February 2012

Results of 2011 Project 184 Surveys for Foothill Yellow-Legged Frog (*Rana boylii*) on the South Fork American River,

El Dorado County, California for the El Dorado Hydroelectric Project (FERC NO. 184)

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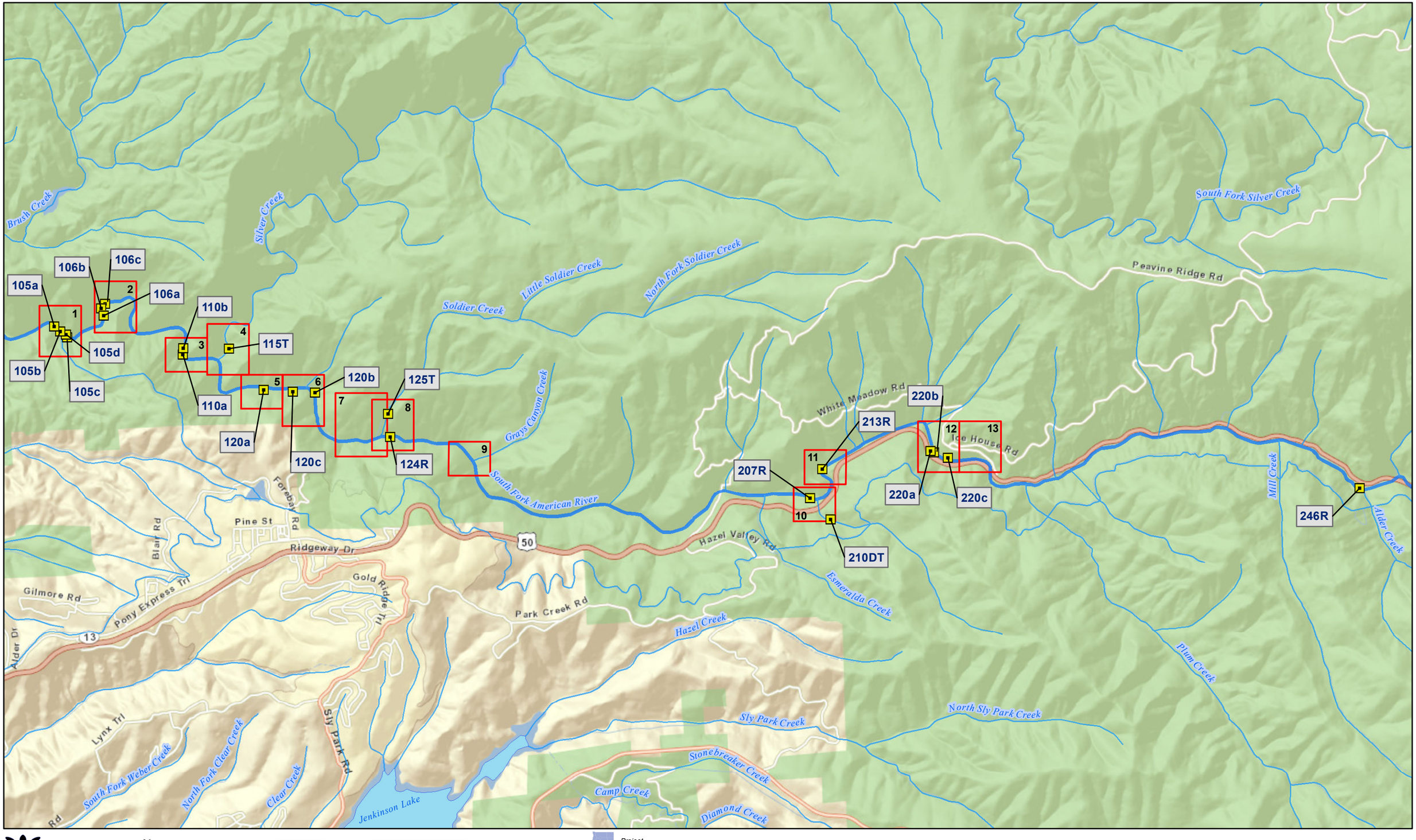
1.0 INTRODUCTION

The El Dorado Irrigation District (District) owns and operates the El Dorado Hydroelectric Project (Project) in El Dorado County, California. The Project is licensed by the Federal Energy Regulatory Commission (FERC; Project No. 184). The Project No. 184 Monitoring Program[1] requires amphibian monitoring of foothill yellow-legged frog (*Rana boylii*; FYLF) in the South Fork American River (SFAR) at five-year intervals. The specific monitoring requirements for FYLF are defined in the Project 184 Foothill Yellow-legged Frog Monitoring Plan (Plan; EID, 2007), which was approved by FERC on September 19, 2007.

The District retained Garcia and Associates (GANDA) to conduct FYLF surveys in the SFAR in 2011. Four rounds of surveys (two egg mass surveys, one tadpole survey, and one metamorph survey) were conducted at nine sites along the SFAR: 105R, 106R, 110R, 120R, 124R, 207R, 213R, 220R, and 246R. In addition, three tributaries: Silver Creek (115T), Ogilby Creek (210DT), and Soldier Creek (125T) were surveyed at least once. Silver Creek was treated as a mainstem breeding site because breeding has been documented during previous surveys. An overview of the Project Area and survey sites is presented in Figure 1.0-1.

Results of the 2011 FYLF surveys are presented in this report.

[1] United States Forest Service Section 4(e) Conditions 37 and 38; State Water Resources Control Board 401 Water Quality Certification Condition 13; Project 184 Settlement Agreement Sections 7 and 8.



GANDA

Figure 1.0-1: EID FYLF Suvey Sites

El Dorado County, California

2.0 METHODS

2.1 Habitat Assessments

Habitat assessments consisted of reviewing the 2007 assessments and noting any significant changes. Previously, habitat assessments were conducted in 2002, 2004, 2005 and 2007 (ECORP 2002, ECORP 2005, GANDA 2007, GANDA 2008a). The results of habitat assessments conducted in 2011 are provided within this report. Habitat assessments were prepared based on guidance in *A Standardized Approach for Habitat Assessments and Visual Encounter Surveys for the Foothill Yellow-Legged Frog* (Seltenrich and Pool 2002). Key habitat parameters recorded during habitat assessments included: amphibian habitat type (e.g., cobble/boulder bar); general river habitat type; river and bank gradient; percent aquatic and terrestrial cover; terrestrial and aquatic substrate; and, margin, emergent, and submerged vegetation. Site measurements were determined using a digital rangefinder.

Representative habitat photographs were taken at all sites. Photographs were taken of upper (upstream), middle, and lower (downstream) portions of all sites and subsites when possible. Representative photographs of each site are provided in Appendix A. Aerial photographs with site delineations are provided for each site in Appendix B.

2.2 Visual Encounter Surveys

Visual Encounter Surveys (VES) were conducted according to *A Standardized Approach for Habitat Assessments and Visual Encounter Surveys for the Foothill Yellow-Legged Frog* (*Rana boylii*) (Seltenrich and Pool 2002). All VES were conducted between 0800 and 1800 hours by teams of at least two biologists. Tributary surveys extended up to 1,000 feet (305 m) from the confluence of the SFAR, if suitable habitat was present. During egg mass and tadpole surveys, each survey crew included one snorkeling surveyor. Polarized sunglasses and Plexiglas viewing boxes were used to reduce glare and increase visibility of aquatic habitats. Care was taken to minimize disturbance to frogs and aquatic habitats.

Survey data were recorded onto Visual Encounter Survey Data Sheets for each subsite surveyed. Young-of-the-year (YOY) was defined as recently metamorphosed frogs, 20-29 mm snout-urostyle length (SUL). Juvenile frogs were defined as frogs from previous years' cohorts, ranging from approximately 30 to 39 mm SUL, but not considered of adult size. Adults were defined as frogs $\geq$ 40 mm SUL.

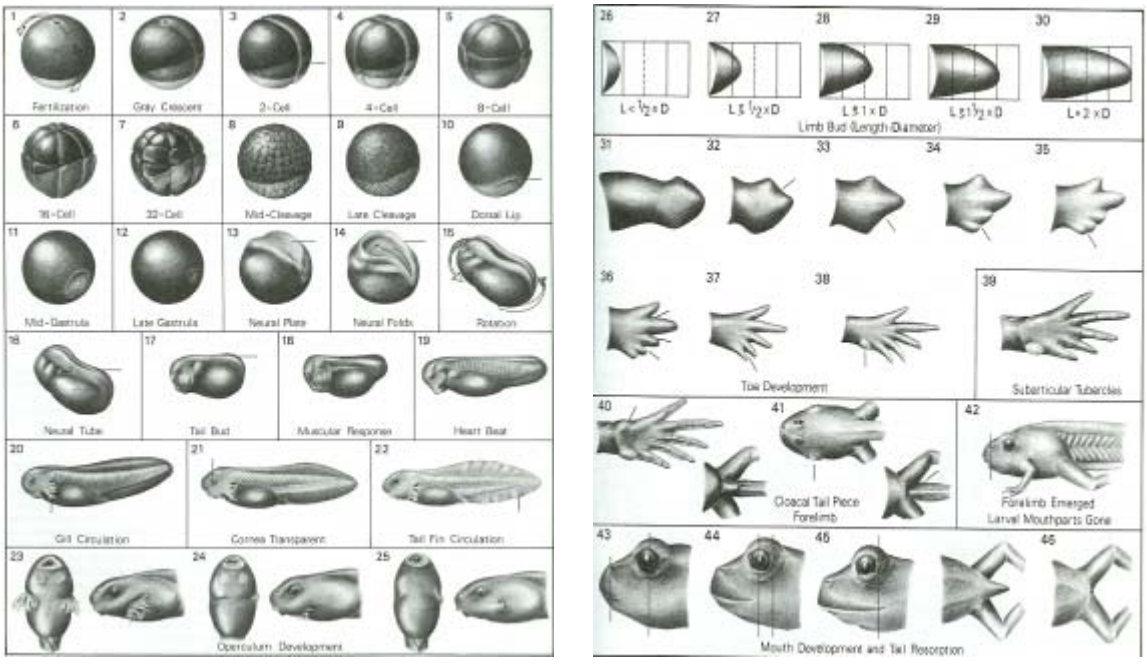
Data parameters collected for FYLF egg masses included: location within site; attachment substrate; distance from shore; depth of egg mass; maximum stream depth; velocity; microhabitat; stream substrate; and, water temperature. Data parameters collected for tadpoles included: tadpole group location in site; number of tadpoles in each group; distance from the shore; velocity; total length; substrate; percent algae and

detritus; and, water depth. The data parameters collected for juvenile and adult FYLF included: number of frogs observed; frog location within the site; sex; age; snout-vent length; habitat type; activity; percent cover of vegetation; percent shade; and, substrate.

Developmental stage of egg masses and larvae were recorded using the Gosner (1960) table of anuran development (Figure 2.2-1). This information enables estimation of egg laying dates, oviposition periods, and rates of tadpole development.

The timing of surveys, as specified in the Plan, is determined by a combination of river flow levels and water temperature (i.e. initial egg mass surveys conducted when SFAR water temperature measured at the powerhouse has reached 12˚C and river flows are less than 150 cfs. Water temperatures reached 12˚C by early July; however, SFAR unimpaired flows were greater than 150 cfs until early August due to the wet hydrological conditions experienced in 2011. Due to these conditions, a reconnaissance survey was conducted on July 27 at easy-to-access sites (105b, 105c, 105d, 213R, 220a, 220b, 220c, and 246R) to evaluate if sites could be safely accessed and surveyed. While not required by the Plan, the results of these reconnaissance surveys are presented in this report. Following the reconnaissance surveys, four rounds of VES surveys were conducted pursuant to the Plan. Surveys at all monitoring sites were conducted on the same calendar day using two crews of two biologists. One crew descended down Soldier Creek (125T) and surveyed all sites downstream (124R, 120R, 115T, 110R, and 106R) to the Akin Powerhouse. The other crew surveyed Sites 246R, 220R, 213R, 207R, and the Akin Powerhouse site (105R).

Figure 2.2-1. Gosner (1960) staging table used to determine FYLF developmental stage (from Duellman and Trueb, 1986).



3.0 RESULTS

3.1 Habitat Assessments

The SFAR is a moderate- to steep-gradient river that flows west, generally paralleling Highway 50 in the Project Area. The SFAR within the study area is approximately 26.7 km (16.6 mi) long from the Alder Creek confluence (Site 246R) to Akin Powerhouse (Site 105R). Upland habitat along the SFAR is generally characterized as foothill hardwood/conifer, consisting of ponderosa pine (*Pinus ponderosa*), oak (*Quercus* spp.), and incense cedar (*Calocedrus decurrens*). Common shrub species include mountain misery (*Chamaebatia foliolosa*), whitethorn (*Ceonothus cordulatus*), poison oak (*Toxicodendron diversilobum*), and manzanita (*Arctostaphylos* sp.). Common riparian species include white alder (*Alnus rhombifolia*), bigleaf maple (*Acer macrophyllum*), willow (*Salix* sp.) and dogwood (*Cornus* sp.). The elevation of the survey area ranges from 575 m (1,880 ft) at the Akin Powerhouse (Site 105R) to 1,060 m (3,480 ft) at the SFAR and Alder Creek confluence (Site 246R). This section describes pertinent habitat features at sites surveyed during 2011.

3.1.1 Site 105R – SFAR at Akin Powerhouse

Site 105R was located near the Akin Powerhouse at approximately 575 m (1,880 ft) elevation. This site included four subsites (105a, 105b, 105c, and 105d) and was 221 m in total length. There were no significant changes in habitat noted in 2011 since the habitat assessment conducted in 2007.

• Subsite 105a was located downstream of Akin Powerhouse (Photo 1, Appendix A). The site length was 96 m and consisted of a left bank, low-gradient lateral bar. Aquatic substrate consisted primarily of boulder (40%) and cobble (30%), with some gravel (20%) and sand (10%). The substrate was moderately embedded. Water velocity was very low throughout the shallow 10 – 15 cm edgewater habitat present along the length of the subsite. Suitable habitat width extended an average of 2 m out from the shore. Exposed cobble and boulder in edgewater areas provided habitat complexity and basking sites for FYLF. Flocculent material and interstitial spaces in the substrate provided abundant aquatic cover. Submerged vegetation, mostly algae, was prevalent (70%) throughout the subsite. Vegetation cover along the river margin was approximately 40 percent and was composed of willow and sedge. Emergent vegetation, overhanging vegetation, and riparian canopy were sparse; each providing less than 10 percent cover.

