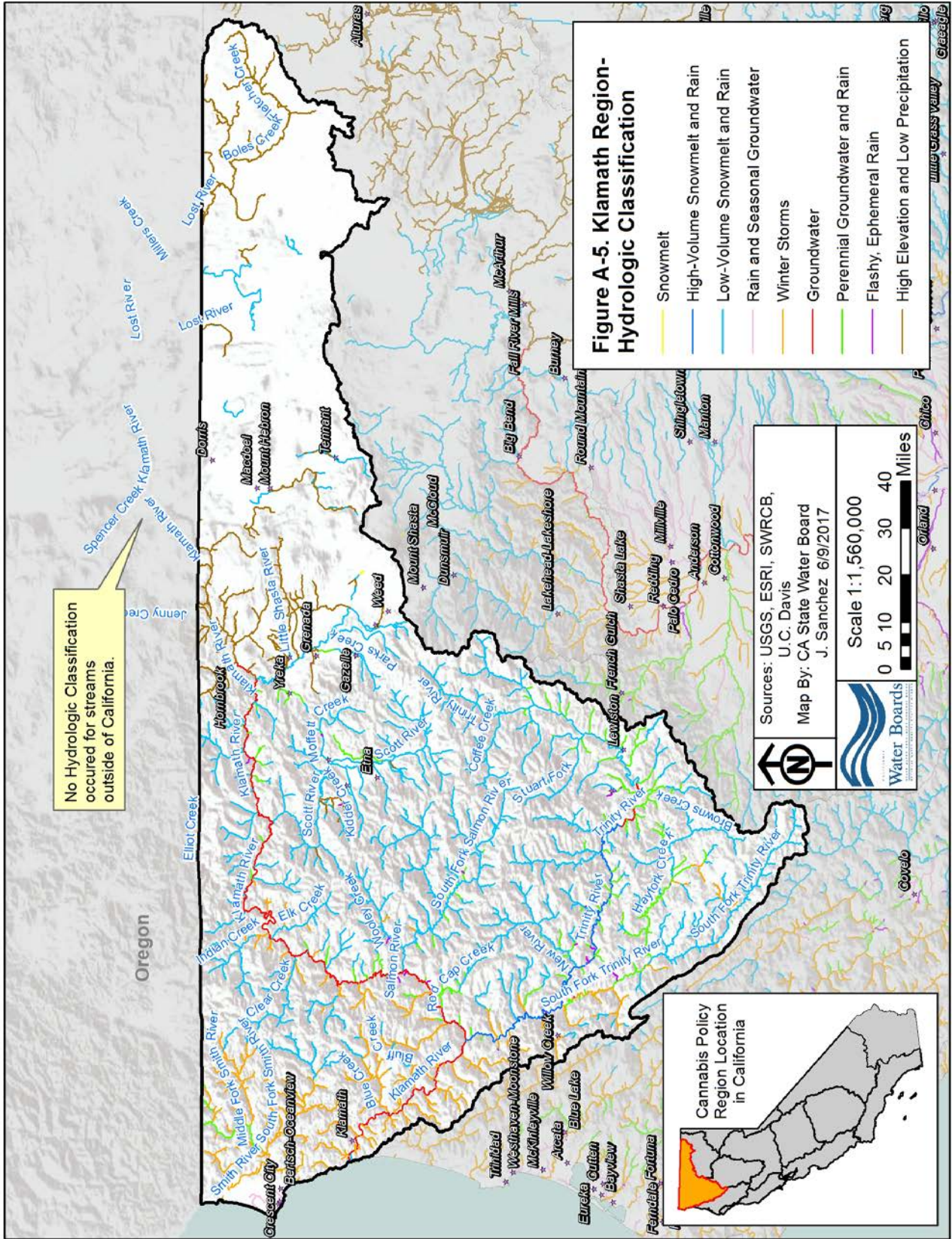
³ UKTR FR and UKTR SR Chinook salmon together constitute a single ESU; however, CDFW treats the two runs as distinct taxonomic entities based upon their distinct life-history strategies and in consideration of the unique management concerns of each run (Moyle et al. 2015).

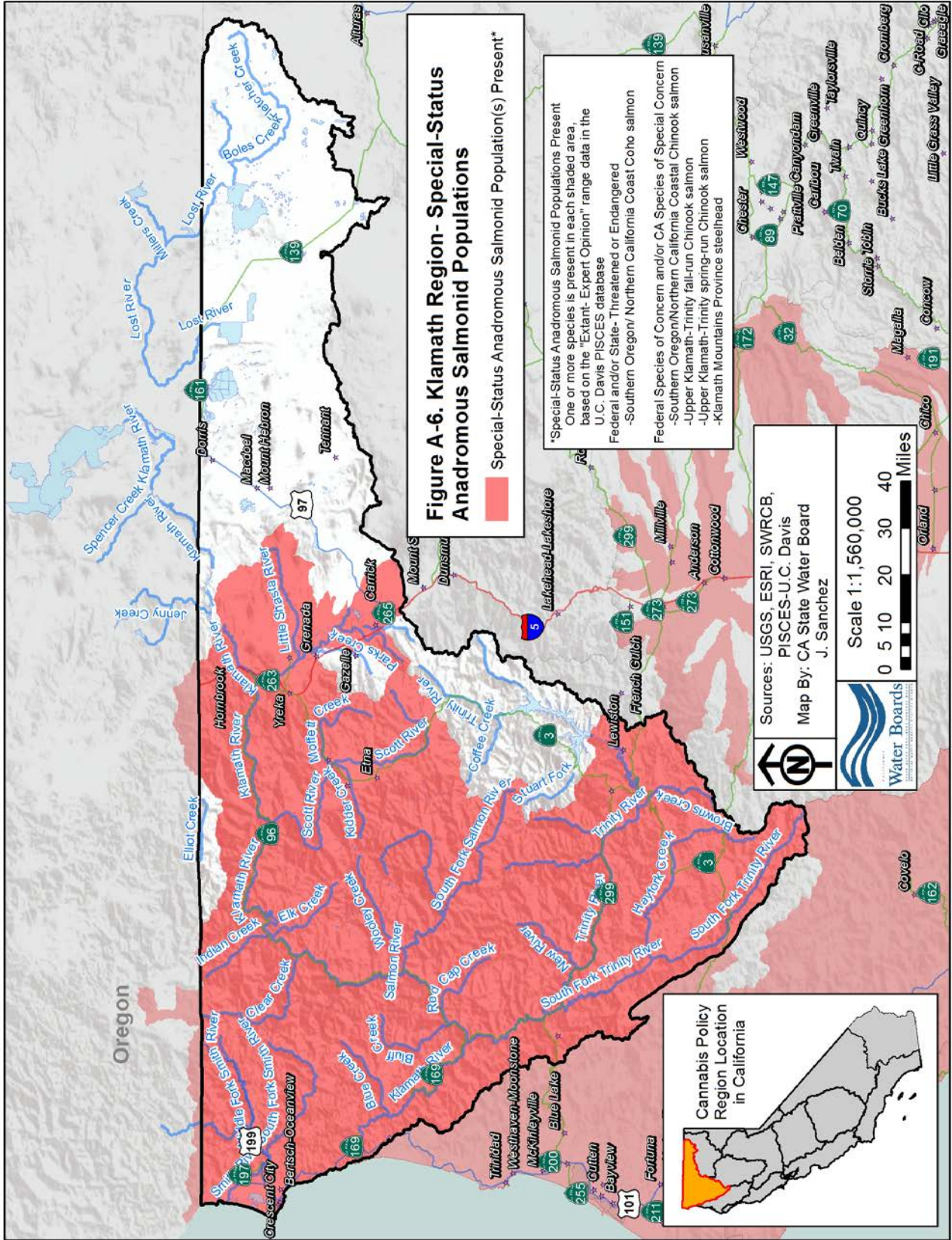












1.2 Upper Sacramento Region

The Upper Sacramento Region covers approximately 6,956 square miles in north-central California, as shown in attached (Figure A-7). Elevations in the region range from 1,000 feet near Lake Shasta, to over 6,000 feet in the mountains bordering the Modoc Plateau. The elevation of Mount Lassen, located on a southern boundary of the region, exceeds 10,400 feet, while the peak of Mount Shasta, located on a northern boundary of the region, reaches over 14,000 feet. Please refer to Figure A-8 for an elevation map of the Upper Sacramento Region. The major watershed comprising the region is the Sacramento River and its significant tributaries of the Upper Sacramento, McCloud and Pit Rivers.

1.2.1 Climate and Precipitation

The climate of the Upper Sacramento Region varies substantially between the western and eastern portions of the region. The western portion of the Upper Sacramento Region, located in the Cascade Range geomorphic province, is characterized by a Mediterranean climate, while the eastern portion of the region, located in the Modoc Plateau geomorphic province, is characterized by a Cool Interior climate. The areas surrounding Shasta Lake and the lower tributary canyons are characterized by Mediterranean climates with hot summers. Between Mount Shasta and the town of Burney, the Cascade Range transitions to the Modoc Plateau, and the climate in this transitional area is characterized as Mediterranean with cool summers. The Modoc Plateau geomorphic province is characterized by a Cool Interior climate; specifically, cool, continental climate with dry summers. Please refer to Figure A-9 for a climatic map of the Upper Sacramento Region.

Temperature conditions also vary greatly from southwest to northeast within the Upper Sacramento Region. Temperatures tend to be higher in the Cascade Range, located in the western portion of the Upper Sacramento Region, compared to the Modoc Plateau, located in the eastern portion of the region. Average annual maximum temperatures near Shasta Lake, in the southwestern portion of the Upper Sacramento Region, exceed 70 degrees Fahrenheit. To contrast, average annual maximum temperatures on the Modoc Plateau exceed 60 degrees Fahrenheit and high elevation temperatures exceed 50 degrees Fahrenheit. Average annual minimum temperatures near Lake Shasta typically fall below 50 degrees Fahrenheit, while average annual minimum temperatures on the Modoc Plateau and at high elevations are typically below freezing.

Average annual precipitation amounts and snowfall patterns also vary greatly from west to east within the Upper Sacramento Region. The western portion of the Upper Sacramento Region tends to receive higher precipitation amounts than the eastern portion of the Upper Sacramento Region; nearly 120 inches of annual precipitation tends to fall around Mount Lassen and Mount Shasta in the central portion of the region, while under 15 inches of annual precipitation tends to fall on the Modoc Plateau. The Cascade Range typically receives moderate amounts snowfall during the winter months, extreme amounts of snowfall tend to occur further east and near Mount Lassen, and the Modoc Plateau typically receives a moderate amount of snowfall. Precipitation events generally occur from November to April in both the Cascade Range and Modoc Plateau provinces.

Please refer to Figure A-10 for a precipitation map of the Upper Sacramento Region. Charts A-3 and A-4 below, illustrate precipitation and temperature patterns in the Upper Sacramento Region for the Cascade Range geomorphic province and for the Modoc Plateau geomorphic province, and illustrate the key differences in precipitation and temperature conditions between the two regions.

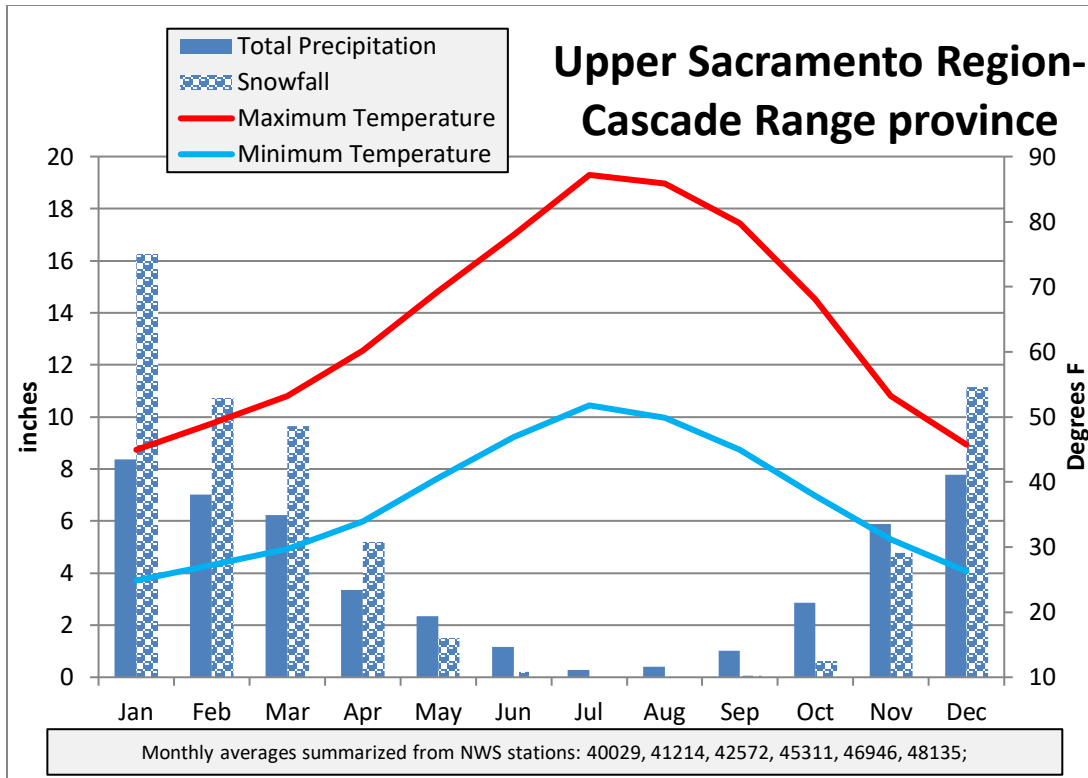


Chart A-3. Average annual patterns of temperature and precipitation in the Upper Sacramento Region, Cascade Range province.

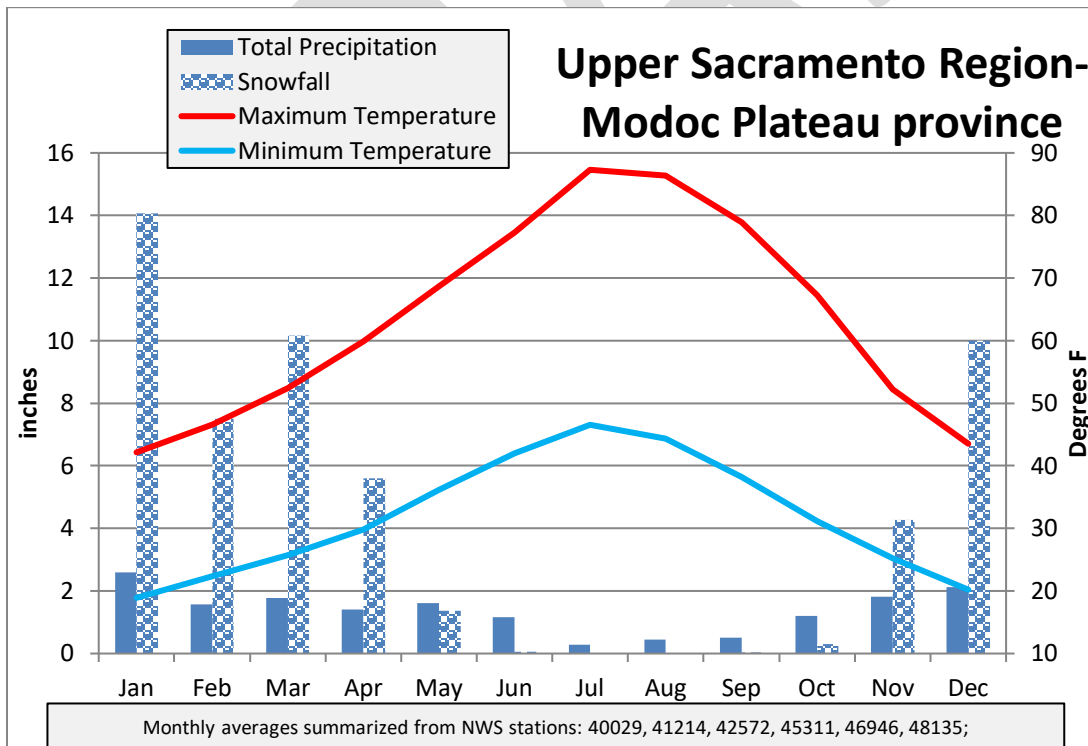


Chart A-4. Average annual patterns of temperature and precipitation in the Upper Sacramento Region, Modoc Plateau province.

1.2.2 Hydrology

The hydrology of stream reaches in the Upper Sacramento Region varies from west to east, and stream reaches in this region are described by several UC Davis hydrologic classifications. Stream reaches in the Cascade Range geomorphic province are generally categorized by Winter Storms (WS) and Low-Volume Snowmelt and Rain (LSR) hydrologic classifications. Small tributaries surrounding Shasta Lake, in the southwest portion of the Upper Sacramento Region, are primarily classified as WS systems. The Upper Sacramento and McCloud River watersheds, located in the Cascade Range geomorphic province, primarily contain stream reaches that are classified as LSR systems. Most stream reaches on the Modoc Plateau, including tributaries in the middle and upper Pit River watershed, are classified as High Elevation and Low Precipitation (HELP) stream reaches. The mainstem Pit River below Lake Briton is classified as a Groundwater (GW) system. Please refer to Figure A-11 for a depiction of the stream classifications within the Upper Sacramento Region. (Lane et al 2016)

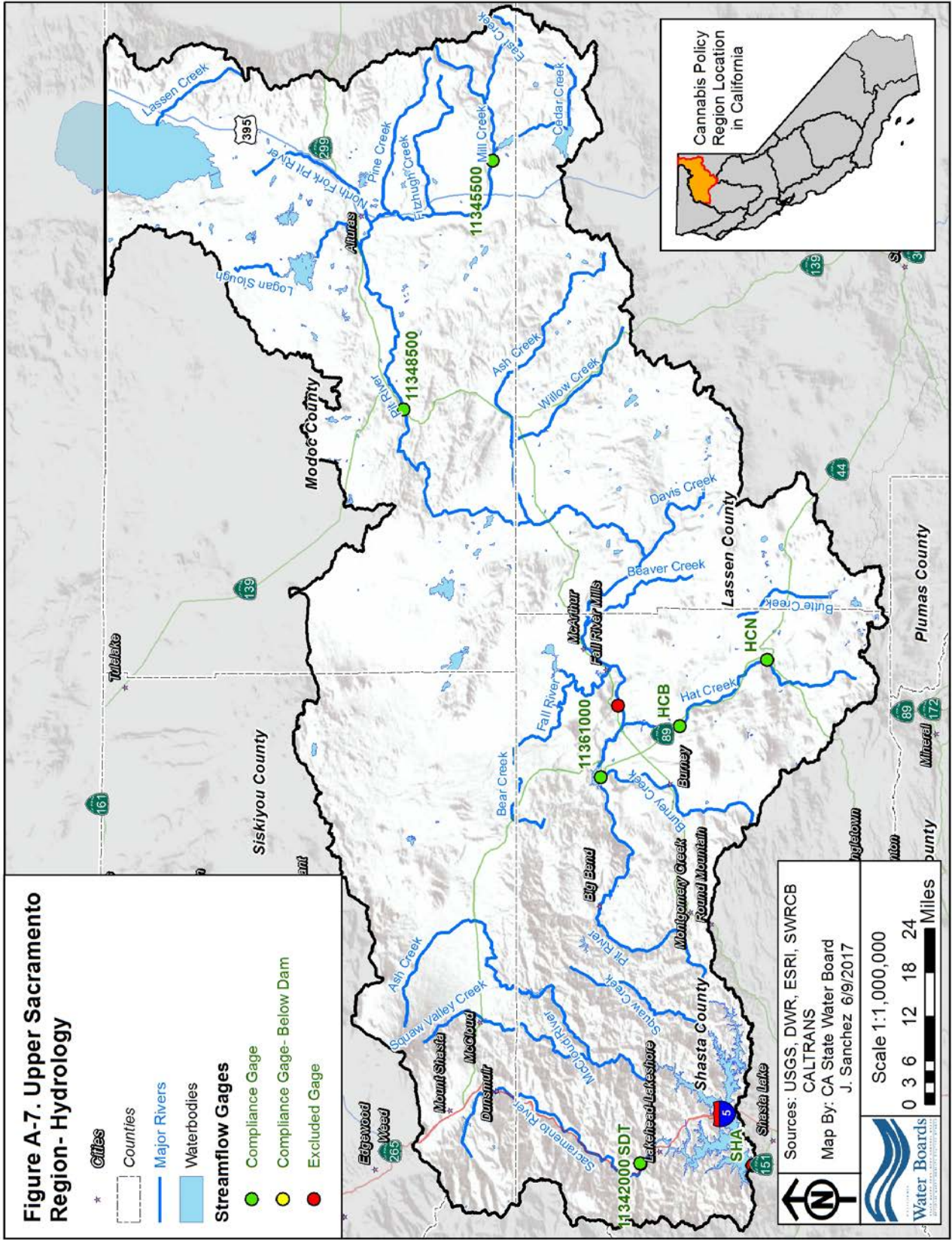
1.2.3 Geology

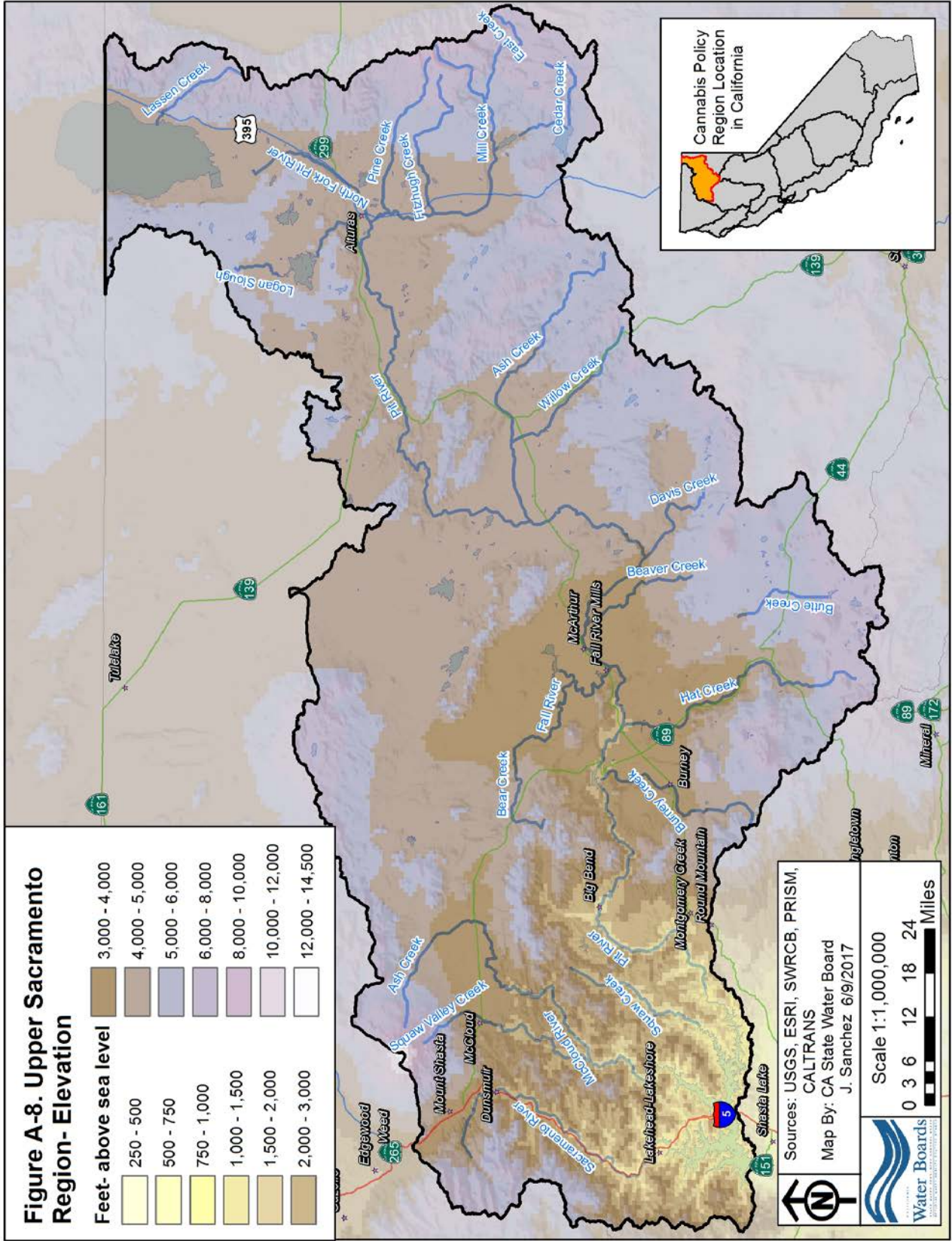
The Upper Sacramento Region is primarily underlain by the Cascade Range geomorphic province in the western portion of the region, and by the Modoc Plateau geomorphic province in the eastern portion of the region. Very small areas of the Klamath Mountains and the Basin and Range geomorphic provinces are located at the western and eastern margins of the Upper Sacramento Region, respectively. (CGS 2002).

Volcanic geology dominates the Upper Sacramento Region. The Cascade Range geomorphic province is characterized by extrusive volcanic activity, and the active volcano Mount Lassen and the potentially active Mount Shasta are located on the boundaries of the Upper Sacramento Region. The Cascade Range is generally underlain by igneous rock, including lava flows, pyroclastic flows and alluvium eroded from volcanic features. The Modoc Plateau is a volcanic table land underlain by lava flows, tuff beds and small volcanic cones. Significant subterranean streamflows occur through porous volcanic features of the Modoc Plateau. (CGS 2002)

1.2.4 Anadromous Salmonid Population

No anadromous salmonid populations are currently extant within the Upper Sacramento Region. Keswick Dam, located on the mainstem Sacramento River near Redding, currently blocks upstream migration into the Upper Sacramento Region. Historically, populations of Sacramento River Winter Run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley fall-run Chinook salmon, Central Valley late fall-run Chinook salmon, and California Central Valley steelhead inhabited the Upper Sacramento Region.





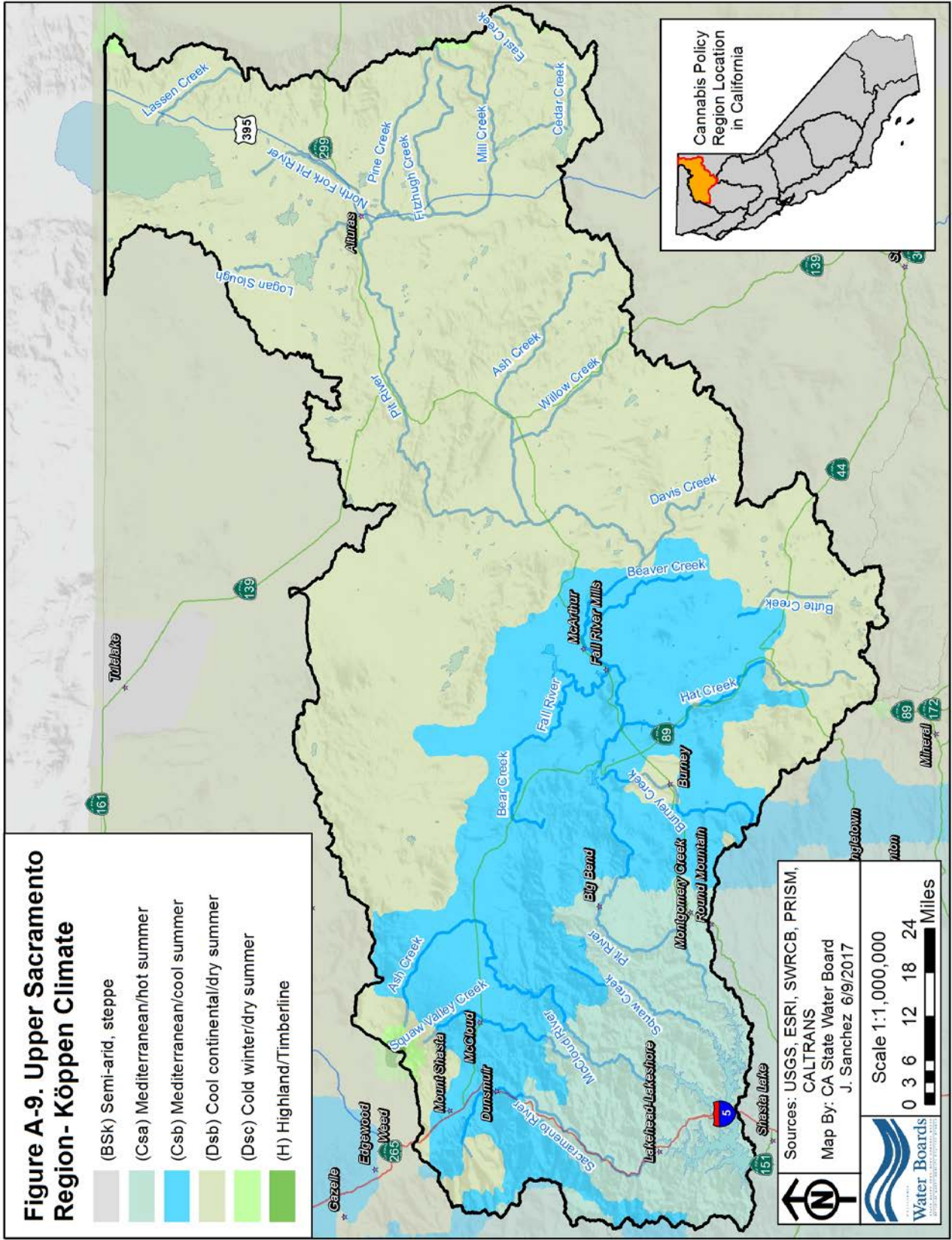


Figure A-9. Upper Sacramento Region - Köppen Climate

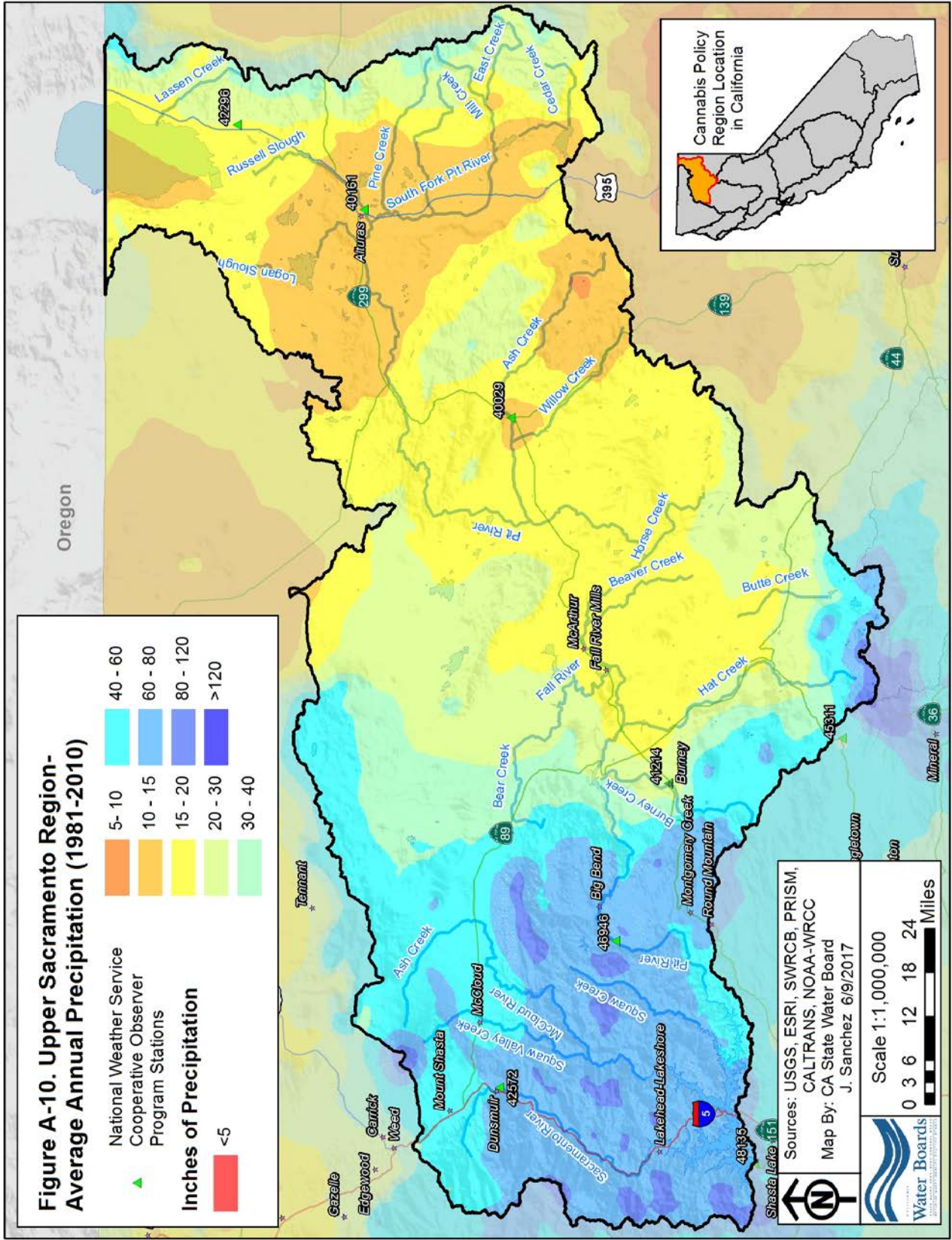
- (BSk) Semi-arid, steppe
- (Csa) Mediterranean/hot summer
- (Csb) Mediterranean/cool summer
- (Dsb) Cool continental/dry summer
- (Dsc) Cold winter/dry summer
- (H) Highland/Timberline

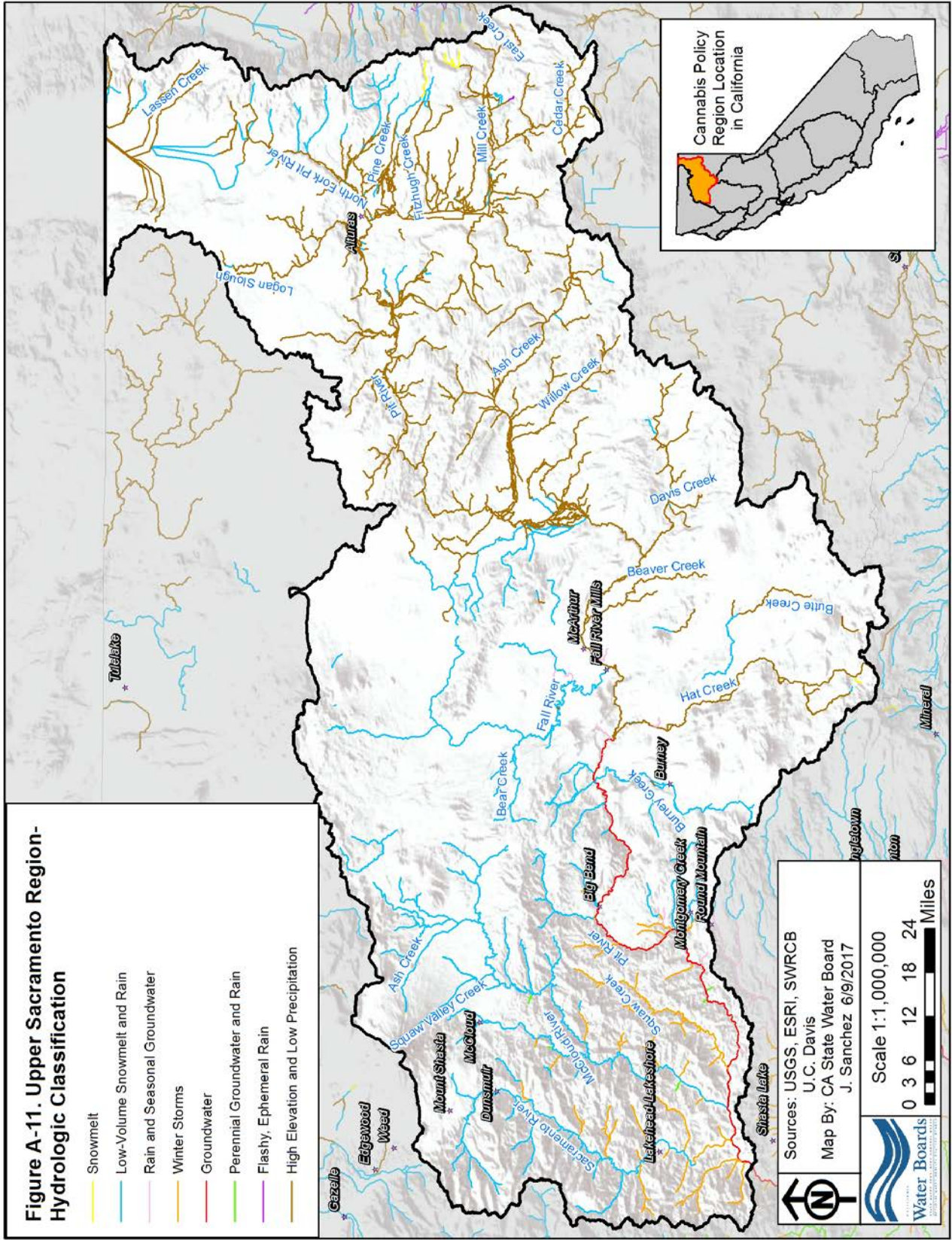
Sources: USGS, ESRI, SWRCB, PRISM, CALTRANS
 Map By: CA State Water Board
 J. Sanchez 6/9/2017

Scale 1:1,000,000

0 3 6 12 18 24 Miles

Water Boards
 CALIFORNIA STATE WATER BOARD





1.3 North Coast Region

The North Coast Region covers approximately 4,947 square miles along the northern coast of California, as shown in attached (Figure A-12). Elevations in the North Coast Region range from sea level to over 7,000 feet along the eastern margin of the region; please refer to (Figure A-13) for an elevation map of the North Coast Region. The North Coast Region includes the major watersheds of Redwood Creek in the north, the Mad River near the middle of the region, and the Eel River and its tributaries in the south.

1.3.1 Climate and Precipitation

The climate of the North Coast Region is described as Mediterranean, with dry summers and moist to wet winters. Please refer to Figure A-14 for a climatic map of the North Coast Region.

Precipitation and temperatures patterns vary within the North Coast Region based on proximity to the coast and on elevation. Temperatures in coastal areas of the North Coast Region are generally less variable compared to temperatures in areas further inland, and the ocean influence in the coastal areas tends to buffer temperature variations. Temperatures also tend to be cooler overall at higher elevation in the North Coast Region compared to lower elevations. Average annual maximum temperatures in the North Coast Region range from over 60 degrees Fahrenheit near the coast to over 70 degrees Fahrenheit inland, with slightly cooler maximum temperatures at the higher elevations. Average annual minimum temperatures in the North Coast Region range from below 40 degrees Fahrenheit at high elevations to below 50 degrees Fahrenheit in coastal areas and at lower elevation areas further inland.

The North Coast Region tends to receive precipitation during the months of October through May, and typically receives the largest amounts of precipitation in December and January. Average annual precipitation in the North Coast Region ranges from 40 inches in valleys and at lower elevations to over 120 inches in the Coast Range mountains. Precipitation falls primarily as rain in the North Coast Region, although small amounts of snow occasionally fall at peak elevations. (WRCC 2016)

Please refer to Figure A-15 for a precipitation map of the North Coast Region. Please refer to Chart A-6 below, for an illustration of typical precipitation and temperature patterns in the North Coast Region.

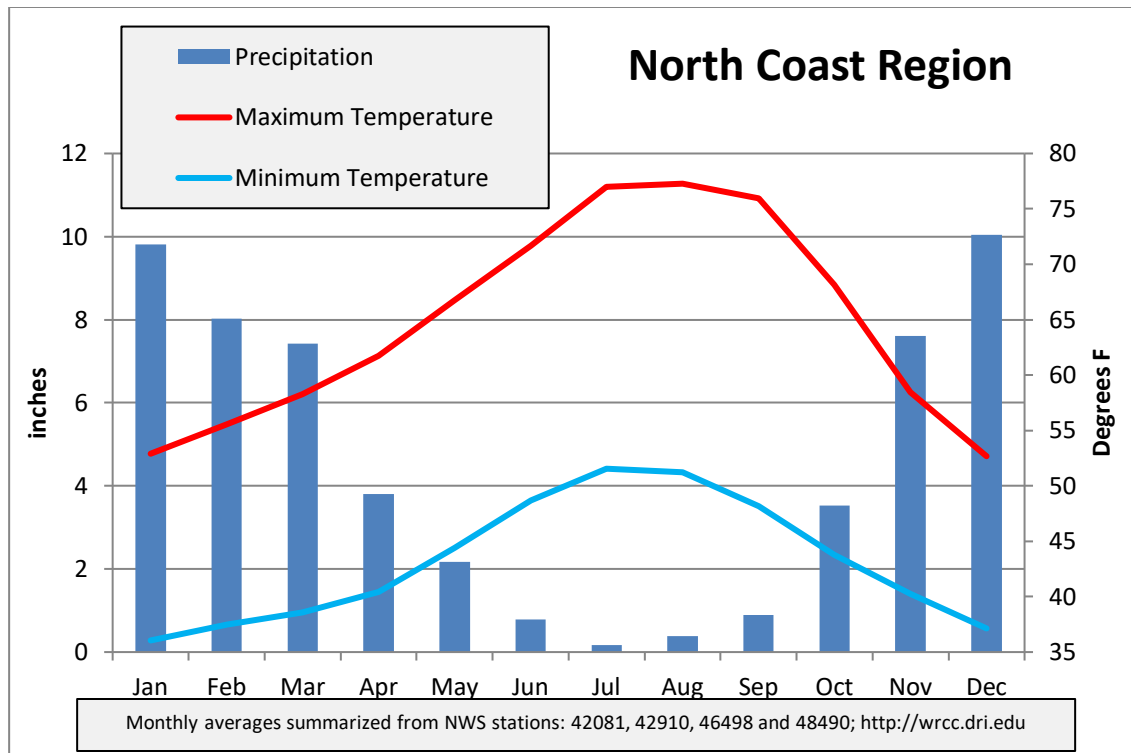


Chart A-5. Average annual patterns of temperature and precipitation in the North Coast Region.

