Streamscape Inventory
for
Landscape Analysis

Lassen National Forest
Almanor Ranger District

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(amended 6/02)

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Introduction

Application

The Streamscape protocol outlines a field extensive methodology intended for evaluating existing conditions of riparian and aquatic resources for Landscape Analysis. Riparian and aquatic zones identified through this inventory may become candidates for more intensive surveys to determine if forest practices and activities are in compliance with forest plan and/or landscape analysis objectives and guidelines. This is also an effective reconnaissance survey for identifying Stream Condition Inventory-Field Intensive reaches.

Channel characteristics differ between channel types. In order to avoid collecting data that are not applicable to a given stream or reach, measurable attributes have been broken into alluvial and non-alluvial channels types. Applicable attributes will vary between these channel types. Different data sets are to be collected for alluvial and non-alluvial reaches. In general, alluvial reaches have a gradient less than 3%, with a channel morphology that has been created by the depositional processes associated with flowing water, and has banks with fine textured soils that may migrate laterally within wide valley bottoms. Non-alluvial reaches have gradients greater than 3%, are morphologically resilient, and generally occupy major tributary valleys.

Survey implementation

In general, the survey is initiated at the mouth of a stream and continues upstream through an analysis area. Data are collected at three levels: 1) at transects (spaced every 100 meters along the stream) 2) between transects 3) at pools. Surveys should be initiated by collecting "at transect" data at the beginning of the first reach. Reach breaks occur at response/transport, low gradient transport/high gradient transport and transport/source interfaces. The survey may be terminated at the boundary of the analysis area, the terminus of a stream system or at a predetermined location that reflects analysis needs. Within any given analysis area, all of the streams may be surveyed using this protocol. The protocol may be applied to ephemeral, intermittent and perennial channels, however, attributes including residual pool depth, pool tail surface fines and wetted width-to-depth ratios may not apply to ephemeral and intermittent channels.

Data Base

A Microsoft Access database has been developed to receive Streamscape Inventory data. The database includes data tables and entry forms. Queries are in the development stage.

List of Attributes

Non-alluvial reaches	Alluvial reaches
Channel gradient	Channel gradient
Pools: residual pool depth	Pools: residual pool depth
Percent pool tail fines	Percent pool tail fines
Large wood recruitment potential	Bankfull and Wetted width-to-depth
Large woody debris tally	Large woody debris tally
Large wood recruitment	Large wood recruitment
Riparian hardwood age structure	Riparian hardwood age structure
Stream shading: % canopy	Stream shading: % canopy
Bank stability	Bank stability
Sediment sources	Sediment sources
Channel shape	Channel shape
Confinement	Confinement
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	Aquatic fauna
	Large wood recruitment potential
	Riparian width

Gradient

Applicability:

All channel types.

Importance:

Calculation of gradient is an important attribute for channel classification. Knowledge of channel gradient can increase understanding of the geomorphic processes shaping the channel.

Objective of the measurement:

Used to delineate reach breaks. To determine the stream channel gradient in percent slope.

Where to take the measurement:

Standing at the waters edge at each transect.

How to take the measurement:

While standing at the waters edge, sight downstream to the last transect with a clinometer and determine the gradient in percent slope. Record as a positive number. When sighting, determine a point downstream which approximates the eye level height of the observer standing at the waters edge.

Use gradient breaks for reach delineations. When a break between dominant slope ranges occurs, delineate a new reach and start a new set of data forms.

If it is not possible to see the last transect location, shoot a few gradients and record the average on the data form.

Slope ranges for reach breaks:

<3%	Response reach
3-6%	Transport reach
6-12%	Transport reach
>12%	Source reach

Residual Pool Depth

Applicability:

All channel types.

Importance:

Pools are an important component of habitat for aquatic organisms. Pools provide habitat complexity, deep water and cool summer temperatures, winter refuge, and areas for rearing of fish. They are also important indicators of channel morphology. The filling of pools with fine sediment is recognized as an indicator of sedimentation and habitat degradation.

Objectives of This Measurement:

1) To quantify the number of primary pools in the reach.
2) To determine the range of residual pool depths within the reach.
3) To determine pool frequency in pools per kilometer and pools per mile.

