Appendix O

Fragmentation Effects

Yolo HCP/NCCP Indirect Effects Analysis 7/15/16

California tiger salamander

Proposed Methodology from Scope of Work: Assess the indirect effect of reduced suitability/value of potentially upland habitat when a potential breeding pond is removed. Identify potential California tiger salamander (CTS) breeding ponds that would be removed by covered activities. Provide for site specific knowledge of conditions and adjust accordingly. For example, the "vineyard pond" in the Dunnigan Hills Specific Plan area would not be included in the calculation because although it is mapped as potential CTS breeding habitat, it does not provide suitable habitat conditions. Similar, modelled habitat in the Yolo Bypass area where there are no know occurrences of the species would also not be included. Where potential breeding ponds are removed, calculate the acres of mapped upland habitat within 1.2 miles of the pond. Of this acreage, remove any land that is part of covered activities as loss of this acreage is already counted as part of the direct effects. Any remaining mapped upland habitat would be the acreage of indirect effect.

We will assess if there is any suitable upland habitat that is identified as being subject to this indirect effect, but is within 1.2 miles if another breeding pond that is preserved. If we run across this situation, we will discuss the best approach to adjusting the indirect effects analysis based on the site specific conditions.

Modified Approach: Focusing on 12 acres of aquatic habitat removed identified in HCP/NCCP. We identified potential upland habitat within 1.2 miles of these 12 acres and took out any portions that were already considered removed by covered activities. Of the remaining upland habitat, we identified areas that would still remain within 1.2 miles of another source of aquatic habitat. So, although one pond might be removed, upland habitat in the vicinity would still have another source of aquatic habitat available and would remain viable. Ultimately, what we identify are locations of upland habitat that would no longer be within 1.2 miles of any suitable aquatic habitat after the removal of the 12 acres from covered activities.

Results: With the removal of 12 acres of aquatic habitat, there would be approximately 3,600 acres of upland habitat within 1.2 miles of these water bodies that would no longer have access to these specific water bodies. However, there are multiple other locations in the vicinity that provide aquatic habitat for CTS. So, if the indirect effect is defined as upland habitat that no longer has any suitable aquatic habitat within 1.2 miles, then approximately 55 acres of upland CTS habitat would be subject to indirect effects.

Western pond turtle

Proposed Methodology from Scope of Work: Assess the indirect effect of reduced suitability/value of potential upland habitat when potential aquatic habitat is removed. The calculation of this indirect effect for western pond turtle (WPT) would follow the same general approach as described above for CTS. The maximum distance of upland habitat from aquatic habitat is identified as 1,640 feet in the HCP/NCCP habitat model; therefore, this is the distance from aquatic habitat where indirect effects will be calculated. The effects analysis will focus on complete losses of relatively isolated aquatic habitat (e.g., ponds). For linear aquatic habitat (streams, creeks) where only a small amount of the overall habitat will be removed or disturbed, indirect effects on upland habitat would not be calculated because there would still be aquatic habitat to continue supporting species populations in the immediate vicinity of suitable upland habitat.

Modified Approach: Taking into account other nearby aquatic habitat. Like the modified approach for CTS, we have refined the definition of indirect effects on upland habitat to consist of upland habitat

that is no longer within 1,640 feet of any aquatic habitat after the estimated removal of relatively isolated aquatic habitat from covered activities.

Results: With the removal of relatively isolated portions of aquatic habitat from covered activities, there would be approximately 1,078 acres of upland habitat within 1,640 feet of these water bodies that would no longer have access to these specific water bodies. However, there are other water bodies in the vicinity of these locations that provide aquatic habitat for WPT. So, if the indirect effect is defined as upland habitat that no longer has any suitable aquatic habitat within 1,640 feet, then approximately 569 acres of upland WPT habitat would be subject to indirect effects.

Giant garter snake

Proposed Methodology from Scope of Work: Assess the indirect effect of reduced suitability/value of potential upland habitat when potential aquatic habitat is removed. The calculation of this indirect effect for giant garter snake (GGS) would follow the same general approach as described above for CTS. Suitable aquatic habitat is defined in the HCP/NCCP habitat model as the rice, aquatic, and freshwater emergent habitat categories. The maximum distance of upland habitat from aquatic habitat is identified as 200 feet for active season habitat and 800 feet for overwintering habitat. The effects analysis will focus on upland habitat that is no longer within 200 feet/800 feet of suitable aquatic habitat based on removal of aquatic habitat from covered activities.

Results:

- 68.7 acres of Active Season Upland Habitat within 200 feet of suitable aquatic habitat that is removed

- 194.8 Acres of Overwintering Habitat within 800 feet of suitable aquatic habitat that is removed

Swainson's hawk

Proposed Methodology from Scope of Work: Asses the indirect effect of reduced suitability/value of potential nesting habitat when potential foraging habitat is removed. Home ranges (calculated as minimum convex polygons) for 12 Swainson's hawks (SWHA) in the Central Valley, including six in Yolo County, averaged 27.6 square kilometers (km2)(10.7 square miles [mi2]) (Estep 1989). Therefore, a radius of about 3.27 miles would generally indicate the home range and foraging habitat required for successful nesting. Using this data, suitable nesting habitat, based on the HCP/NCCP habitat model will be buffered by 3.27 miles. Total currently available suitable foraging habitat within this buffer will be calculated, as well as the acreage removed by covered activities. The acres removed would be an indication of the indirect reduction in the suitability/value of nesting habitat resulting from the removal of foraging habitat within potential nest territories. This loss can be balanced against the preservation/restoration/enhancement of SWHA foraging habitat resulting from the HCP/NCCP.

