STREAM INVENTORY REPORT

Bear Creek

INTRODUCTION

A stream inventory was conducted during the summer of 1995 on Bear Creek and one of its unnamed tributaries. The inventory was conducted in two parts: habitat inventory and biological inventory. The objective of the habitat inventory was to document the habitat available to anadromous salmonids in Bear Creek. The objective of the biological inventory was to document the presence and distribution of juvenile salmonid species. There is no known record of adult spawning surveys having been conducted on Bear Creek.

The objective of this report is to document the current habitat conditions, and recommend options for the potential enhancement of habitat for chinook salmon, coho salmon and steelhead trout. Recommendations for habitat improvement activities are based upon target habitat values suitable for salmonids in California's north coast streams.

WATERSHED OVERVIEW

Bear Creek is tributary to Usal Creek, tributary to the Pacific Ocean, located in Mendocino County, California (Figure 1). Bear Creek's legal description at the confluence with Usal Creek is T23N R18W. Its location is 39°51′47″ north latitude and 123°50′32″ west longitude. Bear Creek is a first order stream and has approximately 1.7 miles of blue line stream according to the USGS Hales Grove and Piercy 7.5 minute quadrangles. Bear Creek drains a watershed of approximately 2.0 square miles. Summer base runoff is approximately 0.4 cubic feet per second (cfs) at the mouth. Elevations range from about 100 feet at the mouth of the creek to 1200 feet in the headwater areas. Redwood and Douglas fir forest dominates the watershed. The watershed is privately owned and is managed for timber production. Foot access is available from a private road by crossing Usal Creek to the mouth of Bear Creek.

METHODS

The habitat inventory conducted in Bear Creek follows the methodology presented in the *California Salmonid Stream Habitat Restoration Manual* (Flosi and Reynolds, 1991 rev. 1994). The California Conservation Corps (CCC) Technical Advisors and Watershed Stewards Project/AmeriCorps (WSP/AmeriCorps) members that conducted the inventory were trained in standardized habitat inventory methods by the California Department of Fish and Game (DFG). Bear Creek personnel were trained in May, 1995, by Gary Flosi. This inventory was conducted by a two-person team.

Bear Creek

<u>SAMPLING STRATEGY</u>

The inventory uses a method that samples approximately 10% of the habitat units within the survey reach (Hopelain, 1994). All habitat units included in the survey are classified according to habitat type and their lengths are measured. All pool units are measured for maximum depth. Habitat unit types encountered for the first time are further measured for all the parameters and characteristics on the field form. Additionally, from the ten habitat units on each field form page, one is randomly selected for complete measurement.

<u>HABITAT INVENTORY COMPONENTS</u>

A standardized habitat inventory form has been developed for use in California stream surveys and can be found in the *California Salmonid Stream Habitat Restoration Manual*. This form was used in Bear Creek to record measurements and observations. There are nine components to the inventory form.

1. Flow:

Flow is measured in cubic feet per second (cfs) at the bottom of the stream survey reach using standard flow measuring equipment, if available. In some cases flows are estimated.

2. Channel Type:

Channel typing is conducted according to the classification system developed and revised by David Rosgen (1985 rev. 1994). This methodology is described in the *California Salmonid Stream Habitat Restoration Manual*. Channel typing is conducted simultaneously with habitat typing and follows a standard form to record measurements and observations. There are five measured parameters used to determine channel type: 1) water slope gradient, 2) entrenchment, 3) width/depth ratio, 4) substrate composition, and 5) sinuosity.

3. Temperatures:

Both water and air temperatures are measured and recorded at every tenth habitat unit. The time of the measurement is also recorded. Both temperatures are taken in degrees Fahrenheit at the middle of the habitat unit and within one foot of the water surface.

