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INYO COUNTY EXISTING CONDITIONS MEMO

DATE: February 10, 2025

TO: Justine Kokx | Inyo County Public Works

FROM: Dave Tokarski, Steffen Coenen | DKS Associates

SUBJECT: Inyo County EV Charging Study - Existing Conditions Project #24738-000

INTRODUCTION

This memorandum describes the current environment regarding electric vehicles (EVs) in Inyo County, including its regional location, major transportation facilities, socioeconomic factors, EV adoption, and existing public charging infrastructure.

INYO COUNTY DEMOGRAPHICS

REGIONAL CONTEXT

Inyo County is located at the southern edge of the Sierra Nevada range, where it serves as a gateway between most of California and Death Valley. Inyo County includes a long stretch of the north-south highway (US 395) that connects Southern California with Northern California on the eastern side of the Sierra Nevada Mountain range. The County is diverse in geography (including both arid and flat areas of Death Valley and mountainous areas leading into the southern portion of the Sierra Nevada mountain range, including Mammoth Mountain immediately north of the County), as shown in **Figure 1**.

As of the 2020 Census, Inyo County had a total population of 19,016[1], while Bishop (its only incorporated city) had a population of 3,819 (or approximately 20% of the County's population). Other communities in Inyo County with 2020 populations over 500 include Dixon Lane-Meadow Creek (adjacent to Bishop with 2020 population of approximately 2,750), West Bishop (adjacent to Bishop with 2020 population of approximately 2,500), Lone Pine (2020 population of approximately 1,500), Big Pine (2020 population of approximately 1,400), and Independence (the County Seat with 2020 population of approximately 760). Additional smaller communities include Furnace Creek and Shoshone (both adjacent to Death Valley National Park).

[1] https://data.census.gov/profile/Inyo_County,_California?g=050XX00US06027

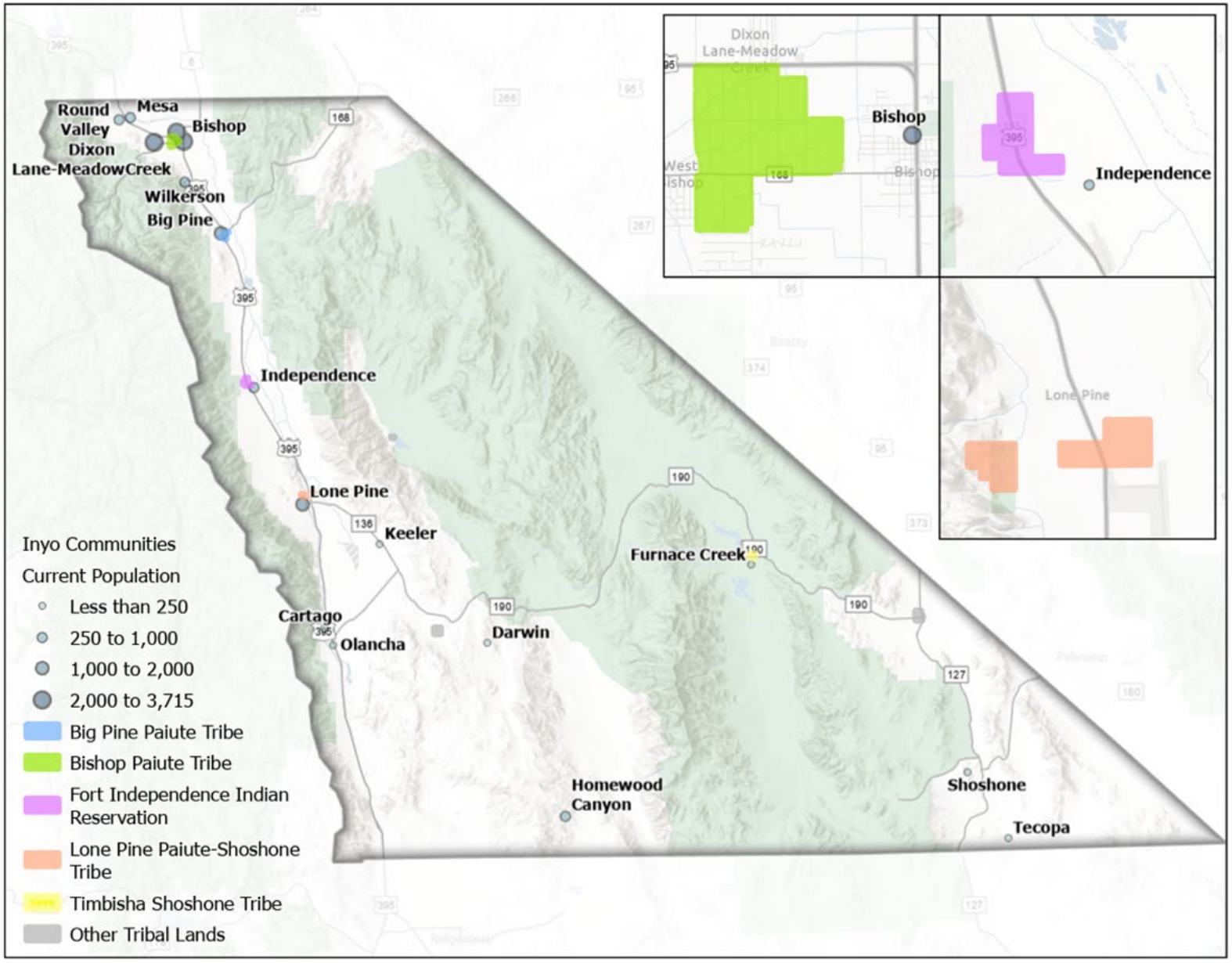


FIGURE 1: INYO COUNTY COMMUNITIES

Additionally, Inyo County is home to five tribes, including the Lone Pine Paiute-Shoshone, Timbisha Shoshone, Fort Independence Tribe, Big Pine Paiute, and Bishop Paiute Tribe. In total these tribes have a population of approximately 3,000.

COMMUTE PATTERNS

The Longitudinal Employer-Household Dynamics (LEHD) program is a U.S. Census Bureau initiative that integrates federal, state, and Census data to create comprehensive labor market statistics. The program's goal is to provide detailed insights into employment, workforce demographics, and commuting patterns, enabling policymakers, researchers, and businesses to analyze economic and labor trends effectively.

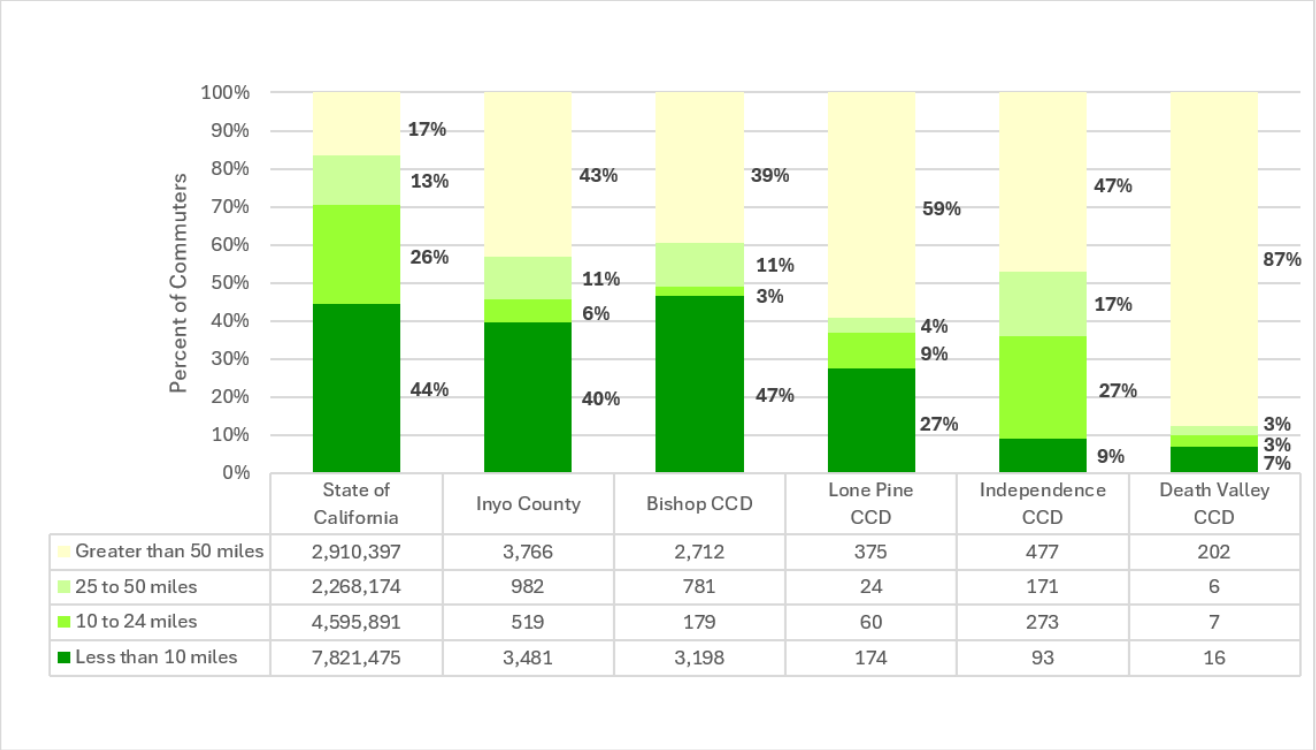
One of LEHD's key tools is *OnTheMap*[2], an interactive online mapping and data application that visualizes where people work and live. It allows users to explore commuting patterns, worker demographics, and industry information for specific geographic areas. The tool is particularly useful for urban planning, transportation projects, economic development, and labor market research.

The LEHD data shows that, as of 2022, Inyo County had 8,748 workers living in the County and 7,015 people working in the County. Of those, well over half lived and/or worked in the Bishop area with much smaller numbers living and/or working in the southern portions of the County.

Analysis of LEHD data demonstrates that Inyo County's working population often has longer commute distances than the state of California as a whole. **Figure 2** and **Figure 3** show the breakdown of commute distances for workers who live in and work in Inyo County and its four census county divisions (CCD) geographies (Bishop, Lone Pine, Independence, and Death Valley), as well as the State of California as a whole, based on 2022 LEHD data. The table shows that while a similar number of workers commute less than ten miles (between 40% and 50%) for both Inyo County and California, a much higher percentage of workers in Inyo County commute more than 50 miles than those in California as a whole. When looking at the CCD areas within the county, the trend toward longer commutes is magnified, with a majority of commute distances in Lone Pine and Death Valley being over 50 miles.

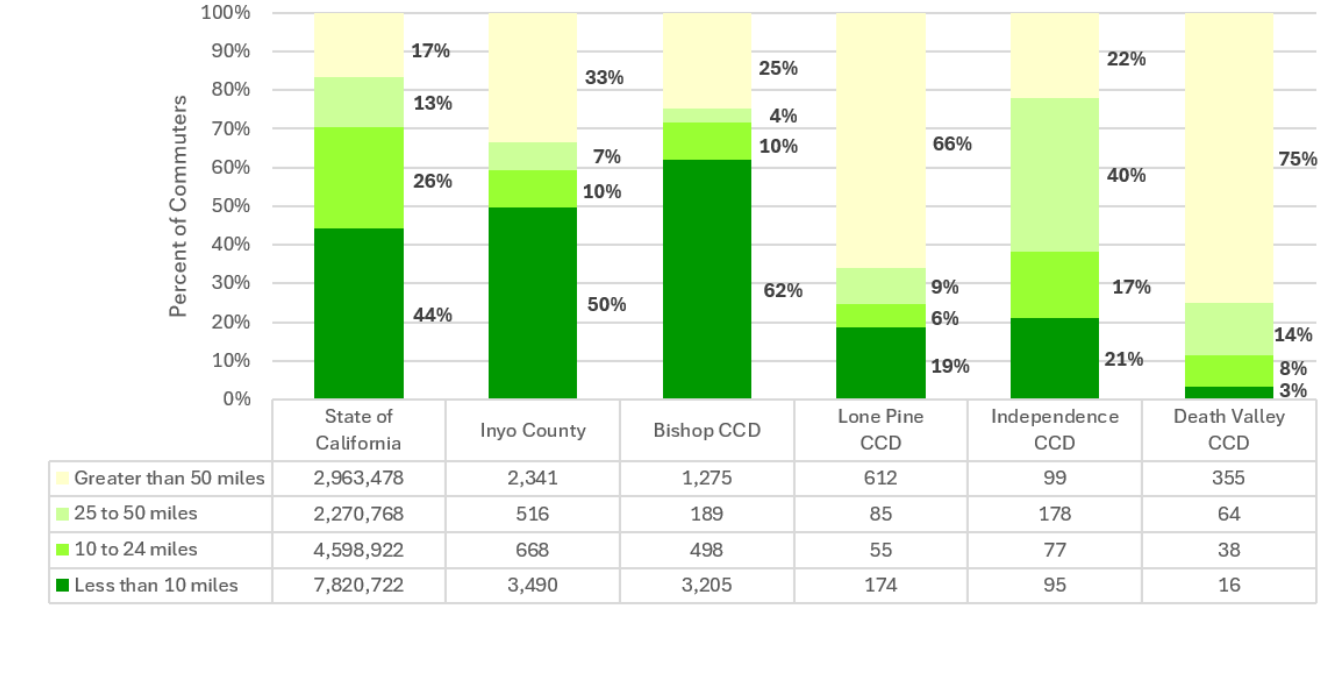
Based on the same LEHD data described above, **Figure 4** shows the boundaries of the four CCD areas as defined by the US Census within the County as a whole and shows graphically the commute patterns for both residents and workers within each area. The diagrams show both the estimated distance and general direction of travel for each of the four CCD areas, Inyo County, and California.

