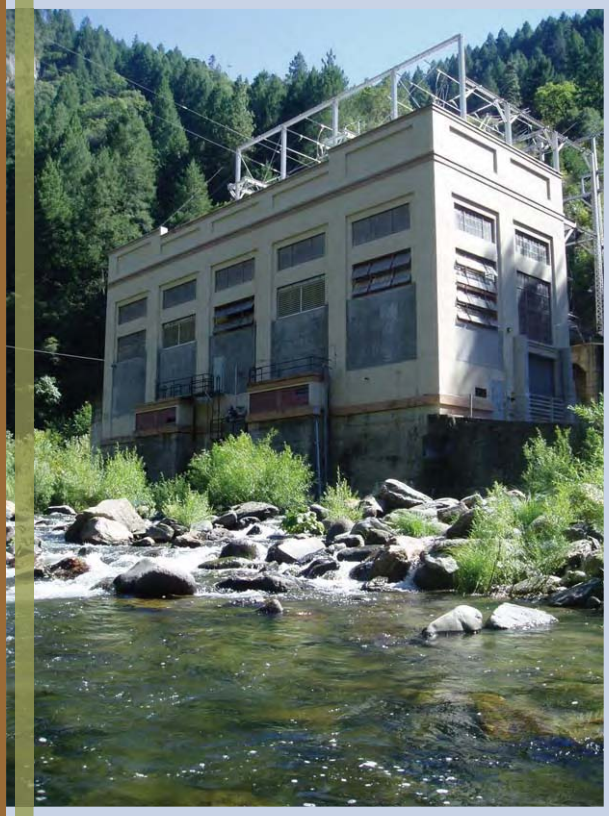
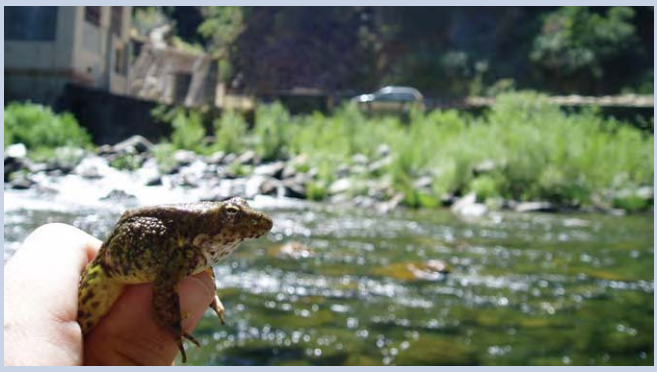
Garcia and Associates
Natural and Cultural Resource Consultants

GANDA

RESULTS OF 2005 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)





February 2007

PREPARED FOR:

El Dorado Irrigation District
2890 Mosquito Road
Placerville, CA 95667

PREPARED BY:

Garcia and Associates
2601 Mission Street, Suite 600
San Francisco, CA 94110

RESULTS OF 2005 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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2890 MOSQUITO ROAD
PLACERVILLE, CALIFORNIA 95667

Prepared by:

GARCIA AND ASSOCIATES
2601 MISSION STREET, SUITE 600
SAN FRANCISCO, CALIFORNIA 94110

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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). As part of the relicensing process, the Settlement Agreement for the Project requires that a Monitoring Program be implemented following license issuance and through the term of the new license and any annual licenses, in coordination with the U.S. Forest Service (USFS), the Ecological Resources Committee (ERC), and the California State Water Resources Control Board (SWRCB).

Under the Settlement Agreement, one task of the Monitoring Program requires the District to conduct protocol surveys for foothill yellow-legged frog (*Rana boylii*; FYLF) using *A Standardized Approach for Habitat Assessments and Visual Encounter Surveys for the Foothill Yellow-Legged Frog* (Seltenrich and Pool 2002) in a sub-sample of appropriate habitat types to document species presence and distribution. An extensive survey in 2002 (ECORP 2002) documented 10 sites with FYLF presence along the mainstem and tributaries of the South Fork American River (SFAR).

The Monitoring Program also requires the District to identify amphibian breeding and larval periods in Project-affected river reaches by periodically surveying reaches of known FYLF presence during spring/summer. The first year monitoring surveys were conducted in 2004 to determine the timing and success of the following life stages of existing known populations: egg laying, tadpole rearing, metamorphosis, and size/condition of metamorphs in late September to estimate probability of overwintering success (ECORP 2005). In addition, the 2004 surveys included four new sites between Alder Creek and Kyburz Diversion Dam to determine the presence and distribution of FYLF in that upper portion of the SFAR bypass reach (none were found).

In 2005, the District contracted Garcia and Associates (GANDA) to conduct surveys for FYLF to fulfill the requirements of the Settlement Agreement's Monitoring Program. Sites chosen for monitoring in 2005 included eight of the sites identified with FYLF presence in 2002 and resurveyed during 2004, with the addition of one site (124R – SFAR at confluence of Soldier Creek). This site was recommended for inclusion in the 2005 surveys in the 2004 report (ECORP 2005). An overview of the Project area and survey sites for 2005 is presented in Figure 1.0.

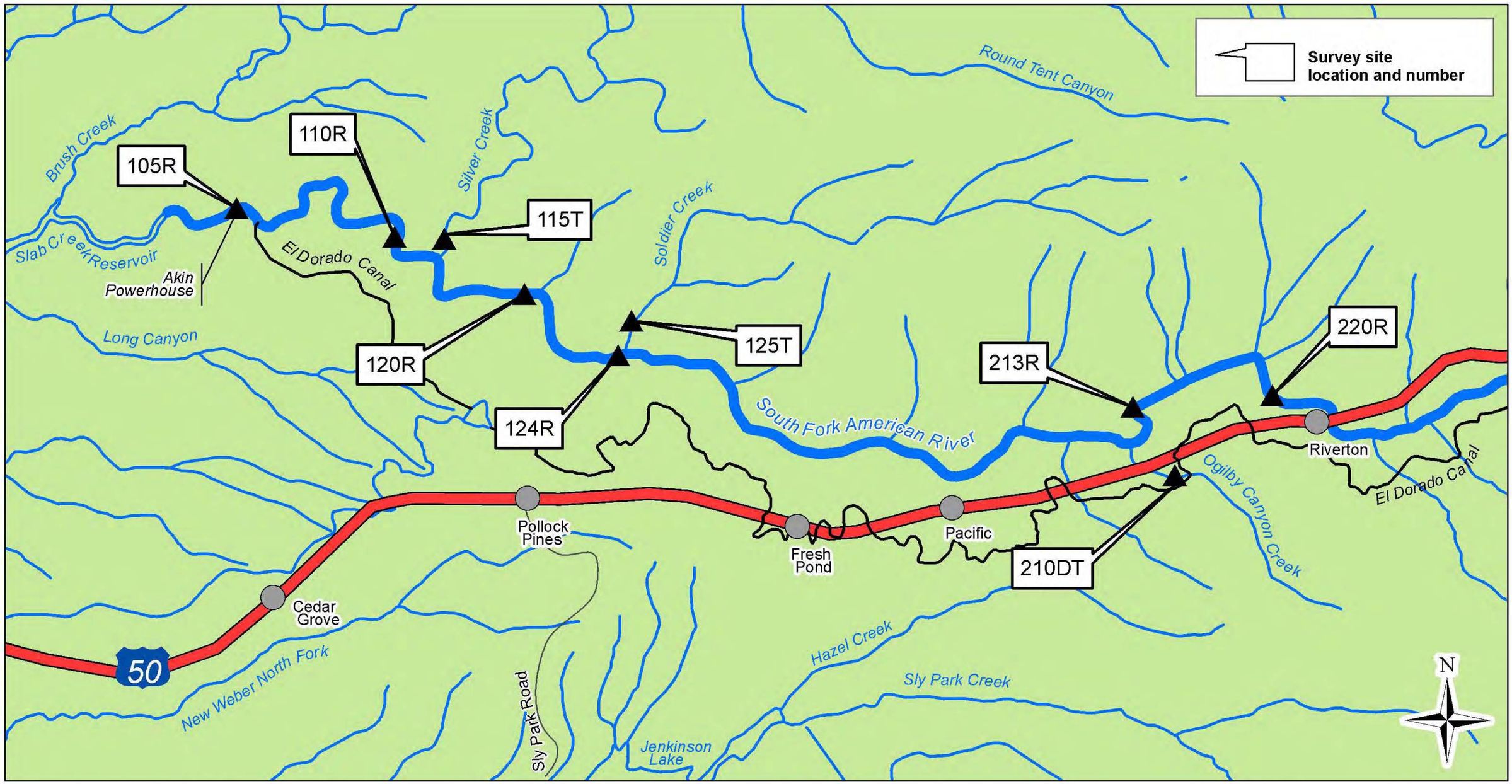


Figure 1.0. Survey sites for foothill yellow-legged frog on the South Fork American River.

0 1 2 4 6
Kilometers

Sources: USGS 1x2 degree topographic map (Sacramento); EID survey protocol.

GANDA

1.1 FYLF Status, Distribution and Current Threats to Populations

The FYLF is designated as a Federal Species of Concern, a Forest Service Sensitive species, and a California Species of Special Concern. FYLF occur in the Coast Ranges from the Santiam River in Oregon south to the San Gabriel River in Los Angeles County and along the west slopes of the Sierra/Cascade crest in most of central and northern California. Other isolated populations have been reported in Baja California Norte (Loomis 1965), in southern California, and at Sutter Buttes in Butte County, California (Stebbins 2003). The elevational range of FYLF extends from sea level to 2,042 m (6,700 ft.) in Baja California Norte. In California, FYLF have been recorded in the Sierra as high as 1,830 m (6,000 ft.) near McKessick Peak, Plumas National Forest and 1,940 m (6,365 ft.) at Snow Mountain in Trinity County (Stebbins 2003). In the Project area, FYLF are recorded along the mainstem SFAR as far upstream as Riverton and downstream to Slab Creek Reservoir (USFS, file data).

In the Sierra Nevada, FYLF have disappeared from an estimated 66 percent of their former range (Stebbins 2003). Non-native predators, land use conversion, pesticide use, and modification of hydrology are considered the main threats to FYLF populations (Jennings and Hayes 1994, Davidson et al. 2002). Non-native bullfrogs (*Rana catesbeiana*) negatively affect FYLF populations via larval competition and direct predation (Moyle 1973, Kupferberg 1997, Crayon 1998). Signal crayfish feed on FYLF eggs and tadpoles (Rombough and Hayes, 2005; Wiseman et al. 2005) and have been shown to negatively affect the species through direct predation and egg mass displacement in ponds (Nyström et al. 2001). Invasive fish, particularly centrarchids, are suspected to feed upon FYLF (Werschkul and Christensen 1977, Van Wagner 1996). Construction of dams and altered hydrological systems continue to threaten FYLF populations by reduction of breeding habitat and scouring of egg masses by untimely water releases (Lind et al. 1996, GANDA 2005).

