QUINAULT INDIAN NATION BIOMASS FEASIBILITY STUDY

Quinault Indian Nation

Business Committee

April 9, 2012

Presentation Overview

- Study Objectives
- Biomass Availability and Cost Analysis
- Key Environmental Issues and Opportunities
- Site Review and Selection
- Technology Selection and Financial Analysis
- Conclusions
- Acknowledgements

Project Sponsors

QUINAULT INDIAN NATION

USDA

COLUMBIA-PACIFIC RESOURCE CONSERVATION & ECONOMIC DEVELOPMENT DISTRICT

Project Cooperators

Study Objectives

- What is the long-term sustainably available volume of forest biomass that is potentially available from the QIN Reservation?
- What are the costs to collect, process and transport forest biomass for value-added uses?
- What value-added forest biomass utilization technologies and business models (scaled for sustainability and matched to local resources) have the highest potential for success?
- Which Tribal business models are complementary and coordinated in a way that employment and revenue generation are oprtimized?


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QUINAULT INDIAN RESERVATION
109
QUINAULT RESERVATION
Olympic NP
Seattle Metro Ar
Olympic NF
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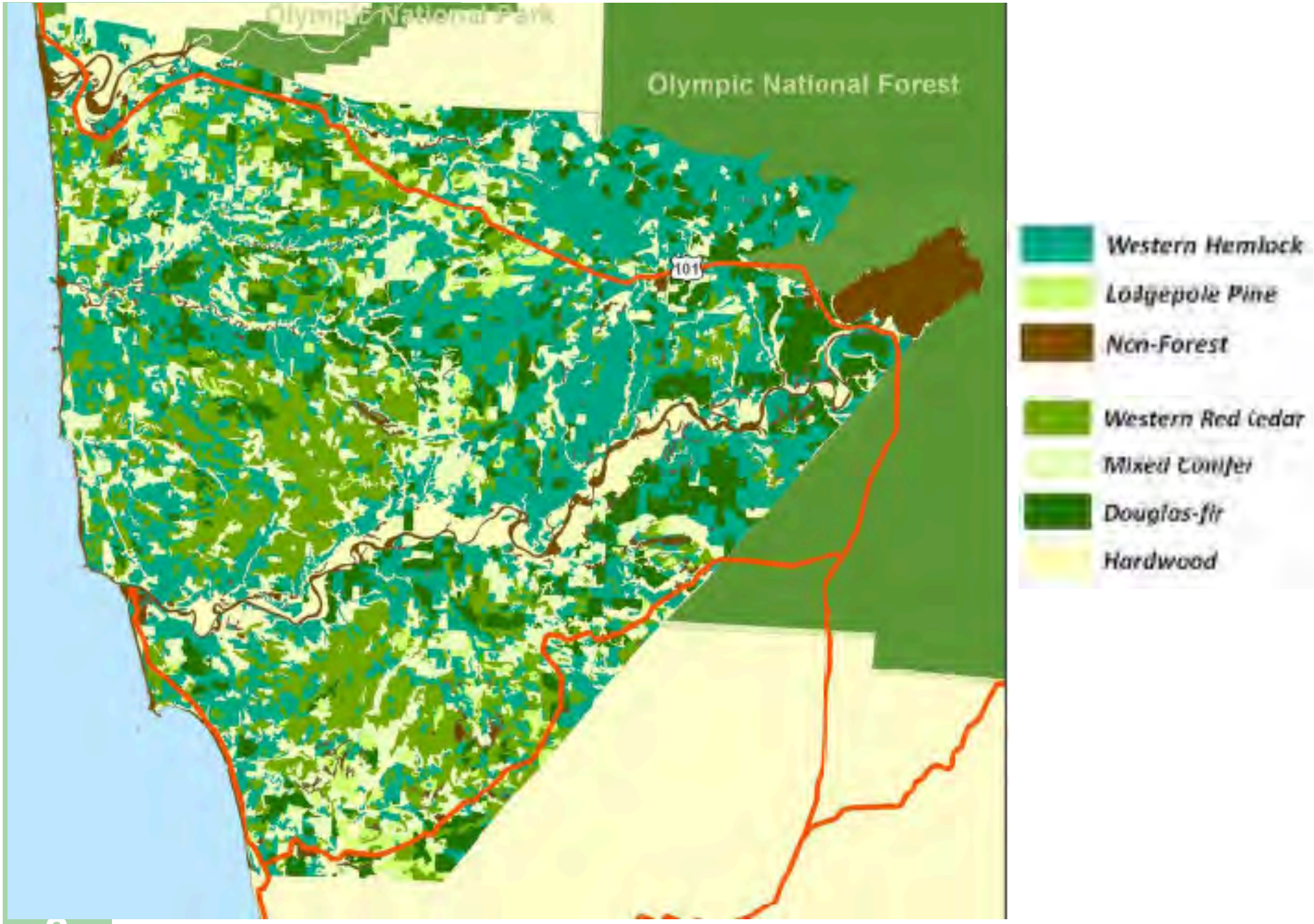
Forest Cover on the QIN Reservation