1.3.2 Hydrology

The North Coast Region contains many stream reaches that are hydrologically classified as Winter Storm (WS) systems, although several other UC Davis hydrologic classifications exist for stream reaches in the North Coast Region. WS stream reaches are generally found at lower elevations in the North Coast Region. Several additional hydrologic classifications are also present in the North Coast Region. Many higher elevation stream reaches fall into the Low-Volume Snowmelt and Rain (LSR) class. Some stream reaches in the southern portion of the North Coast Region are hydrologically classified under the Flashy, Ephemeral Rain (FER) classification. Finally, a smaller number of stream reaches located throughout the North Coast Region fall into the Perennial Groundwater and Rain (PGR) stream class. (Lane et al 2016)

Please refer to Figure A-16 for a hydrologic classification map for the North Coast Region.

1.3.3 Geology

The North Coast Region is located in the Coast Ranges geomorphic province. The San Andreas Fault is a prominent feature in the Coast Ranges and is the driving force responsible for much of the existing topography. The Coast Ranges in the North Coast Region are dominated by irregular, knobby, landslide topography. The North Coast Region is comprised of sedimentary and metamorphic rock, with areas of unconsolidated alluvium in valley floors and along the coastline. (CGS 2002) The region also contains soft, easily eroded soils, allowing the rivers to carry high sediment loads and carve extensive floodplains that support riparian habitats.

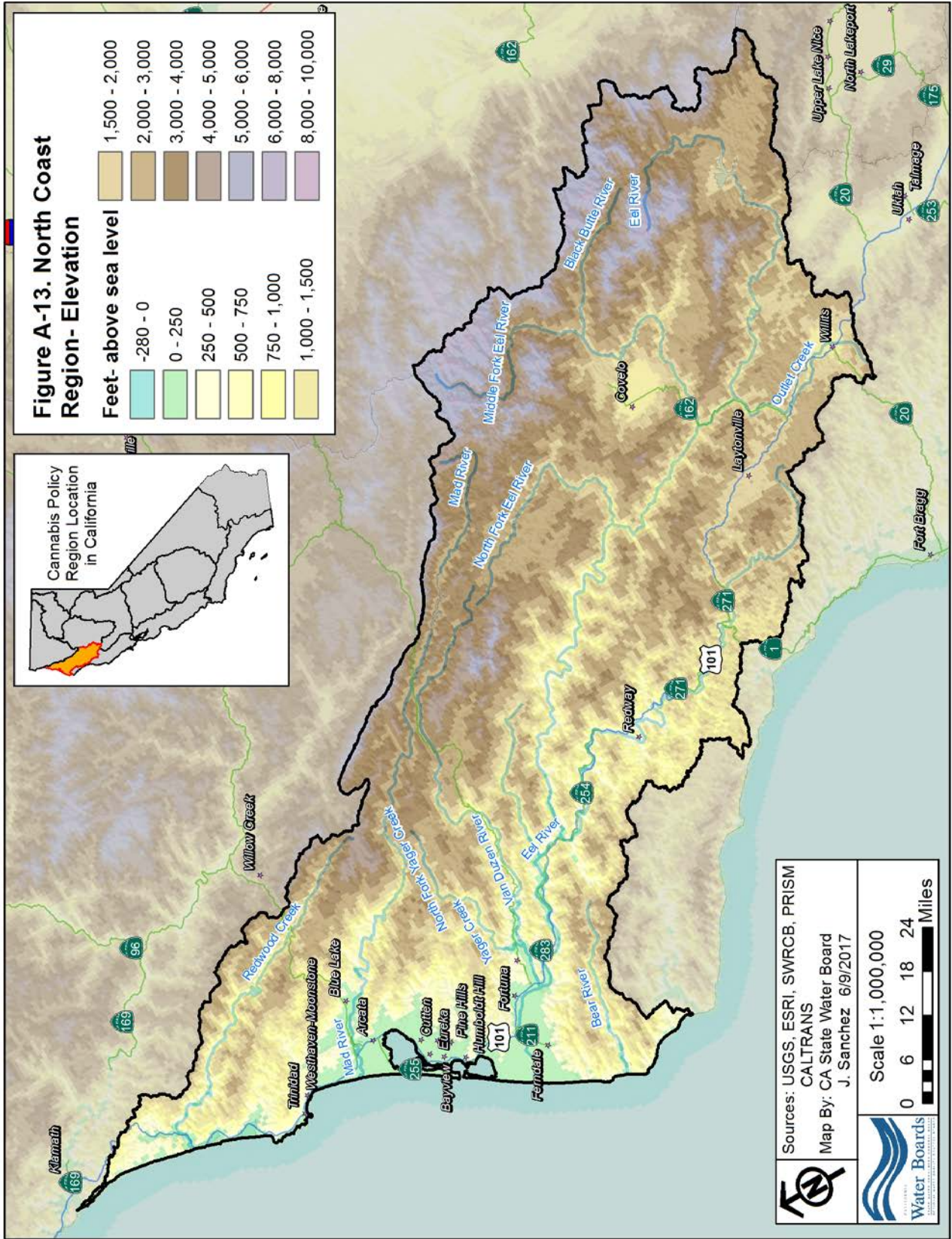
1.3.4 Anadromous Salmonid Population

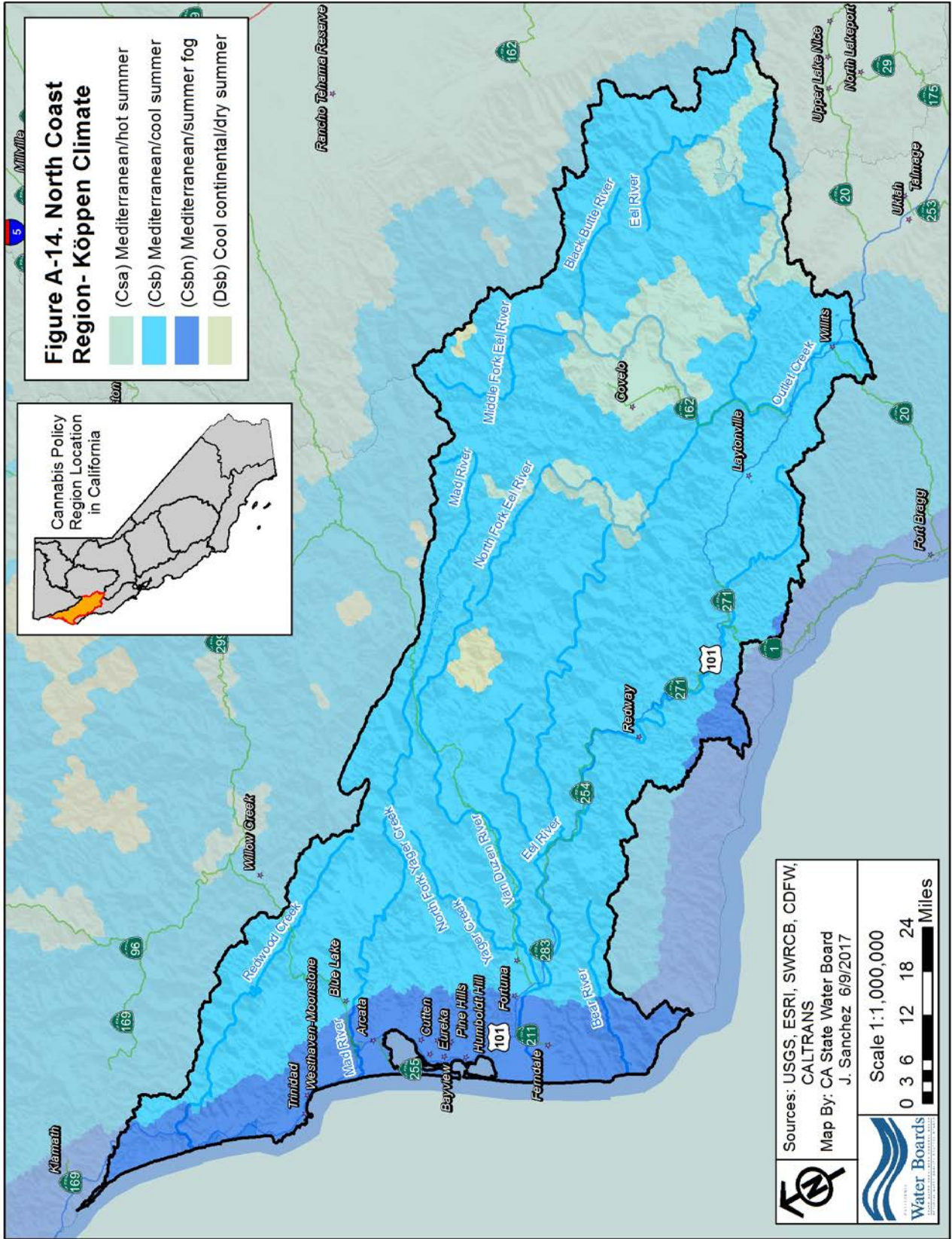
Three special-status ESUs, DPSes, or DTEs are currently extant within the North Coast Region (Figure A-17):

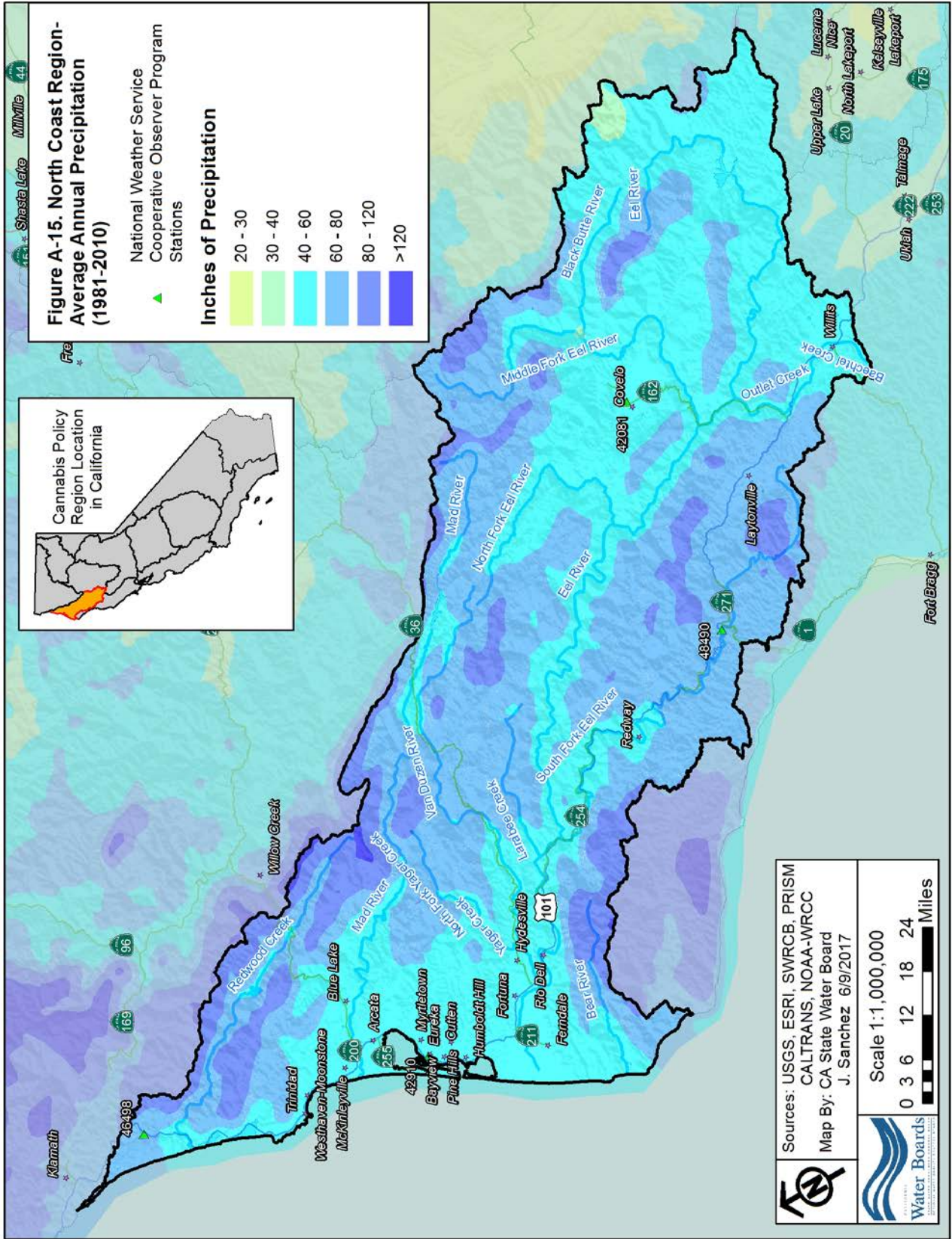
- the California Coastal (CC) Chinook salmon ESU,
- the Northern California (NC) steelhead DPS, and
- the SONCC coho salmon ESU.

The CC Chinook salmon ESU, NC steelhead DPS, and SONCC coho salmon ESU are all currently listed as threatened under the ESA (CDFW 2017b). In addition, the SONCC coho salmon ESU is currently listed as threatened under the CESA (CDFW 2017b).

DRAFT







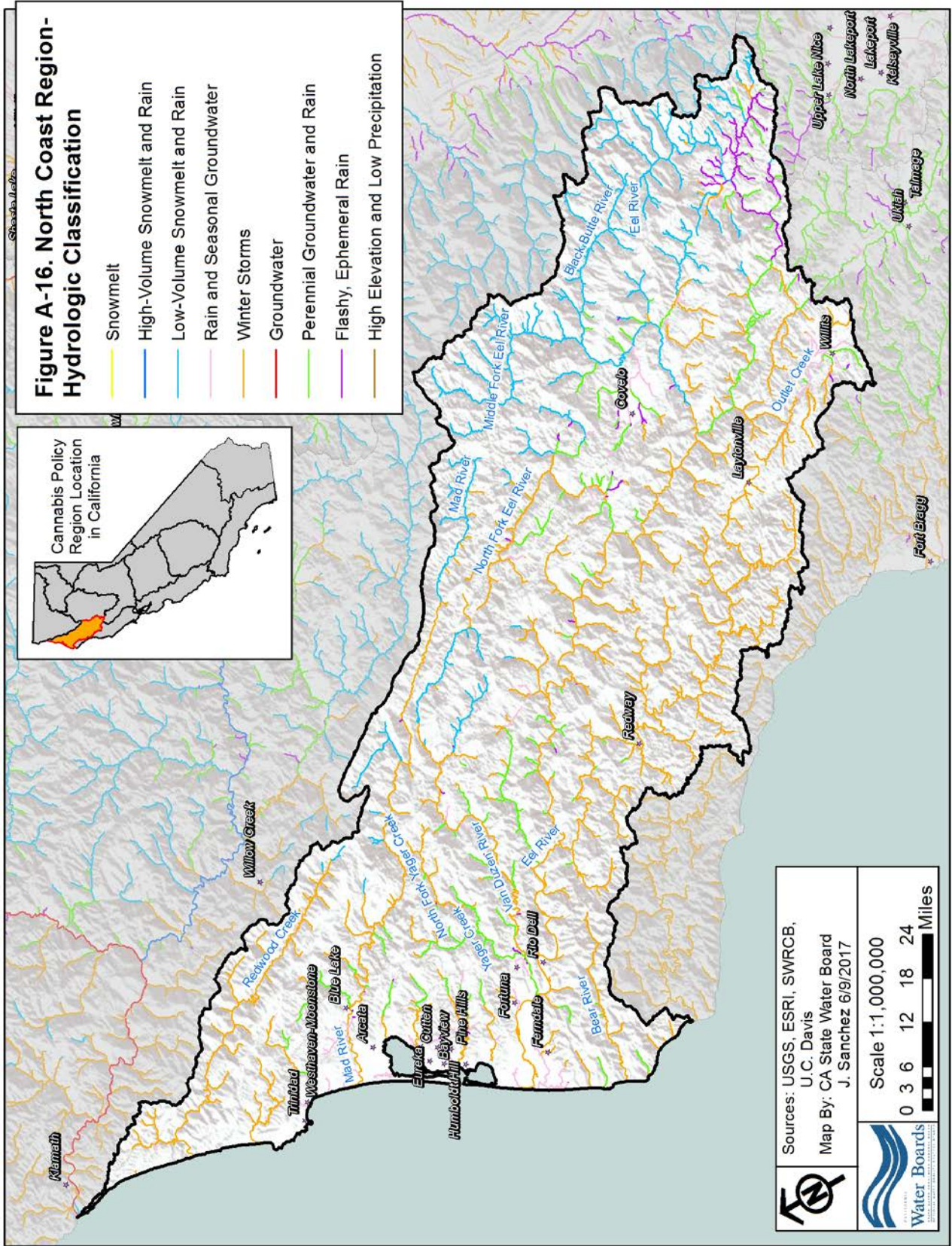
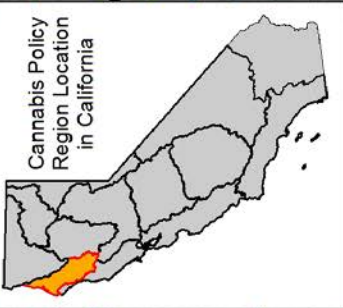


Figure A-16. North Coast Region- Hydrologic Classification

- Snowmelt
- High-Volume Snowmelt and Rain
- Low-Volume Snowmelt and Rain
- Rain and Seasonal Groundwater
- Winter Storms
- Groundwater
- Perennial Groundwater and Rain
- Flashy, Ephemeral Rain
- High Elevation and Low Precipitation



Sources: USGS, ESRI, SWRCB, U.C. Davis
 Map By: CA State Water Board
 J. Sanchez 6/9/2017

Scale 1:1,000,000

0 3 6 12 18 24 Miles

1.4 Middle Sacramento Region

The Middle Sacramento Region covers approximately 8,562 square miles in northern and central California, as shown in attached (Figure A-18). Elevations in this region range from 40 feet near Knights Landing and the confluence of the Sacramento and Feather Rivers, to over 10,400 feet at the peak of Mount Lassen; please refer to (Figure A-19) for an elevation map of the Middle Sacramento Region. The Middle Sacramento Region contains the Coast Ranges in the western portion of the region, the Central Valley in the center of the region, and the Cascade Range in the eastern portion of the region. The Middle Sacramento Region also contains the Sutter Buttes. A portion of the Sacramento River watershed is located in this region, including several significant Sacramento River tributaries. Clear Creek, Cottonwood Creek, Thomes Creek, and Stony Creek drain the east side of the Coast Ranges and Klamath Mountains, and enter the Sacramento River from the west. Battle Creek, Antelope Creek, Mill Creek, Deer Creek, Big Chico Creek, and Butte Creek drain the west side of the Sierra Nevada and Cascade Range, and enter the Sacramento River from the east.

1.4.1 Climate and Precipitation

The Middle Sacramento Region is characterized by a Mediterranean climate, with hot summers and moist to wet winters. Please refer to Figure A-20 for a climatic map of the Middle Sacramento Region. In general, lower elevation areas in the Middle Sacramento Region exhibit higher average annual maximum and higher average annual minimum temperatures compared to higher elevation areas. At lower elevations and in the northern portion of this region, average annual maximum temperatures exceed 75 degrees Fahrenheit, while average annual maximum temperatures exceed 50 degrees Fahrenheit at high elevation areas in this region. Average annual minimum temperatures tend to drop below 50 degrees Fahrenheit in the Central Valley portion of the Middle Sacramento Region, while average annual minimum temperatures at higher elevation areas in the Middle Sacramento Region drop below freezing.

In the Middle Sacramento Region, precipitation tends to fall from October through April. The majority of precipitation in this region falls as rain, and significant snowfall tends to fall only at the high elevation margins of the region. Average annual precipitation amounts vary significantly within the Middle Sacramento Region, and the northern portion of the Middle Sacramento Region tends to receive a larger amount of precipitation compared to the southern portion of the region. Over 120 inches of annual precipitation tends to fall near Mount Lassen in the northern portion of the region, while under 20 inches of annual precipitation tends to fall in the southern portion of the region, south of the Sutter Buttes.

Please refer to Figure A-21 for a precipitation map of the Middle Sacramento Region. Please refer to Chart A-6 and A-7, below, for illustrations of typical precipitation patterns in the northern and southern portions of the Middle Sacramento Region.

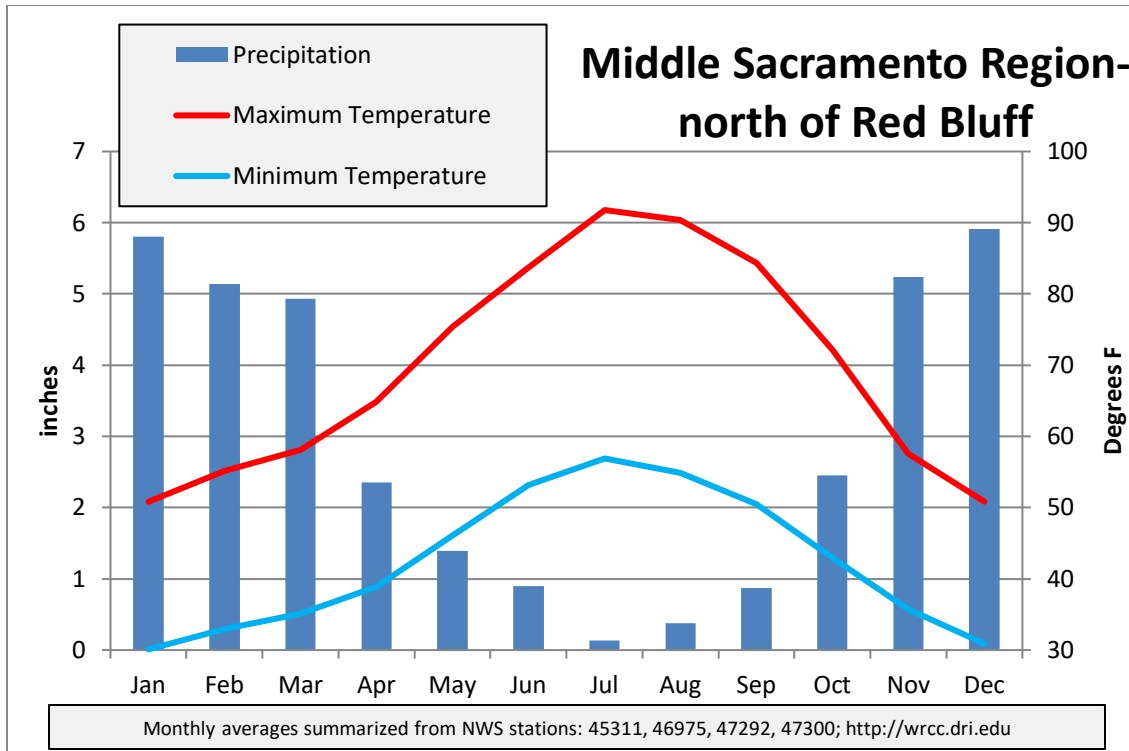


Chart A-6. Average annual patterns of temperature and precipitation in the Middle Sacramento Region, north of Red Bluff.

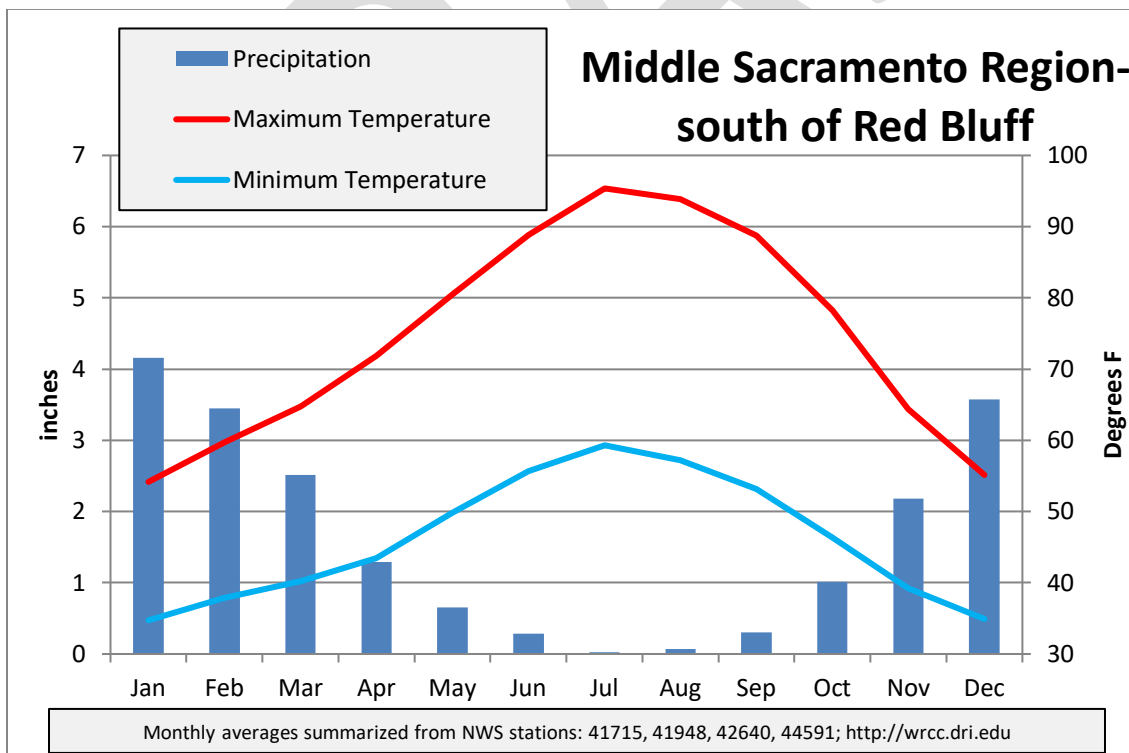


Chart A-7. Average annual patterns of temperature and precipitation in the Middle Sacramento Region, south of Red Bluff.

1.4.2 Hydrology

The hydrology of Middle Sacramento Region streams varies greatly from west to east, and several UC Davis hydrologic classifications exist for stream reaches in this region. The eastern and western margins of the Middle Sacramento Region, which correspond to high elevation mountains, are dominated by Low-Volume Snowmelt and Rain (LSR) stream reaches. The central portion of the region, which corresponds to the Sacramento Valley, contains many Winter Storms (WS) stream reaches. Additionally, Perennial Groundwater and Rain (PGR) stream reaches are located primarily in the northwestern portion of the Middle Sacramento Region, and correspond with mid-elevation areas in the Coast Ranges. Finally, Rain and Seasonal Groundwater (RSG) stream reaches are located at mid-elevation areas in the northern Cascade Range. Other UC Davis hydrologic classifications also exist in the Middle Sacramento Region in smaller numbers. (Lane et al 2016)

Please refer to Figure A-22 for a stream classification map of the Middle Sacramento Region.

1.4.3 Geology

The Middle Sacramento Region is located in the Coast Ranges, Great Valley, and Cascade Range geomorphic provinces. The Cascade Range geomorphic province, located in the northeastern portion of the Middle Sacramento Region, is characterized by extrusive volcanic activity, and the active volcano Mount Lassen is located on the edge of the Middle Sacramento Region. The Cascade Range is generally underlain by igneous rock, including lava flows, pyroclastic flows, and alluvium eroded from volcanic features. The Great Valley geomorphic province, located in the Central Valley and in the middle portion of the Middle Sacramento Region, contains a large alluvial plain and unconsolidated sedimentary deposits. The Coast Ranges, located in the western portion of the Middle Sacramento Region, contain irregular, knobby, landslide topography. The Coast Ranges are primarily comprised of sedimentary and metamorphic rock, and alluvial deposits in valley areas. (CGS 2002)

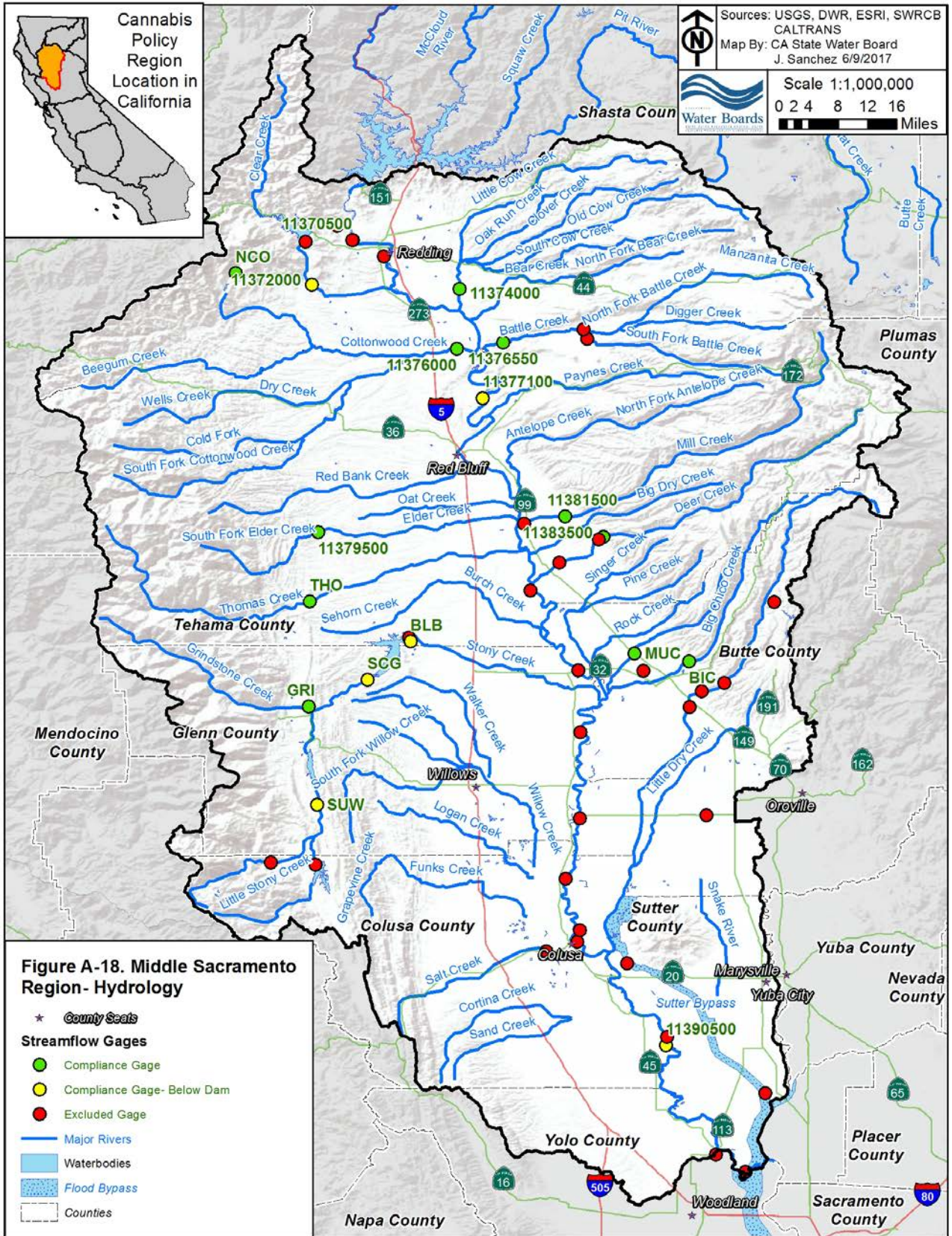
1.4.4 Anadromous Salmonid Population

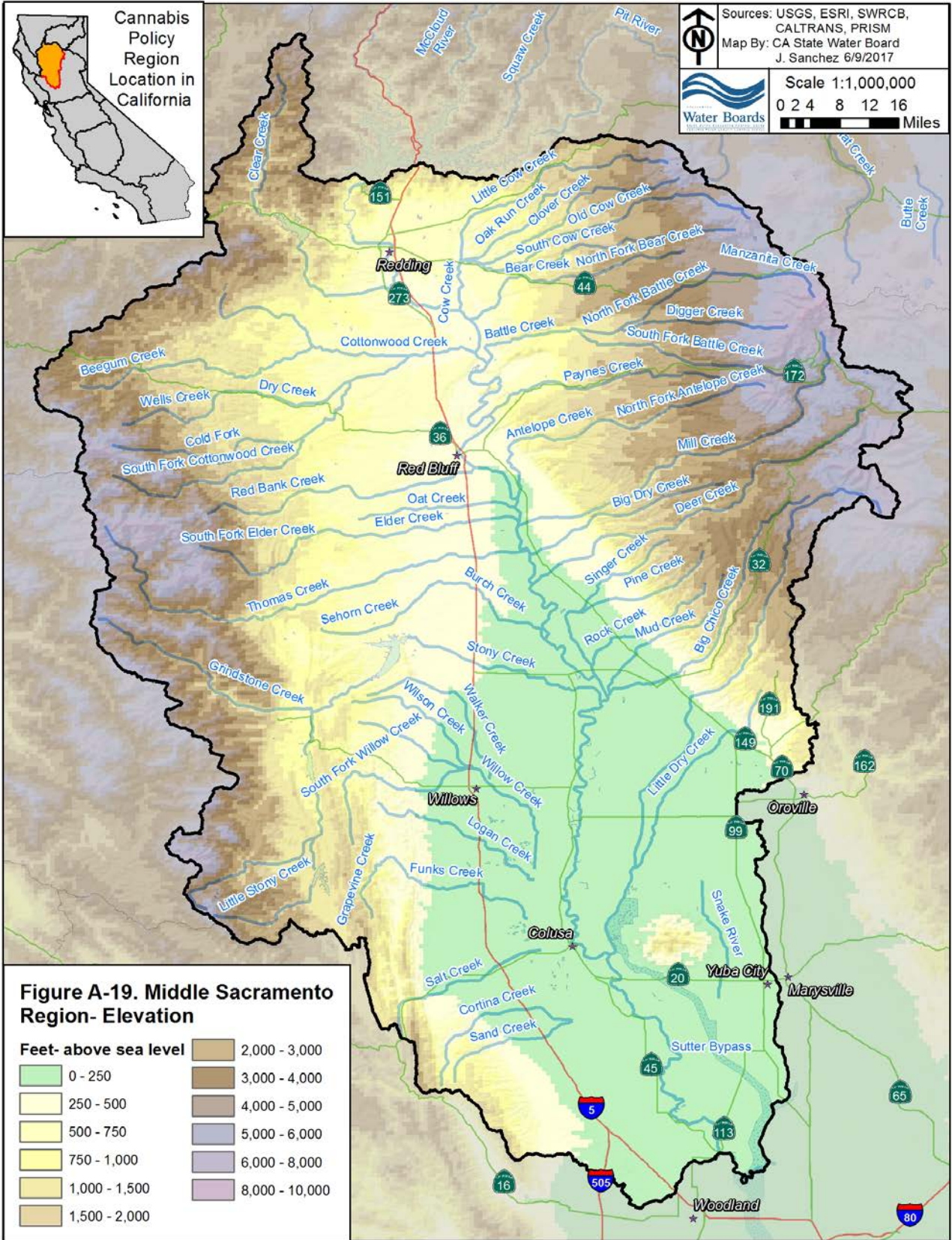
Five special-status ESUs, DPSes, or DTEs are currently extant within the Middle Sacramento Region (Figure A-23):

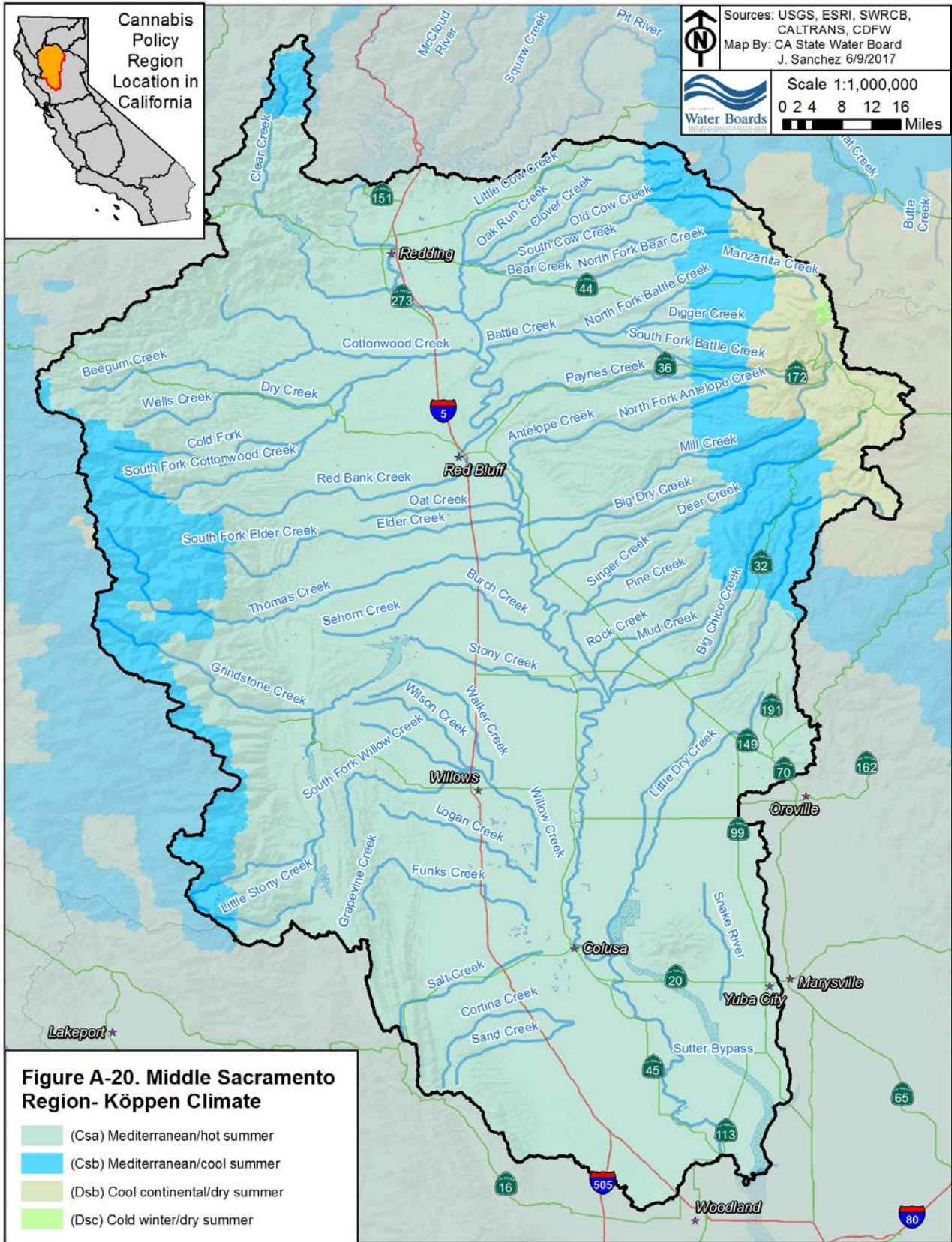
- the Sacramento River winter-run (SRWR) Chinook salmon ESU,
- the Central Valley spring-run (CV SR) Chinook salmon ESU,
- the Central Valley fall-run (CV FR) Chinook salmon DTE⁴,
- the Central Valley late fall-run (CV LFR) Chinook salmon DTE, and
- the California Central Valley (CCV) steelhead DPS.