2.0 METHODS

2.1 Habitat Assessments

Habitat assessments were performed during surveys conducted by ECORP biologists in 2002, 2004 and 2005 (ECORP 2005). In 2005, GANDA biologists reviewed these habitat assessments and noted changes to habitat conditions as necessary. 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 during each survey in 2005. If possible, photographs were taken of upper (upstream), middle, and lower (downstream) portions of all sites and subsites. Representative photographs of each site and a list of all pictures taken is provided in Appendix A.

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). ECORP biologists conducted the first survey round during June and July 2005. GANDA biologists conducted the second and third survey rounds during August and September, respectively. GANDA biologists participating in surveys were Ron Jackman, Joe Drennan, Karla Marlow and Kevin Wiseman.

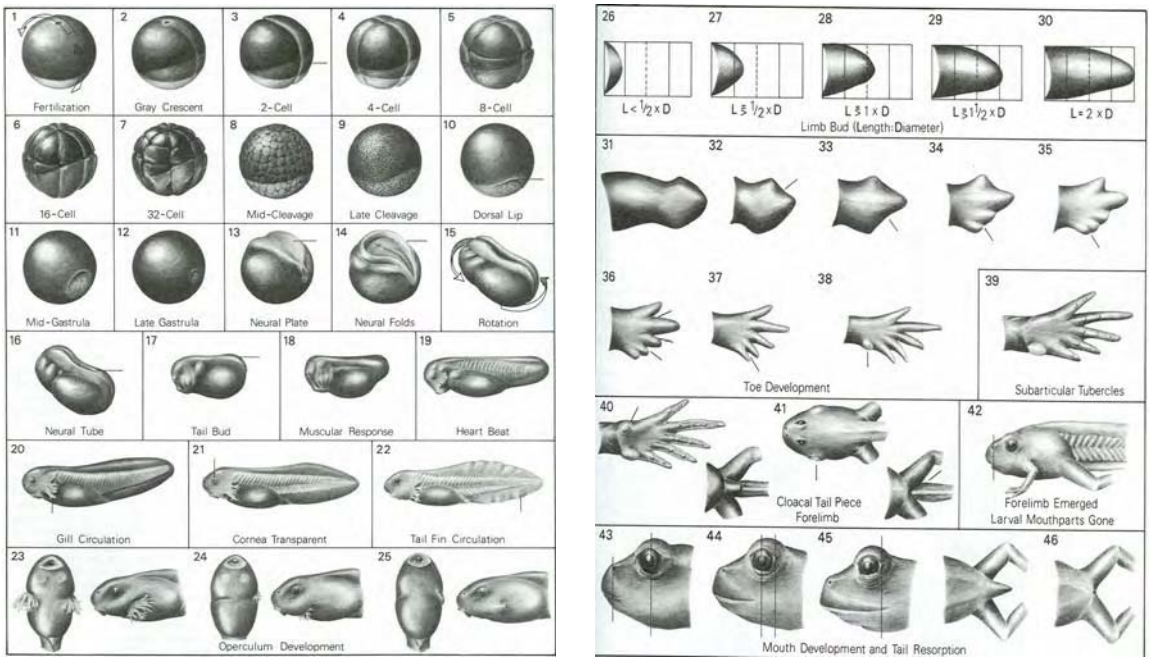
All VES were conducted in teams of two between 0900 and 1800 hrs and were conducted from the downstream end to the upstream end of the site or subsite. Polarized sunglasses and Plexiglas viewing boxes (12 in. x 18 in. x 3 in.) were used to reduce glare and increase visibility of aquatic habitats. Care was taken to minimize disturbance to frogs and aquatic habitats.

Survey data were recorded onto Visual Encounter Survey Data Sheets for each subsite surveyed. Separate data sheets were completed for egg masses, tadpoles, and juveniles and adults. Copies of all completed data sheets are provided in Appendix B.

Data parameters collected for FYLF egg masses included: location within site, attachment substrate, distance from shore, depth of egg mass and 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 group, distance from 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 site, sex, age, snout-vent length, habitat type, activity, percent cover of vegetation, percent shade and substrate.

In addition to the standardized data collected during the surveys, we also recorded developmental stage of larvae observed during the second and third survey rounds using the Gosner (1960) table of anuran development (Figure 2.2-1). This information enables estimation of egg laying dates and rates of tadpole development.

Figure 2.2-1. Gosner 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 along the Project area. The SFAR is approximately 35 km (21 mi) long from the Kyburz Diversion Dam to Akin Powerhouse. General upland habitat along the SFAR is characterized as foothill hardwood/conifer, consisting of ponderosa pine (*Pinus ponderosa*), oaks (*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*), willows (*Salix* spp.) and dogwood (*Cornus* sp.). The elevation of the survey area ranges from 575 m (1,880 ft) at the Akin powerhouse (Site 105R) to 965 m (3,166 ft.) at Site 220R (SFAR at Maple Grove).

This section describes pertinent habitat features at the nine sites surveyed during 2005. The descriptions are from ECORP (2005), with notes added from the 2005 surveys and data sheets. Completed Habitat Assessment Data Sheets for each site are provided in Appendix C. Aerial photographs of each site showing subsite locations are provided in Appendix D.

3.1.1 Site 105R – SFAR at Akin Powerhouse

Site 105R is located near the Akin Powerhouse at approximately 575 m (1,880 ft) elevation. This site includes four subsites (105a, 105b, 105c, and 105d) and is 221 m in total length.

• Subsite 105a is located downstream of Akin Powerhouse. The site length is 96 m and consists 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. The habitat width extended out from the shore to an average of 2 m. 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 provided less than 10 percent cover.

• Subsite 105b is a left bank lateral bar that is 39 m in length. This subsite is located immediately downstream of Akin Powerhouse. The site includes a side pool off of the main channel which becomes isolated from the main channel during base flow conditions present in the late summer. Aquatic substrate was cobble (50%), boulder (30%) and 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 occurs at the pool tail-out upstream of Akin Powerhouse, and consists of a left bank sandbar 56 m in length. 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 continues to increase. The relatively high embeddedness of the aquatic substrate and limited aquatic vegetation resulted in a 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 is located at the pool tail-out upstream of Akin Powerhouse. The site consists 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, blackberry, 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 110R – SFAR upstream of Akin Powerhouse

Site 110R is 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 is 115 m and includes two subsites: 110a and 110b.

• Subsite 110a is 35 m in length and consists of a right bank low gradient boulder/sedge margin, situated near the upstream edge of a cobble/boulder point bar. 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 occur 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 is 80 m long and consists of a right bank low gradient side channel. 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.

3.1.3 Site 115T – Silver Creek

Site 115T encompasses an approximately 500 m (1,640 ft) long section of Silver Creek, a low gradient, right bank tributary to the SFAR. The site extends from the confluence with the SFAR, at an elevation of 620 m (2,034 ft) upstream to approximately 650 m (2,132 ft). In 2004, ECORP biologists identified four subsites (a-d) which were surveyed

in June and July 2005. However, during August and September 2005 these subsites designations were dropped and the subsites were instead surveyed as a single continuous site. At the lower end of the site, near the confluence with SFAR, Silver Creek is divided into two separate channels: a main channel and a secondary channel. Most of the flow travels down the main channel which consists of riffle/run habitat and small cascades. The secondary channel has relatively low flow and consists 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.

3.1.4 Site 120R – SFAR upstream of Silver Creek

Site 120R is 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 is 352 m and includes three subsites: 120a, 120b, and 120c.

• Subsite 120a is 82 m long and consists of a left bank side channel and boulder/sedge margin situated on a boulder/cobble lateral bar. 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. At base flow in 2005, flows though this side channel were extremely low, creating a series of isolated side pools.

• Subsite 120b is 95 m in length and consists of a side channel and pool tail-out located on a right bank boulder/cobble point bar. High gradient cascade/pool habitat occurs adjacent to the subsite. The side channel is comprised of a series of connected pools. The aquatic substrate was primarily boulder (50%), with relatively high amounts of silt (30%) and some cobble (20%), with 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 provide suitable basking sites for FYLF. During mid-day, overhanging vegetation (<20%) and riparian canopy (10%) provided little shade during mid-day.

• Subsite 120c is 175 m in length and consists of a left bank side channel. At high flow levels, the side channel is a high gradient riffle; however, at base flow levels (~50 cfs), the side channel habitat changes 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.

3.1.5 Site 124R – SFAR at confluence with Soldier Creek

Site 124R is located on the SFAR at the confluence with Soldier Creek at an elevation of 755 m (2,480 ft). The total site length decreased during the 2005 season from 305 m in July to 235 in August and 144 m during September. The site is comprised of several isolated pools separated by large boulders. The extent of these isolated pools contracts during the season as flows decrease causing the site length to decrease. 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 and 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.

3.1.6 Site 125T – Soldier Creek

Site 125T includes an 800 m (0.5 mi) section of Soldier Creek, a right bank tributary to the SFAR. The site is located in the lower portion of the creek above the confluence with the SFAR, within an elevation range of 755 – 990 m (2,480 – 3,240 ft). Soldier Creek is 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.

3.1.7 Site 210DT – Ogilby Creek

Site 210DT is an 800 m (0.5 mi) section of Ogilby Creek from the confluence with the SFAR to just below the El Dorado Canal. Ogilby Creek is a diverted left bank tributary to the SFAR that passes under a 160 m long steel and concrete culvert under Highway 50. Elevation ranges 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 is moderate in the lower section but becomes high gradient on the south side of Highway 50. In this upper section the creek includes 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, consisting of sedges, horsetail, 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 is shaded by riparian vegetation.

3.1.8 Site 213R – SFAR upstream of Ogilby Creek

Site 213R is 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). The site is 105 m long and consists 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.

3.1.9 Site 220R – SFAR at Maple Grove

Site 220R is 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 is 286 m.

• Subsite 220a is 102 m in length and is located on the left bank of the SFAR on a low gradient, boulder dominated lateral bar. The aquatic substrate was boulder dominated

(40%) with equal amounts of gravel (20%) and sand (20%), 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 consisting 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 is 112 m in length and consists of a low gradient, right bank cobble/boulder lateral bar. The aquatic substrate was moderately embedded, consisting of a mixture of cobble (40%), boulder (30%), and gravel (20%), with a small amount of sand (10%). Gaps in the substrate provide 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, extending approximately 4 m from shore.

• Subsite 220c is 72 m long and consists of boulder/sedge habitat situated along the margin of an island formed by a split channel. The subsite is 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.

3.2 Visual Encounter Survey Results

Results of the 2005 VES are described in two sections: 1) by site (Sec. 3.2.1), and 2) by FYLF life stage (Sec. 3.2.2)

3.2.1 Site-specific Results

In the following sections, the details of the 2005 surveys are provided for each site and subsite. Adult frogs or egg masses were observed at all SFAR sites except Site 124R, at the mouth of Soldier Creek. Juvenile recruitment was recorded only at the Silver Creek site (115T) and in isolated pools of the side channels at Site 120R, upstream of Silver Creek. Table 3.2-1 presents a summary of VES surveys at all nine Project area sites surveyed in 2005.

Table 3.2-1. Summary of 2005 VES results for FYLF in the Project area.