4. Habitat Type:

Habitat typing uses the 24 habitat classification types defined by McCain and others (1988). Habitat units are numbered sequentially and assigned a type identification number selected from a standard list of 24 habitat types. Dewatered units are labeled "dry". Bear Creek habitat typing used standard basin level measurement criteria. These parameters require that the minimum length of a described habitat unit must be equal to or greater than the stream's mean wetted width. Channel dimensions were measured using hip chains, range finders, tape measures, and stadia rods. All units were measured for mean length; additionally, the first occurrence of each unit type and a randomly selected 10% subset of all units were sampled for all features on the

2

Bear Creek

sampling form (*Sampling Levels for Fish Habitat Inventory*, Hopelain, 1995). Pool tail crest depth at each pool unit was measured in the thalweg. All measurements were in feet to the nearest tenth.

5. Embeddedness:

The depth of embeddedness of the cobbles in pool tail-out reaches is measured by the percent of the cobble that is surrounded or buried by fine sediment. In Bear Creek, embeddedness was ocularly estimated. The values were recorded using the following ranges: 0 - 25% (value 1), 26 - 50% (value 2), 51 - 75% (value 3), 76 - 100% (value 4). Additionally, a rating of "not suitable" (NS) was assigned to tail-outs deemed unsuited for spawning due to inappropriate substrate particle size, having a bedrock tail-out, or other considerations.

6. Shelter Rating:

Instream shelter is composed of those elements within a stream channel that provide salmonids protection from predation, reduce water velocities so fish can rest and conserve energy, and allow separation of territorial units to reduce density related competition. The shelter rating is calculated for each fully-described habitat unit by multiplying shelter value and percent cover. Using an overhead view, a quantitative estimate of the percentage of the habitat unit covered is made. All cover is then classified according to a list of nine cover types. In Bear Creek, a standard qualitative shelter value of 0 (none), 1 (low), 2 (medium), or 3 (high) was assigned according to the complexity of the cover. Thus, shelter ratings can range from 0-300 and are expressed as mean values by habitat types within a stream.

7. Substrate Composition:

Substrate composition ranges from silt/clay sized particles to boulders and bedrock elements. In all fully-described habitat units, dominant and sub-dominant substrate elements were ocularly estimated using a list of seven size classes and recorded as a one and two respectively.

8. Canopy:

Stream canopy density was estimated using modified handheld spherical densiometers as described in the *California Salmonid Stream Habitat Restoration Manual*, 1994. Canopy density relates to the amount of stream shaded from the sun. In Bear Creek, an estimate of the percentage of the habitat unit covered by canopy was made from the center of approximately every third unit in addition to every fully-described unit, giving an approximate 30% sub-sample. In addition, the area of canopy was estimated ocularly into percentages of coniferous or deciduous trees.

9. Bank Composition and Vegetation:

Bank composition elements range from bedrock to bare soil. However, the stream banks are usually covered with grass, brush, or trees. These factors influence the ability of stream banks to withstand winter flows. In Bear Creek, the dominant composition type (options 1-4) and the dominant vegetation type (options 5-9) of both the right and left banks for each fully-described

Bear Creek

unit were selected from the habitat inventory form. Additionally, the percent of each bank covered by vegetation was estimated and recorded.

BIOLOGICAL INVENTORY

Biological sampling during stream inventory is used to determine fish species and their distribution in the stream. In Bear Creek fish presence was observed from the stream banks, and one site was electrofished using one Smith-Root Model 12 electrofisher. These sampling techniques are discussed in the *California Salmonid Stream Habitat Restoration Manual*.

DATA ANALYSIS

Data from the habitat inventory form are entered into Habitat, a dBASE 4.2 data entry program developed by Tim Curtis, Inland Fisheries Division, California Department of Fish and Game. This program processes and summarizes the data, and produces the following six tables:

- Riffle, flatwater, and pool habitat types
- Habitat types and measured parameters
- Pool types
- Maximum pool depths by habitat types
- Dominant substrates by habitat types
- Mean percent shelter by habitat types

Graphics are produced from the tables using Lotus 1,2,3. Graphics developed for Bear Creek include:

- Riffle, flatwater, pool habitats by percent occurrence
- Riffle, flatwater, pool habitats by total length
- Total habitat types by percent occurrence
- Pool types by percent occurrence
- Total pools by maximum depths
- Embeddedness
- Pool cover by cover type
- Dominant substrate in low gradient riffles
- Percent canopy
- Bank composition by composition type
- Bank vegetation by vegetation type

HABITAT INVENTORY RESULTS

The following results and discussion are for mainstem Bear Creek. Results and discussion for Unnamed Bear Creek Tributary are given as a subsection following the main body of this report.

