



# *Project Planning for Biomass Utilization*

## **A Forester's Perspective**

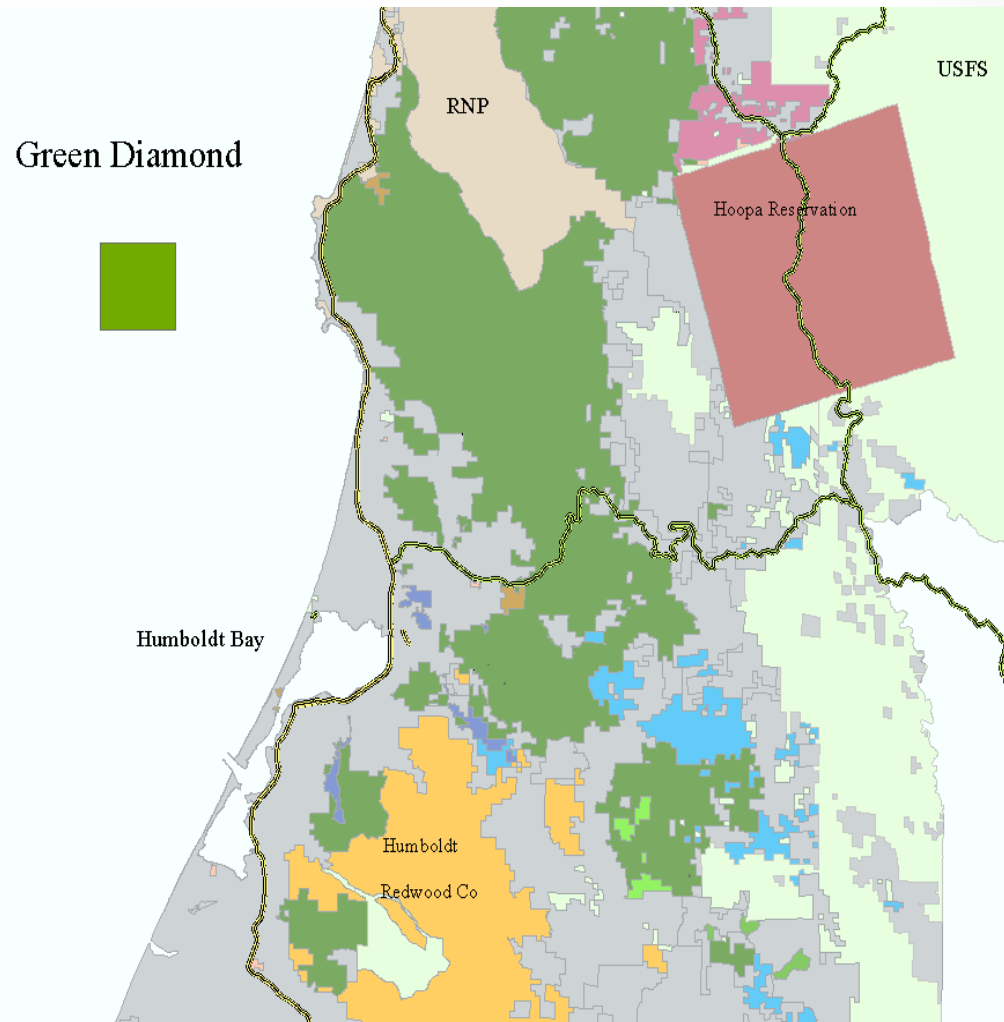
Michael W. Alcorn

Green Diamond Resource Company

April 25, 2019

# Project Location

- 200,000 acres accessible
- Near Eureka CA



Objective;  
Turn this



# Into this

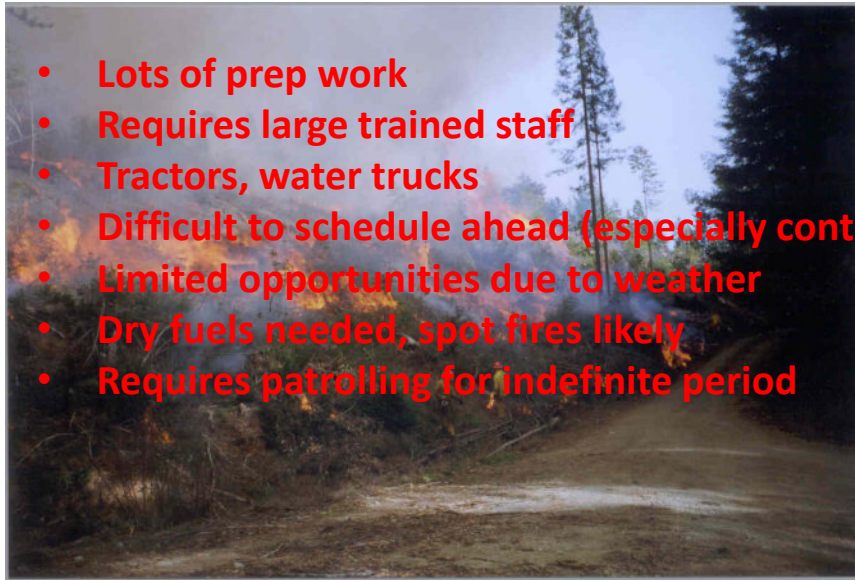