COVER CATEGORIES	ACRES	PERCENT OF TOTAL
Forest Cover	196,675	95%
Non-Forest	10,595	5%
TOTALS	**207,270**	**100%**


Olympic National Park
Olympic National Forest
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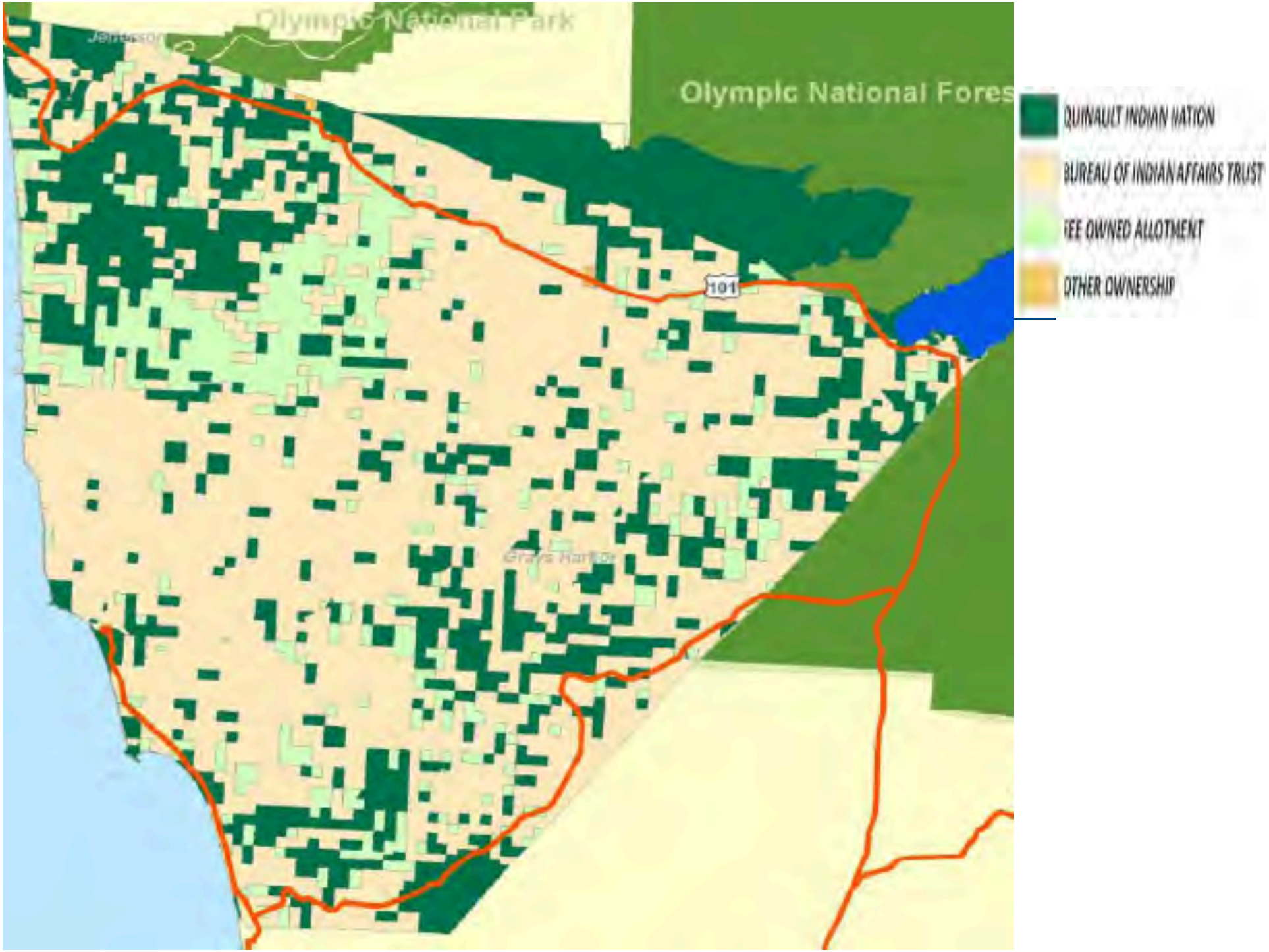
Western Hemlock
Lodgepole Pine
Non-Forest
Western Red Cedar
Mixed Conifer
Douglas-fir
Hardwood