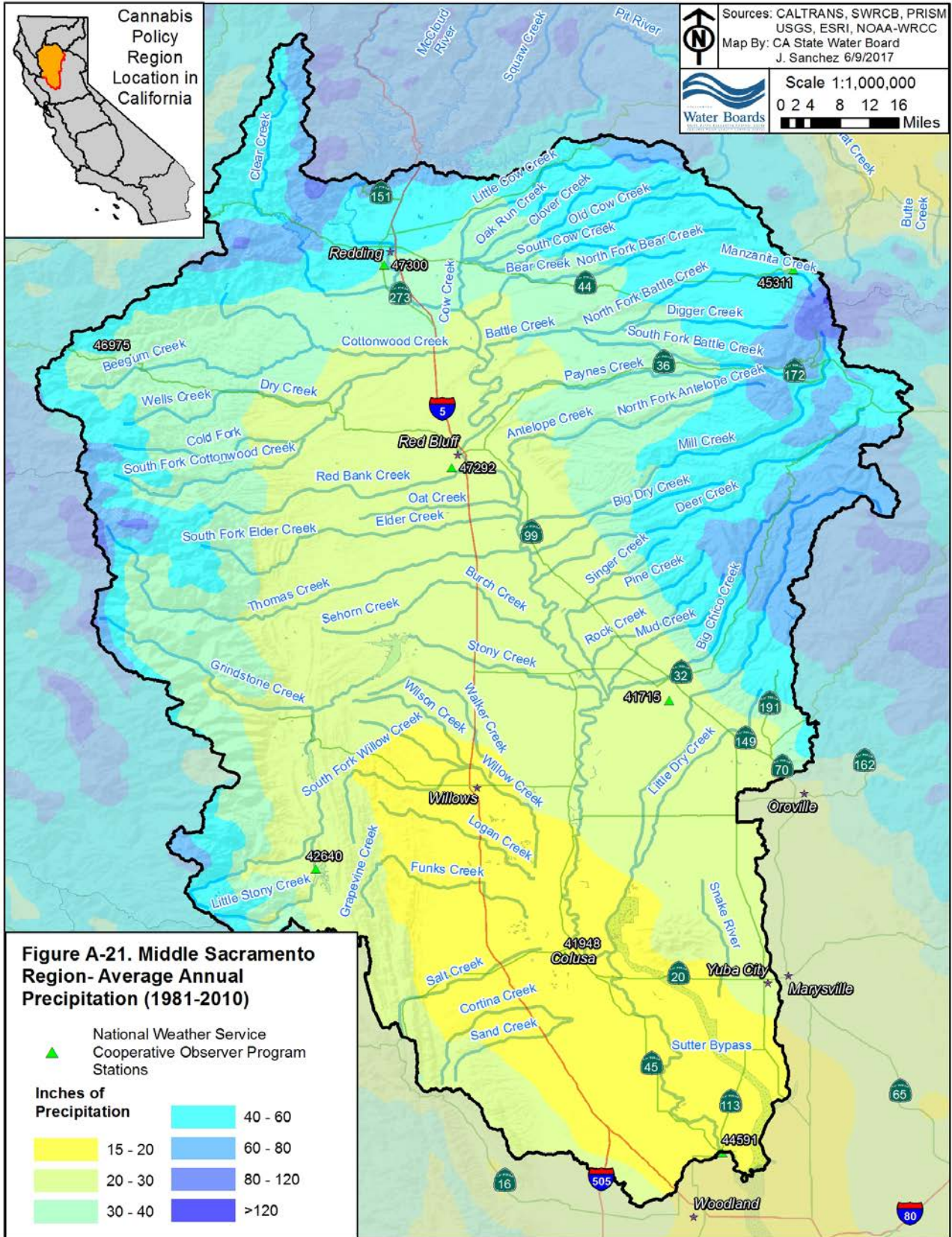
The SRWR Chinook salmon ESU is currently listed as endangered under the ESA and the CESA (CDFW 2017b). The CV SR Chinook salmon ESU and the CCV steelhead DPS are currently listed as threatened under the ESA (CDFW 2017b). The CV SR Chinook salmon ESU is also listed as threatened under the CESA (CDFW 2017b). The CV FR and CV LFR Chinook salmon populations are each listed as species of special concern by CDFW and, jointly, as a species of concern by NMFS (Moyle et al. 2015, NMFS 2017).

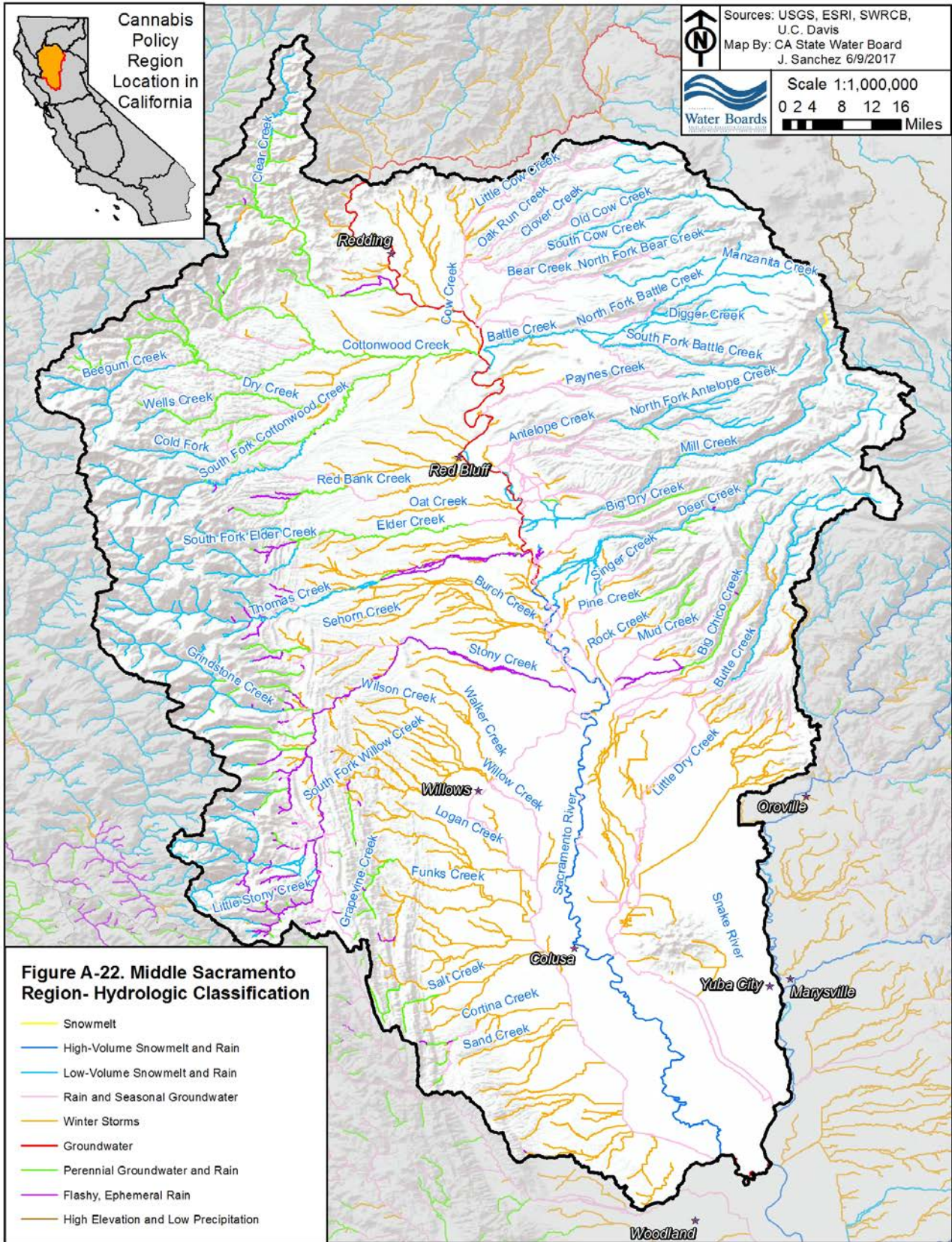
⁴ CV FR and CV LFR Chinook salmon together constitute a single ESU; however, CDFW treats the two runs as distinct taxonomic entities based upon their distinct life-history strategies and in consideration of the unique management concerns of each run (Moyle et al. 2015).

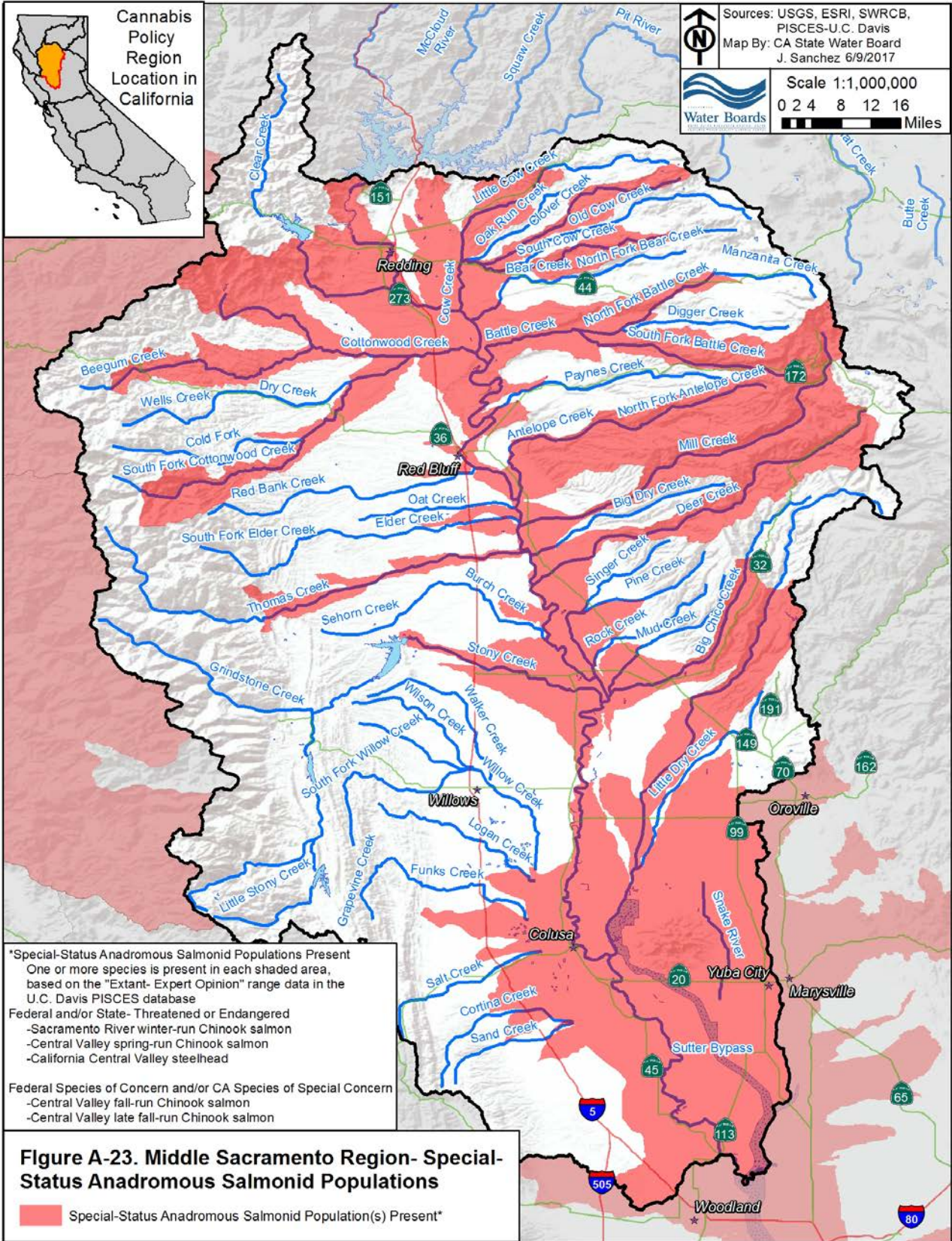












1.5 South Sacramento Region

The South Sacramento Region covers approximately 14,195 square miles in central California, as shown in attached (Figure A-24). Elevations in this region range from below sea level in the Sacramento-San Joaquin River Delta, to over 8,000 feet along the crest of the Sierra Nevada mountains. Please refer to Figure A-25 for an elevation map of the region. The Middle Sacramento region includes the lower Sacramento River watershed, from its confluence with the Feather River to confluence of the Sacramento-San Joaquin River Delta and the San Francisco Bay. Several major tributaries to the Sacramento River are located in this region, including Putah Creek and Cache Creek, which drain the eastern side of the Coast Ranges and enter the Sacramento River from the west, and the Feather, Yuba, and American Rivers, which drain the western side of the Sierra Nevada and enter the Sacramento River from the east.

1.5.1 Climate and Precipitation

The climate of the South Sacramento Region varies with elevation, and generally grades from west to east. There are significant climatic, temperature, and precipitation differences between the Coast Ranges, Central Valley, western side of the Sierra Nevada mountains, and eastern side of the Sierra Nevada mountains. The Coast Ranges and Central Valley, located in the western and central portion of the South Sacramento Region, are characterized by a Mediterranean climate with hot summers. The Sierra Nevada foothills, located to the east of the Central Valley, are characterized by a Mediterranean climate with cool summers. The northern and eastern margins of the Sierra Nevada mountains are characterized as cool continental with dry summers. Please refer to Figure A-26 for a climatic map of the South Sacramento Region.

In general, the western portion of the South Sacramento Region, which includes the Coast Ranges and Central Valley, exhibit higher average annual maximum and higher average annual minimum temperatures compared to the eastern portion of the region, which includes the Sierra Nevada. The western portion of the Sierra Nevada mountains also exhibits higher average annual maximum and higher average annual minimum temperatures compared to the eastern portion of the Sierra Nevada mountains. Average annual maximum temperatures in the Central Valley and Coast Ranges portions of the South Sacramento Region tend to exceed 75 degrees Fahrenheit, while average annual maximum temperatures at higher elevations in the Sierra Nevada mountains tend to exceed 50 degrees Fahrenheit. Average annual minimum temperatures tend to remain above 45 degrees Fahrenheit throughout the Central Valley and Sierra Nevada foothills, while average annual minimum temperatures tend to remain below freezing at high elevation areas in the Sierra Nevada.

In the South Sacramento Region, precipitation generally falls from November through April. Average annual precipitation amounts in the South Sacramento Region vary greatly between the Coast Ranges, Central Valley, and Sierra Nevada mountains. Up to 60 inches of precipitation tends to fall annually in the Coast Ranges, less than 15 inches of precipitation tends to fall annually in the southern portion of the South Sacramento Region, and over 80 inches of precipitation tends to fall annually along the Sierra Nevada crest. East of the Sierra Nevada crest, less than 15 inches of precipitation tends to fall annually, which is a result of the rain shadow effect. Significant amounts of precipitation tend to fall as snow in the Sierra Nevada mountains, and snowfall depths are typically higher in the northern Sierra Nevada mountains compared to the southern Sierra Nevada mountains. Average snowfall totals in the Sierra Nevada mountain portion of the Southern Sacramento Region vary from nearly 190 inches at Mount Lassen, located at the northern boundary of the region, to nearly 400 inches at Echo Summit south of Lake Tahoe. (WRCC 2016)

Please refer to Figure A-27 for a precipitation map of the Southern Sacramento Region. Please refer to Charts A-8, A-9 and A-10, below, for illustrations of the typical precipitation and temperature patterns across the region.

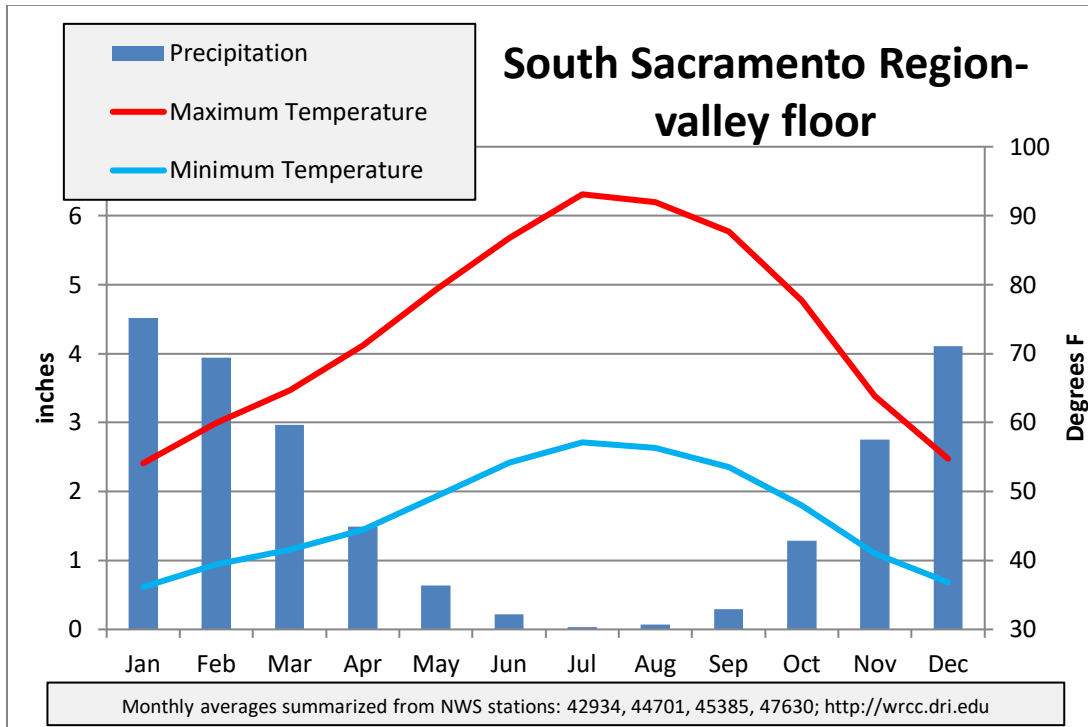


Chart A-8. Average annual patterns of temperature and precipitation in the South Sacramento Region, valley floor.

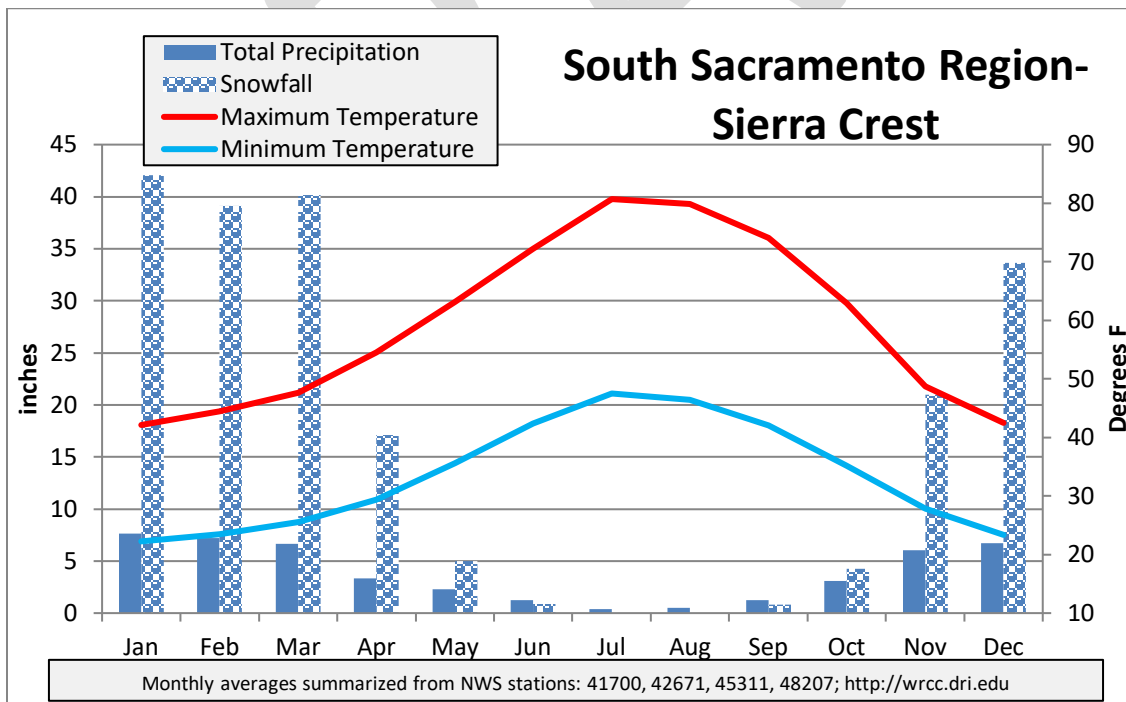


Chart A-9. Average annual patterns of temperature and precipitation in the South Sacramento Region, Sierra Crest.

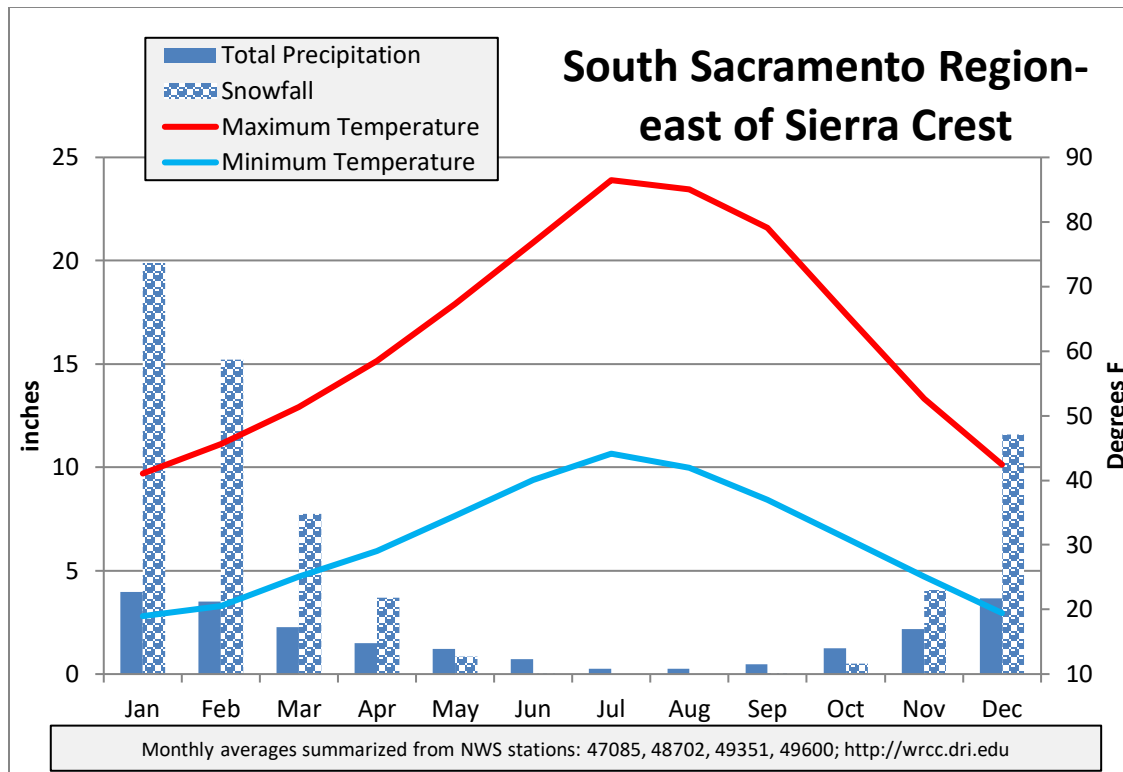


Chart A-10. Average annual patterns of temperature and precipitation in the South Sacramento Region, east of Sierra Crest.

1.5.2 Hydrology

The hydrology of South Sacramento Region stream reaches varies greatly from west to east, and several UC Davis hydrologic classifications exist for stream reaches in this region. Streams in the northwestern portion of the South Sacramento Region, which includes the Coast Ranges, are primarily classified as Rain and Seasonal Groundwater (RSG) or Perennial Groundwater and Rain (PGR) systems. The central portion of the South Sacramento Region, which includes the Central Valley and Sierra Nevada foothills, are dominated by Winter Storms (WS) and Rain and Seasonal Groundwater (RSG) systems. The eastern portion of the South Sacramento Region, which includes the Sierra Nevada, is dominated by Low-Volume Snowmelt and Rain (LSR) systems. Several main rivers, including the Sacramento River on the valley floor, are characterized as High-Volume Snowmelt and Rain (HSR) systems. (Lane et al 2016)

Please refer to Figure A-28 for a depiction of the stream classifications within the Southern Sacramento Region.

1.5.3 Geology

The South Sacramento Region is primarily located in the Coast Ranges, Great Valley, and Sierra Nevada geomorphic provinces. The Coast Ranges, located in the western portion of the South Sacramento Region, contain irregular, knobby, landslide topography. The Coast Ranges contain sedimentary and metamorphic rock, and alluvial deposits in valley areas. The Great Valley geomorphic province, located in the center of this region and corresponding to the Sacramento Valley, consists of a large alluvial plain. The Sierra Nevada geomorphic province, located in the eastern portion of this region, contains steep mountains underlain by a granitic batholith. The foothill region of the Sierra Nevada geomorphic province are comprised of

metamorphic rocks. Small portions of the northeastern portion of the South Sacramento Region are also located in the Cascade Range and the Basin and Range geomorphic provinces. (CGS, 2002)

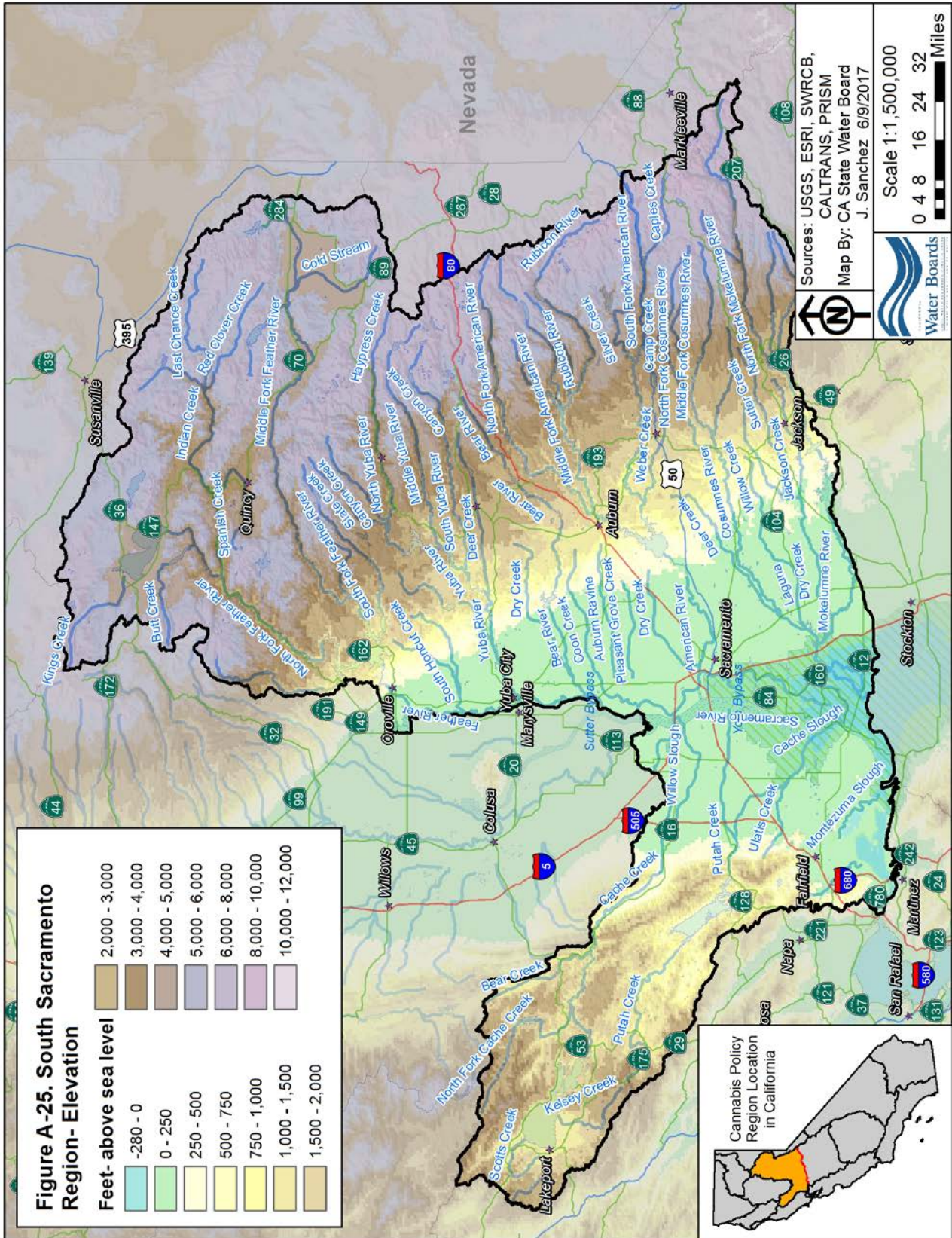
1.5.4 Anadromous Salmonid Population

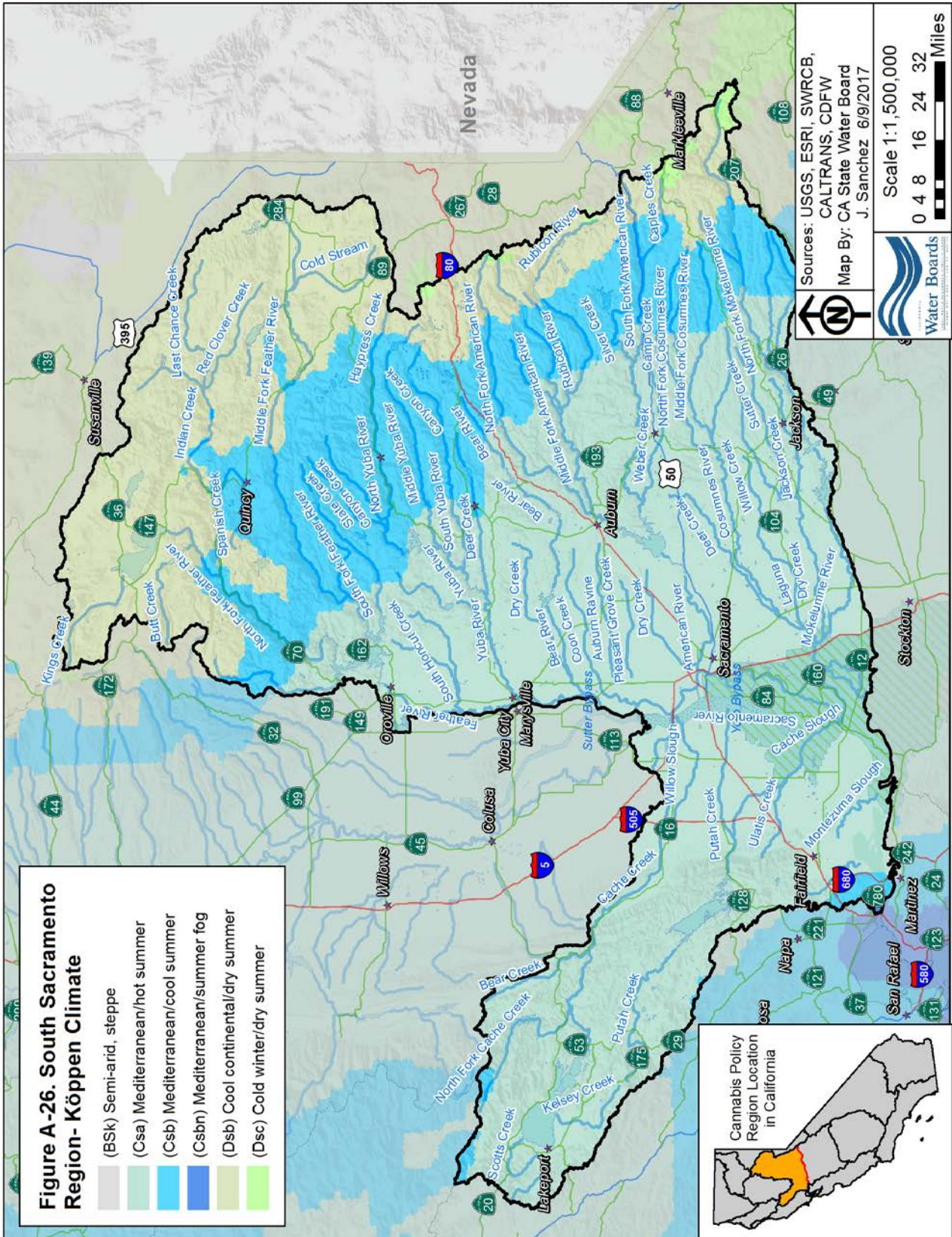
Six special-status ESUs, DPSes, or DTEs are currently extant within the South Sacramento Region (Figure A-29):

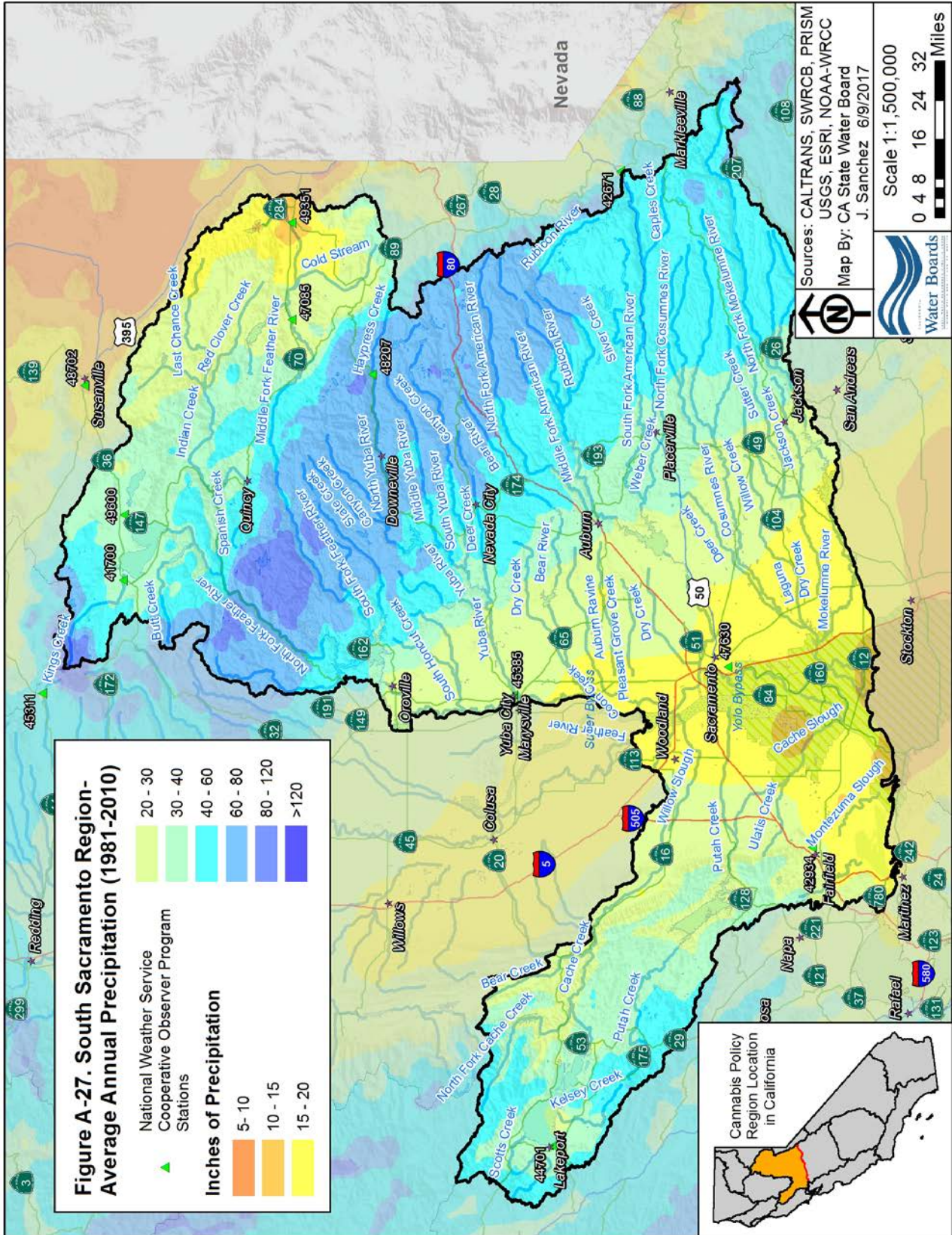
- the SRWR Chinook salmon ESU,
- the CV SR Chinook salmon ESU,
- the CV FR of Chinook salmon DTE⁵,
- the CV LFR of Chinook salmon DTE,
- the CCV steelhead DPS, and
- the Central California Coast (CCC) steelhead DPS.

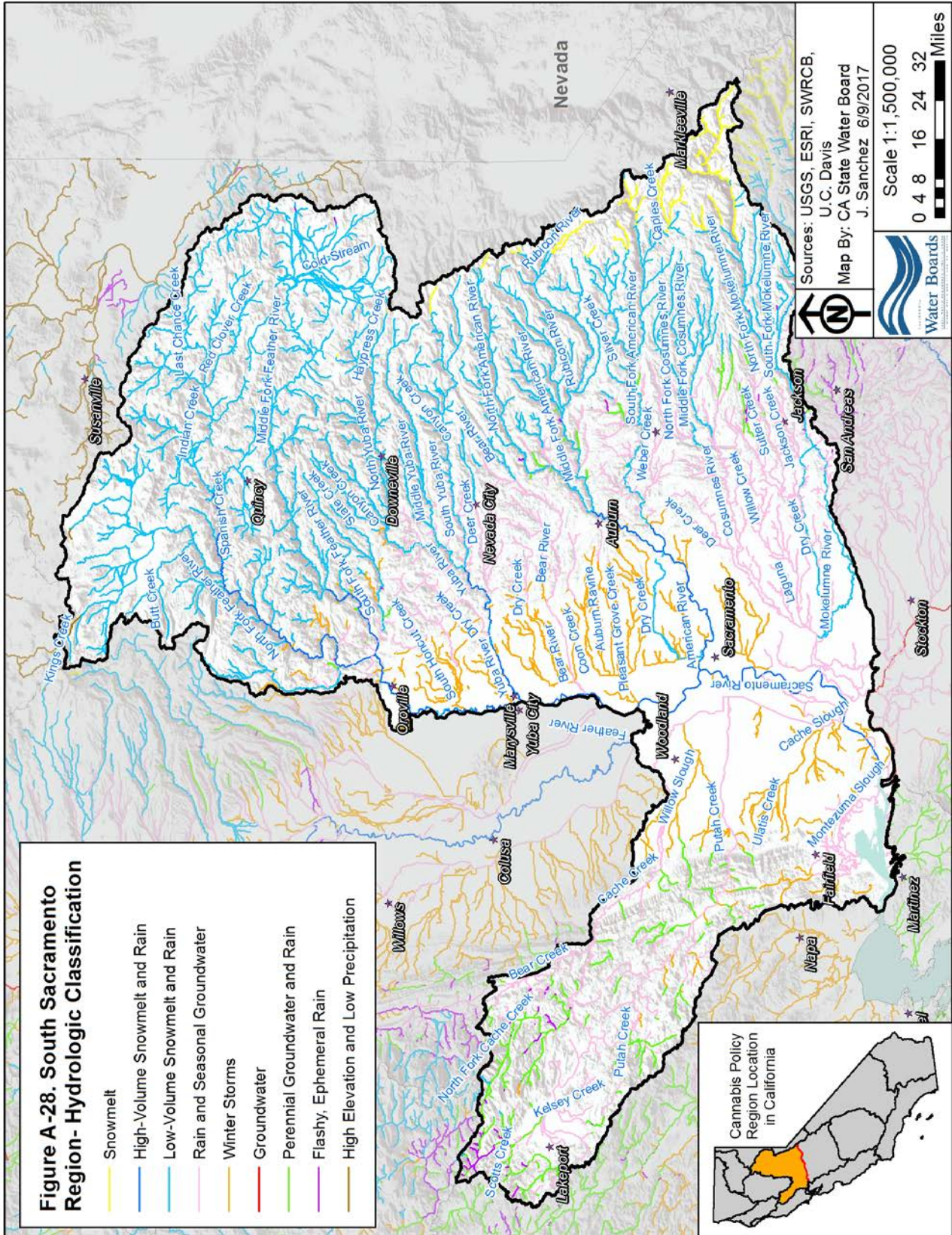
The SRWR Chinook salmon ESU is currently listed as endangered under the ESA and the CESA (CDFW 2017b). The CV SR Chinook salmon ESU, CCV steelhead DPS, and the CCC steelhead DPS are currently listed as threatened under the ESA (CDFW 2017b). In addition, the CV SR Chinook salmon ESU is listed as threatened under the CESA (CDFW 2017b). The CV FR and CV LFR Chinook salmon populations are each listed as species of special concern by CDFW and, jointly, as a species of concern by NMFS (Moyle et al. 2015, NMFS 2017).

