

Recommendations for modifications of the  
**California Fish Passage Assessment Database**  
**and**  
**First Pass Fish Passage Incidental Report**  
to incorporate  
Considerations for Pacific Lamprey

December 2017



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**Introduction:**

The Pacific Lamprey is a widespread anadromous species that historically occupied all drainages > 100 km<sup>2</sup> with access to the ocean, from northern Baja California northward to Alaska. In recent years Pacific Lamprey populations have declined substantially throughout their historical range, resulting in considerable conservation concern and the development of a Pacific Lamprey Conservation Initiative (USFWS). In California, a review of status and threats determined that passage was the most widespread and significant threat to the Pacific Lamprey (Goodman and Reid 2012). In California, Pacific Lamprey have lost about 50% of their historical range to large, impassable dams and continue to be constrained by smaller structures that are generally feasible to remediate. Passage remediation is one of the most cost-effective conservation measures available to improve the status of Pacific Lamprey.

Lampreys and salmonids have very different passage needs. Solutions for anadromous salmonids are often inappropriate for Pacific Lamprey, or may even form a total barrier (Goodman and Reid 2017). Unlike salmonids and pikeminnows (*Ptychocheilus* spp.), lampreys do not jump - so small dams, weirs, step-pool fishladders and Denil fishways designed for salmon can be total barriers to lampreys. The higher velocity fields often encountered in artificial fish passage structures designed for salmonids can also be challenging for lampreys, which are specialized anguilliform swimmers (Reid and Goodman 2016). This makes lampreys very efficient at lower swim speeds but provides relatively limited burst swimming capabilities. However, lampreys have unique sub-aerial climbing capabilities, allowing them to climb over and around barriers that block salmonids. Using their suctorial mouths and specialized climbing behaviors Pacific Lamprey can follow wetted pathways, such as the edges of waterfalls or constructed lamprey 'ramps' that bypass dams. The historical and current distributions of anadromous salmonids and Pacific Lamprey are also independent though often overlapping. A Pacific Lamprey distribution layer was recently added to CalFish BIOS (Reid and Goodman 2017).

The California Fish Passage Assessment Database (PAD; CDFW 2017) was designed generally to document and assess passage barriers for anadromous salmonids. However, the database and the associated Fish Passage Incidental Report (First Pass Data Sheet) for barrier inventory can also be important tools to document fish passage issues associated with lampreys. Many of the data fields provide information that is generally applicable to a barrier site. However, due to the inherent differences in how salmonids and lampreys interact with barriers, as well as differences in their respective distributions, incorporation of Pacific Lamprey into the PAD and survey form may require some adjustment of data fields and their attributes.

In this report we make separate recommendations for modification of both the California Fish Passage Assessment Database and the First Pass Fish Passage Incidental Report to include specific information relevant to Pacific Lamprey.

## **I. Recommendations for modification of the PAD database:**

In this review of the California Fish Passage Assessment Database we have annotated all current data fields (Dec. 2017), distinguishing those that should require no changes for the inclusion of Pacific Lamprey (Table 1), those that may require the inclusion of additional information within the same data field (Table 2), and those that will need independent information for Pacific Lamprey, perhaps with an additional data field specifically for Pacific Lamprey (Table 3). For those fields requiring changes, we have provided a rationale and recommended possible changes. We have also suggested additional fields that would aid in characterizing barrier status for Pacific Lamprey (Table 4).

**Table 1.** Passage Assessment Database (PAD) fields requiring no changes for the inclusion of Pacific Lamprey information.