[2] https://onthemap.ces.census.gov/



	State of California	Inyo County	Bishop CCD	Lone Pine CCD	Independence CCD	Death Valley CCD
Greater than 50 miles	2,910,397	3,766	2,712	375	477	202
25 to 50 miles	2,268,174	982	781	24	171	6
10 to 24 miles	4,595,891	519	179	60	273	7
Less than 10 miles	7,821,475	3,481	3,198	174	93	16

FIGURE 2: COMMUTE DISTANCES BASED ON HOME LOCATION



	State of California	Inyo County	Bishop CCD	Lone Pine CCD	Independence CCD	Death Valley CCD
Greater than 50 miles	2,963,478	2,341	1,275	612	99	355
25 to 50 miles	2,270,768	516	189	85	178	64
10 to 24 miles	4,598,922	668	498	55	77	38
Less than 10 miles	7,820,722	3,490	3,205	174	95	16

FIGURE 3: COMMUTE DISTANCES BASED ON WORK LOCATION

FIGURE 4: INYO COUNTY COMMUTE PATTERNS

MULTI-FAMILY HOUSING

According to the US Census American Community Survey[3], as of 2022, within Inyo County approximately 63% of housing units were single family detached, 1% were single family attached, 2% were housing units with 2 units in the structure, 3% were housing units with 3-4 units in the structure, 4% were housing units with 5-9 units in the structure, 1% were housing units with 10 or more units in the structure, 23% were mobile homes, and about 2% were boats, RVs, or vans. This data indicates that approximately 64% of housing units are single-family, while approximately 36% of housing units are not single family. Additionally, the data indicates that approximately 67% of households are owner-occupied while 23% are renter-occupied.

Inyo County staff provided the project team with data of parcels identified to be multi-family, including apartments and condominiums. **Table 1** shows that there are approximately 900 apartment and condominium units within Inyo County communities. Because currently most multi-family residential developments do not provide EV chargers on-site (especially in rural areas and small communities such as those in Inyo County), of key importance to residents of the residents of multi-family dwelling units (MFDUs) is the availability of public charging close to their homes.

TABLE 1: INYO COUNTY MULTI-FAMILY UNITS

COMMUNITY	APARTMENT UNITS	CONDOMINIUM UNITS	TOTAL MULTI-FAMILY UNITS
BISHOP	689	101	790
BIG PINE	20	0	20
LONE PINE	75	0	75
ROCKING K	9	0	9
COUNTYWIDE	793	101	894

DISADVANTAGED COMMUNITIES

Inyo County residential land use is generally limited to small, dispersed communities which results in long trip lengths for all trip categories. Residents in low-density areas typically do not have shopping, recreation, or entertainment destinations located in walking proximity. This results in significant vehicular travel, which contributes to poor air quality and reduces livability (as measured by time in vehicles or traffic).

The CalEnviroScreen 4.0 model was used to identify communities in Inyo County that face multiple burdens of pollution and socioeconomic disadvantage. The model combines a pollution burden score that measures the amount of pollution (i.e., potential pollution exposures such as air quality, drinking water contamination, pesticide use, toxins from facilities, and traffic density) that an area faces with

[3] https://services.arcgis.com/P3ePLMYs2RVChkJx/arcgis/rest/services/ACS_Housing_Units_in_Structure_Boundaries/FeatureServer

a population characteristics score that measures the sensitivity of the local population in terms of health status, age, and socioeconomic factors, resulting in an overall score that ranges from 0 to 100%. Scores of 70% or greater are considered high-scoring areas and are generally considered disadvantaged as they are more susceptible to adverse environmental, socioeconomic, or cultural hardships.

Figure 6 shows a CalEnviroScreen 4.0 map of Inyo County demonstrating that none of Inyo County's land area or population fall within areas designated as Disadvantaged Communities (70% or higher in average vulnerability score).

The Justice40 initiative[4] establishes a federal government-wide goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution. **Figure 7** displays Disadvantaged Communities (DAC) and/or Low-Income Communities (LIC) as designated by the federal Justice 40 mapping[5]. The figure shows that much of the southern half of the County, including Lone Pine, Furnace Creek, and Shoshone, falls within areas designated as LICs.

[4] https://www.whitehouse.gov/environmentaljustice/justice40/

[5] https://dot.ca.gov/-/media/dot-media/programs/esta/documents/transportation-electrification/nevi/2024-ca-nevi-plan-update-a11y.pdf, Figure 14

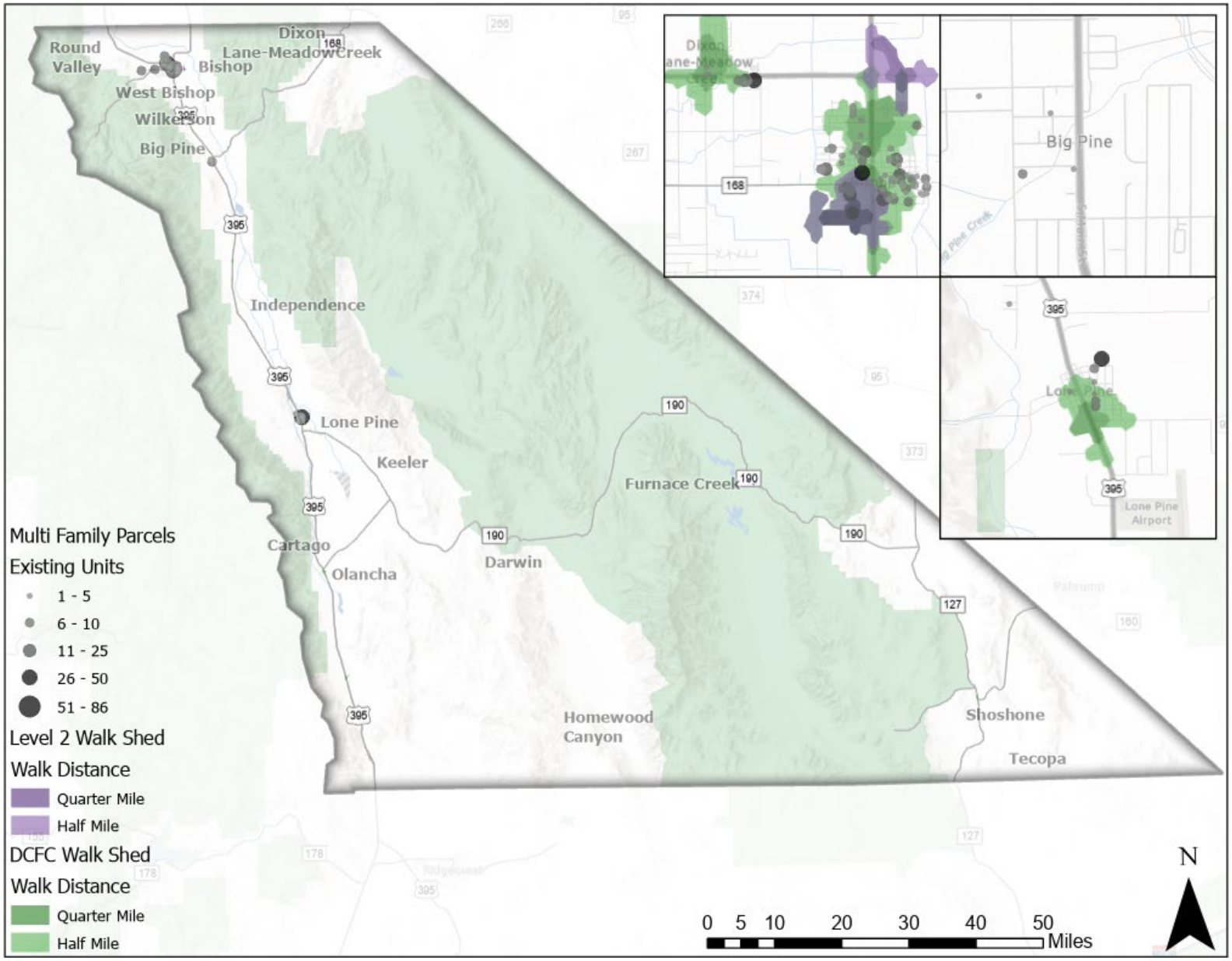


FIGURE 5: EXISTING MULTI-FAMILY UNITS AND EV CHARGER WALK SHEDS

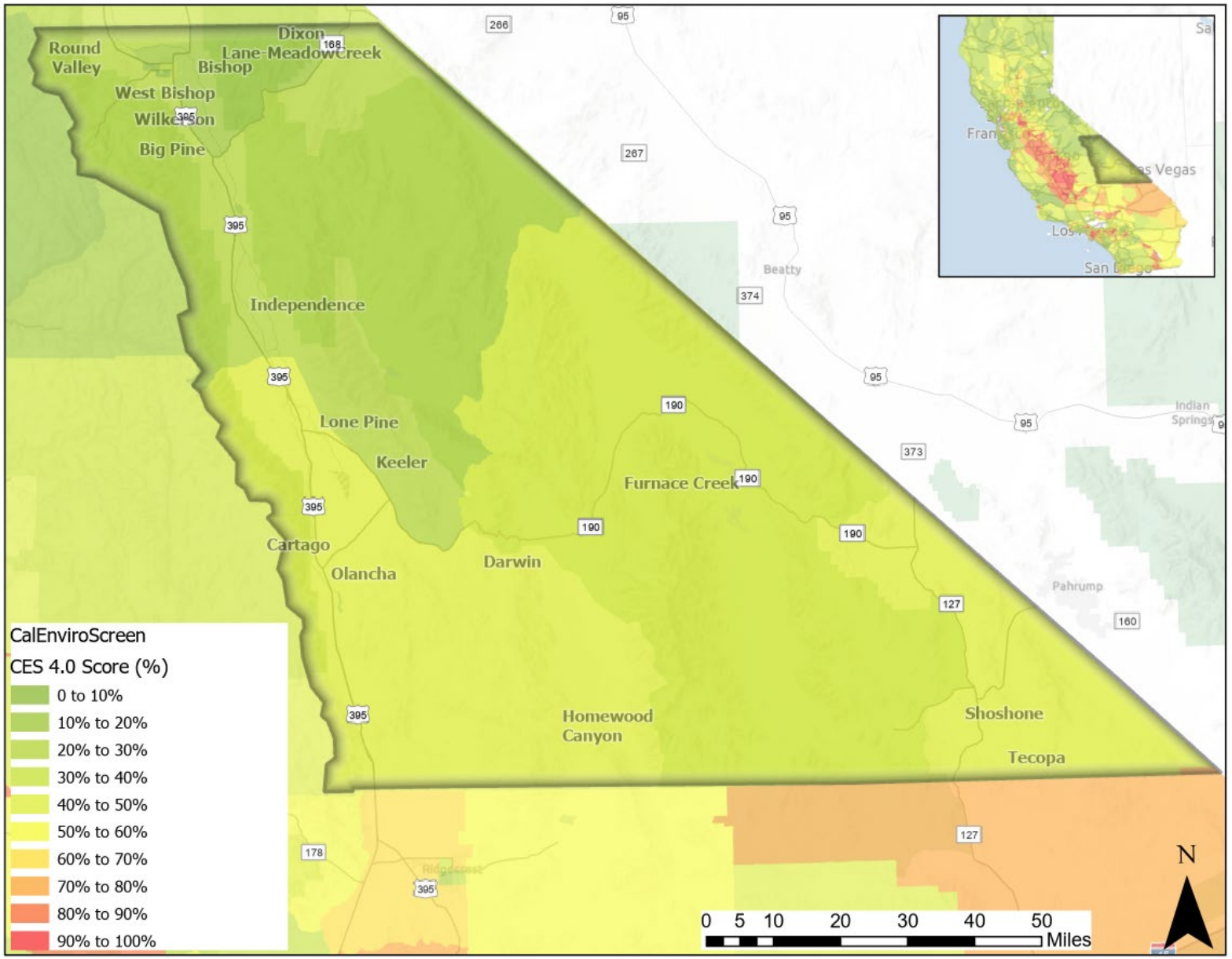
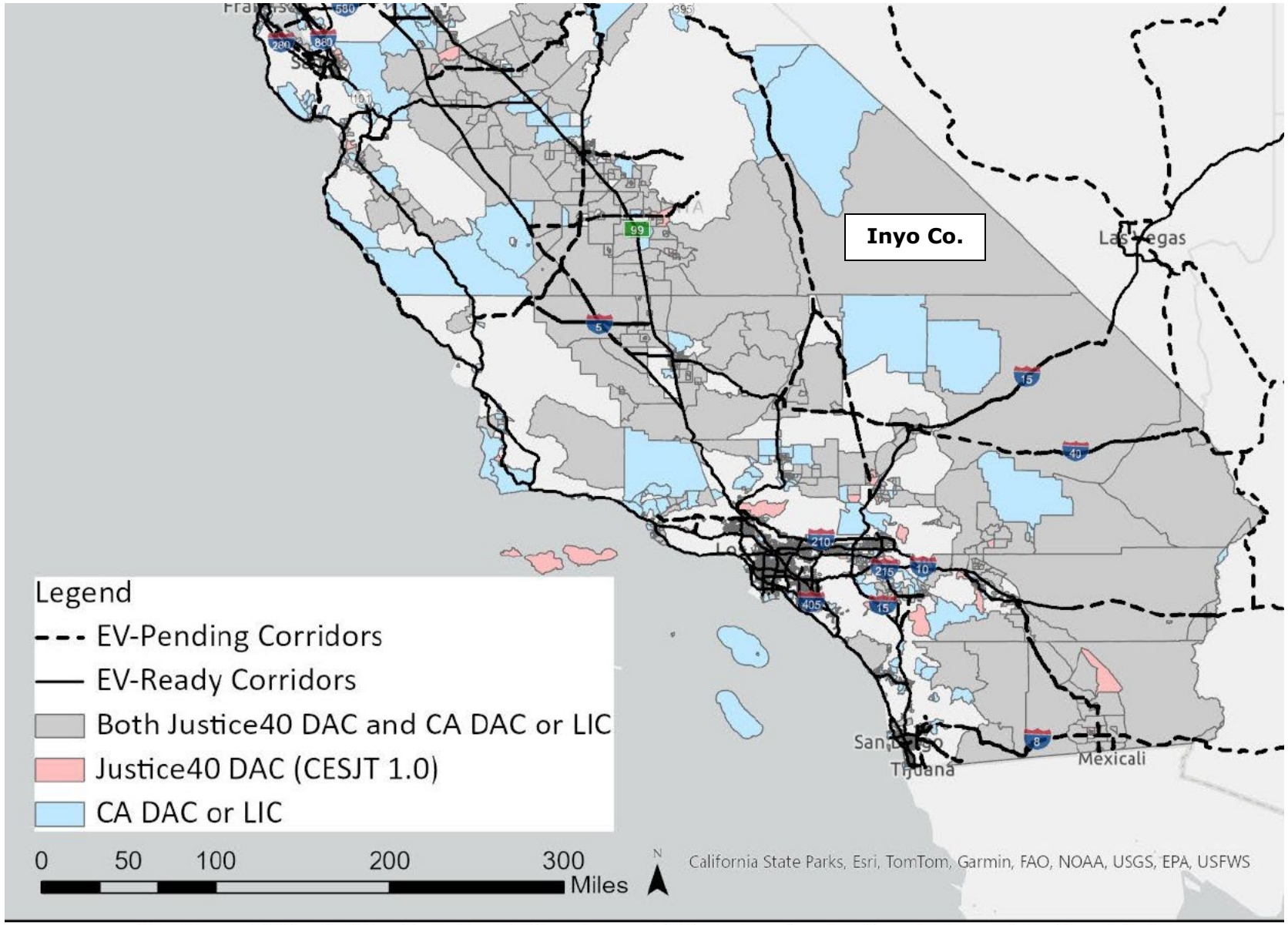