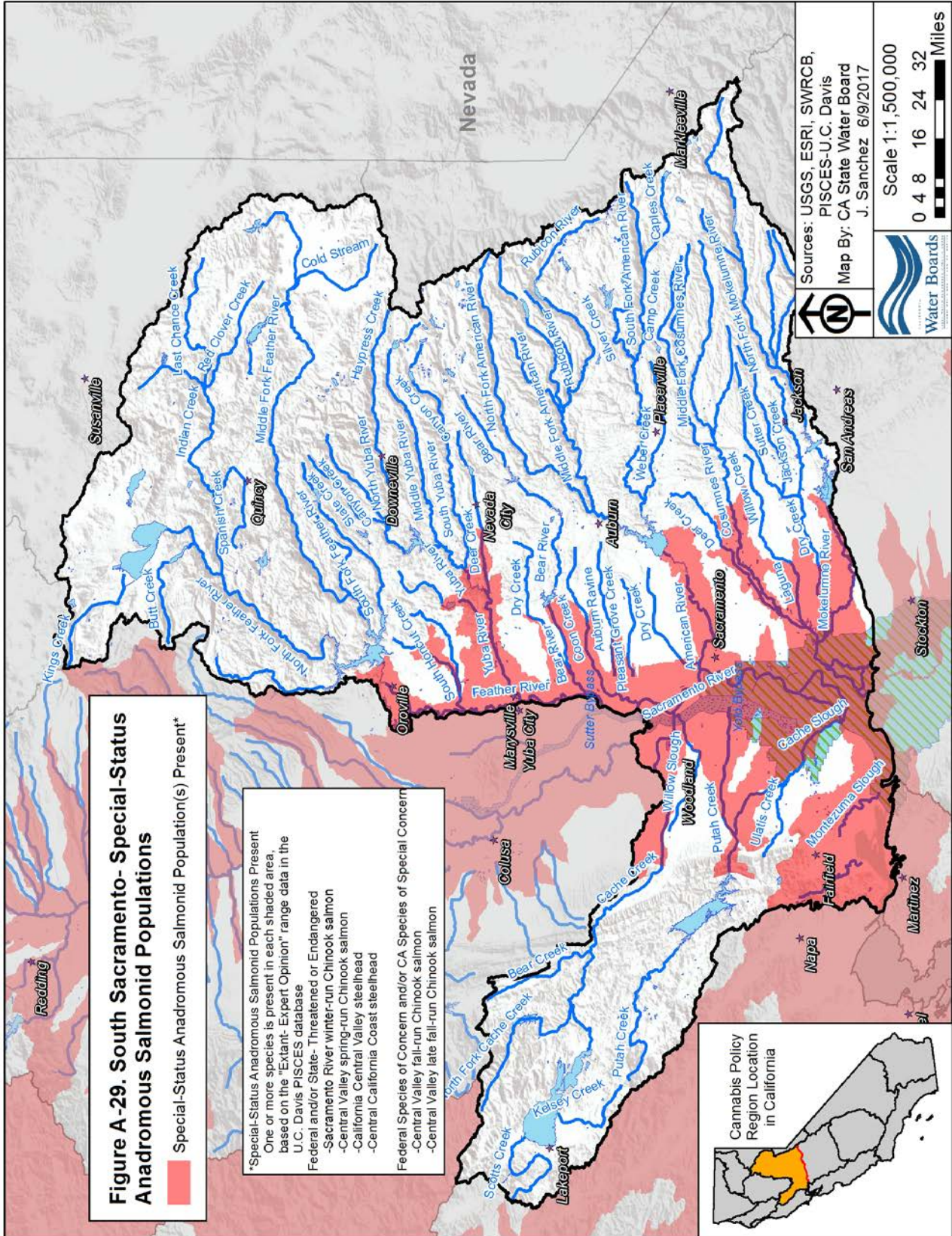
⁵ CV FR and CV LFR Chinook salmon together constitute a single ESU; however, CDFW treats the two runs as distinct taxonomic entities based upon their distinct life-history strategies and in consideration of the unique management concerns of each run (Moyle et al. 2015).











1.6 North Central Coast Region

The North Central Coast Region covers approximately 4,785 square miles along the north-central coast of California, as shown in attached (Figure A-30). This region is bordered by the San Francisco Bay to the south and by the Eel River to the north. Elevations in the North Central Coast Region range from sea level along the coast and near the San Francisco Bay, to over 2,000 feet in the Coast Ranges along the northeastern boundary of the region. Please refer to Figure A-31 for an elevation map of the North Central Coast Region. Several watersheds are located in the North Central Coast Region, including the Russian, Mattole, Noyo, Big, Navarro, Garcia, and Gualala River watersheds which drain directly to the Pacific Ocean, and the Napa, and Petaluma River watersheds which drain into San Francisco Bay. The Russian River watershed is the largest watershed in the North Central Coast Region.

1.6.1 Climate and Precipitation

The climate of the North Central Coast Region is described as Mediterranean with hot summers in inland areas, and Mediterranean with cooler summers in the coastal portions of the region. Summer fog is common along the coast in this region. Please refer to Figure A-32 for a climate map of this region.

Temperature conditions tend to be more variable in the inland portion of the North Central Coast Region compared to areas near the coast. Average annual maximum temperatures in the North Central Coast Region exceed 70 degrees Fahrenheit in inland areas, and remain slightly cooler near the coast. Average annual minimum temperatures in the North Central Coast Region remain above 40-45 degrees Fahrenheit in both coastal and inland areas.

Precipitation in the North Central Coast Region tends to fall during October through April, and the greatest amounts of precipitation tend to fall in December and January. Average annual precipitation amounts in the North Central Coast Region vary from over 60 inches near the northern coast, to under 30 inches in the southeast portion of the region. Snow does not comprise a significant portion of precipitation to the region. (WRCC 2016)

Please refer to Figure A-33 for a precipitation map of the region. Please refer to Chart A-11, below, for an illustration of temperature and precipitation patterns for the North Central Coast Region.

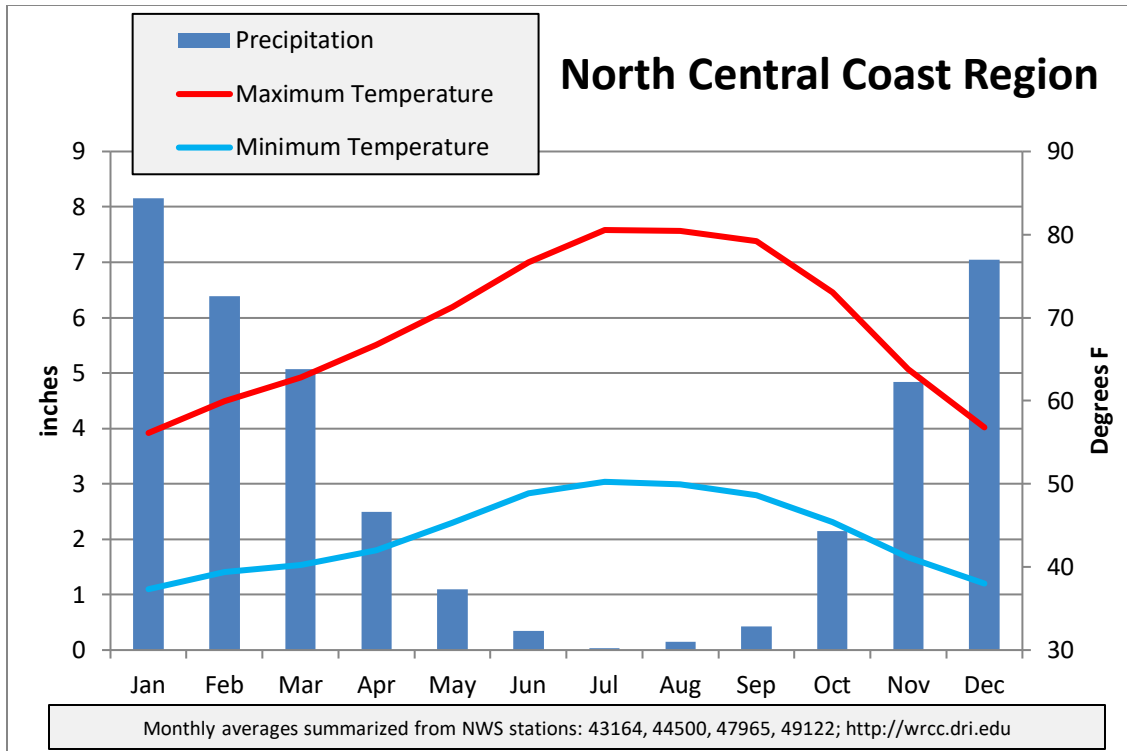


Chart A-11. Average annual patterns of temperature and precipitation in the North Central Coast Region.

1.6.2 Hydrology

Stream reaches in the North Central Coast Region are generally classified under UC Davis' hydrologic classification system as Winter Storms (WS), Perennial Groundwater and Rain (PGR), or Rain and Seasonal Groundwater (RSG) systems. Many North Central Coast Region stream reaches located near the coast, including tributaries to San Francisco Bay, are classified under the Winter Storm (WS) hydrologic regime. Many stream reaches located in the eastern, inland portion of the North Central Coast Region are classified under the PGR hydrologic regime, and a smaller amount of streams in this inland region are classified as RSG stream systems. (Lane et al 2016)

Please refer to (Figure A-34) for a stream classification map of the North Central Coast Region.

1.6.3 Geology

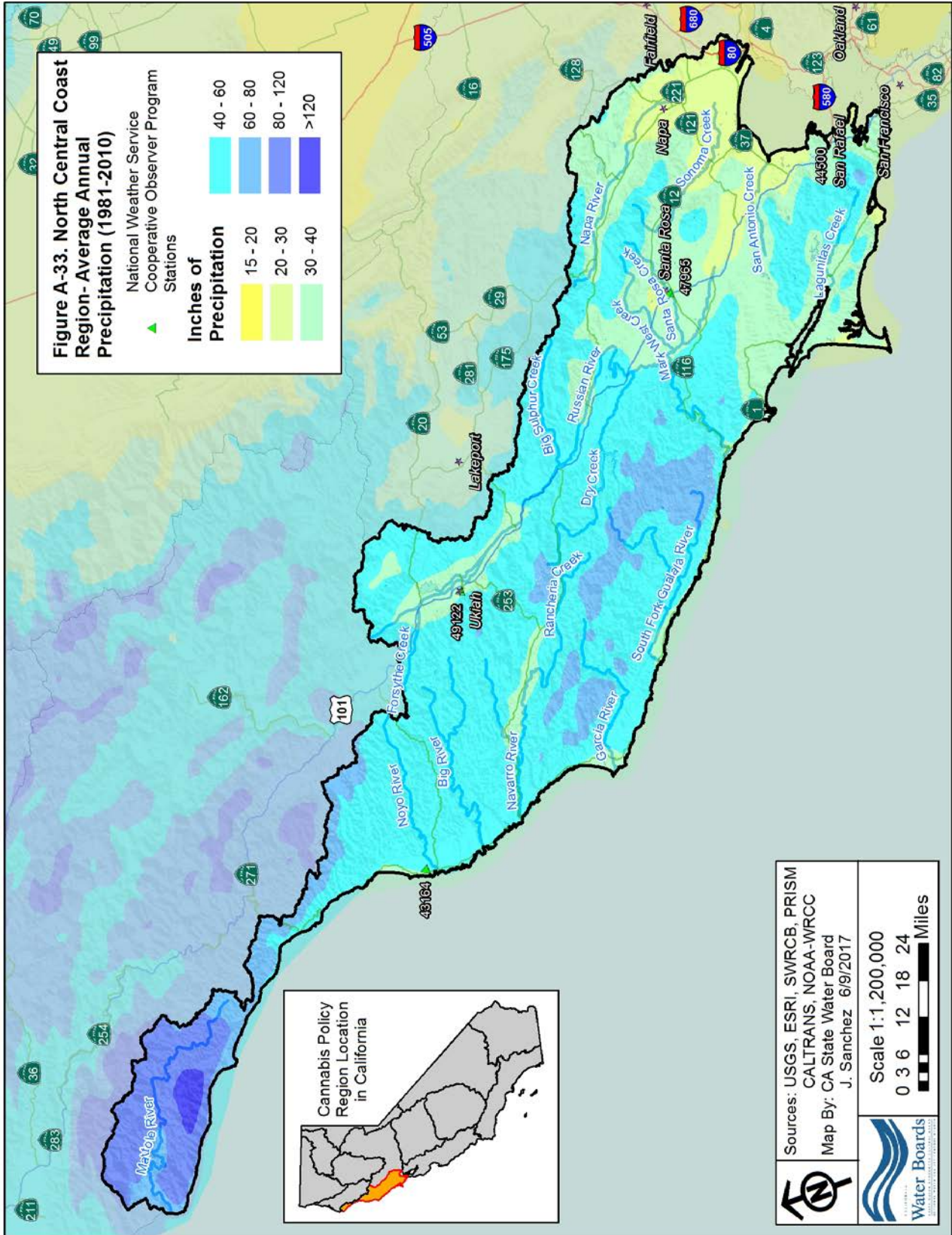
The North Central Coast Region is located in the Coast Ranges geomorphic province. The Coast Ranges in the North Coast Region are dominated by irregular, knobby, landslide topography. The Coast Ranges are underlain by sedimentary and metamorphic rock, with alluvial deposits in valley floors and along the coastline. The San Andreas Fault system is located near the western margin of the North Central Coast Region, and extends off of the California coast in the northern section of the region. (CGS 2002)

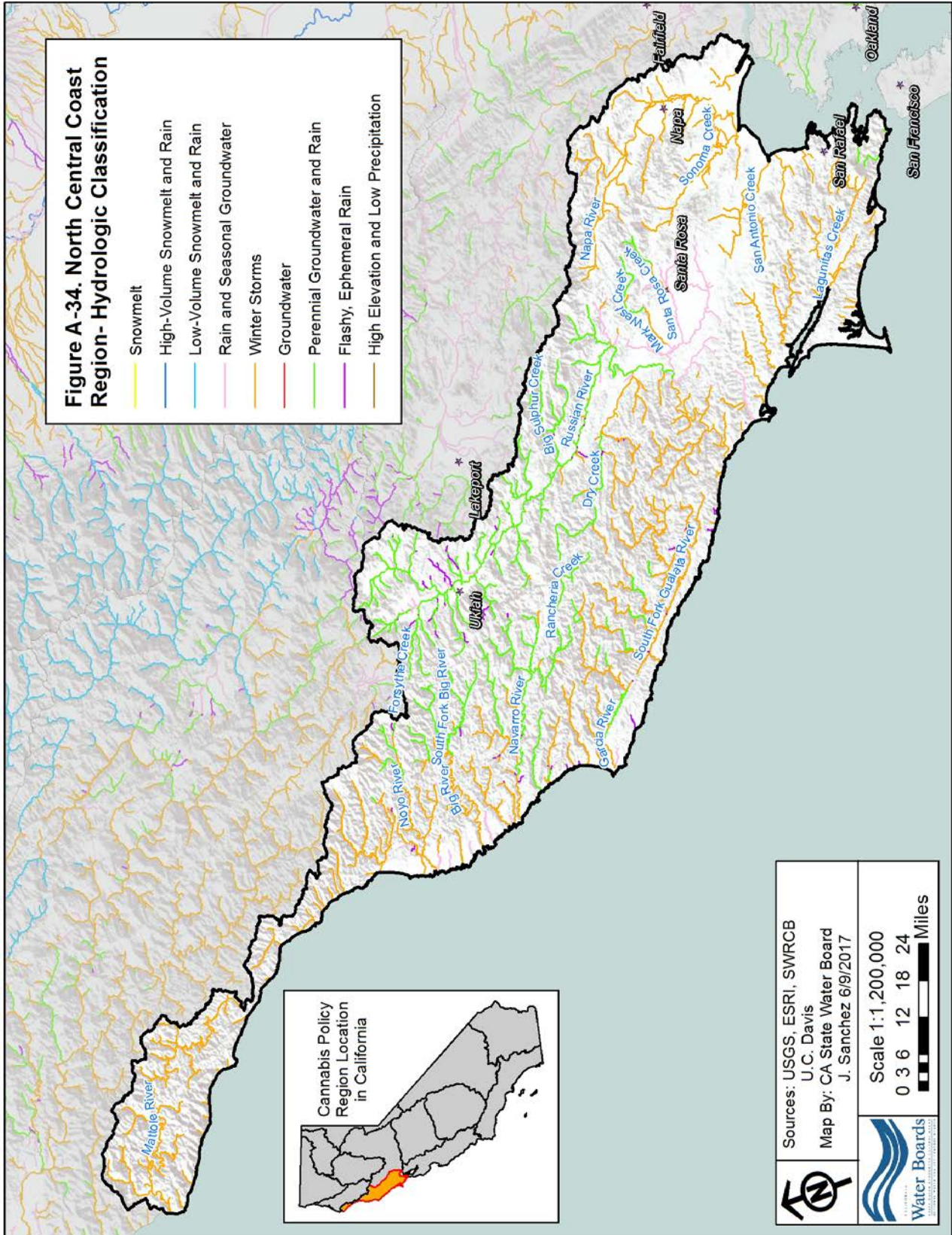
1.6.4 Anadromous Salmonid Population

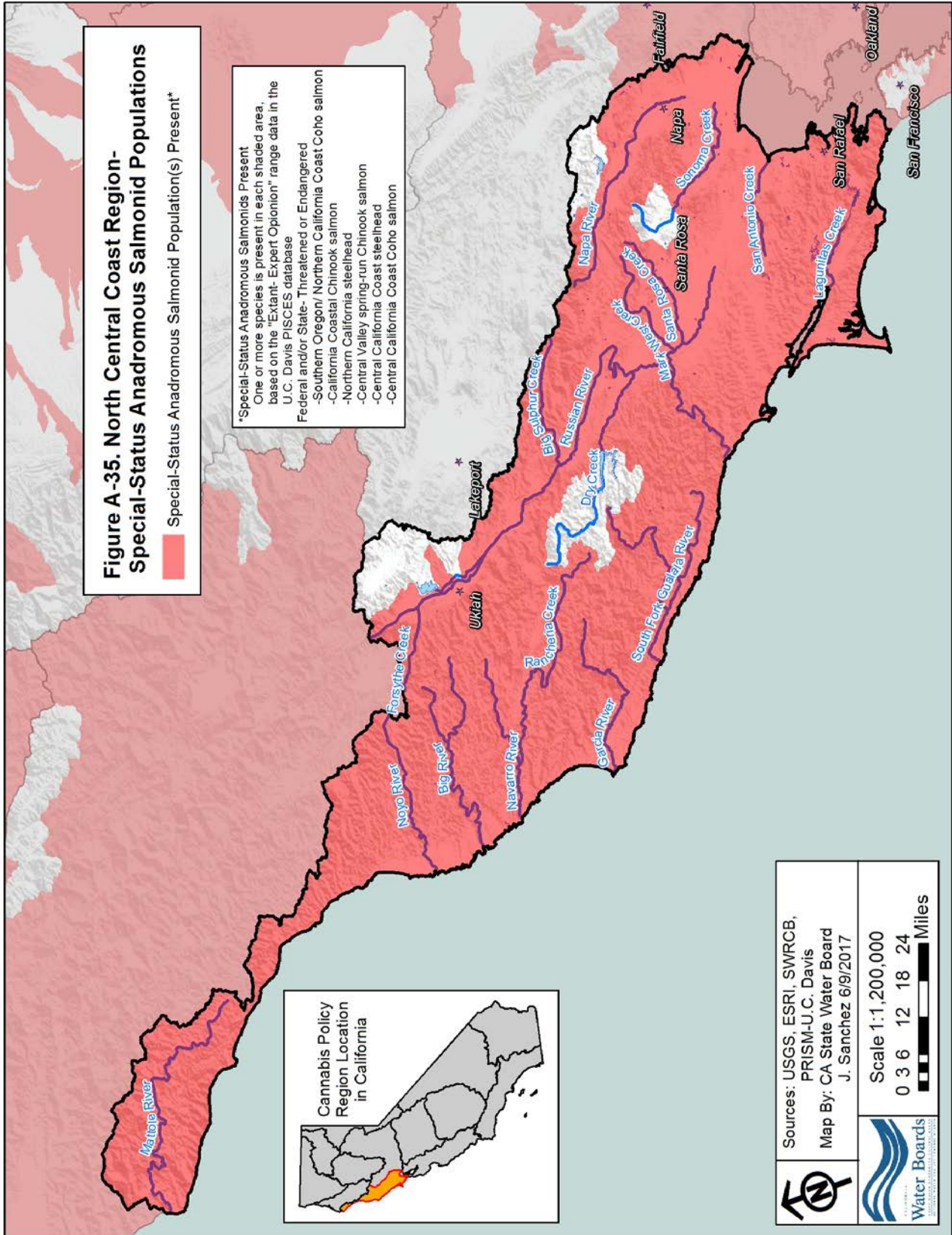
Six special-status ESUs, DPSes, or DTEs are currently extant within the North Central Coast Region (Figure A-35):

- the CC Chinook salmon ESU,
- the CV SR Chinook salmon ESU,
- the NC steelhead DPS,
- the CCC steelhead DPS,
- the SONCC coho salmon ESU, and
- the Central California Coast (CCC) coho salmon ESU.

The CCC coho salmon ESU is currently listed as endangered under the ESA and the CESA (CDFW 2017b). The CC Chinook salmon ESU, CV SR Chinook salmon ESU, NC steelhead DPS, CCC steelhead DPS, and SONCC coho salmon ESU are all currently listed as threatened under the ESA (CDFW 2017b). In addition, the CV SR Chinook and SONCC coho salmon ESUs are currently listed as threatened under the CESA (CDFW 2017b).







1.7 South Central Coast Region

The South Central Coast Region covers approximately 10,050 square miles along the south-central coast of California, as shown in attached (Figure A-36). The South Central Coast Region is bordered by the Santa Maria River to the south and by San Francisco Bay to the north. Elevations in the South Central Coast Region range from sea level along the coast and near the San Francisco Bay, to 2,000-3,000 feet along the eastern regional boundary in the Coast Ranges; please refer to (Figure A-37) for an elevation map of the South Central Coast Region. The Salinas River is the largest watershed in the South Central Coast Region, and the region also contains numerous San Francisco Bay and Pacific Ocean tributaries.

1.7.1 Climate and Precipitation

The South Central Coast Region is characterized by a Mediterranean climate. The eastern portion of the South Central Coast Region, which is furthest from the Pacific Ocean, is characterized by a Mediterranean climate with hot summers. The central portion of the region is generally characterized by a Mediterranean climate with cooler summers. Coastal areas in the South Central Coast Region are characterized by a Mediterranean climate with summer fog. Please refer to (Figure A-38) for a climatic map of the South Central Coast Region.

Precipitation and temperature patterns tend to vary between coastal and inland areas in the South Central Region. Average annual maximum temperatures in the South Central Coast Region tend to exceed 75 degrees Fahrenheit in inland areas, while coastal areas tend to exhibit slightly cooler average annual maximum temperatures. Average annual minimum temperatures in the South Central Coast Region tend to remain above 40-45 degrees Fahrenheit in both coastal and inland areas. The South Central Coast Region tends to receive an average of over 40 inches of precipitation along the coast, and under 15 inches of precipitation in the inland and southeast portions of the region. Precipitation generally falls from November to April, and peaks in December and January. Snow does not contribute a significant proportion of precipitation to the region. (WRCC 2016)

Please refer to (Figure A-39) for a precipitation map of the South Central Coast Region. Please refer to Chart A-12 below, for a graphic illustration of general South Central Coast Region precipitation and temperature.

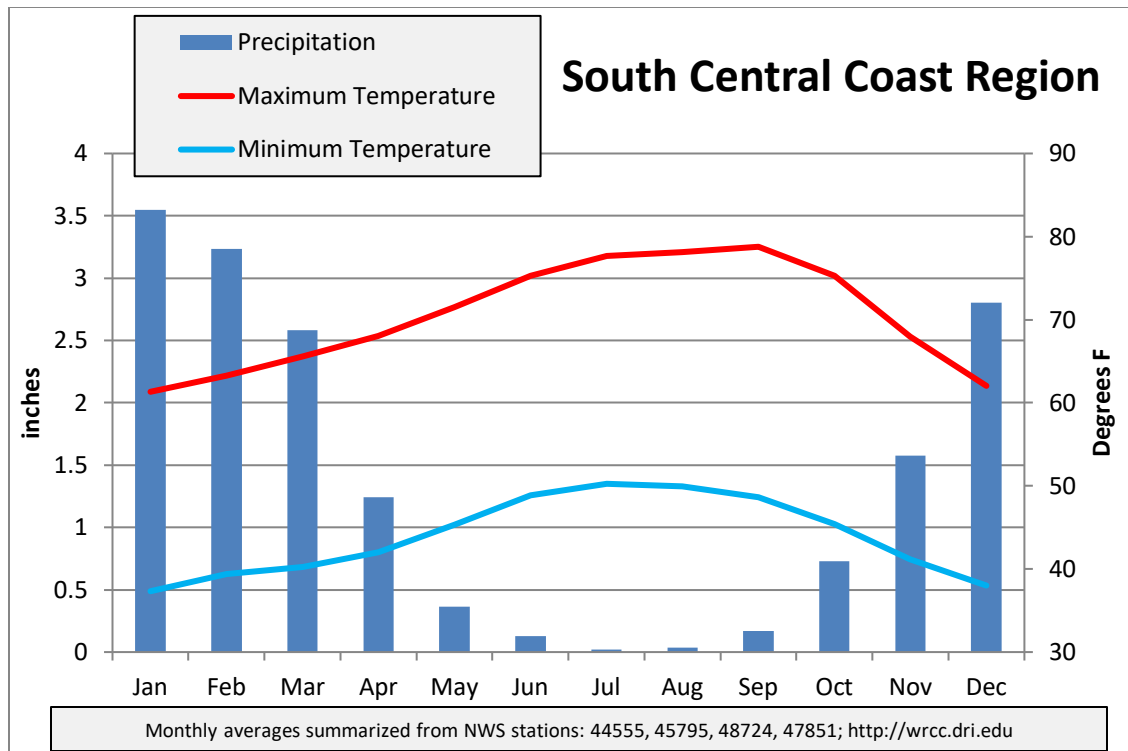


Chart A-12. Average annual patterns of temperature and precipitation in the South Central Coast Region.

1.7.2 Hydrology

The South Central Coast Region contains many streams that are classified as Perennial Groundwater and Rain (PGR) or as Rain and Seasonal Groundwater (RSG) streams under UC Davis' hydrologic classification system. Many coastal streams and tributaries to San Francisco Bay in this region are classified as PGR streams. Many streams in the southeastern portion of the South Central Coast Region and some tributaries to Monterey Bay are classified as RSG stream system. A small number of Winter Storm (WS) stream and Flashy, Ephemeral Rain streams are found in the South Central Coast Region. (Lane et al 2016)

Please refer to (Figure A-40) for a stream classification map of the South Central Coast Region.

1.7.3 Geology

The South Central Coast Region is located in the Coast Ranges geomorphic province, and is dissected by the San Andreas Fault system. The San Andreas Fault system runs through the South Central Coast Region, from the northwestern edge to the southeastern portion of the region. The San Andreas Fault is generally located in the mountain range between the Salinas and San Benito River valleys. The San Andreas Fault system separates oceanic crust from continental crust, and regional geology differs on the two sides of the San Andreas Fault. Granitic outcrops, marine sedimentary, and metamorphosed sedimentary rock underlay the South Central Coast Region west of the San Andreas Fault, whereas marine sedimentary rock underlays the South Central Coast Region east of the San Andreas Fault. Alluvial deposits are characteristic of the valleys throughout the South Central Coast Region. (CGS, 2002)

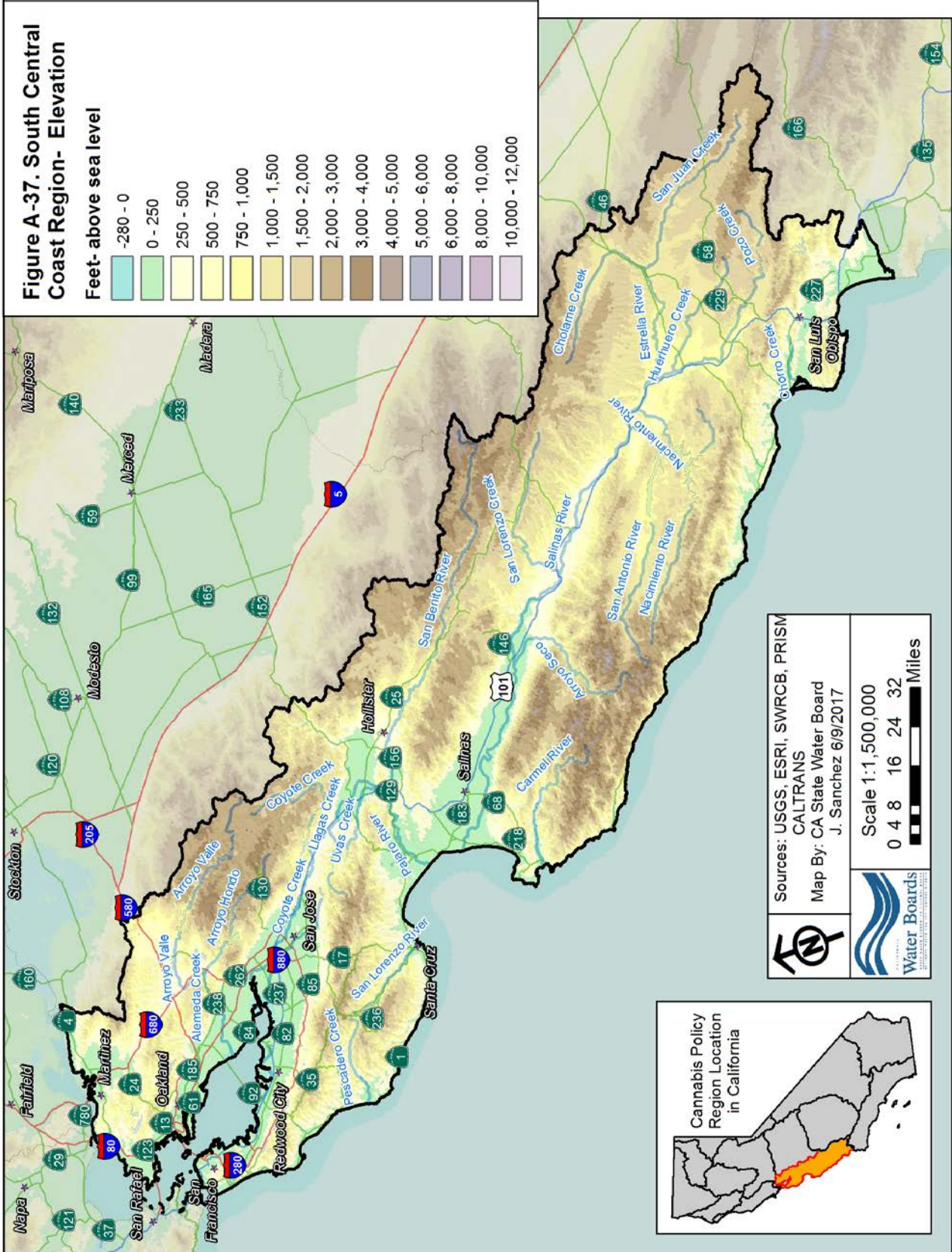
1.7.4 Anadromous Salmonid Population

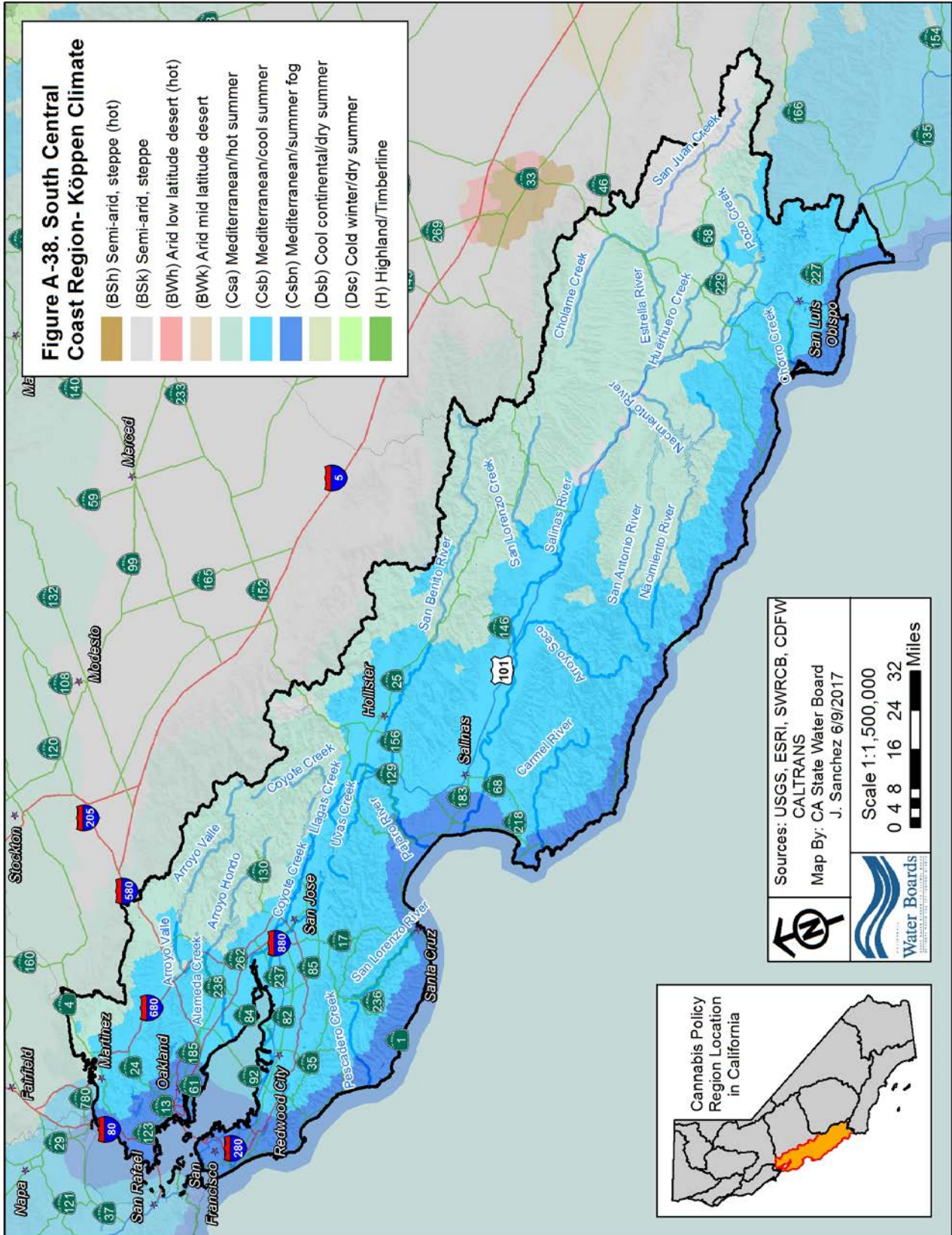
Three special-status ESUs, DPSes, or DTEs are currently extant within the South Central Coast Region (Figure A-41):

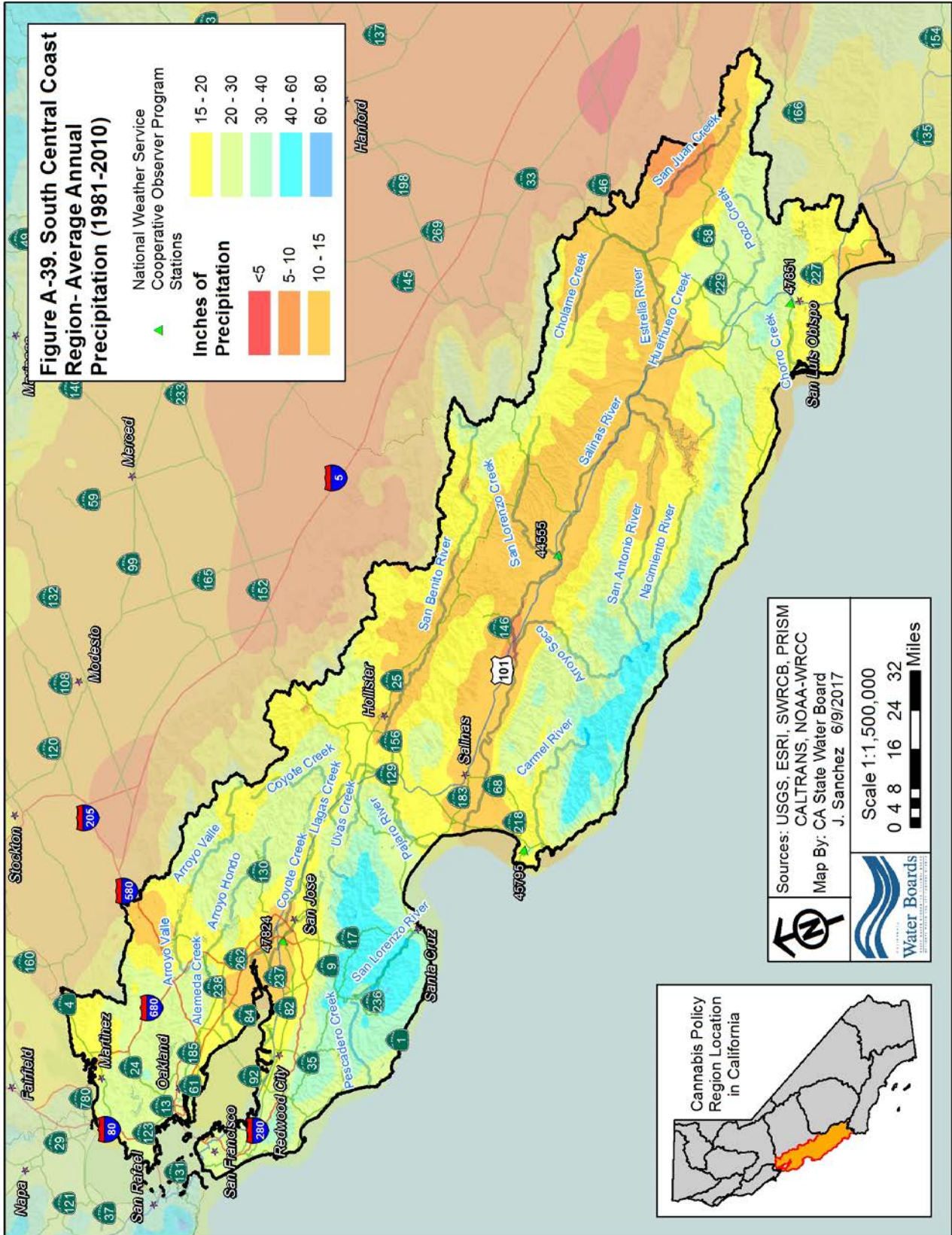
- the CCC steelhead DPS,
- the South-Central California Coast (SCCC) steelhead DPS, and
- the CCC coho salmon ESU.

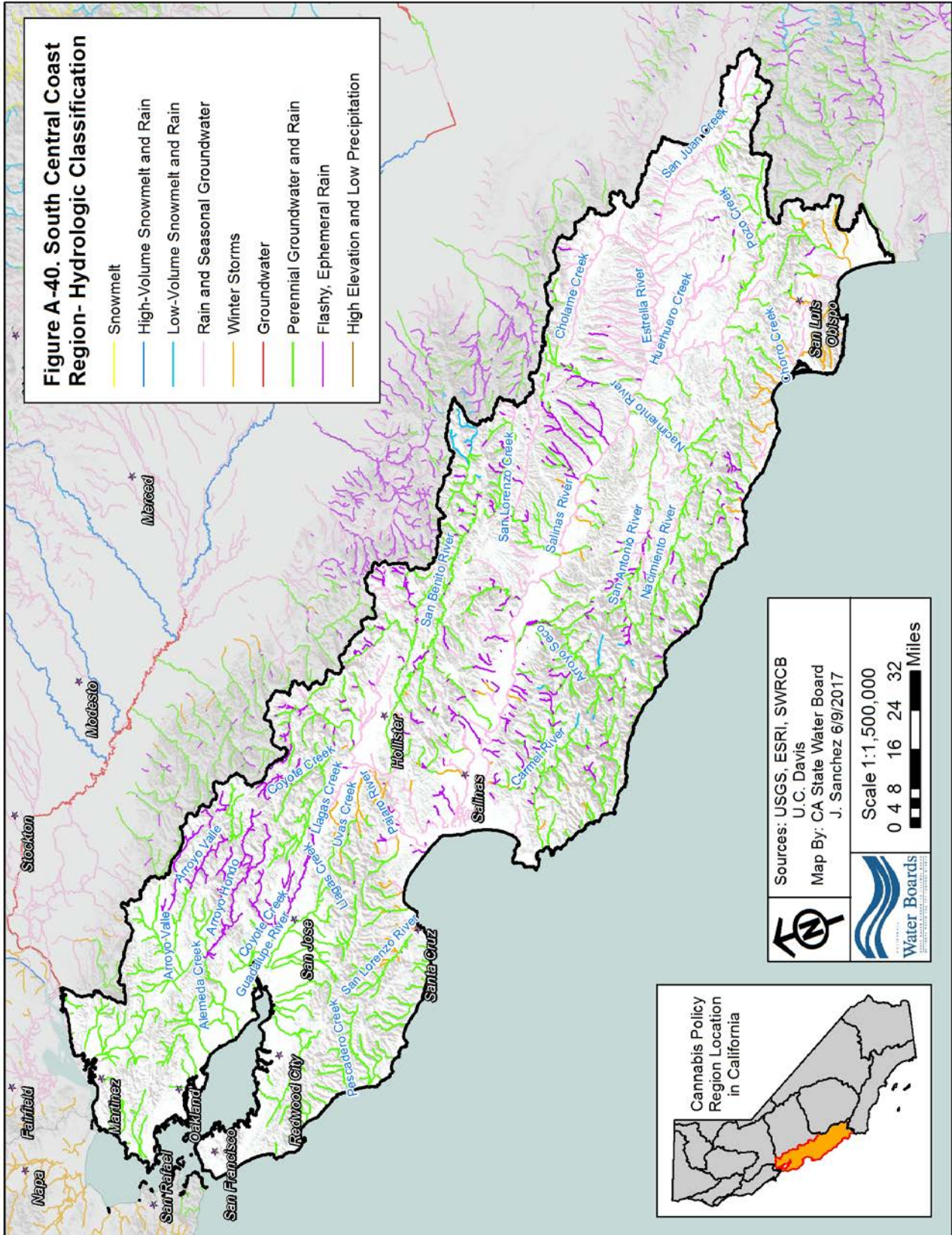
The CCC coho salmon ESU is currently listed as endangered under the ESA and the CESA (CDFW 2017b). The CCC and SCCC steelhead DPSes are currently listed as threatened under the ESA (CDFW 2017b).