<b>Field Name</b>	<b>Description</b>
Photo	Site Photo
PAD_ID	Unique ID for linking to California records in StreamNet
PassageID	PAD internal unique ID
StreamName	Stream where site located
TributaryT	First order tributary to what stream, river or ocean
SiteName	Structure or site name
SiteType	Type of instream structure
SpeciesBlocked	Species blocked by the barrier *
NumStructures	Number of structures at the site
StructOwner	Owner of the structure
LandOwner	Owner of the land
Notes	Subjective notes further describing structure, passage constraints, and summary of the remediation that occurred. *
Watershed	Hydrologic Unit Code (4th field HUC), USGS
County	County name
CalWatHR	Hydrologic Region (Calwater 2.2.1)
CalWatHU	Hydrologic Unit (Calwater 2.2.1)
CalWatHA	Hydrologic Area (Calwater 2.2.1)
CalWatHSA	Hydrologic Subarea (Calwater 2.2.1)
CalWatNo	Calwater number (Calwater 2.2.1)
NHDCOMID	Stream reach ID, indexing to 24k National Hydrography Dataset (NHD)
NHDCOMMeas	Stream reach measure, from indexing to 24k NHD
LLID	CalHydro stream unique ID (100K California Hydrography)
BegFt	CalHydro stream location address (begft) 100K California Hydrography
Route	Road route number or road name
PostMile	Road post mile number

DivOper	Is the diversion operational? (yes/no)
DivMobile	Is the diversion mobile? (yes/no)
Updated	Date record last updated in PAD
Source	All data sources providing data to the PAD
Point_X	GCS North American 1983 Longitude
Point_Y	GCS North American 1983 Latitude

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\* Note that this field appears to be limited in use to a single value (e.g. steelhead or Pacific Lamprey) in the public viewable version on BIOS, limiting usefulness for selecting barriers to other species of interest. There is also no information regarding which species were assessed or to which the barrier data refers.

\* A comment on the "Notes" field: One of the things about Notes, while they can contain plenty of information, often diverse, they are difficult to use for specific filtering or searching of data.

**Table 2.** Passage Assessment Database (PAD) fields that may require the inclusion of additional information for Pacific Lamprey within the same data field.

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<b>Field Name</b>	<b>Description</b>
Protocol	Assessment protocol used to inventory or assess site
AssessedBy	Agency or entity that assessed the site
AssessedByName	Name of the individual(s) that assessed the site*
SurveyDate	Date of the barrier inventory/assessment
YrTreated	Year barrier removed or remediated
TreatedBy	Group responsible for treating or removing barrier

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\* Note that this field is captured by the PAD but is not publically available on BIOS, etc.

**Protocol** (string): Available values include: various CalTrans protocols, FishXing, DFG Restoration Manual, Evaluation of Design Plans, eWRIMS, Field Survey, GIS, HEC-RAS Hydrologic Model, Office Archive, Professional Judgement.

None of these protocols or assessments are designed for lampreys.

Recommend addition of two lamprey protocol choices:

"PAD First Pass - PL" (see proposed mods to PAD First Pass form SR & DG 2017)

"Detailed Field Assessment - PL"

, others as appropriate.

**AssessedBy** (string): If assessed for lampreys, add assessor designated by "(PL)".

**SurveyDate** (string): Might need a longer or separate field to accommodate a date for lamprey and any other surveys.

**YrTreated** (SmallInteger): Might need a different data type or separate field to accommodate a date of treatment for lamprey and other species.

**TreatedBy** (string): If independent treatment for lampreys, add responsible party designated by "(PL)".

**Table 3.** Passage Assessment Database (PAD) fields that will need independent information, perhaps with an additional data field specifically for Pacific Lamprey.

Field Name	Description
BarStatus	Barrier status of the site
TrtStatus	Barrier treatment status
TrtRecom	Potential treatment options to remediate the barrier
WebLegend	Web legend category used for web mapping service: CDFW BIOS
Miles_Upst	Stream miles upstream to next upstream barrier or limit to anadromy

**BarStatus** (String): Available values include: Not a barrier, Partial, Remediated-unconfirmed, Temporal, Temporal & Partial, Total, Structure may not be in existence, Unassessed, Offstream/unrated, Unknown diversion, Screened, Unscreened.

Although some of these values can be generally applied to PL, others may be judged by criteria inappropriate to PL (i.e. Not a barrier, Partial, Remediated-unconfirmed, Temporal, Temporal & Partial, Total). For example, fish-ladders designed for salmonids may be a total barrier for PL, and waterfalls that are total barriers to salmonids are often passable by PL. Remediation for salmonids is often not appropriate for PL.

