State Route 94 Culvert and Bridge Evaluation

Background

State Route (SR-) 94 is a two lane highway which passes through the community of Jamul in the southern portion of the County of San Diego (Figure 1). SR-94 divides the California Department of Fish and Wildlife's (CDFW) Rancho Jamul Ecological Reserve (RJER) from its Hollenbeck Canyon Wildlife Area (HCWA). These properties constitute a major portion of the County of San Diego's Multiple Species Conservation Plan - South County Subarea Plan Core Area. Core areas are intended to provide source populations and allow for genetic diversity to sustain those populations throughout the plan area for all species covered by the MSCP through connections to other core areas. CDFW considers the roadway which bisects this primary core area of the MSCP to be a significant impediment to wildlife movement.

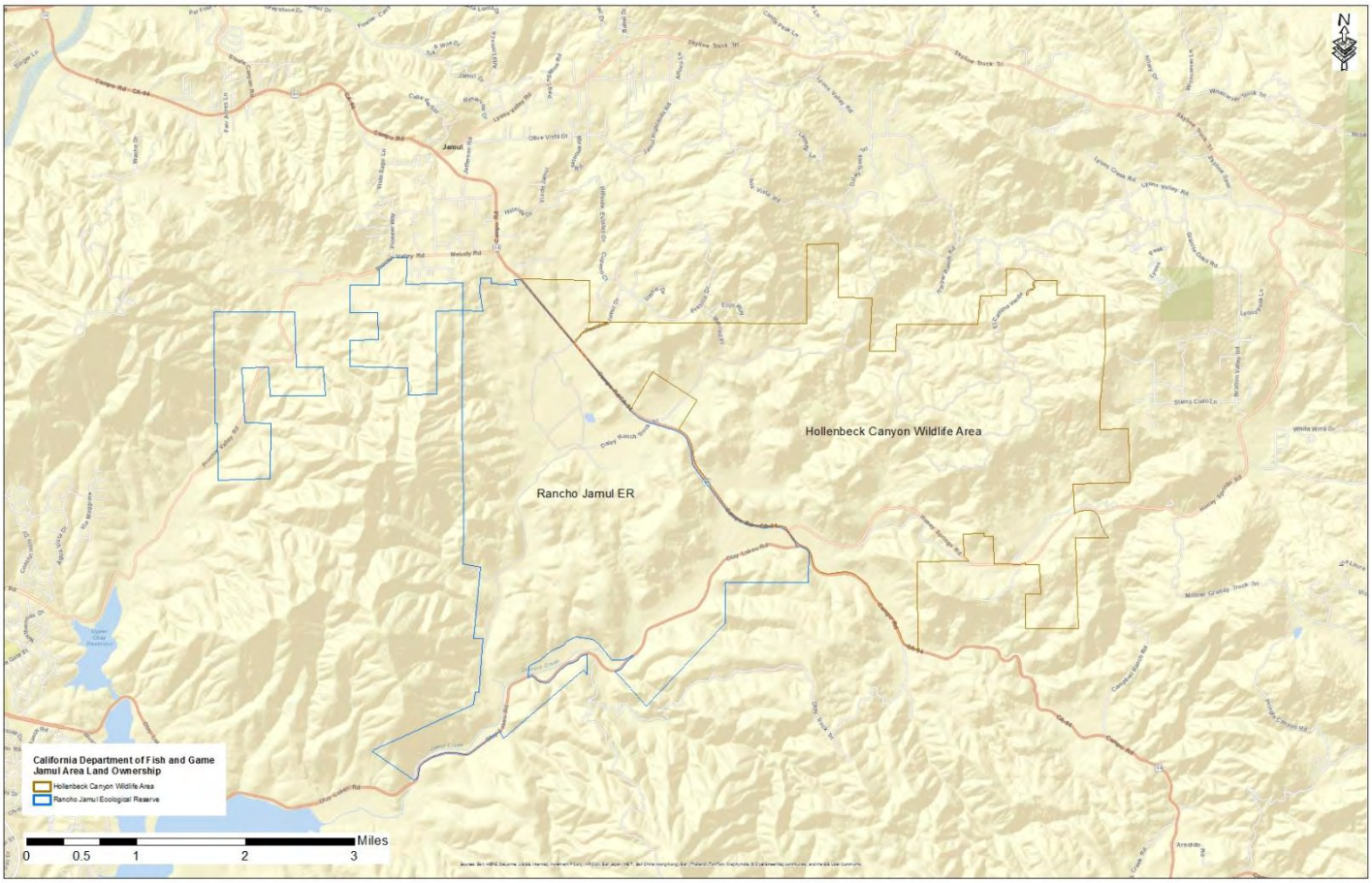

Figure 1. Vicinity Map.