# Without doing this

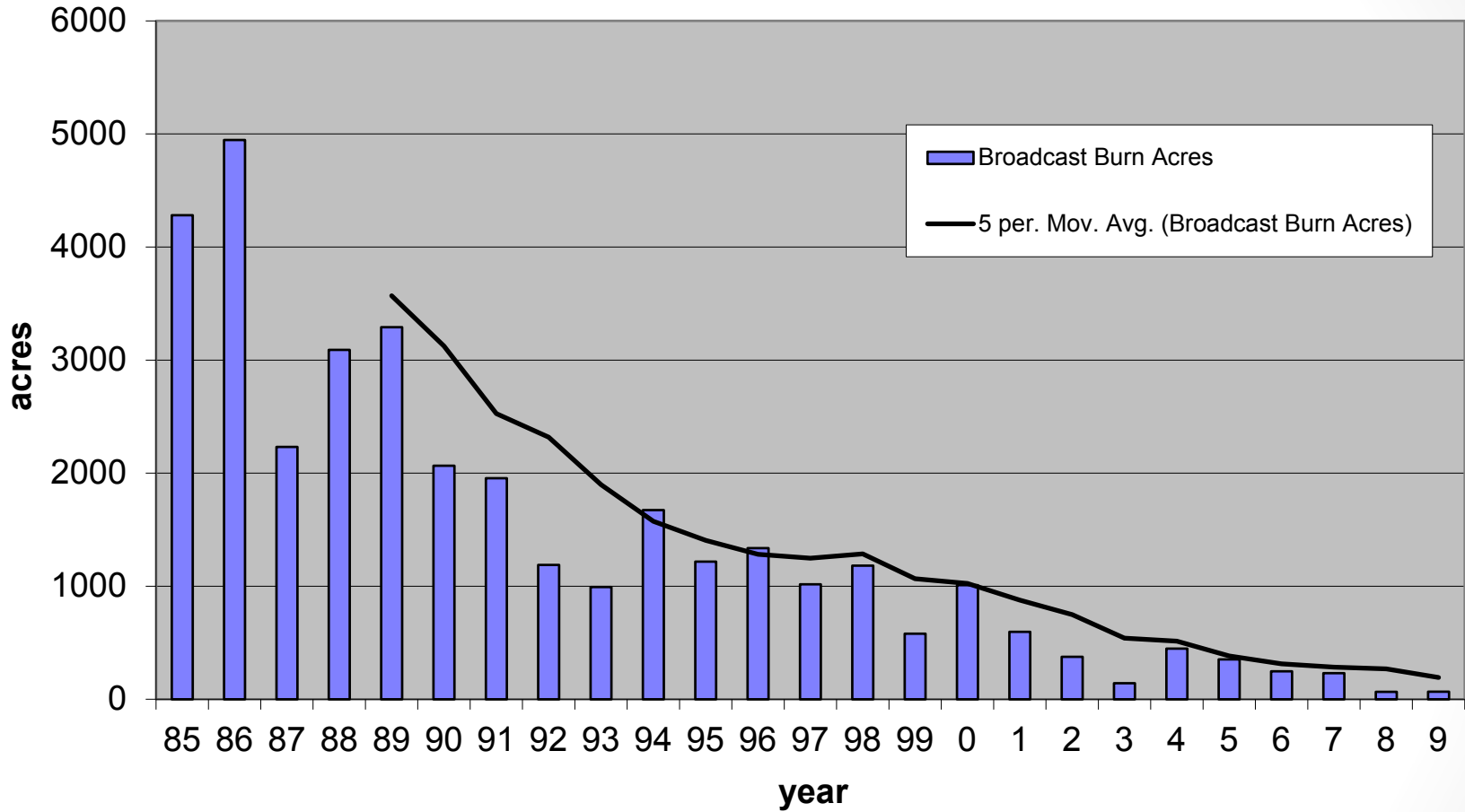


# Treatment options: Broadcast burning

- Lots of prep work
- Requires large trained staff
- Tractors, water trucks
- Difficult to schedule ahead (especially contractors)
- Limited opportunities due to weather
- Dry fuels needed, spot fires likely
- Requires patrolling for indefinite period