Recommend an additional field specific to PL - "**BarStatus\_PL**". Values: Not a barrier, Partial (or alternative term, see below), Temporal, Total, Remediated-unconfirmed, Unassessed.

\* Note that the value "Partial" is defined in the metadata as "only a barrier to certain species or life stages" (from DFG Restoration Manual). This does not provide information on whether a barrier is an incomplete or partial barrier to a given species, e.g. allowing only a percent of successful passage to those attempting it. From a user's perspective, this can be misleading and lead one to assume, incorrectly, that it referred to successful passage of less than 100 % "Not a barrier" and greater than a "Total" barrier.

**TrtStatus** (string): Available values include: Completed, Completed needs monitor, Design Stage, Engineering Planning, Ongoing, Planned, Proposed, Unknown.

Due to different passage needs between PL and other fishes, treatments and their status may not be informative to treatments required for PL.

Recommend an additional field specific to PL - "**TrtStatus\_PL**". Values: same.

**TrtRecom** (string): unstructured text entry of potential options.

Treatment recommendations for fishes other than PL may or may not be suitable for PL. Although, some are (eg total removal, natural channel bottom in bridge, culvert or fishway).

Recommend, either an additional field specific to PL - "**TrtRecom\_PL**" or distinguishing separate recommendations for PL.

**WebLegend** (string): Available values include: Not a Barrier, Partial Barrier, Total Barrier, Natural Total Barrier, Natural Partial Barrier, Unknown Passage Status, Remediated, Fish Response Unconfirmed, Screened Diversion, Unscreened Diversion, Unassessed.

While some of these values can be generally applied to PL, others may be judged by criteria inappropriate to PL (i.e. Not a Barrier, Partial Barrier (see BarStatus for discussion of terminology), Total Barrier, Natural Total Barrier, Natural Partial Barrier, Remediated, Fish Response Unconfirmed). For example, low jumps over weirs designed for salmonids may be a total barrier for PL, and natural waterfalls or log jams that are total barriers to salmonids are often passable by PL. Remediation for salmonids is often not appropriate for PL.

Recommend use of the Maximum Barrier Status for any species, including salmonids, lampreys and others.

**Miles\_Upst**: In the current PAD this field represents stream miles upstream to the next upstream barrier or limit to anadromy tracing the NHD stream network. Barriers outside of NOAA's Steelhead DPS boundary (January 2013) and those areas that were determined to be anthropogenically blocked by NOAA (January 2013) were excluded from this analysis. Potential barriers (unknown passage status and unassessed barriers), non-barriers, removed structures, diversions and non-structural barriers were excluded from this analysis.

The anadromous limits and barriers for PL are often different than those for other fishes. For example, In the Middle Fork Feather River anadromous salmonids were historically blocked at Bald Rock Falls, just above the current Oroville Reservoir, while PL extended at least another 50 mi upstream.

Recommend an additional field specific to PL - "**Miles\_Upst\_PL**". Calculated using recent Pacific Lamprey historical and current distribution layer/dataset (Reid and Goodman 2017) for stream length calculations and updated barrier assessments for upstream barrier status. Limited at this time to 4th order streams. This could be expanded to increase coverage and application in 3rd order streams.

**Table 4.** Passage Assessment Database (PAD) fields that could be added for Pacific Lamprey or general utility.

<b>Field Name</b>	<b>Description</b>
TBD	Lamprey assessment done? - provide link to assessment?
TBD	Lamprey presence? Above, Below, Absent Above, Unknown
TBD	Lamprey notes, problematic features, rationale for status
TBD	Stream order (added by data manager for consistency)

**Lamprey Assessment:** If a specific barrier assessment has been done for Pacific Lamprey passage, it would be useful to note that and to add a link to the datasheet or report that was used for the lamprey data.

**Lamprey presence:** Information on whether Pacific Lamprey are or were historically present above or immediately below the barrier site. This could be derived from the Current/Historical GIS layer or based on actual surveys (info under Notes), but is difficult to filter or select for without a specific field.