Due to the size of the foraging buffer area (3.27 mile radius) and the disbursed nature of potential SWHA nesting habitat in the Plan Area, it is possible that the buffer area encompasses the whole County and there is no distinction between the indirect effect foraging habitat loss calculation and the countywide habitat loss calculated for the HCP/NCCP. If this is the case, then calculation of the indirect effect would not be needed.

Results:

Indirect Effects Analysis				*Data from HCP/NCCP*		
Category of Potential Foraging Habitat	Total Foraging Habitat Within 3.27 miles of nesting habitat	Foraging Habitat Within 3.27 miles of nesting habitat removed by covered activities	Percentage of Total Removed by Covered Activities	*Total Foraging Habitat in Plan Area (per Table 5-5 in Feb. 2016 HCP/NCCP)*	*Total Foraging Habitat Removed (per Table 5-5 in Feb. 2016 HCP/NCCP)*	*Percentage of Total Removed by Covered Activities*
Agricultural Foraging	213,900	9,101	4.25%	*214,078*	*9,399*	*4.4%*
Natural Foraging	77,948	593	0.76%	*79,336*	*1,407*	*1.8%*
Total	291,848	9,694	3.3%	*293,414*	*10,806*	*3.7%*

- Indirect effects analysis obtains results very similar to direct effect impact analysis in the HCP/NCCP. Indicates anticipated scenario that the foraging buffer is so large that it encompasses all, or almost all, foraging habitat in the County and there is no distinction between the indirect effect foraging habitat loss calculation and the countywide habitat loss calculated for the HCP/NCCP. Therefore, no result for indirect effects analysis.

White-tailed kite

Proposed Methodology from Scope of Work: Asses the indirect effect of reduced suitability/value of potential nesting habitat when potential foraging habitat is removed. The calculation of indirect effects for white-tailed kite (WTKI) would follow a similar methodology to that described above for SWHA. According to data from Appendix A in the HCP/NCCP, "White-tailed kites generally hunt from a central perch over areas as large as 3 square kilometers (km2) (Warner and Rudd 1975), but foraging usually occurs within 0.8 km from the nest during the breeding season" (Hawbecker 1942). Therefore, the indirect impact buffer for potential foraging habitat would be 0.5 miles (0.8 km) from potential nesting habitat.

Results:

Indirect Effects Analysis				*Data from HCP/NCCP*		
Category of Potential Foraging Habitat	Total Foraging Habitat Within 0.5 miles of nesting habitat	Foraging Habitat Within 0.5 miles of nesting habitat removed by covered activities	Percentage of Total Removed by Covered Activities	*Total Foraging Habitat in Plan Area (per Table 5-5 in Feb. 2016 HCP/NCCP)*	*Total Foraging Habitat Removed (per Table 5-5 in Feb. 2016 HCP/NCCP)*	*Percentage of Total Removed by Covered Activities*
Primary Foraging	97,464	2,057	2.1%	*101,758*	*2,609*	*2.6%*
Secondary Foraging	127,312	7,118	5.6%	*134,740*	*7,969*	*5.9%*

Total	224,776	9,175	4.1%	*236,498*	*10,578*	*4.5%*

- Indirect effects analysis obtains results very similar to direct effect impact analysis in the HCP/NCCP. Indicates anticipated scenario that the foraging buffer encompasses almost all foraging habitat in the County and there is no distinction between the indirect effect foraging habitat loss calculation and the countywide habitat loss calculated for the HCP/NCCP. Therefore, no result for indirect effects analysis.

Tricolored blackbird

Proposed Methodology from Scope of Work: Asses the indirect effect of reduced suitability/value of potential nesting habitat when potential foraging habitat is removed. Suggest following a similar methodology for calculating indirect impacts for tricolored blackbird (TCBB) as was described for SWHA and WTKI. Indirect impacts to nesting tricolored blackbirds would be calculated based on the acreage of potential foraging habitat removed by Covered Activities within 8 miles of modeled nesting habitat (8 miles is considered suitable foraging distance according to Appendix A in the HCP). Like for SWHA, due to the size of the foraging buffer area (8 mile radius) and the disbursed nature of potential TCBB nesting habitat in the Plan Area, it is possible that the buffer area encompasses the whole County and there is no distinction between the indirect effect foraging habitat loss calculation and the countywide habitat loss calculated for the HCP/NCCP. If this is the case, then calculation of the indirect effect would not be needed.

Results:

Indirect Effect Analysis			*Data from HCP/NCCP*		
Total Foraging Habitat Within 8 miles of nesting habitat	Foraging Habitat Within 8 miles of nesting habitat removed by covered activities	Percentage of Total Removed by Covered Activities	*Total Foraging Habitat in Plan Area (per Table 5-5 in Feb. 2016 HCP/NCCP)*	*Total Foraging Habitat Removed (per Table 5-5 in Feb. 2016 HCP/NCCP)*	*Percentage of Total Removed by Covered Activities*
261,065	7,845	3.0%	*261,133*	*8,942*	*3.4%*

- Indirect effects analysis obtains results very similar to direct effect impact analysis in the HCP/NCCP. Indicates anticipated scenario that the foraging buffer is so large that it encompasses almost all foraging habitat in the County and there is no distinction between the indirect effect foraging habitat loss calculation and the countywide habitat loss calculated for the HCP/NCCP. Therefore, no result for indirect effects analysis.