Site name	Site Code	Round 1	Round 2	Round 3
SFAR at Akin Powerhouse	105R-a	7-13-05-none	8/23/05-1 adult male	9/28/05-none
	105R-b	7-13-05-1 adult male	8/23/05-1 adult on site; 1 tadpole and 1 adult female across river from site	9/28/05-none
	105R-c	No survey	8/23/05-none	9/28/05-none
	105R-d	No survey	8/23/05-none	9/28/05-1 adult male
SFAR-u/s of Akin Powerhouse	110R-a	7-9-05-none	8/30/05-none	9/28/05-none
	110R-b	7-7-05-one adult female	8/30/05-none	9/28/05-none
Silver Creek	115T-a	6/24/05- 2 egg masses, 1 gravid female; 7/10/05- 1 egg mass, 5 tadpole groups	8/30/05-1 adult; 3 tadpoles	9/27/05-11 juveniles, 1 adult male, 1 adult female (palped from a garter snake)
	115T-b	6/24/05-none		
	115T-c	6/24/05- 2 egg masses and 1 adult 7/10/05- 3 tadpole groups, 2 adults		
	115T-d	7/10/05- none		
	115T	7/9/05- 1 adult		
SFAR u/s of Silver Creek	120R-a	7/11/05- 1 adult male	9/09/05- 41 tadpoles in 3 groups; one tadpole between 120a and 120b	9/27/05-19 tadpoles in 3 groups, 2 juveniles
	120R-b	No survey	9/09/05- none	9/27/05-2 adult frogs 5 m below site, 1 adult female ~300 m above site
	120R-c	7/11/05- 2 egg masses, 1 tadpole group	9/09/05- 1 tadpole	9/27/05-1 juvenile
SFAR at Soldier Creek	124R	7/7/05- 1 adult	9/09/05- none	9/27/05-2 juveniles 300 m below site
Soldier Creek	125T	No survey	No survey	9/27/05-1 subadult
Ogilby Creek	210DT	No survey	No survey	9/26/05-none
SFAR u/s of Ogilby Creek	213	7/7/05- 1 adult, 1 egg mass	8/24/05-1 adult female	9/26/05-none
SFAR at Maple Grove	220R-a	7/12/05-none	8/25/05-none	9/26/05-none
	220R-b	7/12/05- 4 egg masses	8/25/05-none	9/26/05-none
	220R-c	7/12/05-none	8/25/05-none	9/26/05-none

3.2.1.1 Site 105R – SFAR at Akin Powerhouse

Adult frogs (3 male, 1 female, 1 unknown sex) were observed at or adjacent to this site but no egg masses, tadpoles, or juveniles were found at any of the four subsites in 2005.

Incidental sightings included one tadpole group and one adult female frog observed directly across the river from subsite 105b and two other frogs observed on subsite 105b while enroute to 105a. Table 3.2-2 summarizes the results of the 2005 VES surveys at Site 105R located along the SFAR at Akin Powerhouse.

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 Frogs	# Adult Frogs
105R-a	1	7/13/05	1230	1250	20	-	30	18.5	18	0	0	0	0
	2	8/23/05	1230	1300	30	28	31	18.5	18	0	0	0	1
	3	9/28/05	925	1012	47	12.5	22	14	13.5	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**1**
105R-b	1	7/13/05	1200	1200	-	30	30	18.5	18	0	0	0	(1)*
	2	8/23/05	1310	1330	20	31	31	19	18	0	(1/1)*	0	(2)*
	3	9/28/05	1020	1040	20	22	22	14.5	13	0	0	0	0
									SUBTOTAL	**0**	**0/0**	**0**	**0**
105R-c	1	No VES	-	-	-	-	-	-	-	-	-	-	-
	2	8/23/05	1445	1455	10	25.5	25.5	19.5	20	0	0	0	0
	3	9/28/05	1120	1145	25	20	22	14	14	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**
105R-d	1	No VES	-	-	-	-	-	-	-	-	-	-	-
	2	8/23/05	1410	1425	15	28	28	19.5	20	0	0	0	0
	3	9/28/05	1055	1115	20	20	20	14	14	0	0	0	1
									SUBTOTAL	**0**	**0**	**0**	**1**

*Incidental sightings.

Total number of egg masses observed, Site 105R	**0**
Total number of tadpoles/groups observed, Site 105R	**0/0**
Total number of juveniles observed, Site 105R	**0**
Total number of adults observed, Site 105R	**2**

3.2.1.2 Site 110R – SFAR upstream of Akin Powerhouse

A single adult female frog was observed during egg mass surveys on July 9; however no egg masses, tadpoles, juveniles, or adult FYLF were seen during subsequent surveys (Table 3.2-3).

Table 3.2-3. Visual Encounter Survey Results for Site 110R, 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 Frogs	# Adult Frogs
110R-a	1	7/9/05	1150	1255	45	28	26	18.5	17	0	0	0	0
	2	8/30/05	1340	1351	11	31	31	19	18	0	0	0	0
	3	9/27/05	1016	1025	9	15.5	15.5	14.5	14.5	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 Frogs	# Adult Frogs
110R-b	1	7/9/05	1310	1405	55	26	26	18.5	-	0	0	0	1
	2	8/30/05	1355	1411	16	31	31	20	19	0	0	0	0
	3	9/27/05	1000	1015	15	15.5	15.5	13.5	14.5	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**1**

Total number of egg masses observed, Site 110R	**0**
Total number of tadpoles/groups observed, Site 110R	**0**
Total number of juveniles observed, Site 110R	**0**
Total number of adults observed, Site 110R	**1**

3.2.1.3 Site 115T – Silver Creek

Silver Creek was initially surveyed as four subsites during the first survey round. During the second and third survey rounds, the subsite designations were dropped and the site was surveyed as a single continuous site. Four egg masses were found during a June 24 survey, and one additional egg mass was observed on July 10. This site was the first location in the Project area where breeding was documented in 2005. Adult frogs were seen in and adjacent to the site during each survey, suggesting seasonal residency along this large tributary of the SFAR. One adult female FYLF was found in the stomach of a Sierra garter snake when it was palped by GANDA biologists in September. Numerous small tadpoles were seen in July; however, those numbers dwindled to only three observations by late August. Eleven juveniles were counted at this site in late September, including one that was recovered from the stomach of the adult female FYLF that was palped from a garter snake. Table 3.2-4 summarizes the results of VES surveys at Site 115T.

Table 3.2-4. 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. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile Frogs	# Adult Frogs
115T[a]	1	6/24/05	1000	1120	105	16	21	15.5	15	4	0	0	2
	1	7/9/05	1000	1000	-	-	-	-	-	0	0	0	(1)[c]
	1	7/10/05	1000	1120	80	20	25	18	-	1	580/8	0	2
	2	8/30/05	1450	1505	15	29	29	18	19	0	3/2	0	1
	3	9/27/05	1050	1320	90	15	27	13.5	13	0	0	11	2[d]
									SUBTOTAL	**5**	**583/10**	**11**	**7**

[a] Subsite a-d combined during survey rounds 2 and 3
[b] Actual number of egg masses, not including repeat observations
[c] Incidental sighting, not on actual subsite.
[d] One adult female observed dead. Predated by T. couchii.

Total number[b] of egg masses observed, Site 115T	**5**
Total number of tadpoles/groups observed, Site 115T	**583/10**
Total number of juveniles observed, Site 115T	**11**
Total number of adults observed, Site 115T	**7**

3.2.1.4 Site 120R – SFAR upstream of Silver Creek

A total of two egg masses were found at one subsite in 2005. One adult male frog was found at Subsite 120a on July 11, but no egg masses were recorded on that date. By

September, there were numerous tadpoles in several of the isolated side pools in this subsite; however, the cool temperatures and north-facing aspect of this shady subsite apparently slowed their development. Only two juveniles had developed by late September and some tadpoles still only had two legs. A single juvenile was counted in late September at Subsite 120c, where two egg masses were found earlier in the year. Two adult frogs were observed just downstream of Subsite 120b as they escaped into a deep pool; one other adult was observed off-site several hundred meters upstream. Table 3.2-5 summarizes the results of the 2005 VES surveys at Site 120R located along the SFAR upstream of Silver Creek.

Table 3.2-5. 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. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile Frogs	# Adult Frogs
120R-a	1	7/11/05	930	1255	85	20	23	16	16	0	0	0	1
	2	9/9/05	949	1020	31	18	18	16	16	0	41/3	0	0
	3	9/27/05	1045	1125	40	16.5	-	-	14	0	19/3	2	0
									SUBTOTAL	**0**	**60/6**	**2**	**1**
120R-b	1	No VES	-	-	-	-	-	-	-	-	-	-	-
	2	9/9/05	1133	1155	22	26	26	-	16.5	0	0	0	0
	3	9/27/05	1230	1300	30	18.5	-	-	15.5	0	0	0	(3)[a]
									SUBTOTAL	**0**	**0**	**0**	**3**
120R-c	1	7/11/05	1400	1510	70	22.5	22.5	19	19	2	50/1	0	0
	2	9/9/05	1048	1110	22	18	18	15.5	15	0	1/1	0	0
	3	9/27/05	1140	1215	30	17	18	-	14	0	0	1	0
									SUBTOTAL	**2**	**51/2**	**1**	**0**

[a] Incidental observations-2 adult frog below site and 1 adult above site

Total number of egg masses observed, Site 120R	**2**
Total number of tadpoles/groups observed, Site 120R	**111/8**
Total number of juveniles observed, Site 120R	**3**
Total number of adults observed, Site 120R	**1**

3.2.1.5 Site 124R - SFAR at confluence with Soldier Creek

No life stages of FYLF were seen at the actual subsite in 2005; however, one adult frog and two juveniles were recorded incidentally during travel between survey sites (Table 3.2-6). The adult frog was located on the right bank of the SFAR upstream of the confluence with Soldier Creek. The juvenile frogs were found along the right bank several hundred meters downstream of Site 124R.

Table 3.2-6. 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. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile Frogs	# Adult Frogs
124R	1	7/7/05	1000	1230	125	20.5	26.5	15.5	15	0	0	0	(1)*
	2	9/9/05	1325	1350	25	21	20	17	17	0	0	0	0
	3	9/27/05	1440	1500	20	19.5	18	-	14.5	0	0	(2) [a]	0
									SUBTOTAL	**0**	**0**	**0**	**0**

[a] Incidental sightings ~300 m below site

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

3.2.1.6 Site 125T – Soldier Creek

Soldier Creek was surveyed once during 2005. A single subadult frog was found during that survey conducted on September 27, 2005 (Table 3.2.7).

Table 3.2-7. 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. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Subadult Frogs	# Adult Frogs
125T	3	9/27/05	1505	1540	35	18	18	-	13.5	0	0	1	0
									SUBTOTAL	**0**	**0**	**1**	**0**

Total number of egg masses observed, Site 125T	**0**
Total number of t tadpoles/groups observed, Site 125T	**0**
Total number of subadult observed, Site 125T	**1**
Total number of adults observed, Site 125T	**0**

3.2.1.7 Site 210DT – Ogilby Creek

No FYLF were observed during the single survey of Ogilby Creek on September 26, 2005 (Table 3.2.8).