• Subsite 105b was located along a left bank lateral bar that was 39 m in length (Photo 2, Appendix A). This subsite was located immediately downstream of Akin Powerhouse. The site included a side pool off of the main channel which becomes isolated from the main channel under lower flow conditions. Aquatic substrate was cobble (50%), boulder (30%), gravel (10%), sand (5%), and silt (5%). Within the side pool, aquatic substrate was composed primarily of small cobble (40%), gravel (30%), and boulder (20%).

Edgewater areas were generally restricted to within approximately 0.5 m of shore, due to deep water and relatively high water velocities. Margin and emergent vegetation, as well as overhanging vegetation and canopy cover, were all less than or equal to 10 percent. The general lack of vegetative cover provided ample basking sites for FYLF. Gaps in the substrate, algae, and detritus provided a moderate amount (50%) of aquatic cover.

• Subsite 105c was located at the pool tail-out upstream of Akin Powerhouse, and consisted of a left bank sandbar 56 m in length (Photo 3, Appendix A). The aquatic substrate was primarily sand (60%), with relatively minor amounts of cobble (20%), boulder (10%), and gravel (10%). The prevalence of sand resulted in a high degree of substrate embeddedness. The edgewater portion of the site was approximately 20 m in length. A relatively large main channel pool occurs immediately adjacent to the sandbar, which restricts edgewater habitat to a width of about 2 m. Beyond 2 m from shore, water depth continued to increase. The relatively high embeddedness of the aquatic substrate and limited aquatic vegetation resulted in low availability of aquatic cover. Few basking sites occur along the sandbar; however, exposed cobble and boulders were present at the base of the pool, just downstream of the sandbar.

• Subsite 105d was located at the pool tail-out upstream of Akin Powerhouse (Photo 4, Appendix A). The site consisted of a 30-m long, right bank boulder/sedge margin. The aquatic substrate was composed primarily of boulder (50%) and cobble (30%), with minor amounts of sand (10%) and gravel (10%). Shallow, low velocity edgewater areas generally extended less than 1 m from shore. Areas with low water velocities were generally restricted to backwaters formed by boulders. Outside of these small protected areas, water velocities increased substantially in association with the adjacent riffle. Sedge (*Carex* spp.), blackberry (*Rubus* spp.), and young willows were abundant (70%) along the river margin. Only minimal amounts of emergent and submerged vegetation were present (10%). Interstitial spaces in the substrate provided a moderate amount of aquatic cover (30%). Exposed boulders provided adequate basking sites for FYLF.

3.1.2 Site 106R – SFAR upstream of Akin Powerhouse

Site 106R was located on the SFAR upstream of the Akin Powerhouse at an elevation of 573 m (1,880 ft.). The total length of this site was 284 m (814 ft.). Three subsites (106a, 106b, and 106c) were established during the habitat assessment conducted in 2007. There were no significant changes in habitat noted in 2011 since the habitat assessment conducted in 2007.

• Subsite 106a was located along a 62 m-long low-gradient left bank lateral boulder bar (Photo 5, Appendix A). Aquatic substrate consisted of boulder (80%), cobble (15%) and sand (5%). Substrate embeddedness was low (<25%). Edgewater habitat was relatively shallow (avg. depth at time of assessment is 20 cm), with low velocities. Margin vegetation (60%) was primarily sedge and willow, with no emergent or submerged vegetation. Aquatic cover (20%) was primarily gaps between substrates. Terrestrial

cover was 40 percent and consisted mostly of vegetation and substrate gaps. Overhanging vegetation was moderate (50%) and consisted primarily of sedge.

• Subsite 106b was 111 m in length and included main channel pool, side channel, and pool tail-out habitats (Photo 6, Appendix A). This site was located on the right bank of a split channel and included an unnamed tributary confluence that intersects the site approximately 45 m from the bottom. It had a low gradient boulder/sedge margin with an aquatic substrate consisting of bedrock (75%), boulder (20%) and sand (5%). Substrate embeddedness was low (<25%). Edgewater habitat occurred throughout the subsite and is relatively shallow (avg. depth at time of assessment is 20 cm), with low velocities. Margin vegetation (50%) was made up of sedge, alder and willow. Emergent vegetation (10%) consisted of sedge and there was no submerged vegetation. Aquatic cover (20%) was primarily gaps between substrate. Terrestrial cover was relatively low (10%) with gaps between substrate. Overhanging vegetation (30%) consisted of alder and willow.

• Subsite 106c was 111 m in length and was located on the left bank at the top portion of the site (Photo 7, Appendix A). It was a low-gradient lateral bar with a sand bar at the top. Aquatic substrate consisted of bedrock (5%), boulder (60%), cobble (20%), gravel/pebble (5%) and sand (10%). Substrate embeddedness was moderate (25-50%) with relatively low margin vegetation (20%) of grass and sedge. Emergent and submerged vegetation was absent from the subsite. Aquatic (40%) and terrestrial (40%) cover both consisted mainly of gaps between substrate. No overhanging vegetation was present. Edgewater habitat was located throughout the subsite with an average depth of approximately 30 cm.

3.1.3 Site 110R – SFAR downstream of Silver Creek

Site 110R was located on the SFAR approximately 0.5 km downstream of the confluence with Silver Creek, at an elevation of 620 m (2,040 ft). The total site length was 115 m and included two subsites: 110a and 110b. There were no significant changes in habitat noted in 2011 since the habitat assessment conducted in 2007.

• Subsite 110a was 35 m in length and consisted of a right bank, low-gradient boulder/sedge margin, situated near the upstream edge of a cobble/boulder point bar (Photo 8, Appendix A). The subsite also included a small bedrock island located about 10 m from the right bank. The aquatic substrate was predominantly bedrock (30%), sand (30%) and silt (20%), with a small amount of cobble (10%) and boulder (10%). Due to the presence of high amounts of sand and silt, aquatic substrates were highly embedded. Shallow 30 cm, low velocity edgewater areas occurred throughout the subsite. Sedges and young willows occurred along approximately 80 percent of the river margin. Emergent vegetation was essentially absent from the subsite. Interstitial spaces in the substrate, flocculent material, silt, and algae provided moderate aquatic cover.

• Subsite 110b was 80 m long and consisted of a right bank, low-gradient side channel (Photo 9, Appendix A). The aquatic substrate was moderately embedded and consisted of a mixture of boulder (40%), cobble (20%), sand (20%), silt (10%), gravel (<10%), and bedrock (<10%). Margin vegetation, sedges, and willows occurred along approximately 30 percent of the side channel. Submerged vegetation, primarily green filamentous algae, occurred within approximately 50 percent of the subsite. Interstitial spaces in the substrate, algae, and flocculent material provided abundant (~80%) aquatic cover. Exposed boulders and cobbles, within and adjacent to the side channel, provided abundant basking sites.

3.1.4 Site 115T – Silver Creek

Site 115T encompassed an approximately 305 m (1,000 ft) long section of Silver Creek, a low-gradient, right bank tributary to the SFAR (Photo 10, Appendix A). The site extended from the confluence with the SFAR, at an elevation of 620 m (2,034 ft) upstream to approximately 634 m (2,080 ft). At the lower end of the site, near the confluence with SFAR, Silver Creek was divided into two separate channels: a main channel and a secondary channel. Most of the flow traveled down the main channel which consisted of riffle/run habitat and small cascades. The secondary channel had relatively low flow and consisted of pool, run and glide habitats. Amphibian habitat was abundant within shallow areas of the main channel, and along the margins of both banks and the secondary channel. The aquatic substrate was composed primarily of boulder and cobble, with lesser amounts of gravel, silt, and bedrock. Aquatic vegetation was generally sparse; except for localized sedge clumps that occurred as partially submerged boulder/sedge islands. Numerous shallow, slow-moving side pools, edgewater areas, and isolated algae-filled pools were present throughout the site. Aquatic cover and terrestrial cover were both abundant, consisting primarily of interstitial crevices, scattered sedge clumps, and overhanging willows. Canopy cover was minimal (<10%), creating relatively exposed conditions throughout much of the site. Abundant basking sites were present on exposed rocky surfaces. There were no significant changes in habitat noted in 2011 since the habitat assessment conducted in 2007.

3.1.5 Site 120R – SFAR upstream of Silver Creek

Site 120R was located on the SFAR approximately 1.0 km upstream of the confluence with Silver Creek at an elevation of 685 m (2,240 ft). The total site length was 352 m and included three subsites: 120a, 120b, and 120c. There were no significant changes in habitat noted in 2011 since the habitat assessment conducted in 2007.

• Subsite 120a was 82 m long and consisted of a left bank side channel and boulder/sedge margin situated on a boulder/cobble lateral bar (Photo 11, Appendix A). The aquatic substrate consisted of a mixture of boulder (40%), cobble (30%) and sand (20%), with some silt (<10%) and gravel (<10%). Sedges, grass, and forbs occurred along about 20 percent of the channel margin. Submerged vegetation (algae) was observed within 30 to

40 percent of the subsite. Algae, interstitial cracks, and silt provided moderate (40%) aquatic cover. A variety of basking sites, primarily exposed cobbles and boulders, were present throughout the subsite. Overhanging vegetation (<10%) and riparian canopy (20%) provided little shade during mid-day; however, due to the north-facing aspect of the canyon in this area, the subsite was shady in the late summer for a significant portion of the day.

• Subsite 120b was 95 m in length and consisted of a side channel and pool tail-out located on a right bank boulder/cobble point bar (Photo 12, Appendix A). High gradient cascade/pool habitat occurred adjacent to the subsite. The side channel was comprised of a series of connected pools. The aquatic substrate was primarily boulder (50%), with relatively high amounts of silt (30%), some cobble (20%), and trace amounts of sand and gravel. The embeddedness of the substrate was moderate. Edgewater habitat was essentially absent along the main channel of the SFAR, due to the increased river gradient and associated deeper, higher velocity water present at this location. Margin vegetation included sedges, cattails, grasses, and forbs. Emergent vegetation was lacking (<10%); however, a small amount (20%) of submerged vegetation (algae, rooted aquatic vegetation) was present. Gaps in the substrate, algae, silt, and aquatic vegetation provided a moderate amount (30%) of aquatic cover. Exposed boulders and cobble along the side channel and main channel provided suitable basking sites for FYLF. Overhanging vegetation (<20%) and riparian canopy (10%) provided little shade during mid-day.

• Subsite 120c was 175 m in length and consisted of a left bank side channel (Photo 13, Appendix A). At high flow levels, the side channel was a high-gradient riffle; however, at base flow levels (~50 cfs), the side channel habitat changed to a series of connected and isolated pools. The aquatic substrate was predominantly boulder (40%) and cobble (30%), with sand (20%) and some silt (10%). Vegetation including sedges, forbs, and grasses occurred along approximately 20 percent of the side channel. There was very little (<10%) emergent vegetation within the subsite. Submerged vegetation, primarily algae, covered 40 to 50 percent of the substrate surfaces. Aquatic cover (50%) consisted of interstitial spaces in the substrate, and under algae and silt. Overhanging vegetation (10%) and riparian canopy (20%) provided little shade during mid-day; however, due to the canyon's north-facing aspect, the subsite was shady in the late summer for a significant portion of the day.

3.1.6 Site 124R – SFAR at confluence with Soldier Creek

Site 124R was located on the left bank of the SFAR across from the confluence with Soldier Creek at an elevation of 755 m (2,480 ft) (Photo 14, Appendix A). The site was 144 m in length and included several isolated pools separated by large boulders. Aquatic substrate was predominantly boulder (80%) with some cobble (15%) and sand (5%). There was sparse vegetation at the site, comprised mainly of sedges. There was no emergent vegetation; submerged vegetation, primarily algae, covered 40 to 50 percent of

the substrate surfaces. Aquatic cover (60%) consisted of interstitial spaces in the substrate, and under algae and silt. There was minimal overhanging vegetation (5%) and riparian canopy (10%); however, as with most left bank sites along this reach of the SFAR, the site was shaded during late summer surveys due to its north-facing aspect. There were no significant changes in habitat noted in 2011 since the habitat assessment conducted in 2007.

3.1.7 Site 125T – Soldier Creek

Site 125T included a 305 m (1,000 ft) section of Soldier Creek, a right bank tributary to the SFAR (Photo 15, Appendix A). Site 125T encompassed an approximately 305 m (1,000 ft) long section of Soldier Creek from the confluence with the SFAR at an elevation of 755 m (2,480 ft) to the bottom of a significant waterfall at 855 m (2,804 ft) elevation. Soldier Creek was a moderate-gradient perennial creek, dominated by cascade and plunge pool habitat. The aquatic substrate was composed primarily of boulder and bedrock, with smaller amounts of cobble, sand, and silt. Aquatic vegetation, both emergent and submerged, was relatively scarce. Woody debris, silt/flocculent material, and spaces between substrate provided a moderate amount of aquatic cover. The riparian canopy consisted of alder, dogwood, and conifers that provided areas of sun and shade throughout the day. Exposed banks (primarily bedrock), boulders, and woody debris provided adequate basking sites. There were no significant changes in habitat noted in 2011 since the habitat assessment conducted in 2007.

3.1.8 Site 207R – SFAR at Ogilby Creek

Site 207R was located on the SFAR downstream of Ogilby Creek at an elevation of 988 m (3,240 ft) (Photo 16, Appendix A). The site was 150 m in length (492 ft.) and ended at the confluence with Ogilby Creek. The site had low river gradient on the left bank and included a side channel. The site had a high amount of margin vegetation (60%) composed predominantly of sedge, willows, and elephant ears (*Darmera peltata*). Emergent vegetation (40%) consisted of primarily sedge and elephant ears, but there was little or no submerged vegetation. Aquatic cover (60%) occurred throughout the site and included aquatic vegetation and gaps between substrate. Terrestrial cover (60%) consisted mostly of substrate gaps and some vegetation. Willow and sedge made up the overhanging vegetation (10%) and riparian canopy (10%) was mostly conifer, willow and alder. Average edgewater depth was 25 cm and occurred throughout the site. This site was located just upstream of the Bridal Veil Falls Campground and received a significant amount of recreational use, including picnicking, swimming, and fishing. In 2011, the confluence of Ogilby Creek contained a greater amount of gravel/cobble deposition, with shallower edgewater habitats and lower water velocities in comparison to 2007.