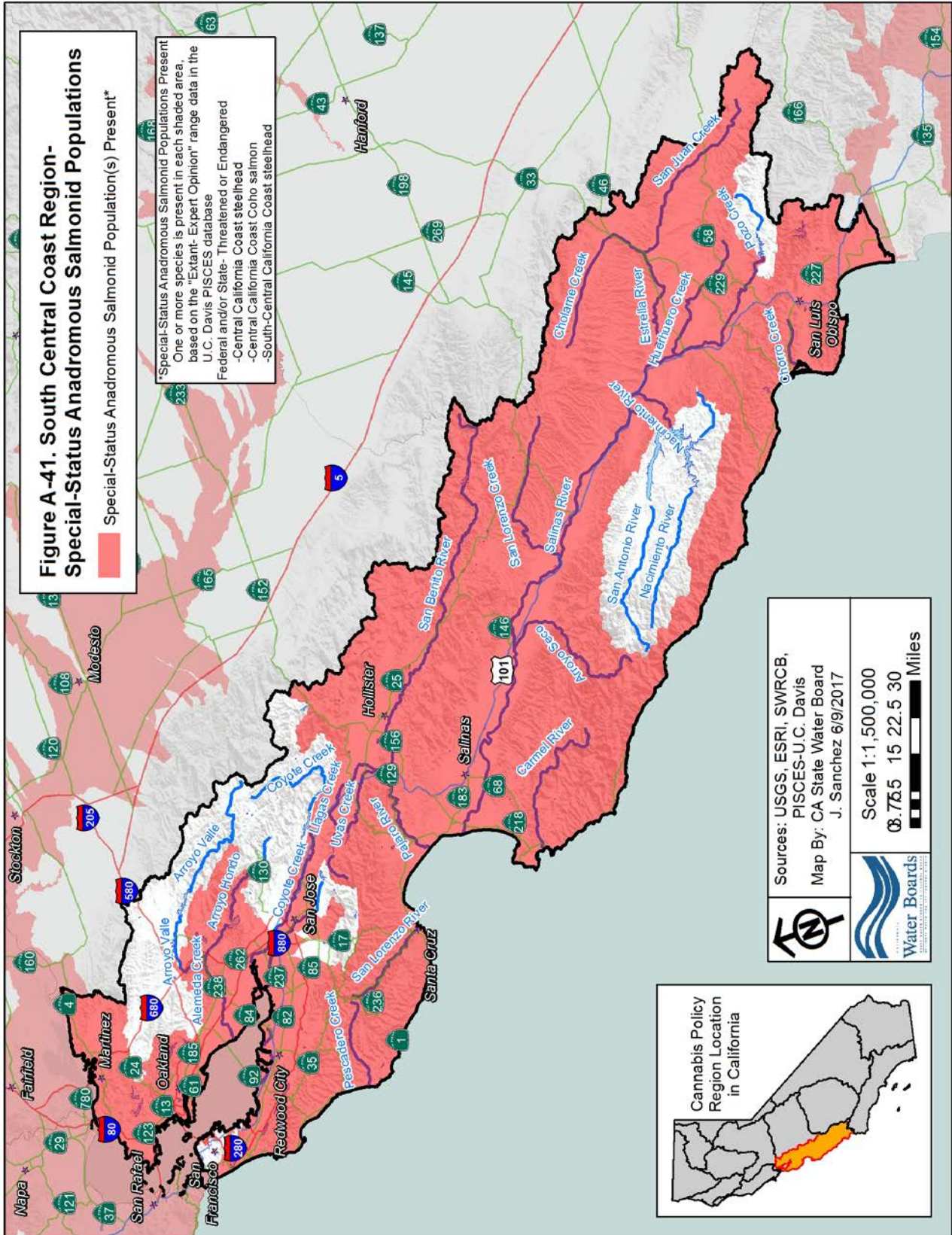
DRAFT











1.8 San Joaquin Region

The San Joaquin Region covers approximately 13,609 square miles in central California, as shown in attached (Figure A-42). Elevations in this region range from below sea level in the Sacramento-San Joaquin River Delta, to over 9,000 feet at the crest of the Sierra Nevada mountains at the northern end of the region, and to over 12,000 feet at the crest of the Sierra Nevada mountains at the southern end of the region (Figure A-43). The region includes the San Joaquin River watershed, including the San Joaquin River and its major tributaries: the Calaveras River, Stanislaus River, Tuolumne River, and Merced River.

1.8.1 Climate and Precipitation

The climate of the San Joaquin Region varies by elevation. The southwestern valley floor portion of the San Joaquin Region exhibits a Steppe (semi-arid, steppe) climate. Much of the center of the San Joaquin Region is characterized by a Mediterranean climate with hot summers. The northeastern margin of the San Joaquin Region is characterized by a Mediterranean climate with cool summers at lower elevations, by a cool continental climate with dry summers at mid- elevations, by cold winters and dry summers at the norther Sierra Nevada crest, and by a Highland/Timberline climate along the southern Sierra Nevada crest. Please refer to Figure A-44 for a climatic map of the San Joaquin Region.

In general, the Central Valley portion of the San Joaquin Region tends to exhibit higher average annual maximum and average annual minimum temperatures compared to the Sierra Nevada mountain portion of the region. Average annual maximum temperatures in the San Joaquin Region exceed 70-75 degrees Fahrenheit on the valley floor, 60 degrees Fahrenheit at mid-elevations in the Sierra Nevada, and 35-40 degrees Fahrenheit at high elevations in the Sierra Nevada. Average annual minimum temperatures in the San Joaquin Region remain above 45 degrees Fahrenheit throughout the Central Valley and Sierra Nevada foothills, and are well below freezing at many high-elevation locations in the Sierra Nevada mountains.

Precipitation patterns vary spatially within the San Joaquin Region, and higher amounts of precipitation tend to fall at the northern end of the region and at higher elevations. In the San Joaquin Region, 15-20 inches of rain typically falls in the northern portion of the Central Valley, and 10 inches or less typically falls in the southern portion of the Central Valley. Precipitation typically exceeds 80 inches along the Sierra Nevada crest, in the eastern portion of the San Joaquin Region. Significant amounts of precipitation tend to fall as snow in the Sierra Nevada mountains, and snowfall depths exceed 200 inches annually in many high-elevation areas. In the San Joaquin Region, precipitation generally lasts from November to April. (WRCC 2016)

Please refer to Figure A-45 for a precipitation map of the San Joaquin Region. Please refer to Charts A-13 and A-14, below, for a comparison of precipitation and temperature conditions for the valley floor and Sierra Nevada crest portions of the San Joaquin Region.

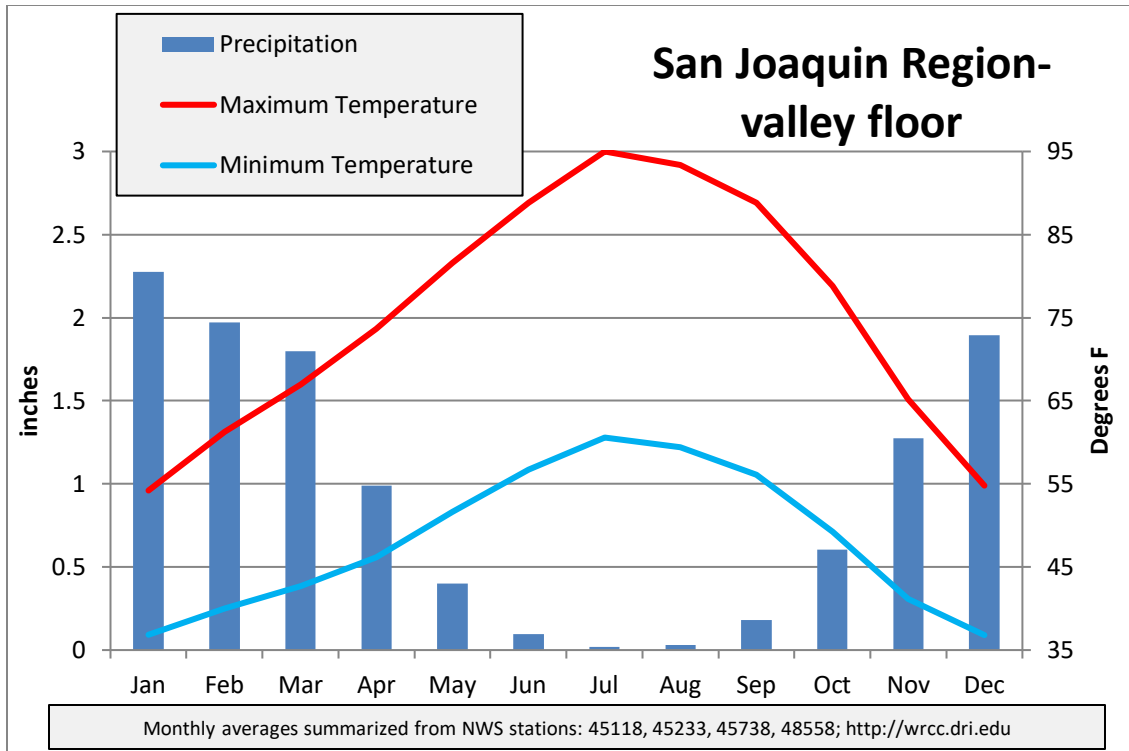


Chart A-13. Average annual patterns of temperature and precipitation, San Joaquin Region, valley floor.

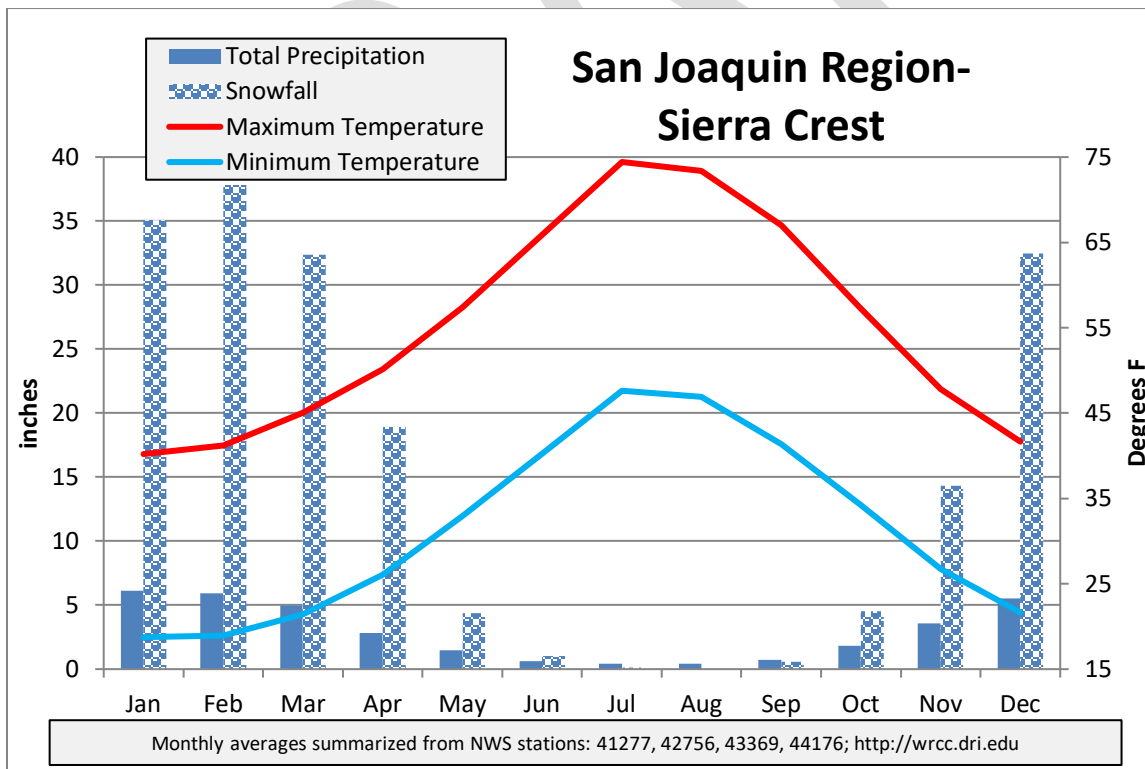


Chart A-14. Average annual patterns of temperature and precipitation, San Joaquin Region, Sierra Crest.

1.8.2 Hydrology

Stream reaches in the San Joaquin Region are generally classified under UC Davis' hydrologic classification system as Rain and Seasonal Groundwater (RSG), Low-Volume Snowmelt and Rain (LSR), and Snowmelt (SM) systems. The western and central portion of the region contains primarily RSG stream reaches. Mid-elevation areas in the Sierra Nevada mountains contain primarily LSR stream reaches. At high elevations in the Sierra Nevada mountains, many stream reaches are classified as SM systems.

Other streams in the San Joaquin Region are classified by Perennial Groundwater and Rain (PGR), Groundwater (GW), High-Volume Snowmelt and Rain (HSR), or the Flashy, Ephemeral Rain (FER) hydrologic classifications. For example, portions of the mainstem San Joaquin River and its major tributaries are classified as High-Volume Snowmelt and Rain (HSR) systems. The lower San Joaquin River is classified by a GW hydrologic regime. (Lane et al 2016)

Please refer to Figure A-46 for a depiction of the stream classifications within the San Joaquin Region.

1.8.3 Geology

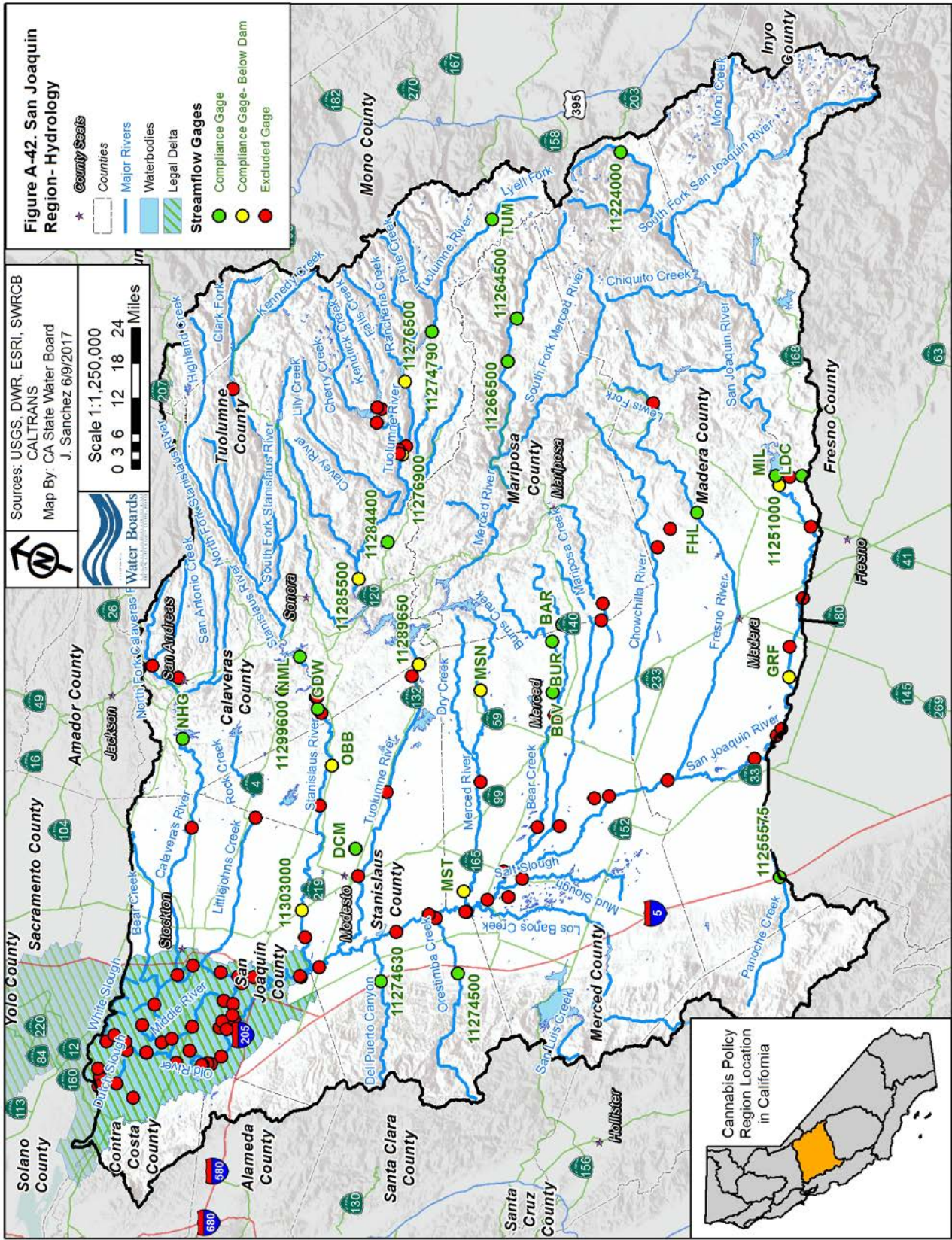
The San Joaquin Region is underlain by the Coast Ranges on the western margin of the region, the Great Valley geomorphic provinces in the center of the region, and the Sierra Nevada geomorphic province in the eastern half of the region. The Coast Ranges geomorphic province is comprised of sedimentary and metamorphic rock and alluvial deposits in valleys and along the coastline. The Great Valley geomorphic province, which consists of a large alluvial plain, underlays the Central Valley. The Sierra Nevada geomorphic province, located in the eastern portion of this region, contains steep mountains underlain by a granitic batholith. Metamorphic rocks comprise the foothill region of the Sierra Nevada geomorphic province. (CGS, 2002)

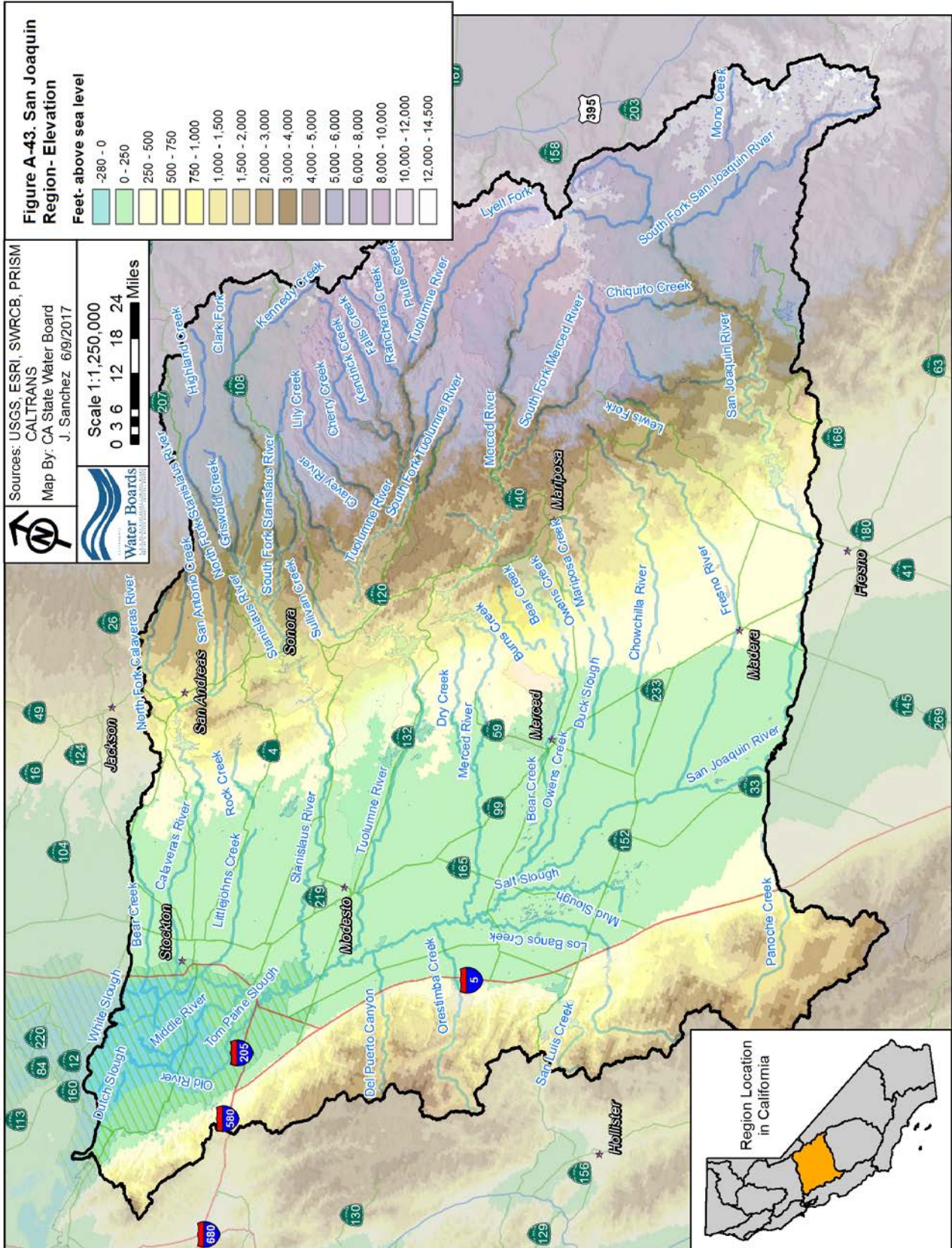
1.8.4 Anadromous Salmonid Population

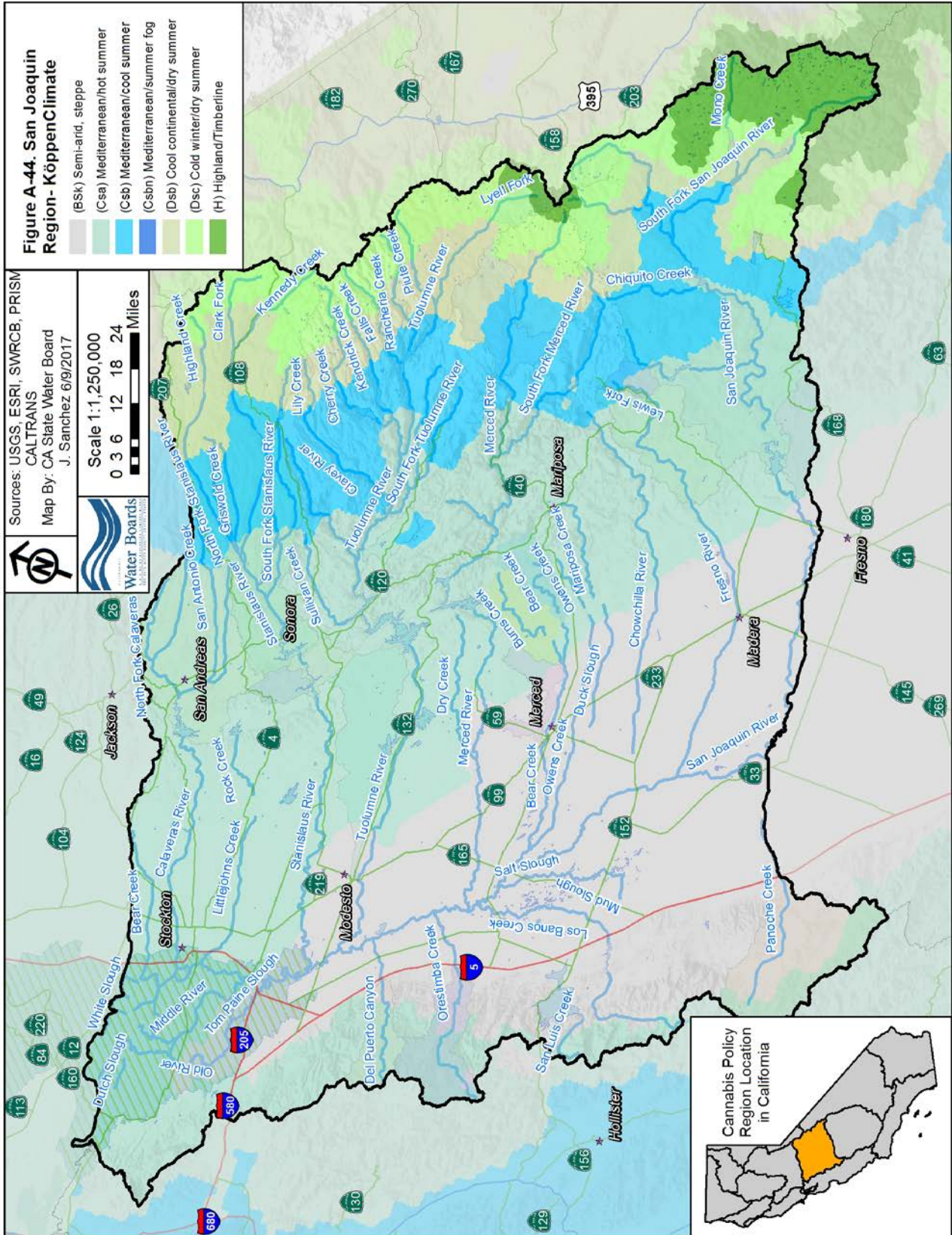
Three special-status ESUs, DPSes, or DTEs are currently extant within the San Joaquin Region (Figure A-47):

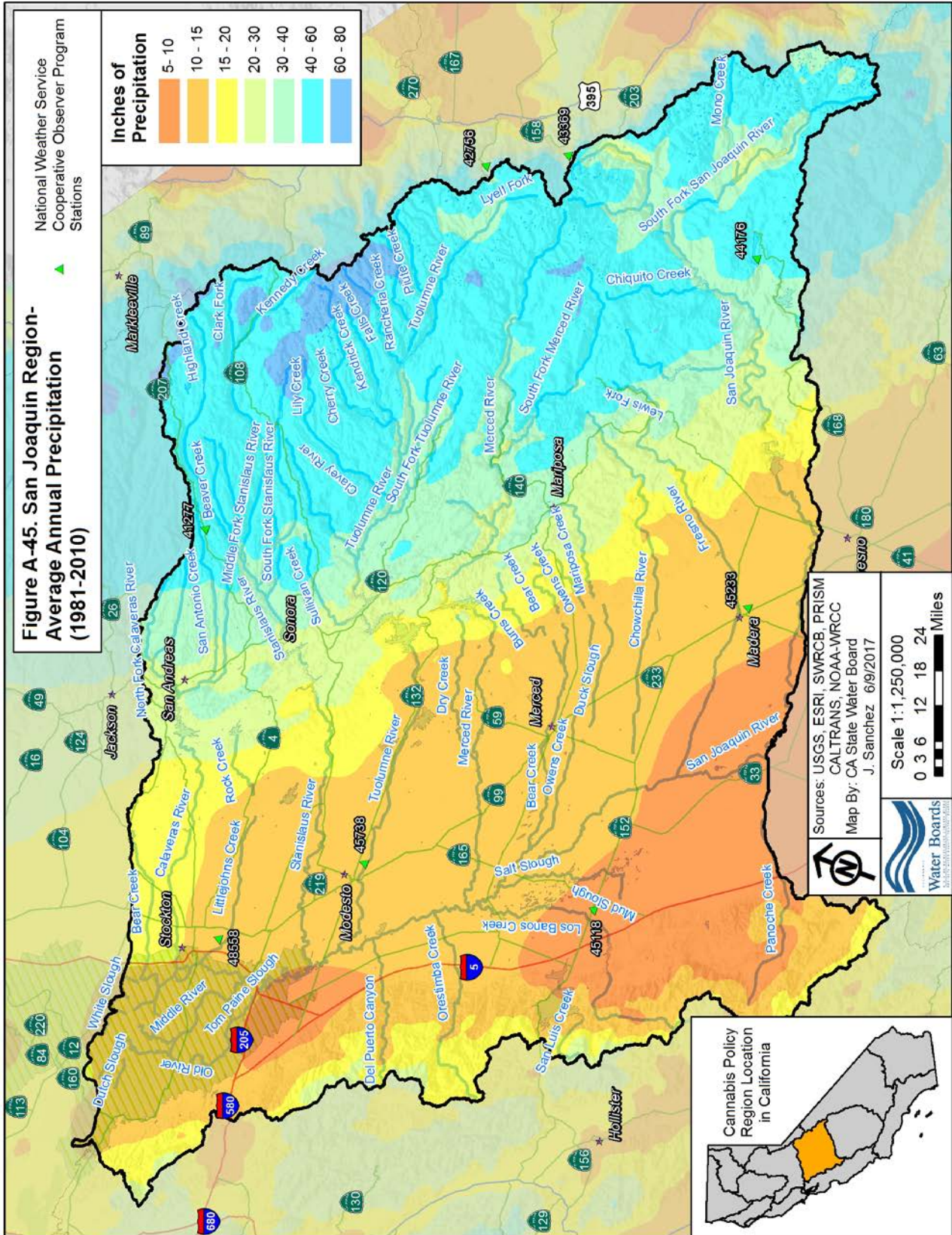
- the CV FR Chinook salmon DTE,
- the CV LFR Chinook salmon DTE, and
- the CCV steelhead DPS.

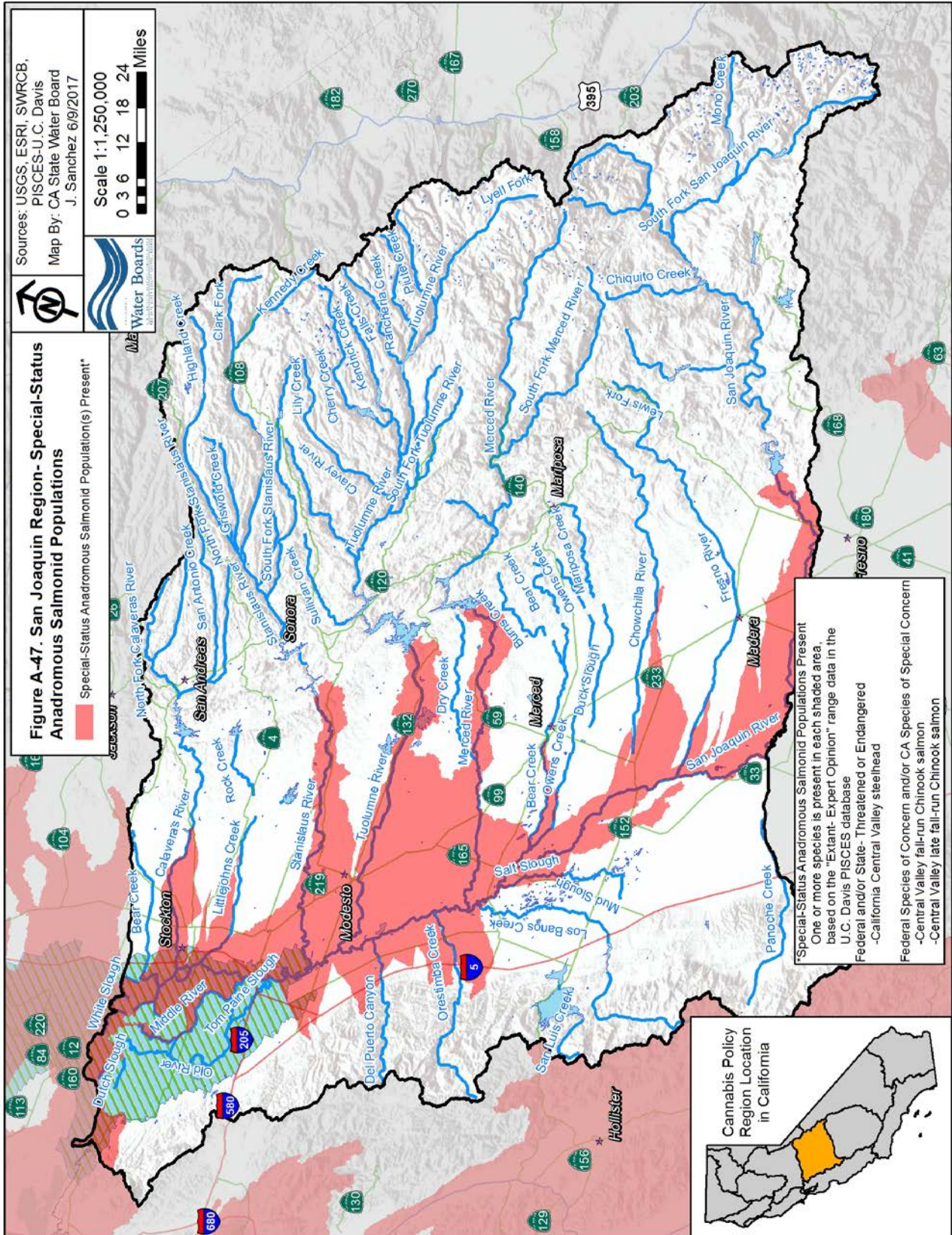
The CCV steelhead DPS is currently listed as threatened under the ESA (CDFW 2017b). The CV FR and CV LFR Chinook salmon populations are each listed as species of special concern by CDFW and, jointly, as a species of concern by NMFS (Moyle et al. 2015, NMFS 2017).











1.9 South Coast Region

The South Coast Region covers approximately 14,431 square miles along the southern coast of California, as shown in Figure A-48. Elevations in the South Coast Region range from sea level along the coast, to over 6,000 feet in the Los Padres and San Bernardino National Forests. Please refer to Figure A-49 for an elevation map of the region. Numerous watersheds of small and moderate size are located in the South Coast Region, including the Santa Maria River, Santa Ynez River, Ventura River, Santa Clara River, Los Angeles River, Santa Ana River, San Luis Rey River, and San Diego River. These coastal watersheds drain to the Pacific Ocean.

1.9.1 Climate and Precipitation

Much of the South Coast Region is described by Mediterranean and Steppe climates. The northern portion of the South Coast Region is generally characterized by a Mediterranean climate, with cool summers. Temperatures in the South Coast Region tend to be cooler near the coast, which is a result of the marine influence. Much of the central and southern portion of the South Coast Region is characterized by a Mediterranean climate with hot summers, or by a Semi-arid, steppe climate. Please refer to Figure A-50 for a climatic map of this region.

Temperature conditions and precipitation patterns in the South Coast Region tend to be mild. Average annual maximum temperatures in the South Coast Region tend to exceed 75 degrees Fahrenheit in inland areas, and coastal and high elevation areas tend to exhibit slightly cooler maximum temperatures. Average annual minimum temperatures in the South Central Coast Region tend to remain above 45 degrees Fahrenheit, although average annual minimum temperatures are cooler at the highest elevations. Average annual precipitation in the South Coast Region tends to range from 5 and 20 inches in most coastal and inland areas, but can exceed 40 inches at mountain peaks). Precipitation events tend to occur from November to April, with precipitation peaks in December and January. Nearly all precipitation in the South Coast Region falls as rain, and snow only contributes significant precipitation to the region in the vicinity of Big Bear Lake. (WRCC 2016)

Please refer to Figure A-51 for a precipitation map of the region. Please refer to Chart A-15, below, for an illustration of precipitation and temperature conditions in the South Coast Region.

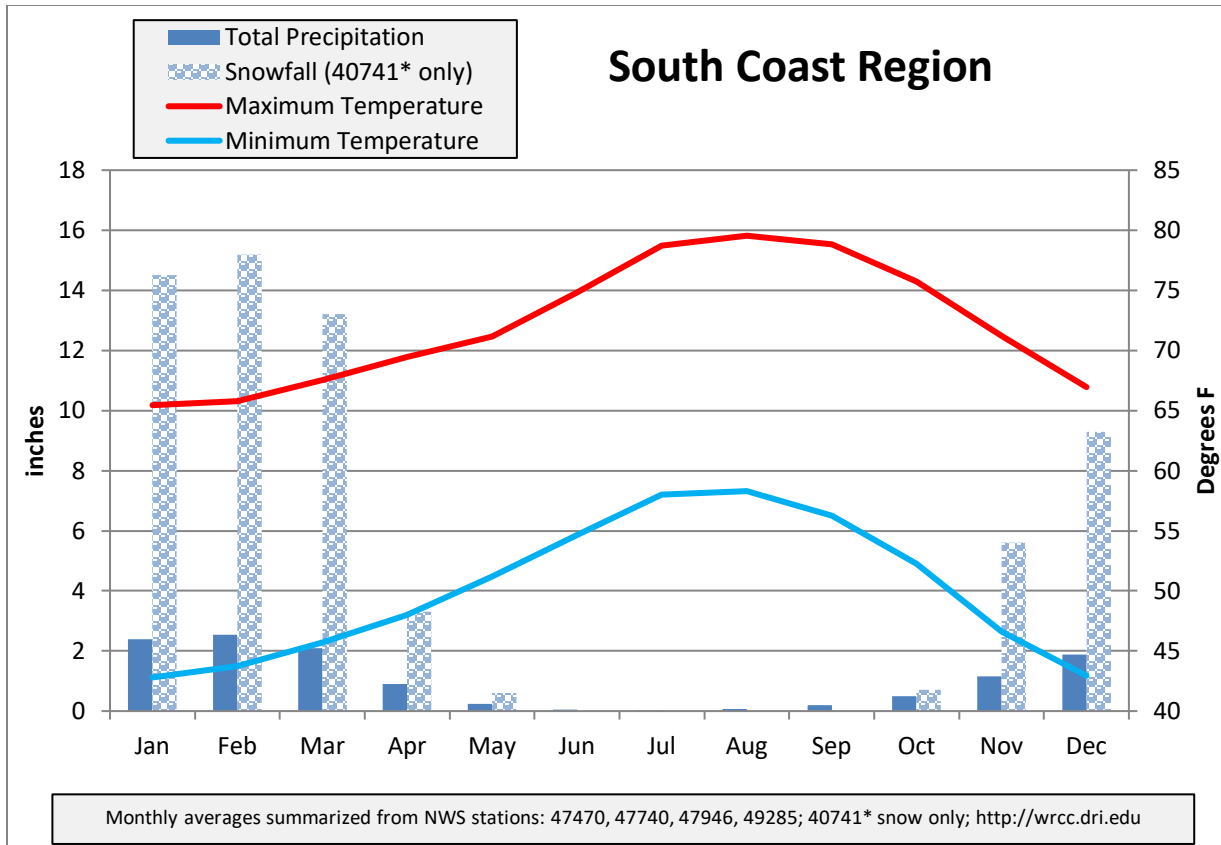


Chart A-15. Average annual patterns of temperature and precipitation in the South Coast Region.

1.9.2 Hydrology

Stream reaches in the South Coast Region are characterized by several classes described under UC Davis' hydrologic classification system. The majority of stream reaches located in the southern half of the South Coast Region are classified as Rain and Seasonal Groundwater (RSG) systems. Many streams located in the northern half of the South Coast Region and located along the eastern margin of the region are classified as Low-Volume Snowmelt and Rain (LSR) systems. The South Coast Region also contains several Perennial Groundwater and Rain (PGR), and Flashy, Ephemeral Rain (FER) stream systems. A small number of Winter Storm (WS) and Snowmelt (SM) stream reaches are also located in this region. (Lane et al 2016)

Please refer to Figure A-52 for a depiction of the stream classifications within the South Coast Region.