**Lamprey notes:** A separate notes section would be useful for lampreys and allow the user to filter relevant information.

**Stream Order:** This information would be generally useful to have in the PAD for establishing relative threat and barrier remediation priorities. Application of a single standard by the database manager would insure consistency. It is an important field because it is a natural filter variable for screening and prioritizing the data.

### **Discussion points**

What is the most effective way to incorporate PL info into the PAD?

Do we add specific PL fields to the PAD?

Can existing fields be modified to include PL information? Yes

A separate database tied to the basic PAD fields?

Pacific Lamprey historical and current distribution layer/dataset (Reid and Goodman 2017) for calculating stream length and upstream barrier status is limited at this time to 4th order streams. This could be expanded to increase coverage and application in 3rd order streams, which would bring in additional barriers more in keeping with the streams often addressed by Fish Passage Forum projects.

We could also consider having an online data form or link to downloadable forms for the lamprey barrier survey that could then be related to the PAD database.

## II. Recommendations for modification of First Pass report:

In this review we have examined all current data fields in the First Pass form (see Appendix A for actual form), as well as examining the CalTrans Reconnaissance Fish Passage Assessment (HDR 2007; see Appendix B for form) and FishXing culvert assessment software (USFS 2006) for additional perspective. For each section of the form, we have annotated fields with comments or suggestions, and in some cases provided a rationale and recommended possible modifications or additions. We have also suggested an additional Pacific Lamprey section with specific fields that would aid in characterizing barrier status for Pacific Lamprey.

Due to the unique characteristics of individual barriers, including both distinct challenges and opportunities for lampreys, we expect the First Pass form to serve as a primary filter, identifying those barriers that are clearly not barriers for lampreys and those that will require a more detailed field assessment by surveyors familiar with lamprey passage needs.

**Table 1.** First Pass Assessment Form fields: **Section 1. General.** Available choices (check boxes) are indicated by " / ". Fields discussed below are indicated by asterisk (\*).

<b>Field Name</b>	<b>Description</b>
Surveyor	Names of people conducting the survey
Date/Time	Date (mm/dd/yy) and the time of survey
* Agency	Agency or organization name
* Weather	Weather conditions (box choices)
* Water Conditions	Clear / Turbid
* Flow Conditions	Continuous / Isolated pools / Dry
* Bank Conditions	Channel erosion / Scour / Riprap
* Water Temperature	Water temperature
* Ambient Temperature	Air temperature

- **Agency:** not all are agencies, suggest Organization or Entity

- **Bank Conditions:** might be useful to have a box for "vegetated or natural".

- All fields from **Weather** down do not seem to contribute much for assessing passage and take up space on the form that could be applied to more relevant information, while allowing the form to remain a single page.

**Table 2.** First Pass Assessment Form fields: **Section 2. Location.** Available choices (check boxes) are indicated by " / ". Fields discussed below are indicated by asterisk (\*).

<b>Field Name</b>	<b>Description</b>
Latitude/Longitude	North American Datum 1983
Quad Name	U.S.G.S. 7.5 minute quadrangle name
Stream Name	From 7.5 minute quadrangle map, if available
Tributary To	Name of receiving stream, river lake or ocean
Barrier(s) Found	Yes / No
Stream Segment Surveyed	Length of stream reach surveyed
Bank Location	Where structure located, looking downstream
* Channel Type	"V" / "U"
Road Name	Road name and/or number
Milepost	Mileage marker, if available
Photos Taken	Inlet / Outlet / Other; date photos taken
Photos Description/Numbers	Description of each photo and file number
Land Owner	Owner/manager's name and contact info
Structure Owner	Structure owner's name and contact info

- **Channel Type:** not sure how this is used or whether it is necessary.

Suggest add "**Reach Gradient**" : ratio or percent slope. Could be useful for determining habitat suitability.

**Table 3.** First Pass Assessment Form fields: **Section 3. Structure.** Available choices (check boxes) are indicated by " / ". Fields discussed below are indicated by asterisk (\*).