How Many Measurements to Take:

Sample every primary pool in the reach. A primary pool is defined in this survey as meeting several criteria, including:

- Unit has a maximum residual depth at least twice that of the pool tail crest.
- Unit has little or no velocity.
- Unit is in the main channel, and is not a subunit surrounded by dissimilar units.

Where to Take the Measurement:

Each primary pool within the reach.

How to Take the Measurements:

Use an incremented staff to measure a pool's deepest point and the pool tail crest depth. Record results on the data form.

Percent Surface Fines: Pool Tail Substrate

Applicability:

All channel types.

Importance:

Watershed and streambank disturbance often result in increased erosion, and sediment input to streams. Increased fine particles in stream substrate have been shown to impair aquatic food production, and decrease survival of young trout.

Objective of This Measurement:

To quantify the percentage of fine sediments on pool tail substrate within the survey reach.

How Many Measurements to Take:

Variable, depending upon the channel type of the survey reach.

> Non-alluvial reaches: Three samples per pool for the first five pools.
> Alluvial reaches: Three samples per pool for every pool in the reach.

Where to Take the Measurement:

At each pool tail, stand immediately downstream of the pool tail crest. Estimate upstream 10% of pool length. The first measurement is taken in the thalweg within the 10% zone; the second measurement is taken midway between the thalweg and left waters edge; the third measurement is taken midway between the thalweg and right waters edge.

How to Take the Measurement:

Define the extent of each pool tail "unit" by estimating a zone that incorporates the downstream 10% of the total pool length. It will lie within the wetted stream width.

Within the area defined, make 3 random tosses of the grid.

The grid is a 14-inch square of metal with a wire or string mesh, which forms 49 intersections. Counts are made of percent fines beneath the string intersections plus one corner of the metal grid to achieve a total of 50 possible counting locations. Each intersection has an initial value of one; in other words, only one fines count can be made at each intersection.

Count and record the number of points above substrate 2 millimeters or less. A viewing tube or dive mask can aid in viewing the grid by breaking the water surface glare and turbulence.

Each point represents 2% fines. Multiply the total fines points per toss by 2 and record this number on the data form.

EXCEPTION: In some streams, aquatic vegetation may be growing or otherwise cover parts of the area to be sampled by the grid, making it's use difficult or impossible. If that is the case, an alternative procedure for that pool tail is employed. At such a location, the pool tail area is defined. Transects are then run across the area, with a particle selected at the toe point of each stride. If the particle falls into the <2mm size class, it is tallied. This procedure is continued until 100 particles have been selected. Transects and strides should be staggered such that the entire pool tail area is sampled equally. The tallied number of particles under 2mm represents the percent surface fines estimate for the pool tail. This percentage is entered on the data sheet in the "Pool Tail Substrate" "Throw 1" column. "-9" is entered in the "Throw 2" and "Throw 3" columns.

Large Woody Debris (LWD)

Applicability:

All channel types.

Importance:

Large wood is important in the morphology of many streams. It influences channel width and meander patterns, provides for storage of both sediment and bedload and is often the most important source of pool formation in small streams. Large wood is also an important component of instream cover for fish, as well as providing habitat for aquatic insects and amphibians. Large wood is part of the nutrient cycling process of aquatic species.

Objective of This Measurement:

To quantify the woody debris in the stream reach.

How Many Measurements to Take:

Conduct a complete tally of woody debris, rootwads, aggregates, and partially buried debris within the stream reach.

Where to Take the Measurement:

Between 100 meter transects. Tally all pieces of wood laying within the designated stream reach, including those which have a portion of its length (at least one meter) laying within the bankfull channel or are spanning the channel.

How to Take the Measurement:

Walk the entire stream reach, counting each piece of dead and down woody debris that extends into the bankfull channel.

Length of wood to be counted varies with channel width, while diameter does not. Minimum length to be tallied must equal 1/2 bankfull width. Minimum diameter is always 20 cm.

Aggregates are defined as having 4 or more pieces of woody debris. Count the number of key pieces in the aggregate and record this number in the aggregate box on the data form. Pieces of wood that comprise an aggregate should be included in the overall wood tally as well. Do not exclude key aggregate pieces from the LWD tally.

Large Wood Recruitment

Applicability:

All channel types.