FIGURE 6: CAL ENVIROSCREEN 4.0 MAP OF INYO COUNTY



Source: CEC staff using the Climate and Economic Justice Screening Tool 1.0

FIGURE 7: FEDERAL JUSTICE40 DESIGNATED DISADVANTAGED COMMUNITIES IN INYO COUNTY

PROGRESS TOWARD ELECTRIFICATION OF TRANSPORTATION

ELECTRIC VEHICLE ADOPTION

While Inyo County has seen increased adoption of zero-emission vehicles (ZEVs), particularly Battery-Electric Vehicles (BEVs) and to a lesser extent Plug-In Hybrid Electric Vehicles (PHEVs)[6], in recent years, its progress (like in many of the mostly rural counties in the state) has lagged behind more urbanized areas and the state as a whole.

BEVs, PHEVs, and FCEVs:
Are all ZEVs created equal?

The range of zero-emission vehicles (ZEVs) includes BEVs, PHEVs, as well as hydrogen fuel cell electric vehicles (FCEVs). However, in the light-duty passenger vehicle segment, FCEVs have seen much lower adoption than the other two powertrain technologies. This is largely due to factors such as lack of PHEV models, the high cost of hydrogen fuel, and very high hydrogen fuel and fueling station development costs, which has led to only a very sparse network of hydrogen fueling stations. In Inyo County, there are no hydrogen fuel stations and so far been no direct FCEV sales have been recorded by the CEC. One Toyota Mirai FCEV was registered in Inyo County during 2020, but since then no FCEV has been part of the light-duty vehicle population in the County. Hence, virtually all cited ZEV population and sales figures in this report refer to BEVs and PHEVs.

Table 2 shows the total vehicle population and ZEV population by year, for years 2010 through 2023 according to the California Energy Commission (CEC)[7]. The table shows that as of 2010, there were very few ZEVs in both Inyo County and the State of California as a whole. By the end of 2023, there were nearly 250 ZEVs in Inyo County and over 1.5 million ZEVs in the State of California. The table shows that while in 2023 ZEVs represented approximately 5% of vehicles statewide, they only represented about 1.2% of vehicles in Inyo County, as also shown in **Figure 8**. The County's ZEV population in 2023 included 142 BEVs (60% of all ZEVs) and 96 PHEVs.

Table 3 shows light-duty vehicle sales (including ZEV sales) by quarter from 2021 through the third quarter of 2023 both statewide and in Inyo County, according to the CEC[8]. The table shows that ZEV sales as a percentage of light-duty vehicle sales have increased quarter-over-quarter statewide but have gone up and down in Inyo County, and the increase in Inyo County (from about 5% in 2021 to about 10% in 2024) trails that of the state (from about 12.5% in 2021 to about 25% in 2023) by a wide margin.

[6] This section explicitly distinguishes between PHEVs and BEVs. Yet, in the long term, fully-electric EVs (i.e. BEVs) are expected to dominate the light-duty ZEV market. Current state regulation (in the form of the Advanced Clean Cars II rule) does not consider PHEVs as ZEVs and only allows for PHEVs to partially count towards meeting their increasing ZEV sales requirements.

[7] https://www.energy.ca.gov/filebrowser/download/6311?fid=6311#block-symsoft-page-title

[8] https://www.energy.ca.gov/filebrowser/download/6737?fid=6737#block-symsoft-page-title

TABLE 2: VEHICLE POPULATION BY TYPE

YEAR	TOTAL VEHICLES		ZEV		ZEV (% OF TOTAL)	
	CALIFORNIA	INYO CO	CALIFORNIA	INYO CO	CALIFORNIA	INYO CO
2010	22,286,130	14,996	754	-	0.00%	0.00%
2011	22,288,061	14,756	5,857	-	0.03%	0.00%
2012	22,502,680	14,909	18,356	2	0.08%	0.01%
2013	23,270,577	15,224	52,427	6	0.23%	0.04%
2014	23,899,504	15,361	108,939	9	0.46%	0.06%
2015	24,412,289	15,548	166,168	12	0.68%	0.08%
2016	25,300,683	15,956	230,171	15	0.91%	0.09%
2017	28,418,039	18,140	322,762	26	1.14%	0.14%
2018	28,681,493	18,377	448,567	42	1.56%	0.23%
2019	29,029,787	18,568	559,969	53	1.93%	0.29%
2020	28,665,934	18,560	628,473	78	2.19%	0.42%
2021	29,942,517	20,375	827,760	124	2.76%	0.61%
2022	29,300,776	19,736	1,099,131	176	3.75%	0.89%
2023	29,344,963	19,701	1,502,119	238	5.12%	1.21%

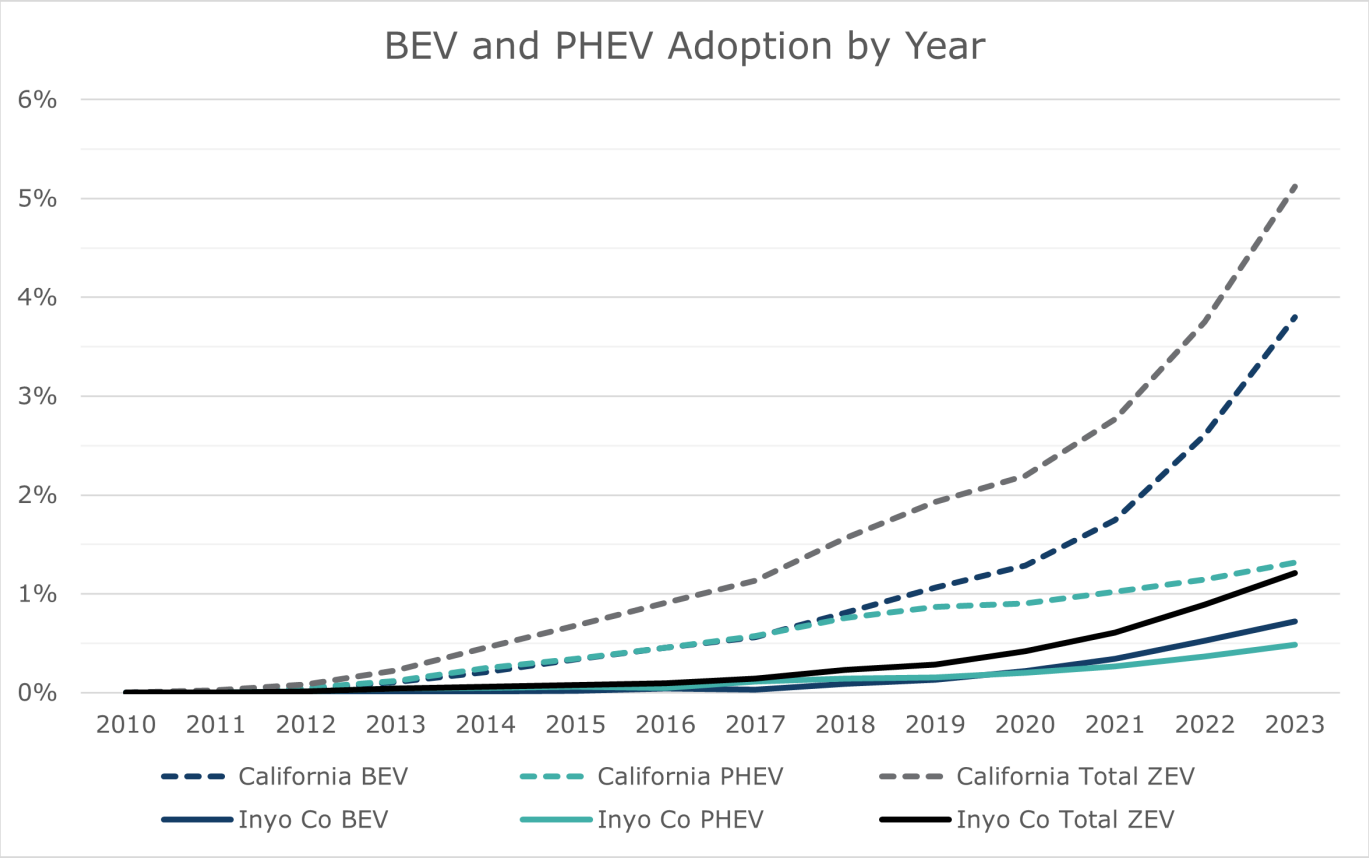


FIGURE 8: BEV AND PHEV ADOPTION IN INYO COUNTY AND CALIFORNIA BY YEAR

TABLE 3: LIGHT-DUTY VEHICLE SALES BY TYPE

YEAR	QUARTER	TOTAL LIGHT DUTY VEHICLE SALES		ZEV		ZEV (% OF TOTAL)	
		CALIFORNIA	INYO CO	CALIFORNIA	INYO CO	CALIFORNIA	INYO CO
2021	Q1	448,726	132	44,521	6	9.9%	4.5%
	Q2	500,734	180	56,168	11	11.2%	6.1%
	Q3	412,848	139	56,626	7	13.7%	5.0%
	Q4	348,247	139	59,240	7	17.0%	5.0%
2022	Q1	404,683	156	70,454	9	17.4%	5.8%
	Q2	402,774	129	71,443	7	17.7%	5.4%
	Q3	374,644	144	75,594	14	20.2%	9.7%
	Q4	399,743	146	90,777	17	22.7%	11.6%
2023	Q1	438,193	161	101,826	9	23.2%	5.6%
	Q2	473,055	171	118,776	11	25.1%	6.4%
	Q3	441,398	160	118,513	19	26.8%	11.9%
	Q4	411,417	156	102,168	8	24.8%	5.1%
2024	Q1	450,373	125	108,843	14	24.2%	11.2%
	Q2	461,248	143	118,473	14	25.7%	9.8%
	Q3	438,367	144	115,897	12	26.4%	8.3%

CVRP DATA

California's Clean Vehicle Rebate Project (CVRP) was initiated in March 2010 and was paused indefinitely in 2024. CVRP offered incentives to purchasers of PEVs in California; however, the program is elective and participation rates can be impacted by vehicle eligibility and applicant income caps. As of the end of 2023[9], CVRP had issued over 590,000 ZEV rebates (equaling about 34% of all ZEV sales in the state between 2010 and 2023). **Table 4** shows CVRP data for BEVs, PHEVs, and FCEVs between 2010 and the end of 2023 for both Inyo County and statewide[10]. The same dataset includes the dollar amount of each rebate and the total value of rebates by type and location. **Table 5** shows that statewide rebates total more than $1.5 billion while Inyo County rebates total just over $100,000 over the life of the program. Inyo County represents approximately 0.01% of total rebates and total rebate dollars statewide, while Inyo County is home to about 0.07% of California's light-duty vehicle population and about 0.02% of the states ZEV population at the end of 2023. This suggests that CVRP was overall underutilized in Inyo County compared with the rest of the state.

[9] By late 2023, CVRP funding was nearly exhausted which may have affected EV registration.