<b>Field Name</b>	<b>Description</b>
* Structure Type	Diversion / Dam / Ford / Culvert / Bridge / Natural / Other
Structure Description	additional information
* Passage Status	re: adult and juvenile salmonid fish passage

- **Structure Type:** might include "Fishway", note that these are often barriers to non-salmonids, as well as to salmonids themselves when poorly designed or maintained.

- **Passage Status:** Is this appropriate for this level of inventory, or should there be more refined logic sequence for determination (see Initial Lamprey Assessment below)?

Might include standardized category boxes: Jumping Fishes (e.g. salmonids, pikeminnows), Swimming Fishes (e.g. suckers, brook lampreys, dace - maybe some sort of velocity criteria), Climbing Fish (e.g. Pacific Lamprey).

**Table 4.** First Pass Assessment Form fields: **Section 4. Fish.** Available choices (check boxes) are indicated by " / ". Fields discussed below are indicated by asterisk (\*).

Field Name	Description
* Salmonids Observed Downstream?	Yes / No
* Salmonids Observed Upstream?	Yes / No

Suggest replacing questions with the following to expand utility and informational content:

**Fish survey:** Visual / Snorkel / Electrofish / Lamprey / Other (see notes) / No survey

**Survey location:** Downstream (of structure) / Upstream / Both

**Survey Results:** Salmonids / Lampreys / Other fishes (see notes) / No fish observed

**Species observed / notes:** additional information.

**Table 5.** First Pass Assessment Form fields: **Section 5. Diversion.** Available choices (check boxes) are indicated by " / ". Fields discussed below are indicated by asterisk (\*).

Field Name	Description
* Diversion Type	Vertical pump / Submersible pump / Slant pump / Centrifugal pump / Pump other / Floodgate / Siphon / Weir / Other
Pump Running	Yes / No
Pipe Size - Inside diameter	< 1 ft / 1-2 ft / >2 ft
* Screened	Yes / No

- **Diversion Type:** This field may be confusing to surveyors as to whether diversions include the weir itself (very different from a pump from the standpoint of passage), or whether weirs are treated as an instream barrier, like a small permanent/seasonal dam (see below, Sec. 6). Maybe put the weir under Dam Type and the facility leading from the weir (e.g. canal, lateral pipe) under Diversion Type.

- **Screened:** Suggest adding type of screen? ie. Fixed / Traveling / Barrel / Louvres / Grate / etc. Information on the size of gaps would also be useful.

**Table 6.** First Pass Assessment Form fields: **Section 6. Dam.** Available choices (check boxes) are indicated by " / ". Fields discussed below are indicated by asterisk (\*).

<b>Field Name</b>	<b>Description</b>
* Dam Type	Earth / Rock/cement / Other
Dam Height	_ (ft)
Dam Width	_ (ft)
Seasonal use	Seasonal / Permanent
Passage facility present?	Yes / No

- **Dam Type:** include Wood (some made of logs) / Flashboard (removable) / Inflatable / Sheetpile / Weir (move from Diversion Type), as this is structural component of diversion.

**Table 7.** First Pass Assessment Form fields: **Section 7. Culvert.** Available choices (check boxes) are indicated by " / ". Fields discussed below are indicated by asterisk (\*).

<b>Field Name</b>	<b>Description</b>
Culvert Type	Box / Circular / Open-bottom Arch/ Pipe Arch / Other / Abandoned/Unmaintained
Culvert Material	Concrete / Metal / Plastic / Log/Wood / Other
Number of Barrels/Pipes	_ #
Culvert Diameter	< 2 ft / > 2 ft
Culvert Height	_ (ft)
Culvert Width	_ (ft)
* Outlet Drop Height	< 1 ft / 1-3 ft / > 3 ft
Weirs, Baffles or other structures present in culvert?	Yes / No
Channel Width	_ (ft)

- **Outlet Drop Height:** Specify measurement in instructions: eg from bottom of culvert to downstream water surface (not stream bottom) at (base?) flow. Might put space for actual height.

Add a "0 ft " value, otherwise all culverts have a drop and could be classified as barriers.

