FOREST BIOMASS TRANSPORT – CHALLENGES, INNOVATIONS, LESSONS LEARNED

Pacific West Biomass Conference

San Francisco, California

January 17, 2012

Presentation Overview

- Introduction
- Background Info
- Project Objectives
- Project Location
- Technologies Selected
- Findings
- Observations
- Acknowledgements

Project Sponsor

Sierra Institute
for Community and Environment

Regional Challenges

- Risk of catastrophic wildfire is extreme.
  - Average acres burned annually in California – 913,000
  - Average cost to suppress fires in California - $1.2 B
- Sawlog values are relatively low.
  - Forest managers need to extract additional value from ancillary products removed including biomass.
- Forest road systems designed to accommodate log trucks.
  - Log trucks have articulated trailers that allow access on road systems with tight radius turns and steep grades.

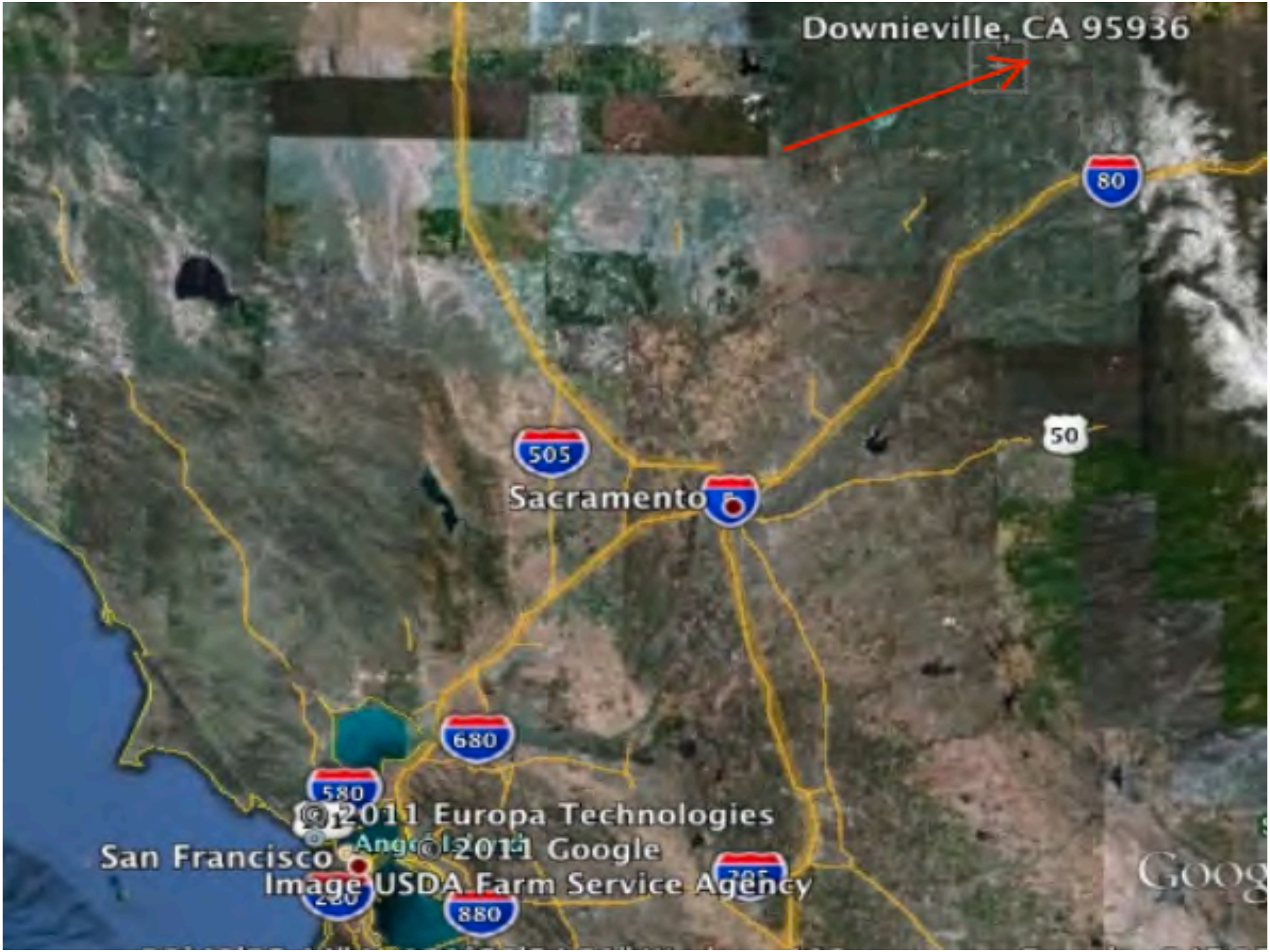
California Landscapes at Risk

Project Objectives

- Seek out innovative biomass transport technologies capable of navigating challenging road systems.
- Design, coordinate and implement a field trial to test selected transport technologies.
- Monitor trials and report results.