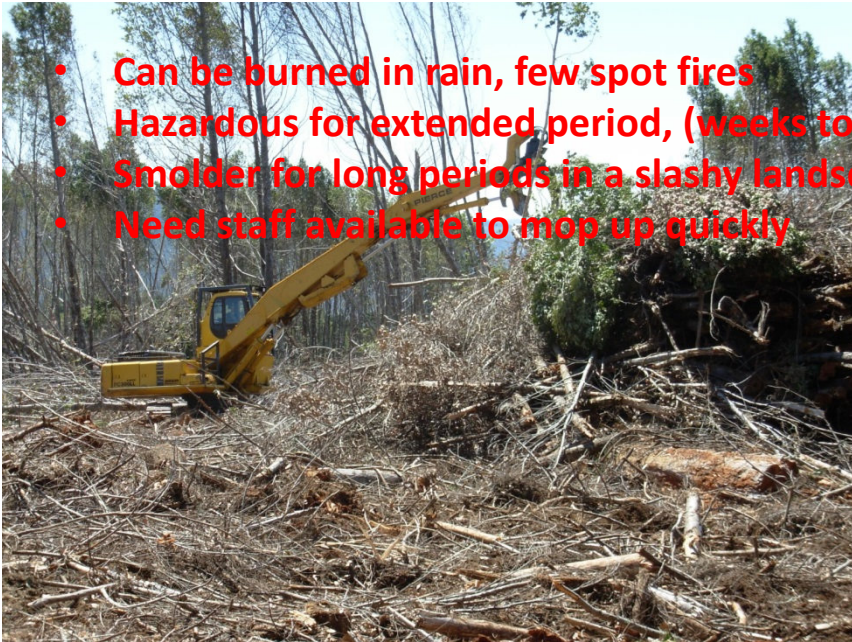
# Broadcast Burning History 1985 to 2009



# Piling

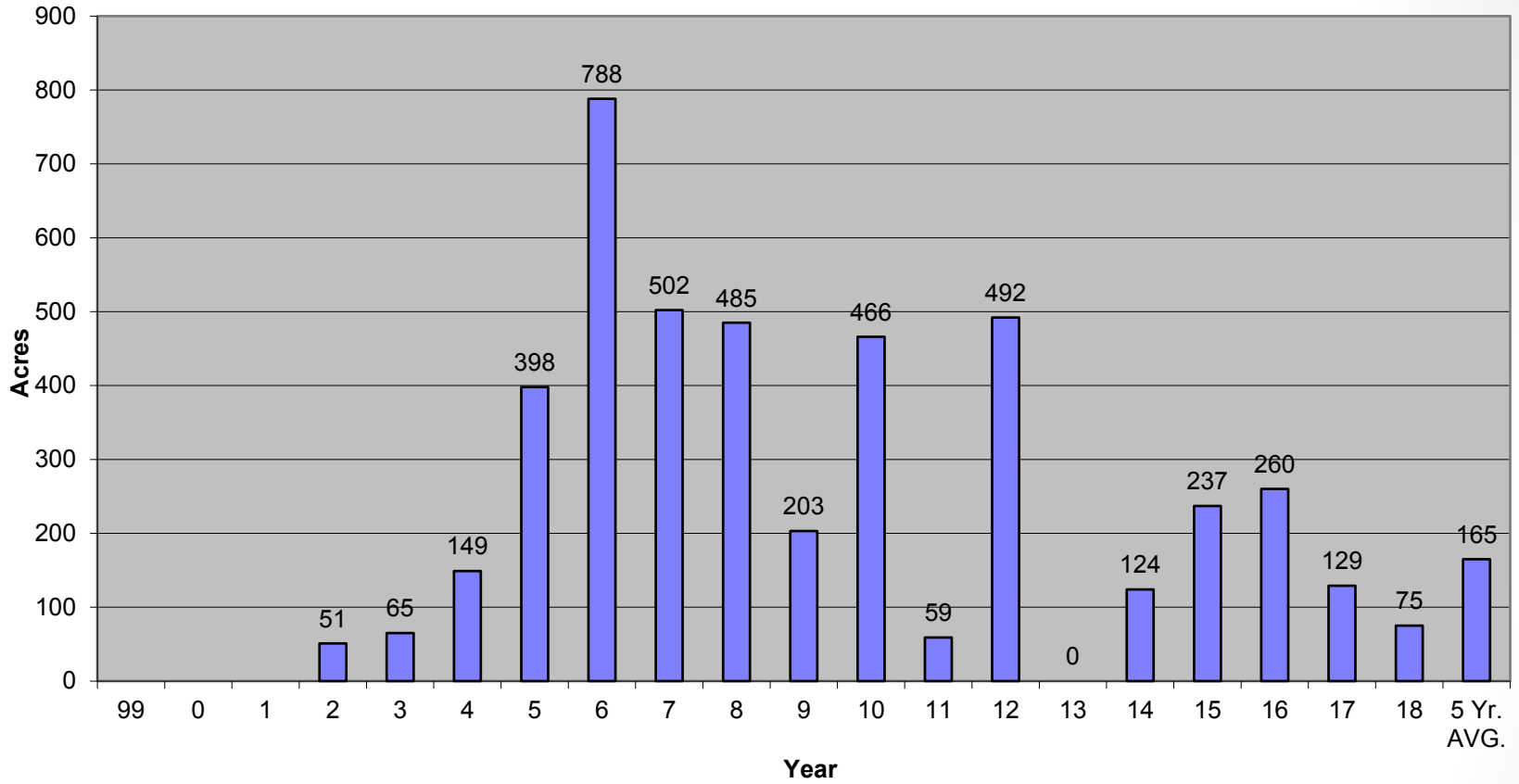
Piles can be burned, biomassed, mulched or left to rot