Importance:

The importance of large woody debris is stated under stream survey attribute: large woody debris. Large woody debris in stream systems is generally recruited from riparian areas. The removal of large trees from riparian zones results in a gradual decrease in wood, over time, as in-channel material decomposes or is moved downstream. This attribute focuses on coniferous species. Deciduous species are considered under stream survey attribute: riparian age structure.

Objective of the observation:

To determine the level of large woody debris recruitment from riparian zones within a survey reach.

Where to make the observation:

Between 100 meter transects and within the top of bank and the slope distance of one site potential tree.

How to make the observation:

Characterize the large woody debris recruitment within the top of bank and the slope distance of one site potential tree with one of the following groups

> **Poor**: No trees available in any form or trees do not exceed 30 centimeters DBH.
> **Fair**: Trees exceed 30 centimeters DBH, but may not exceed 1/2 the bankfull width in height and/or do not lean over the channel and/or less than 5% are dead.
> **Good**: Trees exceed 30 cm DBH, are greater than 1/2 the bankfull width in height, some trees are leaning over the channel, and/or greater than 5% of the trees are dead.

On the data form, enter **P** for poor, **F** for fair, and **G** for good.
If there is no potential for large wood recruitment write "no LWD recruitment potential" in the notes column of the data sheet.

Large Wood Recruitment Potential

Importance:

When evaluating large wood recruitment for landscape analysis it is important to know if a stream reach has the potential to contribute large wood to a stream. Knowing whether or not there is a potential for large wood recruitment will prevent land managers from misinterpreting data.

Conifers within a riparian setting provide a different climate and habitat attributes than riparian hardwoods alone. This is useful in defining habitat diversity within the riparian vegetative communities.

Objective of Measurement:

To roughly estimated the amount of influence that conifers exert on the riparian community.

Where to make the observation:

Between 100 meter transects.

How to take the measurement:

While walking between transects observe if there is conifer growth that could contribute to large wood recruitment. If there is not record an N for no on the data form and if there is record a Y for yes on the form.

Riparian Hardwood Age Structure

Applicability:

All channel types.

Importance:

Riparian zones shade streams, influence channel morphology, provide food and cover for aquatic organisms, and prevent bank erosion. A reduction in riparian vegetation can lead to bank erosion and instability. The long-term effects of a community driven to a mature and decadent age structure include a lack of young trees available to colonize and stabilize failing stream banks. This attribute focuses on species such as alders, willows, cottonwoods, and aspen. Coniferous species are not considered here but are accounted for in the stream survey attribute: LWD recruitment.

Objective of this measurement:

To identify the age structure of deciduous riparian species within a survey reach.

Where to make the observation:

Between 100 meter transects and parallel to the stream channel.

How to make the observation:

Characterize the riparian age structure of each riparian hardwood species (alders, willows, cottonwoods, and aspen) with one of the following groups:

- Type 0: No riparian community exists other than grasses and forbs
- Type 1: Riparian community is predominantly composed of sprouting and/or young trees. Communities are sparse.
- Type 2: Riparian community is predominantly composed of sprouting and/or young trees. Communities are dense.
- Type 3: Riparian community is composed of a diverse assemblage of sprouts, young, mature, dead and decadent community is sparse.
- Type 4: Riparian community is composed of a diverse assemblage of sprouts, young, mature, dead, and decadent trees. Community is dense.
- Type 5: Riparian community is predominantly composed of mature and/or dead or decadent trees. Regeneration is not evident or is not successful. Community is sparse.
- Type 6: Riparian community is predominantly composed of mature and/or dead or decadent trees. Regeneration is not evident or is not successful. Community is dense.

Definitions of Riparian Age Classes:

Sprout: plant has only one stem
Young: plant has 2-10 stems
Mature: plant has > 10 stems, > 1/2 of plant is alive
Decadent: plant has > 10 stems, < 1/2 of plant is alive
Dead: plant is 100% dead

Riparian Width

Applicability:

All channel types.

Importance:

The width indicates the amount of influence of riparian characteristics (microclimates, temperature gradients, etc.). This is important in determining the amount of potential habitat for aquatic (non-fish) and other riparian dependent species.