1.9.3 Geology

The South Coast Region is located in the Coast Ranges, Transverse Ranges, and Peninsular Ranges geomorphic provinces. The Coast Ranges, located in the northern portion of the region, are characterized by irregular, knobby, landslide topography, and contain sedimentary and metamorphic rock. The Transverse Ranges geomorphic province, located in the central portion of the region, contains steep mountain ranges and valleys oriented perpendicular to the other coastal mountain ranges. The Peninsular Ranges geomorphic province, located in the southern portion of the region, is characterized by topography similar to the Coast Ranges, but

with rock types more similar to the Sierra Nevada mountains. Alluvial deposits are found in valleys throughout the South Coast Region. (CGS, 2002)

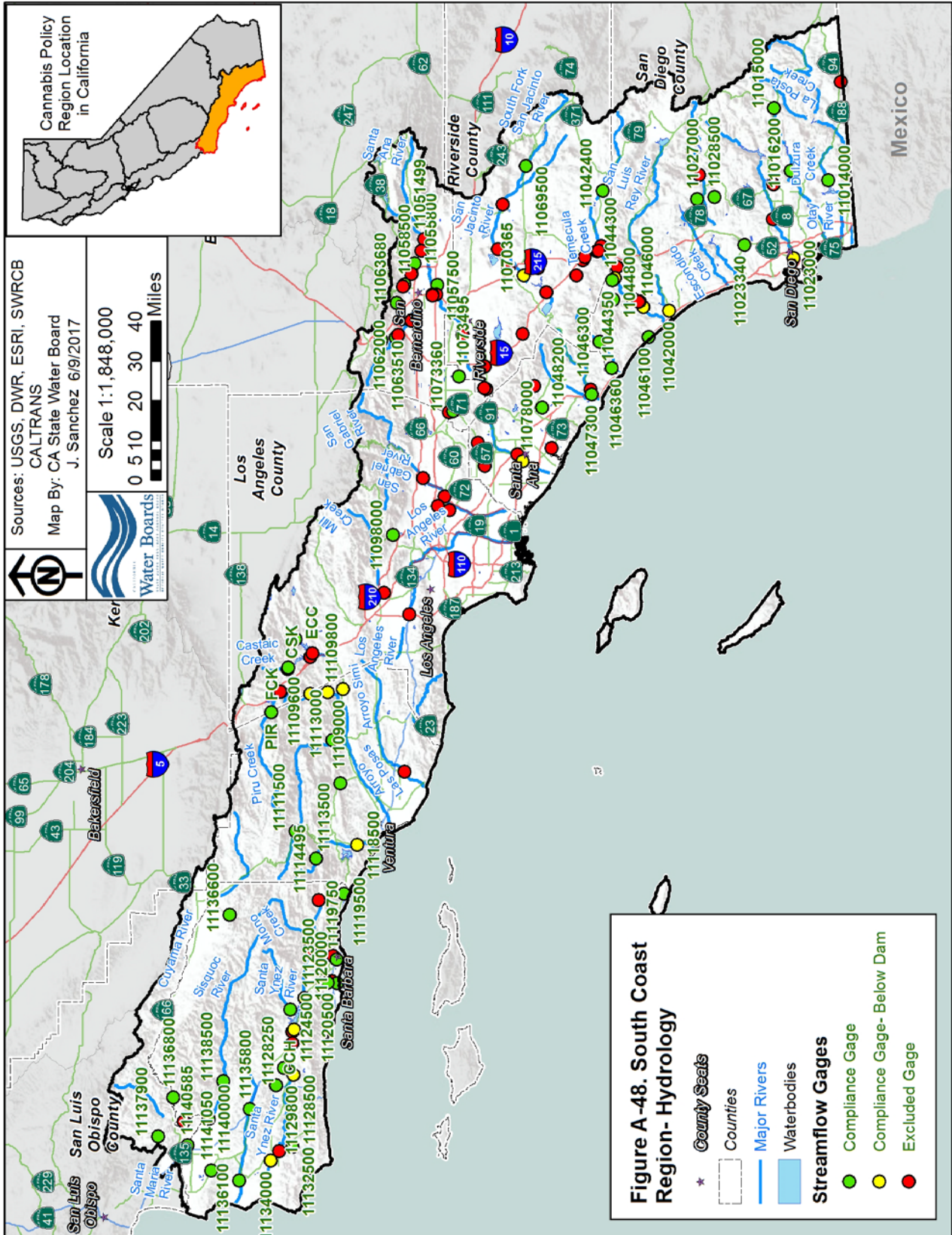
1.9.4 Anadromous Salmonid Population

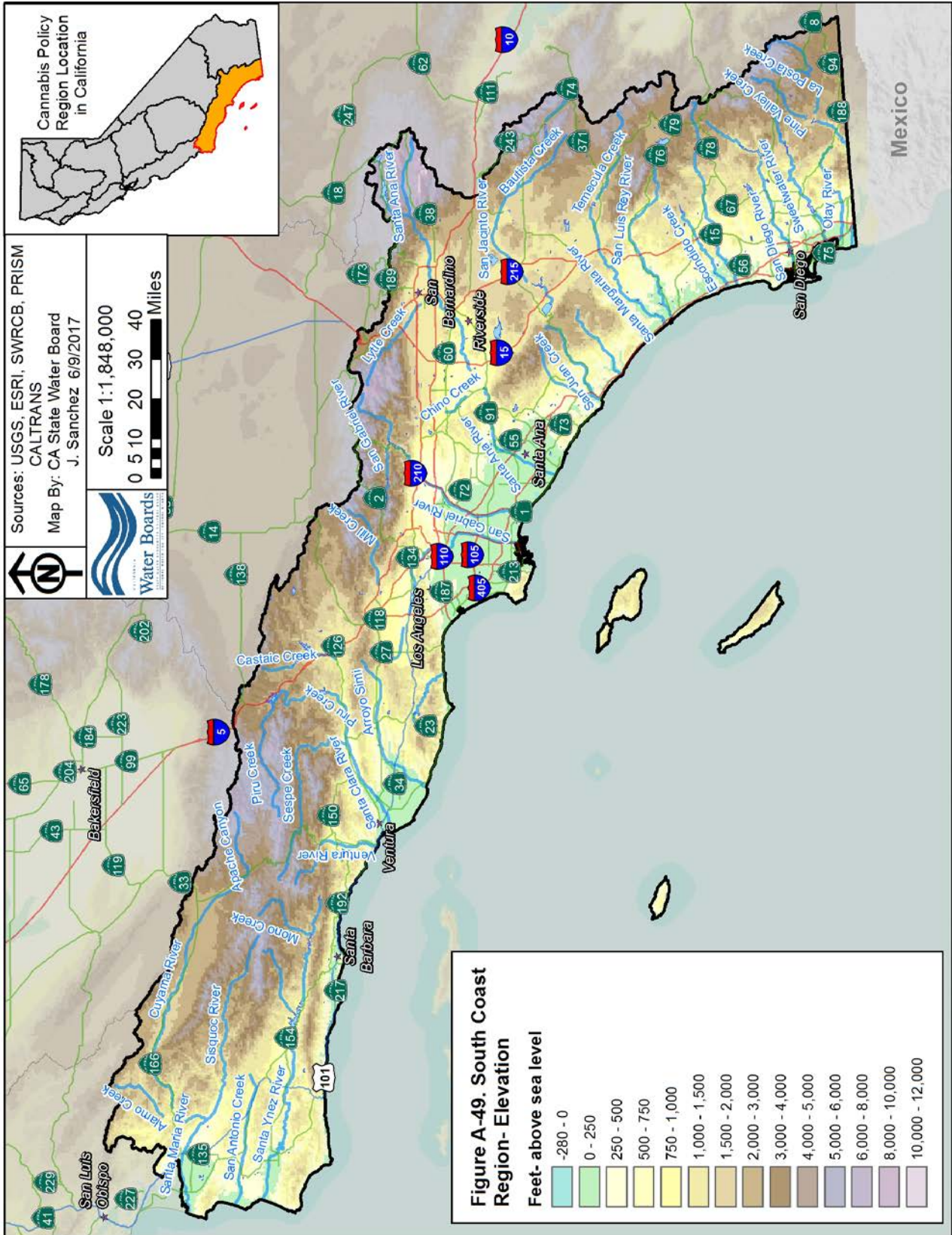
One special-status ESU, DPS, or DTE is currently extant within the South Coast Region (Figure A-53):

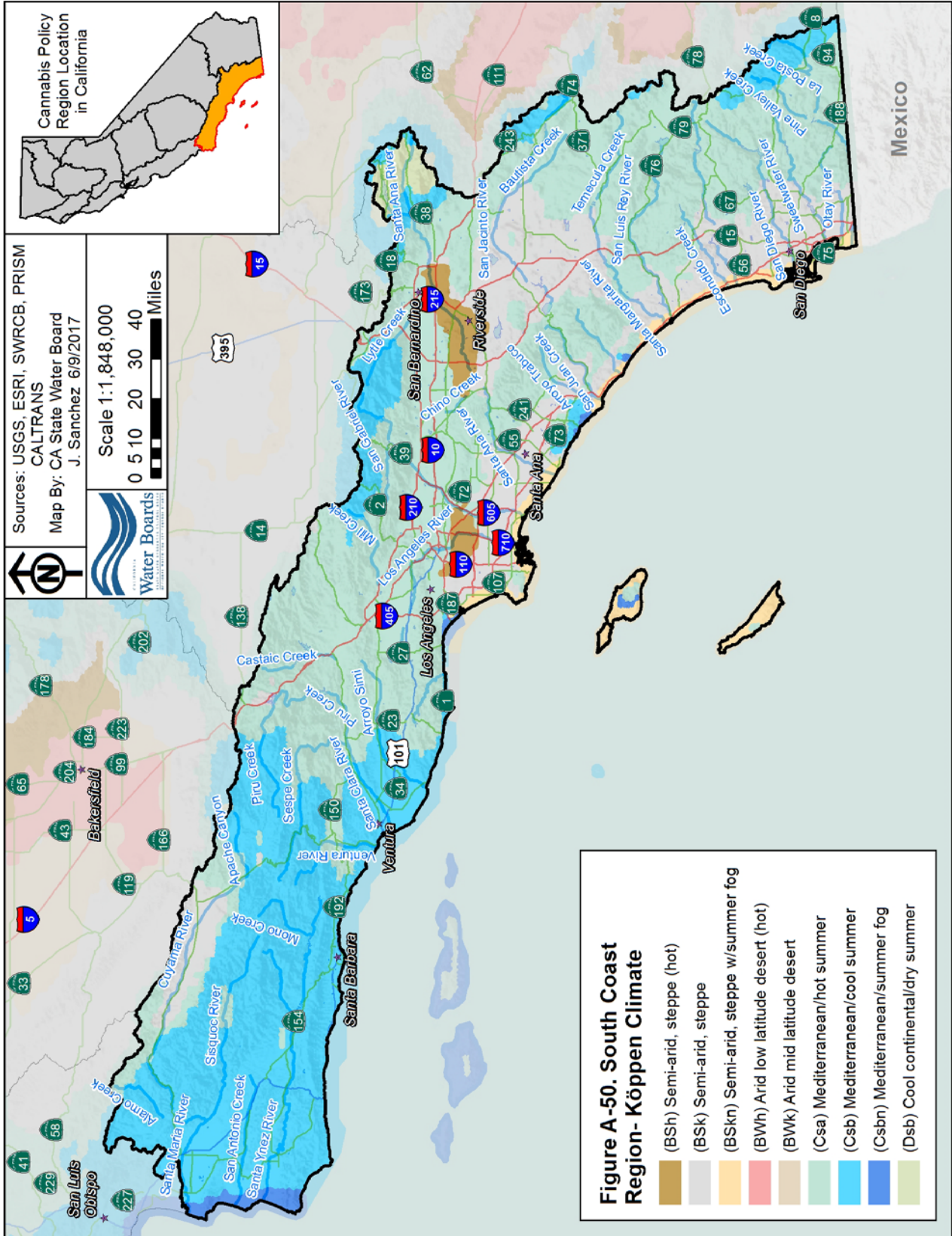
- the Southern California Coast (SCC) steelhead DPS.

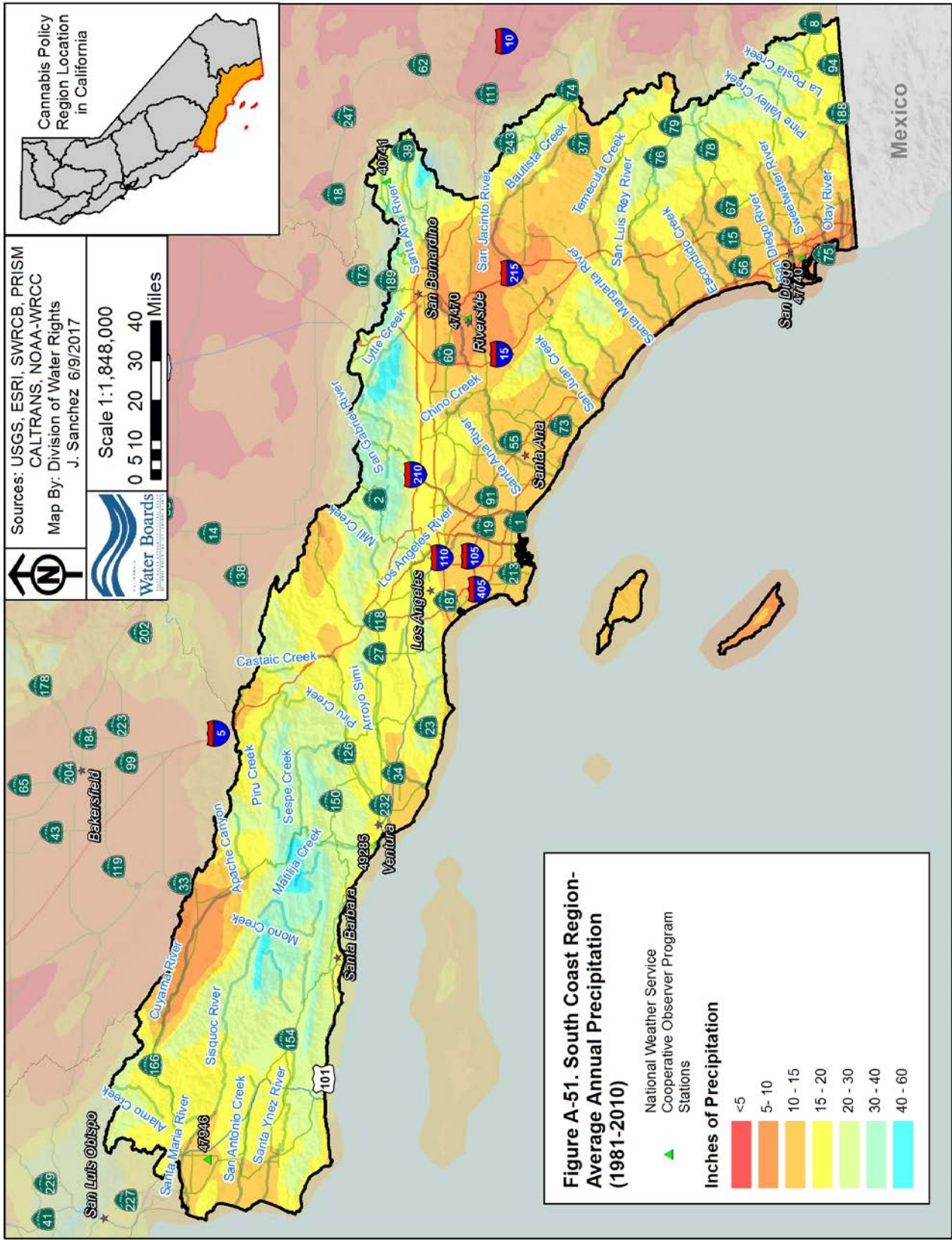
The SCC steelhead DPS is currently listed as endangered under the ESA (CDFW 2017b).

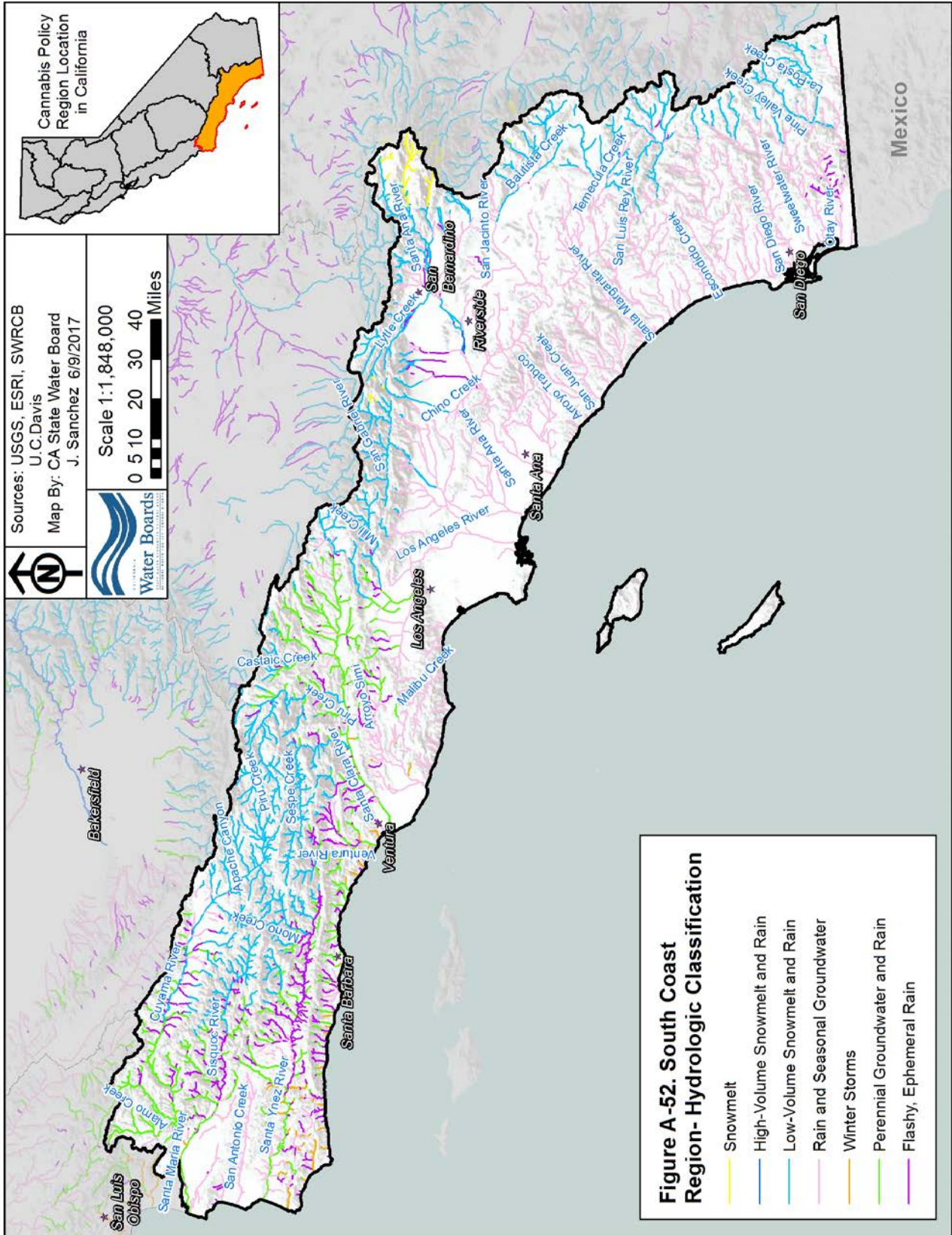
DRAFT

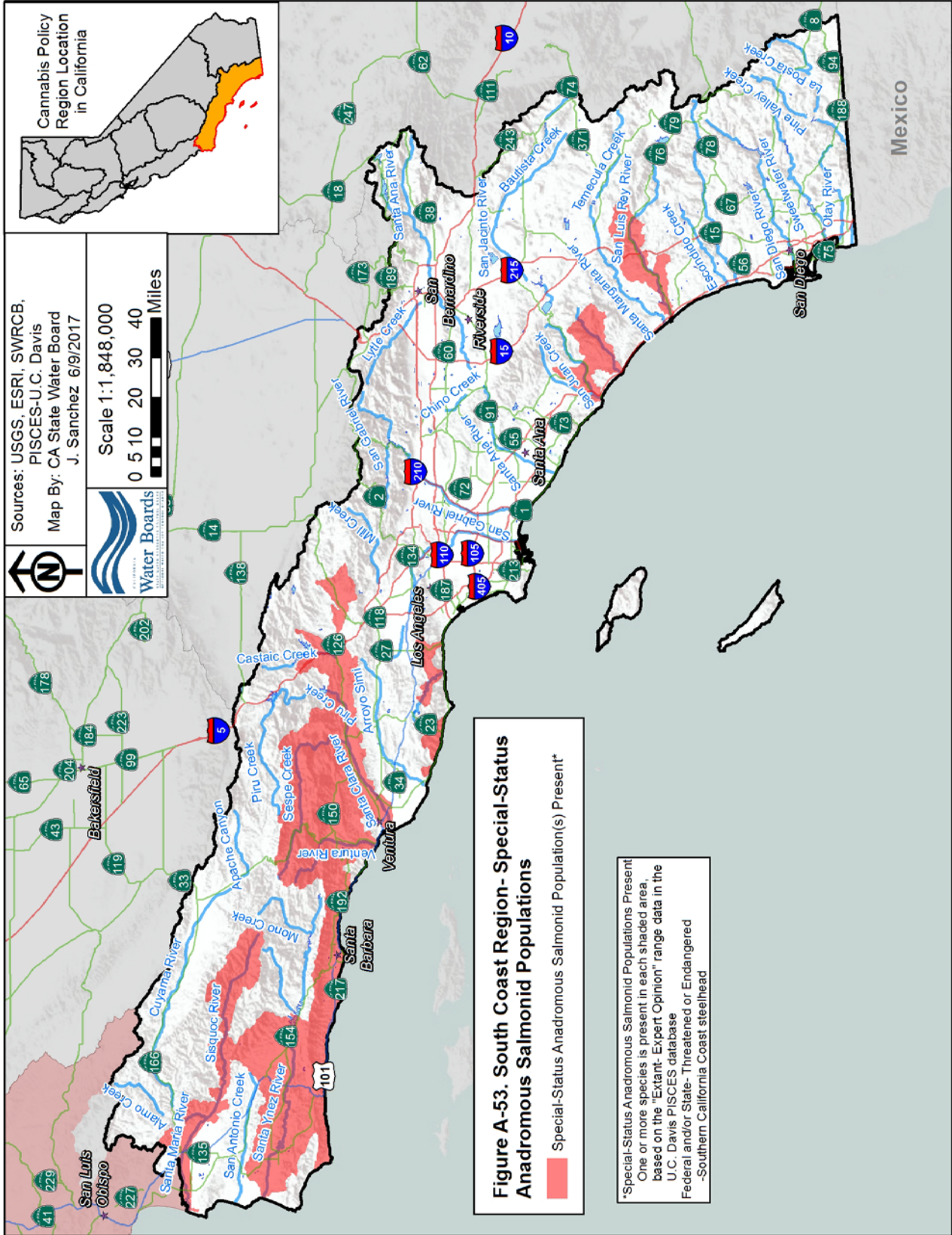












1.10 North East Desert Region

The North East Desert Region covers approximately 3,951 square miles in the northeastern corner of California (Figure A-54). Elevations in this region range from approximately 3,000 feet above sea level to over 8,700 feet above sea level at Hat Mountain. Please refer to Figure A-55 for an elevation map of the region. The region includes the watersheds of the Susan River, Pine Creek, Willow Creek, Red Rock Creek, Long Valley Creek, Bidwell Creek, Bare Creek, and Dry Valley Creek.

1.10.1 Climate and Precipitation

The climate of the North East Desert Region is generally characterized by a cool continental climate with dry summers, and with areas of Semi-arid, steppe climate. Please refer to Figure A-56 for a climatic map of the North East Desert Region.

Temperatures patterns within the North East Desert Region have very little variation. Most of the region exhibits average annual maximum temperatures of 65 degrees Fahrenheit and average annual minimum temperatures of 32 degrees Fahrenheit. Some of the southern portions of the region exhibit slightly higher average annual minimum temperatures of 40 degrees Fahrenheit.

Most of the North East Desert Region receives between 5 to 20 inches of precipitation annually. However, there are a few areas in the most western parts of the region that receive between 40 to 60 inches annually. The amount of precipitation tends to decrease at higher elevations.

Please refer to Figure A-57 for a precipitation map of the region. Please refer to Chart A-16, below, for an illustration of precipitation and temperature conditions in the North East Desert Region.

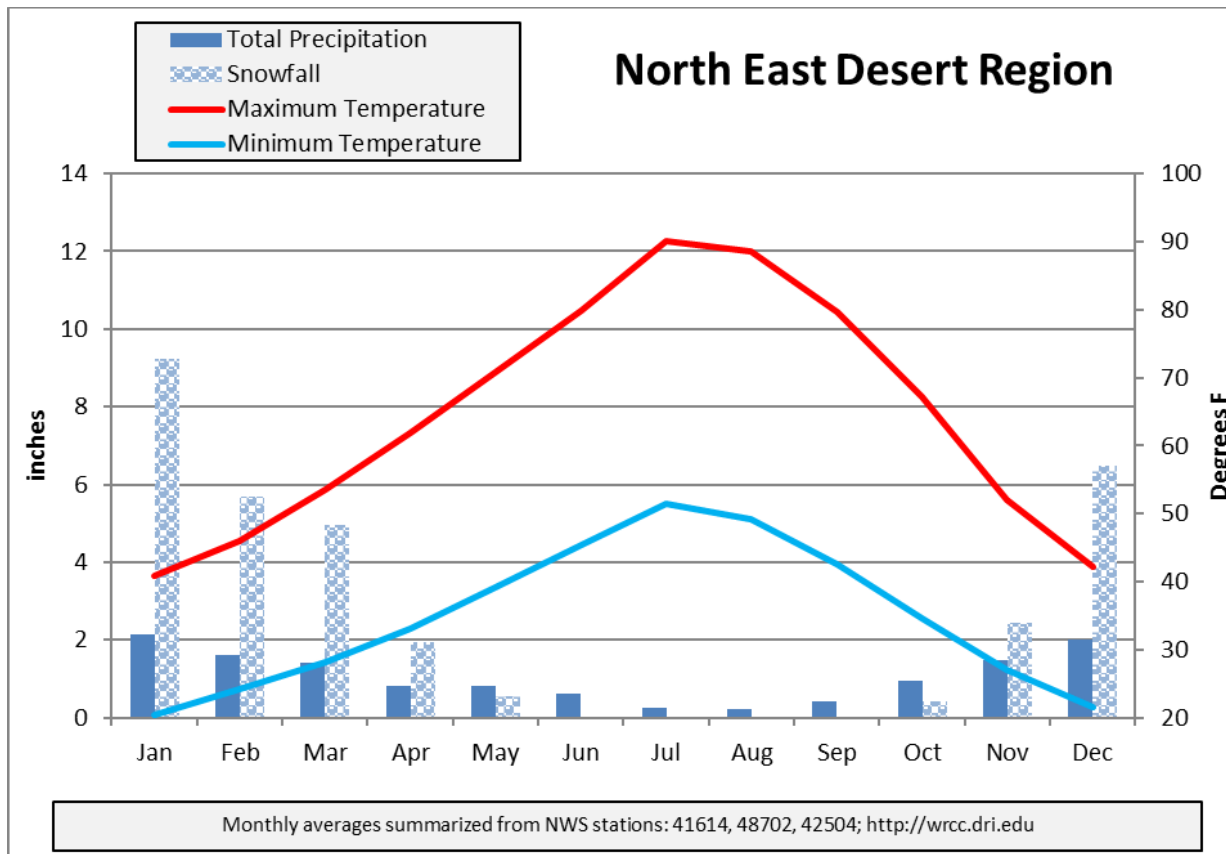


Chart A-16. Average annual patterns of temperature and precipitation in the North East Desert Region.

1.10.2 Hydrology

The hydrology of North East Desert Region streams is dominated by High Elevation and Low Precipitation (HELP) systems. There are a smaller number of streams classified as Flashy, Ephemeral Rain (FER), Perennial Groundwater and Rain (PGR), Snowmelt (SM), and Low-Volume Snowmelt and Rain (LSR) systems. (Lane et al 2016)

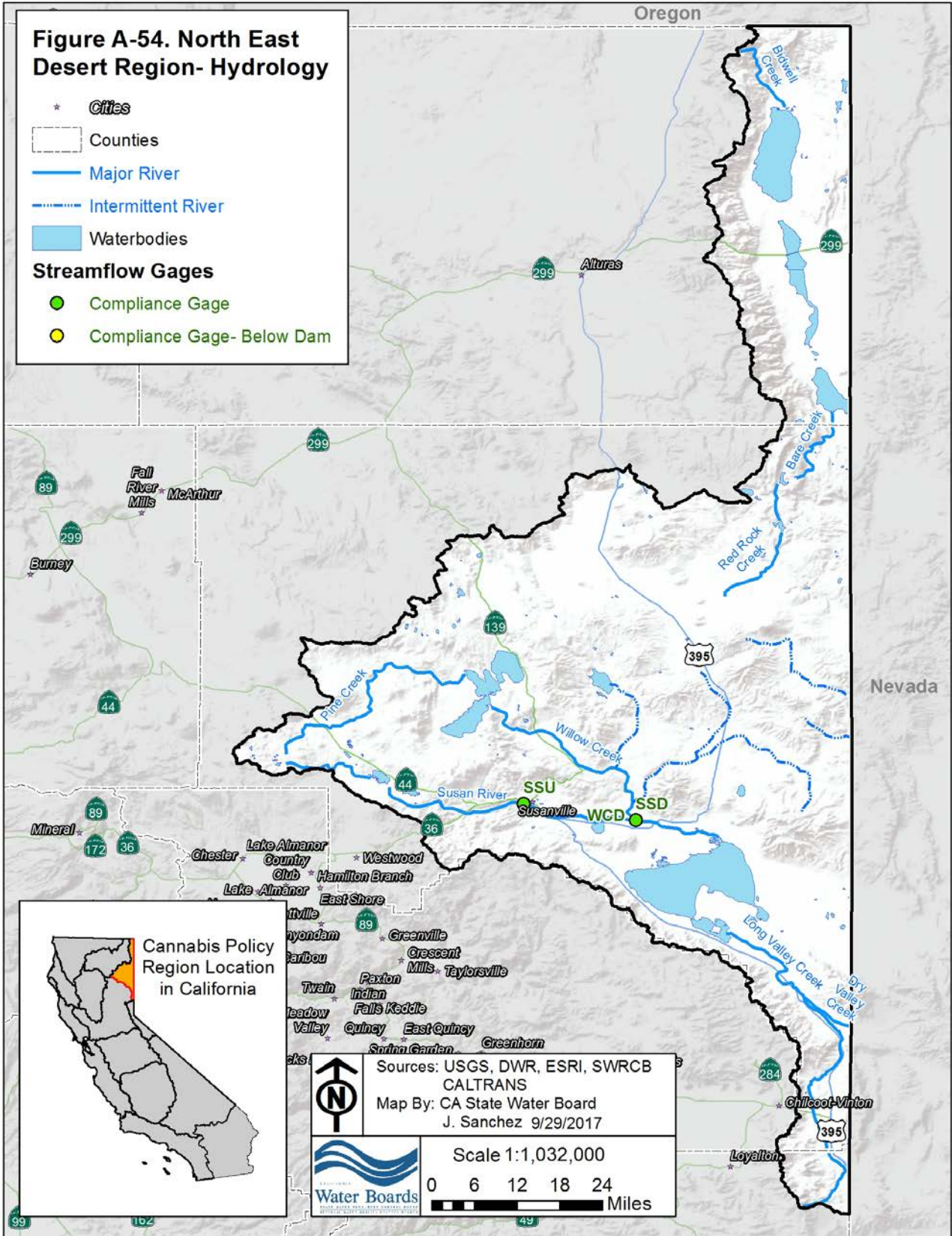
Please refer to Figure A-58 for a depiction of the stream classifications within the South Coast Region.

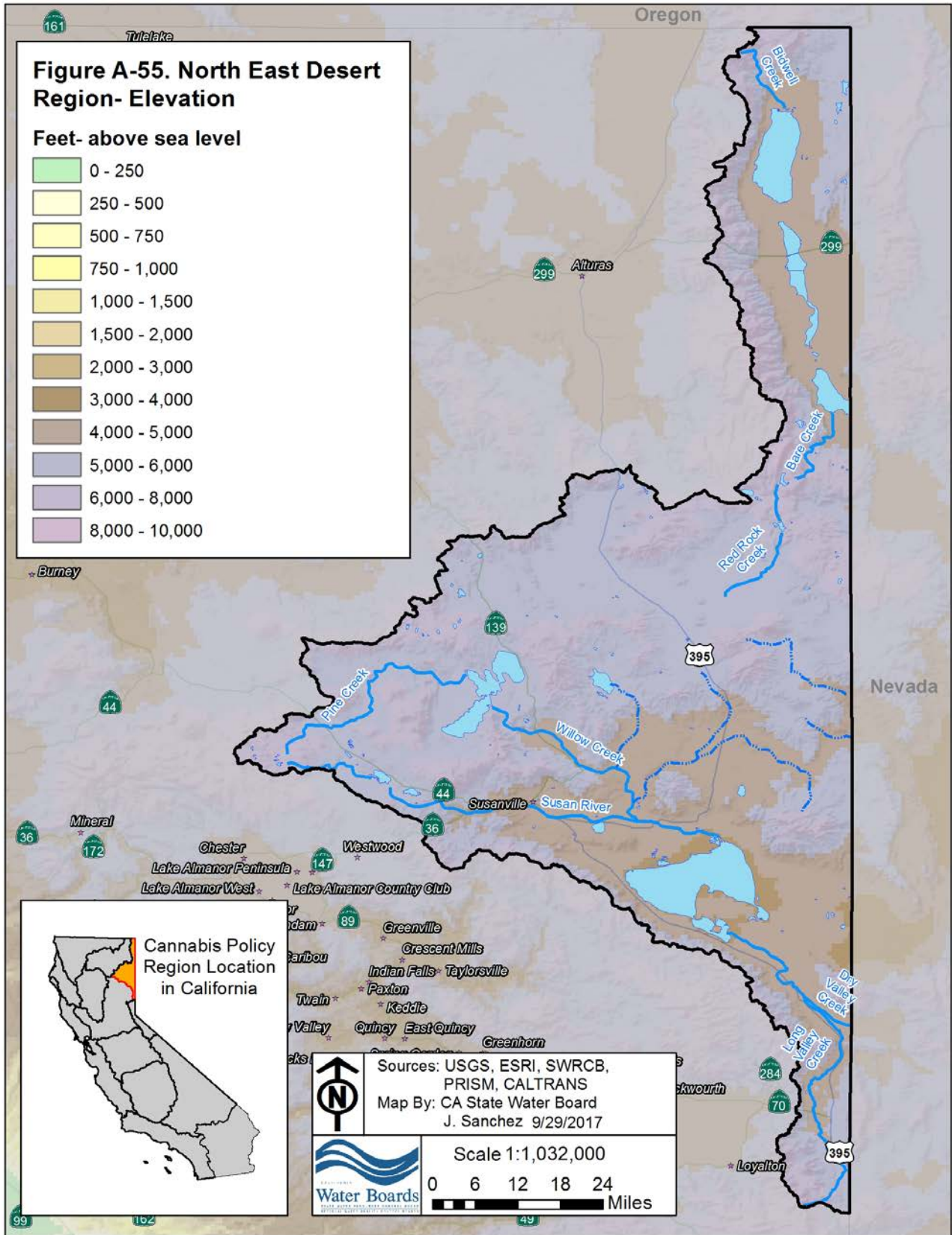
1.10.3 Geology

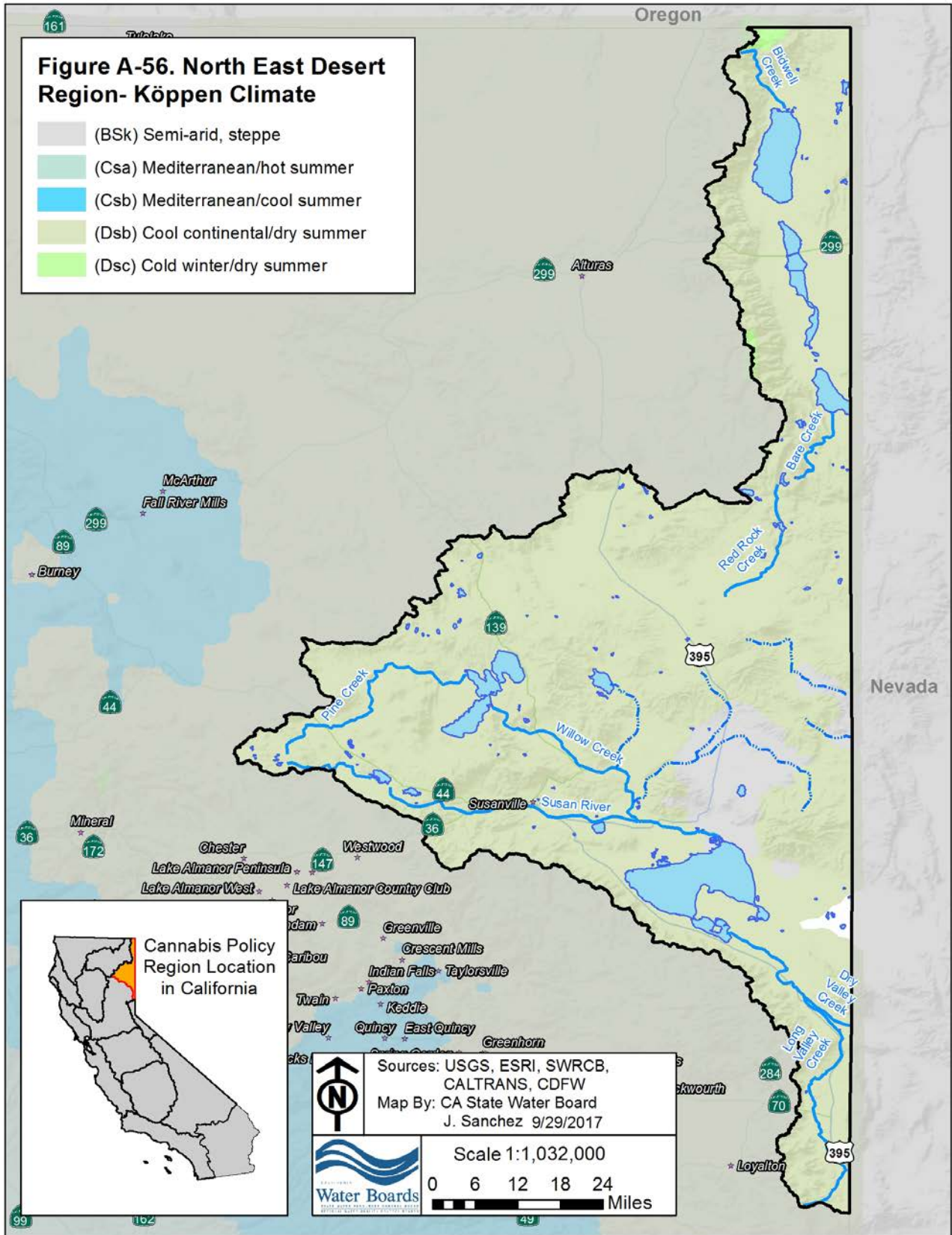
The North East Desert Region is located in the Basin and Range, Cascade Range, and Modoc Plateau geomorphic provinces. The Cascade Range is a rugged mountain range, and the Modoc Plateau is an elevated volcanic plateau located in the northeastern corner of California. The Cascade Range is generally underlain by igneous rock, including lava flows, pyroclastic flows, and alluvium eroded from volcanic features. The Modoc Plateau is a volcanic table land consisting of lava flows, tuff beds and small volcanic cones. Significant subterranean streamflows occur through porous volcanic features in the Modoc Plateau (CGS 2002).

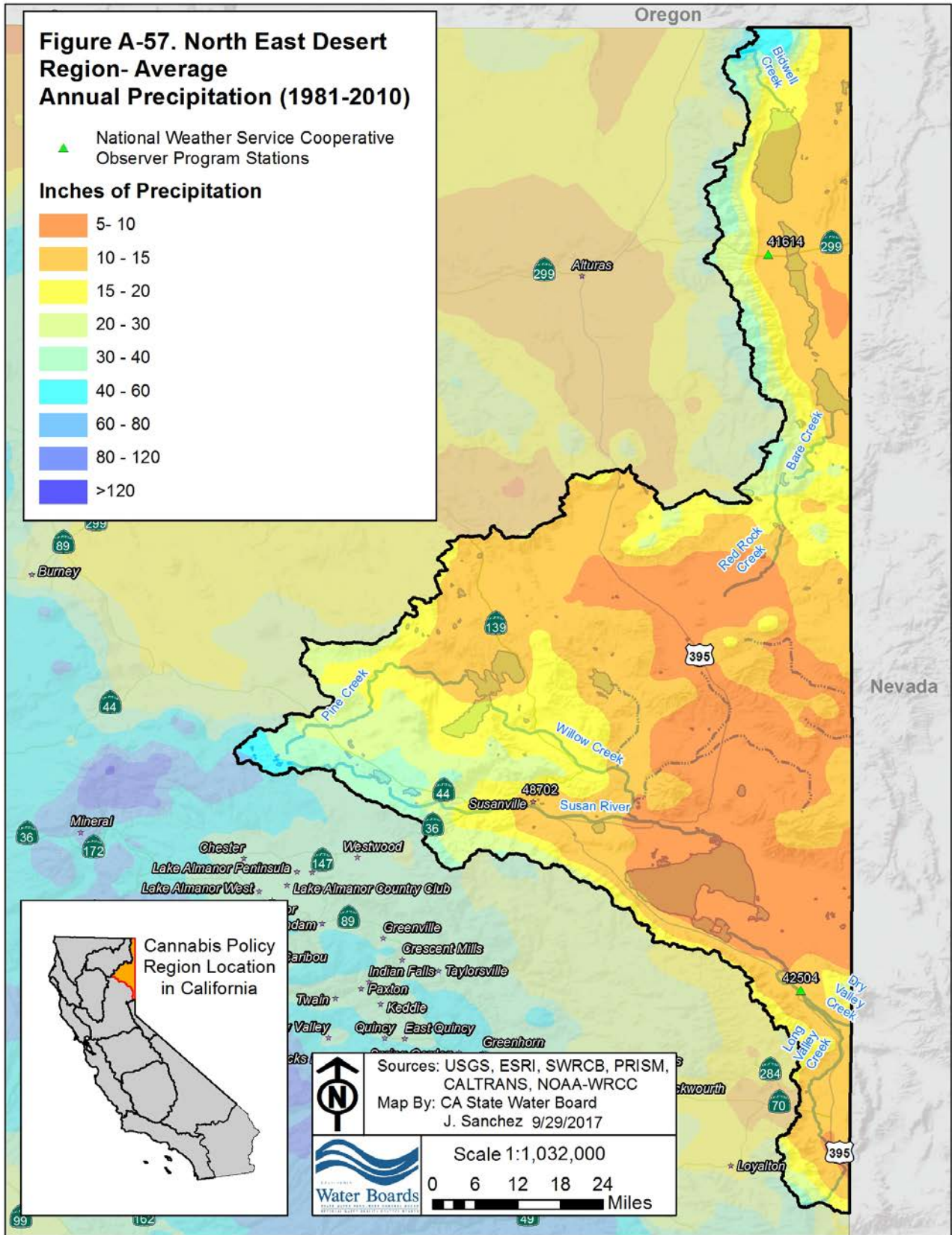
1.10.4 Anadromous Salmonid Population

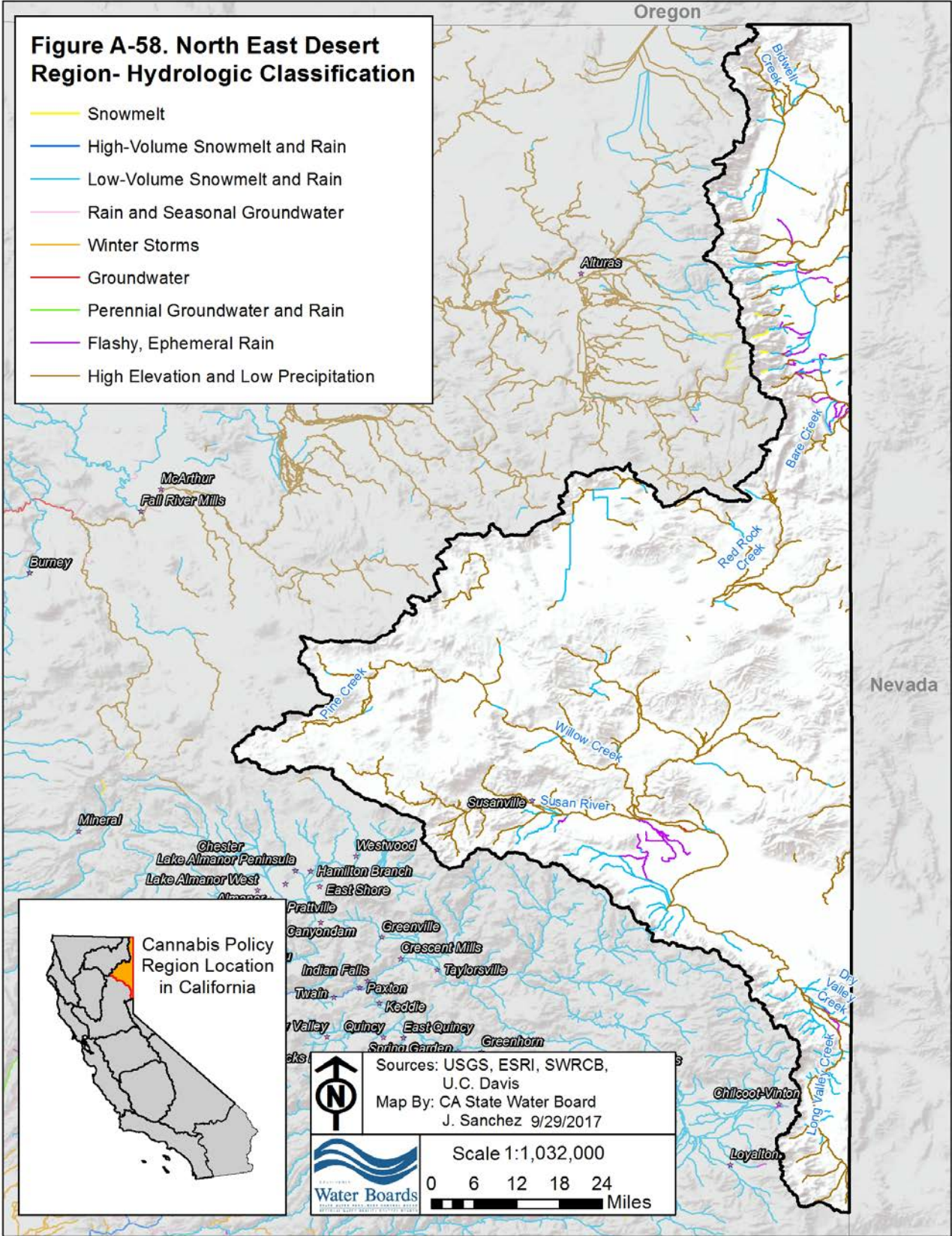
No anadromous salmonids are present in the North East Desert Region.