[10] https://cleanvehiclerebate.org/en/rebate-statistics

TABLE 4: CVRP REBATES BY TYPE

YEAR	BEV REBATES		PHEV REBATES		FCEV REBATES		TOTAL REBATES	
	STATE WIDE	INYO CO	STATE WIDE	INYO CO	STATE WIDE	INYO CO	STATE WIDE	INYO CO
2010	67	-	-	-	8	-	135	-
2011	4,424	-	-	-	1	-	4,521	-
2012	3,741	-	7,376	-	3	-	11,219	-
2013	15,389	-	13,615	2	23	-	29,152	3
2014	24,610	-	18,942	1	43	-	43,702	1
2015	31,343	1	15,040	1	56	-	46,543	2
2016	27,935	1	15,497	1	875	-	44,455	2
2017	27,578	1	17,992	2	2,085	-	47,757	3
2018	46,160	7	25,050	1	2,076	-	73,391	8
2019	50,244	4	18,901	1	1,852	-	71,125	5
2020	34,707	4	8,016	-	853	-	43,702	4
2021	40,928	3	6,152	1	2,483	-	49,636	4
2022	34,041	3	2,414	0	1,792	-	38,351	3
2023	85,216	8	2,996	1	2,130	-	90,369	9
TOTAL	**426,383**	**32**	**151,991**	**11**	**14,280**	**-**	**594,058**	**44**

TABLE 5: CVRP REBATE TOTALS BY TYPE

VEHICLE TYPE	TOTAL REBATES		TOTAL FUNDING	
	CALIFORNIA	INYO CO	CALIFORNIA	INYO CO
BEV	426,388	32	$1,183,526,034	$79,000
PHEV	151,996	11	$248,361,445	$23,000
FCEV	14,280	-	$73,038,818	-
OTHER	1,404	1	$2,187,740	$900
TOTAL	**594,068**	**44**	**$1,507,114,037**	**$102,900**

EXISTING EV USAGE IN INYO COUNTY

A number of data sources exist that track person and vehicular trips throughout local areas and the nation as a whole. One such data source is Replica[11], a "big data" source that estimates trips nationwide (by means of "mega-regions") and allows users to extract data for desired sub-areas, both by actual area of travel and by home location of drivers themselves. This allows users to better study the travel patterns of roadway users as well as users who begin and/or end trips in an area of interest. Replica includes BEV trips, allowing users to estimate and map BEV auto usage in terms of vehicles on roadways and vehicle miles traveled (VMT). According to Replica, approximately 0.7 percent of vehicular trips and associated VMT originating, terminating (or both) in Inyo County are made by BEVs. This figure trails the slightly over 1.2% of vehicles countywide that are BEVs, indicating that fewer trips and associated VMT are made by each BEV when compared to an internal combustion engine (ICE) powered vehicle.

Figure 9 through **Figure 11** show demographic data associated with BEV drivers who travel to, from, or within Inyo County according to Replica. The data shows that well over 50% of BEV drivers have a household income of over $100,000, while over 60% of BEV drivers have at least two vehicles in their household. Additionally, over 70% of BEV drivers live in a single-family house (the most likely to have home-based charging for a BEV) according to the data. **Figure 12** and **Figure 13** show the distribution of vehicle trips by distance and travel time for both all vehicles and BEVs.

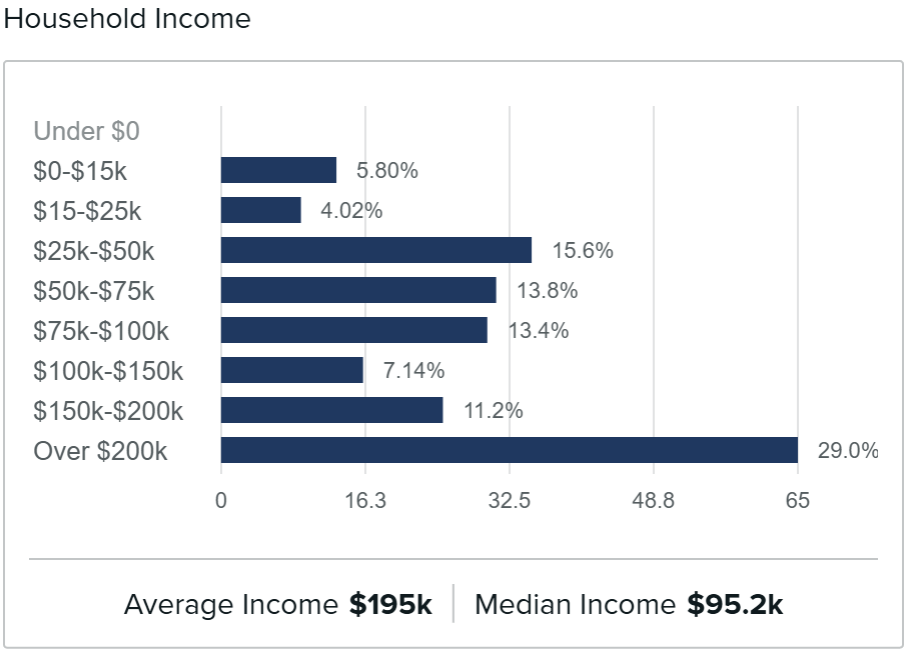


FIGURE 9: HOUSEHOLD INCOME OF BEV DRIVERS

[11] https://www.replicahq.com/

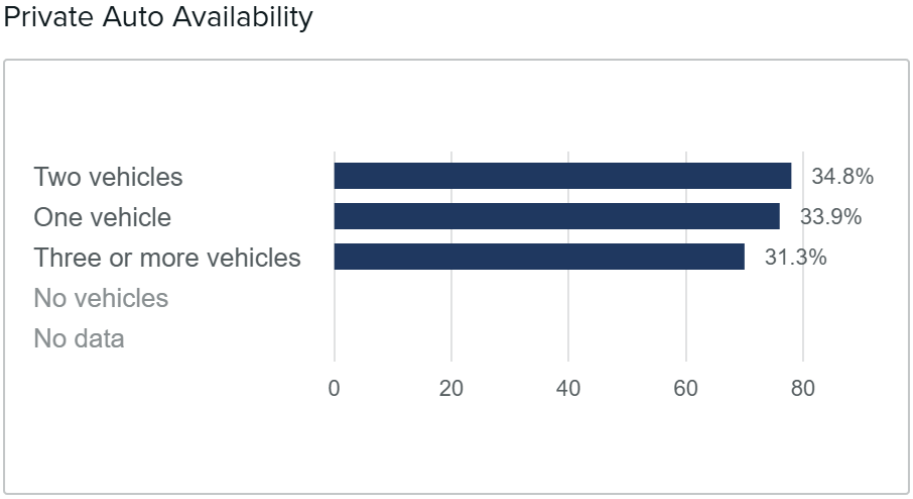


FIGURE 10: AUTO OWNERSHIP OF BEV DRIVERS

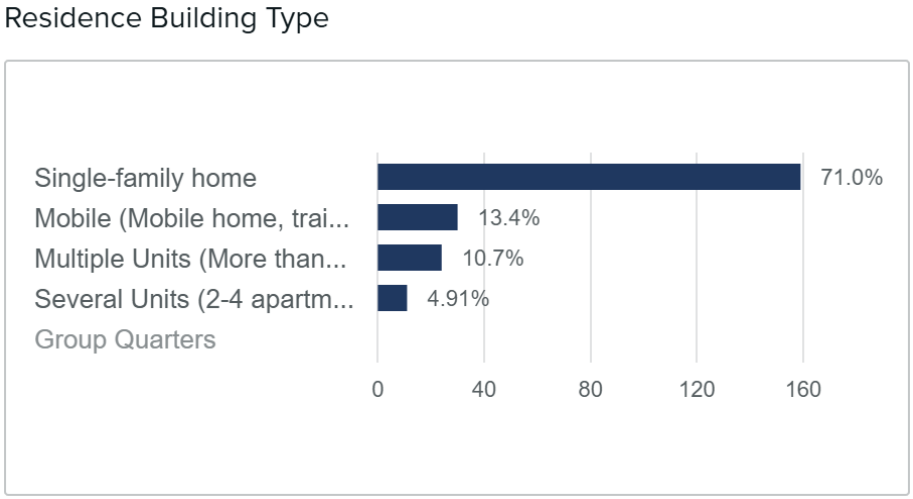


FIGURE 11: RESIDENTIAL BUILDING TYPE OF BEV DRIVERS

Figure 14 shows some of the data obtained via the Replica platform distributed geographically in Inyo County. Similar to the CVRP data, BEV trips appear to be focused around the urban areas including and surrounding Bakersfield. Additionally, as expected portions of Interstate 5 and State Route 99 show the highest concentrations of daily BEV traffic. The figure also shows that existing infrastructure (particularly DC Fast Chargers) tends to be located along these highways that display higher amounts of BEV traffic.

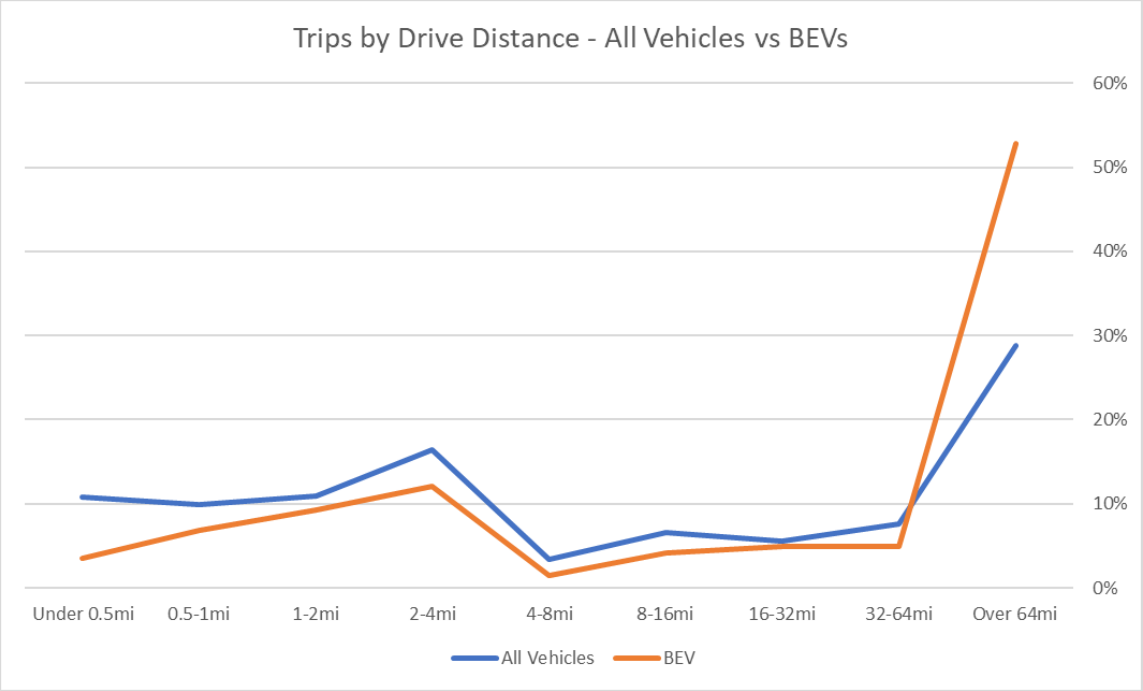


FIGURE 12: TRIPS BY DRIVE DISTANCE (REPLICA)

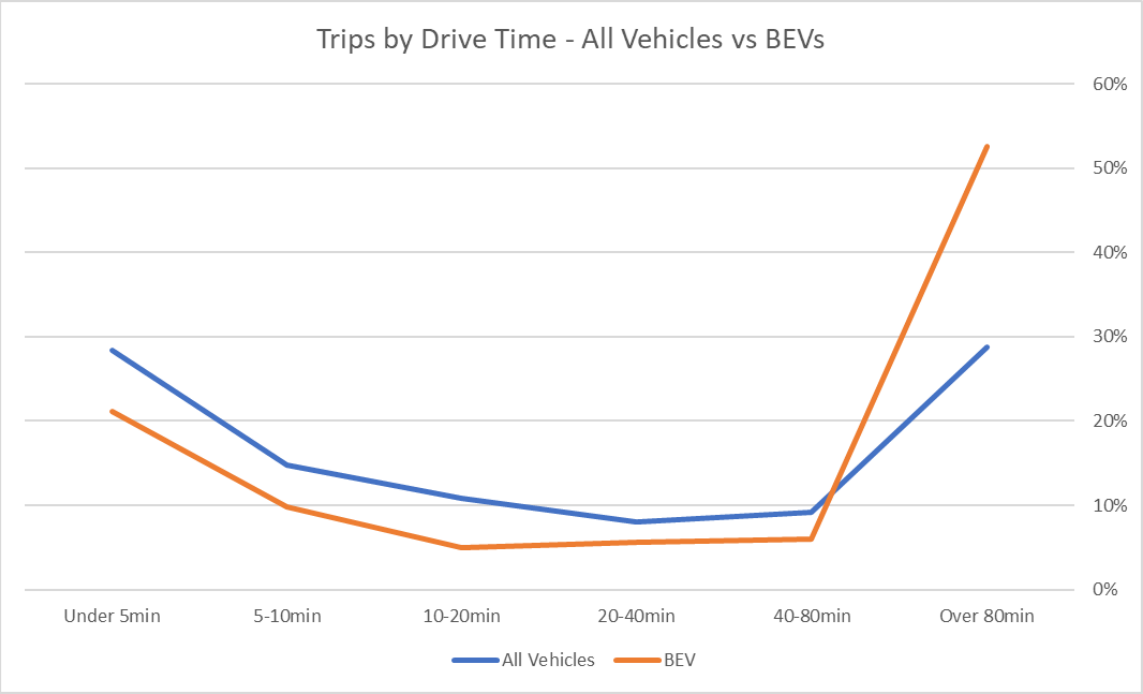


FIGURE 13: TRIPS BY DRIVE TIME (REPLICA)