Objective of Measurement:

Used to record the average width. This will be used to develop an overall description of the amount of riparian habitat within the stream segment.

Where to take the measurement:

Between 100 meter transects and parallel to the stream channel.

How to take the measurement:

While walking between transects observe the width of the riparian zone and record the average width (in 15 meter increments) for the right and left side of the stream on the data form.

Stream Shading

Applicability:

All channel types.

Importance:

Stream shade may influence water temperature in some stream systems. Water temperature, in turn influences the health, behavior and survival of aquatic organisms.

Objective of This Measurement:

Determine the average canopy cover for the channel reach.

Where to Take the Measurement:

At fast water transects spaced approximately 100 meters apart (visually sighted distance).

At mid-channel, approximately 30 cm above the water surface.

How to Take the Measurement:

Stream shading is measured using a Solar Pathfinder. At each sample location, level the instrument facing south at a height of approximately 30 cm above the water surface. Look for the reflection of the sky and objects providing shade on the instrument's dome, as viewed from no more than 15 degrees from vertical.

Use the August sun path. Add the shaded sections along the sun path to yield the percent shade for each sample. When totaling the shade numbers, observe the portion of each section that is shaded. Count fractions of individual sections that are shaded. Document the total number of shade on the data sheet.

Channel Width-to-Depth Ratio

Applicability:

Alluvial reaches only.

Importance:

Channel width to depth relationships are important to fish habitat (generally, deeper channels provide better habitat for adult fish and neoteric salamanders) and are also key indicators of channel stability and dynamics. Changes in channel width and depth over time may be indicative of changes in water and/or sediment discharge, or changes in riparian condition.

Objective of This Measurement:

To characterize the channel and understand stream processes and condition in comparison to streams with similar channel types.

How Many Measurements to Take:

Variable depending on reach length.

Where to Take the Measurement:

At the first five transects at nearest fast water.

Take the measurements at the stream's widest point within each selected fast water (or riffle).

How to Take the Measurement:

The bankfull channel is the channel defined by the banks of the stream. It is the incipient elevation on the bank where flooding begins, and is associated with the flow that just fills the channel to the top of its banks at a point where water begins to overflow onto the floodplain.

At each location, identify and flag the bankfull elevation on both sides of the stream channel. Once bankfull has been identified, stretch a measuring tape between bankfull flags. Starting at bankfull on the left bank, take a minimum of 10 depth measurements before reaching bankfull on the right bank. Include the thalweg, water's edge and major slope changes in the channel cross section. Take depth measurements at intervals which result in a representative sample of the bankfull channel depths.

Note the presence of undercut banks on the data form but disregard computing undercut widths. It is beyond the scope of this attribute to assess undercut area, and in most cases undercuts have a negligible effect on width-to-depth ratio.

If a braided channel is encountered with multiple bankfulls, measure each braid separately to account only for width and depth of water at bankfull level.

Bank Stability

Applicability:

All channels types.

Importance:

Channel stability is an important indicator of the bank's susceptibility to erosion. Erosion may cause excessive sediment deposition in the channel, which in turn affects aquatic habitat and runoff processes.

Objective:

To identify indicators of channel reach condition.

Where to take the measurement:

Between 100 meter transects, and within the bankfull channel.

How to make the Observation:

Characterize the channel banks into one of the following groups:

- Type 0: No bank erosion evident
- Type 1: Noticeable bank erosion occurs only on the outside of meanders.
- Type 2: Bank erosion is prevalent on the outside of meanders and on at least one side of some straight reaches.
- Type 3: Streambanks show extensive erosion except at the inside of bends.

Sediment Sources

Applicability:

All channel types.

Importance:

Sediment sources are areas where sediment enters the stream channel. Sediment is defined as non-organic material less than two millimeters in diameter. An increased sediment load in streams may adversely affect the habitat of aquatic organisms by filling in interstitial spaces, embedding or blanketing spawning substrate, and/or altering channel morphology. Examples of sediment sources include gullies, landslides, debris torrents, exposed stream banks, roads, skid trails and landings in streamside zones, water truck access points.

Objective:

To quantify sediment sources in square meters.

Where to take the measurement:

Between 100 meter transects.

Inventory any roads, landings, skid trails and other ground disturbing features if they occur within 90 meters of the stream channel.