**Table 8.** First Pass Assessment Form fields: **Section 8. Bridge.** Available choices (check boxes) are indicated by " / ". Fields discussed below are indicated by asterisk (\*).

Field Name	Description
Bridge Type	Free span / Instream structures (e.g. piers)
Active/Abandoned?	Active / Abandoned
* Apron present?	Yes / No

- **Bridge Apron:** Is the apron flush with the stream bottom or is there a drop? What is the drop height? Values = Flat / Shelf / Absent, or something like that.

**Table 9.** First Pass Assessment Form fields: **Section 9. Natural.** Available choices (check boxes) are indicated by " / ". Fields discussed below are indicated by asterisk (\*).

Field Name	Description
* Natural Barrier Type	Waterfall / Grade / Landslide / Log Jam / Other
* Waterfall Drop	≤ 8 ft / > 8 ft

- **Natural Barrier Type:** add "Cascade".

- **Waterfall Drop:** Why not just give actual height (maximum or minimum?) at base flow. This could be applied to any structure, natural or artificial.

**Proposed Initial Lamprey Assessment section:**

**Is one of the following true:**

A natural structure (e.g. waterfall, cascade, log-jam) \_\_\_\_

Natural bottom thru culvert or under bridge \_\_\_\_

Structure submerged during most flows \_\_\_\_

Diversion without instream structure blocking upstream passage \_\_\_\_

All stream reaches upstream of gradient > 2% and lacking fines \_\_\_\_

Barrier site outside the historical range of Pacific Lamprey \_\_\_\_

If any boxes are checked, then there is **no further Lamprey Passage Assessment needed** \_\_\_\_

If surveyor disagrees (see features below), \_\_\_\_ reasoning:

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Photos should include downstream entrance to structure, upstream exit, interior of culverts (esp. if any structural features) and any features of concern.

Structural features that may challenge lamprey: perched culverts, acute edges, u-channels, baffles, weirs or other structures in the structure, overhangs, near-bottom velocities > 1 m/s, porous surface (grates), gaps or holes, lack of subaerial routes, confused turbulence, seams/cracks/gaps that break suction on otherwise smooth surfaces, heavy moss/algae, repeated challenges, seasonally dry conditions at site or upstream.

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## **Citations:**

California Department of Fish and Wildlife, California Fish Passage Assessment Database [ds69], November 2017 Version 5.49.25. <https://map.dfg.ca.gov/bios/>.

Goodman, D.H. and S.B. Reid. 2012. Pacific Lamprey (*Entosphenus tridentatus*) Assessment and Template for Conservation Measures in California. U.S. Fish and Wildlife Service, Arcata, California. 128 pp.

Goodman, D.H. and S.B. Reid. 2017. Climbing above the competition: innovative approaches and recommendations for improving Pacific Lamprey passage at fishways. *Ecological Engineering* 107: 224–232. <https://doi.org/10.1016/j.ecoleng.2017.07.041>.

HDR Engineering. 2007. CalTrans - Reconnaissance Fish Passage Assessment Instructions and Procedures. Prepared for California Dept. of Transportation, March 2007.

Reid, S.B. and D.H. Goodman. 2016. Free swimming speeds and behavior in adult Pacific Lamprey, *Entosphenus tridentatus*. *Environmental Biology of Fishes* 99: 969. doi:10.1007/s10641-016-0537-2.

Reid, S.B. and D.H. Goodman. 2017. Pacific Lamprey: Historical and Current Distribution - USFWS [ds2673]. California Dept. Fish and Wildlife, Biogeographic Information and Observation System (BIOS). <https://map.dfg.ca.gov/bios/>.

U.S. Forest Service. 2006. Fish Xing 3.0: Software to assist engineers, hydrologists and fish biologists in the evaluation and design of culverts for fish passage. <http://www.stream.fs.fed.us/fishxing/>



## Appendix A. California Dept. Fish and Wildlife - PAD First Pass Fish Passage Survey Form.

### FISH PASSAGE INCIDENTAL REPORT (First Pass Data Sheet)

This form is intended to be used for rapid barrier inventorying and barrier data collection. It is not intended for barrier passage assessment and is not meant to replace any existing barrier assessment protocols.

