

**APPENDIX D.
TIMING OF LIFE - HISTORY EVENTS FOR NATIVE FISH SPECIES IN THE
SAN JOAQUIN RIVER. BASED ON MOYLE 2002**

LIFE HISTORY STAGE	MONTH																					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec										
ACIPENSERIDAE																						
WHITE STURGEON																						
Upstream migration																						
Spawning																						
Downstream migration of adults																						
Hatching of larvae																						
Juvenile outmigration	Not known																					
GREEN STURGEON																						
Upstream migration																						
Spawning																						
Downstream migration of adults																						
Hatching of larvae																						
Juvenile outmigration (end of second year)																						
CATOSTOMIDAE																						
SACRAMENTO SUCKER																						
Migration within the watershed to spawning stream																						
Spawning																						
Incubation and hatching																						
Post larvae downstream migration																						
CENTRARCHIDAE																						
SACRAMENTO PERCH																						
Instream migration	No spawning migration																					
Spawning																						
Incubation and emergence																						
Planktonic larval stage																						

LIFE HISTORY STAGE	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
COTTIDAE												
PRICKLY SCULPIN												
Adult movement into freshwater and intertidal areas												
Spawning												
Larval planktonic stage present (3-5 weeks)												
Juveniles moving upstreams or into shallow areas												
RIFLE SCULPIN												
Adult instream migration	No spawning migration											
Spawning												
Incubation and emergence												
Larval stage	Guarded by male until yolk-sac is absorbed											
Rearing or juveniles present	Assume benthic existence after absorbing yolk-sac											
CYPRINIDAE												
CALIFORNIA ROACH												
Adult instream migration from pools into shallow areas												
Spawning												
Incubation and emergence												
Larval stage	Not known											
Rearing or juveniles present	Not known											
HARDHEAD												
Adult migration into tributaries												
Spawning												
Incubation and emergence	Not known											
Larval stage	Larval and post larval fish remain in dense cover of flooded vegetation or fallen tree branches											
Rearing or juveniles present	Move into deeper habitat											
HITCH												
Adult instream migration												
Spawning												

LIFE HISTORY STAGE	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Incubation and emergence												
Larval stage in littoral areas												
Rearing or juveniles present	Move into open water at about 50 mm total length											
SACRAMENTO BLACKFISH												
Adult instream migration	No spawning migration											
Spawning												
Incubation and emergence	Not known											
Larval stage												
Rearing or juveniles present	Juveniles school in shallow water											
SACRAMENTO PIKEMINNOW												
Adult instream migration												
Spawning												
Incubation and emergence												
Larval stage												
Rearing or juveniles present	Move into deeper water, in runs and riffles											
SPECKLED DACE												
Adult instream migration												
Spawning												
Incubation and emergence												
Larval stage	Remain in shallow areas											
Rearing or juveniles present	Not known											
SPLITTAIL												
Adult instream migration												
Spawning												
Incubation and emergence												
Larval stage moving into deeper water												
Juvenile downstream migration												
THICKTAIL CHUB												

LIFE HISTORY STAGE	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Adult instream migration	Unknown - Extinct											
Spawning												
Incubation												
Larval stage												
Rearing or juveniles present												
EMBIOTOEIDAE												
TULE PERCH												
Adult instream migration	No spawning migration											
Mating												
Fertilization												
Birth of young												
Rearing or juveniles present	Not known											
GASEROSTEIDAE												
THREESPINE STICKLEBACK												
Migration (if anadromous)												
Spawning												
Incubation and emergence												
Larval stage	Guarded by male											
Rearing or juveniles present	Join adult fish											
PETROMYZONTIDAE												
KERN BROOK LAMPREY												
Spawning												
Incubation and emergence	Not known											
Larval stage	Not known											
Rearing or juveniles present	Not known											
Metamorphosis												
PACIFIC LAMPREY												
Adult migration												

LIFE HISTORY STAGE	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Spawning												
Incubation and emergence												
Larval stage (washed downstream)												
Rearing or juveniles present	Filter feed in mud or sand up to 7 years											
Outmigration												
Ocean time	Not known											
RIVER LAMPREY												
Adult migration												
Spawning												
Rearing or juveniles present	Remain in silty backwaters up to 5 years											
Metamorphosis												
Outmigration												
Ocean time	Up to 2 years											
WESTERN BROOK LAMPREY												
Adult migration	No spawning migration											
Spawning												
Incubation	Not known											
Metamorphosis												
Rearing or juveniles present	Not known											
SALMONIDAE												
CHINOOK SALMON (FALL RUN)												
Adult migration												
Spawning												
Incubation and hatching												
Larval stage												
Rearing or juveniles present												
Juvenile outmigration												
CHINOOK SALMON (SPRING RUN)												

LIFE HISTORY STAGE	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Adult migration												
Spawning												
Incubation and emergence												
Larval stage												
Rearing or juveniles present												
Smolt outmigration												
STEELHEAD												
Adult migration												
Spawning												
Incubation and emergence												
Larval stage	Fry live in quiet waters before they move into deeper, faster flowing waters											
Rearing or juveniles present												
Juvenile outmigration												

Probable span of life history activity	
Peak of life history activity	