How to take the measurement:

Estimate the total surface area (in square meters) of sediment sources between transects and record this number on the data form. In many cases it is not possible to estimate the size of a sediment source from the stream. For example, debris torrents, gullies, and slides may originate upslope and out of sight from an instream location but may contribute sediment. In these instances, the surveyor must leave the stream channel to estimate the size of the sediment source.

Aquatic Fauna

Applicability:

All channel types.

Importance:

Biota are key indicators of aquatic condition. The presence and distribution of aquatic biota is useful for management considerations.

Objective of the observation:

To collect information on the presence and distribution of aquatic vertebrates in the survey reach.

Where to make the observation:

Between 100 meter transects.

How to make the observation:

Conduct an ocular survey of the entire reach as you proceed upstream gathering hydrological data.

Proceed upstream searching for herptiles and other species of concern that may be located within the bankfull channel. Periodically move cover objects within bankfull in moist areas in order to look for cryptic organisms. When springs or seeps are observed, conduct a sight specific survey outside of the bankfull channel. In many instances, a meadow may contain ponded water that serves as suitable habitat for herpetiles. These situations require the surveyors to leave the stream channel and search for adults, larvae and egg masses. An aquarium net is a useful tool for collecting larvae and egg masses in areas that have dense aquatic vegetation. Upon completing a thorough search, surveyors should return to the stream where they left and continue the channel survey. If measurements are to be taken, carefully measure snout-vent lengths in salamanders, frogs and snakes, until you are confident of visually estimating.

Survey pools for fish and other organisms using a snorkeling mask. Record the species and size range of fish observed. If the distribution throughout the reach is not uniform, comment. Describe the habitat in which the critter was found.

Identify the organisms, using a Stebbins field guide or frog/salamander cards, and record the life stage (egg mass, larva, adult) of the herpetiles observed.

Species codes include:

RBT: rainbow trout
BRT: brown trout
BKT: brook trout
SPD: speckled dace
GDS: golden shiner
GRS: green sunfish
CSF: Cascades frog
FTY: foothill yellow-legged frog
MTF: mountain yellow-legged frog
PTF: pacific tree frog
WST: western toad
WPT: western pond turtle
UNIDT: unidentified trout
UNIDF: unidentified frog

Channel Shape

Applicability:

Alluvial channels only.

Importance:

Channel shape provides insight into channel morphology and condition.

Objective of the observation:

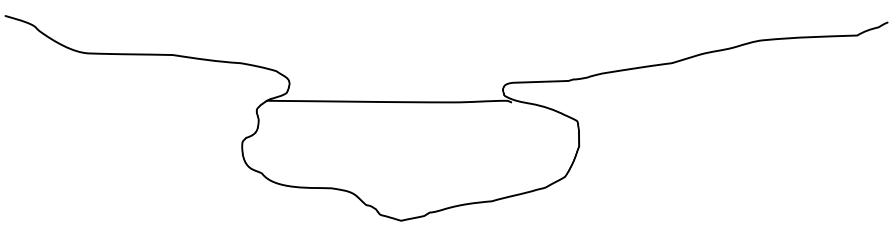
To characterize channel shape trends throughout the survey reach.

Where to make the observation:

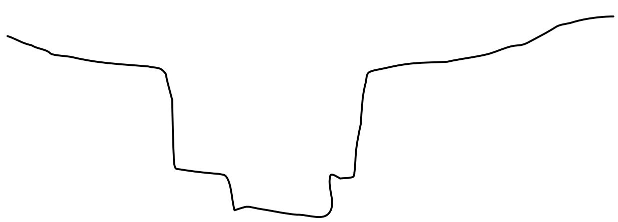
Between 100 meter transects.

How to make the observation:

Compare the banks within the channel reach with the diagrams provided, and select the type that most closely characterizes the bank shape between transects. Consider these shapes as general models used to compare to the variety of forms that will actually occur on different streams. Transport reaches often have a V shaped valley and can be characterized with a V on the data sheet, enter an I for incised reaches, a U for undercut reaches and an S for swales.



Undercut



Incised or downcut

An undercut channel has overhanging banks. An incised, or downcut channel has sheer banks and is often found in meadow streams. There is little to no floodplain connectivity in an incised or downcut channel.