- Can be burned in rain, few spot fires
- Hazardous for extended period, (weeks to months)
- Smolder for long periods in a slashy landscape
- Need staff available to mop up quickly





### Pile Burn Clearcut History 2002 to 2018



# Weather limitations

- Inconsistent results
- Unreliable forecasts
- Variable productivity – year to year
- Money spent preping units that never get burned



# Smoke management

- **Limits number of burn days**
- **Additional air quality permits / smoke management plans**
- **Risk of impacting communities and sensitive populations**
- **Change in weather results in air quality violations**



# Protection of desirable features

- **Infrastructure, other landowner's property**
- **Riparian retention areas**
- **Rare and endangered plants**
- **Wildlife habitat retention areas**
- **Archaeological and historical features**



# Vegetation management

- Fire germinates existing seed banks in soil
- Prepares seed bed for invasives
- Increases veg. management costs dramatically
- Increases pesticide use



# Escapes / Liability

- Escapes are inevitable
- The more you burn, the greater the risk
- Individual and landowner liability
- High firefighting cost
- Liability for damage is unlimited
- Risky in wildland interface where most needed



# Mastication

- Large window of opportunity
- Less dangerous firefighting conditions
- Coastal heavy fuels still may not be plantable
- Fire risk from blades striking rocks



# Leave slash distributed

- Cheap
- Provide shade and browse protection for seedlings
- Large areas of contiguous flashy fuels
- Breaks down faster than piles
- Interferes with planting, spraying
- New plantation may burn up





# Biomass utilization

- **Consistently reduces fuel load and fire hazard**
- **Large window of opportunity**
- **Easy to schedule contractors**
- **Improves access for planting, spraying, thinning**
- **Well distributed crop tree stocking**
- **Little risk from fire**
- **Reduces veg. management cost**
- **Reduces pesticide use**



# Elements for a Successful Project

Before



After



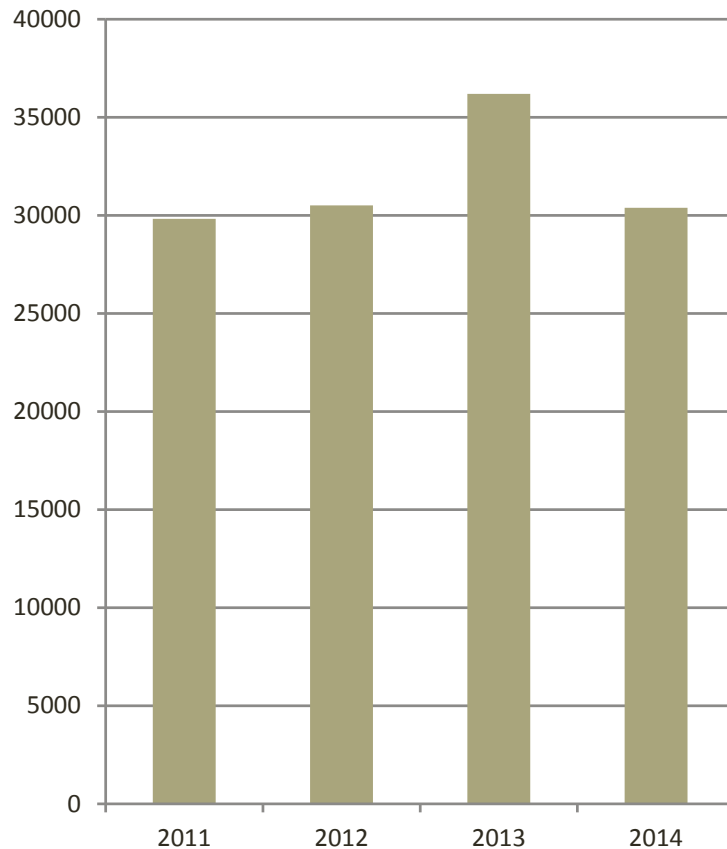
# Material availability

- Slash is recoverable for about 5 years in this area before decay
- Approximately 1600 acres, 48,000 dry tons accessible annually
  - Within current operating area
  - Using current equipment configuration
- With some creative process revision
- Likely 2000+ acres, 60,000 dry tons annually

