TECHNICAL MEMORANDUM

TO: James McRacken, Senior Biologist, Energy Renewal Partners

FROM: Michael Bumgardner, Bumgardner Biological Consulting

SUBJECT: Response to California Department of Fish and Wildlife Comment Related to Cal. Code Regs., tit. 14, § 783.2, subd. (a)(5) and the Incidental Take Permit Application (2081-2014-035-04) for the Panoche Valley Solar Farm

DATE: 3/14/2015

CC:

In regards to the February 9, 2015 comment from the California Department of Fish and Wildlife (CDFW) related to Cal. Code Regs., tit. 14, § 783.2, subd. (a)(5) and the *Incidental Take Permit Application (2081-2014-035-04) for the Panoche Valley Solar Farm* please see the following response. The comment reads as follows: "This section requires an analysis of whether and to what extent the project or activity for which the permit is sought could result in the taking of species to be covered by the permit. This section is incomplete because the Application does not describe all of the impacts to CTS. The Application discusses a stormwater detention basin east of one of the ponds, but the location of that detention basin is not disclosed. In addition, the Application does not quantify the types and extent of ground disturbances proposed in uplands occupied by the California tiger salamander. Lastly, the Application maps only a 1,969-ft buffer around breeding ponds and discusses impacts within only 2,300 ft of the ponds. The Application bases the analysis on outdated estimates of upland habitat use by CTS. In 2011, Searcy and Shaffer estimated that 95% of a CTS population's reproductive value is within 6,125 ft of the breeding pool, 90% is within 4,925 ft, and 50% is within 1,844 ft. CDFW considers those to be the best available estimates and should be the basis for assessing impacts and developing mitigation measures. Please map, describe the sources of, and quantify all proposed ground disturbances within each of the three buffer distances described by Searcy and Shaffer."

Use of the Searcy and Shaffer calculated CTS migration distances within which 50%, 90%, and 95% of the reproductive value of a breeding pond should be found would result in the percentages and total acreage of available upland habitat reflected in Table 1 being adversely affected for the five identified CTS breeding ponds (i.e., known, historic, and potential ponds) if all underlying assumptions related to the calculation of the distance thresholds (as determined for the Jepsom Prairie Preserve) are also applicable to the Panoche Valley.

TABLE 1. ACRES OF CTS ESTIVATION HABITAT AFFECTED BY THE PROJECT (BASED ON SEARCY & SHAFFER CALCULATED MIGRATION THRESHOLDS)

	Project Footprint		Conservation Lands		Private Land	
Buffer	**Acres**	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
0 - 562 meters	316.7	30.2%	546.3	52.1%	185.9	17.7%
562 - 1501 meters	1494.3	29.4%	2163.8	42.6%	1417.0	27.9%
1501 - 1866 meters	514.1	20.0%	1105.1	43.0%	949.9	37.0%
Cumulative Total	2325.1	26.7%	3815.2	43.9%	2552.8	29.4%

The Searcy and Shaffer model appears to be relatively robust when compared to the available data regarding CTS migration distances at other locations (e.g., Hastings Natural History Reservation in Monterey County). However, the Panoche Valley is drier (at the driest end of the spectrum for CTS) and has fewer potential movement nights during the CTS breeding season (based on the 2 mm rainfall threshold for CTS movement) than Jepsom Prairie Preserve and other sites addressed by Searcy and Shaffer (i.e., approximately 23% of the mean number of potential movement nights during immigration that were identified for Jepsom Prairie Preserve from 2005 to 2010) (see Table 2). As such, CTS in the Panoche Valley would be expected to move shorter total distances given fewer nights when there are suitable conditions for movement. Though there is no empirical data from the Panoche Valley to support this hypothesis, discussion with Christopher Searcy (personal communication, February 25 and 26, 2015) found no flaws in this logic.

Table 2 reflects rainfall data from the Panoche 2w weather station that is archived at the Western Regional Climate Center (http://www.wrcc.dri.edu/summary/Climsmcca.html). Specifically, Table 2 reflects the number of days per month for the months November through February from the years 1950-2014 in which cumulative rainfall for the day was 2 mm or greater (i.e., the threshold from the Searcy and Shaffer model for CTS movement). The Panoche 2w weather station is located at latitude/longitude 36.6066°/-120.8841° at the south end of the Panoche Valley (within a couple miles of the project). Analysis of the data set for the years 1950-2014 and 2004-2014 resulted in the estimates of the mean number of potential movement days during immigration (inbound) and emigration (outbound) that are reflected in Table 3.

TABLE 2. NUMBER OF DAYS WITH MINIMUM 2 MM RAINFALL AT PANOCHE 2W WEATHER STATION

Breeding Season	November	December	January	February
1950-1951	4	4	3	2
1951-1952	2	9	9	2
1952-1953	3	10	3	0
1953-1954	0	1	5	2
1954-1955	2	4	5	3
1955-1956	3	8	8	2
1956-1957	0	1	5	5
1957-1958	2	4	4	7
1958-1959	1	1	3	7
1959-1960	0	1	3	7
1960-1961	5	1	2	1
1961-1962	4	3	6	10
1962-1963	0	1	2	4
1963-1964	3	1	2	0
1964-1965	6	7	5	1
1965-1966	4	4	1	2
1966-1967	6	5	4	0
1967-1968	4	5	3	4
1968-1969	5	5	10	9
1969-1970	1	3	10	3
1970-1971	6	7	2	1
1971-1972	1	4	1	1
1972-1973	5	4	7	11
1973-1974	4	5	4	0
1974-1975	1	3	0	9
1975-1976	0	0	0	6
1976-1977	3	2	5	1
1977-1978	2	6	8	8
1978-1979	2	1	10	7
1979-1980	2	4	9	10
1980-1981	0	1	5	4
1981-1982	6	3	6	2
1982-1983	7	4	8	8
1983-1984	6	6	2	2