*\* Please fill Section I and II even when no barriers found!*

Send to: Anne Elston, CDFW, 830 S Street, Sacramento, CA 95814, Email: [Anne.Elston@wildlife.ca.gov](mailto:Anne.Elston@wildlife.ca.gov)

I. GENERAL			
Surveyor:		Date: / /	Time: AM/PM
Agency:			
Weather: <input type="checkbox"/> Sunny <input type="checkbox"/> Overcast <input type="checkbox"/> Raining	Water Conditions: <input type="checkbox"/> Clear <input type="checkbox"/> Turbid	Flow Conditions: <input type="checkbox"/> Continuous <input type="checkbox"/> Isolated pools <input type="checkbox"/> Dry	Bank Conditions: <input type="checkbox"/> Channel erosion <input type="checkbox"/> Scour <input type="checkbox"/> Rip/rap
Water Temperature (°C):		Ambient Temperature (°C):	
II. LOCATION			
Latitude:	Longitude:	Quad Name:	
Stream Name:		Tributary To:	
Barrier(s) Found?: <input type="checkbox"/> Yes <input type="checkbox"/> No		Stream Segment Surveyed:	
Bank Location (looking downstream): <input type="checkbox"/> Left <input type="checkbox"/> Right <input type="checkbox"/> Both		Channel Type: <input type="checkbox"/> V <input type="checkbox"/> U	
Road Name:			Milepost:
Photos Taken: <input type="checkbox"/> Inlet <input type="checkbox"/> Outlet <input type="checkbox"/> Other			
Photo Description/Numbers:			
Land Owner:		Structure Owner:	
III. STRUCTURE			
Structure Type: <input type="checkbox"/> Diversion <input type="checkbox"/> Dam <input type="checkbox"/> Culvert	<input type="checkbox"/> Arizona crossing (ford) <input type="checkbox"/> Bridge <input type="checkbox"/> Natural <input type="checkbox"/> Other _____	Description:	
Passage Status:			
IV. FISH			
Salmonids Observed Downstream? <input type="checkbox"/> Yes <input type="checkbox"/> No		Salmonids Observed Upstream? <input type="checkbox"/> Yes <input type="checkbox"/> No	
V. DIVERSION			
Diversion Type: <input type="checkbox"/> Slant pump <input type="checkbox"/> Vertical pump <input type="checkbox"/> Submersible pump	<input type="checkbox"/> Floodgate <input type="checkbox"/> Other _____ <input type="checkbox"/> Centrifugal pump <input type="checkbox"/> Pump other	<input type="checkbox"/> Siphon <input type="checkbox"/> Weir	Pump Running? <input type="checkbox"/> Yes <input type="checkbox"/> No Pipe Size: <input type="checkbox"/> < 1 ft <input type="checkbox"/> 1 - 2 ft <input type="checkbox"/> > 2 ft Screened? <input type="checkbox"/> Yes <input type="checkbox"/> No
VI. DAM			
Dam Type: <input type="checkbox"/> Earth <input type="checkbox"/> Rock/cement <input type="checkbox"/> Other _____	<input type="checkbox"/> Seasonal <input type="checkbox"/> Permanent	Dam Height (ft):	Dam Width (ft):
Passage Facility? <input type="checkbox"/> Yes <input type="checkbox"/> No			
VII. CULVERT			
Culvert Type: <input type="checkbox"/> Box <input type="checkbox"/> Circular <input type="checkbox"/> Open-bottom arch <input type="checkbox"/> Pipe arch <input type="checkbox"/> Other _____ <input type="checkbox"/> Abandoned/Unmaintained	Culvert Material: <input type="checkbox"/> Concrete <input type="checkbox"/> Metal <input type="checkbox"/> Plastic <input type="checkbox"/> Log/wood <input type="checkbox"/> Other _____	Number of Barrels/Pipes:	
		Culvert Diameter: <input type="checkbox"/> ≤ 2 ft <input type="checkbox"/> > 2 ft	
		Culvert Height (ft):	Culvert Width (ft):
		Outlet Drop Height: <input type="checkbox"/> < 1 ft <input type="checkbox"/> 1 - 3 ft <input type="checkbox"/> > 3 ft	
		Weirs/Baffles? <input type="checkbox"/> Yes <input type="checkbox"/> No	
		Channel Width (ft):	
VIII. BRIDGE			
Bridge Type: <input type="checkbox"/> Free span <input type="checkbox"/> Instream structure	<input type="checkbox"/> Active <input type="checkbox"/> Abandoned	Apron? <input type="checkbox"/> Yes <input type="checkbox"/> No	
IX. NATURAL			
Natural Barrier Type: <input type="checkbox"/> Waterfall <input type="checkbox"/> Grade <input type="checkbox"/> Landslide <input type="checkbox"/> Log jam <input type="checkbox"/> Other _____			
Waterfall Drop: <input type="checkbox"/> ≤ 8 ft <input type="checkbox"/> > 8 ft			
X. ADDITIONAL NOTES			
Does this site need treatment? What are specific treatment recommendations? (Please use other side if needed for additional notes).			