3.1.9 Site 210DT – Ogilby Creek

Site 210DT was a 305 m (1,000 ft) section of Ogilby Creek from the confluence with the SFAR to just below the El Dorado Canal (Photo 17, Appendix A). Ogilby Creek was a diverted left bank tributary to the SFAR that passed under a 160 m long steel and concrete culvert under Highway 50. Elevation ranged from 930 m (3,050 ft) at the confluence with the SFAR to 1,100 m (3,610 ft) at the top of the site. The creek gradient was moderate in the lower section but became high gradient on the south side of Highway 50. This upper section the creek included several cascades and bedrock sections. Aquatic substrate consisted primarily of boulder and cobble with areas of bedrock. A moderate amount of emergent vegetation was present, which consisted of sedges, horsetail (*Equisetum* sp.), grasses, and forbs. Vegetation, gaps in the substrate, and woody debris provided a relatively high amount of aquatic cover. Margin vegetation, boulders and woody debris provided abundant terrestrial cover. Most of the creek channel was shaded by riparian vegetation. In 2011, the confluence of Ogilby Creek contained a greater amount of gravel/cobble deposition, with shallower edgewater habitats with low water velocities in comparison to 2007.

3.1.10 Site 213R – SFAR upstream of Ogilby Creek

Site 213R was located on the left bank of the SFAR about 0.6 km (1,970 ft) upstream of the confluence with Ogilby Creek, at an elevation of 930 m (3,050 ft) (Photo 18, Appendix A). The site was 105 m long and consisted of a low-gradient cobble/gravel point bar. The aquatic substrate was composed of a mixture of cobble (40%), gravel (30%), and sand (20%) with some boulder (10%). Aquatic substrates were moderately embedded with sand. A relatively wide area of suitable breeding habitat (i.e., shallow, low velocity edgewater areas with appropriate substrates) occurred along the entire length of the site. In general, the width of suitable habitat averaged 4 – 5 m from shore. Habitat complexity was relatively low due to the limited amount of exposed aquatic substrate. Vegetation along the margin of the point bar consisted primarily of sedges and willow saplings. Very little emergent or submerged vegetation (<10%) was present, and overhanging vegetation and riparian canopy cover was minimal (<10%). A moderate amount of aquatic cover (~40%) was provided by spaces in the substrate and flocculent material. Exposed substrate along the shoreline provided sufficient basking sites. There were no significant changes in habitat noted in 2011 since the habitat assessment conducted in 2007.

3.1.11 Site 220R – SFAR at Maple Grove

Site 220R was located near Maple Grove Campground at an elevation of 965 m (3,160 ft). Three subsites were established within the site: 220a, 220b, and 220c. The total site length was 286 m. There were no significant changes in habitat noted in 2011 since the habitat assessment conducted in 2007.

• Subsite 220a was 102 m in length and was located on the left bank of the SFAR on a low-gradient, boulder-dominated lateral bar (Photo 19, Appendix A). The aquatic substrate was boulder dominated (40%) with equal amounts of gravel (20%) and sand (20%), and some cobble (15%) and silt (<5%). The substrate was highly embedded which reduced the amount of aquatic cover. Vegetation along the river margin was primarily sedges and willow saplings. A limited amount of emergent vegetation (20%) was present. Submerged and overhanging vegetation were negligible (<10%) and riparian canopy was absent. Suitable habitat consisted of shallow, low-velocity edgewater habitat occurred throughout the length of the subsite. Flocculent material, woody debris, and interstitial spaces between substrate provided moderate (30%) aquatic cover.

• Subsite 220b was 112 m in length and consisted of a low-gradient, right bank cobble/boulder lateral bar (Photo 20, Appendix A). The aquatic substrate was moderately embedded, and consisted of a mixture of cobble (40%), boulder (30%), and gravel (20%), with a small amount of sand (10%). Gaps in the substrate provided the primary source of aquatic cover. Willow saplings and sedges occurred along approximately 30 percent of the river margin. Very little emergent or submerged vegetation was present (<10% each), and no overhanging vegetation or riparian canopy occurred in the subsite. Shallow, low-velocity edgewater habitat was present throughout the site, which extended approximately 4 m from shore.

• Subsite 220c was 72 m long and consisted of primarily of boulder/sedge habitat situated along the margin of an island formed by a split channel (Photo 21, Appendix A). The subsite was located on the right bank of the left channel. The aquatic substrate was comprised of cobble (40%), boulder (30%), and gravel (20%) with a small amount of sand (10%). The substrate was moderately embedded, although to a lesser extent than subsites 220a and 220b. Sedges and willow saplings were relatively abundant along the channel margin. Emergent and submerged vegetation was sparse (<10% each) within the subsite; and overhanging vegetation and riparian cover was generally absent. Gaps in the substrate, flocculent material, and aquatic vegetation provided a moderate amount (50%) of aquatic cover. Shallow, low-velocity edgewater habitat occurred along the entire length of the subsite.

3.1.12 Site 246R – SFAR at Alder Creek

Site 246R was located immediately downstream of the confluence of Alder Creek and SFAR at an elevation of 1,060 m (3,480 ft) (Photo 22, Appendix A). The site was about 130 m (427 ft) long and located along the right riverbank. The site was comprised of a cobble/boulder lateral bar that was low gradient in the lower half and moderate to high gradient in the upper half. The aquatic substrate consisted of cobble (30%), boulder (30%), gravel (20%), and sand (20%). The relative prevalence of gravel and sand resulted in the aquatic substrate being highly embedded. Vegetation, primarily willow saplings

and sedges, was abundant (70%) along the river margin. Emergent, submerged, and overhanging vegetation were negligible. Shallow (avg. depth = 20 cm [8 in]), low-velocity edgewater areas occurred throughout the length of the site. Gaps between substrate and detritus appeared to provide a moderate amount of aquatic cover. This site received regular recreational use, including fishing and swimming. There were no significant changes in habitat noted in 2011 since the habitat assessment conducted in 2007.

3.2 Visual Encounter Survey Results

Results of the 2011 VES are described in two sections: 1) by site (Sec. 3.2.1) and, 2) by FYLF life stage (Sec. 3.2.2). Section 3.2.3 summarizes VES survey results for efforts conducted in 2002, 2004, 2005, 2007 and 2011. Visual encounter survey datasheets are provided in Appendix C.

3.2.1 Site-specific Results

In the following sections, the details of the 2011 surveys are provided for each site and subsite. In 2011, FYLF were observed only at sites 120R (one juvenile), 125T (two adults), and 213R (four egg masses and 21 tadpoles); FYLF were not observed at sites 105R, 106R, 110R, 115T, 124R, 207R, 220R, and 246R (Table 3.2-1).

Table 3.2-1. Summary of 2011 Visual Encounter Survey Results for FYLF in the Project Area.

Site name	**Site #**	**Reconnaissance survey** July 27	**Round 1** August 4	**Round 2** August 18	**Round 3** September 14	**Round 4** October 4
SFAR at Akin Powerhouse	105a	—[a]	0[b]	0	0	0
	105b	0	0	0	0	0
	105c	0	0	0	0	0
	105d	0	0	0	0	0
SFAR-u/s of Akin Powerhouse	106a	—	0	0	0	0
	106b	—	0	0	0	0
	106c	—	0	0	0	0
SFAR-d/s of Silver Creek	110a	—	0	0	0	0
	110b	—	0	0	0	0
Silver Creek	115T	—	—[c]	0	0	0
SFAR u/s of Silver Creek	120a	—	0	1 juvenile	0	0
	120b	—	0	0	0	0

Site name	Site #	Reconnaissance survey July 27	Round 1 August 4	Round 2 August 18	Round 3 September 14	Round 4 October 4
	120c	—	0	0	0	0
SFAR at Soldier Creek	124R	—	0	0	0	0
Soldier Creek	125T	—	1 adult male	0	1 unk. adult	0
SFAR d/s of Ogilby Creek	207R	—	0	0	0	0
Ogilby Creek	210DT	—	—	—	0	—
SFAR u/s of Ogilby Creek	213R	3 egg masses	15 tadpoles	5 tadpoles in area where egg mass was not observed	1 tadpole	0
SFAR at Maple Grove	220a	0	0	0	0	0
	220b	0	0	0	0	0
	220c	0	0	0	0	0
SFAR at Alder Creek	246R	0	0	0	0	0

a No survey was conducted.

[b] FYLF were not observed.

[c] No survey was conducted due to high flows/unsafe conditions.

3.2.1.1 Site 105R – SFAR at Akin Powerhouse

No FYLF life stages were observed at Site 105R during surveys in 2011 (Table 3.2-2).

Table 3.2-2. Visual Encounter Survey Results for Site 105R, SFAR at Akin Powerhouse.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
105a	1	8/4	1543	1555	12	29.5	29.5	17.5	17.5	0	0	0	0
	2	8/18	1608	1619	10	26	26	16.5	16.5	0	0	0	0
	3	9/14	1439	1448	9	26	26	16	15.75	0	0	0	0
	4	10/4	1335	1342	7	17.5	17.5	13	13	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**
105b	Recon	7/27	1542	1600	18	27	27	17	16.5	0	0	0	0
	1	8/4	1555	1607	12	29.5	29.5	17.5	17.5	0	0	0	0
	2	8/18	1622	1632	8	26	26	16.5	16	0	0	0	0
	3	9/14	1448	1457	9	26	26	16	15.75	0	0	0	0
	4	10/4	1345	1355	10	17.5	17.5	13	13	0	0	0	0
									SUBTOTAL	**0**	**0/0**	**0**	**0**
105c	Recon	7/27	1545	1550	5	27	27	19	18	-	-	-	-
	1	8/4	1626	1636	10	28.5	28.5	21.5	21	0	0	0	0
	2	8/18	1530	1540	8	26	26	21	19	0	0	0	0
	3	9/14	1515	1522	7	26	26	19.5	18.5	0	0	0	0
	4	10/4	1400	1404	4	18	18	13.5	13	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
105d	Recon	7/27	1550	1600	10	27	27	19	18	0	0	0	0
	1	8/4	1636	1646	10	28.5	28.5	21.5	21	0	0	0	0
	2	8/18	1541	1549	8	26	26	19	19.5	0	0	0	0
	3	9/14	1506	1511	5	26	26	19.5	18.5	0	0	0	0
	4	10/4	1408	1415	7	18	18	14.5	13	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**

Total number of egg masses observed, Site 105R	**0**
Total number of tadpoles/groups observed, Site 105R	**0**
Total number of juveniles/YOY observed, Site 105R	**0**
Total number of adults observed, Site 105R	**0**

3.2.1.2 Site 106R – SFAR upstream of Akin Powerhouse

No FYLF life stages were observed at Site 106R during surveys in 2011(Table 3.2-3).

Table 3.2-3. Visual Encounter Survey Results for Site 106R, SFAR upstream of Akin Powerhouse.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
106a	1	8/4	1645	1700	15	31	31	23.5	20	0	0	0	0
	2	8/18	1639	1650	11	30.5	30.5	21.5	20.5	0	0	0	0
	3	9/14	1510	1515	5	27	27	20	18.5	0	0	0	0
	4	10/4	1536	1543	7	12	12	12	11.5	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**
106b	1	8/4	1633	1642	9	31	31	21	20	0	0	0	0
	2	8/18	1630	1637	7	30.5	30.5	20.5	20.5	0	0	0	0
	3	9/14	1500	1510	10	27	27	18.5	18.5	0	0	0	0
	4	10/4	1530	1536	6	12	12	12	11.5	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**
106c	1	8/4	1615	1630	15	31	31	22	20	0	0	0	0
	2	8/18	1610	1630	20	30.5	30.5	20.5	20.5	0	0	0	0
	3	9/14	1445	1455	10	27	27	19	18.5	0	0	0	0
	4	10/4	1515	1520	5	12	12	12	11.5	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**

Total number of egg masses observed, Site 106R	**0**
Total number of tadpoles/groups observed, Site 106R	**0**
Total number of juveniles/YOY observed, Site 106R	**0**
Total number of adults observed, Site 106R	**0**

3.2.1.3 Site 110R – SFAR downstream of Silver Creek

No FYLF life stages were observed at Site 110R during surveys in 2011(Table 3.2-4).

Table 3.2-4. Visual Encounter Survey Results for Site 110R, SFAR downstream of Silver Creek.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
110a	1	8/4	1414	1425	11	32	32	20.5	20	0	0	0	0
	2	8/18	1435	1445	10	22	22	21	20.5	0	0	0	0
	3	9/14	1310	1320	10	27	27	18	17.5	0	0	0	0
	4	10/4	1345	1350	5	11.5	11.5	11.5	11.5	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**
110b	1	8/4	1425	1435	10	32	32	21	20	0	0	0	0
	2	8/18	1445	1455	10	22	22	21	21	0	0	0	0
	3	9/14	1320	1330	10	27	27	17.5	17.5	0	0	0	0
	4	10/4	1350	1357	7	11.5	11.5	11.5	11.5	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**

Total number of egg masses observed, Site 110R	**0**
Total number of tadpoles/groups observed, Site 110R	**0**
Total number of juveniles/YOY observed, Site 110R	**0**
Total number of adults observed, Site 110R	**0**

3.2.1.4 Site 115T – Silver Creek

No FYLF life stages were observed at Site 115T during surveys in 2011(Table 3.2-5).

Table 3.2-5. Visual Encounter Survey Results for Site 115T, Silver Creek.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edge.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
115T	1	8/18	1345	1420	35	22	22	19	19	0	0	0	0
	2	9/14	1200	1245	45	26.5	27	17	16.5	0	0	0	0
	3	10/4	1245	1320	35	13.5	13.5	13	13	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**

Total number of egg masses observed, Site 115T	**0**
Total number of tadpoles/groups observed, Site 115T	**0**
Total number of juveniles/YOY observed, Site 115T	**0**
Total number of adults observed, Site 115T	**0**

3.2.1.5 Site 120R – SFAR upstream of Silver Creek

One juvenile FYLF was observed at Site 120a during surveys in 2011(Table 3.2-6).

