Makah Renewable Energy Feasibility Study in Neah Bay Washington

Makah Project Manager: Bud Denney
Technical Contact: Bob Lynette
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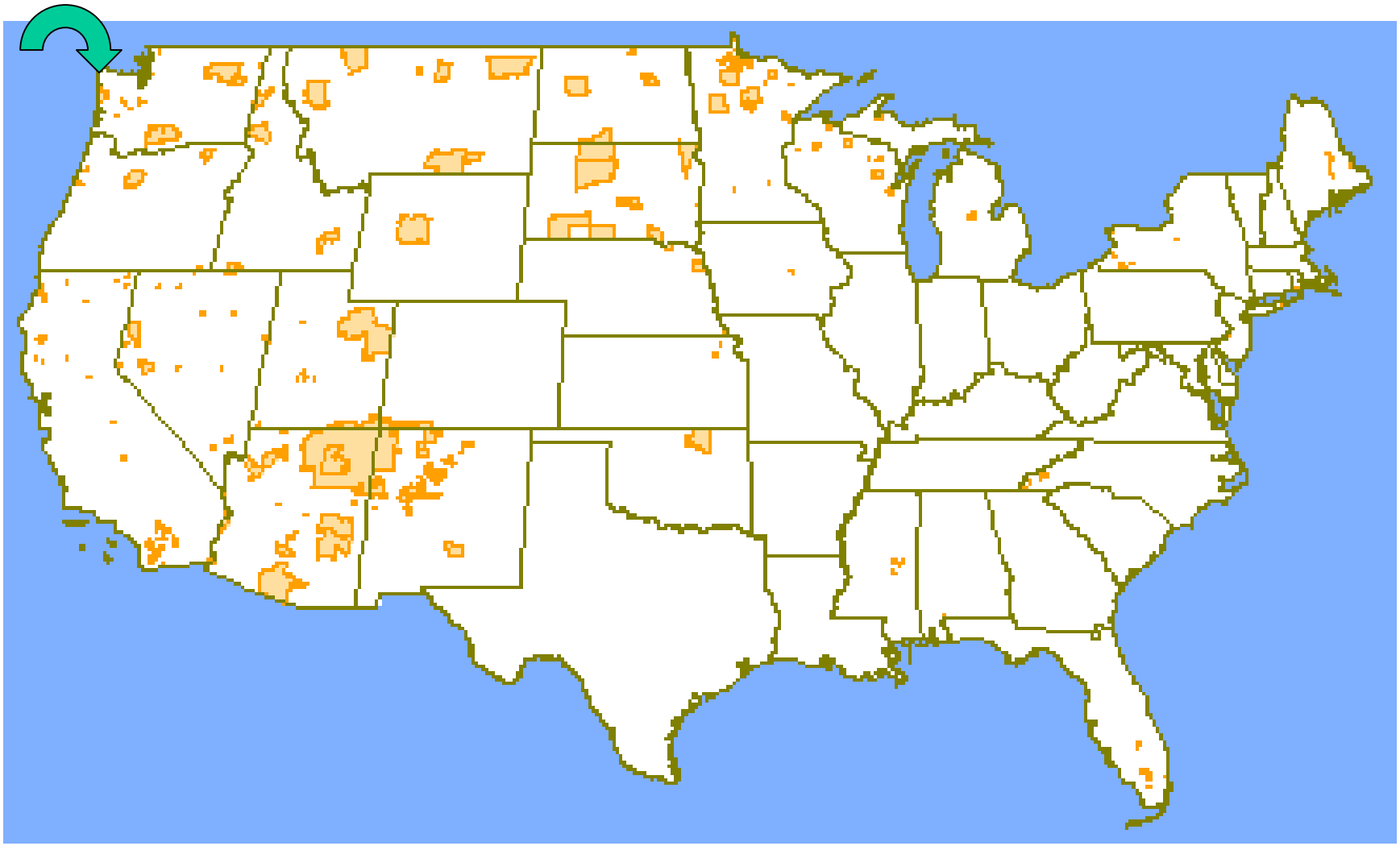
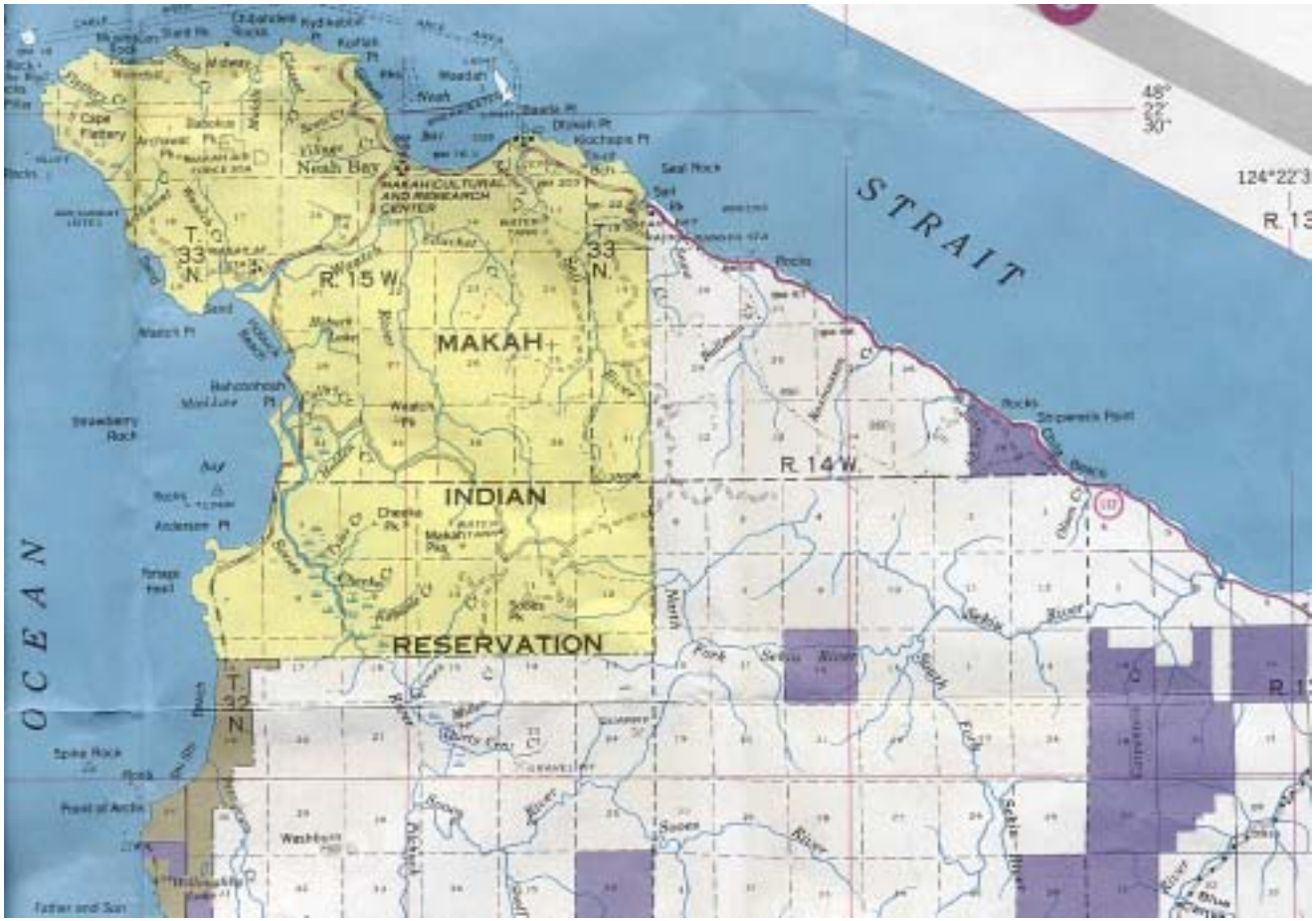
Background