Table 3.2-8. 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. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile Frogs	# Adult Frogs
210DT	3	9/26/05	1245	1430	105	19	20	-	12.5	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**

3.2.1.8 Site 213R – SFAR upstream of Ogilby Creek

One egg mass and one adult male FYLF were found at this site in July, and one adult female was seen in late August. No observations of tadpoles or juveniles were recorded at this site in 2005 (Table 3.2.9).

Table 3.2-9. 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. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile Frogs	# Adult Frogs
213R	1	7/7/05	1100	1225	85	26	27	17	16	1	0	0	1
	2	8/24/05	1630	1705	35	27	27	21.5	21	0	0	0	1
	3	9/26/05	1402	1427	25	19	20	15	14	0	0	0	0
									SUBTOTAL	**1**	**0**	**0**	**2**

Total number of egg masses observed, Site 213R	**1**
Total number of tadpoles/groups observed, Site 213R	**0**
Total number of juveniles observed, Site 213R	**0**
Total number of adults observed, Site 213R	**2**

3.2.1.9 Site 220R – SFAR at Maple Grove

Four egg masses were found at Subsite 220b on July 12, 2005. Subsequent surveys in August and September failed to detect tadpoles or juveniles and no adult frogs were observed at this site (Table 3.2-10).

Table 3.2-10. 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. (edgew.) (°C)	Water Temp. (channel) (°C)	# Egg Masses	# Tadpoles/ # groups	# Juvenile Frogs	# Adult Frogs
220R -a	1	7/12/05	1215	1248	33	29	-	18	17	0	0	0	0
	2	8/25/05	1235	1255	20	31	31	18	17	0	0	0	0
	3	9/26/05	1310	1325	15	19	20	14	13	0	0	0	0
									SUBTOTAL	**0**	**0**	**0**	**0**
220R -b	1	7/12/05	1400	1450	40	-	30	19.5	19	4	0	0	0
	2	8/25/05	1200	1230	30	30	31	18	17	0	0	0	0
	3	9/26/05	1245	1300	15	18.5	18.5	14	13	0	0	0	0
									SUBTOTAL	**4**	**0**	**0**	**0**
220R -c	1	7/12/05	1652	1715	23	-	26	20.5	19.5	0	0	0	0
	2	8/25/05	1311	1325	14	32	32	17.5	17	0	0	0	0
	3	9/26/05	1330	1340	10	21	21	15	14	0	0	0	0
									SUBTOTAL	**4**	**0**	**0**	**0**

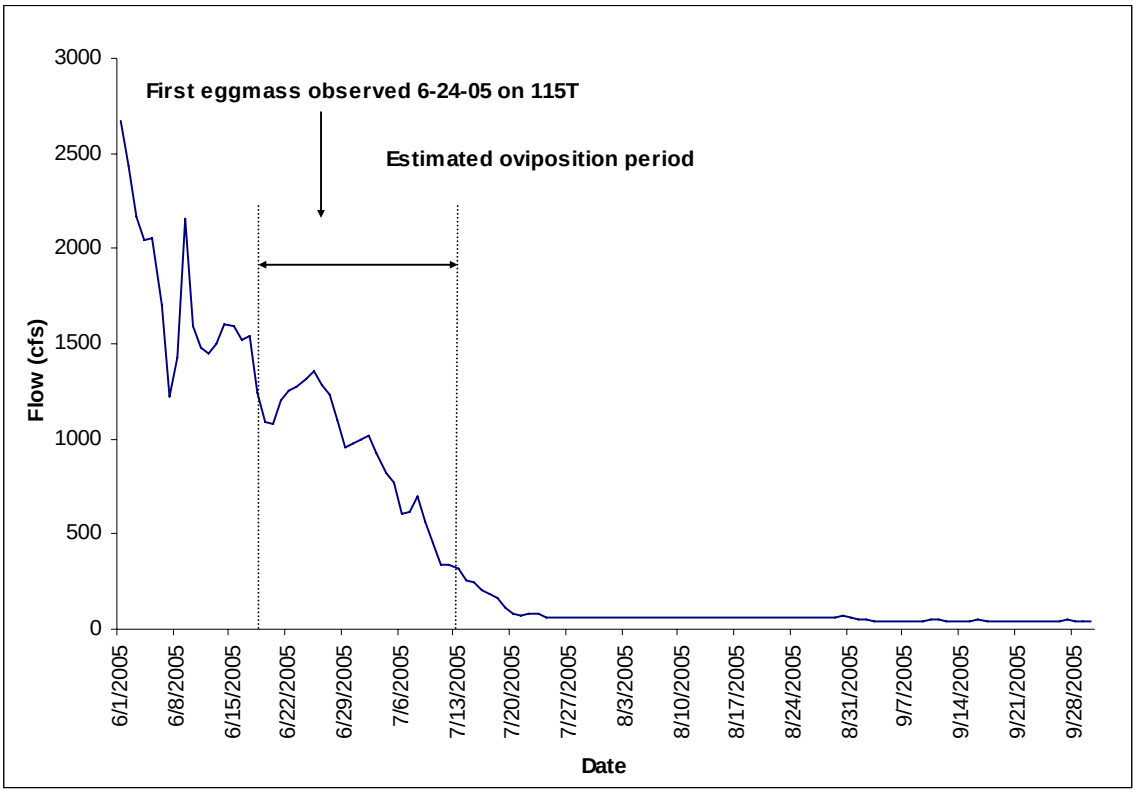
Total number of egg masses observed, Site 220R	**4**
Total number of tadpoles/groups observed, Site 220R	**0**
Total number of juveniles observed, Site 220R	**0**
Total number of adults observed, Site 220R	**0**

3.2.2 VES Results by FYLF Life Stage

3.2.2.1 Egg Masses

A total of 12 egg masses were located during surveys conducted between June 24 and July 13, 2005. None of these masses were examined to determine their stage of development using the Gosner (1960) table of anuran development which enables estimation of the oviposition date. However, based on the dates they were located and subsequent examination of tadpoles, it is estimated that these egg masses were deposited from mid-June to mid-July. During this time period, the daily mean flow in the SFAR was declining but still experienced short duration flow increases (Figure 3.2-11).

Figure 3.2-11. Mean daily flow on the South Fork American River from June 12 to September 30, 2005 and estimated breeding period (measured at gaging station A-12 at Kyburz Diversion Dam).



Egg masses (N = 12) were deposited an average distance of 2.7 m from shore, but ranged from 0 to 10 m out from the wetted edge. On average, egg masses were deposited at a depth of 41 cm. The deepest oviposition site was 87 cm a location where the maximum depth was 120 cm. Water velocity measured at egg masses was 1.5 cm/sec on average. Surface water velocity was not recorded at egg mass sites. Water temperatures at egg

masses averaged 18.9°C when first observed. Table 3.2-11 provides a summary of aquatic habitat characteristics measured at egg mass sites recorded during the 2005 VES.

Table 3.2-11. Summary of FYLF oviposition site habitat parameters.

	Distance from shore (m)	Egg mass depth (cm)	Max. Depth at egg mass (cm)	Velocity at egg mass (cm/sec)	Surface velocity above egg mass (cm/sec)	Water Temperature (°C)
2005 (N = 12)						
Mean	2.7	41.1	50.1	1.5	Not Measured	18.9
Standard Dev.	2.6	24.6	32.6	0.9	-	0.74
Range	0-10	10-87	13-120	0-3	-	18-20

Most egg masses were attached to boulders, and most were found underneath the attachment substrate. Percentage of silt buildup on egg masses was primarily in the range of 51 to 75 percent (33% of total egg masses) or greater than 75 percent (25%). Seventeen percent of egg masses had 25-50 percent silt and 17 percent had no silt. Half the egg masses were located in edgewater microhabitats; the remaining masses were deposited in boulder/sedge (25%) and side channel (17%) microhabitats. Mainstream habitat adjacent to egg masses was run (42%), main channel pool (42%), or high-gradient riffle (17%). A summary of the some of the other habitat characteristics recorded at egg mass oviposition sites in 2005 is provided in (Table 3.2-12).

Table 3.2-12. Summary of habitat characteristics associated with FYLF egg masses. Predominate characteristic types are highlighted in bold.

Habitat characteristic		Egg Masses (N=12)	
		Number of egg masses	Percent of total
Attachment substrate	Cobble	2	17
	Boulder	**9**	**75**
	Bedrock	1	8
% Silt on egg mass	None	2	17
	<25	2	17
	25-50	1	8
	51-75	**4**	**33**
	>75	3	25
Orientation on substrate	Upstream	1	8
	Shore side	3	25
	Stream side	1	8
	Underneath	**7**	**59**
	Sheltered from flow	**5**	**42**
	Alongside flow	**5**	**42**

Habitat characteristic		Egg Masses (N=12)	
		Number of egg masses	Percent of total
	Eddy Current	2	17
	No flow	0	0
Microhabitat	Side channel	2	17
	Boulder Sedge	3	25
	Edgewater	**6**	**50**
	Other	1	8
Substrate at Egg Mass	Sand/gravel	2	17
	Gravel/pebble	1	8
	Cobble/Sand	**6**	**50**
	Boulder/Cobble	3	25
	Bedrock	0	0
Mainstream Habitat	Low-gradient riffle	0	0
	High gradient riffle	2	17
	Run	**5**	**42**
	Main channel pool	**5**	**42**

3.2.2.2 Tadpoles

The number of tadpole groups declined throughout the season. During the first survey round, nine tadpoles groups were located. These tadpoles were recently-hatched from egg masses and averaged 14.1 mm in total length. During the second survey round, seven tadpole groups were located with a mean tadpole length of 43.3 mm. During the third survey round, three tadpole groups were located and mean tadpole length was 36.3 mm. The mean maximum depth of tadpoles groups decreased substantially between the first survey round (77 cm) and the second (29.7 cm) and third survey rounds (30 cm). Similarly, mean water velocity decreased from 4.1 cm/sec during the first survey round to zero during the second and third survey rounds. Mean water temperature decreased during the survey season. The highest temperatures were recorded during the late June and July surveys (19.2°C) and lower temperatures were recorded during round two (August 23-25 and September 9; 16.9°C) and round 3 (September 26-28; 14.5°C). Tadpole development was slow. Tadpoles were identified with a mean Gosner stage of 25 during the first survey round. During the second and third survey rounds, their mean Gosner stage of development was 37 and 38 respectively. Mean percent cover of algae varied during the season from 25.6 percent during the first round to 36.7 percent during the third round. Mean percent cover of detritus increased substantially between the first (17.8%) and second (59%) rounds but remained nearly the same between the second and third (60%) survey rounds. The distance to shore for tadpole groups found during round 1 surveys averaged 3.1 m, decreased to 1.5 m during round 2, and averaged 12.5 m during round 3 surveys.

Table 3.2-13. Characteristics of tadpoles and habitat for tadpole groups.