Bear Creek

The habitat inventory of July 19 through August 9, 1995, was conducted by Kyle Young (WSP/AmeriCorps) and Craig Mesman (CCC). The total length of the stream surveyed was 10,557 feet with an additional 582 feet of side channel.

Flow was measured at the bottom of the survey reach with a Marsh-McBirney Model 2000 flowmeter at 0.38 cfs on August 3, 1995.

Bear Creek is an F4 channel type for the entire 10,557 feet of stream reach surveyed. F4 channels are entrenched, meandering, riffle/pool channels on low gradients with high width/depth ratios and gravel-dominant substrates.

Water temperatures ranged from 56 to 60 degrees Fahrenheit. Air temperatures ranged from 58 to 74 degrees Fahrenheit.

Table 1 summarizes the Level II riffle, flatwater, and pool habitat types. Based on frequency of **occurrence** there were 39% pool units, 32% riffle units, and 28% flatwater units (Graph 1). Based on total **length** of Level II habitat types there were 37% flatwater units, 32% pool units, and 30% riffle units (Graph 2).

Seventeen Level IV habitat types were identified (Table 2). The most frequent habitat types by percent **occurrence** were low-gradient riffles, 28%; mid-channel pools, 24%; and runs, 14% (Graph 3). Based on percent total **length**, low-gradient riffles made up 26%, step runs 24%, and mid-channel pools 20%.

A total of 177 pools were identified (Table 3). Main channel pools were most frequently encountered at 69% and comprised 72% of the total length of all pools (Graph 4).

Table 4 is a summary of maximum pool depths by pool habitat types. Depth is an indicator of pool quality. Thirty-nine of the 177 pools (22%) had a depth of two feet or greater (Graph 5).

The depth of cobble embeddedness was estimated at pool tail-outs. Of the 147 pool tail-outs measured, 27 had a value of 1 (18%); 63 had a value of 2 (43%); 55 had a value of 3 (37%); and 2 had a value of 4 (1%) (Graph 6). On this scale, a value of 1 indicates the highest quality of spawning substrate.

A shelter rating was calculated for each habitat unit and expressed as a mean value for each habitat type within the survey using a scale of 0-300. Pool habitat types had a mean shelter rating of 51, and riffle habitats had a mean shelter rating of 26 (Table 1). Of the pool types, the main channel pools had the highest mean shelter rating at 58. Scour pools had a mean shelter rating of 45 (Table 3).

Table 5 summarizes mean percent cover by habitat type. Boulders are the dominant cover type in Bear Creek. Graph 7 describes the pool cover in Bear Creek.

Table 6 summarizes the dominant substrate by habitat type. Gravel was the dominant substrate observed in 9 of the 12 low-gradient riffles measured (75%). Large cobble was the next most frequently observed dominant substrate type and occurred in 17% of the low gradient riffles

5

Bear Creek

(Graph 8).

The mean percent canopy density for the stream reach surveyed was 99%. The mean percentages of deciduous and coniferous trees were 63% and 37%, respectively. Graph 9 describes the canopy in Bear Creek.

For the stream reach surveyed, the mean percent right bank vegetated was 64%. The mean percent left bank vegetated was 67%. The dominant elements composing the structure of the stream banks consisted of 10% bedrock, 21% boulder, 68% cobble/gravel, and 2% sand/silt/clay (Graph 10). Deciduous trees were the dominant vegetation type observed in 64% of the units surveyed. Additionally, 24% of the units surveyed had coniferous trees as the dominant vegetation, including down trees, logs, and root wads (Graph 11).

BIOLOGICAL INVENTORY RESULTS

One site was electrofished on August 17, 1995, in Bear Creek. The site was sampled by Craig Mesman (CCC) and Kyle Young (WSP/AmeriCorps).

The site sampled included habitat units 21-30, a series of pools, runs, and riffles approximately 559 feet from the confluence with Usal Creek. This site had a length of 80 feet. The site yielded eighteen 0+ steelhead, twelve 1+ steelhead, and one Pacific giant salamander.