Vegetation Cover - Detail

PRIMARY FOREST SPECIES	ACRES	PERCENT OF TOTAL
Western hemlock	75,147	36%
Western red cedar	38,687	19%
Mixed Conifer	35,020	17%
Douglas-fir	24,160	12%
Hardwoods	17,388	8%
Non-Forest	10,595	5%
Lodgepole pine	6,273	3%
TOTALS	**207,270**	**100%**


Olympic National Park
Olympic National Fores
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QUINAULT INDIAN NATION
BUREAU OF INDIAN AFFAIRS TRUST
FEE OWNED ALLOTMENT
OTHER OWNERSHIP

Biomass Availability
Operable Acres

OWNERSHIP	OPERABLE ACRES	PERCENT OF TOTAL
Quinault Indian Nation	44,260	28%
Bureau of Indian Affairs (Trust)	92,790	59%
Fee Allotments	20,089	13%
Other	124	0%
TOTAL	**157,263**	**100%**

Filters Used to Determine Available Forest Biomass

- Vegetation Cover – conifer forest veg cover has the highest potential to provide sustainable quantities of forest biomass and small logs over time (depending on land management objectives).
- Account for topography and forest road systems.
- Forecast based on current forest restoration, fuels treatment and forest harvest trends.
- Base recovery metrics on actual experience and local knowledge.

Forest Biomass Availability

BIOMASS SOURCE	POTENIALLY AVAILABLE (BDT/YEAR)	PRACTICALLY AVAILABLE (BDT/YEAR)
Quinault Indian Nation	13,100	5,460
Bureau of Indian Affairs	20,650	8,600
TOTALS	**33,750**	**14,060**

Forest Biomass Collection, Processing and Transport Costs

BIOMASS RECOVERY METHOD	LOW RANGE $/BDT	HIGH RANGE $/BDT
Alternative 1	$32	$52
Alternative 2	$42	$63

Value-Added Uses Considered

- QIN Biomass Processing Enterprise
- Residential Fuel Pellets
- Densified Fuel Logs
- Small-Scale Biomass Combined Heat and Power
- Thermal Energy Facility for Tribal Facilities

Thermal Energy for Tribal Buildings – Existing and Planned

- **Site Review and Selection**
  - Land Use Zoning
  - Transportation Routes
  - Public Health and Safety
  - Water Supply Resources
  - Geology/Soils
  - Cultural Resources
  - Potential Co-Location Opportunies
    - Crane Creek
    - Taholah


QIN Administration Complex
QIN Health Center
Hot water supply/ cold water return pipeline
Approximate location of other proposed QIN buildings
Approximate location of biomass thermal facility
Approximate location of proposed school

Technology Selection and Financial Analysis

- **Two technologies considered:**
  - Skanden
    - Multiple Boiler System
  - Messersmith
    - Single Boiler System
    - Currently Installed at Forks High School

Buildings to be Heated

BUILDING	SIZE (Sq Ft)
Administration Complex	59,608
Health Center	28,485
School	25,000
Emergency Services	14,000
TOTAL	**127,093**

Cost of the Messersmith System

ITEM	COST
Furnace/Boiler 1.5 MMBtu/hour	$456,000
Shipping	$30,000
Pumps, Tanks Heat Exchanger, Building Retrofit	$90,000
Piping	$183,750
Back Up Heating - Electric	$150,000
Subtotal	$1,189,750
Contingency @ 10%	$118,975
TOTAL	**$1,308,725**

Annual Costs Using the Messersmith System (Assuming 80% Capital Grant and $45/BDT Fuel)

BUILDINGS	CURRENT HEATING COSTS	PROJECTED HEATING COSTS	SAVINGS
Admin Complex	$59,237		
Health Center	$67,183		
Existing Total	**$126,420**	**$47,548**	**$78,872**
School	$14,287		
Emergency Services	$23,997		
Proposed Total	**$38,284**	**$25,041**	**$13,242**

Recommendations

- Consider grant funding opportunities including:
  - USDA Great Regions
  - USFS Woody Biomass Utilization Grant
- Tour the Forks High School site and view Messersmith System first hand.
- Consider development of a communications plan to update Taholah community of the potential for a small biomass fired heating system.

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Tad Mason
TSS Consultants
2724 Kilgore Road
Rancho Cordova, CA 95670
916.266.0546
tmason@tssconsultants.com
www.tssconsultants.com