Table 3.2-6. Visual Encounter Survey Results for Site 120R, SFAR upstream of Silver Creek.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edge.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
120a	1	8/4	1225	1315	50	30	30	20	18.5	0	0	0	0
	2	8/18	1210	1230	20	21	21	19	18.5	0	0	1	0
	3	9/14	1115	1130	15	19	19	17.5	17	0	0	0	0
	4	10/4	1125	1140	15	17	17	11.5	11	0	0	0	0
									SUBTOTAL	**0**	**0**	**1**	**0**
120b	1	8/4	1130	1150	20	26	26	18	18	0	0	0	0
	2	8/18	1055	1120	25	20	20	17	17	0	0	0	0
	3	9/14	1025	1045	20	18	18	16.5	16	0	0	0	0
	4	10/4	1030	1050	20	14	14	11	11	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**
120c	1	8/4	1200	1215	15	26	26	18.5	18	0	0	0	0
	2	8/18	1130	1150	20	20	20	17.5	17	0	0	0	0
	3	9/14	1050	1105	15	18	18	16	16	0	0	0	0
	4	10/4	1055	1110	15	14	14	11	11	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**

Total number of egg masses observed, Site 120R	**0**
Total number of tadpoles/groups observed, Site 120R	**0**
Total number of juveniles/YOY observed, Site 120R	**1**
Total number of adults observed, Site 120R	**0**

3.2.1.6 Site 124R - SFAR at confluence with Soldier Creek

No FYLF life stages were observed at Site 124R during surveys in 2011(Table 3.2-7).

Table 3.2-7. Visual Encounter Survey Results for Site 124R, SFAR at confluence with Soldier Creek.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edge.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
	1	8/4	1010	1030	20	19	19	17	17	0	0	0	0
	2	8/18	0920	0945	25	20	20	17.5	16.5	0	0	0	0
	3	9/14	0920	0935	15	15	15	16	16	0	0	0	0
	4	10/4	0930	0945	15	12	12	12	11	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**

Total number of egg masses observed, Site 124R	**0**
Total number of tadpoles/groups observed, Site 124R	**0**
Total number of juveniles/YOY observed, Site 124R	**0**
Total number of adults observed, Site 124R	**0**

3.2.1.7 Site 125T – Soldier Creek

The Plan specifies tributary sites be surveyed once during the season. In 2011, Soldier Creek was surveyed four times because crews used it to access river sites located downstream on the SFAR. One adult male (51 mm SUL; 22g) was captured 20 m upstream of the confluence with the SFAR and another uncaptured adult was observed 75 m upstream of the confluence (Table 3.2-8).

Table 3.2-8. Visual Encounter Survey Results for Site 125T, Soldier Creek.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edge.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile/ YOY Frogs	# Adult Frogs
125T	1	8/4	0900	0945	45	16.5	16.5	—	13.5	0	0	0	1
	2	8/18	0830	0900	30	20	20	12	12	0	0	0	0
	3	9/14	0835	0900	25	15	15	12.5	12.5	0	0	0	1
	4	10/4	0840	0900	20	10	10	8	—	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**2**

Total number of egg masses observed, Site 125T	**0**
Total number of t tadpoles/groups observed, Site 125T	**0**
Total number of juveniles/YOY observed, Site 125T	**0**
Total number of adults observed, Site 125T	**2**

3.2.1.8 Site 207R – SFAR downstream of Ogilby Creek

No FYLF life stages were observed at Site 207R during surveys in 2011(Table 3.2-9).

Table 3.2-9. Visual Encounter Survey Results for Site 207R, downstream of Ogilby Creek.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edge.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
	1	8/4	1402	1459	57	29	29	19	19	0	0	0	0
	2	8/18	1337	1410	30	31	24	19.75	18.25	0	0	0	0
	3	9/14	1140	1157	17	25.5	25.5	18	15.5	0	0	0	0
	4	10/4	1140	1205	25	18	18	11	11	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**

Total number of egg masses observed, Site 207R	**0**
Total number of tadpoles/groups observed, Site 207R	**0**
Total number of juveniles/YOY observed, Site 207R	**0**
Total number of adults observed, Site 207R	**0**

3.2.1.9 Site 210DT – Ogilby Creek

Ogilby Creek was surveyed once in 2011; no FYLF life stages were observed (Table 3.2-10).

Table 3.2-10. Visual Encounter Survey Results for Site 210DT, Ogilby Creek.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edge.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
210DT	1	9/14	1141	1225	44	25.5	—	—	13.5	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**

Total number of egg masses observed, Site 210DT	**0**
Total number of tadpoles/groups observed, Site 210DT	**0**
Total number of juveniles observed, Site 210DT	**0**
Total number of adults observed, Site 210DT	**0**

3.2.1.10 Site 213R – SFAR upstream of Ogilby Creek

A total of four egg masses were detected at Site 213R; one of these egg masses was identified by the observation of a group of recently-hatched tadpoles on August 18 near the top of the site which had not been observed during previous surveys. A total of 21 tadpoles in three groups were observed at the site; 15 tadpoles were observed on August 4, five observed on August 18, and a single tadpole was observed with a damaged tail on September 14. During the final survey round on October 4, no FYLF tadpoles or YOY frogs were observed.

Table 3.2-11. Visual Encounter Survey Results for Site 213R, SFAR upstream of Ogilby Creek.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edge.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
213R	Recon	7/27	1224	1334	55	27	27	16.5	16.5	3	0	0	0
	1	8/4	1301	1333	29	29.5	—	19	19	0	15/1	0	0
	2	8/18	1200	1246	40	26	26.5	17	16.75	1	5/1	0	0
	3	9/14	1050	1117	22	25	25	15.5	15	0	1/1	0	0
	4	10/4	1100	1115	15	20	20	12	11	0	0	0	0
									SUBTOTAL	**4**	**21/3**	**0**	**0**

Total number of egg masses observed, Site 213R	**4**
Total number of tadpoles/groups observed, Site 213R	**21/3**
Total number of juveniles/YOY observed, Site 213R	**0**
Total number of adults observed, Site 213R	**0**

3.2.1.11 Site 220R – SFAR at Maple Grove

No FYLF life stages were observed at Site 220R during surveys in 2011(Table 3.2-12).

Table 3.2-12. Visual Encounter Survey Results for Site 220R, SFAR at Maple Grove.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edge.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
220a	Recon	7/27	1133	1145	12	27	27	15	14.5	0	0	0	0
	1	8/4	1100	1141	38	26	27.25	17	16.5	0	0	0	0
	2	8/18	1055	1118	21	26	25	16	15.5	0	0	0	0
	3	9/14	1011	1020	9	24	25	16	15	0	0	0	0
	4	10/4	1013	1022	9	17.5	17.5	11	12	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**
220b	Recon	7/27	1133	1145	12	27	27	15	14.5	0	0	0	0
	1	8/4	1053	1110	17	25.5	26	19.5	16.25	0	0	0	0
	2	8/18	1035	1050	15	24.5	26	16	15.5	0	0	0	0
	3	9/14	1000	1010	10	24	24	16	15	0	0	0	0
	4	10/4	1007	1012	5	17.5	17.5	12	11	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**
220c	1	8/4	1152	1214	20	27.25	26.5	19	17.5	0	0	0	0
	2	8/18	1124	1134	10	25	26	15.5	15.25	0	0	0	0
	3	9/14	1024	1031	7	25	25	16.5	15.5	0	0	0	0
	4	10/4	1027	1036	9	14	14	11	12	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**

Total number of egg masses observed, Site 220R	**0**
Total number of tadpoles/groups observed, Site 220R	**0**
Total number of juveniles/YOY observed, Site 220R	**0**
Total number of adults observed, Site 220R	**0**

3.2.1.12 Site 246R – SFAR at Alder Creek

No FYLF life stages were observed during any of the surveys (Table 3.2-13).

Table 3.2-13. Visual Encounter Survey Results for Site 246R, SFAR at Alder Creek.

Subsite #	Round	Date	Beg. Time	End Time	Actual VES time (min.)	Beg. Air Temp. (°C)	End Air Temp. (°C)	Water Temp. (edge.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile /YOY Frogs	# Adult Frogs
246R	Recon	7/27	1040	1058	18	27	27.5	13	13	0	0	0	0
	1	8/4	1005	1021	15	20	21	15.5	15	0	0	0	0
	2	8/18	0942	1006	23	21.5	21.5	14.75	14	0	0	0	0
	3	9/14	0923	0933	10	23	23	15	14	0	0	0	0
	4	10/4	0935	0945	10	14	14	11	10.5	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**

Total number of egg masses observed, Site 246R	**0**
Total number of tadpoles/groups observed, Site 246R	**0**
Total number of juveniles/YOY observed, Site 246R	**0**
Total number of adults observed, Site 246R	**0**

3.2.2 VES Results by FYLF Life Stage

Locations of FYLF observed in 2011 at established monitoring sites and incidentally between sites are included with site maps provided in Appendix B.

3.2.2.1 Egg Masses

Four egg masses were observed in 2011, all of which were located at Site 213R. Three egg masses were observed during reconnaissance surveys (July 27, 2012) during the receding limb of the hydrograph. Two of these egg masses were found detached from the substrate and the other one was found attached to the downstream side of a boulder. In a subsequent survey, a group of recently-hatched tadpoles was observed approximately 25 m from the previously identified egg masses. The large distance between the observed tadpoles and the previously observed egg masses indicates that a fourth egg mass was likely present at this site. Egg masses are typically deposited during receding flows; therefore, distances from shore, egg mass depth, maximum depth, and water velocities represent values at the time of discovery and do not necessarily reflect values during oviposition. Egg masses (N = 3) were located an average distance of 2.2 m from shore, but ranged from 0.5 to 5.1 m out from the wetted edge (Table 3.2-15). Water depths at observed egg mass locations ranged from 6 to 7 cm (mean = 6.3 cm) and maximum depths ranged from 6 to 11 cm (mean = 7.7 cm). Egg masses were in located in calm areas without flowing water. Water temperatures at egg mass locations ranged from 16 to 19°C (mean = 18°C) when first observed.

The developmental stage for the three egg masses when first observed was Gosner stage 19, and the fourth egg mass was identified by the presence of recently-hatched tadpoles at approximately Gosner stage 24-26. Based upon these observed developmental stages and the dates they were found, we estimate that oviposition occurred from approximately July 19 to August 4 in 2011.

3.2.2.2 Tadpoles

Twenty-one tadpoles in three groups were observed in 2011, all of which were located at Site 213R where egg masses were also observed. Fifteen tadpoles were observed on August 4, five observed on August 18, and a single tadpole was observed on September 14.

3.2.2.3 Young-of-the-Year

Young-of-the-year frogs were not observed during surveys conducted in 2011 (Table 3.2-1).

3.2.2.4 Juveniles

A single juvenile frog (30 mm SUL) was observed 15 m upstream of the bottom of Site 120a in 2011. This frog likely represents the 2010 cohort (i.e., a one-year old frog).

3.2.2.5 Adults

Two adult frogs (one male, one undetermined) were observed within established monitoring sites in 2011. These two frogs were observed along Soldier Creek (Site 125T); on August 4, 2011. One was a 51 mm SUL male captured 20 m upstream of the confluence with the SFAR. The second was an approximately 50 mm SUL frog and was observed about 75 m upstream of the confluence of Soldier Creek and the SFAR.

3.2.3 Incidental FYLF Observations on the SFAR

In 2011, three incidental FYLF observations were made along the SFAR. These three observations were all of adult FYLF. These observations included one 63 mm SUL female captured upstream of Site 106c, one adult at the confluence with Silver Creek, and another adult observed 75 m upstream of the top of Site 213R. These observations occurred while walking to existing monitoring sites.

3.2.4 Summary of FYLF VES Results Conducted in 2002, 2004, 2005, 2007 and 2011

During the five years (2002, 2004, 2005, 2007 and 2011) of amphibian surveys on the SFAR, a total of 45 egg masses, 3,671 tadpoles (in 130 groups), 286 YOY, 33 juveniles, and 85 adults have been observed (Table 3.2.-14).

Table 3.2-14. Summary of Visual Encounter Survey Results Conducted in 2002, 2004, 2005, 2007, and 2011.

Survey Year	FYLF Life Stage				
	Egg Masses	Tadpoles (groups)	Young-of-the-year (YOY)	Juveniles	Adults
2002	0	118 (5)	12	14	24
2004	24	1822 (61)	151	6	38
2005	12	695 (19)	15	1	12
2007	5	1015 (42)	108	11	9
2011	4	21 (3)	0	1	2
Total	45	3671 (130)	286	33	85

Surveys conducted in 2011 and 2007 followed the same survey methodologies and included the same survey sites. As such, comparison of these two years provides a relative assessment of the status of the population from 2007 to 2011. Overall, the

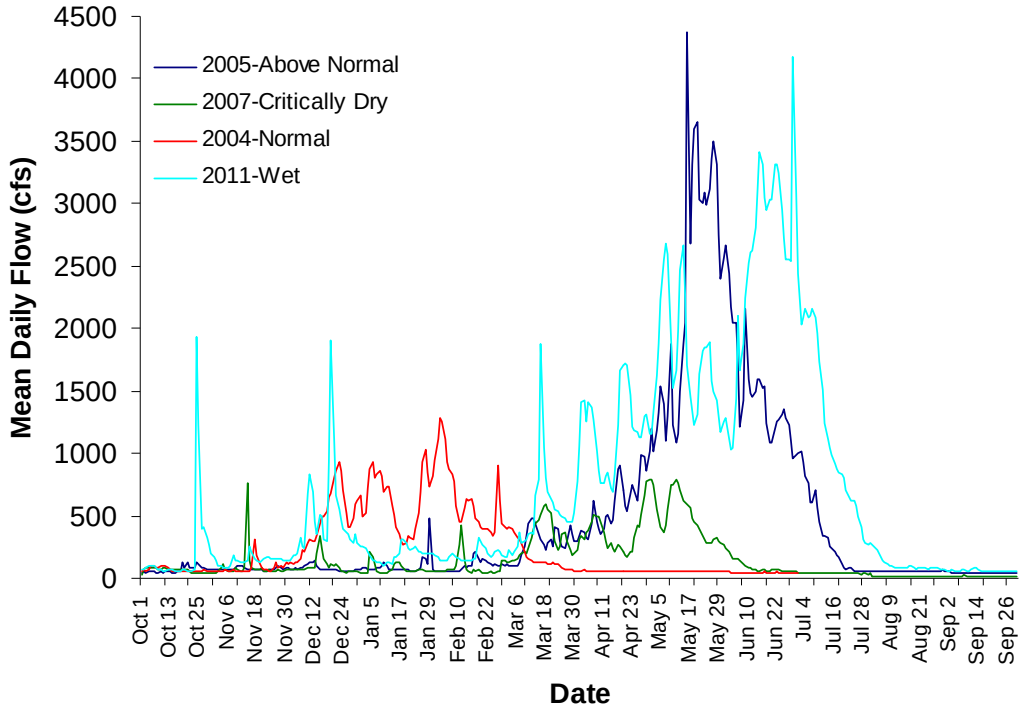
observations of various FYLF life stages were greater in 2007 compared to 2011. However, the decreased detections in 2011 compared to 2007 likely reflected the different water year types more than any real trend. In 2007, a critically dry water year, conditions for breeding were ideal with low, stable base flows throughout the breeding season. In contrast, 2011, a wet water year, had conditions less suitable for successful breeding. Flows remained elevated during May, June and July during the period when breeding had occurred during prior years. Locations of FYLF observations from this period (May to July 2011) are provided along with site maps in Appendix B.