DISCUSSION

Bear Creek is an F4 channel type for the entire 10,557 feet of stream surveyed. The suitability of F4 channel types for fish habitat improvement structures is as follows: good for bank-placed boulders; fair for low-stage weirs, single and opposing wing deflectors, channel constrictors, and log cover; and poor for medium-stage weirs.

The water temperatures recorded on the survey days July 19 through August 9, 1995, ranged from 56 to 60 degrees Fahrenheit. Air temperatures ranged from 58 to 74 degrees Fahrenheit. This is a fair water temperature range for salmonids. To make any further conclusions, temperatures would need to be monitored throughout the warm summer months, and more extensive biological sampling would need to be conducted.

Flatwater habitat types comprised 37% of the total **length** of this survey, riffles 30%, and pools 32%. The pools are relatively shallow, with only 39 of the 177 (22%) pools having a maximum depth greater than 2 feet. In general, pool enhancement projects are considered when primary pools comprise less than 40% of the length of total stream habitat. In first and second order streams, a primary pool is defined to have a maximum depth of at least two feet, occupy at least half the width of the low flow channel, and be as long as the low flow channel width. Installing structures that will increase or deepen pool habitat is recommended for locations where their installation will not conflict with the modification of the numerous log debris accumulations (LDA's) in the stream. The LDA's in the system are retaining needed gravel. Any necessary modifications to them should be done with the intent of metering the gravel out to downstream

6

Bear Creek

reaches that will trap the gravel for future spawning use.

Fifty-seven of the 147 pool tail-outs measured had embeddedness ratings of 3 or 4. Only 27 had a 1 rating. Cobble embeddedness measured to be 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. In Bear Creek, sediment sources should be mapped and rated according to their potential sediment yields, and control measures should be taken.

The mean shelter rating for pools was moderate with a rating of 51. The shelter rating in the flatwater habitats was much lower at 9. A pool shelter rating of approximately 100 is desirable. The relatively modest amount of cover that now exists is being provided primarily by boulders in all habitat types. Additionally, large woody debris contributes a small amount. Log and root wad cover structures in the pool and flatwater habitats are needed to improve both summer and winter salmonid habitat. Log cover structure provides rearing fry with protection from predation, rest from water velocity, and also divides territorial units to reduce density related competition.

Nine of the 12 low gradient riffles measured had gravel or small cobble as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy density for the stream was 99%. This is a high percentage of canopy. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was moderate at 64% and 67%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

1)   Bear Creek should be managed as an anadromous, natural production stream.

2)   Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

3)   Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from boulders. Adding high quality complexity with woody cover is desirable and in some areas the material is locally available.

4)   Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

5)   The limited water temperature data available suggest that maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and

Bear Creek

meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

6)   There are several log debris accumulations present on Bear Creek that are retaining large quantities of fine sediment. The modification of these debris accumulations is desirable, but must be done carefully, over time, to avoid excessive sediment loading in downstream reaches.

PROBLEM SITES AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

Position (ft):	Comments:
0'	Begin survey at confluence with Usal Creek. Channel type is F4.
247'	LDA 8' high x 50' wide x 10' long retaining gravel 8' deep at base. Passable via side channel at high flows.
585'	Five foot diameter embedded log spans channel.
665'	LDA 6' high x 30' wide x 8' long retaining gravel 5' deep at base. Possible barrier.
1881'	LDA 10' high x 80' wide x 30' long retaining gravel 10' deep at base. Possible barrier.
2126'	LDA 8' high x 30' wide x 10' long retaining gravel 7' deep at base. Not a barrier (NB).
2187'	Dry left bank tributary.
3619'	Left bank seep.
4584'	LDA 5' high x 20' wide x 10' long retaining gravel 5' deep at base.
4766'	Small LDA retaining gravel 1' deep at base. NB.
4921'	Left bank erosion.
5729'	Dry left bank tributary.
5856'	LDA 3' high x 25' wide x 15' long retaining gravel 3' deep at base. NB.
6791'	LDA 8' high x 40' wide x 30' long retaining gravel 8' deep at base. Possible