	Number of Tadpole Groups (Number of tadpoles)	Mean Tadpole Length (mm)	Mean Gosner Stage	Mean Max Depth (cm)	Mean Velocity (cm/sec)	Mean Group Distance From Shore (m)	Mean Temp (° C)	Mean % Algae	Mean % Detritus
Round 1	9 (630)	14.1	25 (All)	77	4.1	3.1	19.2	25.6	17.8
Round 2	7 (46)	43.3	37 (Range: 34-43)	29.7	0	1.5	16.9	46.7	59.0
Round 3	3 (19)	36.3	38 (Range: 35-43)	30.0	0	12.5	13.7	36.7	60.0

3.2.2.3 Adults and Juveniles

Adult or subadult frogs were observed at most survey sites in 2005, with the exception of 124R, 210DT, and 220R. Juveniles were found only at Site 115T (N=10) and Site 120R (N=3). Adult female frogs ranged from 42 to 66 mm snout-vent length (SVL) and adult male frogs ranged from 38 to 55 mm SVL. An equal number of male and female frogs (N=6) were captured during VES in 2005 (Table 3.2-14).

Table 3.2-14. Snout to vent length of adult, subadult and juvenile frogs.

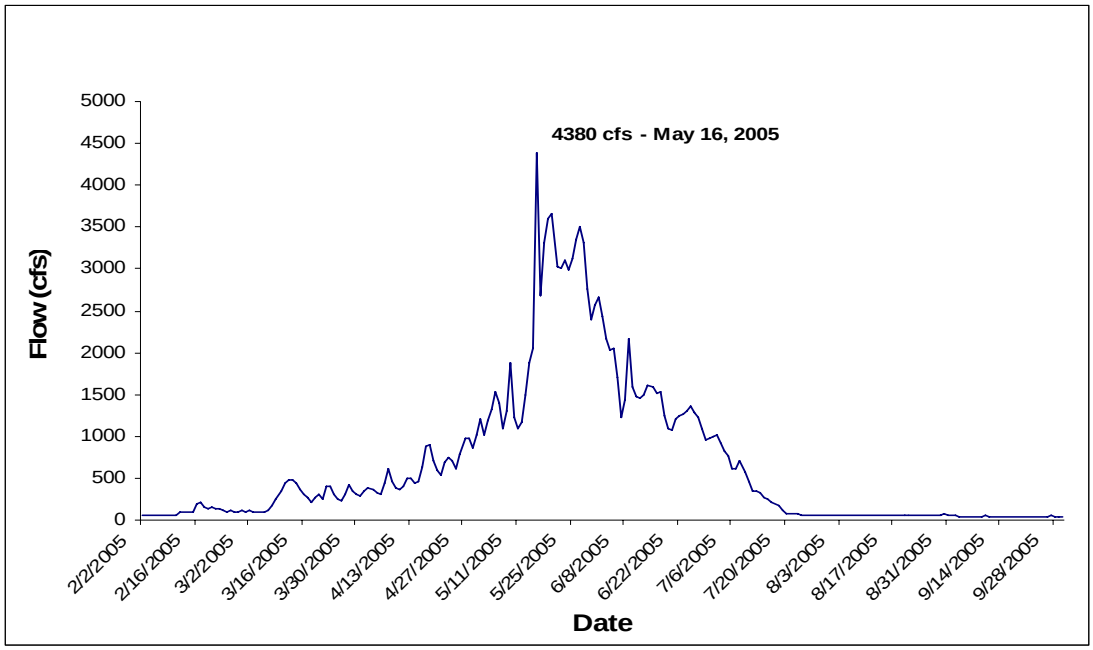
SVL Lengths	Adult Females	Adult Males	Subadults	Juveniles
	N=6	N=6	N=1	N=13
Range	42-66 mm	38-55 mm	35 mm	18-22 mm
Mean	56.5	46.2	35 mm	20.8
Standard Dev.	8.9	6.6	-	5.1

4.0 DISCUSSION

The 2005 breeding season was approximately 1-2 months later in 2005 compared to 2004. In 2005, the first egg masses were observed during the June 24 surveys along Silver Creek (Site 115T) at the lower end of Project area and the last egg masses were observed on July 12 at Site 220R the highest elevation breeding site in the Project area. In 2004, all egg masses had hatched by early July and many had hatched during June (ECORP 2005). The variation in breeding dates between seasons is likely due to late rains and high flows present in 2005 from mid-March to mid-July (Figure 4.1). These conditions likely affected breeding and may have contributed to the lack of breeding evidence in 2005 at two sites where breeding was confirmed in 2004 (i.e., sites 105R and 110R, SFAR at and upstream of Akin Powerhouse, respectively). Some frogs may have delayed breeding while others may have oviposited during the period of high flows and either had their egg masses scoured (if water flows increased) or desiccated (if water

flows decreased). Scouring of egg masses was documented at several FYLF localities throughout California in 2005, including the South Fork Eel River (Kupferberg, unpublished data) and the North Fork Feather River (GANDA, unpublished data).

Figure 4.1. Mean Daily Flow (cfs) on the South Fork American River from February 1 to September 30, 2005 (measured at gaging station A-12 at Kyburz Diversion Dam)



As a result of the late breeding season in 2005, tadpole development and metamorphosis were also delayed. Tadpoles were first observed in 2005 during the July 10 survey, whereas, in 2004 tadpoles were observed on June 14. Similarly, metamorphosis was not observed in 2005 until the late September survey, whereas, in 2004, tadpoles metamorphosed in late August.

The most significant decrease in mean daily flow along the SFAR was on July 15, 2005, when flow levels as measured at gaging station A-12 (SFAR below Kyburz Diversion Dam) dropped from 240 cfs to 79 cfs. Prior to this date, daily mean flows were greater than 100 cfs since March 4, 2005 (Figure 4.1). Egg masses were found at two sites along the upper reach (sites 213R and 220R; SFAR at Ogilby Creek and Maple Grove, respectively) prior to this date; however, no tadpoles or evidence of juvenile recruitment was found during subsequent surveys. One possible explanation for the lack of observations at these sites during subsequent surveys is that the egg masses were desiccated prior to hatching when water levels dropped. In contrast to the SFAR, breeding along Silver Creek (Site 115T) was relatively successful in 2005. We speculate

that flow levels in Silver Creek fluctuated less than in the SFAR and were therefore more conducive to successful breeding.

At Site 120 (SFAR upstream of the Silver Creek confluence), egg masses were oviposited in a side channel off the main stem prior to the July 11 survey. By early September, this site was a series of isolated pools containing tadpoles that were identified as Gosner stage 34 to 39 (mean=36.5). Eighteen days later on September 27, tadpoles at this site were Gosner stage 35 to 43 (mean=39). This observation suggests that tadpole development during September was approximately 1 Gosner stage per each 6 days. At that rate those tadpoles would require an additional 42 days (November 8) to reach Gosner stage 46 and become juvenile frogs. We attribute the slow rate of development to cool water temperatures observed in these side pools (14°C on 9/27/05 at 1200 hours) which is due to the canyon's steep walls and the north facing aspect of these left bank sites.

ECORP (2005) speculated that cooler water temperatures in the upper SFAR reach above Alder Creek compared to the lower reach might preclude FYLF utilization of the former. In addition, the moderate river gradient, narrow channel, general lack of preferred substrates, and higher elevation (>915m; 3,000 ft. elevation) may explain why FYLF have not been found in this upper reach of the SFAR (ECORP 2005). The furthest upstream active sites (Sites 213 and 220) were the least productive in both 2004 and 2005.

The number of tadpoles observed decreases throughout the season due to mortality, (primarily from predation), dispersal, and in part due to development of cryptic coloration. Although tadpole presence is important to note as confirmation of breeding in a particular area, a better index of the productivity of a particular site is juvenile recruitment, the numbers of juveniles observed. The total number of juveniles observed within survey sites during the final surveys in 2004 was 114, compared to 13 for the same sites in 2005. Mean number of juveniles per site in 2004 was 9.1 (S.D. = 9.4) and significantly greater than in 2005 (1.9 juveniles/survey, S.D. = 3.8; paired $t = 2.10$, df = 6, P = 0.08). Clearly, 2004 was a more productive year for FYLF than 2005 in the survey area.

Access to some of the survey sites was extremely challenging. Site 115T (Silver Creek near the confluence with SFAR), Site 120R, Site 124R, and 125T each require long steep approaches to access. For example, access to Site 120 required an approximately 2 hour hike from Peavine Ridge Road near the intersection with Soldier Creek. As a result, the Project Reach likely experiences little recreational activities such as fishing, hiking and boating that might influence or disturb FYLF.

During the late September surveys conducted on Silver Creek (115T), an adult Sierra garter snake (*Thamnophis couchii*) was captured and palped to determine its stomach contents. The snake was observed with a recently captured adult female FYLF (26 grams, 62 mm SVL). Stomach analysis of the predated female frog revealed several ladybeetle (Coleoptera) exoskeletons and one juvenile FYLF (~1 gram, 22 mm SVL).

Although predation of FYLF by garter snakes is widely reported in the literature, to our knowledge this is the first observation of cannibalism by a FYLF.

5.0 SUMMARY

Three rounds of surveys were conducted for FYLF during 2005 at seven breeding sites in the Project area. Survey round 1 was conducted by ECORP biologists during late June and early July and focused on locating egg masses. The second and third survey rounds were conducted by GANDA biologists in August and September and focused on locating tadpoles and juvenile and adult frogs. In addition to the seven breeding sites, two tributaries were surveyed during September. Overall, the total numbers of egg masses (N=12), juvenile (N=15), subadult (N=1) and adult frogs (N=12) were low compared to numbers observed during 2004 surveys. Based on the egg masses that were located, breeding was initiated in late June on Silver Creek and extended into mid to late-July. We speculate environmental conditions, such as fluctuation in flow levels from mid-March to mid-July delayed breeding and/or caused scouring or desiccation of egg masses. Despite the low numbers observed, we have no data to speculate about the population trend.

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Appendix A: Representative Site Photographs and Photographic log

Site 105R-a – SFAR at Akin Powerhouse- bottom of site looking upstream, August 23, 2005

Site

105R-a – SFAR at Akin Powerhouse- top of site looking downstream 105R, August 23, 2005

Site 105R-b – SFAR at Akin Powerhouse- top of site looking downstream, August 23, 2005

Site 105R-b – SFAR at Akin Powerhouse- side pool, August 23, 2005

Site 105R-c – SFAR at Akin Powerhouse- bottom of site looking upstream, August 23, 2005

Site 105R-d – SFAR at Akin Powerhouse- bottom of site looking upstream, August 23, 2005

Site 110R-a – SFAR upstream of Akin Powerhouse-bottom of site looking upstream, August 30, 2005

Site 110R-b – SFAR upstream of Akin Powerhouse-bottom of site looking upstream, August 30, 2005

Site 115T – Silver Creek- bottom of subsite looking upstream, August 30, 2005

Site 115T – Silver Creek- looking downstream from 30 m above gaging station, September 27, 2005

Site 120R-a – SFAR upstream of Silver Creek-bottom of site looking upstream, September 27, 2005

Site 120R-b – SFAR upstream of Silver Creek-bottom of site looking upstream, September 27, 2005

Site 120R-c – SFAR upstream of Silver Creek-bottom of site looking upstream, September 27, 2005

Site 124R – SFAR at confluence with Soldier Creek-looking upstream, September 27, 2005

Site 125T – Soldier Creek-looking upstream, September 27, 2005

Site 213R – SFAR upstream of Ogilby Creek, September 26, 2005

Site 210DT – Ogilby Creek, September 26, 2005

Site 220R-a – SFAR at Maple Grove-bottom of site looking upstream, August 25, 2005

Site 220R-b – SFAR at Maple Grove-top of site looking downstream, August 25, 2005

Site 220R-c – SFAR at Maple Grove-bottom of site looking upstream, August 25, 2005

Thamnophis couchii observed along LB of Silver Cr., 38 m below gaging station. Note large lump mid body. This snake was subsequently palped and found with an adult female FYLF below. 9/27/05

Adult female FYLF palped from *T. couchii* and stomach contents including one juvenile FYLF.