1.11 Tahoe Region

The Tahoe Region covers approximately 2,169 square miles along the eastern boarder of California (Figure A-59). Elevations in this region range from approximately 5,000 to 12,000 feet above sea level. Please refer to Figure A-60 for an elevation map of the region. The region includes the watersheds of the Truckee River, Little Truckee River, Carson River, Walker River, Virginia Creek, Markleeville Creek, Pleasant Valley Creek, and Trout Creek.

1.11.1 Climate and Precipitation

The climate of the Tahoe Region is generally characterized by a cool continental with dry summer climate, with pockets of cold winter with dry summer climate at higher elevations. Please refer to Figure A-61 for a climatic map of the Tahoe Region.

Temperatures patterns within the Tahoe Region have very little variation. Most of the region exhibit average annual maximum temperatures of 65 degrees Fahrenheit and average annual minimum temperatures of 15 degrees Fahrenheit. Some of the higher elevations have cooler annual maximum temperatures around 50 degrees Fahrenheit.

Precipitation patterns vary within the Tahoe Region, with the western side of the Tahoe Region near the Sierra Nevada mountains crest receiving a much larger amount of precipitation annually compared to the eastern side of the region. The western side of the Tahoe Region receives between 60-80 inches of precipitation annually. The amount of precipitation received annually decreases as you move to the east and to the south, with the lowest amounts occurring in the West Walker River and East Walker River watersheds. These two areas receive between 5 and 10 inches of precipitation annually.

Please refer to Figure A-62 for a precipitation map of the region. . Please refer to Charts A-17 and A-18, below, for a comparison of precipitation and temperature conditions for the Nevada Desert area and Sierra Mountains portions of the Tahoe Region

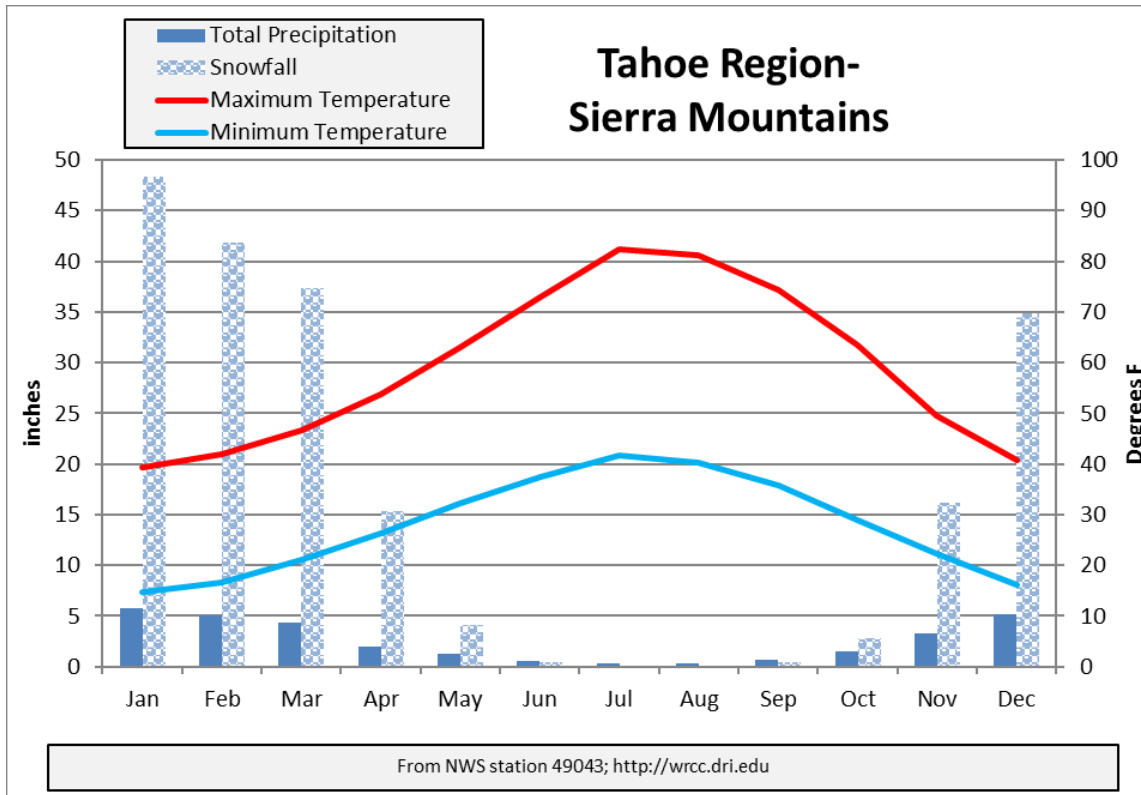


Chart A-17. Average annual patterns of temperature and precipitation, Tahoe Region, Sierra Mountains

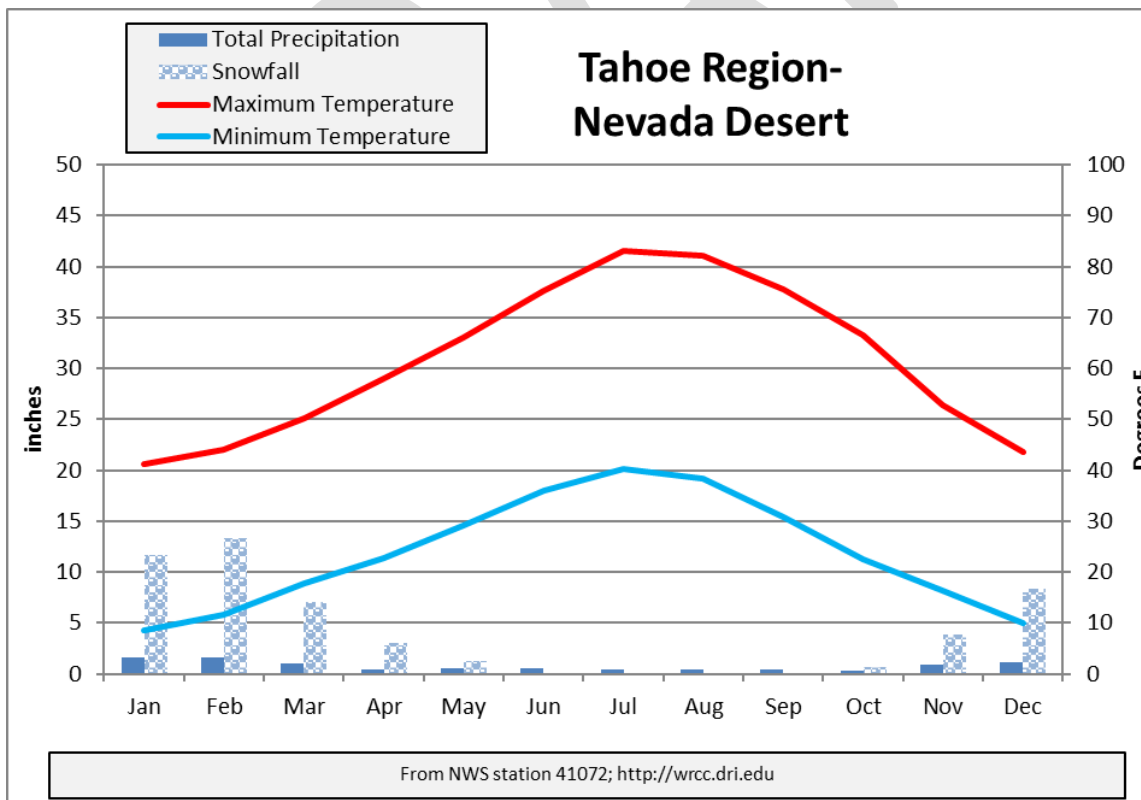


Chart A-18. Average annual patterns of temperature and precipitation, Tahoe Region, Nevada Desert.

1.1.2 Hydrology

The hydrology of Tahoe Region is dependent upon elevation, with higher elevation areas containing streams classified as Snowmelt (SM) systems and lower elevation areas containing Low-Volume Snowmelt and Rain (LSR) streams. (Lane et al 2016)

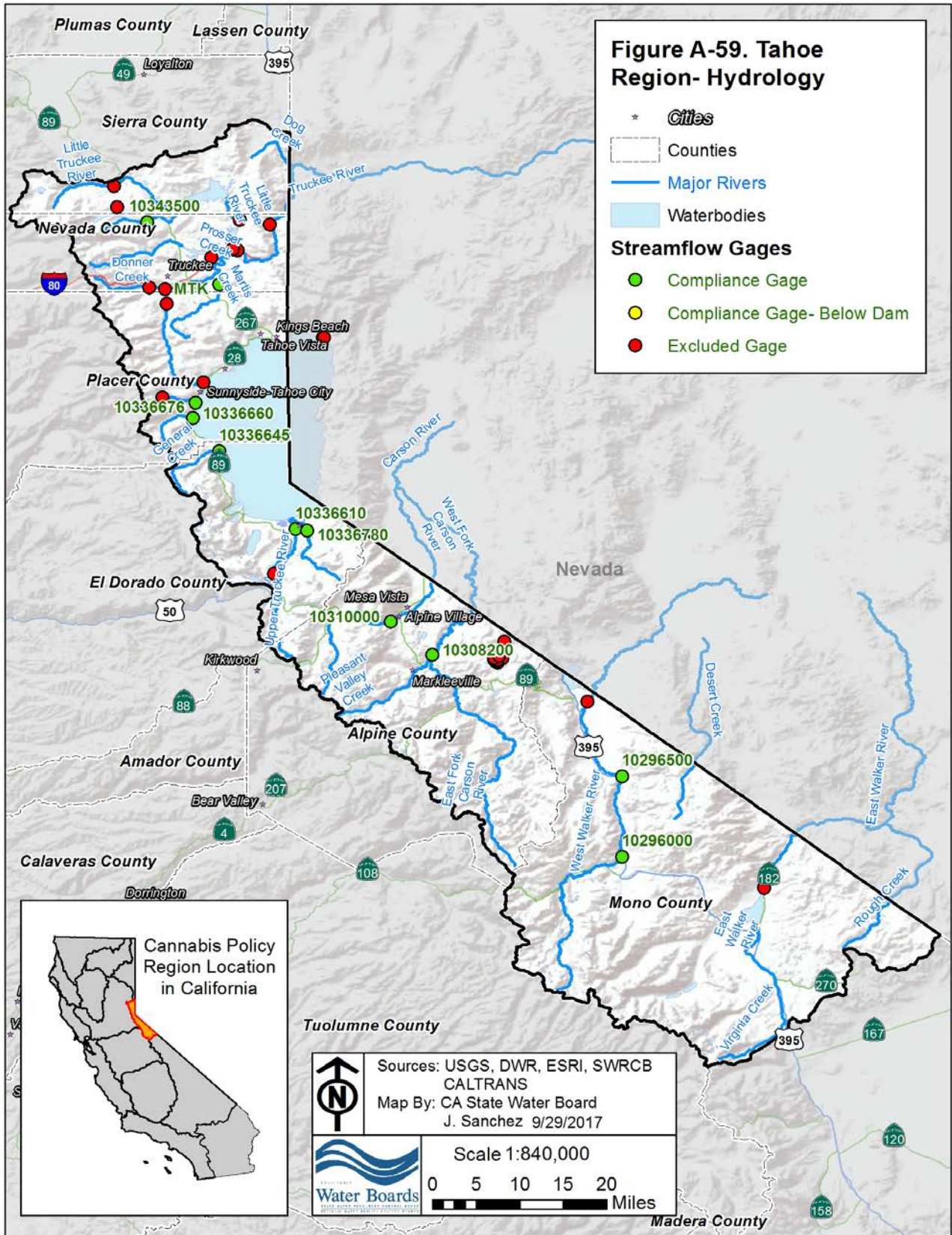
1.1.3 Geology

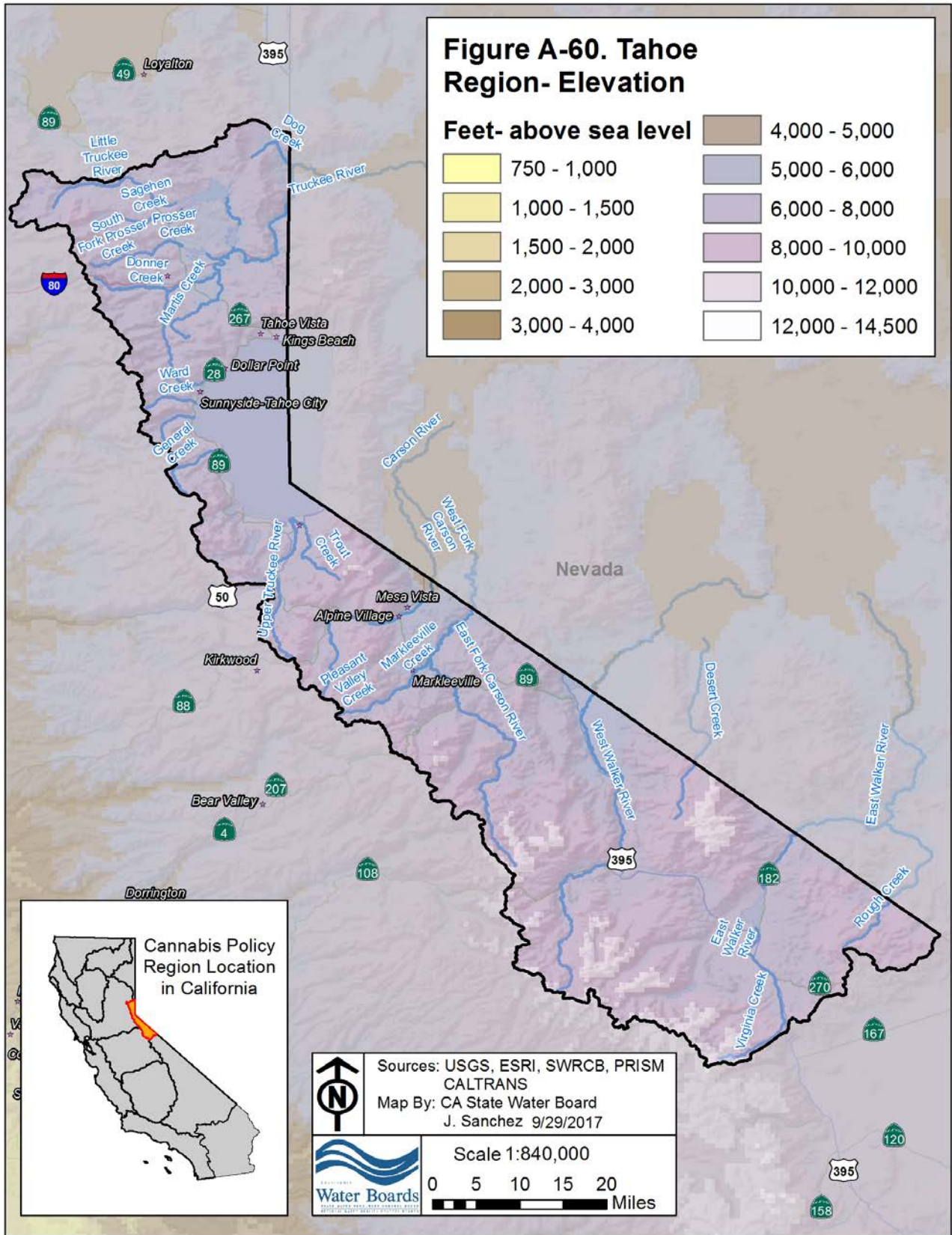
The Tahoe Region is predominantly located in the Sierra Nevada Range geomorphic province with the south west corner located in the Basin and Range province. The Sierra Nevada geomorphic province contains steep mountains underlain by a granitic batholith. The foothill regions of the Sierra Nevada geomorphic province are comprised of metamorphic rocks.

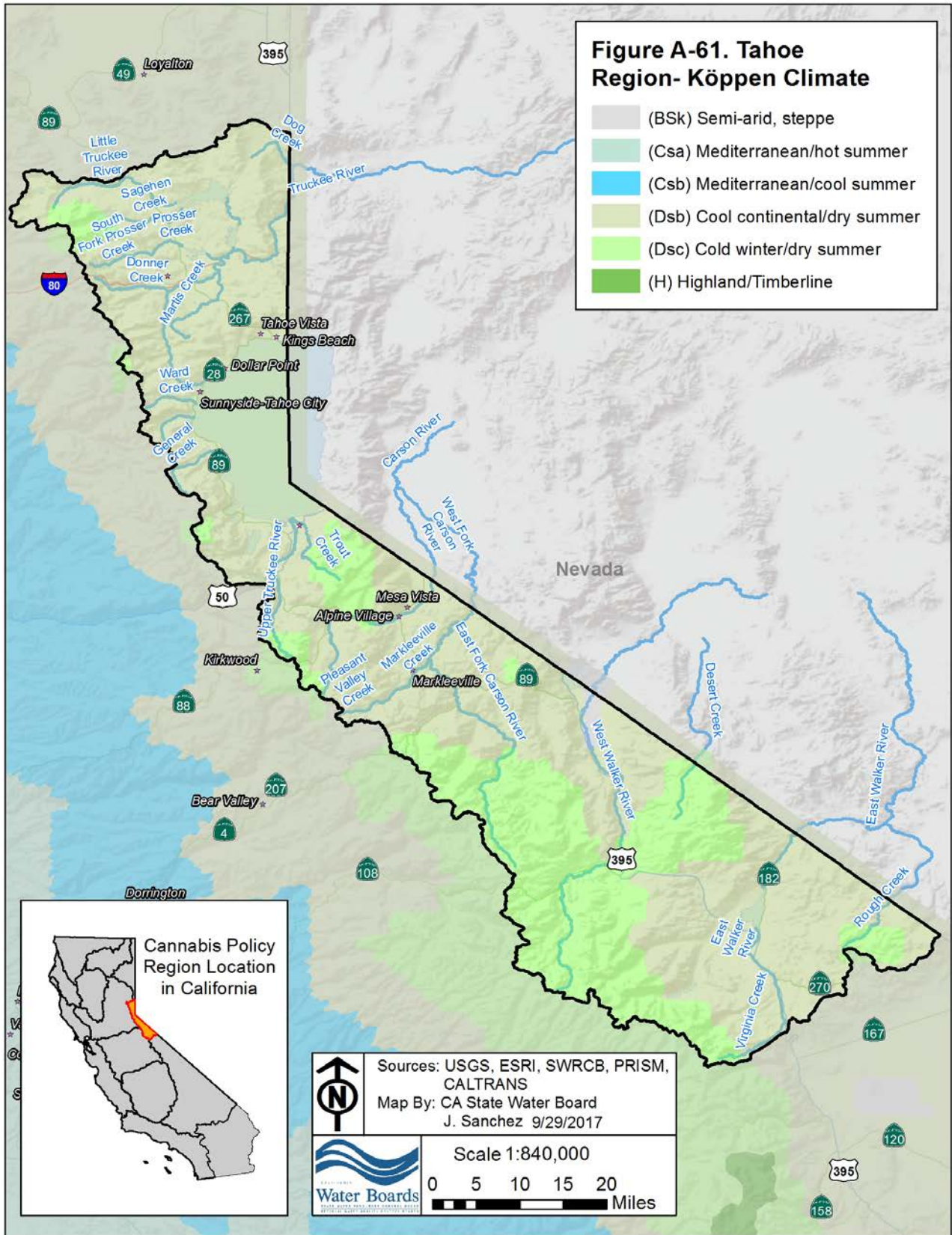
1.1.4 Anadromous Salmonid Population

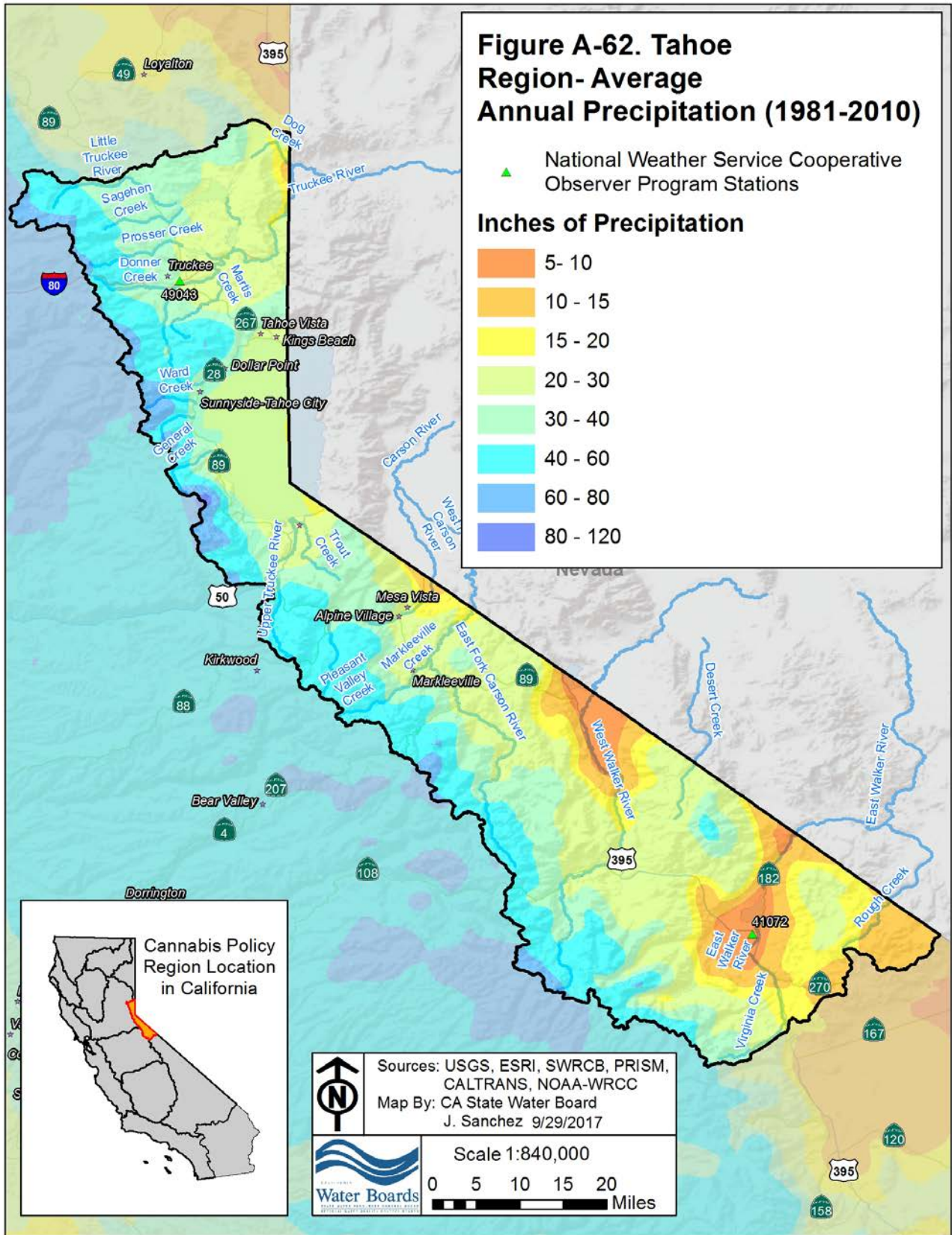
No anadromous salmonids are present in the Tahoe Region.

DRAFT









1.12 Mono Region

The Mono Region covers approximately 26,673 square miles along the eastern boarder of California (Figure A-63). Elevations in the Mono Region range from 282 feet below sea level at Badwater Basin to over 14,000 feet above sea level at White Mountain Peak. Please refer to Figure A-64 for an elevation map of the region. The region includes the watersheds of Owens River, Bishop Creek, Mill Creek, Rush Creek, Big Pine Creek, and Cottonwood Creek.

1.12.1 Climate and Precipitation

The climate of the Mono Region varies greatly depending upon elevation. The lower elevations are predominately arid low latitude desert and arid mid latitude desert climates. The climate transitions between Semi-arid, steppe; Cold winter with dry summer; and Highland/Timberline as the elevation increases. Please refer to Figure A-65 for a climatic map of the Mono Region.

Temperatures patterns within the Mono Region greatly vary depending upon elevation and location. The southern part of the Mono Region is much warmer with average annual maximum between 75 and 85 degrees Fahrenheit and the average annual minimum temperature between 50 and 60 degrees Fahrenheit. The lowest elevations are the warmest with average annual maximum temperatures reaching 90 degrees Fahrenheit and average annual minimum temperatures between 65 and 72 degrees Fahrenheit. The higher elevations to the north have much cooler temperature patterns with average annual minimum temperatures between 25 and 32 degrees Fahrenheit and average annual maximum temperatures between 40 and 45 degrees Fahrenheit.

Precipitation patterns in the Mono Region are also dependent upon elevation. The low elevation areas to the west and south within the Mono Region receive less than five inches of precipitation annually, while the northern areas of high elevation can receive up to 40 inches of precipitation annually.

Please refer to Figure A-66 for a precipitation map of the region. Please refer to Chart A-19, below, for an illustration of precipitation and temperature conditions in the Mono Region.

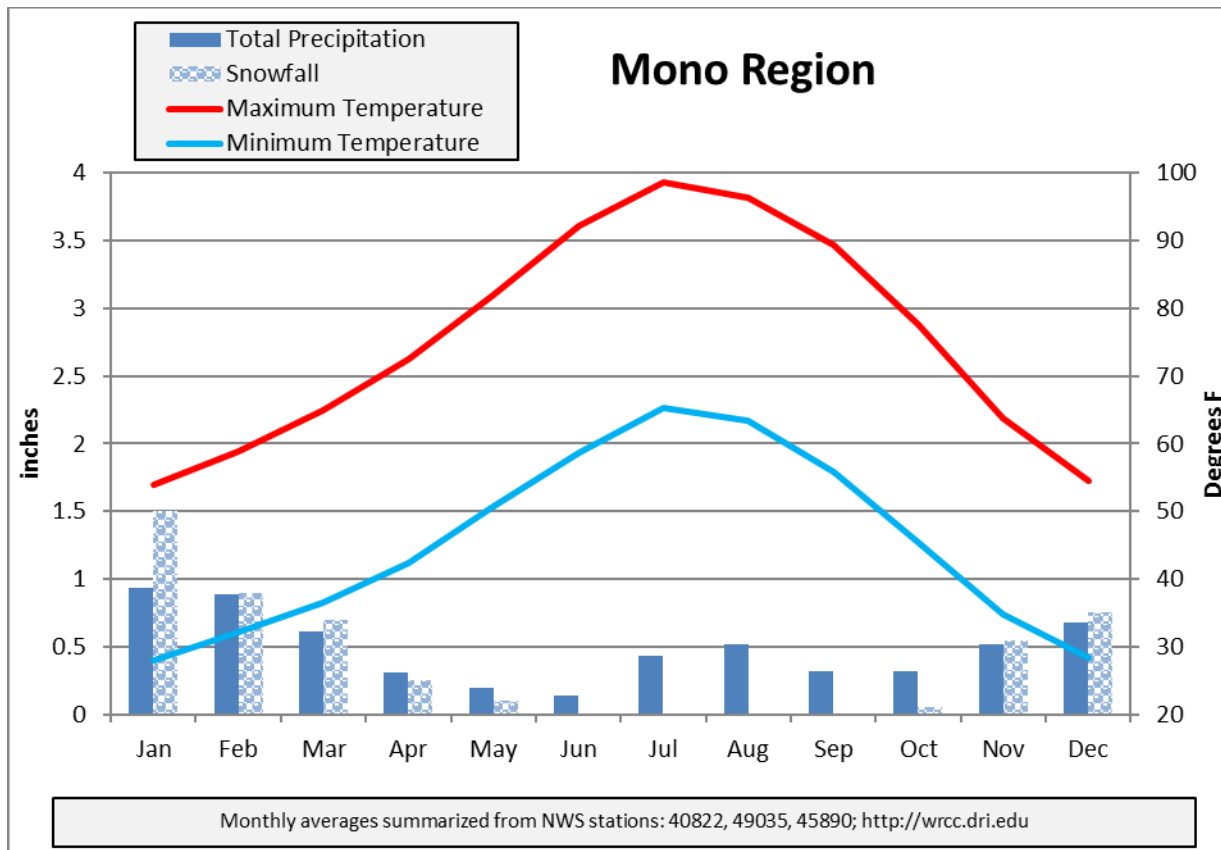


Chart A-19. Average annual patterns of temperature and precipitation, Mono Region.

1.12.2 Hydrology

The hydrology of Mono Region is dependent upon elevation. The lower elevation areas contain streams that are classified as Flashy, Ephemeral Rain (FER) or Low-Volume Snowmelt and Rain (LSR) systems. The streams found at the higher elevations in the northern part of the Mono Region are classified as Snowmelt (SM) systems. There is also an influence of Groundwater (GW) systems within the Owens River watershed. (Lane et al 2016)

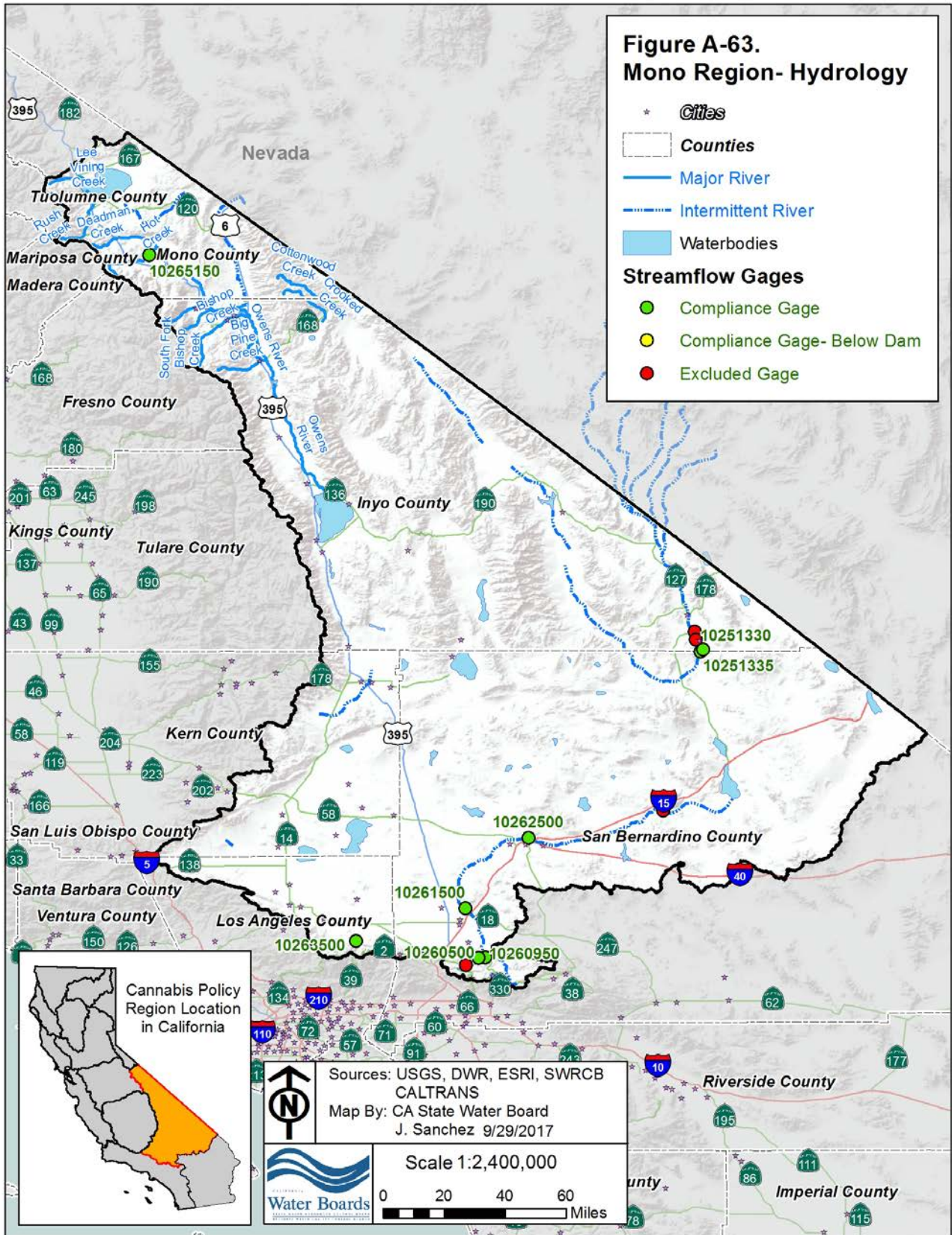
Please refer to Figure A-67 for a depiction of the stream classifications within the Mono Region.

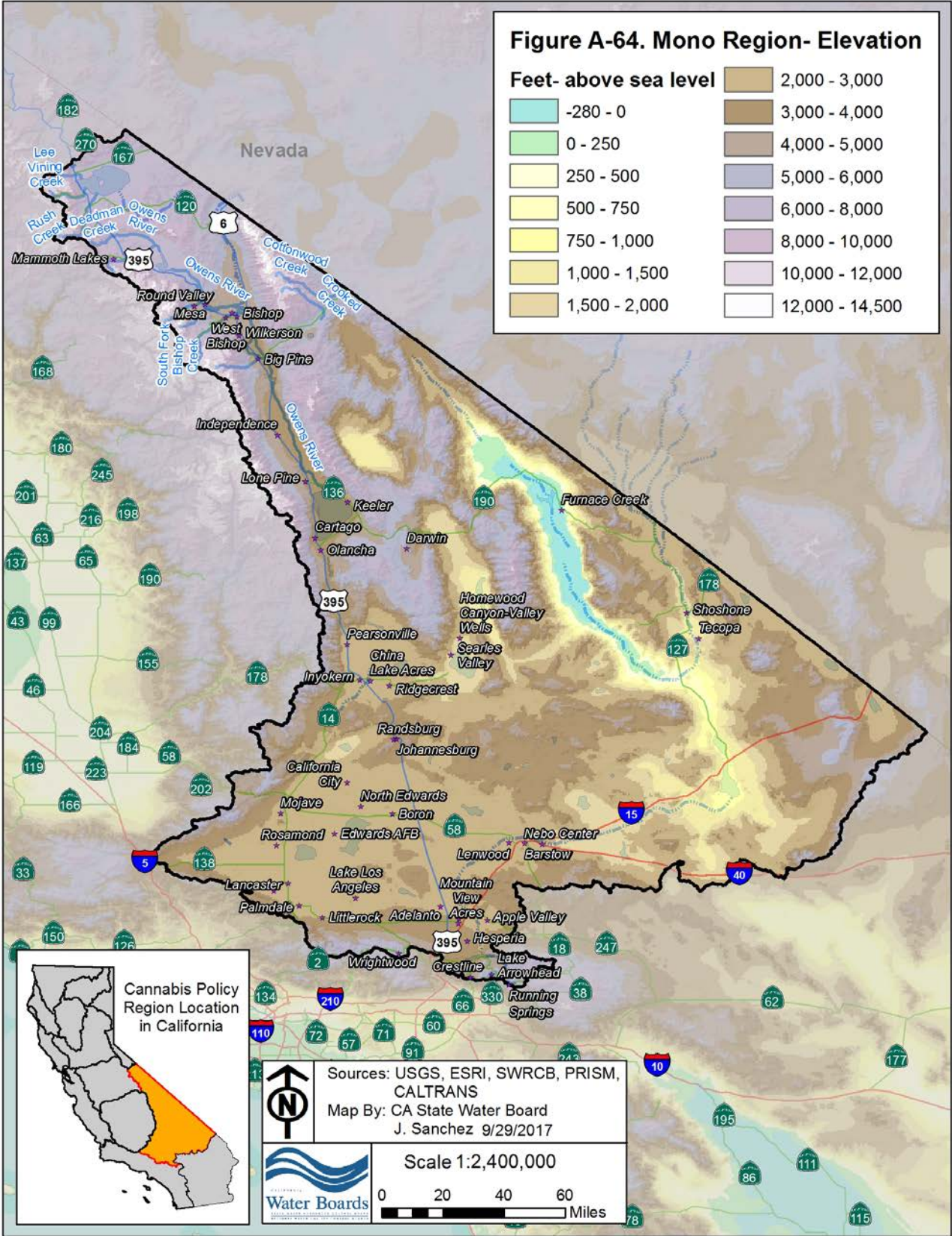
1.12.3 Geology

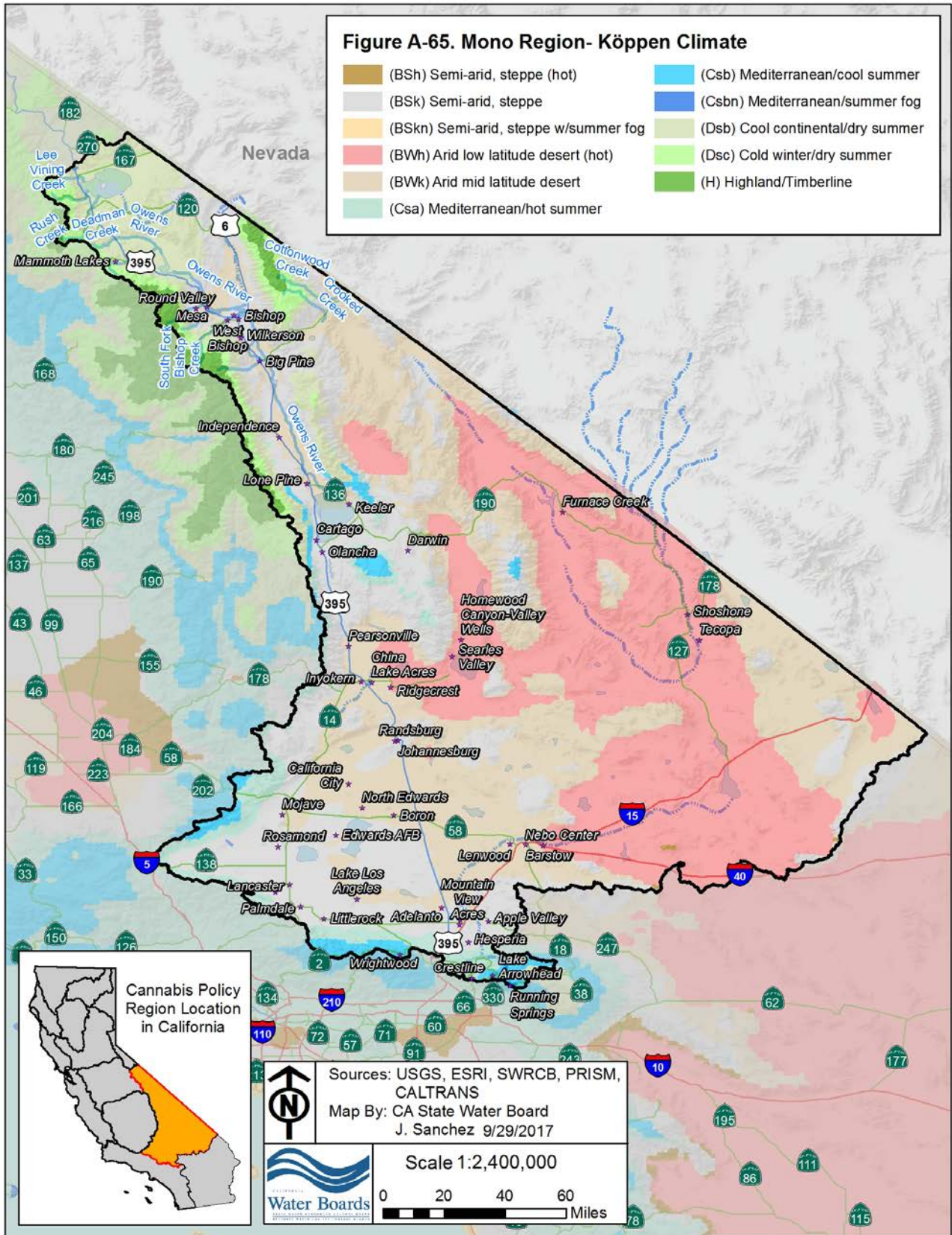
The Mono Region is located in the Sierra Nevada, Basin and Range, and Mojave Desert geomorphic provinces. The Sierra Nevada geomorphic province contains steep mountains underlain by a granitic batholith. The foothill regions of the Sierra Nevada geomorphic province are comprised of metamorphic rocks.