4.0 DISCUSSION

4.1 Interannual Comparison of Water Year Types and Oviposition Periods

According to the California Department of Water Resources the SFAR experienced a wet water year (172% of normal precipitation) in 2011, in contrast to 2007 (critically dry), 2005 (above-normal), and 2004 (normal) (Figure 4.1-1).

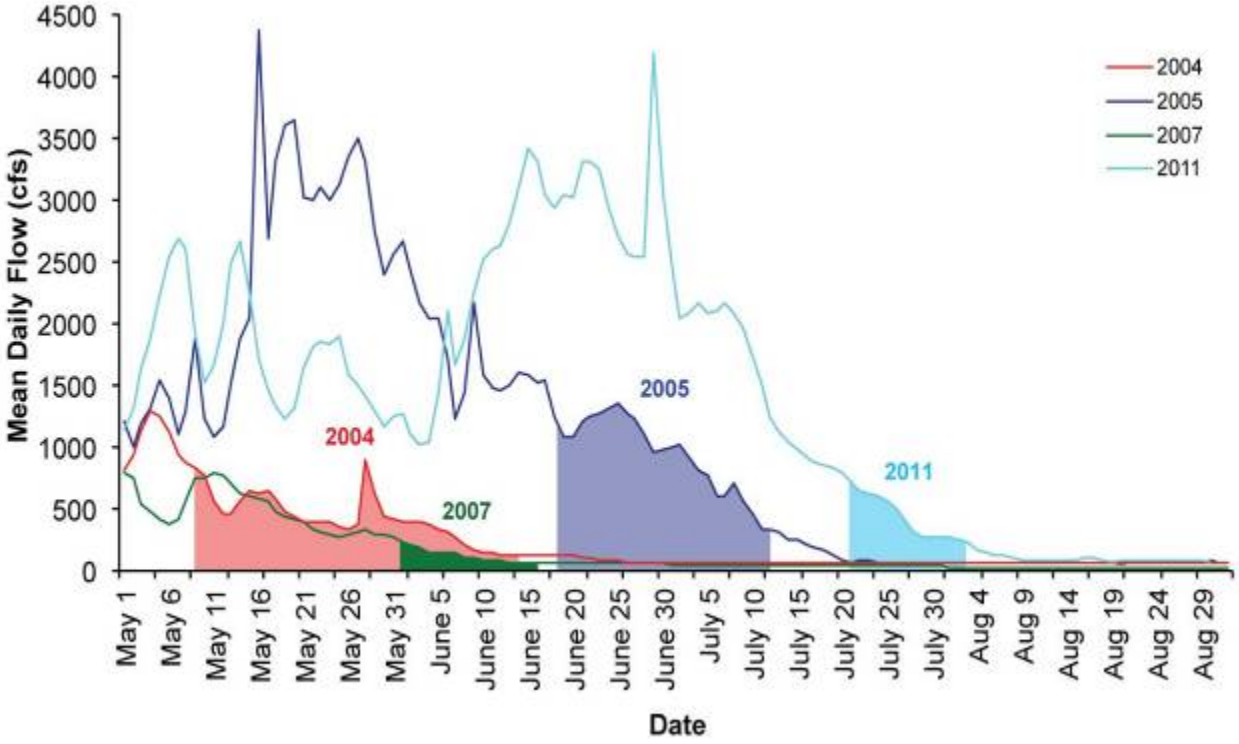
Figure 4.1-1. Mean daily flow (cfs) on the South Fork American River in 2004, 2005, 2007 and 2011 (measured at gaging station A-12 at Kyburz Diversion Dam).



During these years, FYLF surveys conducted on the SFAR allowed an estimation of oviposition periods by backdating the presence of egg masses based upon their developmental stage and typical inter-stage progression.

In 2011, flows peaked at 4,179 cfs (average daily flow) on June 29 and decreased during July. Based upon on the developmental stage of egg masses observed in 2011 (N = 4; three observed egg masses and one egg mass inferred from a group of recently hatched tadpoles), we estimate the oviposition period occurred from July 19 to August 4 while SFAR unimpaired flows were receding (Figure 4.1-2). This oviposition period represented the latest reproduction on the SFAR observed for the survey years 2004, 2005, 2007, and 2011. This delayed onset of breeding is likely due to the relative difference in the magnitude, duration and timing of seasonal snowmelt between years. In general, oviposition occurred earlier on the SFAR during normal (2004) and critically dry (2007) water years, and later during above-normal (2005) and wet (2011) water years (Figure 4.1-2).

Figure 4.1-2. Mean daily flow (cfs) on the South Fork American River and estimated FYLF oviposition periods (represented by the shaded areas under the hydrographs) for survey years 2004, 2005, 2007 and 2011.



These oviposition periods appeared to vary in duration, with the egg laying period lasting approximately 36 days in 2004, 26 days in 2005, and 16 days in both 2007 and 2011. These estimated periods represent minimum durations because they are based only on observed egg masses. The actual duration is likely longer.

During these four monitoring years, FYLF initiated breeding during times when flows were on the receding limb of the hydrograph. During 2004, 2005, and 2007, egg masses were observed first along Silver Creek (Site 115T) where flow levels are generally lower than on the SFAR. In contrast, no FYLF life stages were observed during three survey rounds (305 m upstream of the SFAR confluence) on Silver Creek in 2011. Similarly, only four egg masses and six juvenile/adult frogs (both within monitoring sites and incidentally observed) were found on the mainstem SFAR. These results suggest that 2011 was a poor reproductive year for FYLF in the SFAR. Due to the delayed oviposition period in 2011, there was a shorter period for FYLF tadpoles to reach metamorphosis prior to the onset of winter and high flows due to storm events.

5.0 CONCLUSIONS

One reconnaissance-level survey and four survey rounds (two egg mass surveys, one tadpole survey, and one metamorph survey) were conducted within the Project Area between July 27 and October 4, 2011. The four survey rounds occurred at Sites 105R, 106R, 110R, 120R, 124R, 207R, 213R, 220R, and 246R. In addition, three tributaries (Ogilby Creek [Site 210DT], Soldier Creek [Site 125T], and Silver Creek [Site 115T]) were surveyed at least once during the survey effort. Four egg masses were observed (one of which was inferred from a group of recently-hatched tadpoles) at Site 213R, which was the only location among survey sites where FYLF reproduction was confirmed in 2011. Twenty-one tadpoles in three groups were observed in 2011, all of which were located at Site 213R where egg masses were observed. Young-of-the-year FYLF were not observed at any monitoring sites in 2011. One juvenile frog was observed at Site 120a, and two adult frogs were found on Soldier Creek (Site 125T). One adult frog was incidentally observed at each of three locations: upstream of Site 213R, at the Silver Creek confluence, and upstream of Site 106c. Survey data to date suggest that the SFAR FYLF population is relatively small and highly variable depending on water year conditions, with larger populations is drier years and smaller populations in wetter years.

Based on the developmental stages of egg masses observed, it is estimated that the oviposition period in 2011 occurred from approximately July 19 to August 4. This time frame represents the latest estimated date for initiating reproduction on the SFAR observed during the survey years 2004, 2005, 2007, and 2011. Variation in the date of breeding onset and duration of oviposition during these years is likely due to the differences between years in the magnitude and timing of seasonal snowmelt. As expected considering the timing of declining spring flows (a key environmental cue for FYLF egg-laying) oviposition occurred earlier on the SFAR during normal (2004) and

critically dry (2007) water years, and later during above-normal (2005) and wet (2011) water years.

6.0 LITERATURE CITED

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Appendix A: Representative Site and FYLF Photographs

Photo 1. Site 105a – SFAR at Akin Powerhouse, bottom of site looking upstream, August 4, 2011.

Photo 2. Site 105b – SFAR at Akin Powerhouse, bottom of site looking upstream, August 18, 2011.

Photo 3. Site 105c – SFAR at Akin Powerhouse, view from the right bank of the SFAR, July 27, 2011.

Photo 4. Site 105d – SFAR at Akin Powerhouse, top of site looking downstream, August 18, 2011.

Photo 5. Site 106a – SFAR upstream of Akin Powerhouse, bottom of site looking upstream, September 14, 2011.

Photo 6. Site 106b – SFAR upstream of Akin Powerhouse, bottom of site looking upstream, September 14, 2011.

Photo 7. Site 106c – SFAR upstream of Akin Powerhouse, bottom of site looking upstream, September 14, 2011.

Photo 8. Site 110a – SFAR downstream of Silver Creek, top of site looking upstream, September 14, 2011.

Photo 9. Site 110b – SFAR downstream of Silver Creek, bottom of site looking downstream, September 14, 2011.

Photo 10. Site 115T – Silver Creek, bottom of site looking upstream, September 14, 2011.

Photo 11. Site 120a – SFAR downstream of Soldier Creek, bottom of site looking upstream, September 14, 2011.

Photo 12. 120b – SFAR downstream of Soldier Creek, top of site looking downstream, September 14, 2011.

Photo 13. Site 120c – SFAR downstream of Soldier Creek, bottom of site looking upstream, September 14, 2011.

Photo 14. Site 124 – SFAR at Soldier Creek, bottom of site looking upstream, September 14, 2011.

Photo 15. Site 125T – Soldier Creek, looking upstream at the SFAR confluence, September 14, 2011.

Photo 16. Site 207R- SFAR downstream of Ogilby Creek, bottom of site looking upstream, August 18, 2011.

Photo 17. Site 210DT- Ogilby Creek, just upstream of the confluence with the SFAR, September 14, 2011.

Photo 18. Site 213- SFAR upstream of Ogilby Creek, bottom of site looking upstream, September 14, 2011.

Photo 19. Site 220a- SFAR at Maple Grove, bottom of site looking upstream, September 14, 2011.

Photo 20. Site 220b- SFAR at Maple Grove, top of site looking downstream, September 14, 2011.

Photo 21. Site 220c- SFAR at Maple Grove, bottom of site, view of edgewater habitat, August 4, 2011.

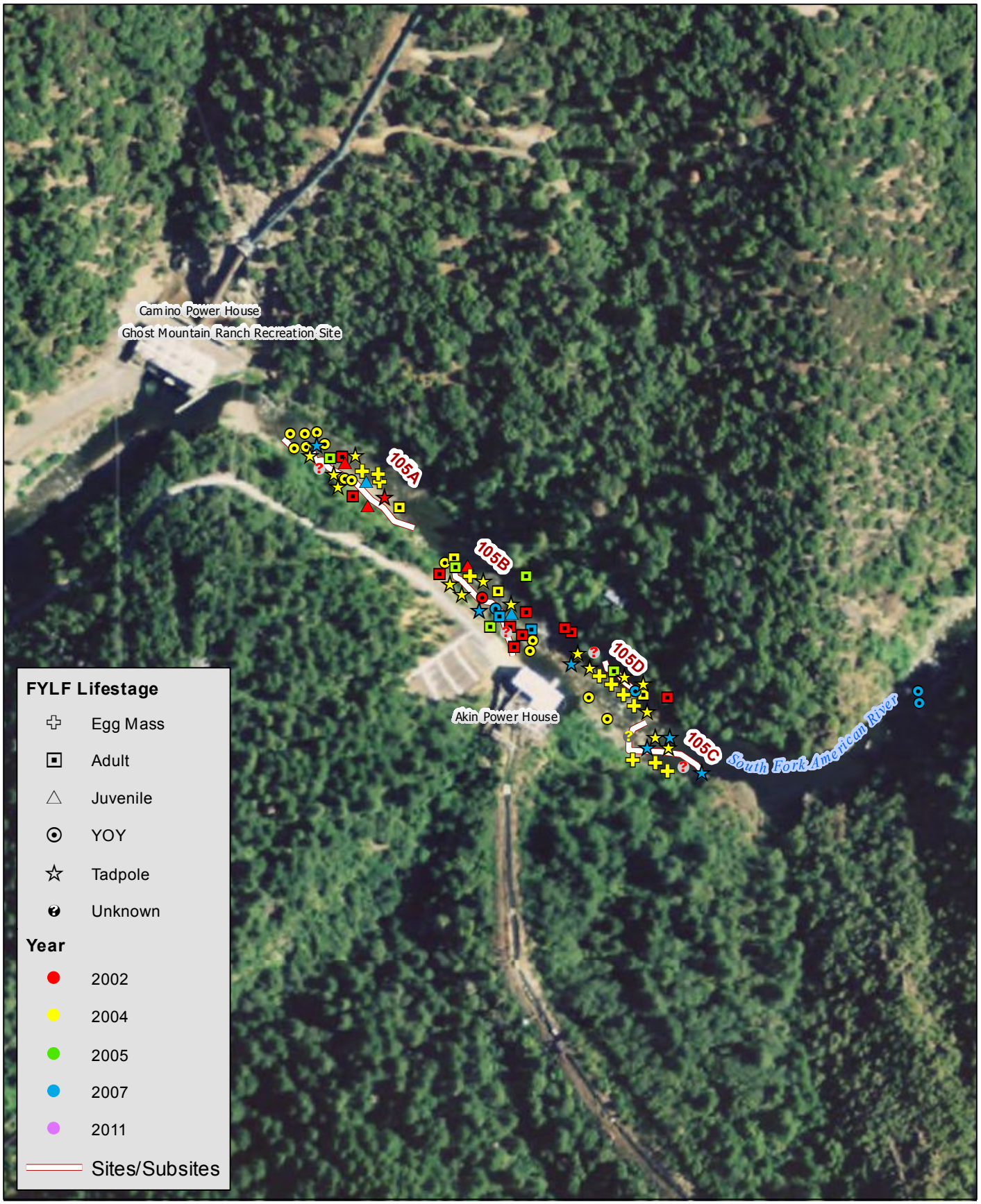
Photo 22. Site 246R- SFAR at Alder Creek, bottom of site looking upstream, July 27, 2011.

Photo 23. Site 213R, egg mass "B" (indicated by red arrow) observed on July 27, 2011.

Photo 24. Foothill yellow-legged frog tadpole observed at Site 213R on August 18, 2011.

Photo 25. Juvenile FYLF observed at Site 120a on August 18, 2011.