Confinement

Applicability:

All channel types.

Importance:

The distribution of streamflow above bankfull stage is a primary influence on the character of the channel. These flood flows play a major role in sediment and storage as well as channel morphology.

Objective:

To aid in channel classification for understanding of stream processes in comparison with other similar channel types.

Where to make the observation:

Between 100 meter transects.

How to make the observation:

Three classes of confinement will be considered:

Unconfined (U): where the floodplain extends beyond 10 bankfull channel widths from at least one side of the stream. Similarly if there is no confining structure, canyon wall, ridge, etc. with in 10 bankfull channel widths but no definable floodplain the system will be considered unconfined.

Confined (C): Where the system is confined within three bankfull channel widths in the same manner, i.e. floodplain width or structure, we will consider it confined.

Partially Confined (PC): Where confinement is between 3 bankfull channel widths and 10 bankfull channel widths.

Groundcover

Applicability:

Alluvial reaches only.

Importance:

Bare ground along streams can increase runoff rates and sediment loads to the stream channel. The lack of streamside vegetation can also lead to bank instability, further increasing sediment delivery to stream channels.

Objective of this measurement:

To determine the extent of bare ground within a survey reach.

Where to make the observation:

Between 100 meter transects and within the top of bank and 5 meters parallel to the stream channel.

How to make this observation:

Characterize the groundcover with one of the following groups:

- Type 0: No bare ground exists.
- Type 1: Bare ground is patchy, mostly grasses and forbes.
- Type 2: Bare ground is extensive few grasses and forbes available for forage.

Water quality

Applicability: All flowing streams.

Importance: The quality of water greatly influences the composition and abundance of aquatic life. For example, many aquatic organisms are stressed when the pH of water drops below 6.0, and ultimately die as the pH progressively decreases.

Objectives of this measurement

1.) To obtain several basic field water quality measurements of streams.

How many measurements to take and where

1.) Each flowing stream should be measured.
2.) Each stream above and below major tributaries. A major tributary is defined as that which is contributing more than 10 percent to the flow of the receiving stream.

What to measure (at each location)

1) *pH*. Measure directly in the stream with a pH meter. Make sure the reading stabilizes, which may take up to five minutes. Do not measure in pools.
2) *Conductivity*. Measure directly in the stream using a conductivity meter. Make sure the reading stabilizes.
3) *Turbidity*. Take a sample from the stream and bring back to the office for measurement – sample bottles will be provided. Sample should be taken in the middle of the stream, facing upstream. Be careful not to disturb the stream bottom in the sample area (i.e. don't kick up sediment and then collect it). Do not measure in pools.
4) *Temperature*. Use a thermometer to measure the temperature of the stream, prefereably in the middle of the stream. Do not measure pools or stagnant water areas along the side of the stream.
5) *Flow*. Estimate the flow of the stream in cubic feet per second in the following ranges: <0.5 cfs.; 0.5 – 2.0 cfs., 2.0 – 10 cfs.; 10 –20 cfs., 20 – 50 cfs., 50 – 100 cfs., > 100 cfs.. A few tips on estimating streamflow:
   - Pick a rectangular or semi-rectangular cross-section perpendicular to the direction of flow (a rectangular cross-section has an equal water depth across it).
   - Estimate or measure the width of the stream.
   - Estimate or measure the average depth of the stream (a rectangular cross-section makes this easy).
   - Estimate the velocity of the water. Velocity is distance divided by time. One method is to place a measuring device along the edge of the stream, place a stick in the middle of the channel, and time how long it takes for the stick to move that distance. Make sure to convert the velocity to #feet / 1 second. Discharge = Width (feet) X Depth (feet) X Velocity (feet/second).

NOTE: Describe the location of the stream precisely, such as : Willow Creek 0.5 miles above confluence with North Fork Feather River and 100 feet downstream of unnamed tributary.

Headcuts

Applicability:

Alluvial response channels.

Importance:

Headcuts are indicators of active incising or downcutting of a stream channel. Headcuts may originate at tributary confluences and move up tributaries or they may originate and move up "mainstem" channels.

Objective of this measurement:

To quantify the number of mainstem and tributary headcuts in a survey reach.