- Enrollment for the Makah Tribe is 2,389
- Approximately 1,213 tribal members live on the Reservation; an additional non- Indian residential population of about 295
- Reservation is 47 square miles with elevations typically between 500 and 1,000 feet
- Four major watersheds; over 100” rainfall/year
- Closest town is 60 miles away.
- 30 MW line to reservation; frequent loss of power

Makah Reservation



Makah Reservation



Participants

Project Participant	Contact	Role
Makah Indian Reservation	Bud Denney	Tribal planner, Project manager / liaison
Springtyme Company, L. L. C.	Robert Lynette	Technical contact, wind consultant
AP&T Solutions, LLC*	Bob Grimm	Financial analyst
	Larry Coupe	Engineer, hydropower
Terranova Power	John Wade	Meteorologist, wind power analyst
Northwest Wildlife Consultants	Karen Kronner	Biologist
Met Tower Services	Mike Sailor	Wind tower installation

*A subsidiary of Alaska Power & Telephone

Project Overview

Objectives

- **Determine feasibility of one or more wind power and/or small hydro installations that could provide one or more of the following functions:**
  - **Produce electricity for the Tribe**
  - **Produce power to sell to Clallam County PUD**
  - **Provide back-up power**
  - **Provide employment during construction and for O&M**

One Day Course-Wind Energy

- Technology (small and large WTGs)
- Siting considerations
  - Wildlife (e.g., birds)
  - Visual
  - Noise
- Wind resource assessment - wind speed, shear, direction, turbulence
- Energy production calculations
- Installation, operation & maintenance

The Work – Wind Energy

Narrow down to 3 potential sites based on:

- Past wind resource assessments
- Topography
- Climatic conditions
- Anecdotal information
- Location of current and planned human activities (e.g., logging)
- Transmission infrastructure

Wildlife Study

- Conduct a study to determine potential avian conflicts within the candidate sites.
- Identify areas where wind turbines should be prohibited based on potential conflicts with biological resources such as level of avian use or presence of unique habitat.

Wind Resource Assessment

- Select two sites for wind resource assessments
- Erect one 50-meter tower with 3 anemometers and 2 direction sensors and data logger at each site
- Monitor sites for one year

Final Site Feasibility Report

- Site layout
- Interconnect and transmission diagrams
- Equipment, infrastructure
- Annual energy output
- Financial analyses
  - COE
  - Financing options and potential financing sources

Micro/Small-Hydroelectric Power

- Identify potential sites
  - **Adequate stream flow**
  - **Adequate head**
  - **Proximity to existing transmission lines**
  - **Downstream barriers to fish migration**
- Conduct on-site field analyses
- Develop/calculate critical parameters

Micro/Small-Hydroelectric Power

- Develop layout of the generating facilities
- Develop construction cost estimates
- Calculate the expected COE and determine if the project is economically feasible.
- Evaluate the potential and cost impacts of alternative financing methods.

Report and Business Plan

Prepare business plan based on feasibility results

- Match to the tribes' social and economic development needs
- Implementation plan
- Financial analyses

Requested Technical Support

- Supply a CD with power curves of current WTGs
- Can NREL provide visual terrain/windpark simulation software?