Appendix B: Aerial Photographs of Survey Sites and FYLF Observations



Map 1
Sites 105A, 105B, 105C, 105D

El Dorado County, California

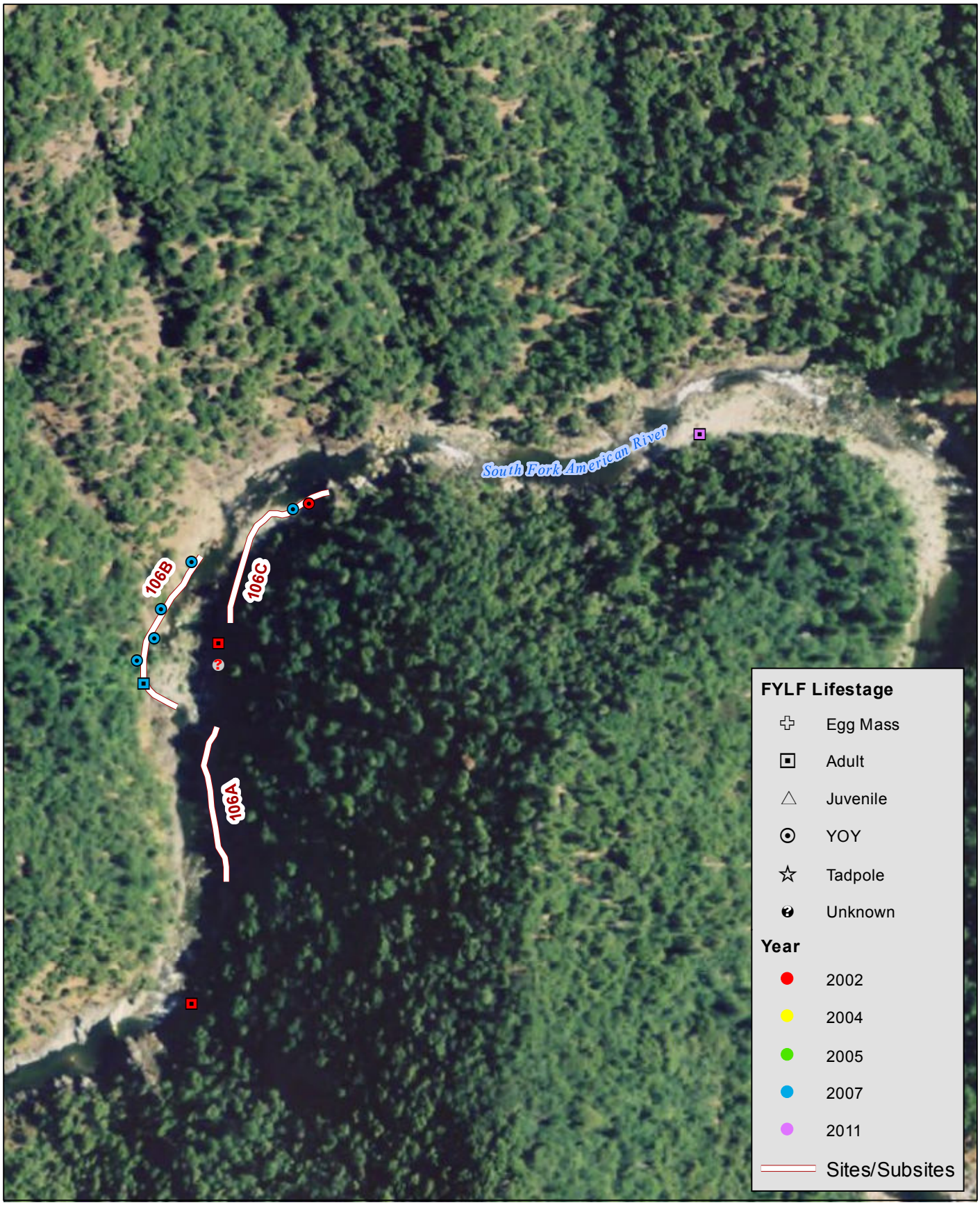
Project Location

Feet
0 125 250

Meters
0 50 100

N

GANDA



Map 2
Sites 106A, 106B, 106C

El Dorado County, California

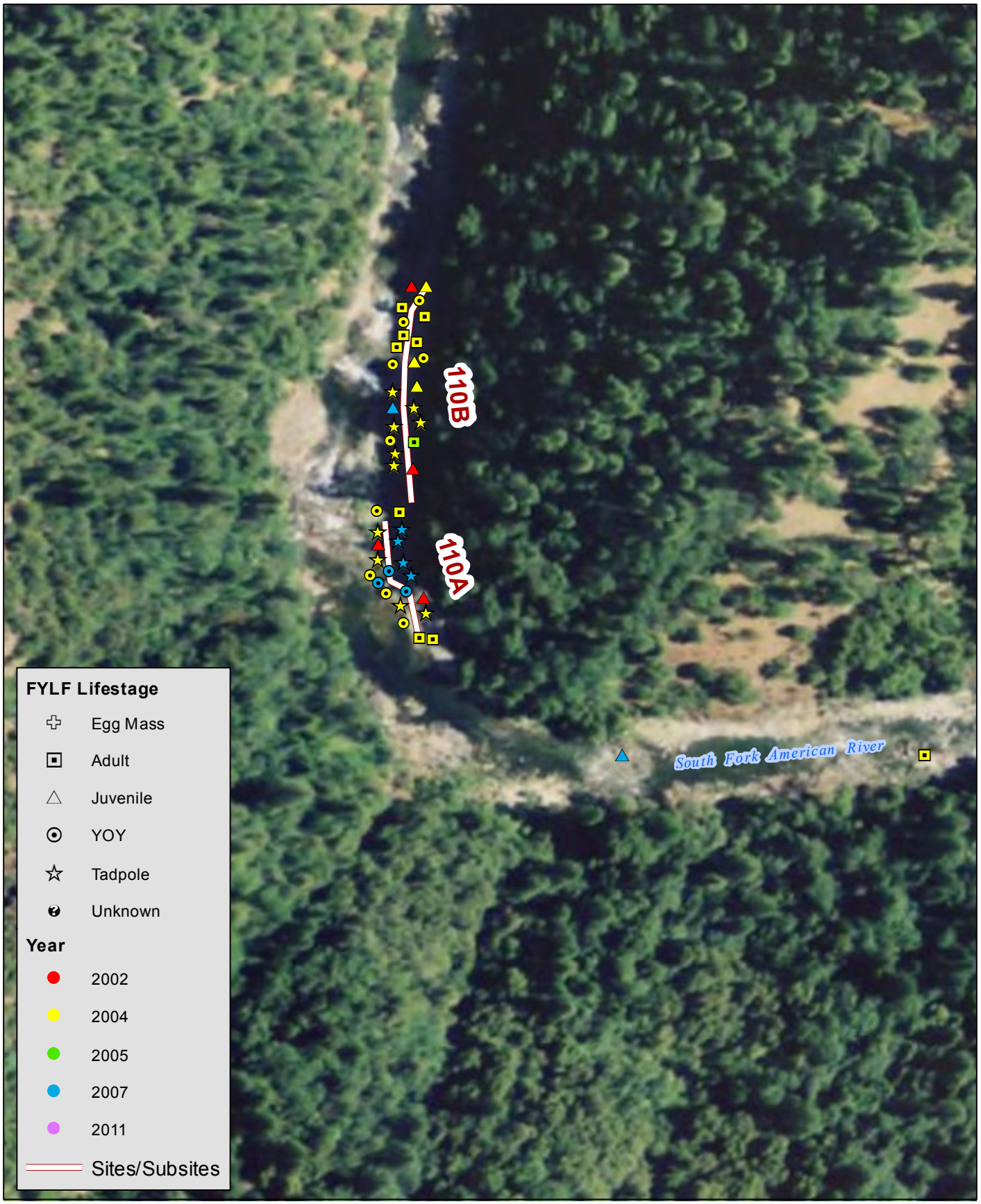
Project Location

0 125 250 Feet

0 50 100 Meters

N

GANDA



Map 3
Sites 110A, 110B

El Dorado County, California

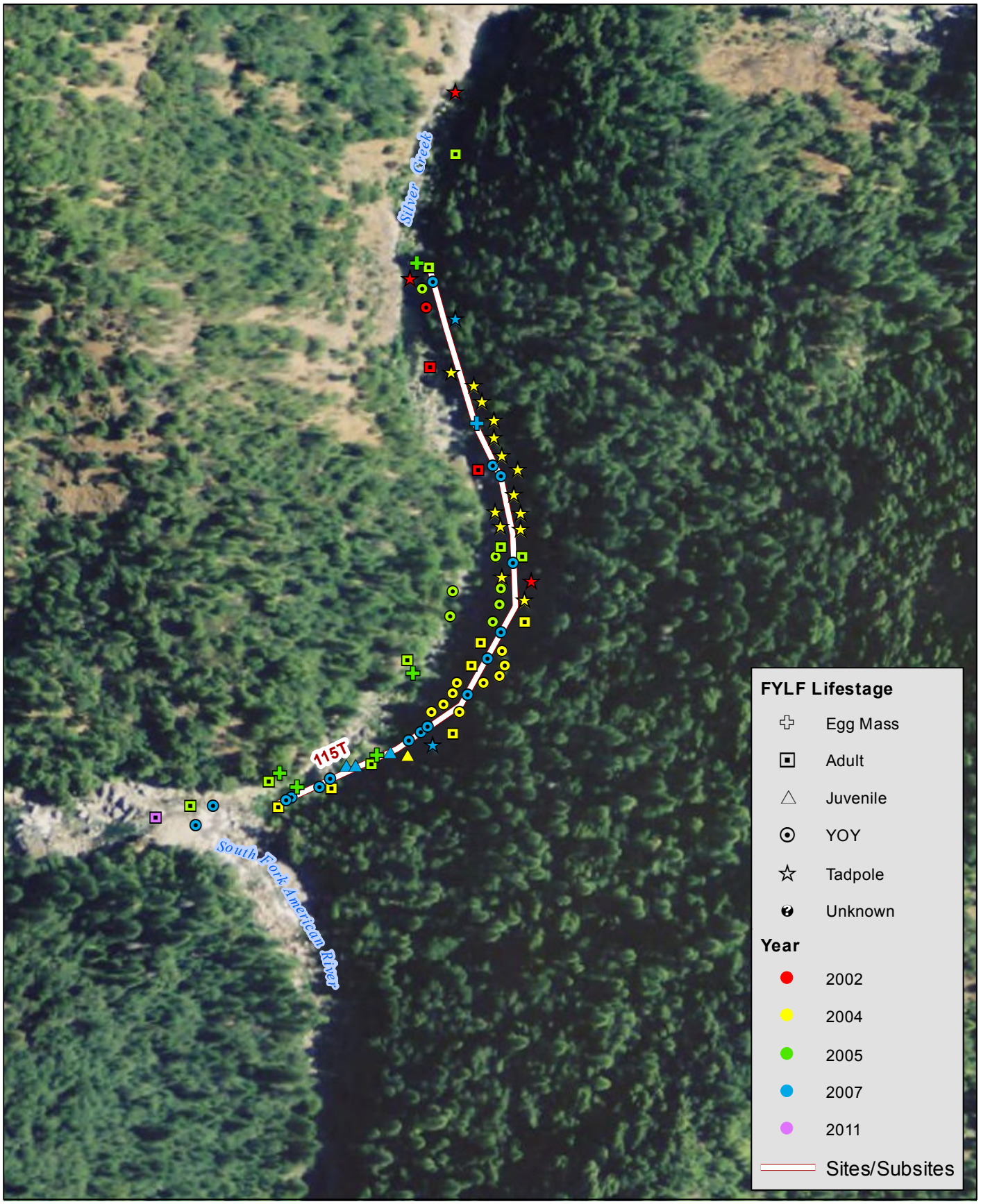
Project Location

0 125 250 Feet

0 50 100 Meters

N

GANDA



Map 4
Site 115T

El Dorado County, California

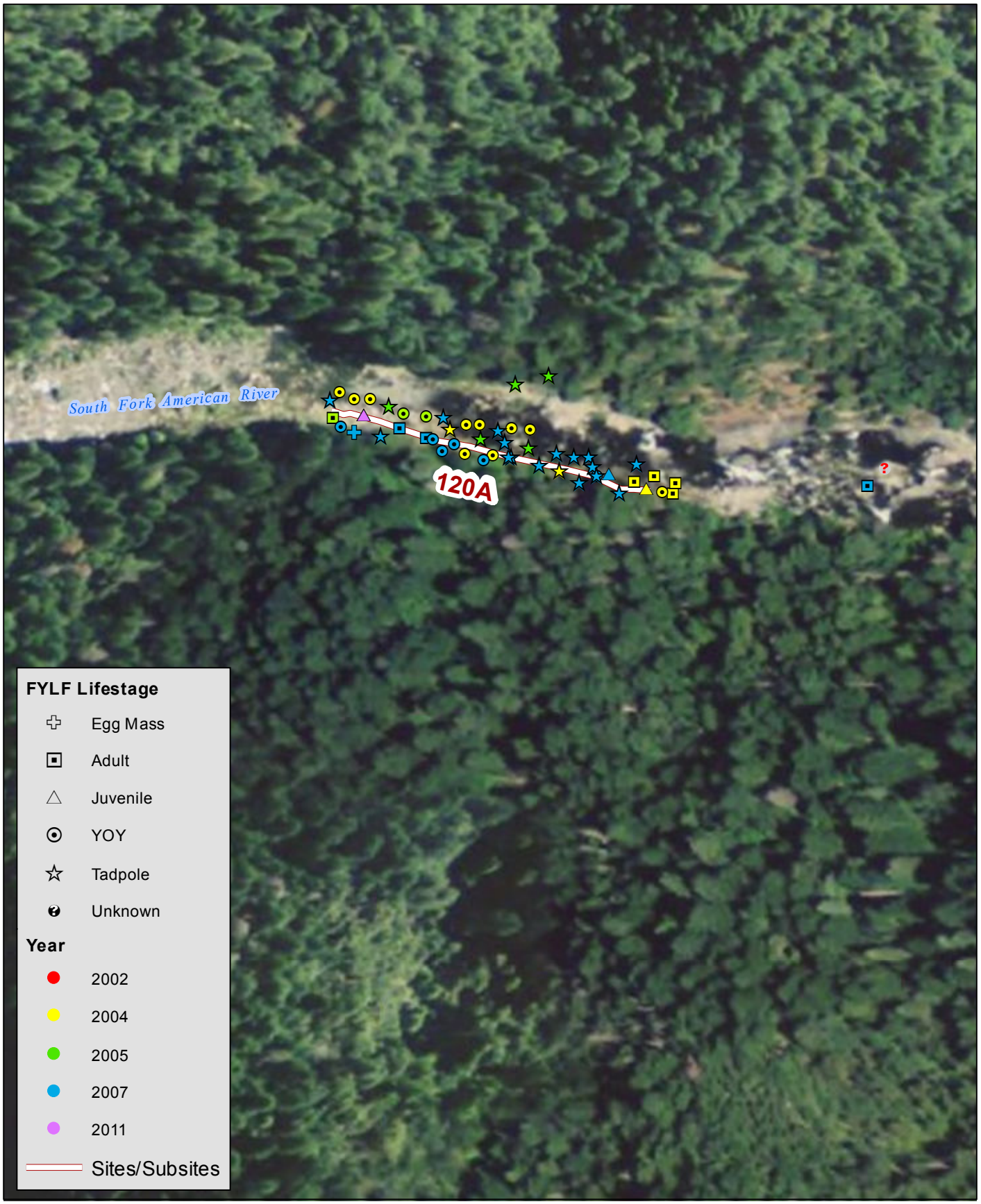
Project Location

0 125 250 Feet