Where to take the measurement:

Between transects.

How to take the measurement:

Count all mainstem and tributary headcuts between transects and write the number of each in the appropriate data column. Describe physical dimensions of a headcut in the notes column on the data form.

Stream Survey Summary

Applicability:

All channel types.

Importance:

Stream survey summaries may provide the greatest amount of insight related to watershed processes but are frequently forgone when surveyors finish their work or feel that the survey protocol accurately reflects stream condition.

Objective:

To create a narrative that describes watershed processes, general condition, application of survey attributes, and opportunities for restoration for each stream surveyed.

How to complete this task:

Upon completing the survey for a given stream, complete the form while reflecting on each attribute and its importance relative to assessing the general condition of the stream. Include a description of road and landing locations and describe any opportunities for restoration.

Road and Landing Inventory

Applicability:

Throughout the analysis area with special emphasis given to near-stream locations.

Importance:

Roads are a source of sediment to streams. Increased fine sediment to stream substrate impairs aquatic food production, and decreases the productivity of redds (spawning beds) by reducing oxygen flow through redd substrate and increasing larval fish mortality. By improving road and landing drainage and location with course aggregate and obliterating roads that are identified as chronic sediment sources, sedimentation to streams can be reduced and aquatic production can be maintained or improved.

Objective of this measurement:

To identify roads, stream crossings, and landings that are in a near stream location and or deliver sediment to streams.

Where to make the observation

Roads and landings should be evaluated during the implementation of the stream surveys as well as by driving the existing road system. Temporary roads, poorly maintained roads, and isolated landings may need to be accessed by walking.

How to take the measurement:

Identify roads, drainage structures and landings that are in a near stream location and or deliver sediment to streams. Illustrate the location of these sites on a map and develop a written narrative that describes the location, problem and possible restoration of these sites.

Mapping

Applicability:

All channel types.

Importance:

Mapping a stream or reach is essential for navigation as well as for analysis and planning efforts.

Objective:

To successfully navigate along the stream courses of an analysis area and to identify stream survey reaches and points of interest.

How to complete this task:

Before initiating a survey effort, compile a set of maps that delineates the analysis area and displays the stream courses. It may be helpfull to increment the stream courses in 100-meter sections before heading into the field. This will aid in navigation, identifying transect boundaries and locating areas of interest (restoration opportunities, sensitive species habitat, or riparian hardwood locations).

Seasonally Flowing Channels

Applicability:

Stream channels with intermittent or ephemeral flow

Importance:

Seasonal channels provide large wood, deliver sediment, gravel and other colluvial material to perennial channels. Seasonal channels may also provide spawning and rearing habitat for salmonids.

Objective:

Survey seasonally flowing channels in sufficient detail to describe their general condition within the analysis area.

How to complete this task:

Before initiating a survey effort, compile a set of maps that delineates the analysis area and displays the stream courses. Identify seasonal channels based on obvious map crenulations. In the field, identify on maps any seasonal channels encountered that were not recognized from crenulations.

Complete the Seasonally Flowing Channel Survey Form for each channel inventoried.

Road Crossings

Applicability:

All road/stream intersections

Importance:

The crossing of streams with roads present high-risk situations.

Objective:

Survey seasonally flowing channels in sufficient detail to describe their general condition within the analysis area.

How to complete this task:

Before initiating a survey effort, compile a set of maps that delineates the analysis area and displays the stream courses. Identify seasonal channels based on obvious map crenulations. In the field, identify on maps any seasonal channels encountered that were not recognized from crenulations.

Complete the Seasonally Flowing Channel Survey Form for each channel inventoried.

Notes and Comments

Applicability:

All channel types.

Importance:

Notes and comments are critical for describing situations that may not be captured by stream survey attributes but reflect site-specific situations relative to a particular stream or reach. Notes are also helpful for writing summary reports.

Objective:

To capture stream surveyor observations in a consistent manner.

How to complete this task:

Record notes in the notes and comments field on the data form. Notes may reflect the presence of potential sensitive species habitat, beaver activity, single dead aspens or cottonwoods, exceptional spawning habitat, restoration opportunities among others. Consult your supervisor about site-specific interests that may be relative to a particular analysis area before initiating a survey.