**Appendix B. CalTrans Reconnaissance Assessment Survey Form.**

D- RECONNAISSANCE ASSESSMENT SURVEY FORM		County _____						
v. 033107		Route _____						
		PM _____						
					YES	NO	UNK	QC
<b>1.0 SURVEY INFORMATION</b>								
1.1 Date: _____ Time: _____		1.2 Agency performing survey _____						
1.3 Data recorder: _____		1.4 Survey team: _____						
<b>2.0 SITE INFORMATION</b>								
<b>2.1 GPS Data</b>								
2.1.1 Latitude: _____								
2.1.2 Longitude: _____								
2.1.3 GPS HDOP _____								
2.1.4 Location of GPS point taken: <input type="checkbox"/> Above inlet <input type="checkbox"/> Above outlet <input type="checkbox"/> At postmile paddle marker (PM _____)								
<b>2.2 Natural Stream Channel</b>								
2.2.1 Stream Name: _____		2.2.2 Source: _____						
2.2.3 Is there a definable channel upstream of the crossing?								
If "No", indicate in section 4.1 that no Detailed Fish Passage Assessment is needed								
2.2.4 Is the primary function for storm water runoff or road drainage?								
If "Yes", indicate in section 4.1 that no Detailed Fish Passage Assessment is needed								
2.2.5 Is the waterway a concrete-lined flood control channel?								
If yes, indicate the extent of concrete lining: Upstream of crossing: _____ ft Downstream of crossing: _____ ft								
If "Yes" is, Detailed Fish Passage Assessment needed?								
<b>2.3 Fish Bearing Stream</b>								
2.3.1 Does the site contain an active channel width >2 feet?								
2.3.2 Is the stream gradient < 20%?								
If "No" to either question, indicate in section 4.1 that no Detailed Fish Passage Assessment is needed.								
<b>2.4 Historic Anadromous Reach:</b>								
Has the stream reach upstream of the crossing supported an anadromous fish population?								
Source: _____								
If "No", indicate in section 4.1 that no Detailed Fish Passage Assessment is needed.								
<b>2.5 Crossing Type:</b>								
<input type="checkbox"/> Culvert <input type="checkbox"/> Bridge w/ potential passage constraints <input type="checkbox"/> Bridge w/o passage constraints <input type="checkbox"/> Other								
General Description: _____					ID: _____			
If crossing is "bridge w/o passage constraints", Indicate "NO" in section 4.1.								
<b>3.0 Photos Taken</b>								
3.1 Upstream looking upstream Photo ID _____								
3.2 Upstream looking downstream Photo ID _____								
3.3 Downstream looking upstream Photo ID (Required for all sites) _____								
3.4 Downstream looking downstream Photo ID _____								
<b>4. Detailed Fish Passage Assessment Survey Requirement</b>								
4.1 Detailed Fish Passage Assessment Required?								