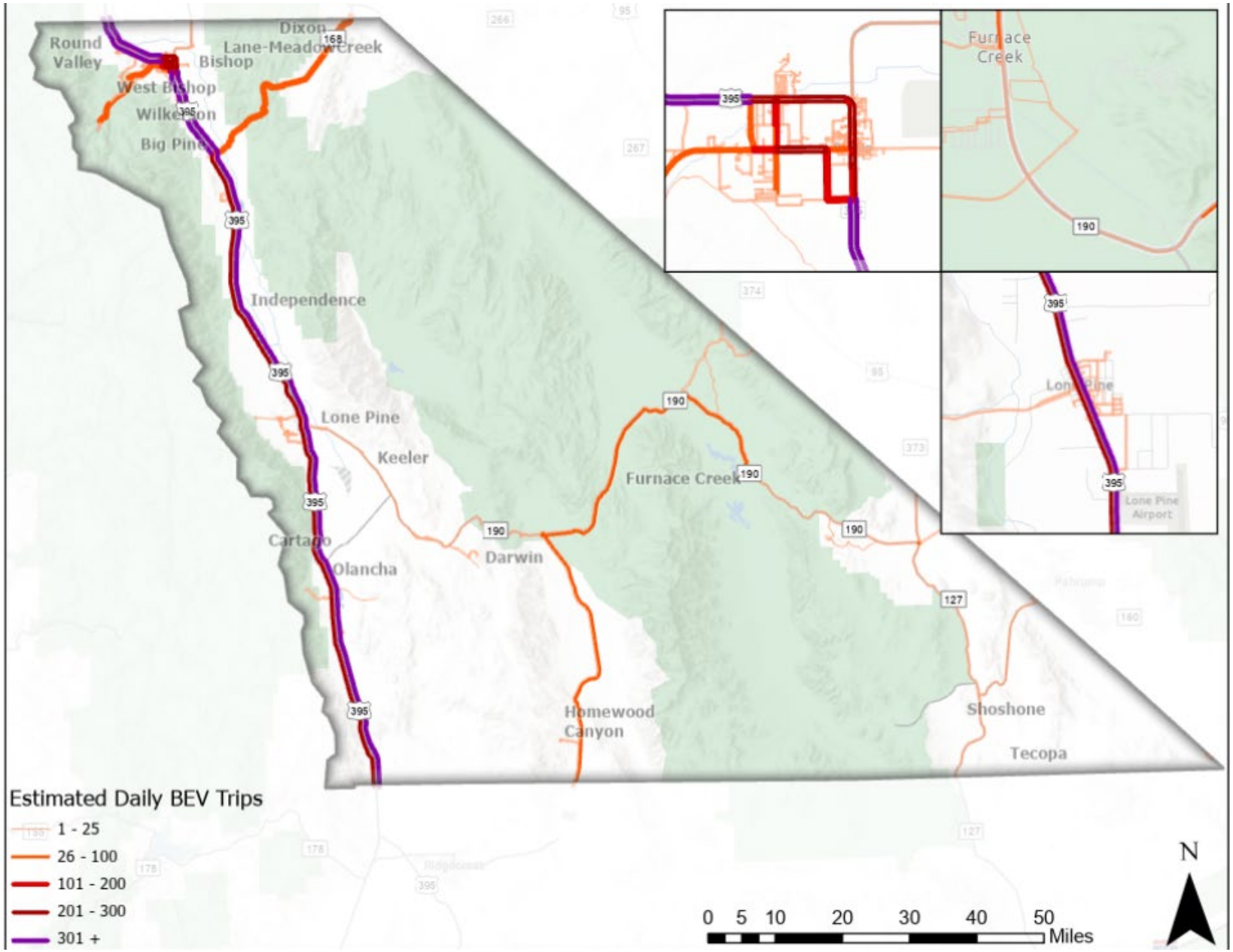


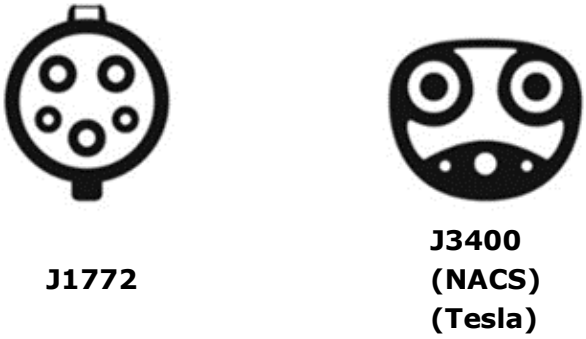
FIGURE 14: ESTIMATED BEV TRIPS IN INYO COUNTY

ELECTRIC VEHICLE CHARGING TYPES

Typical EV charging infrastructure consists of three main types, based on power output and therefore potential charging speed. The three main categories include "Level 1" which is a typical 110- or 120-Volt AC outlet, "Level 2" which typically consists of a 220- or 240-Volt energy source, and "Level 3" or DC Fast Charge, which typically consists of a higher power (480 Volt or higher) power source. For the purposes of this document, Level 1 is not discussed further, as it typically involves simply plugging into existing outlets and is hardly ever used for public charging, while Level 2 and DCFC are discussed in more detail. One often-used term in the EV charging industry is electric vehicle supply equipment (EVSE), which describes all electrical hardware and software needed to safely connect and EV to a power source for recharging. The terms "chargers", "charging stations", and "EVSE" can be and are used interchangeably in this document.

LEVEL 2 CHARGERS

The most common type of charging stations or EVSE is known as a Level 2 charger, though, technically speaking, the charger is on board the EV to convert alternating current (AC) power to direct current (DC) for storage in the EV's battery. In that sense, Level 2 EVSE is the electrical supply that powers an EV's onboard charger. In general, Level 2 EVSE supplies 220-240 Volts of AC and is usually capable of delivering 6-12 kilowatts (kW) of power, though some Level 2 EVSE can deliver up to 19.2 kW when supplied by 100-amp circuits. Level 2 EVSE can typically add between 15 and 40 miles of range to an EV per hour of charge, depending on the amperage of the circuit and the charging capabilities of the vehicle. As illustrated in **Figure 15**, there are two main connector types for Level 2 EVSE. The most common is the J1772 connector, which is compatible with all current plug-in electric vehicles (although Tesla vehicles need to use an adapter). The less typical, but often faster, connector is the Tesla connector (recently given the name North American Charging Standard, or NACS, by Tesla and soon to be confirmed by the US government as the J3400 connector). This connector is currently only compatible with Tesla vehicles without an adapter, however, many vehicle manufacturers have indicated that they will be adopting the NACS plug starting in 2025. It should be noted that, while most Tesla Destination chargers (the kind currently deployed locally) have Tesla connectors, the company has started producing and selling destination chargers with J1772 connectors.



J1772

J3400 (NACS) (Tesla)

FIGURE 15: LEVEL 2 CONNECTOR TYPES

Given that an EV with a depleted battery requires several hours or even overnight to recharge, drivers typically use Level 2 chargers for the two most common charging applications—residential and workplace charging. Residential charging typically takes place overnight while the EV is parked at the driver's home. The residential charger generally belongs to the owner of the home or property in the case of rentals, though some renters may use available 240 V or even 120 V (Level 1) outlets to plug in their own charger. Workplace charging occurs at the EV driver's place of employment with the charger provided by the employer or property owner/manager. The relatively long nightly parking (dwell) time for residential charging or daily dwell time for workplace charging makes this practical and convenient, and Level 2 charging can be provided at relatively low costs for many applications.

FIGURE 16: LEVEL 2 CHARGERS – OASIS AT DEATH VALLEY

Hotels, restaurants, and other local destinations may provide Level 2 chargers operated by commercial charging networks for public use as a customer amenity, often providing free or low-cost charging for patrons such as the one shown in **Figure 10**. Many models of networked or smart Level 2 chargers are available that can be managed to provide scheduled or reserved charging, automated load management, or demand response functionality to avoid charging during peak power demand periods reducing the cost of electricity.

DC FAST (LEVEL 3) CHARGERS

As previously discussed, EVs have onboard chargers capable of converting AC power to DC for storage in their battery packs. An EV can be charged faster directly through DC power using powerful chargers sometimes referred to as Level 3 or simply DC Fast Chargers (DCFC). These operate on 400+ Volts and are currently capable of providing between 25 kW and 350 kW of power. These chargers can add anywhere between 60 miles to 500+ miles of range per hour of charge depending on the power supply, charger rating, and EV's charging acceptance rate.

FIGURE 17: DCFC CONNECTOR TYPES

As illustrated in **Figure 17**, there are three main types of connectors associated with DC Fast chargers. The first and oldest type of charging connector is the CHAdeMO connector. This connector was developed in Japan and is typically compatible with vehicles manufactured in Japan (such as the Nissan Leaf) and some older European and North American EVs. Typically, CHAdeMO

chargers operate at a maximum of 50 kW power. The second and newest type of DCFC connector is the CCS connector (more commonly known as simply "CCS") consisting of AC connectors in the same pattern as the J1772 connector above two DC connectors. This connector was developed more recently and is compatible with most EVs produced in the past few years. Newer Nissan models use CCS chargers, so CHAdeMO is expected to be replaced by CCS going forward. CCS chargers deliver between 50 kW and 350 kW of power, making them capable of the fastest maximum charging speeds currently available to light-duty EVs, depending on the vehicle being charged. It should be noted that lower-capacity plug-in hybrid vehicles (PHEV) typically cannot use DCFC connectors. DCFC is the preferred charging technology for opportunity charging facilities serving travelers along freeway corridors and for the public when in need of a quick charge while performing short errands like highway locations as illustrated in **Figure 18** and dining out. On a per-unit basis, DC Fast Chargers are far more expensive to purchase and install (including required electrical service upgrades) than Level 2 chargers though they can charge far more EVs within the same amount of time. They are also more likely to incur demand charges from utilities and require more maintenance. Due to the higher capital and operations costs, users pay higher per-kWh charging costs in exchange for the convenience of much quicker charging speeds.

FIGURE 18: DCFC AT HIGHWAY REST STOP

DC Fast Chargers that can deliver greater than 150 kW are considered "high power" chargers due to their ability to charge EVs at much faster rates than typical 50kW chargers commonly used for public EV charging. High-power DC Fast Chargers have charging speeds ranging from 150 – 350kW, which allows a typical light-duty EV to charge to 80% in 35 minutes or less, depending on the EV's acceptance rate and charger's capability. With such rapid charging speeds, high-power chargers are especially suitable for interregional travelers in need of a quick charge as well as for trucks and other heavy-duty EVs needing to charge large-capacity batteries. For this reason, the National Electric Vehicle Infrastructure (NEVI) Formula Program requires that new chargers funded by the program will operate at a minimum of 150 kW. Since California's share from the NEVI Formula Program is estimated at $384 million over 5 years and significant additional discretionary Charging and Fueling Infrastructure (CFI) grant program funding will also be available, a major focus of this project will be planning for future high power charger deployment. Because of their much higher

FIGURE 19: RIVIAN ADVENTURE NETWORK DCFC

purchase and installation costs and power demands, it is generally more cost-effective to cluster high-power chargers near major transportation corridors for convenient access.

TESLA DCFC/HIGH POWER CHARGERS

FIGURE 20: TESLA SUPERCHARGER

As with Level 2 chargers, Tesla has its own DCFC network that up until recently was exclusively for use by Tesla vehicles. These stations use the same Tesla connector as on its Level 2 chargers shown previously. Tesla DCFC includes 72 kW "urban DC Fast chargers" as well as second (V2), third (V3), and fourth (V4) generation high-power chargers branded as "Superchargers" that have maximum charging speeds up to 150 kW, 250 kW, and 350 kW respectively. As stated previously, Tesla has recently renamed their connector the North American Charging Standard (or NACS) and many vehicle manufacturers have indicated that they will be adopting the NACS plug in 2025. A number of manufacturers (including Ford, GM, Rivian, Volvo, Polestar, and Nissan have begun either sending adapters free of charge or making adapters available for sale) to their customers. As of late 2024, Tesla has also rolled out a number of "Magic Docks" at their charging stations that include a built-in adapter for CCS vehicles that want to use the Tesla Superchargers. These are still fairly limited in number and are not available in all areas.

MEGAWATT CHARGING SYSTEM (MCS)

An even more powerful charging standard called the Megawatt Charging System (MCS) is beginning to be deployed to be able to charge medium and particularly heavy-duty EVs faster than current DCFCs are capable of. CharIN, who also developed the popular Combined Charging System (CCS), is currently working on an MCS standard. The proposed MCS would be rated to deliver up to 3.75 MW of DC power and can be expected to become the worldwide standard fast charging system for medium- and heavy-duty commercial vehicles. The system, if established, could significantly reduce charging times to as little as 10-20 minutes, even for heavy-duty (Class 7 or 8) vehicles.

EXISTING CHARGING INFRASTRUCTURE IN INYO COUNTY

The U.S. Department of Energy's Alternative Fuels Data Center (AFDC) provides an alternative fueling station locator using data for existing and planned stations. Data is provided by trade media, Clean Cities coordinators, infrastructure equipment and fuel providers, original equipment manufacturers, and regular station users. The station locator provides details about the station location, power level, plug, connector type, and charging network for alternative fueling stations.

The data set also includes whether the charging station is available to the public or only accessible to certain users (i.e., private or "behind the gate").

AFDC data shows that there are currently 18 public Level 2 charge ports and 83 DC Fast Charge ports within the boundaries of Inyo County and its communities. **Table 6** shows the number of Level 2 and DC Fast Charge ports currently in Inyo County by EV charging network. The table shows that 14 of the 101 total charge ports are non-networked, while over half of the total charge ports are Tesla Superchargers.