Project Location

- Cap Plantation Thin on the Yuba River Ranger District, Tahoe National Forest.
- Project is a 82 acre stewardship service contract to thin ponderosa pine stands.
- Biomass removal was required. Original plan was to use off road dump truck to move biomass to storage site.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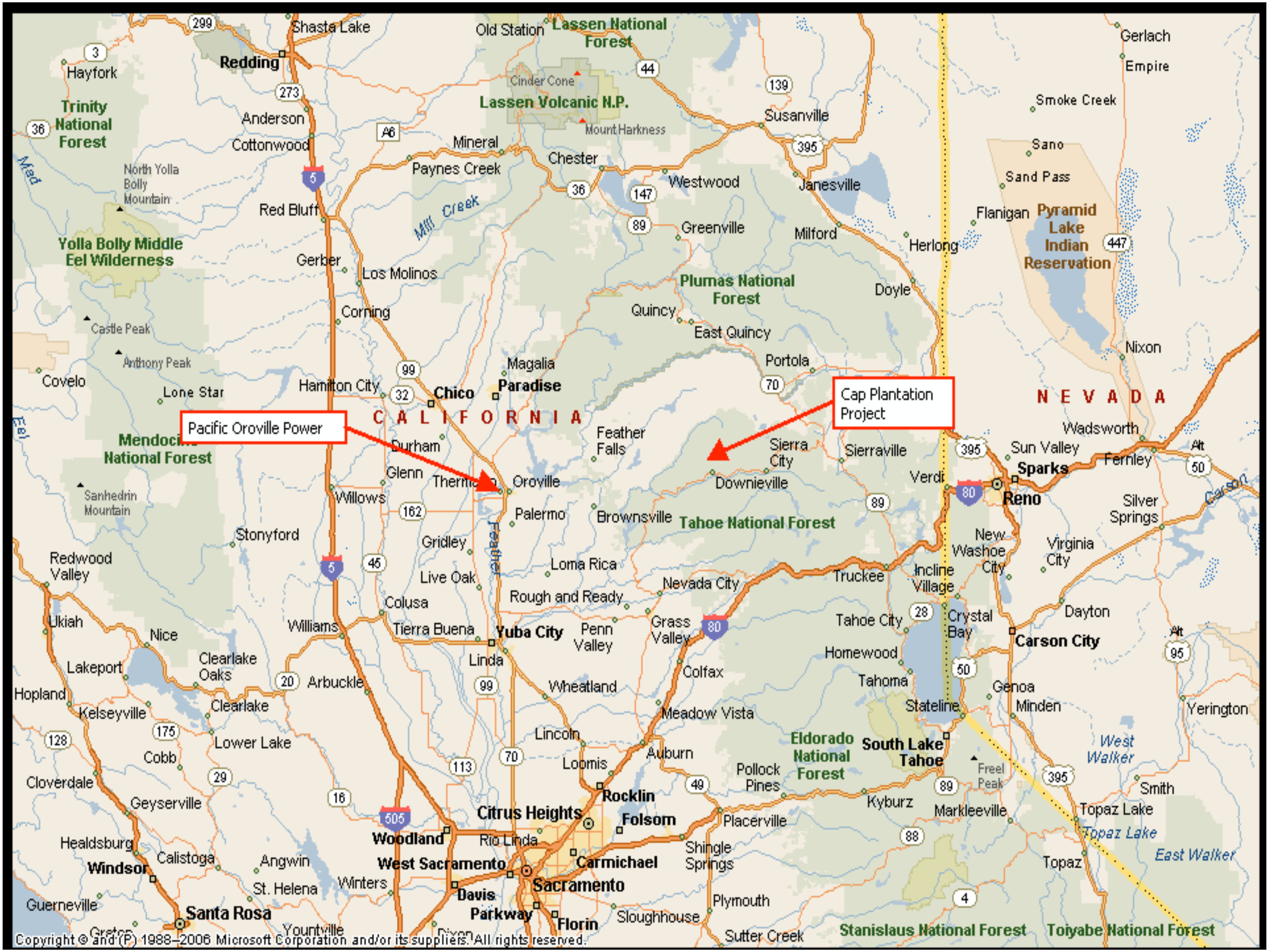
Pacific Oroville Power
Cap Plantation Project
C A L I F O R N I A
N E V A D A
Redding
Shasta Lake
Old Station
Lassen National Forest
Lassen Volcanic N.P.
Cinder Cone
Mount Harkness
Hayfork
Trinity National Forest
Anderson
Cottonwood
Mineral
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Susanville
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Janesville
Greenville
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Herlong
Red Bluff
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Empire
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Sano
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Flanigan
Pyramid Lake Indian Reservation
Nixon
Wadsworth
Sun Valley
Sparks
Fernley
Reno
Silver Springs
New Washoe City
Virginia City
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Project Logistics