FYLF tadpole found in between Subsites 120R-a and 120R-b on September 9, 2005.

Juvenile FYLF found at subsite 120R-c on September 27, 2005.

Photo Log

Picture #	Photo Date	Photo Time	Site #	Photograph Description
KDW P8230001	8/23/05	1157	105A	Male FYLF @ 34 m
KDW P8230002	8/23/05	1234	105A	Bottom of site looking upstream
KDW P8230003	8/23/05	1234	105A	Bottom of site looking downstream towards SMUD powerhouse
KDW P8230004	8/23/05	1253	105A	Top of site looking downstream
KDW P8230005	8/23/05	1254	105A	Top of site looking upstream
KDW P8230006	8/23/05	1308	105B	Bottom of site looking downstream
KDW P8230007	8/23/05	1308	105B	Top of site looking upstream
KDW P8230008	8/23/05	1312	105B	Side pool
KDW P8230009	8/23/05	1325	105B	Top of site looking upstream at Akin Powerhouse
KDW P8230010	8/23/05	1326	105B	Top of site looking downstream
KDW P8230011	8/23/05	1340	---	Female FYLF located across river from Subsite 105B
KDW P8230012	8/23/05	1421	105D	Bottom of site looking upstream towards USGS gaging station
KDW P8230013	8/23/05	1421	105D	Bottom of site looking downstream
KDW P8230014	8/23/05	1427	105D	View of Subsite 105D from left bank SFAR (from subsite 105C)
KDW P8230015	8/23/05	1440	105C	Bottom of site looking upstream
KDW P8230016	8/23/05	1442	105C	Isolated side pool adjacent to subsite 105C
KDW P8230017	8/23/05	1448	105C	Top of site looking upstream
KDW P8230018	8/23/05	1449	105C	Top of site looking downstream towards Akin Powerhouse
KDW P8230019	8/23/05	1456	105C	Pool tailout located in between subsites 105C and 105D
KDW P8230020	8/23/05	1502	105C	Subsite 105C from right bank @ USGS gaging station
KDW P8230021	8/23/05	1503	105C	Subsite 105C from right bank @ USGS gaging station
KDW P8230022	8/23/05	1535	105C	Akin Powerhouse
KDW P8240023	8/24/05	1335	---	FYLF location on Soldier Creek (incidental sighting)
KDW P8240024	8/24/05	1344	---	*Thamnophis couchii* on Soldier Creek, 10 m upstream of Whites Meadow Rd. crossing
KDW P8240025	8/24/05	1633	213	Bottom of subsite looking upstream
KDW P8240026	8/24/05	1633	213	Bottom of subsite looking downstream
KDW P8240027	8/24/05	1649	213	Top of subsite looking downstream
KDW P8240028	8/24/05	1649	213	Top of subsite looking upstream
KDW P8240029	8/24/05	1652	213	Female FYLF located 13 m upstream of top of subsite 213
KDW P8240030	8/24/05	1653	213	Female FYLF located 13 m upstream of top of subsite 213
KDW P8240031	8/24/05	1653	213	Female FYLF located 13 m upstream of top of subsite 213
KDW P8240032	8/24/05	1656	213	Chin photo of FYLF located 13 m upstream of top of subsite 213
KDW P8240033	8/24/05	1657	213	Female FYLF located 13 m upstream of top of subsite 213
KDW P8250036	8/25/05	1215	220A	Bottom of subsite looking upstream (match w/ECORP photo)
KDW P8250037	8/25/05	1217	220A	Bottom of subsite looking upstream
KDW P8250038	8/25/05	1217	220A	Bottom of subsite looking downstream
KDW P8250040	8/25/05	1231	220A	Top of subsite looking downstream
KDW P8250041	8/25/05	1259	220A	Side channel on left bank adjacent to subsite 220A
KDW P8250039	8/25/05	1229	220B	Top of subsite looking downstream
KDW P8250042	8/25/05	1307	220C	Bottom of subsite looking upstream (match w/ ECORP photo)
KDW P8250043	8/25/05	1311	220C	Wounded *Catostomus occidentalis* (sucker)
KDW P8250044	8/25/05	1316	220C	Top of subsite looking downstream
KDW P8300001	8/30/05	1118	---	KRM hiking down ridge trail to Silver Creek/SFAR confluence
KDW P8300002	8/30/05	1213	---	SFAR just downstream of Silver Creek confluence
KDW P8300003	8/30/05	1334	110A	Bottom of subsite looking upstream (match w/ ECORPS photo)
KDW P8300004	8/30/05	1334	110A	Bottom of subsite looking downstream
KDW P8300005	8/30/05	1341	110A	View of island located within subsite 105A
KDW P8300006	8/30/05	1343	110A	Crayfish at edgewater
KDW P8300007	8/30/05	1344	110A	Bottom of subsite looking downstream
KDW P8300008	8/30/05	1344	110A	Bottom of subsite looking upstream
KDW P8300009	8/30/05	1355	110B	Top of subsite looking downstream
KDW P8300010	8/30/05	1355	110B	Top of subsite looking upstream
KDW P8300011	8/30/05	1406	110B	Bottom of subsite looking downstream

Photo Log

Picture #	Photo Date	Photo Time	Site #	Photograph Description
KDW P8300012	8/30/05	1406	110B	Bottom of subsite looking upstream
KDW P8300013	8/30/05	1449	115T-A	Bottom of subsite looking upstream from confluence w/SFAR
KDW P8300014	8/30/05	1454	115T-A	Deep pool located ~ 40 m upstream of confluence w/SFAR
KDW P8300015	8/30/05	1457	115T-A	Top of subsite looking downstream towards SFAR
KDW P8300016	8/30/05	1501	115T-A	Top of subsite looking upstream towards RB channel of Silver Cr.
KDW P8300017	8/30/05	1501	115T-A	Top of subsite looking upstream towards LB channel of Silver Cr.
KDW P8300018	8/30/05	1535	115T-B	Tadpole microhabitat located 175 m from confluence w/SFAR
KDW P8300019	8/30/05	1707	---	KRM hiking uphill towards Silver Creek ridge trail
KDW P9090001	9/09/05	0949	120A	Bottom of subsite looking upstream
KDW P9090002	9/09/05	0949	120A	Bottom of subsite looking downstream
KDW P9090003	9/09/05	0955	120A	Midsite looking upstream
KDW P9090004	9/09/05	0955	120A	Midsite looking downstream
KDW P9090005	9/09/05	1003	120A	FYLF tadpole (gosner 39) located at 75 m
KDW P9090006	9/09/05	1004	120A	FYLF tadpole (gosner 39) located at 75 m
KDW P9090007	9/09/05	1004	120A	FYLF tadpole (gosner 39) located at 75 m
KDW P9090008	9/09/05	1005	120A	Tadpole group A microhabitat (isolated side pool)
KDW P9090009	9/09/05	1011	120A	Tadpole group B microhabitat (isolated side pool)
KDW P9090010	9/09/05	1026	120A/120B	FYLF tadpole (incidental obs.) found in between 120A and 120B
KDW P9090011	9/09/05	1027	120A/120B	FYLF tadpole (incidental obs.) microhabitat
KDW P9090012	9/09/05	1042	120C	Bottom of subsite looking downstream
KDW P9090013	9/09/05	1042	120C	Bottom of subsite looking upstream
KDW P9090014	9/09/05	1052	120C	Midsite looking downstream
KDW P9090015	9/09/05	1052	120C	Midsite looking upstream
KDW P9090016	9/09/05	1100	120C	FYLF tadpole (gosner 43) located at 172 m
KDW P9090017	9/09/05	1101	120C	FYLF tadpole (gosner 43) located at 172 m
KDW P9090018	9/09/05	1103	120C	Tadpole group A microhabitat (isolated side pool) at 172 m
KDW P9090019	9/09/05	1104	120C	Top of subsite looking downstream
KDW P9090020	9/09/05	1104	120C	Top of subsite looking upstream
KDW P9090021	9/09/05	1128	120B	Bottom of subsite looking upstream
KDW P9090022	9/09/05	1128	120B	Bottom of subsite looking downstream
KDW P9090023	9/09/05	1135	120B	Midsite looking upstream
KDW P9090024	9/09/05	1135	120B	Midsite looking downstream
KDW P9090025	9/09/05	1139	120B	Top of subsite looking downstream
KDW P9090026	9/09/05	1139	120B	Top of subsite looking upstream
KDW P9090027	9/09/05	1150	---	Pothole in bedrock where *Thamnophis sirtalis* YOY were found
KDW P9090028	9/09/05	1221	---	Abandoned kayak on RB SFAR downstream of Randolph Cyn.
KDW P9090030	9/09/05	1318	124	Bottom of subsite looking downstream
KDW P9090031	9/09/05	1319	124	Bottom of subsite looking upstream
KDW P9090032	9/09/05	1323	124	Confluence of SFAR and Soldier Creek from Site 124
KDW P9090033	9/09/05	1334	124	Looking upstream near top of site
KDW P9090034	9/09/05	1334	124	Looking downstream near top of site
KDW P9090036	9/09/05	1342	124	*Thamnophis sirtalis* adult basking
KDW P9090037	9/09/05	1429	---	REJ hiking up hillside near Soldier Creek
KDW P9260093	9/26/05	1513	---	Kyburz Diversion Dam from right bank of SFAR
KDW P9260094	9/26/05	1513	---	Kyburz Diversion Dam from right bank of SFAR
KDW P9260095	9/26/05	1513	---	Kyburz Diversion Dam from right bank of SFAR
KDW P9260096	9/26/05	1513	---	Kyburz Diversion Dam from right bank of SFAR
KDW P9260097	9/26/05	1513	---	Kyburz Diversion Dam from right bank of SFAR
KRM P9270001	9/27/05	0827	---	KDW on SMUD access road above Silver Creek access ridge
KRM P9270002	9/27/05	0828	---	KDW on SMUD access road above Silver Creek access ridge
KRM P9270003	9/27/05	1037	115	SFAR from Silver Creek confluence looking up river
KRM P9270004	9/27/05	1037	115	Silver Creek at confluence with SFAR, looking upstream
KRM P9270005	9/27/05	1139	115	*T. couchii* regurgitating female FYLF 38m below gauging station
KRM P9270006	9/27/05	1140	115	*T. couchii* regurgitating female FYLF 38m below gauging station
KRM P9270007	9/27/05	1140	115	*T. couchii* regurgitating female FYLF 38m below gauging station