TABLE 6: EXISTING CHARGING PORTS IN INYO COUNTY – BY EV NETWORK

EV NETWORK	LEVEL 2		DC FAST CHARGE (DCFC)			TOTAL
	J1772	TESLA	CHADEMO	CCS	TESLA	
TESLA SUPERCHARGER					52	**52**
RIVIAN ADVENTURE NETWORK				15		**15**
ELECTRIFY AMERICA			2	6		**6**
TESLA DESTINATION		6				**6**
BLINK	3					**3**
SHELL RECHARGE	2					**2**
EVGATEWAY	1					**1**
NON-NETWORKED	6		4	4		**14**
TOTAL	**12**	**6**	**6**	**25**	**52**	**101**
	18			**83**		

Figure 21 shows the locations of all charge ports in Inyo County colored by charging network. The figure shows a clustering of chargers in the Bishop area that include Tesla Superchargers, Rivian Adventure Network chargers, and Electrify America chargers all clustered in or close to Bishop. There are additional Tesla Superchargers at Lone Pine and Rivian Adveture Network chargers at Olancha and Shoshone.

In total, Tesla Superchargers represent approximately 50% of the total charge ports countywide, with 52 charge ports at three Supercharger locations, Rivian Adventure network has 15 charge ports at three locations, and Electrify America has 6 charge ports at one location. Blink has 3 charge ports at one location at Furnace Creek (Death Valley). There are 14 charge ports listed by AFCD as non-networked.

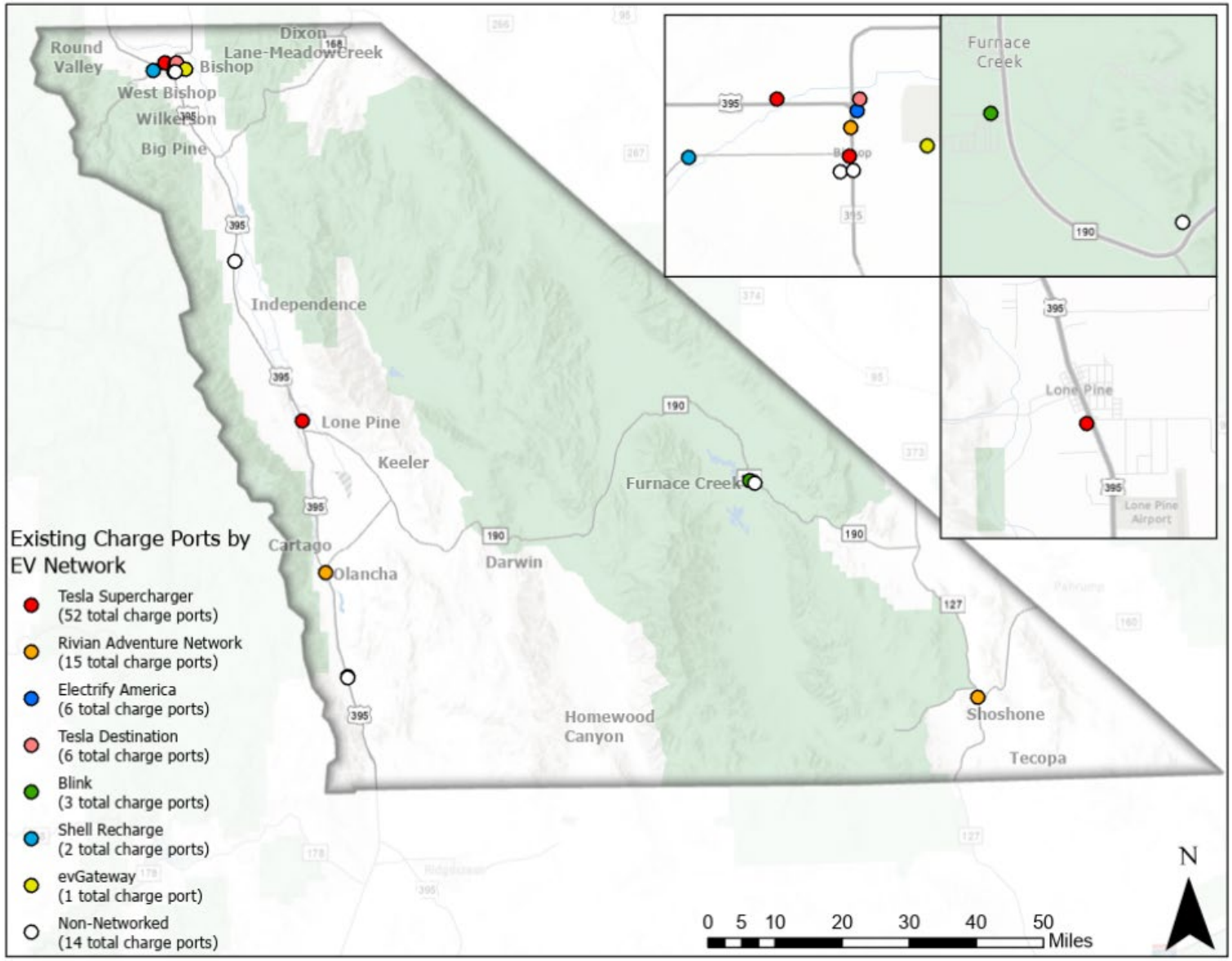


FIGURE 21: LOCATIONS OF EXISTING CHARGE PORTS BY EV NETWORK

Figure 22 shows the growth in Level 2, DCFC, and total chargers in Inyo County from 2010 through the end of 2024. The figure shows that growth in chargers was fairly limited between 2010 and 2019 and has since escalated more rapidly between 2019 and the end of 2024.

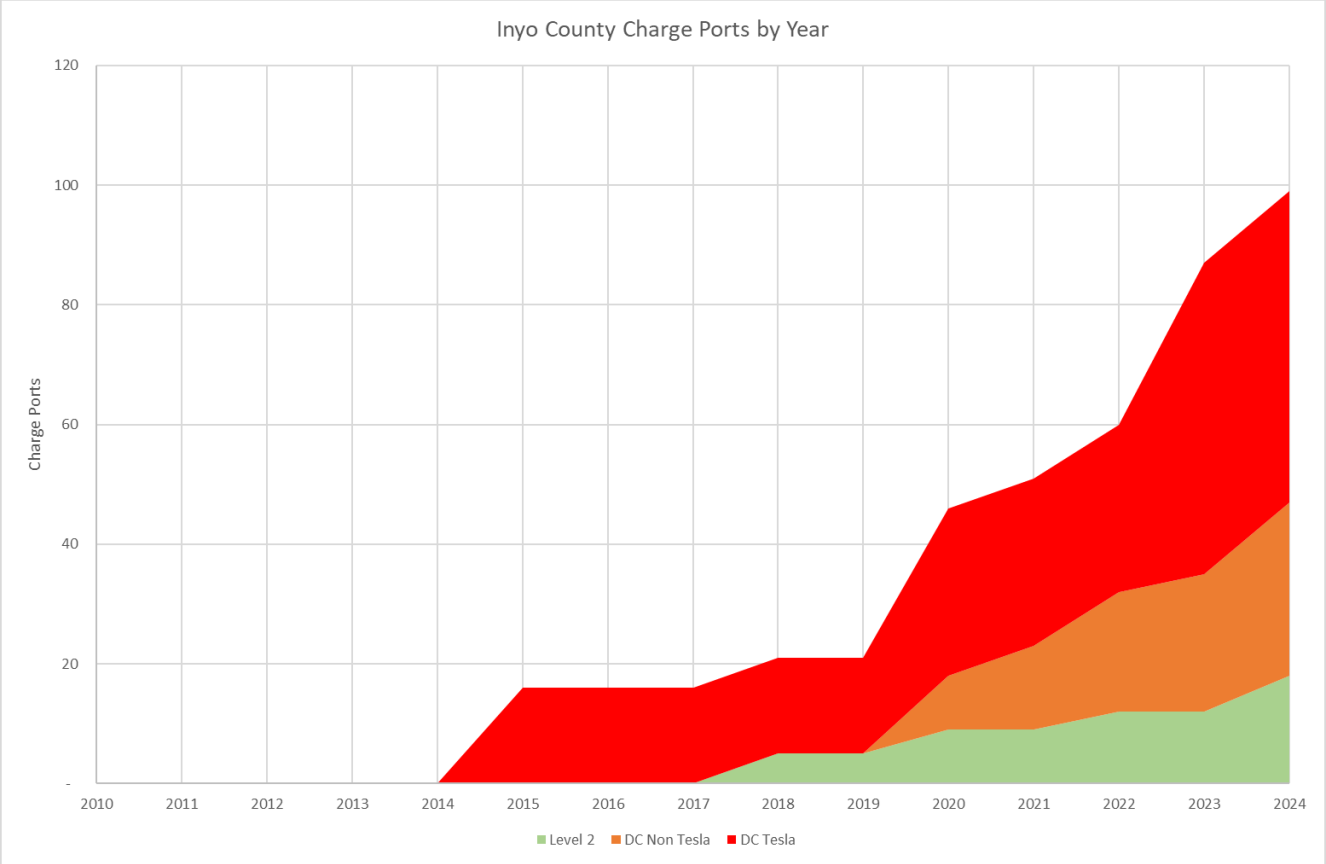


FIGURE 22: INYO COUNTY CHARGE PLUGS BY YEAR

LEVEL 2 CHARGERS

Table 7 and **Figure 23** show the locations of public Level 2 charging stations with a total of 18 charge ports in the County that are listed in the AFDC database. The table shows that all Level 2 charging locations in Inyo County have 6 or fewer charge ports. **Table 8** shows the opening year of Level 2 charger locations by network provider. The table shows that Blink was the first EV charger network to open chargers prior to 2020, while the 6 Tesla Destination chargers opened recently in 2024.

Figure 24 shows a 20-mile drive shed (representing approximately one hour of Level 2 charging for a typical EV) along with shorter 5-mile and 10-mile drive sheds. These drive sheds visualize the effective service area the existing public chargers in Inyo County provide for relatively quick access for EV drivers. The map shows that a fairly small percentage of Inyo County's land area is within 20 miles of any existing Level 2 chargers within the County. It should be noted that these drive sheds do not account for chargers located adjacent to but outside Inyo County.

TABLE 7: EXISTING LEVEL 2 CHARGERS (PLUGS) IN INYO COUNTY

STATION NAME	CITY/ COMMUNITY	EV NETWORK	YEAR OPENED	LEVEL 2 J1772	LEVEL 2 TESLA	TOTAL L2 PLUGS
Best Western Bishop Lodge - Tesla Destination	Bishop	Tesla Destination	2024	-	6	6
Ranch at Death Valley	Furnace Creek	Blink	2018	2	-	2
Inn at Death Valley	Death Valley	Blink	2018	1	-	1
Inn at Death Valley	Death Valley	Non-Networked	2018	2	-	2
Control Substation	West Bishop	Shell Recharge	2022	2	-	2
Eastern Sierra Transit Authority	Bishop	evGateway	2022	1	-	1
LADWP - Bishop Telecomm	Bishop	Non-Networked	2020	4	-	4
TOTAL				**12**	**6**	**18**

TABLE 8: EXISTING LEVEL 2 CHARGERS (PLUGS) IN INYO COUNTY – BY OPENING YEAR

EV NETWORK	2010-2019	2020	2021	2022	2023	2024	TOTAL
TESLA SUPERCHARGER	-	-	-	-	-	-	-
RIVIAN ADVENTURE NETWORK	-	-	-	-	-	-	-
ELECTRIFY AMERICA	-	-	-	-	-	-	-
TESLA DESTINATION	-	-	-	-	-	6	6
BLINK	3	-	-	-	-	-	3
SHELL RECHARGE	-	-	-	2	-	-	2
EVGATEWAY	-	-	-	1	-	-	1
NON-NETWORKED	2	4	-	-	-	-	6
TOTAL COUNTY	**5**	**4**	**-**	**3**	**-**	**6**	**18**