1.12.4 Anadromous Salmonid Population

No anadromous salmonids are present in the Mono Region.







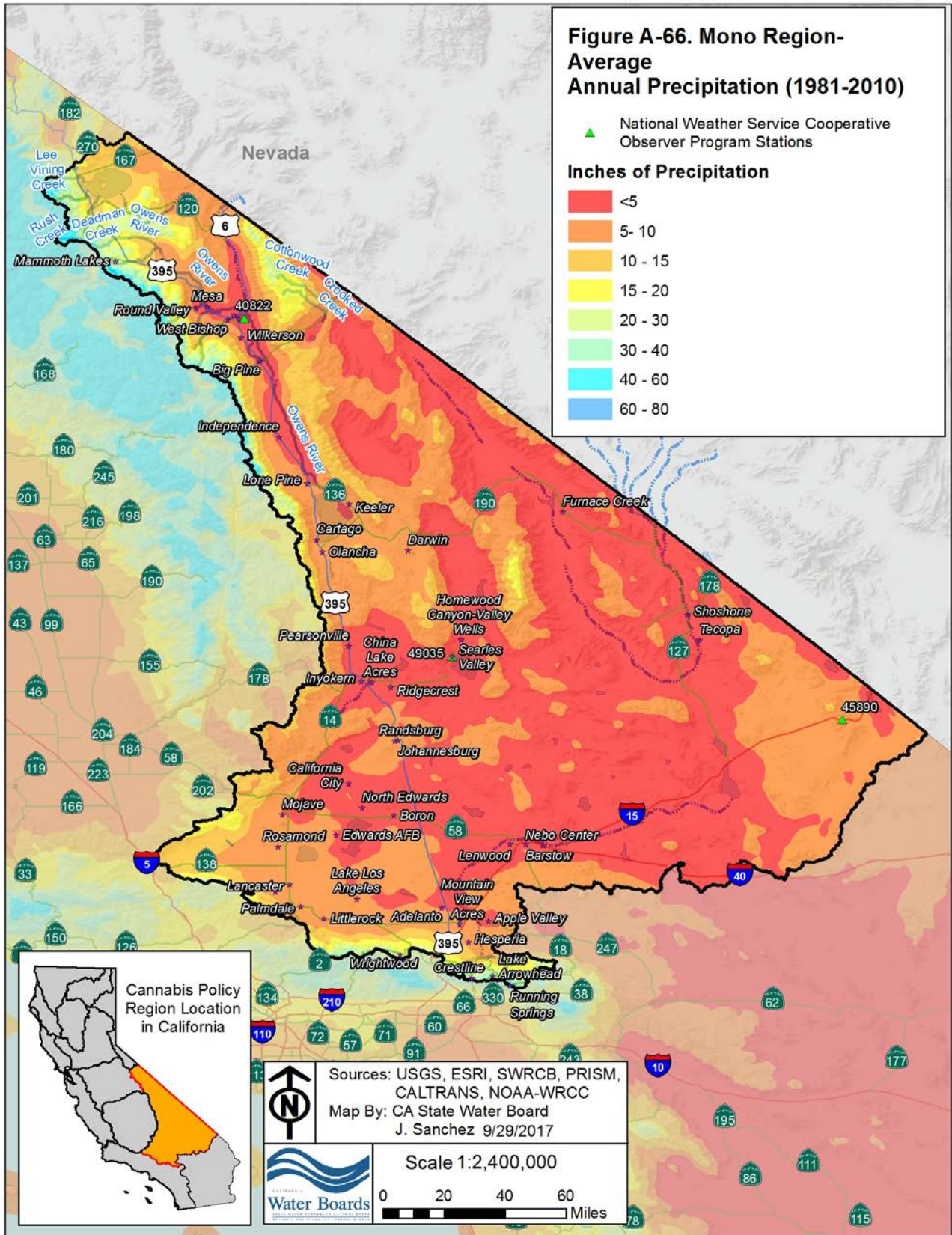
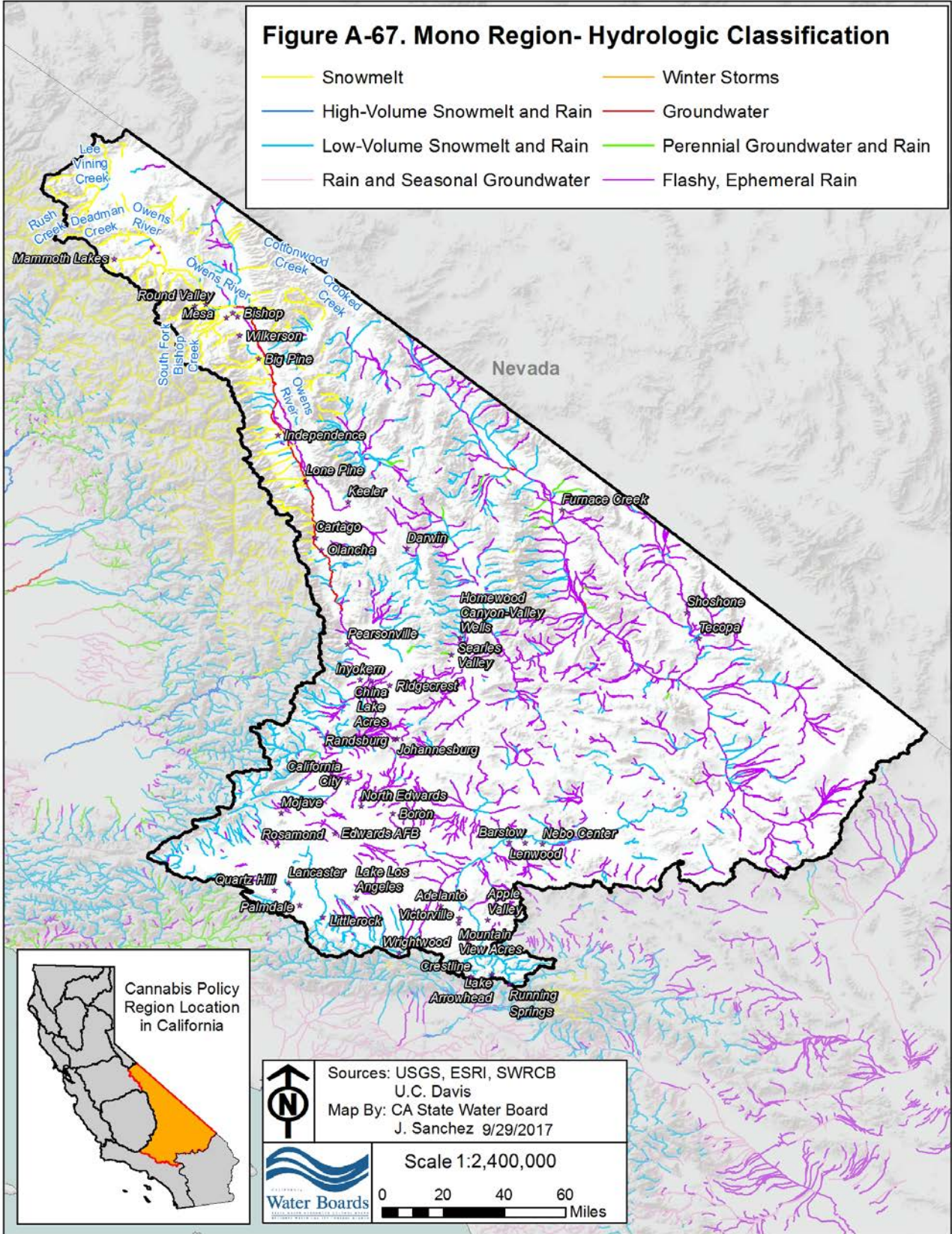


Figure A-67. Mono Region- Hydrologic Classification

- Snowmelt
- High-Volume Snowmelt and Rain
- Low-Volume Snowmelt and Rain
- Rain and Seasonal Groundwater
- Winter Storms
- Groundwater
- Perennial Groundwater and Rain
- Flashy, Ephemeral Rain



1.13 Kern Region

The Kern Region covers approximately 16,859 square miles in central southern California (Figure A-68). The Kern Region covers the southernmost part of the San Joaquin Valley. Elevations of the Kern Region vary greatly with elevations in the valley floor being near sea level and the highest elevation of 14,505 feet above sea level at Mount Whitney, the highest peak in the contiguous United States. Please refer to Figure A-69 for an elevation map of the region. The region includes the watersheds of the Kings River, Tule River, Kaweah River, Deer Creek, Poso Creek, and Kern River.

1.13.1 Climate and Precipitation

The climate of the Kern Region varies greatly with most changes related to changes in elevation. The valley area is dominated by Semi-arid, steppe climate with some Arid low latitude desert areas in the south and to the west. The climate transitions to Mediterranean with hot summers; Mediterranean with cool summers; Semi-arid, steppe, cold winter with dry summer; and Highland/Timberline in the eastern part of the region and at higher elevations of the Sierra Nevada Mountain Range. Please refer to Figure A-70 for a climatic map of the Kern Region.

Temperature patterns in the Kern Region are also driven by elevation, with cooler temperatures being found at the higher elevations at the eastern part of the region. At the higher elevations, average annual minimum temperatures are between 15 and 25 degrees Fahrenheit, and average annual maximum temperatures can reach between 40 and 45 degrees Fahrenheit. The lowest elevations experience average annual minimum temperatures between 50 and 55 degrees Fahrenheit and average annual maximum temperatures up to 85 degrees Fahrenheit.

Precipitation also varies greatly within the Kern Region. The highest annual average precipitation occurs in the eastern portion of the region at higher elevations of the Sierra Nevada Mountain Range with up to 60 inches of precipitation occurring on an annual average. The least amount of annual average precipitation occurs at the southern part of the valley floor where less than five inches of precipitation falls on an annual basis.

Please refer to Figure A-71 for a precipitation map of the region. Please refer to Charts A-20 and A-21, below, for a comparison of precipitation and temperature conditions for the valley floor and Sierra Mountains portions of the Kern Region

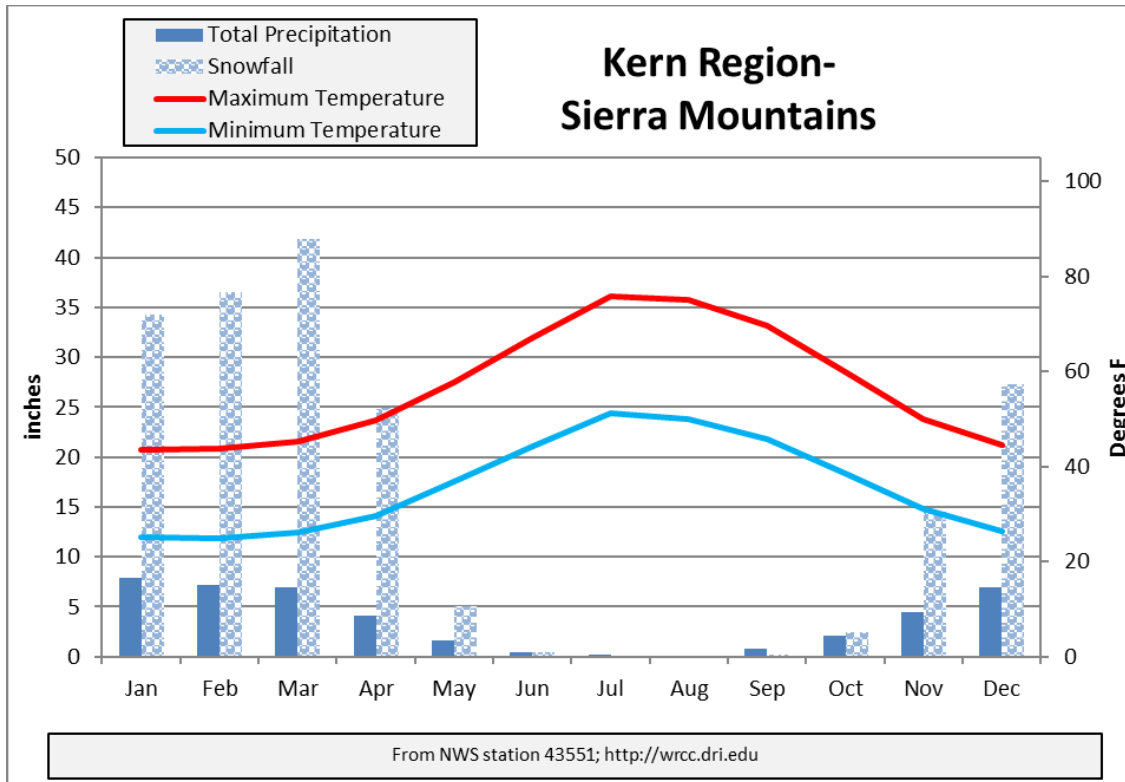


Chart A-20. Average annual patterns of temperature and precipitation, Kern Region, Sierra Mountains

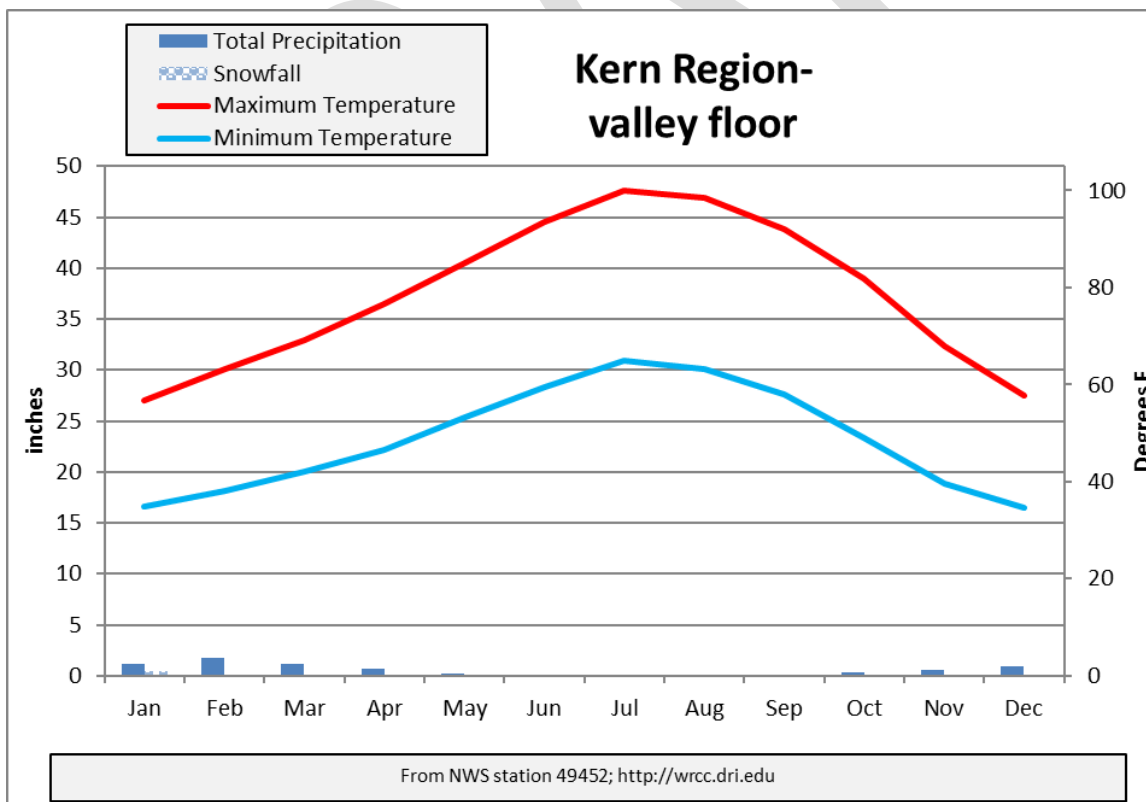


Chart A-21. Average annual patterns of temperature and precipitation, Kern Region, valley floor.

1.13.2 Hydrology

The hydrology of Kern Region streams varies greatly depending upon elevation. The major streams at the valley floor are classified as High Volume Snowmelt and Rain (HSR) systems. In the lower foothills to the east, the streams are a mix of Low-Volume Snowmelt and Rain (LSR) and Perennial Groundwater and Rain (PGR) systems. The highest elevations in the eastern part of the Kern Region are dominated by Snowmelt (SM) systems. The higher elevations located in the western part of the region contain a mix of PGR and Flashy, Ephemeral Rain (FER) systems. (Lane et al 2016)

Please refer to Figure A-72 for a depiction of the stream classifications within the South Coast Region.

1.13.3 Geology

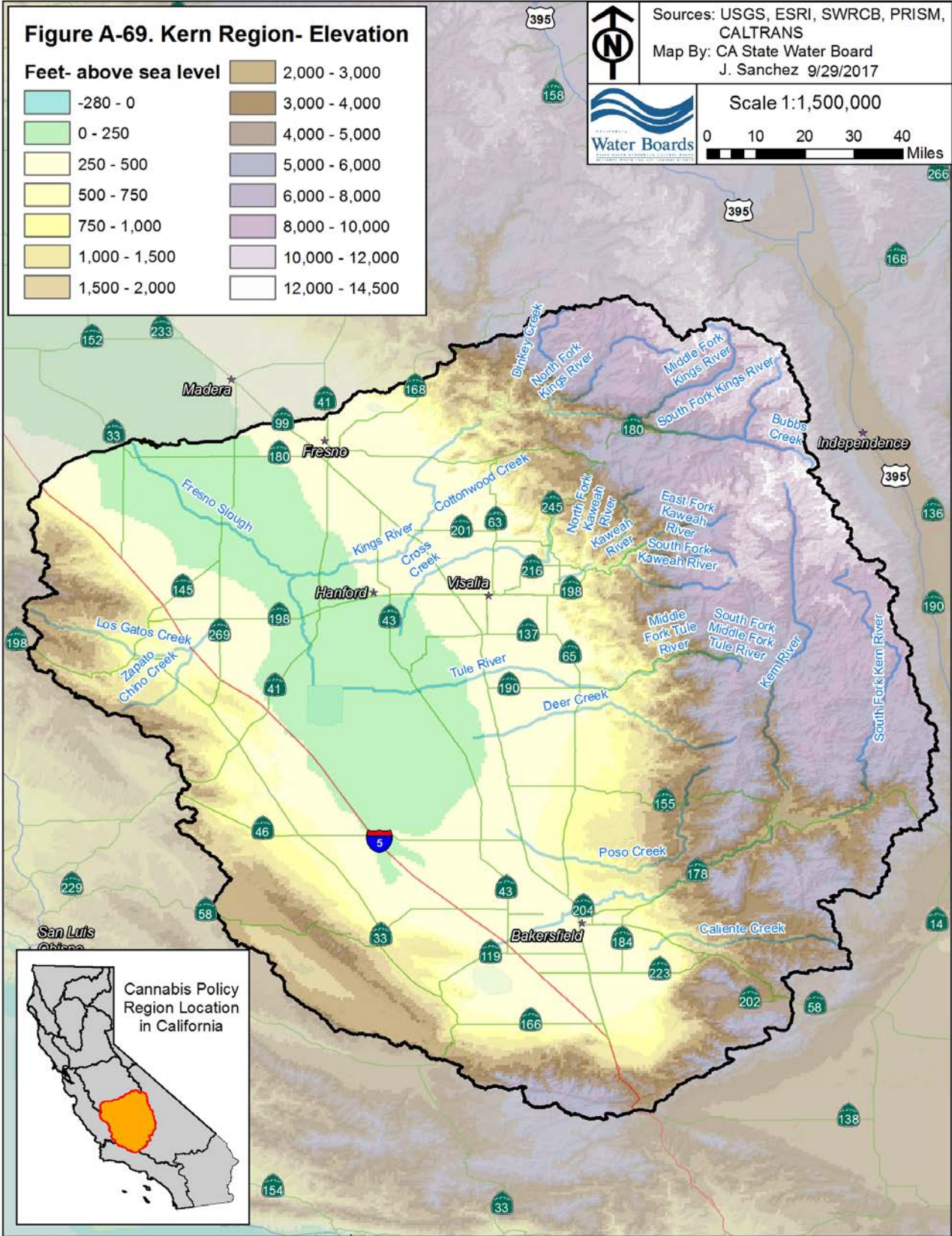
The Kern Region is located in the Sierra Nevada, Great Valley, and Coastal Ranges geomorphic provinces. The Sierra Nevada geomorphic province contains steep mountains underlain by a granitic batholith. The foothill regions of the Sierra Nevada geomorphic province are comprised of metamorphic rocks. The Coast Ranges geomorphic province is comprised of sedimentary and metamorphic rock and alluvial deposits in valleys and along the coastline. The Great Valley geomorphic province consist of a large alluvial plain.

1.13.4 Anadromous Salmonid Population

Two special-status ESU, DPS, or DTE are currently extant within the Kern Region (Figure A-53):

- CV FR Chinook salmon.
- CV LFR Chinook salmon.

The CV FR and CV LFR Chinook salmon populations are each listed as species of special concern by CDFW and, jointly, as a species of concern by NMFS (Moyle et al. 2015, NMFS 2017).



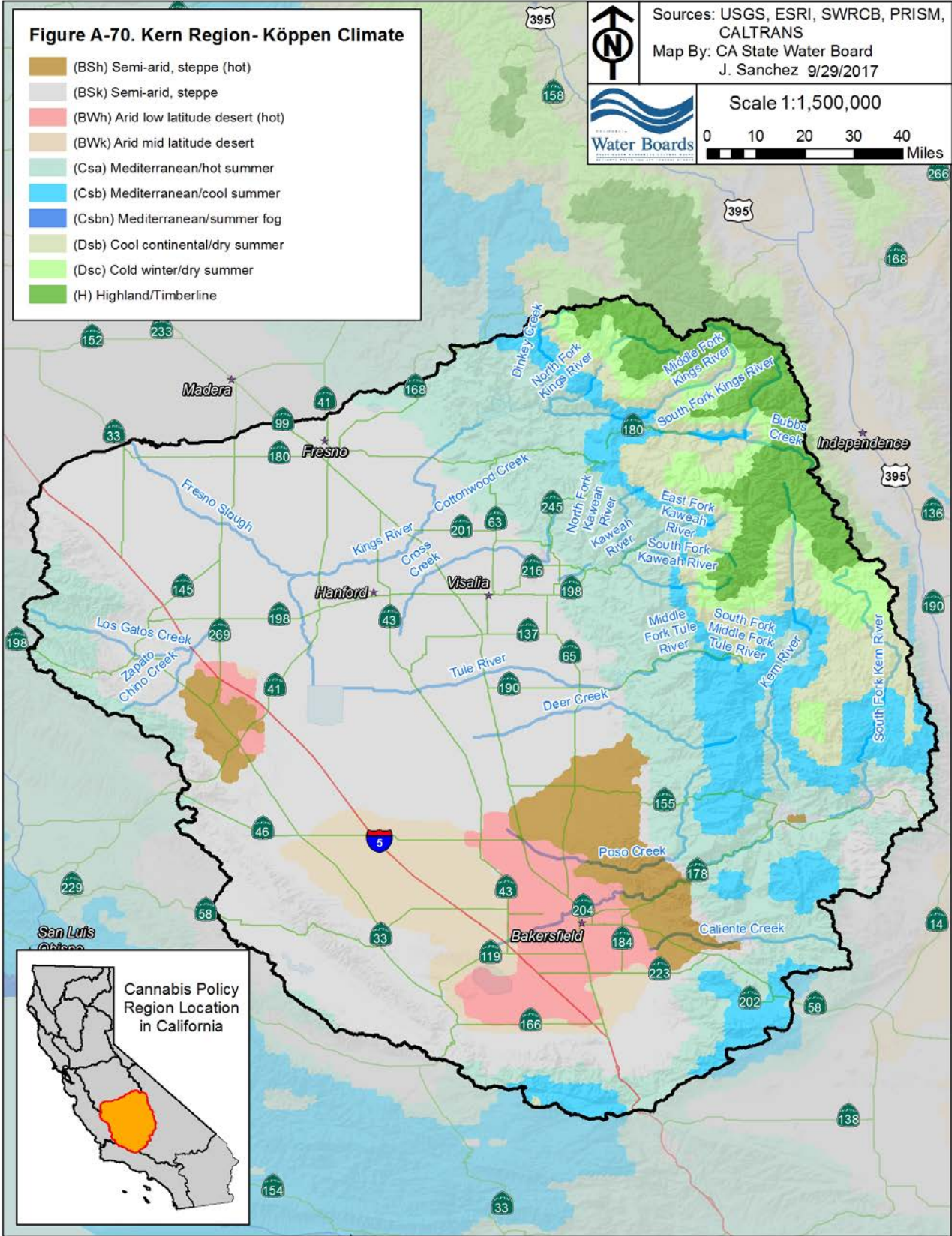


Figure A-71. Kern Region- Average Annual Precipitation (1981-2010)

▲ National Weather Service Cooperative Observer Program Stations

Inches of Precipitation

- <5
- 5- 10
- 10 - 15
- 15 - 20
- 20 - 30
- 30 - 40
- 40 - 60
- 60 - 80



Sources: USGS, ESRI, SWRCB, PRISM, CALTRANS, NOAA-WRCC
 Map By: CA State Water Board
 J. Sanchez 9/29/2017



Scale 1:1,500,000

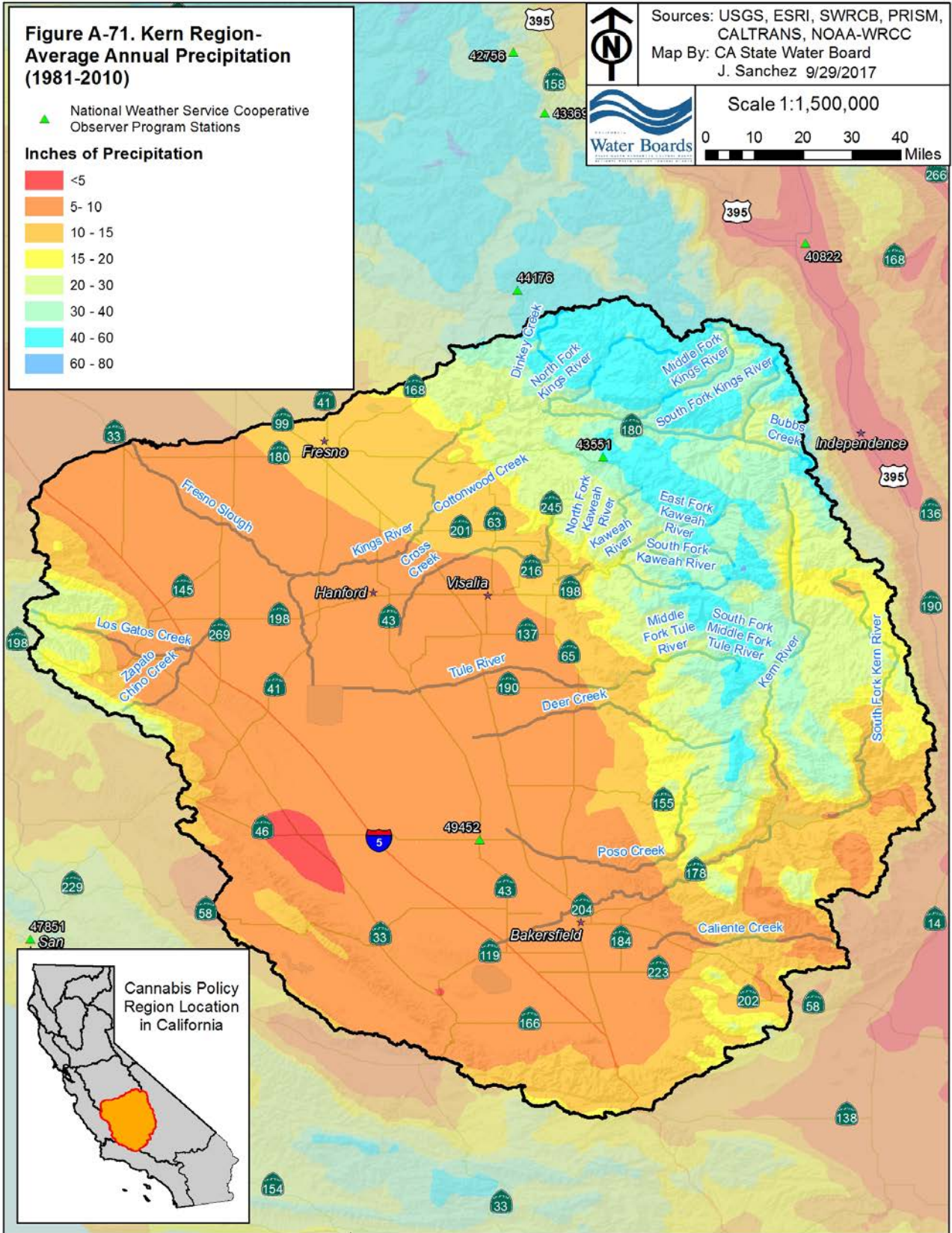
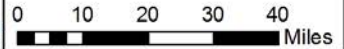


Figure A-72. Kern Region- Hydrologic Classification

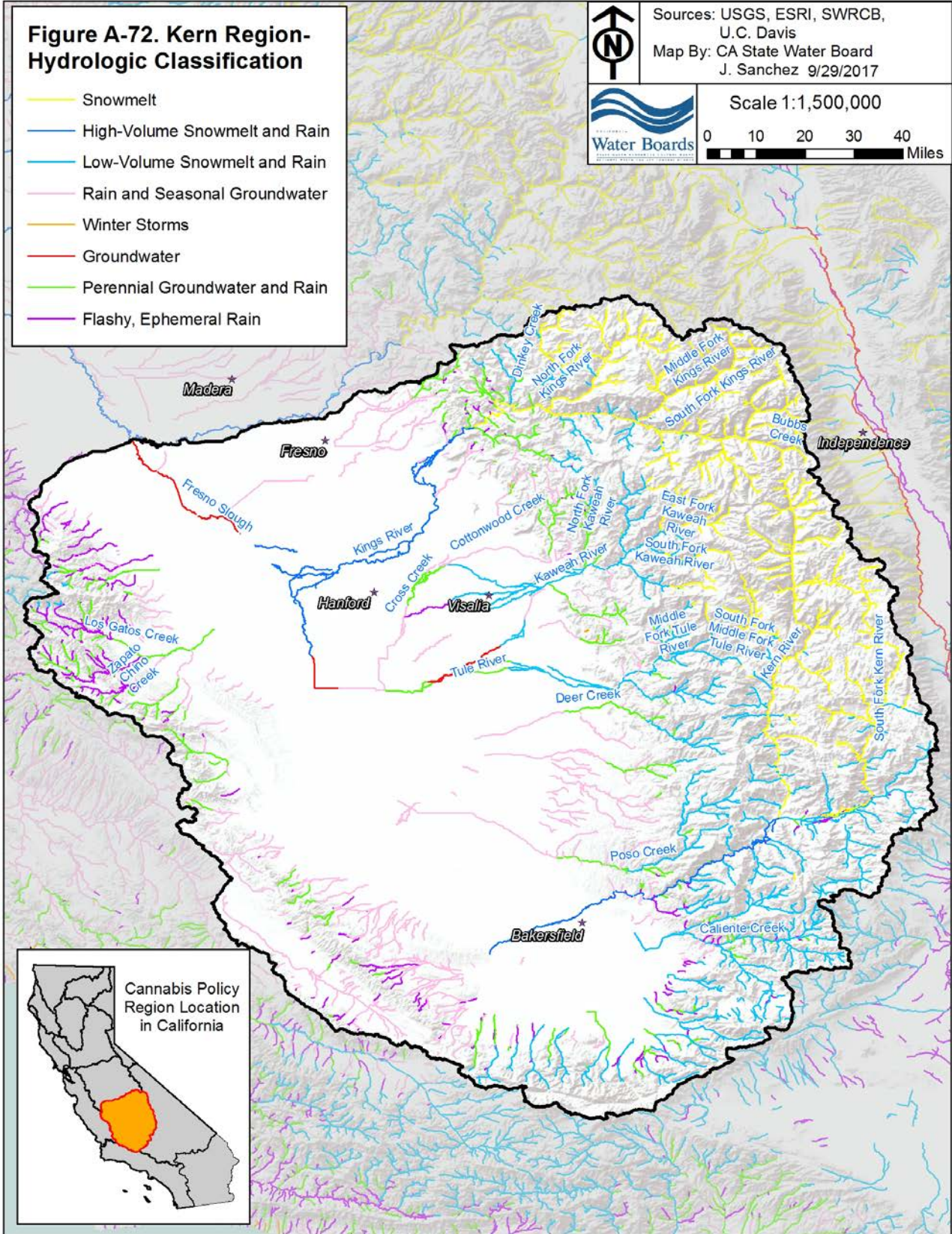
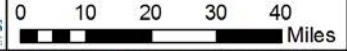
- Snowmelt
- High-Volume Snowmelt and Rain
- Low-Volume Snowmelt and Rain
- Rain and Seasonal Groundwater
- Winter Storms
- Groundwater
- Perennial Groundwater and Rain
- Flashy, Ephemeral Rain



Sources: USGS, ESRI, SWRCB,
U.C. Davis
Map By: CA State Water Board
J. Sanchez 9/29/2017



Scale 1:1,500,000



1.14 South East Desert Region

The South East Desert Region covers approximately 19,859 square miles in the southeastern corner of California (Figure A-74). Elevations in this region range from approximately 226 feet below sea level at Bombay Beach to over 11,000 feet above sea level at San Geronio Mountain. Please refer to Figure A-75 for an elevation map of the region. The region includes the watersheds of the Alamo River, New River, and Colorado River.

1.14.1 Climate and Precipitation

The climate of the South East Desert Region is generally characterized by an Arid low latitude desert climate (hot). There are small micro climates at the higher elevations of the western part of the region. These consist of Semi-arid steppe, Mediterranean with cool summer, Mediterranean with hot summer, and Arid mid latitude desert. Please refer to Figure A-76 for a climatic map of the South East Desert Region.

Temperatures patterns within the South East Desert Region vary only slightly with most of the region seeing very high annual maximum temperatures. The higher elevations of the western part of the South East Desert region exhibit average annual maximum temperatures over 80 degrees Fahrenheit and annual minimum temperatures of 45 degrees Fahrenheit. The inner areas of the South East Desert Region have average annual maximum temperatures of 90 degrees Fahrenheit and average minimum temperatures of 60 degrees Fahrenheit.

Annual average precipitation throughout the South East Desert Region is minimal, with most areas receiving less than five inches of precipitation annually. The western part of the South East Desert Region receives a little more with some areas receiving between 5 and 20 inches of precipitation annually. The areas of higher precipitation tend to be in areas of higher elevation.

Please refer to Figure A-77 for a precipitation map of the region. Please refer to Chart A-22, below, for an illustration of precipitation and temperature conditions in the South East Desert Region.

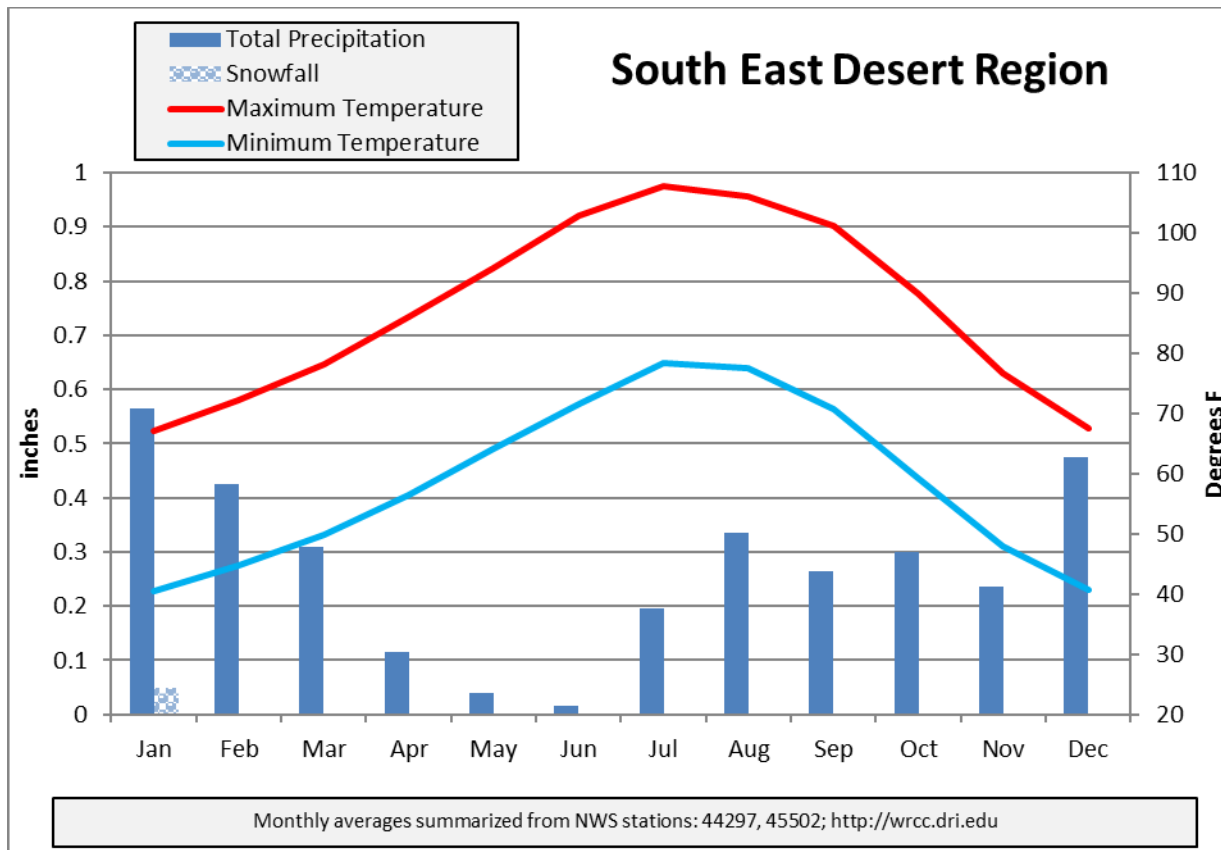


Chart A-22. Average annual patterns of temperature and precipitation, South East Desert Region.

1.14.2 Hydrology

The hydrology of South East Desert Region streams is dominated by Flashy, Ephemeral Rain (FER) systems. At higher elevations in the western part of the South East Desert Region there are streams characterized as Low-Volume Snowmelt and Rain (LSR) systems. (Lane et al 2016)

Please refer to Figure A-78 for a depiction of the stream classifications within the South Coast Region.

1.14.3 Geology

The South East Desert Region is located in the Mojave Desert, Colorado Desert, Peninsular Ranges, and Transverse Ranges geomorphic provinces. The Transverse Ranges geomorphic province contains steep mountain ranges and valleys oriented perpendicular to the other coastal mountain ranges. The Peninsular Ranges geomorphic province is characterized by topography similar to the Coast Ranges, but with rock types more similar to the Sierra Nevada mountains.

1.14.4 Anadromous Salmonid Population

No anadromous salmonids are present in the South East Desert Region.