Photo Log

Picture #	Photo Date	Photo Time	Site #	Photograph Description
KRM P9270008	9/27/05	1140	115	*T. couchii* regurgitating female FYLF 38m below gauging station
KRM P9270009	9/27/05	1140	115	*T. couchii* regurgitating female FYLF 38m below gauging station
KRM P9270010	9/27/05	1141	115	*T. couchii* regurgitating female FYLF 38m below gauging station
KRM P9270011	9/27/05	1141	115	*T. couchii* regurgitating female FYLF 38m below gauging station
KRM P9270015	9/27/05	1359	---	KDW with *Masticophis lateralis*
KRM P9270016	9/27/05	1452	---	KDW on Silver Creek ridge trail
KDW P9270098	9/27/05	0833	---	SFAR from Silver Creek ridge trail looking east
KDW P9270099	9/27/05	0859	---	SFAR from Silver Creek ridge trail looking east
KDW P9270100	9/27/05	0958	110B	KRM at bottom of subsite
KDW P9270101	9/27/05	1017	---	KRM along SFAR just upstream of subsite 110A
KDW P9270102	9/27/05	1100	115	Adult male FYLF 144 m upstream of SFAR confluence, R bank.
KDW P9270103	9/27/05	1100	115	Adult male FYLF 144 m upstream of SFAR confluence, R bank.
KDW P9270104	9/27/05	1103	115	Adult male FYLF 144 m upstream of SFAR confluence, R bank.
KDW P9270106	9/27/05	1105	115	Chin pattern of adult male FYLF at 144 m
KDW P9270107	9/27/05	1116	115	Juvenile FYLF 175 m above SFAR, in isolated RB side pool
KDW P9270108	9/27/05	1117	115	Juvenile FYLF 175 m above SFAR, in isolated RB side pool
KDW P9270109	9/27/05	1117	115	Juvenile FYLF 175 m above SFAR, in isolated RB side pool
KDW P9270110	9/27/05	1117	115	Juvenile FYLF 175 m above SFAR, in isolated RB side pool
KDW P9270111	9/27/05	1120	115	Isolated side pool where juvenile FYLF were observed
KDW P9270113	9/27/05	1143	115	*T. couchii* observed along LB of Silver Cr., 38 m below g. station
KDW P9270114	9/27/05	1201	115	Juvenile FYLF above SFAR, 38 m below gaging station
KDW P9270115	9/27/05	1236	115	Silver Creek, looking downstream, approx. 30 m above g. station
KDW P9270116	9/27/05	1254	115	Silver Creek, looking north, at approx. 80 above gauging station
KDW P9270117	9/27/05	1338	115	*Elgaria multicarinata* on RB, ~100 m upstream of gauging station
KDW P9270118	9/27/05	1402	---	*Masticophis lateralis* on hillside north of Silver Creek
KDW P9270119	9/27/05	1425	---	KRM on ridge above Silver Creek
KDW P9270120	9/27/05	1427	---	KRM on ridge above Silver Creek
KDW P9270121	9/27/05	1431	---	KRM on ridge above Silver Creek
KDW P9270122	9/27/05	1456	---	KRM on ridge above Silver Creek
KDW P9270123	9/27/05	1549	---	Tarantula hawk w/ spider at SMUD access road/Forebay Rd.
KDW P9270124	9/27/05	1549	---	Tarantula hawk w/ spider at SMUD access road/Forebay Rd.
KDW P9270125	9/27/05	1549	---	Tarantula hawk w/ spider at SMUD access road/Forebay Rd.
KDW P9270126	9/27/05	1550	---	Tarantula hawk w/ spider at SMUD access road/Forebay Rd.
KDW P9270127	9/27/05	1550	---	Tarantula hawk w/ spider at SMUD access road/Forebay Rd.
KRM P9280017	9/28/05	1058	105D	KDW and Jan Williams (EDNF)
KRM P9280018	9/28/05	1138	105C	KDW and Jan Williams (EDNF) crossing SFAR
KRM P9280018	9/28/05	1138	105C	KDW and Jan Williams (EDNF) crossing SFAR
KDW P9280128	9/28/05	1051	105D	Adult male FYLF at 8 m
KDW P9280130	9/28/05	1100	105D	Adult male FYLF at 8 m
KDW P9280131	9/28/05	1100	105D	Adult male FYLF at 8 m
KDW P9280132	9/28/05	1120	105C	KRM and Jan Williams (EDNF) crossing SFAR
REJ P9260135	9/26/05	1249	210DT	Mouth of Ogilby Creek at confluence with SFAR
REJ P9260136	9/26/05	1257	210DT	Highway 50 Culvert at Ogilby Creek
REJ P9260137	9/26/05	1336	210DT	Bedrock area below flume in Ogilby Creek
REJ P9260138	9/26/05	1344	210DT	*Taricha torosa*
REJ P9260139	9/26/05	1345	210DT	Plunge pool in Ogilby Creek ~midway survey area
REJ P9260140	9/26/05	1345	210DT	Plunge pool in Ogilby Creek ~midway survey area
REJ P9260141	9/26/05	1347	210DT	*Taricha torosa* crawling on rock
REJ P9260142	9/26/05	1406	210DT	Large plunge pool near top of Ogilby Creek survey area
REJ P9260143	9/26/05	1415	210DT	*T. torosa* juvenile
REJ P9260144	9/26/05	1416	210DT	*T. torosa* juvenile
REJ P9260145	9/26/05	1515	210DT	Juvenile *Thamnophis* sp. Found dead in pool
REJ P9270147	9/27/05	1052	120A	Bottom of subsite looking upstream

Photo Log

Picture #	Photo Date	Photo Time	Site #	Photograph Description
REJ P9270148	9/27/05	1058	120A	Juvenile FYLF
REJ P9270149	9/27/05	1058	120A	Juvenile FYLF
REJ P9270150	9/27/05	1105	120A	FYLF tadpole
REJ P9270151	9/27/05	1108	120A	JED searching for FYLF
REJ P9270152	9/27/05	1122	120A	Top of subsite looking downstream
REJ P9270153	9/27/05	1143	120C	Bottom of subsite looking upstream
REJ P9270154	9/27/05	1203	120C	Top of subsite looking downstream
REJ P9270155	9/27/05	1209	120C	Top of subsite looking downstream
REJ P9270156	9/27/05	1210	120C	Top of subsite; juvenile microhabitat
REJ P9270157	9/27/05	1213	120C	Juvenile FYLF at top of subsite
REJ P9270158	9/27/05	1213	120C	Juvenile FYLF at top of subsite
REJ P9270159	9/27/05	1213	120C	Juvenile FYLF at top of subsite
REJ P9270160	9/27/05	1214	120C	Juvenile FYLF at top of subsite
REJ P9270161	9/27/05	1214	120C	Juvenile FYLF at top of subsite
REJ P9270162	9/27/05	1233	120B	Bottom of subsite looking upstream
REJ P9270163	9/27/05	1236	120B	Microhabitat of FYLF observed XX m below bottom of 120B
REJ P9270164	9/27/05	1253	120B	Top of subsite looking downstream
REJ P9270165	9/27/05	1253	120B	Top of subsite looking upstream
REJ P9270166	9/27/05	1339	---	Adult FYLF
REJ P9270167	9/27/05	1340	---	Adult FYLF microhabitat
REJ P9270168	9/27/05	1356	---	SFAR scenery between Subsites 120 and 124
REJ P9270169	9/27/05	1402	---	SFAR scenery between Subsites 120 and 124
REJ P9270170	9/27/05	1403	---	SFAR scenery between Subsites 120 and 124
REJ P9270171	9/27/05	1424	124	Incidental juvenile and microhabitat near Soldier Creek (1)
REJ P9270172	9/27/05	1428	124	Incidental juvenile and microhabitat near Soldier Creek (2)
REJ P9270173	9/27/05	1443	124	Bottom of subsite looking upstream
REJ P9270174	9/27/05	1452	124	Middle of subsite looking downstream
REJ P9270175	9/27/05	1452	124	Middle of subsite looking upstream
REJ P9270176	9/27/05	1458	124	Top of subsite looking downstream
REJ P9270177	9/27/05	1505	125T	Soldier Creek confluence with SFAR
REJ P9270178	9/27/05	1505	125T	Soldier Creek confluence with SFAR looking upstream
REJ P9270179	9/27/05	1507	125T	Pool near confluence of Soldier Creek and SFAR
REJ P9270180	9/27/05	1521	125T	At ~200m looking downstream
REJ P9270181	9/27/05	1521	125T	At ~200m looking upstream
REJ P9270182	9/27/05	1530	125T	Subadult microhabitat
REJ P9270183	9/27/05	1537	125T	Top of Subsite looking upstream