Note: Data through December 1, 2024

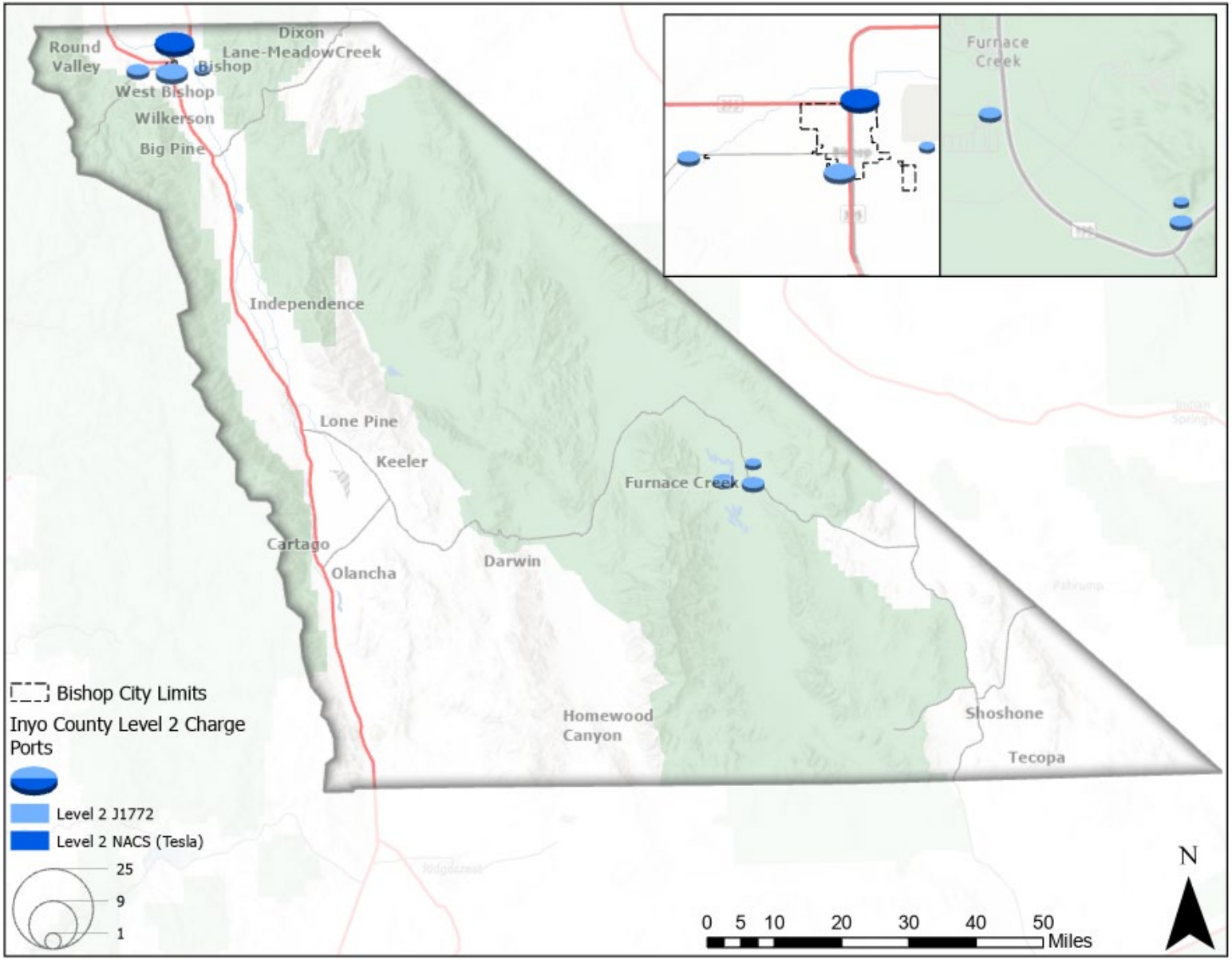


FIGURE 23: LEVEL 2 CHARGERS IN INYO COUNTY

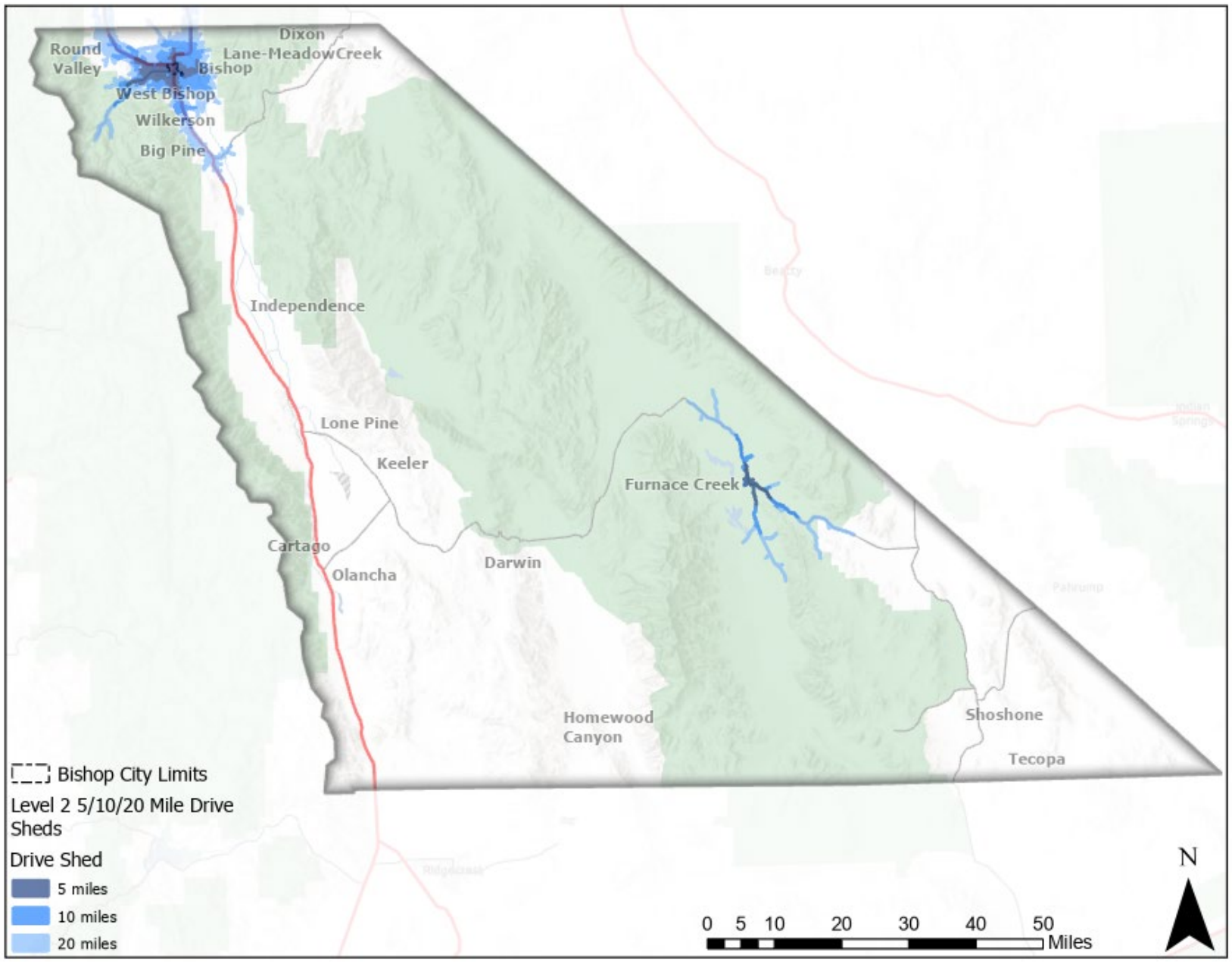


FIGURE 24: LEVEL 2 CHARGER 20-MILE SERVICE AREA

DC FAST CHARGERS

Table 9 and **Figure 25** show the locations of public DC Fast Chargers that are listed in the AFDC database. **Table 9** is sorted by total number of charging plugs by location (with a maximum of 24 Tesla Superchargers at the Rocking West Drive location in Bishop). The table shows that of the three stations with ten or more total DCFC plus, all are Tesla Supercharger locations.

TABLE 9: EXISTING DC FAST CHARGING PLUGS IN INYO COUNTY

NAME/STREET ADDRESS	CITY	EV NETWORK	YEAR OPENED	DCFC CHADEMO	DCFC CCS	DCFC TESLA	TOTAL PLUGS
Bishop, CA - Rocking West Drive - Tesla Supercharger	Bishop	Tesla Supercharger	2023			24	24
Lone Pine Film History Museum - Tesla Supercharger	Lone Pine	Tesla Supercharger	2015			16	16
Lot 13 - Tesla Supercharger	Bishop	Tesla Supercharger	2020			12	12
787 North Main Street	Bishop	Rivian Adventure Network	2022		6		6
601 US-395	Olancha	Rivian Adventure Network	2023		3		3
491 State Highway 127	Shoshone	Rivian Adventure Network	2024		6		6
Vons 1753 - Bishop, CA	Bishop	Electrify America	2020	1	3		4
Coso Junction Store	Olancha	Electrify America	2020	1	3		4
LADWP - Bishop Telecomm	Bishop	Non-Networked	2020	1	1		1*
Coso Junction Rest Area	Olancha	Non-Networked	2021	1	1		2
CalTrans - Division Creek Safety Roadside Rest Area	Independence	Non-Networked	2021	1	1		2
CalTrans - Bishop	Bishop	Non-Networked	2021	1	1		1*
TOTAL				**6**	**25**	**52**	**81**

Table 10 shows the number of DC Fast Chargers (plugs) by opening year and by charging network. The table shows that most of the existing DC Fast Chargers in Inyo County have been implemented since 2019, with the largest number of chargers opened in 2023. Rivian, a relatively new entrant in the DC Fast Charging landscape, has opened three locations with a total of 15 charge ports (6 in 2022, 3 in 2023, and 6 in 2024).

Figure 26 shows the estimated service area (50-mile driving distance, based on the maximum distance the National Electric Vehicle Infrastructure (NEVI) program prescribes for spacing of DCFC stations, as well as 25-mile for informational purposes) for DC Fast Chargers in Inyo County which covers most of the US 395 corridor, as well as the southeastern portion of the County, however large portions of the County are not within a 50-mile driving distance of a DC Fast Charge port.

TABLE 10: EXISTING DC FAST CHARGERS (PLUGS) IN INYO COUNTY – BY OPENING YEAR

EV NETWORK	2010-2019	2020	2021	2022	2023	2024	TOTAL
TESLA SUPERCHARGER	16	12	-	-	24	-	52
RIVIAN ADVENTURE NETWORK	-	-	-	6	3	6	15
ELECTRIFY AMERICA	-	8	-	-	-	-	8
TESLA DESTINATION	-	-	-	-	-	-	-
BLINK	-	-	-	-	-	-	-
SHELL RECHARGE	-	-	-	-	-	-	-
EVGATEWAY	-	-	-	-	-	-	-
NON-NETWORKED	-	1	5	-	-	-	6
TOTAL COUNTY	**16**	**21**	**5**	**6**	**27**	**6**	**81**