Purpose

In order to facilitate potential enhancements to the State Route (SR-) 94 for wildlife movement, an initial assessment was performed to identify current road undercrossings which may be suitable for wildlife movement between Rancho Jamul Ecological Reserve (RJER) and Hollenbeck Canyon Wildlife Area (HCWA), between Otay Lakes Road at the South end of RJER and the Jamul Indian Village at the North end.

Methods for evaluating wildlife use

This assessment of culverts and bridges as potential wildlife crossings was performed by Senior Environmental Scientist (Specialist) Tim Dillingham on September 12, 2013 as a background study to determine the number of structures which could provide suitable opportunities for wildlife to safely cross under State Route 94 from the Rancho Jamul Ecological Reserve (RJER) and the Hollenbeck Canyon Wildlife Area adjacent to SR-94.

Each culvert and bridge was examined from both sides, and an attempt was made to look or pass through the undercrossing to determine connectivity. A 30 foot Stanley English unit tape measure was used to determine size of the culverts (diameter and length) and bridges (width, height and length). Photographs were taken with a Nikon digital format SLR camera at 14 megapixel resolution. Mile post locations were determined using the Caltrans Earth internet site.

This assessment contains photographs of the undercrossings, location information on each culvert and bridge within this segment of SR-94, a description of the structure, a professional opinion on the suitability of the crossings, and recommendations for improving the crossing, where possible.

Methods for evaluating safety issues

CDFW staff reviewed known accident information, observed traffic volume and vehicle speeds, and general observations relative to traffic volume, vehicle speeds, passing, and line of sight. Safety recommendations are based on staff experiences accessing and driving on Highway 94, and concerns expressed by visitors to the CDFW properties. No traffic studies were done.

Discussion

The structures are listed from north to south, starting at the entrance to the Jamul Indian Village property, and ending at the Otay Lakes Road intersection with SR-94. Caltrans Post Mile (PM) markers are listed for location purposes. The Dulzura Creek watershed includes Jamul Creek, Hollenbeck Creek, Dulzura Creek and all unnamed tributaries of those streams. All drainages flow from east to west towards Lower Otay Lake, Otay River and ultimately San Diego Bay.

Location 1 - PM 21.508 Daley Dip

a. Existing Conditions: The "Daley Dip" is an Arizona style crossing with three 3-foot diameter RCP pipes beneath the roadway. Fencing is a three strand barbed wire fence subject to storm flow damage.
b. Wildlife Evaluation: Wildlife crosses at this location at grade because sediment fills the culverts following most storm events and in generally maintained only immediately prior to a storm event. Numerous road kill events at this location both documented and observed prior to establishment of the road kill data base.
c. Safety Evaluation: Traffic slows for the dip crossing and often vehicles will tailgate slower vehicles. During storm events water flows over the roadway slowing traffic further, and occasionally stops traffic during heavy flood events. Vehicles may also swerve to avoid striking wildlife.
d. Recommendations: Raising the roadway to eliminate flooding would also allow better wildlife crossing if properly designed. Installation of a bridge would be the preferred alternative to minimize encroachment into habitat, although large culverts would provide a suitable crossing as well.

Figure 2. Looking west into RJER.

Figure 3. Looking west from HCWA. Note 3 foot diameter pipes almost entirely buried in sediment.

Figure 4. Looking east into HCWA.