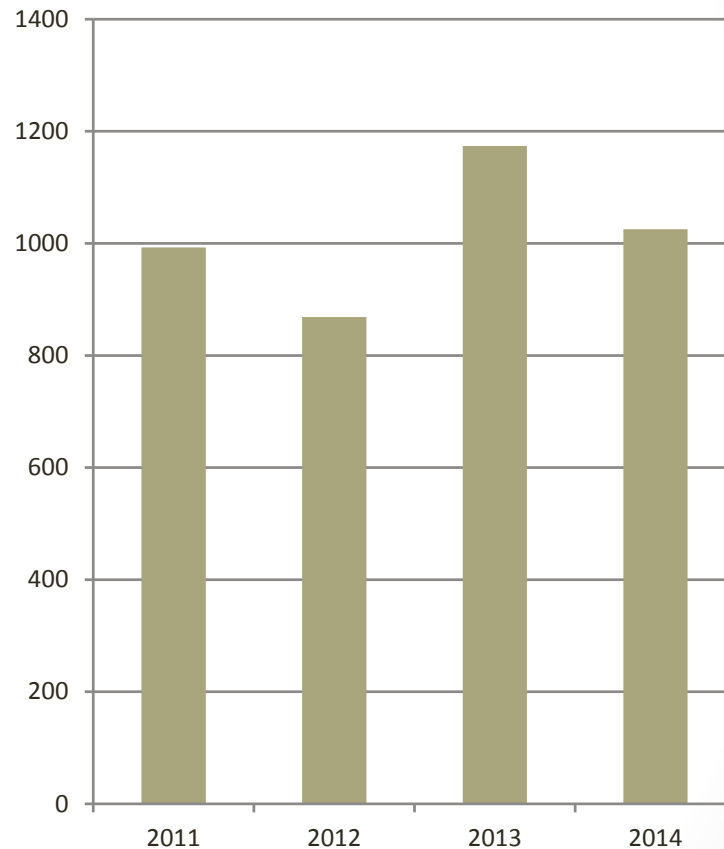
# Productivity

30-35 BDT/acre

Dry Tons / Year



Acres / Year







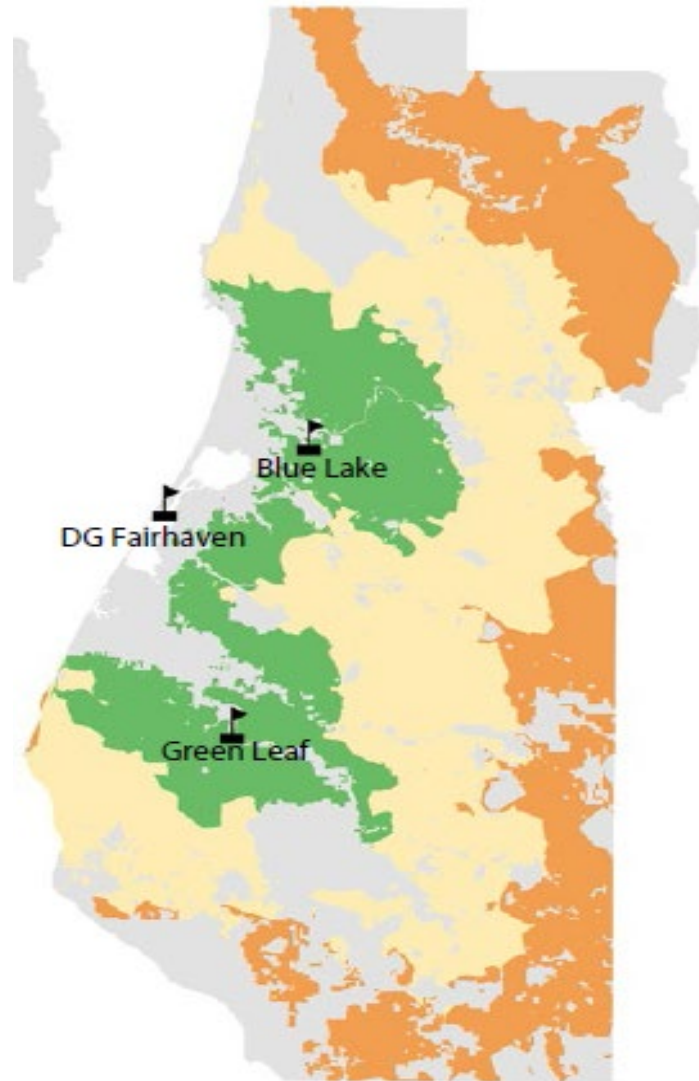
**20 loads / day – 375 dry tons/day**  
**About 100 working days per year**  
**Winter operations curtailed due to weather**  
**And Habitat Conservation Plans**