Bear Creek

	barrier.
7234'	Dry right bank tributary.
7411'	LDA 10' high x 50' wide x 50' long retaining gravel 8' deep at base. Possible barrier.
7642'	Left bank landslide 50' high x 113' long.
7981'	Dry left bank tributary.
8674'	LDA 10' high x 40' wide x 30' long retaining gravel 8' deep at base. Possible barrier.
8760'	LDA 6' high x 25' wide x 20' long. Not a barrier and no gravel retained (NBNG).
8898'	Right bank tributary. Estimated flow <0.1 cfs. Not accessible to fish.
9275'	LDA 8' high x 40' wide x 25' long retaining gravel 6' deep at base. NB.
9518'	Unnamed Bear Creek tributary enters right bank (see subsection).
9568'	LDA 5' high x 15' wide x 15' long retaining gravel 5' deep at base. Possible barrier.
9742'	LDA 8' high x 50' wide x 20' long retaining gravel 8' deep at base. Probable barrier.
10093'	LDA 10' high x 40' wide x 20' long.
10415'	Right bank tributary. Estimated flow 1 gallon per minute.
10557'	LDA 10' high x 30' wide x 20' long. End of survey due to increasing gradient.

REFERENCES

Flosi, G., and F. Reynolds. 1994. California salmonid stream habitat restoration manual, 2nd edition. California Department of Fish and Game, Sacramento, California.

Hopelain, J. 1995. Sampling levels for fish habitat inventory, unpublished manuscript. California Department of Fish and Game, Inland Fisheries Division, Sacramento, California.

Bear Creek

STREAM INVENTORY REPORT

Unnamed Tributary to Bear Creek

WATERSHED OVERVIEW

The unnamed tributary is a tributary to Bear Creek, a tributary to Usal Creek, located in Mendocino County, California (Figure 1). The unnamed tributary's legal description at the confluence with Bear Creek is T24N R18W. Its location is 39°53′04″ north latitude and 123°49′58″ west longitude. The unnamed tributary is an intermittent stream according to the USGS Piercy 7.5 minute quadrangle. The unnamed tributary drains a watershed of approximately 0.5 square miles. Elevations range from about 420 feet at the mouth of the creek to 1600 feet in the headwater areas. Redwood and Douglas fir forest dominates the watershed. The watershed is privately owned and is managed for timber production. Foot access is available via an abandoned haul road.

HABITAT INVENTORY RESULTS AND DISCUSSION

The habitat inventory of August 15, 1995, was conducted by Craig Mesman (CCC) and Heidi Hickethier (WSP/AmeriCorps). The total length of the stream surveyed was 1,876 feet.

Flows were not measured on the unnamed tributary.

The unnamed tributary is a B3 channel type for the entire 1,876 feet of stream surveyed. The suitability of B3 channel types for fish habitat improvement structures is as follows: excellent for low-stage plunge weirs, boulder clusters, bank-placed boulders, single and opposing wing deflectors, and log cover; and good for medium-stage plunge weirs.

The water temperatures recorded on the survey day August 15, 1995, ranged from 60 to 61 degrees Fahrenheit. Air temperatures ranged from 68 to 76 degrees Fahrenheit. This is a fair water temperature range for salmonids, but water temperature data for the warm summer months are lacking. For a more complete and accurate water temperature profile, 24-hour temperatures would need to be monitored throughout the warm summer months.

Based on the total **length** of this survey, Level II habitat units consisted of 47% flatwater units, 29% pool units, and 21% riffle units. The pools are relatively shallow, with only 3 of the 40 pools (8%) having a maximum depth greater than 2 feet.

Twelve of the 26 pool tail-outs measured had embeddedness ratings of 3 or 4. Only 3 had a 1 rating. Cobble embeddedness of 25% or less, a rating of 1, is considered to indicate good quality spawning substrate for salmon and steelhead. In the unnamed tributary, sediment sources should be mapped and rated according to their potential sediment yields, and control measures should be taken.