Location 2 - PM 21.708: Culverts northwest of Rancho Jamul Road.

a. Existing Conditions: Three 4 foot diameter side by side culverts. Fencing is a 4 foot tall field fence topped with a single strand barbed wire.
b. Wildlife Evaluation: These culverts function somewhat as a small animal crossing. Camera traps show use by long tailed weasels and rabbits. Coyotes still tend to cross at grade, and improvements to the culvert approaches could increase use.
c. Safety Evaluation: Keeping wildlife off of the highway could prevent accidents caused by swerving to avoid wildlife.
d. Recommendations: Improve habitat on both sides of the roadway and maintain the culverts to provide clear approaches to the crossing.

Figure 5. Looking east from RJER.

Figure 6. Looking north from west side of SR-94 (RJER)

Location 3 - PM 21.877 Culvert southeast of Rancho Jamul Road.

a. Existing Conditions: a 24 inch culvert partially blocked with sediment and brush. Fencing is a 4 foot tall chain link fence with a gap on the bottom edge to allow debris flow.
b. Wildlife Evaluation: This culvert does not provide a functional crossing as the upstream entrance is within the roadway fencing, fencing does not direct wildlife into the culvert and the culvert is too small for most wildlife. The downstream end of the culvert is a diversion box which obscures visibility through the culvert, and often fills with sediment and debris.
c. Safety Evaluation: Keeping wildlife off of the highway could prevent accidents caused by swerving to avoid wildlife.
d. Recommendations: Remove the diversion box and redirect the flows to the adjacent field. A swale from historic flows still exists through the grassland. Enlarge the culvert to provide a small/medium animal crossing, extend the upstream end into HCWA and fence the approach to direct wildlife into the crossing. Improve habitat on both sides of the roadway and maintain the culverts to provide clear approaches to the crossing.

Figure 7. Looking north towards Rancho Jamul Road.

Figure 8. Looking east towards HCWA.

Location 4 - PM 22.353: Whoop-de-doos.

a. Existing Conditions: A segment of undulating roadway approximately 750 feet north of the RJER main gate without culverts or other crossings. Wildlife currently crosses the roadway at grade, and well developed game trails exist to the east and west. The fence is a six-foot chain link fabric recently repaired by CDFW.
b. Wildlife Evaluation: Wildlife previously crossed the roadway through gaps in the fencing caused by multiple vehicle accidents. Wildlife is likely to continue to attempt to cross the road in this location as a major water source exists on RJER in this area. A safe crossing should be installed, likely a dual basin undercrossing as the land is relatively flat on both sides of the highway.
c. Safety Evaluation: CDFW has repaired these fences numerous times following vehicle accidents. The undulations in the roadway hide oncoming traffic from those who are willing to illegally pass in this section, leading to vehicles swerving off of the highway to avoid head on collisions. Leveling the road and improving the line of sight in this section could help prevent these types of accidents.
d. Recommendations: Installing a culvert underneath this section and leveling the roadway would improve conditions for both wildlife and for public safety.

Figure 9. Looking west towards RJER.

Location 5 - PM 22.56: 500 feet north of RJER main gate.

a. Existing Conditions: A single 48 inch culvert which has a bend in the pipe somewhere underneath SR-94, with an outlet in a drainage ditch within RJER, and two inlets on either side of SR-94 consisting of grated drains, and a large inlet with steeply angled concrete sides. The fence is a six-foot chain link fabric recently repaired by CDFW.
b. Wildlife Evaluation: Wildlife previously crossed the roadway through gaps in the fencing caused by multiple vehicle accidents. Wildlife is likely to continue to attempt to cross the road in this location as a major water source exists on RJER in this area. The existing culvert provides little if any function for wildlife.
c. Safety Evaluation: CDFW has repaired these fences numerous times following vehicle accidents. The undulations in the roadway to the north hide oncoming traffic from those who are willing to illegally pass in this section, leading to vehicles swerving off of the highway to avoid head on collisions. Leveling the road and improving the line of sight in this section could help prevent these types of accidents. This is also an area CDFW identified in the RJER management plan as a public access point.
d. Recommendations: Installing a culvert underneath this section and leveling the roadway would improve conditions for both wildlife and for public safety. If CDFW develops a public parking area here, a slowing and turn lanes for school buses should be installed.

Figure 10. Looking south. This inlet is very steep and the sides are smooth concrete.