Appendix B: Visual Encounter Survey Data Forms

Appendix C: Habitat Assessment Data Forms

Appendix D: Aerial Photographs of Survey Sites and Transect Locations

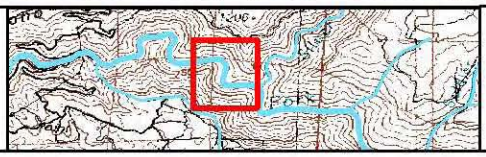
Site 105R
SFAR at Akin Powerhouse

0 25 50
Meters
1 cm equals 25.0 m

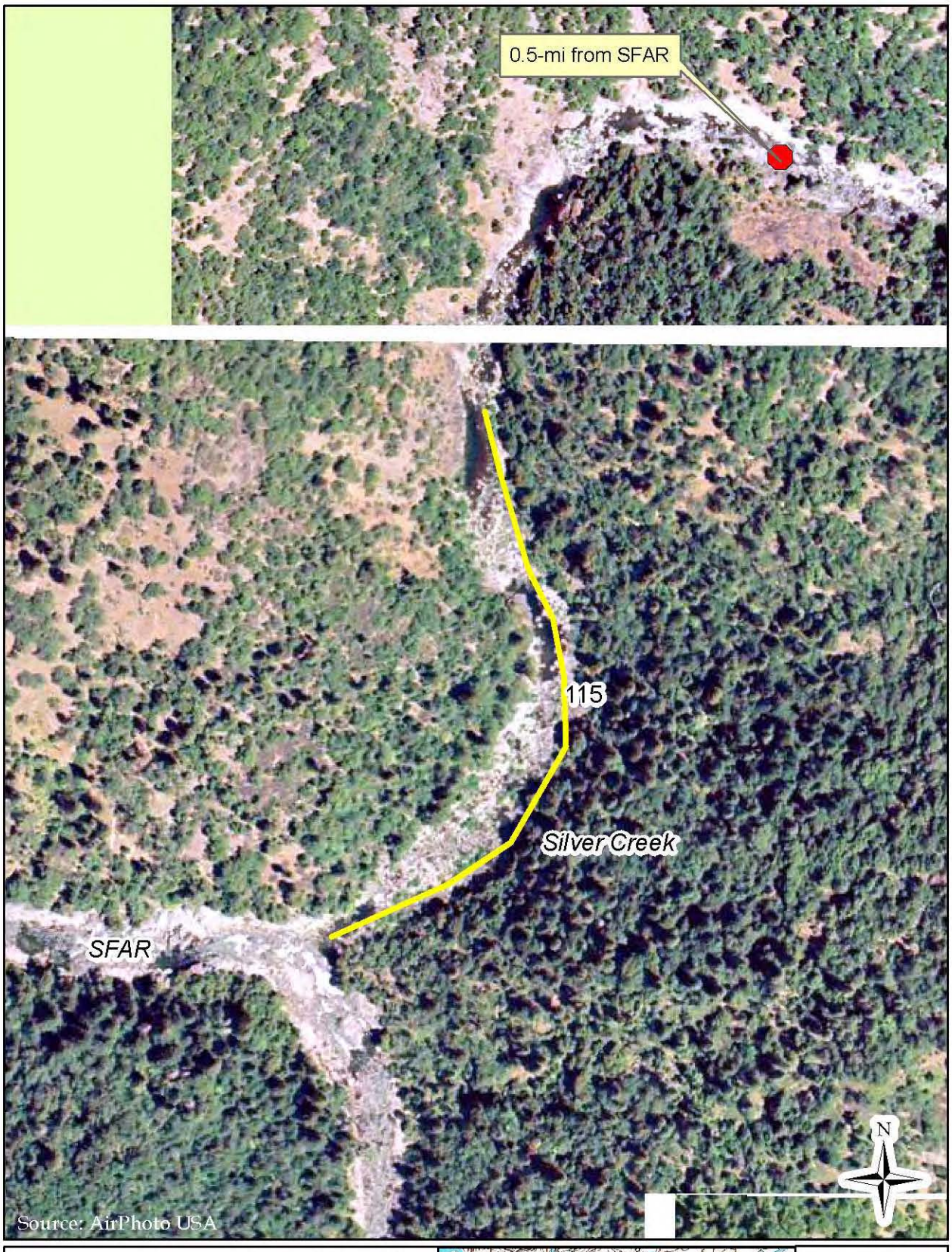
GANDA

Site 110R.
SFAR upstream of
Akin Powerhouse.

0 25 50 100
Meters
1 cm equals 45 m

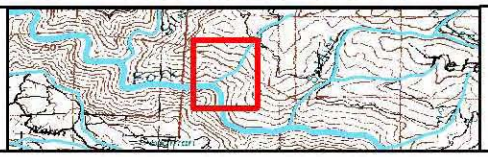


GANDA



Site 115T.
Silver Creek.

0 25 50 100
Meters
1 cm equals 40.0 m



GANDA

Source: AirPhoto USA

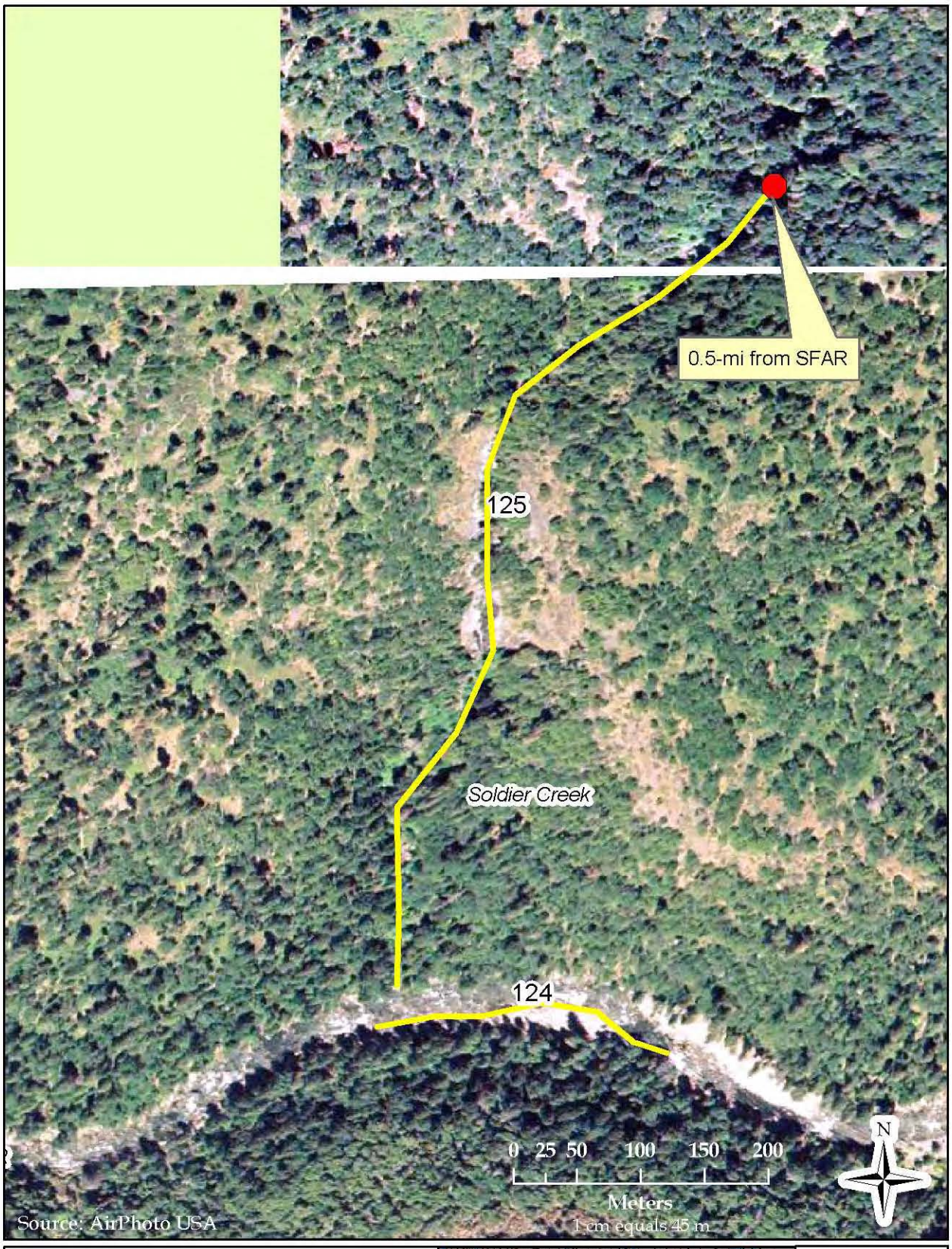
Site 120R.
SFAR upstream of
Silver Creek.

0 2550 100 150 200

Meters

1 cm equals 70.0 m

GANDA

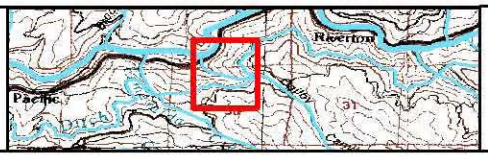


Site 124R. SFAR at confluence with Soldier Creek.
Site 125T. Soldier Creek.

GANDA

Site 210DT.
Ogilby Creek.

0 25 50 100
Meters
1 cm equals 40.0 m

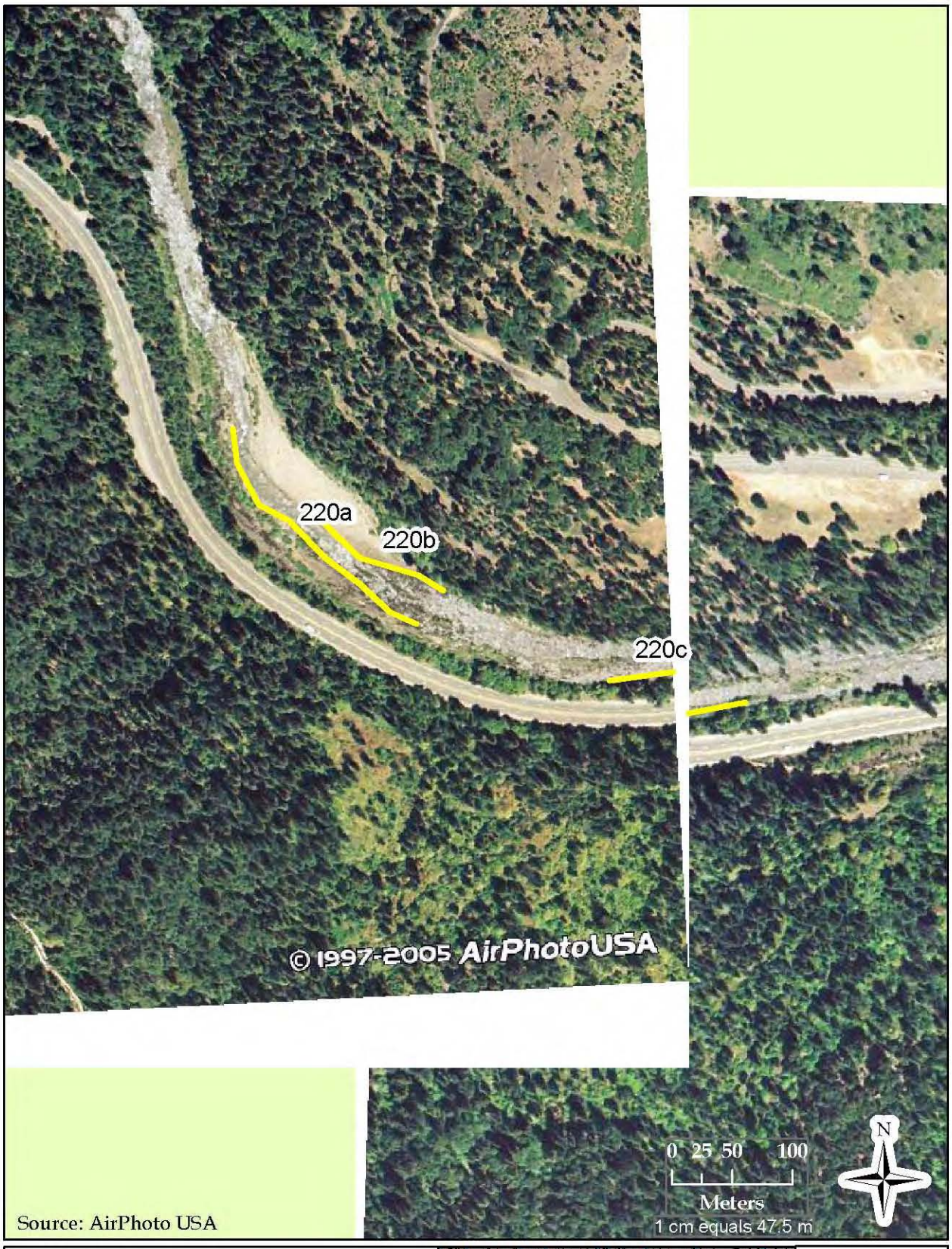


GANDA

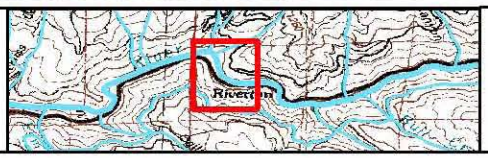
Site 213R.
SFAR upstream of
Ogilby Creek.

0 25 50
Meters
1 cm equals 25.0 m

GANDA



Site 220R.
SFAR at Maple Grove
(Blackbird Campground).



GANDA