# Transportation Cost Factors

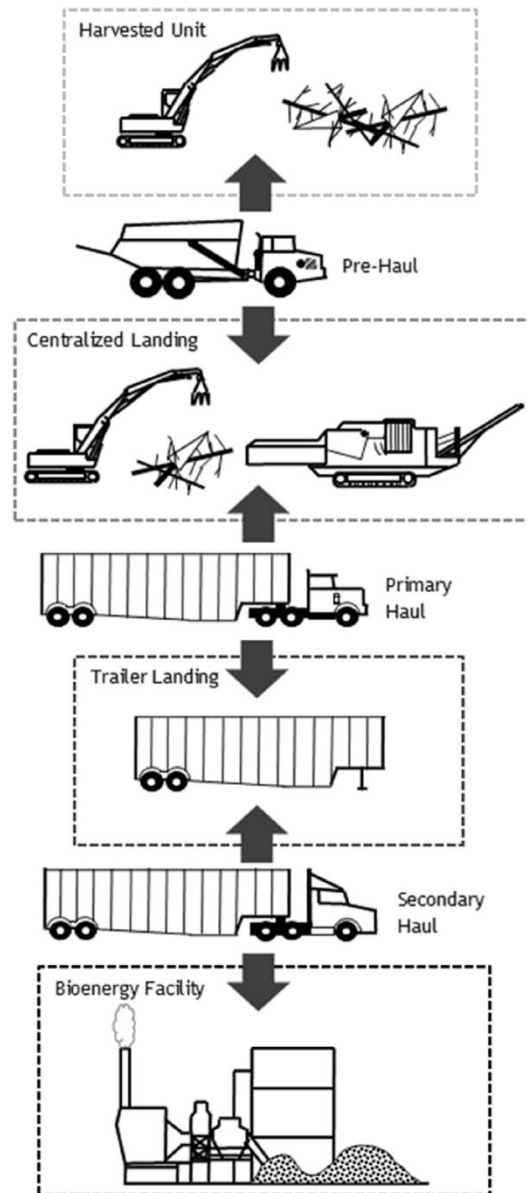
Operated effectively in the \$10 zone, and portions of the \$20 zone with subsidized haul cost.

## Transportation cost zones

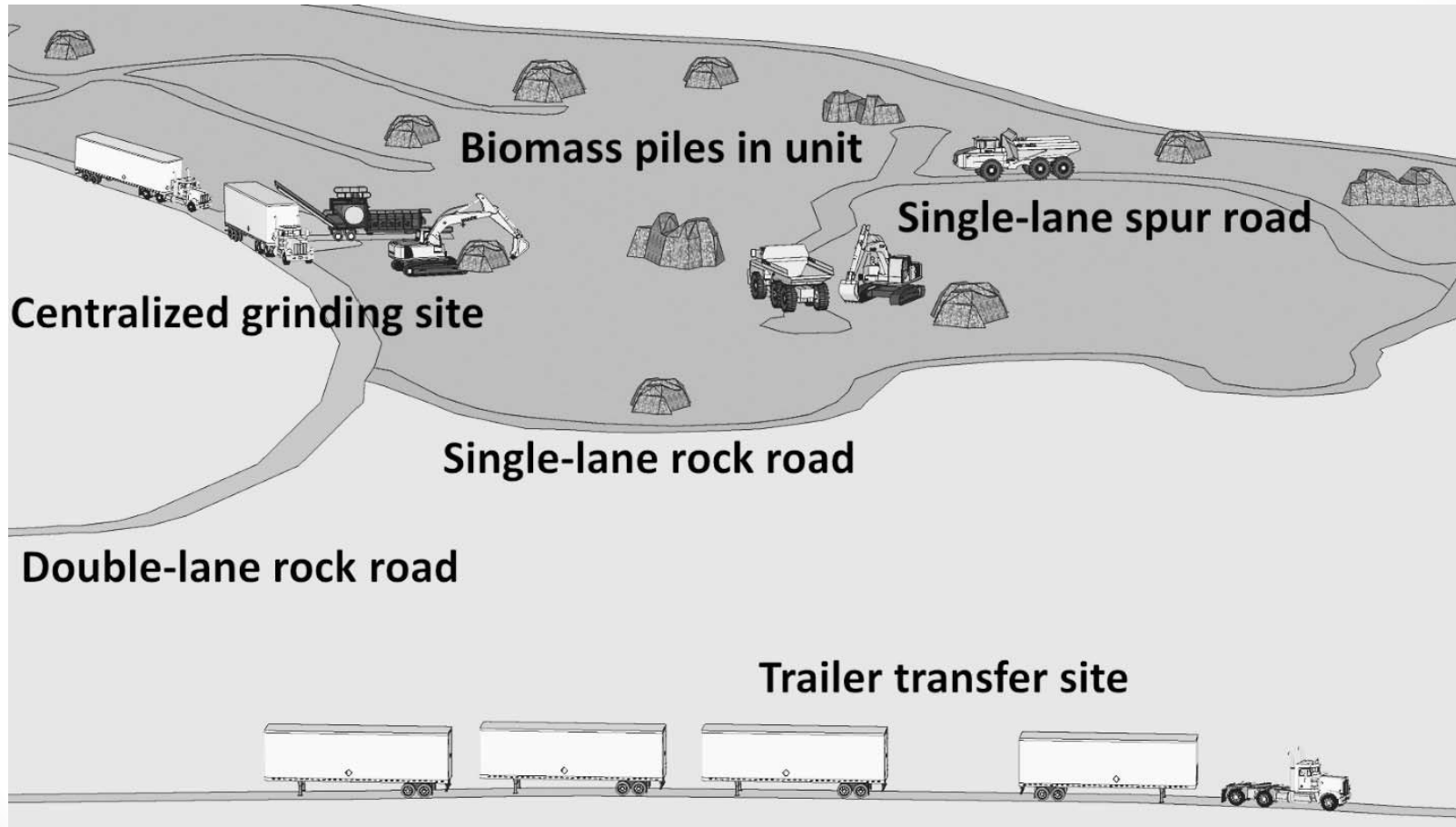
-  \$10/BDT
-  \$20/BDT
-  \$30/BDT
-  Power plants