0 50 100 Meters

N

GANDA



Map 5
Site 120A

El Dorado County, California

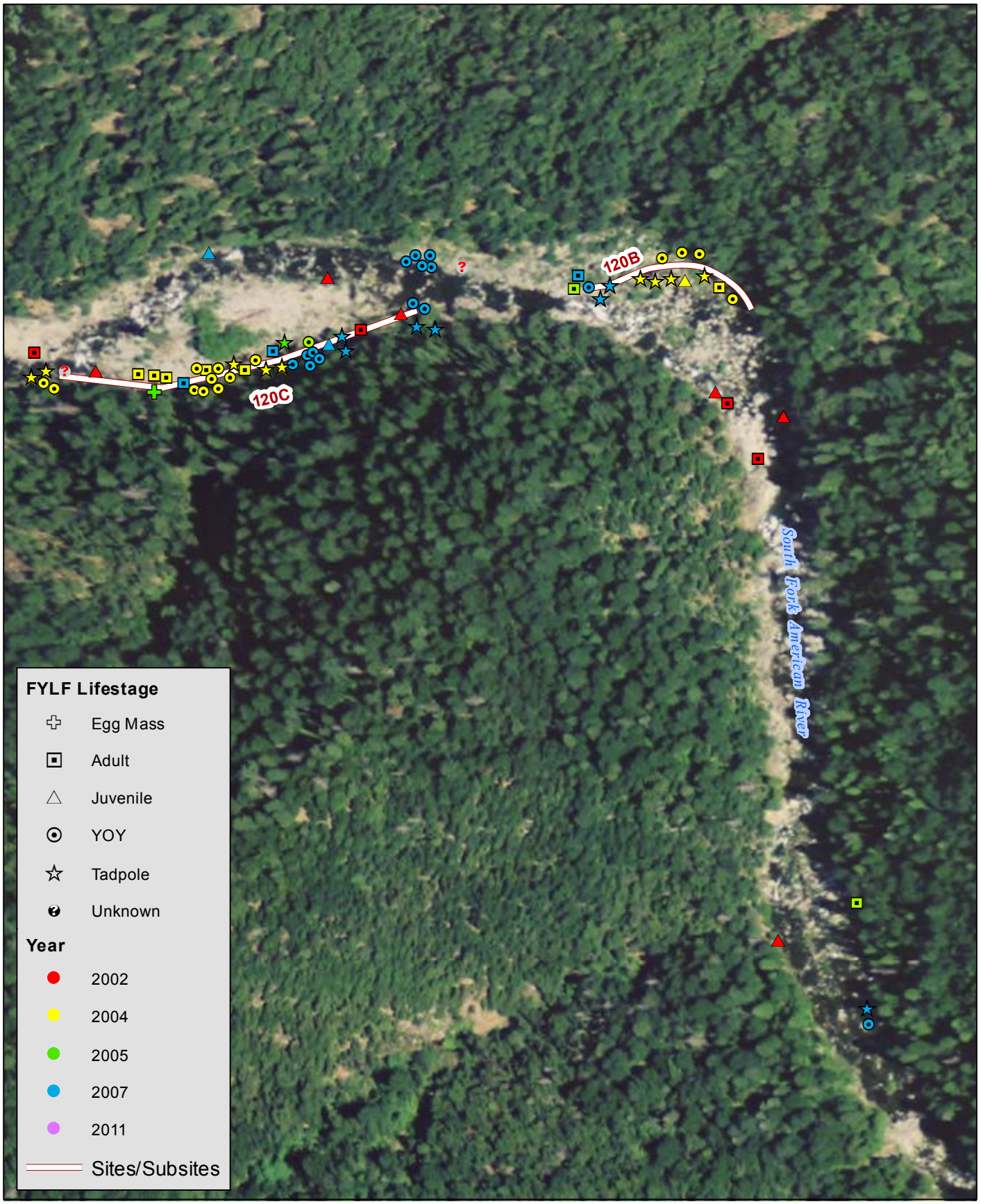
Project Location

0 125 250 Feet

0 50 100 Meters

N

GANDA



Map 6
Sites 120B, 120C

El Dorado County, California

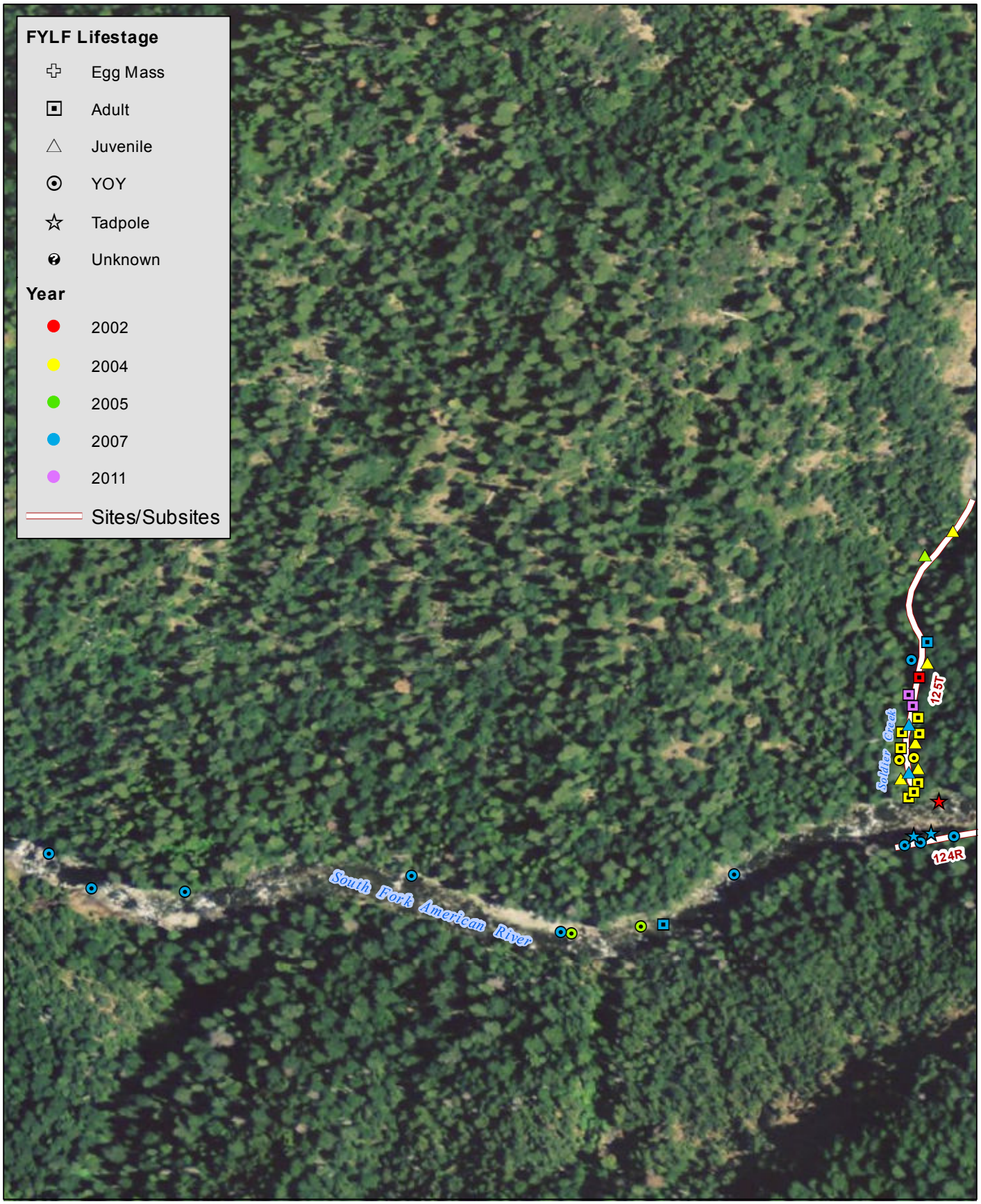
Project Location

0 125 250 Feet

0 50 100 Meters

N

GANDA



Map 7
South Fork American River

El Dorado County, California

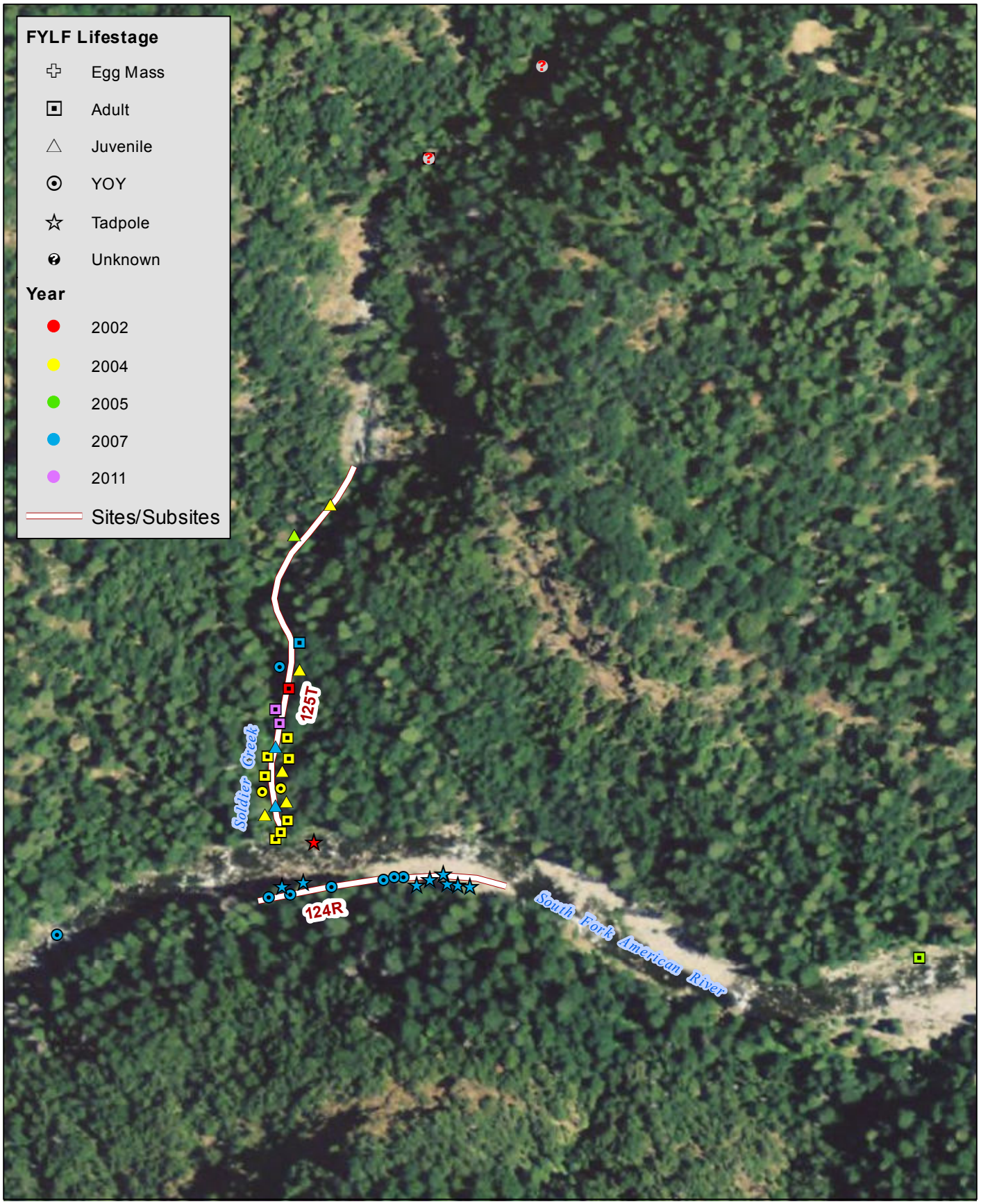
Project Location

Feet
0 125 250

Meters
0 50 100

N

GANDA



Map 8
Sites 124R, 125T

El Dorado County, California

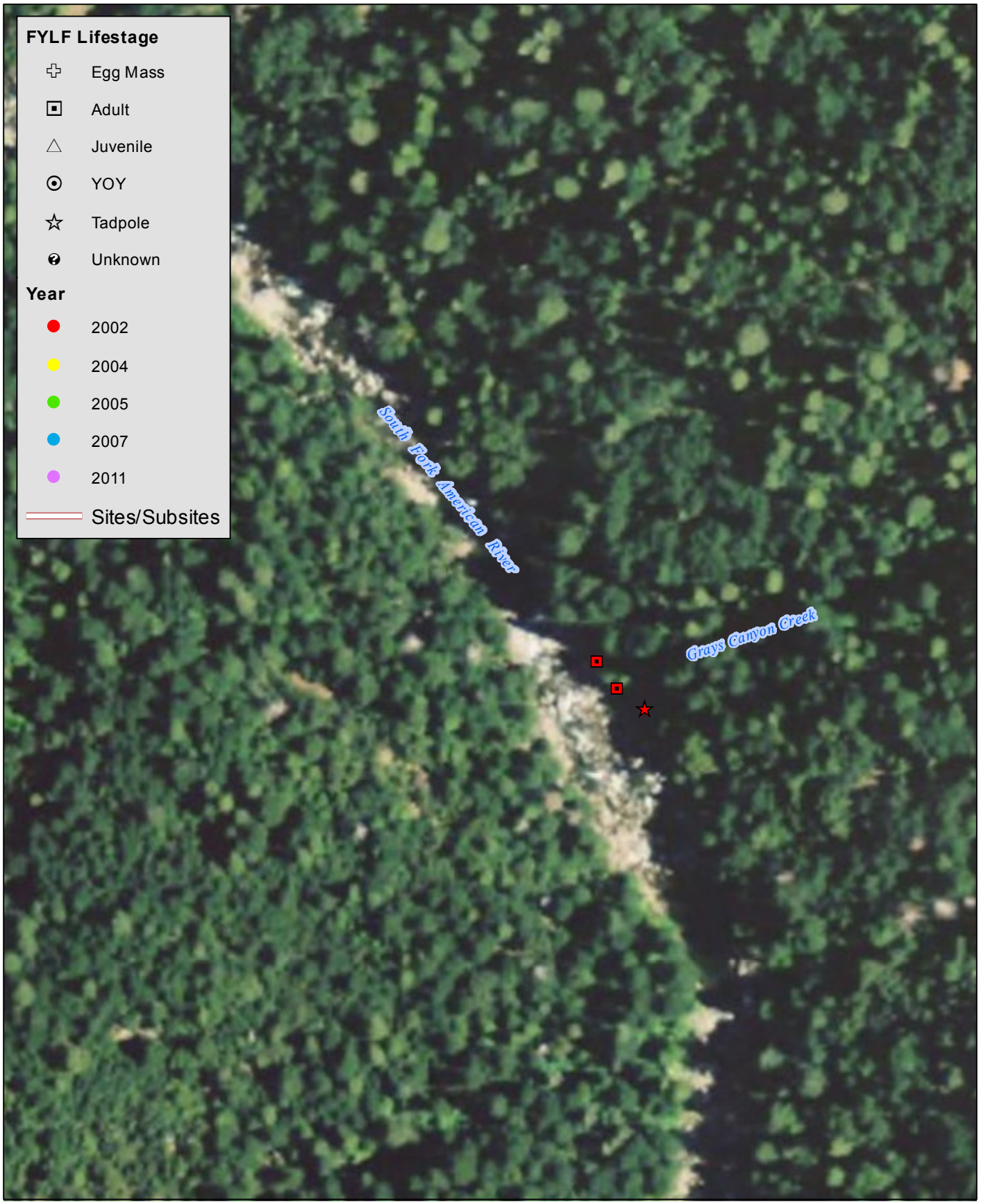
Project Location

Feet
0 125 250

Meters
0 50 100

N

GANDA



Map 9