- Project conducted Sept 19 – 22, 2011.
- All biomass fuel transported transported 100 miles (one way) to Pacific Oroville Power.
- Total of 100.15 GT of fuel delivered.
- Nobody hurt.

Technologies Selected

TRANSPORT SYSTEM TECHNOLOGY	TOTAL LENGTH	VAN LENGTH	WIDTH	HT	CUBIC CAPACITY CUBIC UNITS	WEIGHT CAPACITY TONS GROSS	NET
Stinger Steer	**56.7'**	**40'**	**8'**	**13.4'**	**21**	**40**	**21**
Short Trailer	**49'**	**32'**	**8.5"**	**13.5'**	**19**	**40**	**26**
Conventional Trailer (Drop bed trailer)	64'	45'	8.5'	13.5'	27	40	25
Conventional Trailer (Straight bed trailer)	59'	40'	8.5'	13.5'	21	40	25


FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE


Peterson
4310


CRUSH HAZARD

Findings – Fuel Deliveries

TRANSPORT SYSTEM	DELIVERY DATE	GROSS WEIGHT (GREEN TONS)	TARE WEIGHT (GREEN TONS)	NET WEIGHT (GREEN TONS)	NET WEIGHT (BDT)
Stinger steer	Sept 19	38.14	19.25	18.90	9.37
Stinger steer	Sept 20	33.03	19.24	13.79	7.51
Stinger steer	Sept 21	35.51	19.26	16.25	6.25
Stinger steer	Sept 22	42.65	19.64	23.01	13.11
Averages for Stinger Steer		**37.33**	**19.35**	**17.99**	**9.06**
Short Trailer	**Sept 21**	**41.97**	**13.76**	**28.21**	**10.86**

Findings – Fuel Deliveries

TRANSPORT SYSTEM	COST PER HOUR	COST PER GT	COST PER BDT	COMMENTS
Stinger steer	$90	$30.02	$59.60	$2.70/mile. Six hour round trip. Economics improve without live floor trailer due to improved carry capacity.
Short Trailer	$85	$19.14	$49.72	$2.55/mile. Six hour round trip. Due to State of CA DOT regs, legal loads are limited to 73,000 gross weight. Short trailers are hard to find.

Findings – All Material Removed

MATERIAL REMOVED AND DESTINATION	VOLUME REMOVED	TRUCK LOADS	AVERAGE VOLUME PER LOAD	COMMENTS
Sawlogs to SPI Lincoln	522 MBF	157	3.3 MBF	All ponderosa pine sawlogs. Total volume by weight = 4,386 GT.
Firewood logs to Cal Hotwood	610 GT	25	24.4 GT	Primarily small logs made up of tops and cull logs.
Firewood logs to Bamford	342 GT	14		Very small logs (known as baseball bats). No weigh scale at Bamford yard. Used 24.4 GT/load average (from Cal Hotwood deliveries).
Biomass fuel to Pacific Oroville Power	1,313 GT (697 BDT)	52	25.2 GT (13.4 BDT)	Tops, limbs and defective boles that would not make sawlogs or firewood. Averaged 47% moisture content.
				Average biomass fuel volume per acre removed =

Findings

- Both transport systems performed well.
- Short trailer system is more cost effective.
- Stinger steer trailer is more versatile due to articulated stinger.
- Net revenue generated from biomass recovery helped overall project economics.
- Biomass recovery factor of 1.34 BDT/ MBF.

Recommendations

- Important to have trained and experienced drivers.
- Stinger steer trailer should be engineered to carry 26 GT net which would improve haul costs significantly due to increased payload.
- Trailers need to have on board weigh scales to assure full capacity, yet legal loads.

Acknowledgements

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- Sierra Institute for Community and Environment.

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