Note: Data through December 1, 2024

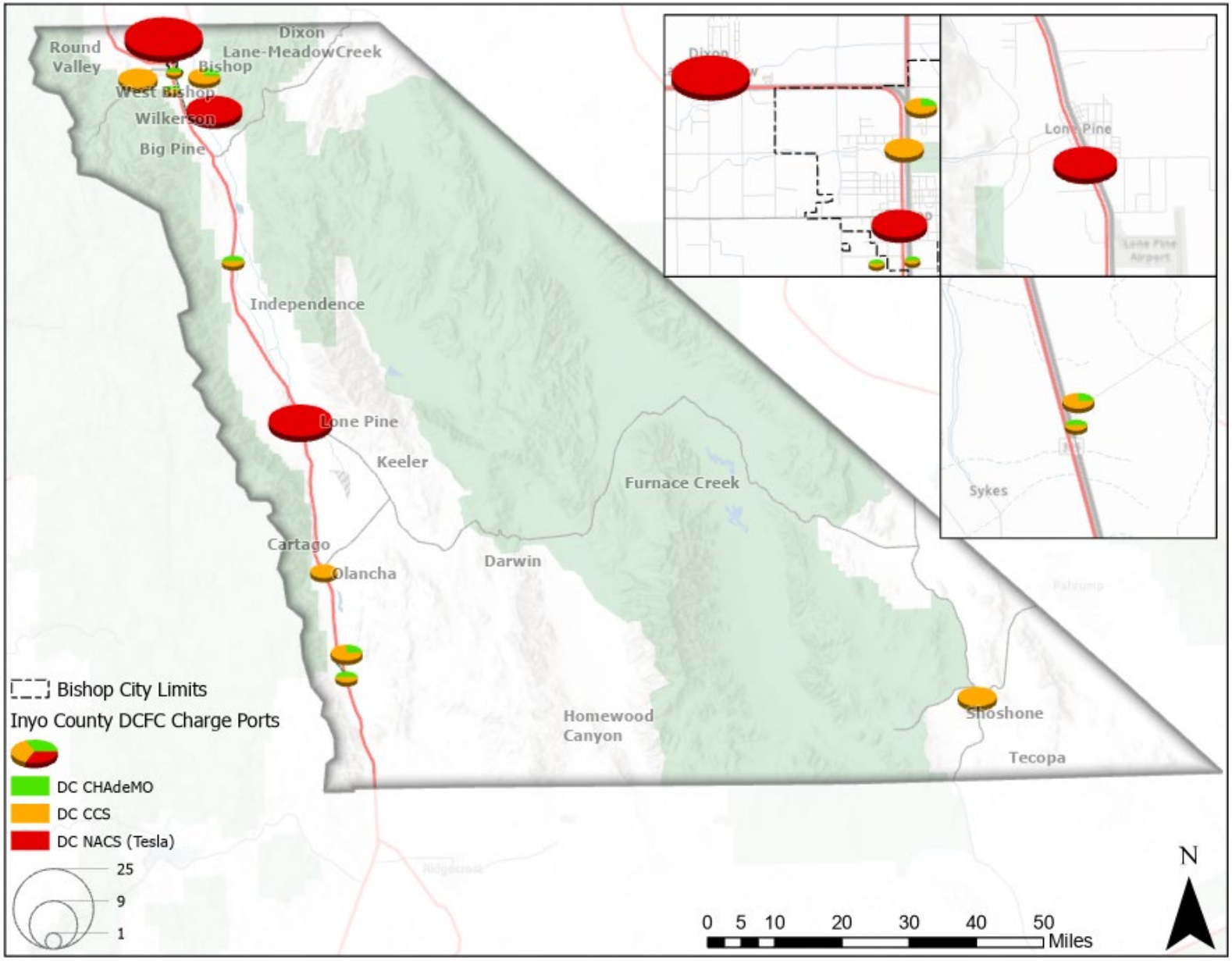


FIGURE 25: DC FAST CHARGER LOCATIONS IN INYO COUNTY

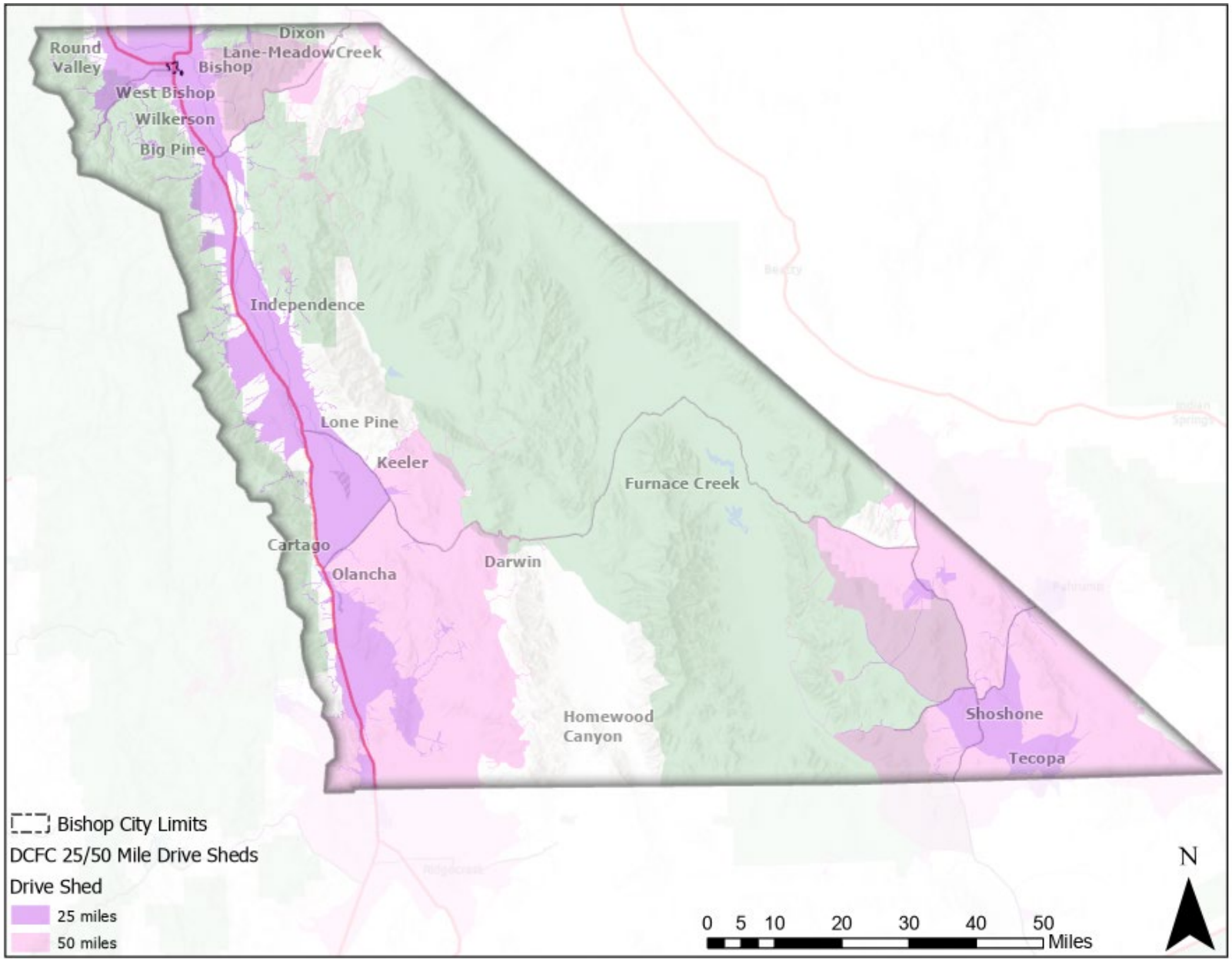


FIGURE 26: DC FAST CHARGER 50 MILE SERVICE AREA

CHARGING FOR MULTI-FAMILY HOUSING

A geographic analysis of existing MFDUs and public EV chargers indicates that a relatively small percentage of multi-family units are within a comfortable walk distance of ¼ mile while close to half of multi-family units are within a longer walk distance of ½ mile of existing public EV chargers. **Table 11** summarizes this data by community and Inyo County as a whole. The table shows that only multi-family units in Bishop have public Level 2 chargers (appropriate for overnight charging) within ½ or ¼ mile walking distance, while some units in Bishop and Lone Pine have public DC Fast Chargers (appropriate for quicker charging) within ¼ or ½ mile walking distance. **Figure 5** shows the locations of existing multi-family units and the ¼ and ½ mile walk sheds of existing Level 2 (L2) and DC Fast chargers countywide, along with the overlay to determine how many units are within walking distance of existing EV infrastructure.

TABLE 11: MULTI-FAMILY UNITS WITHIN WALKING DISTANCE OF PUBLIC EV CHARGERS

COMMUNITY	TOTAL MFDU	PERCENT WITHIN ¼ MILE WALK DISTANCE		PERCENT WITHIN ½ MILE WALK DISTANCE	
		L2	DCFC	L2	DCFC
BISHOP	790	3%	19%	12%	53%
BIG PINE	20	-	-	-	-
LONE PINE	75	-	-	-	32%
ROCKING K	9	-	-	-	-
COUNTYWIDE	894	2%	11%	11%	49%

ENERGY STORAGE IN INYO COUNTY

California is a world leader in energy storage with the largest deployment of batteries that store energy for the electricity grid. Energy storage is an important tool to support grid reliability and complement the state's abundant renewable energy resources. These technologies capture energy generated during non-peak times to be dispatched at the end of the day and into the evening as the sun sets and solar resources go offline, reducing dependence on fossil fuel generation to meet peak loads.

The Public Utilities Code defines an energy storage system as commercially available technology that absorbs energy, stores it for a specified period, and then dispatches the energy. From 2018 to 2024, battery storage capacity in California increased from 500 megawatts (MW) to more than 13,000 MW by late 2024. The state projects 52,000 MW of battery storage will be needed by 2045.

Inyo County, like the state, has seen a steady increase in energy storage in recent years. The California Energy Commission (CEC) maintains an online dashboard[12] that includes mapping and summarizing of energy storage by ZIP code, city, and county. The data (shown in **Figure 27** for the state as a whole and **Figure 28** for Inyo County) shows that Inyo County currently has about 61 MW of storage capacity, representing about 0.5% of the state's total of approximately 13,400 MW of storage. While the average capacity for installations across the state (currently approximately 195,000 installations) is approximately 68 kW, the average capacity for installations in Inyo County (currently 46 installations) is approximately 1,300 kW (much higher than the statewide average). The two figures also show that one of the largest installations in the state is located in Inyo County (thus leading to a much higher average capacity). The largest capacity installation is located at Little Lake, with smaller locations spread elsewhere in the County.

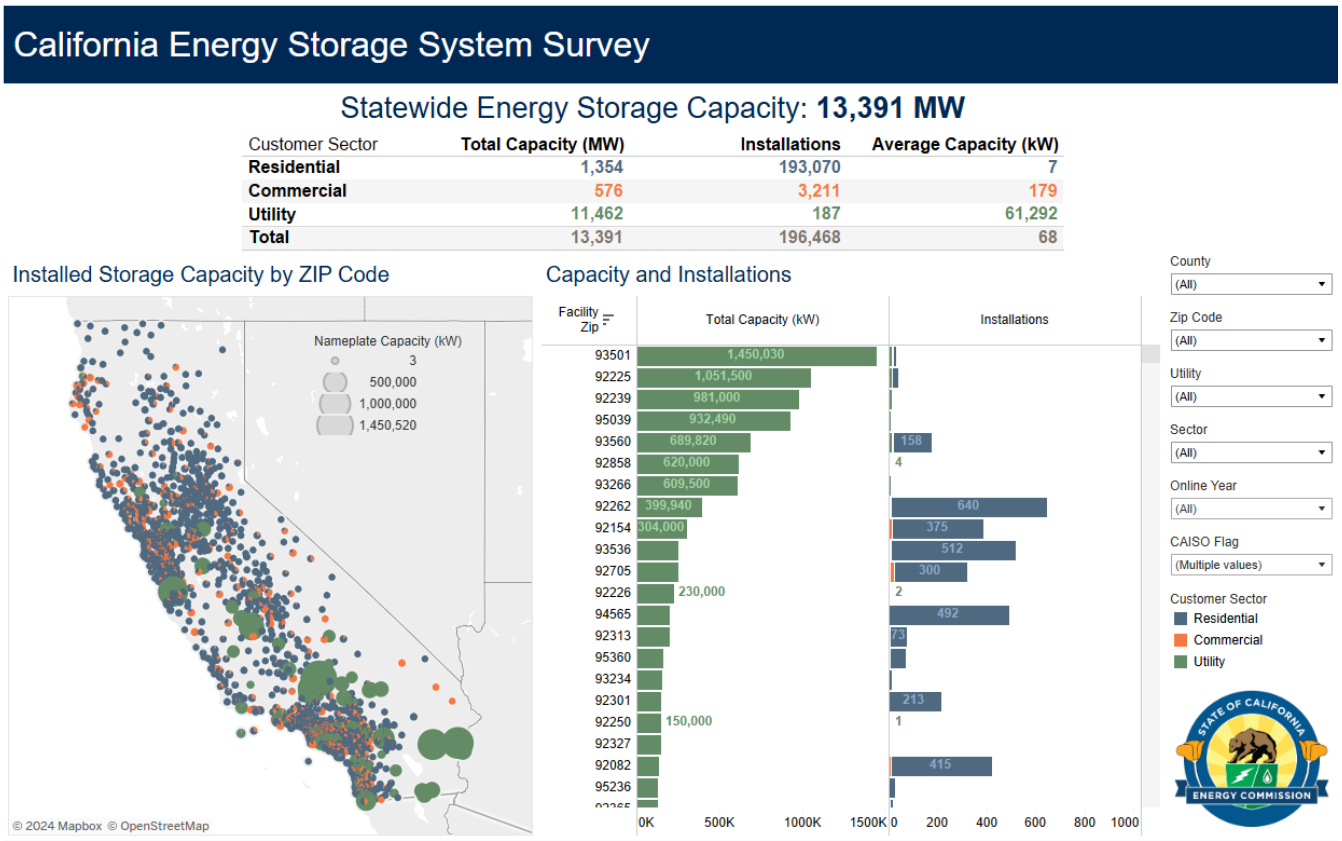


FIGURE 27: STATE OF CALIFORNIA ENERGY STORAGE DATA

[12] https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/california-energy-storage-system-survey

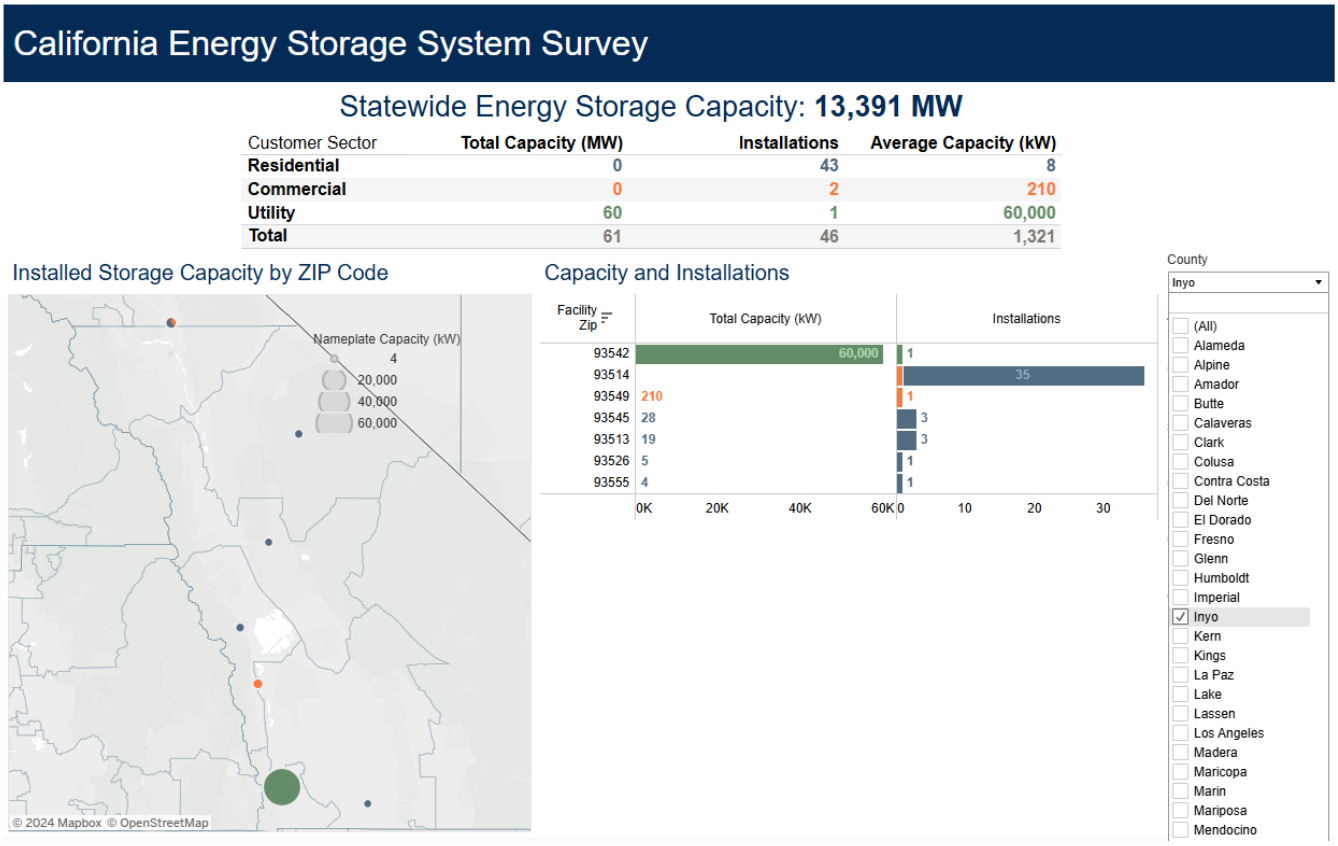


FIGURE 28: INYO COUNTY ENERGY STORAGE DATA