Breeding Season	November	December	January	February
1984-1985	6	6	3	2
1985-1986	7	2	3	8
1986-1987	1	3	5	6
1987-1988	3	5	3	2
1988-1989	2	6	3	2
1989-1990	1	0	3	5
1990-1991	1	3	2	4
1991-1992	1	4	3	7
1992-1993	0	7	11	10
1993-1994	3	2	3	6
1994-1995	5	3	17	3
1995-1996	0	7	6	11
1996-1997	2	7	12	0
1997-1998	9	5	10	10
1998-1999	4	3	7	3
1999-2000	1	0	8	11
2000-2001	1	1	6	7
2001-2002	3	8	3	1
2002-2003	2	7	1	5
2003-2004	1	6	3	5
2004-2005	2	5	3	7
2005-2006	0	0	0	0
2006-2007	2	5	3	7
2007-2008	1	3	9	6
2008-2009	2	3	4	8
2009-2010	0	6	6	7
2010-2011	5	13	3	6
2011-2012	3	1	2	3
2012-2013	0	0	0	0
2013-2014	2	1	1	6
Totals (1950-2014)	170	250	303	299
Average per Month (1950-2014)	2.7	3.9	4.7	4.7
Totals (2004-2014)	17	37	31	50
Average per Month (2004-2014)	1.7	3.7	3.1	5

TABLE 3. MEAN DAYS WITH AT LEAST 2 MM RAINFALL FOR THE IDENTIFIED PERIODS IN THE PANOCHE VALLEY[1, 2]

Data Period	Mean Potential CTS Movement Days
1950 - 2014	
Immigration (Nov 1 – Dec 15)	4.7
Emigration (Jan 16 – Feb 28)	7.1
2004 - 2014	
Immigration (Nov 1 – Dec 15)	3.6
Emigration (Jan 16 – Feb 28)	6.6

Notes:

1 Similar to the Searcy and Shaffer (2011) model, it is assumed that most if not all CTS in the Panoche Valley are at the breeding ponds and not moving during approximately Dec 16 – Jan 15).

2 The calculation of mean number of potential movement nights for immigration (for each period of record) is calculated as the sum of the mean number of potential movement nights for November and 50% of the mean number of potential movement nights for December. The calculation of mean number of potential movement nights for emigration (for each period of record) is calculated as the sum of the mean number of potential movement nights for February and 50% of the mean number of potential movement nights for January.

Unless the CTS within the Panoche Valley are behaving in a manner that is different from the CTS populations that have been studied elsewhere in California, the available data suggests that individuals in the Panoche Valley are moving away from their breeding ponds no more than 678 m (2,223 ft). This latter maximum migration distance corresponds to Searcy and Shaffer's ecophysiological maximum migration distance (calculated as the maximum sustainable migration rate [188.2 m/night] x maximum number of suitable movement nights [a mean of 3.6 nights during the CTS breeding seasons of the most recent 10-year period of record] where the number of available suitable movement nights during either immigration or emigration (whichever was smaller) was chosen as the maximum number of suitable movement nights for both immigration and emigration). This calculation suggests that virtually all CTS in the Panoche Valley should be located within 2,223 ft of the identified breeding ponds. If CTS in the Panoche Valley are behaving differently (i.e., in a way that allows them to migrate further than the above calculated ecophysiological maximum migration distance), the model and its assumptions should be considered insufficiently robust to apply to this location. As such, it is my opinion that the most applicable distance threshold for CTS in the Panoche Valley is 678 m (2,223 ft) from the identified breeding ponds (i.e., the distance in which virtually all CTS in the valley should be found). This distance is consistent with the Searcy and Shaffer model and its assumptions, while the calculated migration distances associated with the 50%, 90%, and 95% population thresholds that were determined for the Jepsom Prairie Preserve are not (given the substantially fewer number of suitable movement nights in the Panoche Valley).

Use of the ecophysiological maximum migration distance, as determined for CTS in the Panoche Valley, results in a more accurate estimate of the CTS estivation habitat that is associated with the project footprint, dedicated conservation lands, and adjacent private land (see Table 4).

TABLE 4. ACRES OF CTS ESTIVATION HABITAT AFFECTED BY THE PROJECT (BASED ON ECOPHYSIOLOGICAL MAXIMUM MIGRATION THRESHOLD FOR PANOCHE VALLEY)

	Project Footprint		Conservation Lands		Private Land	
Buffer	**Acres**	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
0 - 678 meters	463.9	31.7%	726.4	49.7%	272.5	18.6%

Literature Cited

Searcy, C. A., and H. B. Shaffer. 2011. Determining the migration distance of a vagile verbal pool specialist: How much land is required for conservation of California tiger salamanders? Pages 73-87 in D. G. Alexander and R. A. Schlising (Editors), Research and Recovery in Vernal Pool Landscapes. Studies from the Herbarium, No. 16. California State University, Chico, CA.