Location 6 - PM 22.376: RJER main gate.

a. Existing Conditions: Three side by side 12'x12' culverts approximately 40 feet long. On the west side of the highway, the RJER main gate is a six foot tall steel gate surrounded by five foot chain link topped by 3-strand barbed wire. On the east side there is a four foot tall chain link fence across the culvert.
b. Wildlife Evaluation: A bent fence post allows wildlife to move through the culvert but is limited to small and medium mammals.
c. Safety Evaluation: This is an access point for visitors to the reserve including school buses. Traffic often is traveling very fast and close. There has been a least one fatal accident at this location.
d. Recommendations: Creation of a slowing and turn lanes at this location would improve safety for the public and staff. Removal of fencing on the east side of the culverts would allow larger wildlife to move through, however the upstream channel restricts movement and should be returned to a natural channel where possible. This property is currently privately owned.

Figure 11. Looking east towards private residence.

Figure 12. Looking west towards RJER.

Location 7 - PM 23.373: Adjacent to Call Box 94-234, one half mile southeast of RJER main gate.

a. Existing Conditions: A single 24" culvert approximately 80 feet long with significant vertical drop on the eastern end. The culvert discharges into the gully at the bottom of the slope on the east side of the highway. Fencing is four foot tall field fencing partially buried and topped with three strand barbed wire.
b. Wildlife Evaluation: This culvert is small and has a steep drop through a very long pipe. It is non-functional.
c. Safety Evaluation: This is the beginning of the passing zone. Traffic is often traveling at a high rate of speed in either direction while attempting to complete a pass.
d. Recommendations: Placement of an over or an undercrossing at this location would greatly improve wildlife crossing opportunities and connect RJER to HCWA in a significant movement area. The turnout is a large fill slope with enough space underneath the roadway to install a large mammal crossing without significant modification of the road elevation.

Figure 13. Looking east at culvert set eight feet below road surface

Figure 14. Looking northeast. The culvert outlet is at the bottom of the slope. The truck on opposite side of the road is above the opening to the culvert (figure 4) on the west side.

Location 8 - PM 23.86: Hollenbeck Creek.

a. Existing Conditions: two 44 foot long side by side 5x5 foot culverts connect the good riparian habitat on either side of SR-94. Fencing is composed of three strand barbed wire.
b. Wildlife Evaluation: These culverts provide small/medium animal crossing, however a sharp drop on the downstream end of the culvert limits the suitability. The upstream end is within the Right of Way fencing and does not prevent wildlife from entering the roadway.
c. Safety Evaluation: This is the beginning of the passing zone. Traffic is often traveling at a high rate of speed in either direction while attempting to complete a pass. Public enters the wildlife area at this location, especially during hunting season. Deceleration and turn lanes would improve safety for public and staff.
d. Recommendations: Improvement to the entrances to the culverts to allow better access into the culverts is needed. Fencing to direct wildlife into the upstream end, elimination of the drop on the downstream end through the installation of a bench or other feature and better directional fencing would improve its use as a small/medium animal crossing.

Figure 15. Looking west from HCWA

Figure 16. Looking west from SR-94

Figure 17. Looking south along SR-94

Figure 18. Looking north along SR-94

Location 9 - PM 24.685: Otay Lakes Road Bridge.

a. Existing Conditions: The bridge consists of 3 bents, 6-15 feet tall, with 40 foot spans between bents. Fencing is composed of three strand barbed wire. A staging area has been expanded and public is beginning to use the area as a rest stop.
b. Wildlife Evaluation: The bridge is suitable for all species; however fencing along the road is three-strand barbed wire with numerous gaps in the length caused by vehicle accidents. Animals pass freely through the fence, and without significant upgrades to the entire fence it will not prevent animals from entering onto the roadway. The bridge also provide significant bat roost habitat for sensitive bat species.
c. Safety Evaluation: Damaged fencing from repeated minor and major vehicle accidents allows wildlife to enter the roadway.
d. Recommendations: Improve fencing along roadways to direct wildlife to the bridge crossing. Eliminate human access to the bridge except for necessary crews and law enforcement to reduce human disturbance to improve wildlife use.

Figure 19. Looking east from RJER towards HCWA

Figure 20. Looking north from south end of bridge