Bear Creek

The mean shelter rating for pools was low with a rating of 27. The shelter rating in the flatwater habitats was 18. A pool shelter rating of approximately 100 is desirable. Log and root wad cover structures in the pool and flatwater habitats are needed to improve both summer and winter salmonid habitat.

The three low-gradient riffles measured had gravel as the dominant substrate. This is generally considered good for spawning salmonids.

The mean percent canopy density for the stream was 99%. This is a high percentage of canopy. In general, revegetation projects are considered when canopy density is less than 80%.

The percentage of right and left bank covered with vegetation was moderate at 61% and 64%, respectively. In areas of stream bank erosion or where bank vegetation is not at acceptable levels, planting endemic species of coniferous and deciduous trees, in conjunction with bank stabilization, is recommended.

RECOMMENDATIONS

1)   The unnamed tributary should be managed as an anadromous, natural production stream.

2)   The limited water temperatures available suggest that the maximum temperatures are within the acceptable range for juvenile salmonids. To establish more complete and meaningful temperature regime information, 24-hour monitoring during the July and August temperature extreme period should be performed for 3 to 5 years.

3)   Where feasible, design and engineer pool enhancement structures to increase the number of pools. This must be done where the banks are stable or in conjunction with stream bank armor to prevent erosion.

4)   Increase woody cover in the pools and flatwater habitat units. Most of the existing cover is from boulders. Adding high quality complexity with woody cover is desirable and in some areas the material is at hand.

5)   Active and potential sediment sources related to the road system need to be identified, mapped, and treated according to their potential for sediment yield to the stream and its tributaries.

PROBLEM SITES AND LANDMARKS

The following landmarks and possible problem sites were noted. All distances are approximate and taken from the beginning of the survey reach.

Bear Creek

Position (ft):	Comments:
0'	Begin survey at confluence with Bear Creek. Channel type is B3.
520'	Right bank tributary. Estimated flow <0.1 cfs. First 60' are accessible to fish.
597'	Five foot high plunge over debris obstruction retaining gravel. Possible barrier.
827'	LDA 5' high retaining gravel. Not a barrier.
1203'	LDA 4' high retaining gravel.
1882'	End of survey due to increasing gradient and diminished habitat.

LEVEL III and LEVEL IV HABITAT TYPE KEY

HABITAT TYPE	LETTER	NUMBER
RIFFLE		
Low Gradient Riffle	[LGR]	1.1
High Gradient Riffle	[HGR]	1.2
CASCADE		
Cascade	[CAS]	2.1
Bedrock Sheet	[BRS]	2.2
FLATWATER		
Pocket Water	[POW]	3.1
Glide	[GLD]	3.2
Run	[RUN]	3.3
Step Run	[SRN]	3.4
Edgewater	[EDW]	3.5
MAIN CHANNEL POOLS		
Trench Pool	[TRP]	4.1
Mid-Channel Pool	[MCP]	4.2
Channel Confluence Pool	[CCP]	4.3
Step Pool	[STP]	4.4
SCOUR POOLS		
Corner Pool	[CRP]	5.1
Lateral Scour Pool - Log Enhanced	[LSL]	5.2
Lateral Scour Pool - Root Wad Enhanced	[LSR]	5.3
Lateral Scour Pool - Bedrock Formed	[LSBk]	5.4
Lateral Scour Pool - Boulder Formed	[LSBo]	5.5
Plunge Pool	[PLP]	5.6
BACKWATER POOLS		
Secondary Channel Pool	[SCP]	6.1
Backwater Pool - Boulder Formed	[BPB]	6.2
Backwater Pool - Root Wad Formed	[BPR]	6.3
Backwater Pool - Log Formed	[BPL]	6.4
Dammed Pool	[DPL]	6.5

Bear Creek

End habitat survey (LOA (?537'))

End habitat survey (1872')

Right bank trib (1010')

Mouth of unnamed trib (751?')

Chimney Rock

Dugans Opening

Begin 1995 habitat survey at confluence with Bear Crk (0')

Begin 1995 habitat survey at confluence with Usal Creek (0')

BEAR CRK & UNNAMED TRB
USGS quad: Hales Grove (1970)
Scale 1:24000

GP

0 ————————— 4000'