# Process

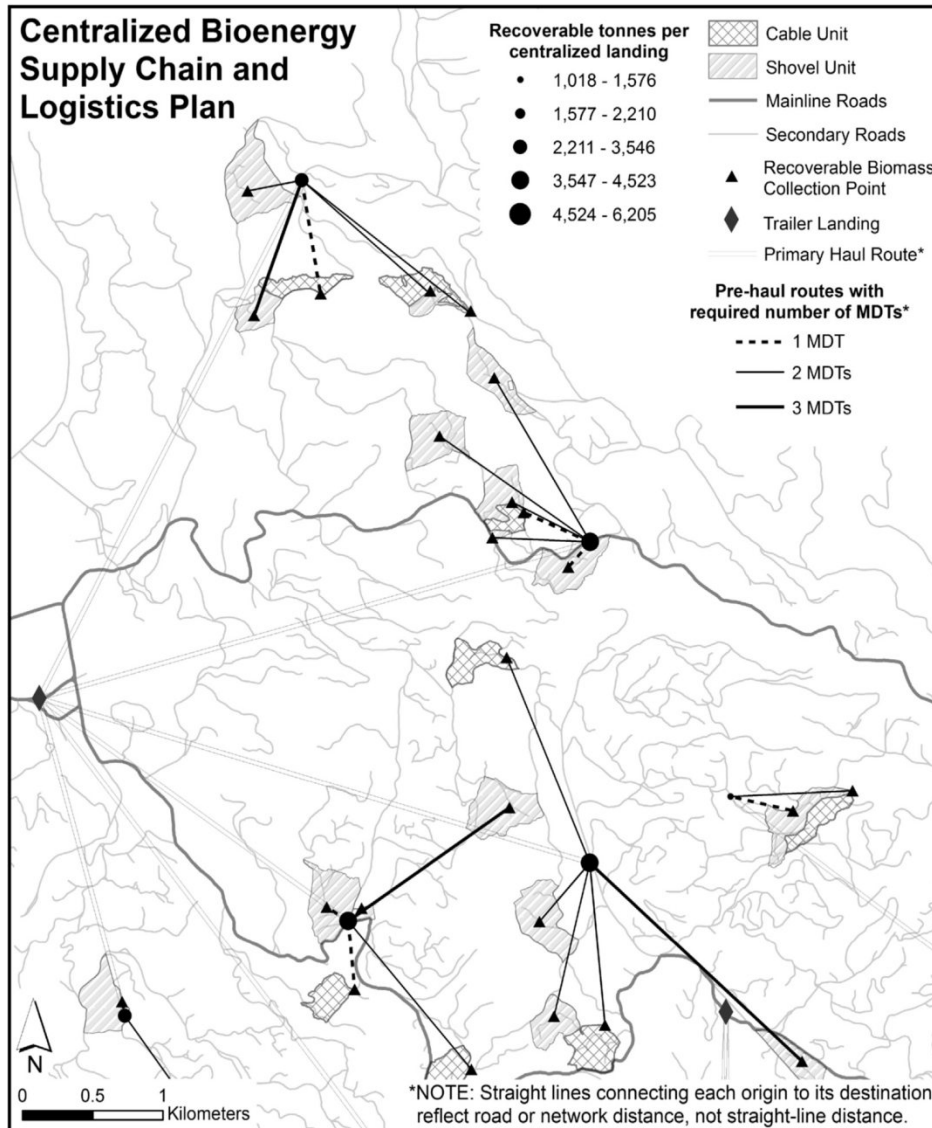


# Logistics, production site



# Logistics, area of operations

Multiple units within 1 mile of central grinding site

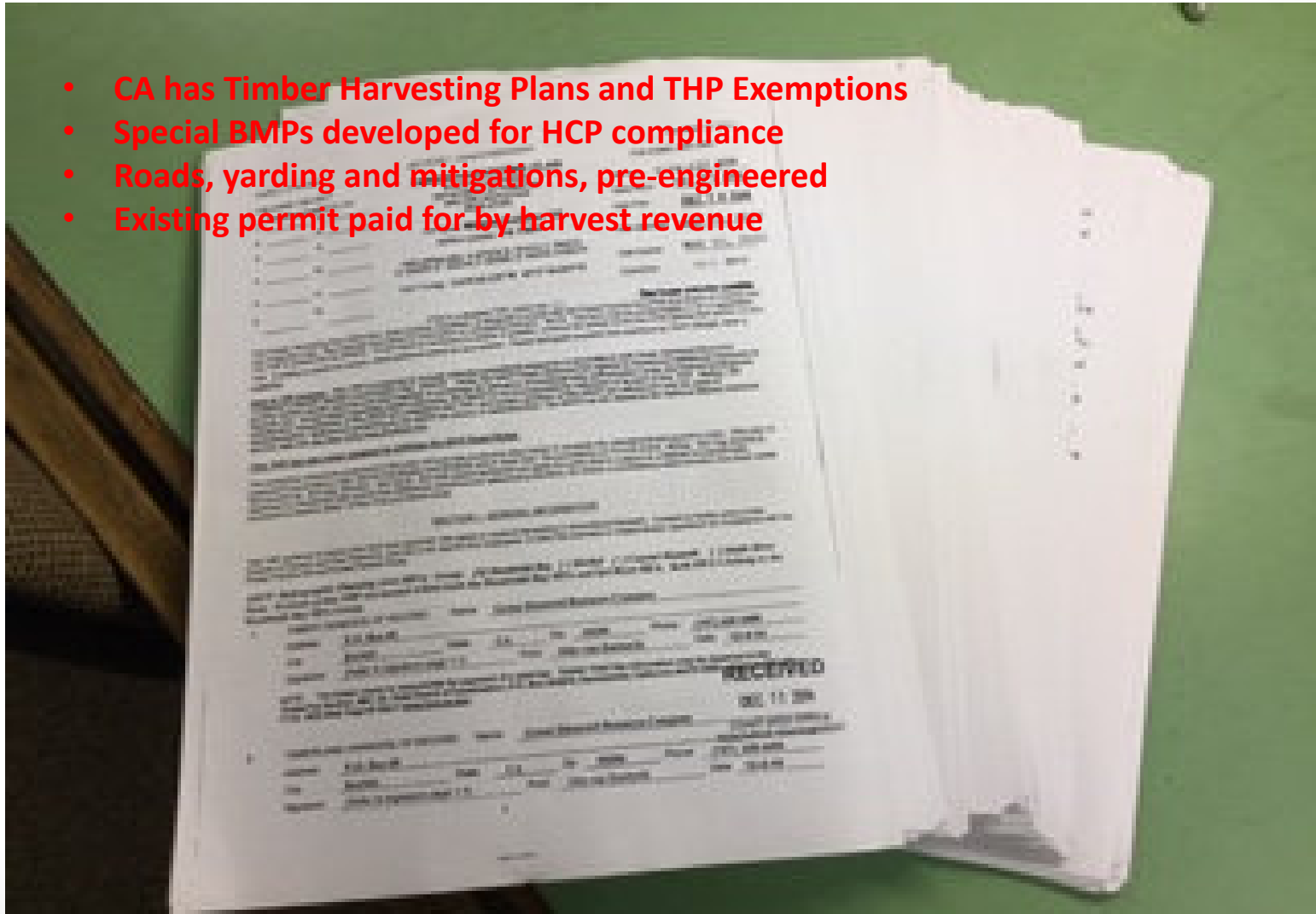




# Permitting & Engineering

Permits will be needed.

- CA has Timber Harvesting Plans and THP Exemptions
- Special BMPs developed for HCP compliance
- Roads, yarding and mitigations, pre-engineered
- Existing permit paid for by harvest revenue



# Roads / Access

- Harvest units from various years are accessed
- Roads systems put to bed or abandoned need reopening
- Effort required is balanced with amount of fuel behind obstacle



# Peripheral Equipment

Needed to open and close out road systems

- Excavator
- Tractor
- Grader
- Water/fire truck
- Fuel truck
- Service truck
- Pickup trucks
- Low Bed
- Reduces waiting for other contractors to complete work



# Gathering

- Custom brush grapples
- Multiple loaders staged at next work site
- Multiple loaders to maintain grinder production



# Pre-haul

Off road in harvest units and on private roads

- Customized dump truck
- Built up side boards, hinged
- Articulated tailgate
- Skidder tires
- 1-3 trucks depending on distance to landing



# Grinding

- **Grinder is key to production**
- **Must be kept running full speed**
- **All other equipment is working for the grinder**



# Primary Haul

Off highway, to staging areas

- Steep roads
- Tight turns
- Variable road surfaces
- All wheel drive trucks



# Secondary haul / Staging

- 20 loads during day shift plugs the chip dump
- Trailers staged in woods by primary haul trucks
- Highway trucks contracted to run 24 hours / day
- Chip dump less congested at night





# Cleanup

Water-barring, ripping, planting

- Abandon interior spurs and crossings
- Waterbar , drain roads and pre-haul trails
- Rip compacted areas for planting
- Ground impacted by machine footprint, less than 5%
- Stocking levels not reduced below state standards
- Impacted areas and pile footprints replanted.



# Scale up projects

- Biomass is best method to replace burning
- Fuels management is needed across the landscape
- Biomass utilization projects should be scaled up to supply
- Combine technologies on one delivery site, ie. pellet plant and co-gen plant



# Thank You

- Han-Sup Han, Northern Arizona Univ.
- Anil R Kizha, Humboldt State Univ.
- Tim Montgomery, Humboldt State Univ.
- Joel Bison, Humboldt State Univ
- Steve Morris, Steve Morris Logging
- Jake Morris, Steve Morris Logging
- Green Diamond Resource Company