Site 130A

El Dorado County, California

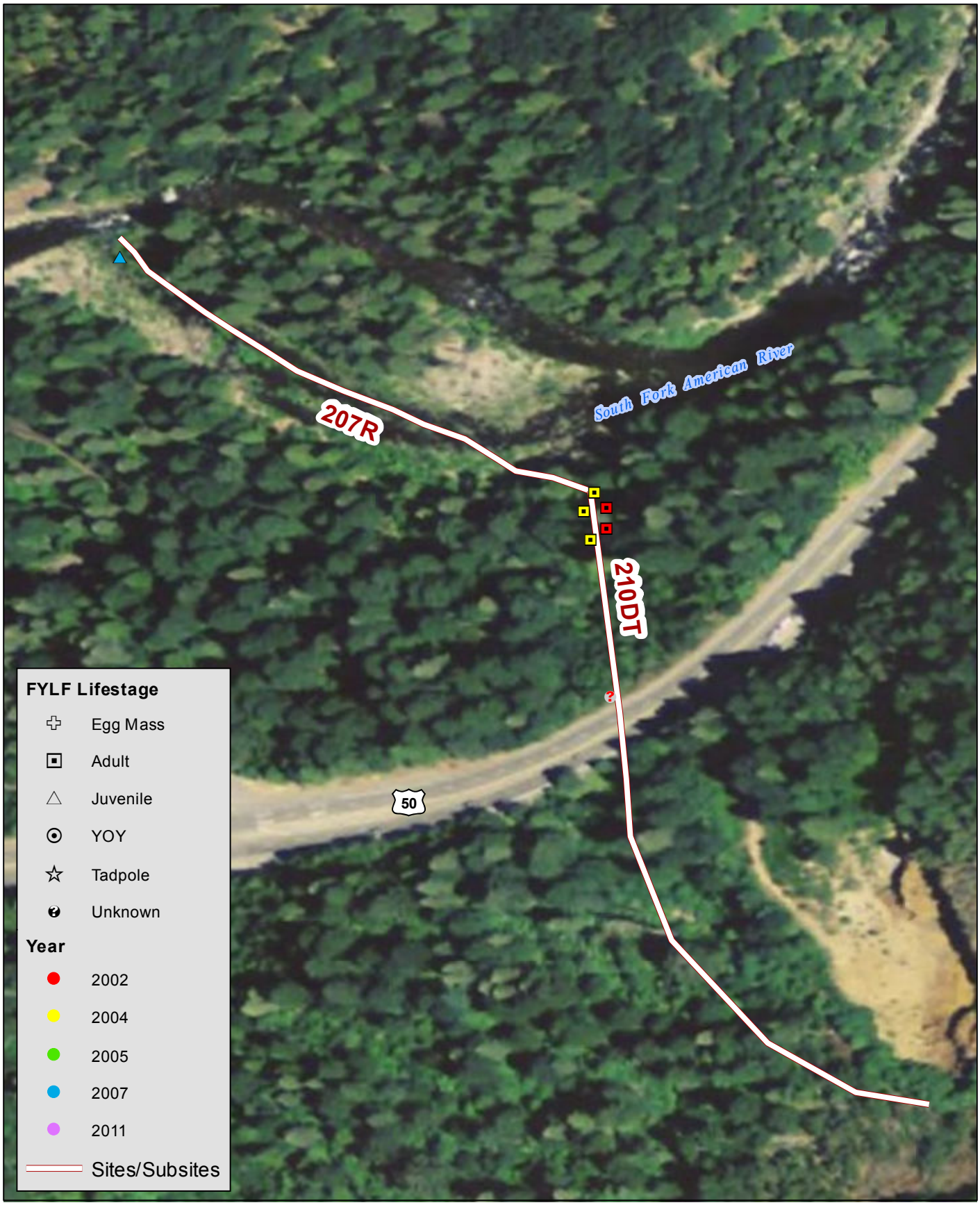
Project Location

0 125 250 Feet

0 50 100 Meters

N

GANDA



Map 10
Sites 207R, 210DT

El Dorado County, California

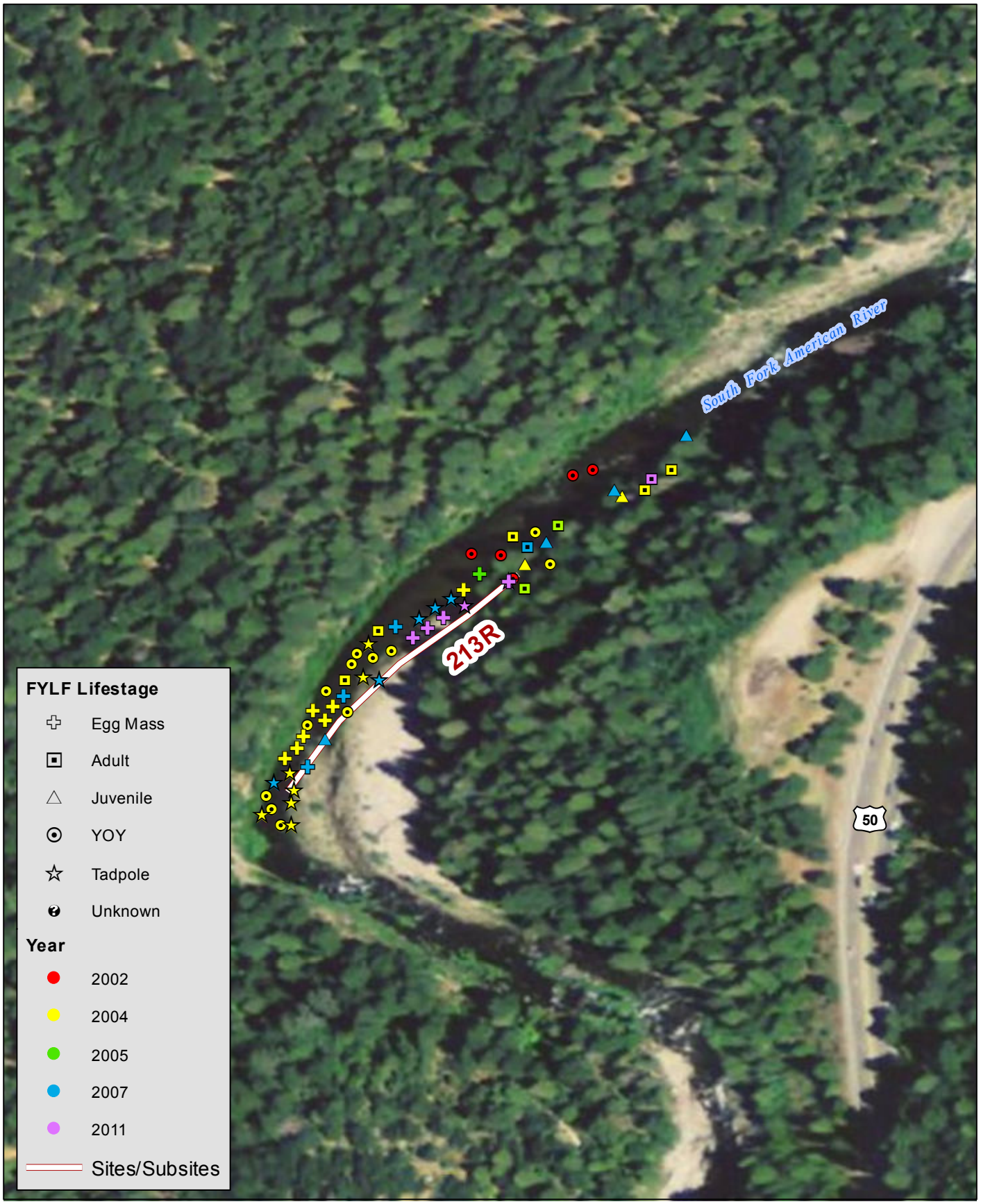
Project Location

0 125 250 Feet

0 50 100 Meters

N

GANDA



Map 11
Site 213R

El Dorado County, California

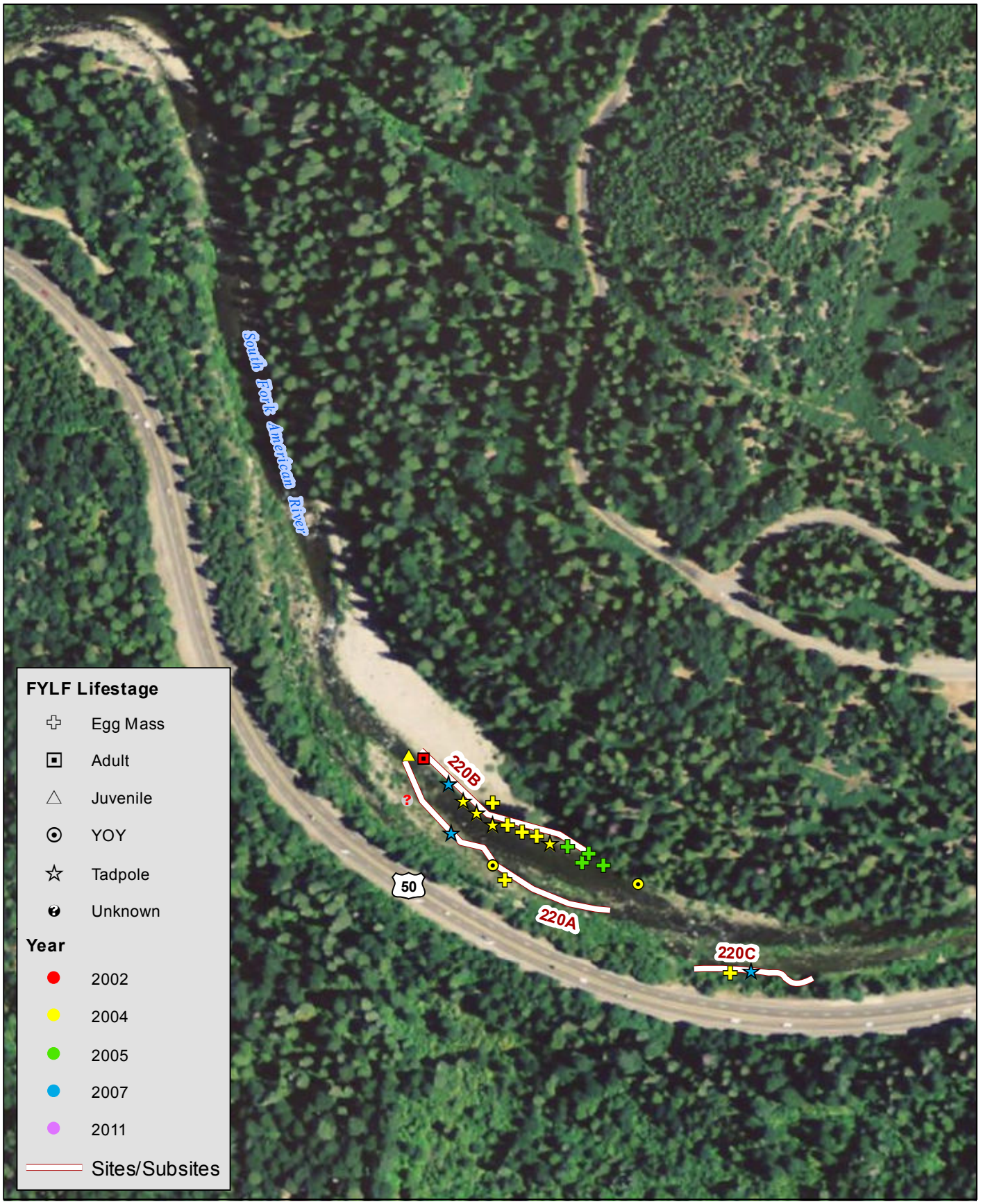
Project Location

0 125 250 Feet

0 50 100 Meters

N

GANDA



Map 12
Sites 220A, 220B, 220C

El Dorado County, California

Feet
0 125 250

Meters
0 50 100

N

GANDA

Map 13
South Fork American River

El Dorado County, California

Project Location

0 125 250 Feet

0 50 100 Meters

N

GANDA