Equipment List

Incremented measuring staff
Surface fines grid
Viewing tube for breaking water surface glare when conducting fines measurement
Snorkel and mask
Hand level
Clinometer
Map of streams and analysis area
Tally whacker
Solar Pathfinder
Lunch
Sunscreen
Backpack or field vest
Camera

All measurements in meters

Streamscape Inventory

Date: | **Reach:**
Management Area: | **T.R.S. of start**
Stream: | **Crew:**

Record	**At Transect Data**				**Between Transect Data**														**Pool Data**					**Notes**
number		Wetted	Bankfull		Riparian Hardwood Age Type				Riparian Width		LWD	Recruitment	Bank	Channel		Sediment			Pool Tail	Max Pool	Fines			
	Gradient	Width	Width	% Shade	Willow	Alder	Aspen	Cottonwood	Left	Right	Recruitment	Potential	Stability	Shape	Confinement	Sources	Groundcover	Headcuts	Crest Depth	Depth	Grid x 2			

Riparian age type:
0=no hardwoods
1=sprouting/young-sparse
2=sprouting/young-dense
3=diverse-sparse
4=diverse-dense
5=mature/dead/decadent-sparse
6=mature/dead/decadent-dense

Recruitment:
poor=no conifers or conifers <20cm dbh
fair=conifers>20cm dbh but may not exceed 1/2 b.f. in height
and/or do not lean
good=conifers exceed 20cm dbh, lean over channel,
and/or > than 5% are dead

Groundcover:
0=no bare ground
1=patchy bare ground
2=extensive bare ground

Bank Stability:
0=no bank erosion
1=erosion at outside of meanders
2=erosion at outside of meanders
and 1 side of some straight reaches
3=extensive erosion

Riparian width:
0=no riparian
15=1-15 meters wide
30=16-30 meters wide
45=31-45 meters wide

Confinement:
Unconfined (U)=floodplain >10 bf channel widths
Confined(C)=floodplain within 3 channel widths
Partially Confined(PC)=floodplain is 3-10 bf channels widths

Recruitment Potential:
(Y)es
(N)o

(yellow) Alluvial channels only

Streamscape Inventory

Aquatic Fauna & Large Woody Debris

Date: ____________________ Reach: ____________________

Management Area: ____________________ T. R. S. of start ____________________

Stream: ____________________ Crew: ____________________

Record number	Species	# of Individuals	Habitat	Notes

Large Woody Debris Tally
(Pieces > 20 cm dbh & >1/2 B.F. width)

Aggregates

(4 or more pieces)

Notes

Streamscape Inventory

Stream Survey Summary

Stream: ______________________________

Analysis Area: ______________________________

General Summary Comments:

Restoration Opportunities: Describe location and condition of skid trais, roads, landslides, channel downcutting, problematic culverts, and rangeland overutilizatic

Provide restoration recommendations:

Lassen National Forest Stream Recon Form

Date ________________
Project ______________
Unit ________________
Survey By ___________

Channel Type

_____ Perennial (fish bearing)
_____ Perennial (non-fish bearing)
_____ Seasonally Flowing
_____ Combination (describe)

Diversion- Stream Capture

____ Natural channel
____ Non-Natural channel (complete following)

comment on cause _______________________
____
____
____
is cause correctable? ____________________
____
____

Unit and Channel Topography and Form

Unit Slope (range) _________________
Channel Side Slope (range) __________
Channel Gradient (range) ____________
Dominant Channel Substrate __________

Restoration Opportunities (check if applicable)

____ LWD in channel
____ LWD recruitment
____ Landing/skidtrail rehab/obliteration
____ RHCA thinning
____ Road related improvement (could be outside unit
____ Other _________________________

Existing Disturbance

Source (chk if present)	Active or recovered
_____ landing	_________________
_____ skidtrail	_________________
_____ roads	_________________
_____ fire	_________________
_____ other	_________________

Description of Resource Condition:

Photographs taken (describe)
Site Map prepared (attach)

Streamscape Inventory

Landing and Road Assessment

(include maps)

Analysis Area:

Site Number and Location (sites need to be numbered on a map.   location should include a legal as well as proximity to stream):

Site Description: Describe landing or road location and potential impact to stream.

Provide restoration recommendations for each site: