

**Vegetation Resource Survey**

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# **Trees/ Vegetation**

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# Stream Inventory Project

## *Vegetation Resource Survey*

### Importance

Riparian vegetation provides critical food, shelter, and nesting/denning resources for many species of wildlife in California. Riparian vegetation also provides important nutrients to the stream's invertebrate populations and provides cooling shade to moderate water temperature in streams. Little information currently exists on the condition of riparian trees, shrubs and herbs.

### Method

A field team comprised of a minimum of three volunteers establishes the boundaries of a "belt transect" at a previously determined study location. The transect is 10 meters in width and extends perpendicular to the creek from the outer edge of riparian vegetation on one bank to the outer edge of vegetation on the other bank. Within this "belt", all trees over 4 cm in diameter are measured and identified. A metric tape measure is extended through the middle of the transect longitudinally to measure the extent and type of understory vegetation. Canopy cover (percent canopy closure) is measured above the wetted channel at four locations within the transect.

### Equipment

- Tape measures
  - 100 meter tape
  - 50 meter tape
  - "Diameter at Breast Height" (DBH) tape
- "Cruising stick" (optional)
- Clinometer
- Range finder
- Stadia (surveyor's) rod
- Transect marking equipment
  - Rebar stakes (4 lengths of 2')
  - Hammer
  - 10 meter rope
- Data sheets
- Clipboards (2)
- Plant identification books
- Pencils
- Plastic bags for unidentified samples

## Constraints

Although this protocol was developed using a 10 meter wide transect every 500 meters along a stream course, other transect widths could be used to increase sample population size. Steep eroded banks are difficult to access and frequently encountered. Vegetation data in such cases can only be estimated.

## Quality Assurance

Vegetation teams can periodically be joined by local botanists from horticultural societies or the California Native Plant Society. The team and the botanist can collect replicate data and review results after data collection is complete. The team can be evaluated on skill and familiarity with the field equipment, adherence to protocol and skill and accuracy in vegetation identification.

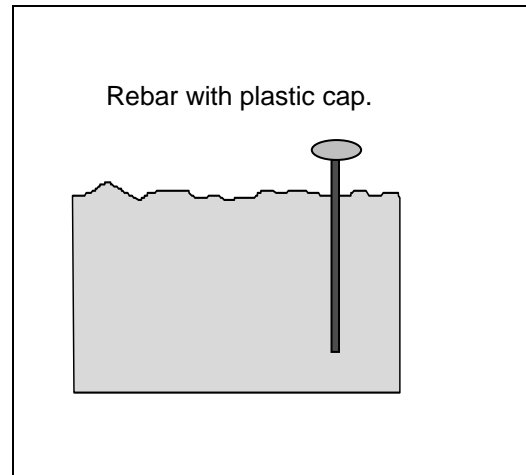
## Data Value

The information gathered by this team will help describe the important vegetational components of the riparian habitat on each creek. Correlations can be made between various vegetation parameters and wildlife observations. Vegetation also contributes to changes in stream flow patterns and provides important instream habitat for amphibians and fish.

# Vegetation Survey Instructions

## Establishing the Transect Boundaries

The first task the survey team must undertake is establishing the boundaries of the transect using the survey marker in place on the stream bank. There are several methods for marking the survey site. The most permanent is with a brass surveyor's marker anchored in cement. These are expensive and difficult to install. The most commonly used marker is a piece of "rebar" driven nearly flush into the ground. Usually a plastic orange safety cap is placed on the top but these are often stolen. Another method used often is an orange "tassel" attached to the top of a stake driven level with the ground surface. A large number is written on the top of the stake which corresponds to the number appearing on the stream map. Contact the Volunteer Coordinator for information on the point marker and detailed maps on their location.



The following process will establish the boundaries of the "belt transect".

1. Stretch out the measured 10 meter rope perpendicular to the creek with the orange mark (center mark) on top of the stake. At one end of the rope, pound or push a "rebar" stake into the ground just enough to hold a 2 ft. piece of fluorescent orange PVC pipe upright. Stretch the rope taut, pound in the other corner rebar stake, and place the other PVC pipe on top.
2. Send two members of the team to the top of the opposite bank with 2 rebar stakes, 2 lengths of PVC pipe, a measuring rope, hammer, and a compass.
3. Standing at either the "0" or "10" marker, align the compass along the length of the meter tape and set the bezel on the compass to match the line on the mirror. Rotate 90<sup>0</sup> toward the opposite bank and, sighting along the line of the compass, align the team member (or orange PVC pipe) on the opposite bank.
4. Once aligned, the team member will place a stake and a piece of fluorescent orange PVC pipe on the corner. The opposite bank team member will then repeat the process of marking the other corner of the transect and the transect is marked.

As the opposite bank team members begins coming back across the stream, they should tie small lengths of survey tape to tree branches or vegetation, marking the outside boundary of the transect. This will make it easier to determine if a particular tree is in or outside the transect. **All markers, stakes and tape should be removed after the data gathering is finished.**

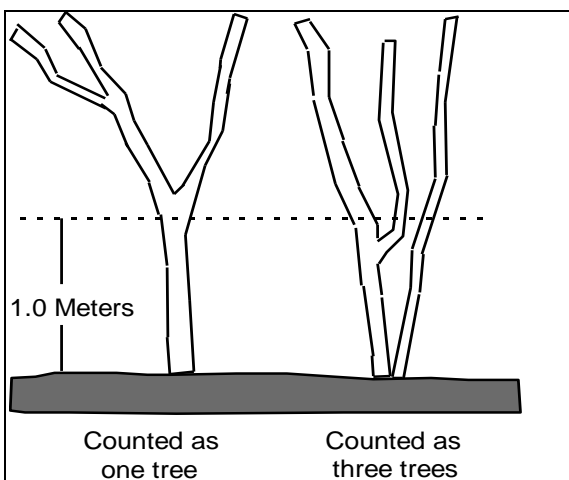
Once the outside boundaries of the transect have been established, the team needs to determine how far the transect will extend past the top of the bank on either side of the stream. **We will only count trees which are associated with the riparian system. For example, all trees which are ecologically associated with the stream, and provide riparian habitat for**

**wildlife.** In urban areas, do include trees which are riparian, native, and/or within the riparian system, even though they may have been planted by adjacent homeowners. Many California urban backyards are wholly or partially within riparian areas. However, do not enter any private property without permission of the landowner. In most cases, reasonable ecological boundaries of the riparian zone should be fairly easy to determine. (Revised 5/02 by a Clean Water Team member) In rural areas, it may be more difficult to determine where the influences of the stream begin to diminish. This is particularly true where a slope leads directly into a stream bed. In general, do not carry the transect more than 10 meters beyond the level of the top-of-bank. Once this has been determined you can begin taking data.

**Note:** Trees at the edge of the transect boundary which are leaning out of the transect should be counted as long as they are rooted inside. Trees which lean into the transect but are rooted outside the transect should not be counted.

## Tree Measurement

For the purposes of this study, a tree is defined as any woody vegetation over 3 meters high and having a diameter of 4 cm or more. Young willows, alders or other tree species growing near the low flow channel frequently are below the limits listed above. **Sapling and seedling trees which do not meet the 4cm/3m criteria should be counted and noted on the data sheet.** Separate counts should be made for low, mid, and upper slope.



Also, for multi-trunked trees such as buckeyes and bays, each trunk is considered a separate tree as long as it is at least 4 cm in diameter and branches from another trunk at or within 1 meter of the base.

The information we will be gathering on trees is as follows:

- Species
- Diameter (in centimeters)
- Height (in meters)
- Location on bank
- Whether the tree was planted or volunteer (subjective determination)

## Tree Species

Use the common name of the tree on the data sheet. Write legibly. If you cannot confidently identify the species by using the field guides provided, (e.g., red willow or yellow willow) note the the family (e.g., willow) and collect a sample of the plant as follows: under "Species" enter "Unidentified Sample #1" on the data sheet, collect an outer branch of the plant and place it into a large ziplock bag with a label indicating the stream point #, the date, and the collectors name and sample # 1. Whenever possible, include a sample of any flower or fruit

present. On the back of the data sheet describe the trunk characteristics (e.g., smooth, deeply grooved) and the branching pattern (branching near the base, central trunk, branching near the top). The more information you take on any unknown tree, the better the chance are that we will be able to identify it.

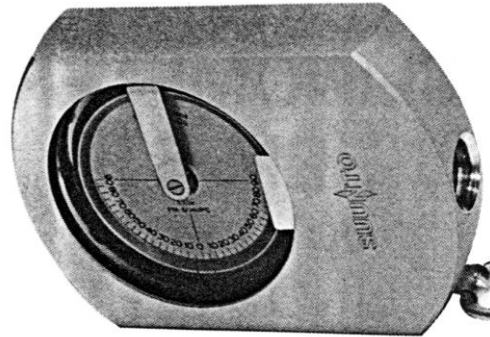
### **Diameter (Diameter at Breast Height, DBH)**

Using the metric diameter tape, wrap the tape around the trunk of the tree, take a reading, and record the measurement in the "Diameter" column on the data sheet. Diameter measurements should be taken at approximately 1.2 meters from the base of the tree (average chest height).

**Note that there are two scales on the tape.** Make sure you use the scale marked "Diameter in centimetres and millimetres" (European spelling) with all black markings. The other side of the tape (with red meter numbers) is a standard metric tape.

### **Height**

Tree height measurements are obtained in one of two ways. If the tree is 3 to 7 meters tall, the stadia rod can be used to take a direct height measurement. One member of the team will stand the rod as close to the base as possible and extend the rod sections up through the center of the tree canopy until the top of the rod reaches the top of the canopy. Another member of the team should stand approximately 10 meters away from the tree to insure that the rod has actually reached the top of the tree. Direct height measurements should be recorded in the "Direct" column of the data sheet.



If the tree is over 7 meters tall or if the vegetation is so dense that the stadia rod cannot be raised to the top of the tree or cannot be read by the observer, then tree height is determined through the use of the "Optical Height Meter" pictured below. This instrument measures inclination relative to a predetermined distance from the base of the tree. There are a number of steps involved in using this instrument.

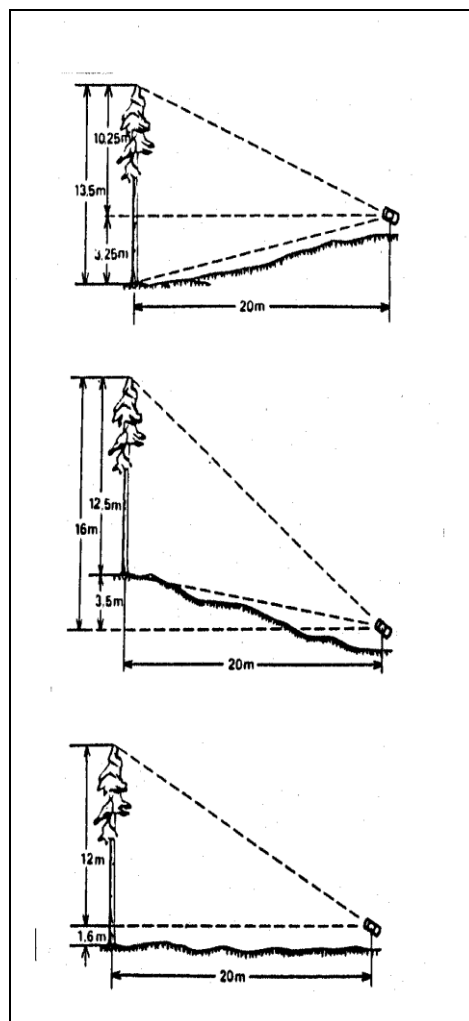
1. Using the 50 Meter tape measure, determine a distance from the tree (this distance must be either 10, 15 or 20 meters measured horizontally from the tree) where you can easily see both the base and the top of the tree. Record this distance in the "Distance" column on the data sheet.

1. Holding the clinometer to one eye, sight to the top of the tree. In order to locate the top of the tree you must have both eyes open and alternately focus on the top the tree and through the instrument.

1. As you look through the meter, you will notice two scales and a horizontal line. The horizontal line should be lined up with the top of the tree. If your distance to the tree is either **10 or 20** meters, use the left scale to take your readings. If your horizontal distance is **15** meters use the right scale. Record the reading in the column marked "Ht.". Record which scale you used (left or right) in the "Scale" column.

2. Repeat the above process for the base of the tree and record your value in the column marked "Base".

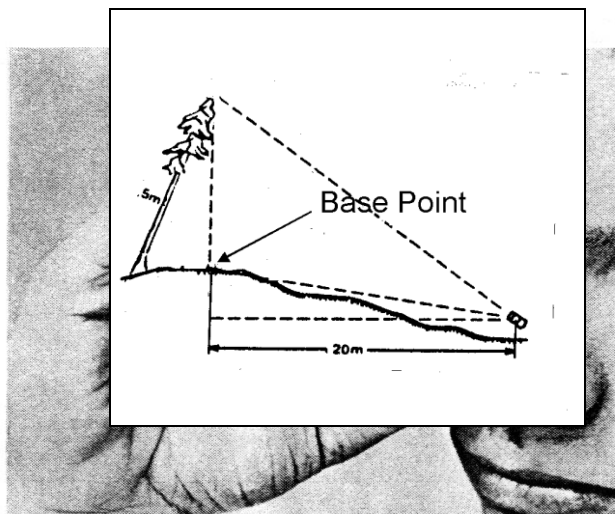
3. Next, record whether you are standing upslope, downslope or level with the base of the tree and record in the "Upslope or downslope" column.

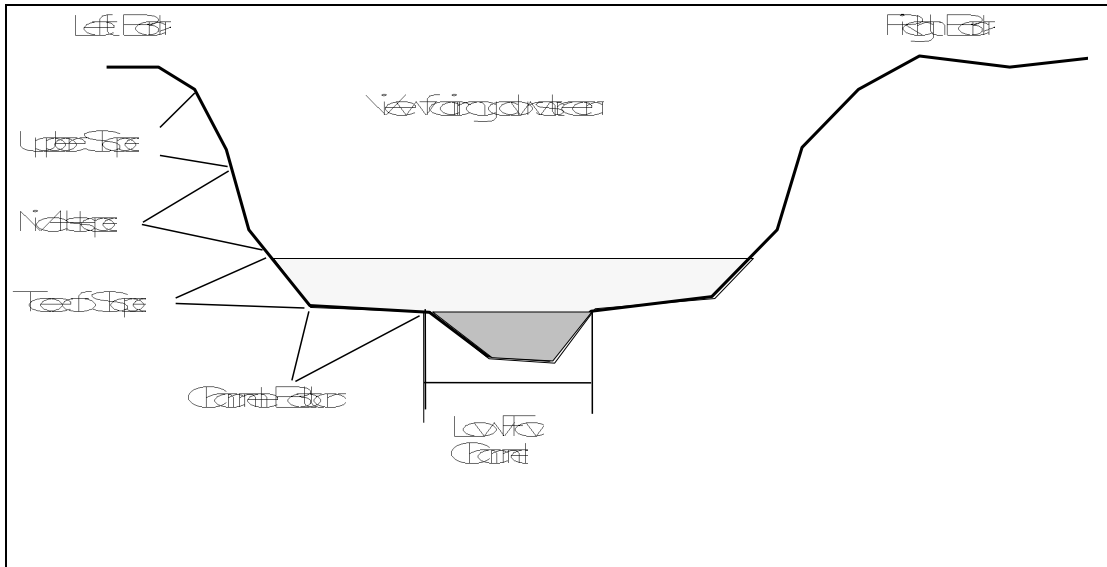


Note: When tree is leaning or misshapen, it is critical to measure from directly below the highest visible point of the tree, rather than the base of the tree itself.

### Location on Bank

Bank sides (right or left) are determined by facing **downstream**. Refer to the diagram above to determine the appropriate contour features to record in the "Location on Bank" column. Also note whether the tree is located on





the "upper", "mid", or "toe" of the slope.

### Planted or Volunteer

Determine if possible whether the trees are planted or naturally occurring. In some cases it is obvious that homeowners have planted native or semi-native trees along the top of the bank. We are trying to determine also the extent of planting of nonnative invasive trees. All such trees should be noted in this column.

### Sapling and Seedling Trees

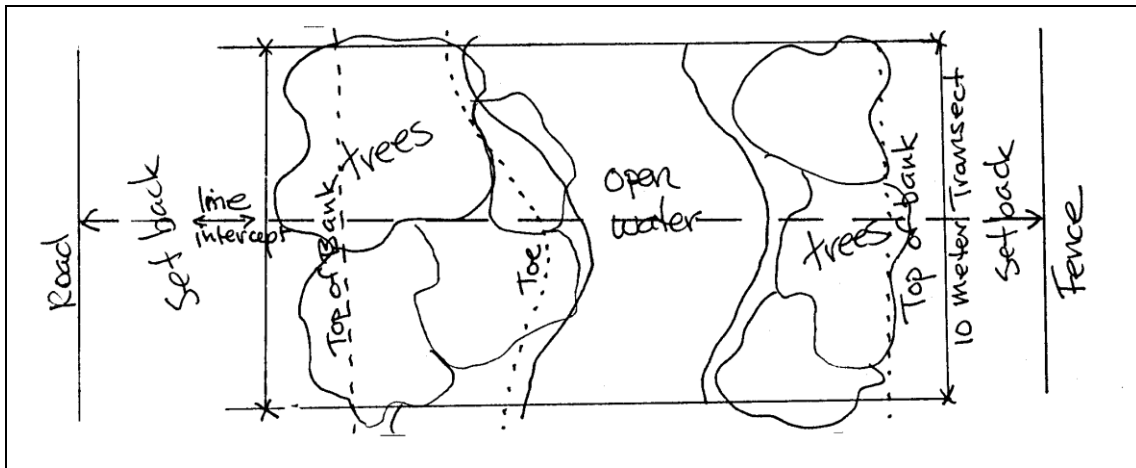
Young or small trees which do not meet the 4 cm/3m diameter and height requirements should be identified by species and location, and counted according to their position in the channel (upper, mid, lower slope) and whether they are clumped in one area or dispersed loosely around the site. If it is clear whether the young trees are seedlings (sprouted from seeds) or shoots (sprouted from the roots, base, stump or trunk of an established tree) please cite in the notes. Give exact number of trees up to 50, then note categories of 25 (i.e. 50-75, 75-100) for numbers of trees above 50.

Seedling/Shoots	R/L	Location on Bank			Clump	Notes
		Up	Mid	Low		
Fremont Cottonwood	R	128	9	0	yes	All from downed tree
White Alder	L	19	2	1	no	Scattered along gravel bar

### Understory and Setback Measurements

The vegetation growing underneath the taller trees is important habitat for wildlife and provides additional shading to keep water temperatures within a range necessary to support native fish populations. To characterize and measure this important component of the riparian ecosystem we will be using a technique known as the "line intercept" method.

- Using one of the stakes from the belt transect, anchor the end of the 100 meter tape near the point survey stake. Stretch the tape across the creek to the center of the belt transect on the opposite side of the creek. Make certain



the tape lies on or near the ground.

- Beginning at "0" determine the dominant vegetation type or if the ground is bare or covered with leaf litter. Move along the length of the tape until the major component of the understory changes. On the data sheet mark the corresponding meter mark as the end of that understory component. Follow the example on the next page.
- Continue the process until you work across the creek to the top of the bank on the opposite side. Do not include small patches of different vegetation. Minimum patch size is 0.5 meters. Again, if you cannot determine what the dominant understory vegetation is, collect a sample and label it "Unident. understory #1" and put it in a ziplock bag with a label indicating Point #, date sample #, and collector.
- Indicate the extent of water or, if the channel is dry, streambed on the data sheet also.

	0	16.5	22.25	26.0	29.6	
Bank (L/R)	Left	Dom.	Vinca	Open Water	Cattail	Elderberry
Structure	Wood Fence	Subdom.	Ann. Grass		Bullrush	Snowberry

## Canopy Cover

The last task before moving on to the next point, is a determination of the percent of canopy cover at the site. This information is extremely valuable since it determines, to a great extent, the amount of shading of the channel and the temperature of the water.

Canopy cover is measured with an apparatus known as a "spherical densiometer". This is a rather fancy name for a concave mirror with a grid on the surface. Our densiometers have 50 equally spaced dots on the surface as a grid. Hold the mirror about 6 cm from the middle of

your chest; your head should just fit in the small box at the bottom of the mirror. Simply count the number of dots covered by vegetation and record that number. There are 4 boxes on the data sheet for 4 separate canopy cover measurements. These four measurements should be taken along the line intercept at regular intervals from the toe of one bank slope to the toe of the other.

## Notes

Anything unusual that is seen during the course of your survey work should be noted in this section.

Before you leave the study area, review the data sheets. Look for missing data and check all the decimal points for completeness and accuracy. Make sure all information is recorded on the data sheets and that they are collated if extra pages are necessary. Turn in all data sheets promptly to the Team Leader. It is the team leader's responsibility to screen the data sheets prior to submitting them to the Vegetation Survey Coordinator. Should the vegetation coordinator have questions on any of the data, the Team Leader will be responsible for contacting survey participants if necessary.







# Tree Inventory Data

Creek Name	Guadalupe River
Survey Point	42
Date	4/14/98
Time Start	1130
Time Finish	1215
Page	2 of 2

Participants	
Kurt Specht	
Joel Tesler	Recorder Pam Peterson

Tree Species	Dead?	Direct	Height		Ht	Base (+/-)	Upslope Downslope Level	Diam.	Loc. On Bank			Plant Vol.
			Dist. to Base	Scale (L/R)					Bilt.	L/R	U/M/L	
OAK CANYON LIVE	NO	NO	10M	R	3.75	-6.0	DOWN	10.7	T	R	M	V
"	NO	NO	10M	R	3.50	-7.75	DOWN	8.4	T	R	L	V
"	NO	NO	10M	R	9.50	-1.5	LEVEL	9.7	T	R	L	V
"	NO	NO	10M	R	7.75	-1.5	LEVEL	10.4	T	R	L	V
"	NO	NO	10M	R	7.75	-1.5	LEVEL	7.9	T	R	L	V
"	NO	NO	10M	R	7.00	-2.5	DOWN	14.4	T	R	M	V
"	NO	NO	10M	R	4.75	-5.75	DOWN	15.1	T	R	M	V

Sapling/Sprout Species	RL	Location on Bank			Clumped	Notes
		Up	Mid	Low		
CANYON LIVE OAK	R	✓	✓	✓	YES	730 INDIVIDUALS
CANYON LIVE OAK	L	✓			NO	JUST ONE

Notes

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## Part 636.2 – Inventory Methods

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### 636.20 General

The National Planning Procedures Handbook, Part 600.23, describes the resource inventory process. The inventory process is used to collect information about the planning area's resources. This information is used to define the problems and opportunities and to formulate and evaluate alternatives.

Parts 636.2 and 636.3 of this handbook provide a detailed description of the common inventory methods and tools used in forestry and agroforestry applications. This part details the various methods used to conduct resource inventories related to the planning process.

Much of the understanding a client acquires about the nature of their resources, on which they may base many of their decisions, comes during the inventory stage. It is essential to work on the land with the decisionmaker that is empowered to make the necessary resource management decisions.

Forests are rarely homogeneous areas. Prior to conducting an inventory, forested areas should be divided into units that are reasonably uniform with respect to the quality of the land, the density of the trees, the species composition of the stand, and the size and age of the trees. Forestland Ecological Site Descriptions can be a valuable source of information to determine these groupings. Refer to the National Forestry Manual, Part 573.3 for a detailed discussion of Forestland Ecological Site Descriptions.

### 636.21 Forest Stand Inventory

The zigzag transect method of sampling will normally meet the inventory needs relative to conservation planning. However, there may occasionally be a need to employ other common sampling methods.

In addition to the zigzag transect method, three other common forest stand inventory methods are also discussed in this subpart – strip sampling, fixed plot sampling, and variable plot sampling.

The strip sampling and plot sampling methods are based on a percentage system. A limited proportion of the area is measured, on the assumption that the samples are typical of the entire stand. The percentage of the area sampled depends on the uniformity of the stand and the size of the area to be sampled. In uniform stands, typical sampling percentages range from 20 percent on

small areas of from 20 to 40 acres to 5 percent on areas larger than 80 acres. In areas where trees are of irregular distribution, the percentage of the area sampled may need to be increased to give adequate results.

Only a brief explanation of the strip sampling and plot sampling methods is given. Foresters should refer to other sources, such as the Society of American Foresters' *Forestry Handbook*, for a detailed description of these inventory methods.

#### (a) Zigzag Transect Method

A common inventory procedure used by NRCS foresters is the zigzag transect. The zigzag transect is a simple and rapid forest land inventory system that is used to determine

- Average tree diameter
- Range of tree diameters
- Stocking rates (trees per acre)
- Stand composition
- Stand condition (health)

#### (1) Zigzag Transect Procedures

The following procedures are used to conduct a zigzag transect.

##### (i) Step 1 – Select Main Stand

The main stand is usually made up of larger trees. There may be more than one general crown level. Beneath the main stand there is usually an understory of suppressed trees, advanced reproduction, or other plants. The client's principal concern should be with the main stand. (see Figure 636-1).

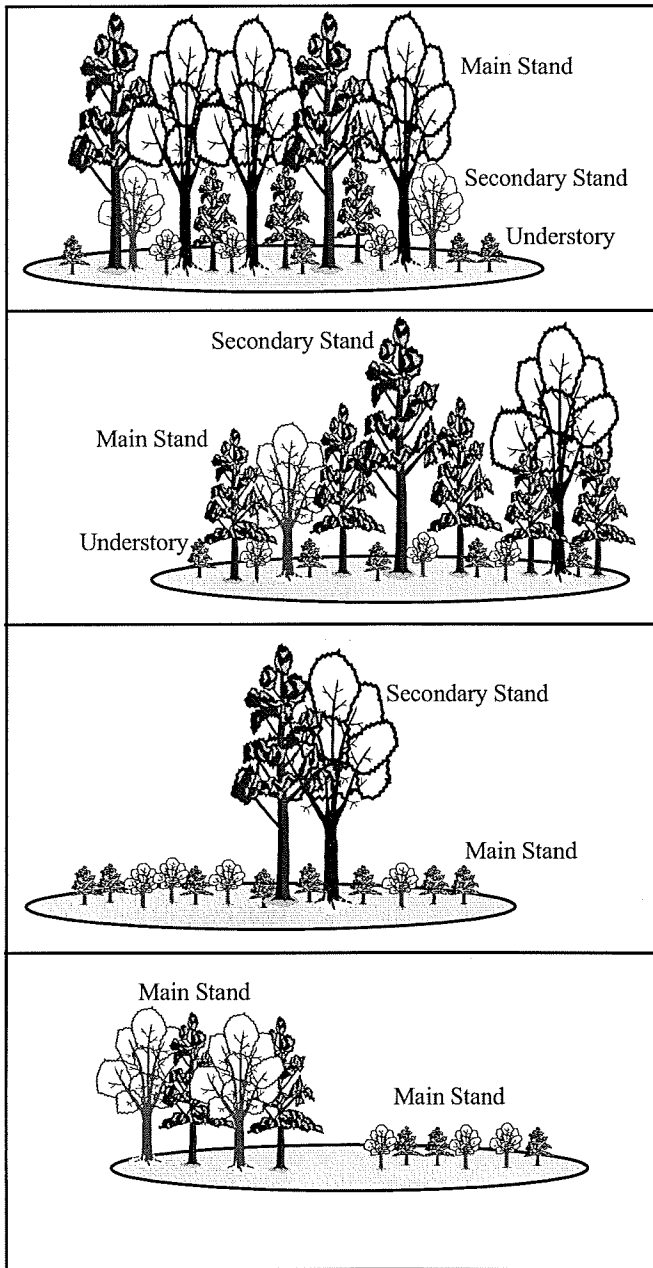
##### (ii) Step 2 – Choose a Route

Choose a route through the stand so you can sample a good cross section. Generally, this can best be accomplished by crossing the drainageways. On a sunny day you can use the sun as a direction marker by going toward it, away from it, or at some angle to or from it. A visible landmark can also be used as a direction marker.

##### (iii) Step 3 – Select a Starter Tree

The starter tree may be any tree that is a part of the main stand. No measurements are made of the starter tree. It serves only as a point of beginning.

Figure 636-1 Differentiating Stands



An occasional tree may be borderline between the main stand and the secondary stand. If, in your opinion, the tree offers significant competition to the tree in the main stand, consider it as part of the main stand.

Don't separate large trees as a secondary stand unless they are considerably larger and clearly of an earlier generation than the trees of the main stand.

If the larger trees are numerous, there may be a question as to which is the main stand. In case of doubt, consider the larger trees as the main stand.

A change in the main stand may show need for a field boundary

**(iv) Step 4 – Choose a Direction**

At the base of the starter tree, face the chosen direction, place your heels together and position your toes to make a 90-degree angle. A line along the direction of travel bisects the angle formed by your feet (see Figure 636-2). A 90-degree arc is printed on some information sticks to help define the angle. When a 25" stick is held horizontally 12" from the eye, the ends of the stick form a 90-degree angle. A compass may also be used.

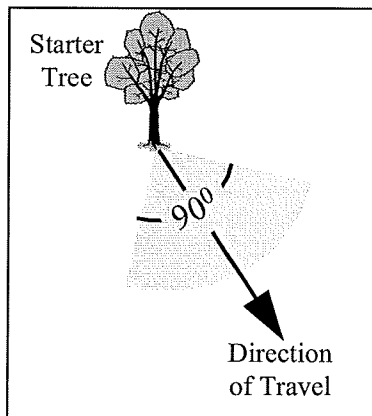
**(v) Step 5 – Locate Closest Tree**

Locate the closest main stand tree, the center of which is within the 90-degree angle. This is tree #1, as shown in Figure 636-3.

**(vi) Step 6 – Determine Distance, Species, and Diameter**

Pace or measure the distance from the center of the starter tree to the center of tree # 1. Determine the species of the tree identified in step 5 and measure its diameter at breast height (4.5 feet). Record measurements in the field notes (see Figure 636-5).

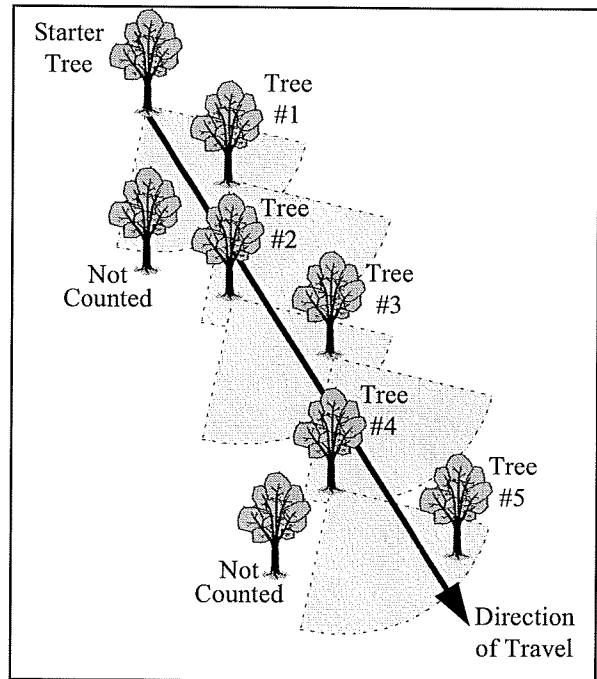
**Figure 636-2 Starter Tree**



**(vii) Step 7 – Rate Tree Condition**

Examine the tree and rate its condition as good, fair, or poor. A good tree is reasonably straight, has a sound and full crown, does not have excessive limbs, and does not have evidence of scars, wounds, or disease. A poor tree may have a broken top, a bad crotch, excessive limbs, canker, wounds, scars, disease, or a combination of defects. Use fair as an intermediate rating. Do not confuse species desirability with the condition rating. Rate each tree on its merits, without regard to species.

**Figure 636-3 Tree Selection Sequence**



Record the condition rating in the field notes as shown in Figure 636-5. Show in the "notes" the reason for rating a tree as fair or poor.

**(viii) Step 8 – Repeat Process**

Standing at tree # 1, repeat steps 5-7 to select, measure, and rate tree # 2. Continue in this manner until at least 20 trees have been examined. The line of travel will proceed in a zigzag fashion as shown in Figure 636-3.

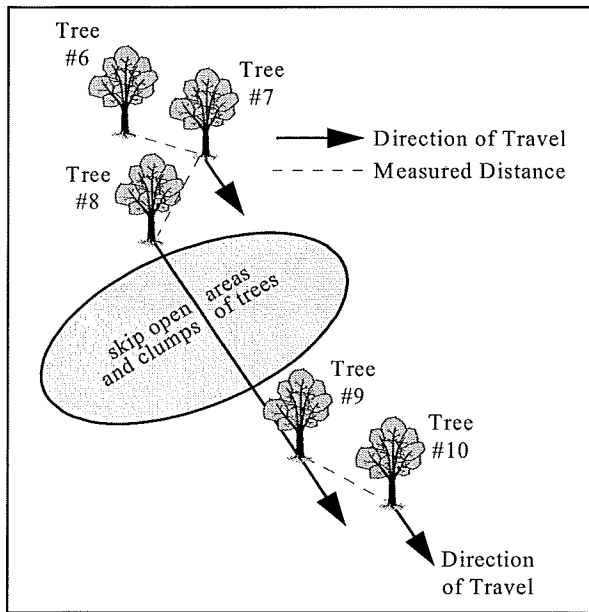
**(2) Zigzag Conventions**

The following conventions are observed when conducting a zigzag transect.

**(i) Clumps and Open Area**

Skip over openings and clumps or patches of trees that are not a part of the main stand or are decidedly different in kind or size from the main stand. Do not include spacing measurements or diameter measurements of trees on the edges of openings or clumps. Bypass those trees in the chosen direction of travel and start measurements on the opposite side (see Figure 636-4).

**Figure 636-4** Openings and Clumps



**(ii) Plantations**

In plantations, alternate the direction of travel. Use the direction of the row for the first tree; go at 90° to the row for the second; use the direction of the row for the third, and so on.

**(iii) Eligible Trees**

When two eligible trees are equidistant, select the one closest to the direction of travel. Trees joined at the base are considered separate and individual and both may be counted.

**(3) Zigzag Inventory Analysis**

**(i) Stand Diameter Calculation**

Average stand diameter is obtained by dividing the total of diameters by the number of trees sampled. For example: Average diameter =  $176 \div 20 = 8.8$  inches; round to 9 inches.

The range of diameters can be determined by noting the smallest and largest of the trees sampled. (In the example, 6 to 11 inches).

**Figure 636-5** Zigzag Transect Field Notes Example

Tree No.	Species	Distance (feet)	Diameter (inches)	Condition	Notes
1	loblolly pine	12	8	good	
2	loblolly pine	9	7	good	
3	loblolly pine	15	10	fair	scar at base
4	loblolly pine	16	11	good	
5	shortleaf pine	14	11	good	
6	shortleaf pine	5	9	good	
7	loblolly pine	13	8	poor	broken top
8	loblolly pine	14	8	good	
9	loblolly pine	9	9	good	
10	loblolly pine	14	6	good	
11	loblolly pine	9	7	fair	cronartium cankers
12	loblolly pine	10	7	good	
13	loblolly pine	11	9	good	
14	shortleaf pine	11	11	good	
15	loblolly pine	11	11	good	
16	loblolly pine	1	8	good	
17	loblolly pine	1	8	good	
18	loblolly pine	9	9	good	
19	loblolly pine	10	8	poor	cronartium cankers
20	shortleaf pine	15	11	good	
TOTALS		238	176		
AVERAGE		11.9	8.8		

**(ii) Average Tree Spacing Calculation**

Average tree spacing is found by dividing the total of distances by the number of trees sampled. For example: Spacing =  $238 \div 20 = 11.9$  feet; round to 12 feet.

**(iii) Trees Per Acre Calculation**

The number of trees per acre is calculated as follows:

$$\text{Number of trees per acre} = \frac{43560}{\text{spacing}^2}$$

For example:  $\frac{43560}{12^2} = 303$  trees/acre

**(iv) Thinning Determinations**

For planning purposes, the  $D + x$  “rule of thumb” is adequate to approximate the number of trees that need to be removed from a stand to avoid overcrowding. This rule of thumb is primarily applicable to even-aged stands. According to the  $D + x$  rule, the average spacing between trees should equal the average stand diameter (D) plus a constant (x), expressed in feet. The constant x varies, depending on location and tree type. In Southern States, a constant of 6 is most commonly used for southern pines. In Western States, the constant can range from 2 for West Coast Douglas fir, to 4 for ponderosa pine. For stands with average diameters less than 6 inches, constants of 4 in the East and 2 in the West are commonly used. You should consult your local forest specialist to determine the constants applicable to the trees in your locale.

The approximate number of trees to be removed in a  $D + x$  thinning is the difference between the number now present and the number that would be present after thinning. For example:

Assume that 6 is the applicable spacing constant for this stand of trees. From the zigzag transect, it is determined that the average tree diameter of the stand is 9 inches, and the average number of trees per acre is calculated to be 303. According to the  $D + x$  rule, the average trees per acre for 9 inch trees is calculated to be 194, as follows:

$$D + 6 = 15$$

$$43560/15^2 = 194$$

Therefore, approximately 109 trees per acre (303-194) need to be removed to provide adequate spacing.

See Exhibit 636-1 to determine the appropriated number of trees per acres at various  $D + x$  spacings and tree diameters.

**(v) Species Composition Analysis**

An approximation of species composition can be made from the zigzag transect. For example: four shortleaf pines were sampled out of 20 trees, indicating 20 percent shortleaf pine and 80 percent loblolly pine as stand composition.

**(vi) Stand Condition Analysis**

An approximation can be made of the percent of trees in poor condition in the same manner as used to get species composition. The percentage is not as important as making the landowner aware of the condition of the growing stock. The trees in poor condition can be slated for early removal to favor those in better condition.

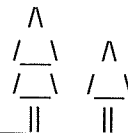
Transect information can reveal treatment needs and alternatives. Transects need not be taken in every field or at every change in forest condition. Each planning job is different. An experienced planner will need to take fewer transects than a less experienced planner.

**(b) Strip Sampling**

In strip sampling, the sample units are continuous strips of uniform width, spaced at a predetermined distance apart. The width of the strips and the distance between the centerline of the strips determines the percentage of the area sampled. See Figure 636-6 for an example of a typical 10 percent strip sampling layout.



# FOREST AND WOODLAND PLANNING WORKSHEET



Landowner:	Planner:	Date:
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Location:	Transect No:
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Stand Number:	Acres:	Species:	Site Index:
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**MAIN STAND - Transect Notes**

MAIN STAND - Transect Notes						Summary	
No.	Species	Distance	DIA.	Condition	Notes	Avg. spacing	
1						Avg. Diameter	
2						D+X Spacing	
3						Desired D+X	
4						(D) ? + (X) ? =	
5						No. Trees/ac.	
6						Desired Number	
7						Trees per ac.	
8						Excess Trees/ac	
9						Needed Trees/ac	
10						Dia. Range	
11						Species	Percent
12							
13							
14							
15							
16							
17						Quality	Percent
18						Good	
19						Fair	
20						Poor	

ft.  
in.  
ft.  
in.  
%  
%  
%  
%  
%  
%  
%  
%  
%  
%

Total	Average	TYPE OR STAND (check one)	MS	Species	Avg. Age
-------	---------	------------------------------	----	---------	----------

Salable or usable products:		-MS	MS	
			MS	
			ss	
			ss	
			ss	

Other values & considerations:		- ss	us	
			us	
			us	

Treatment discussed with owner:		- ss	ss	
			ss	
			MS	
			MS	
			MS	
			us	
			us	
			us	

Soil & ESD Suitability Group Name		- ss	ss	
			ss	
			MS	
			MS	
			MS	

Site Index Measurements							MS = main stand; ss = secondary stand; us = understory
Tree Species	Diameter	Ring Count	Adj. Age	Total Age	Height	SI	
						BasalArea	
						Canopy Cover	
						Densiometer	

%

**FOREST - WOODLAND USE ALTERNATIVES**

- WOOD CROPS \_\_\_\_\_
- RECREATION \_\_\_\_\_
- WILDLIFE \_\_\_\_\_
- GRAZING \_\_\_\_\_
- AESTHETICS \_\_\_\_\_
- WILDERNESS \_\_\_\_\_

**FOREST - WOODLAND TREATMENT ALTERNATIVES**

- ACCESS ROADS \_\_\_\_\_
- SKID TRAILS \_\_\_\_\_
- FIREBREAKS \_\_\_\_\_
- SITE PREPARATION \_\_\_\_\_
- SEEDING \_\_\_\_\_
- TREE PLANTING \_\_\_\_\_
- THINNING \_\_\_\_\_
- WEEDING \_\_\_\_\_
- PRUNING \_\_\_\_\_
- INTERMEDIATE CUTTING \_\_\_\_\_
- HARVEST CUTTING \_\_\_\_\_
- BRUSH CONTROL \_\_\_\_\_
- SALVAGE \_\_\_\_\_
- CHRISTMAS TREE MGT. \_\_\_\_\_
- PROPER GRAZING USE \_\_\_\_\_
- EROSION CONTROL MEASURES \_\_\_\_\_
- STREAMSIDE MANAGEMENT \_\_\_\_\_

**PROTECTION**

- CRITICAL AREAS \_\_\_\_\_
- INSECTS \_\_\_\_\_
- DISEASE \_\_\_\_\_
- FIRE \_\_\_\_\_

**MARKETS**

- MAJOR PRODUCTS \_\_\_\_\_
- MINOR PRODUCTS \_\_\_\_\_
- LOCATION \_\_\_\_\_

**ORDINANCES AND REGULATIONS**

CALIFORNIA FOREST PRACTICE ACT - TIMBER HARVEST PLAN  
CALIFORNIA DEPT. OF FISH AND GAME

**SOILS INFORMATION FOR AREA**

SOIL NAME

SOIL SYMBOL

_____	_____
_____	_____
_____	_____
_____	_____