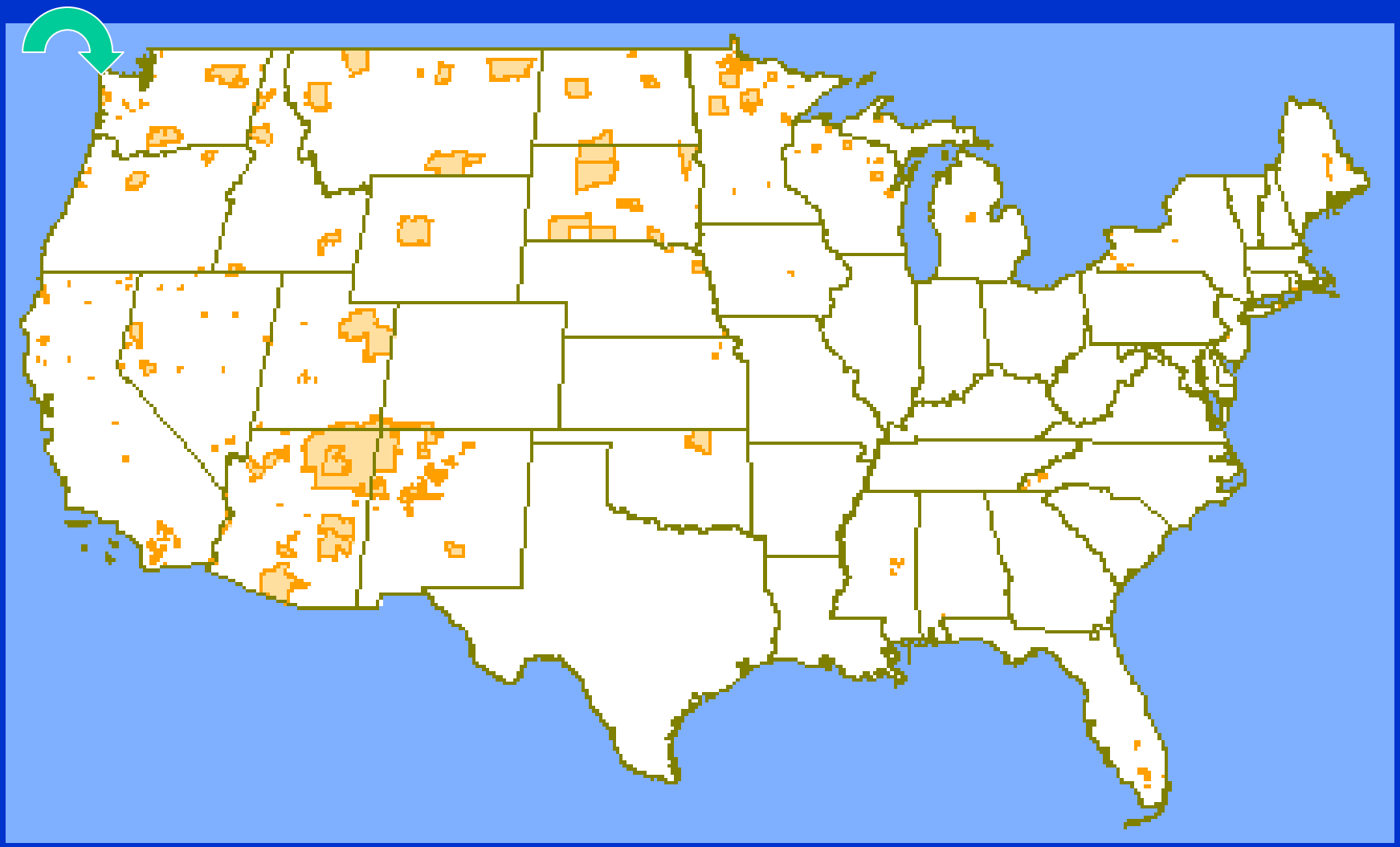
Makah Renewable Energy Feasibility Study

Makah Project Manager: Bud Denney
Coordinator: Ryland Bowchop
Technical Contact: Bob Lynette
October 2004

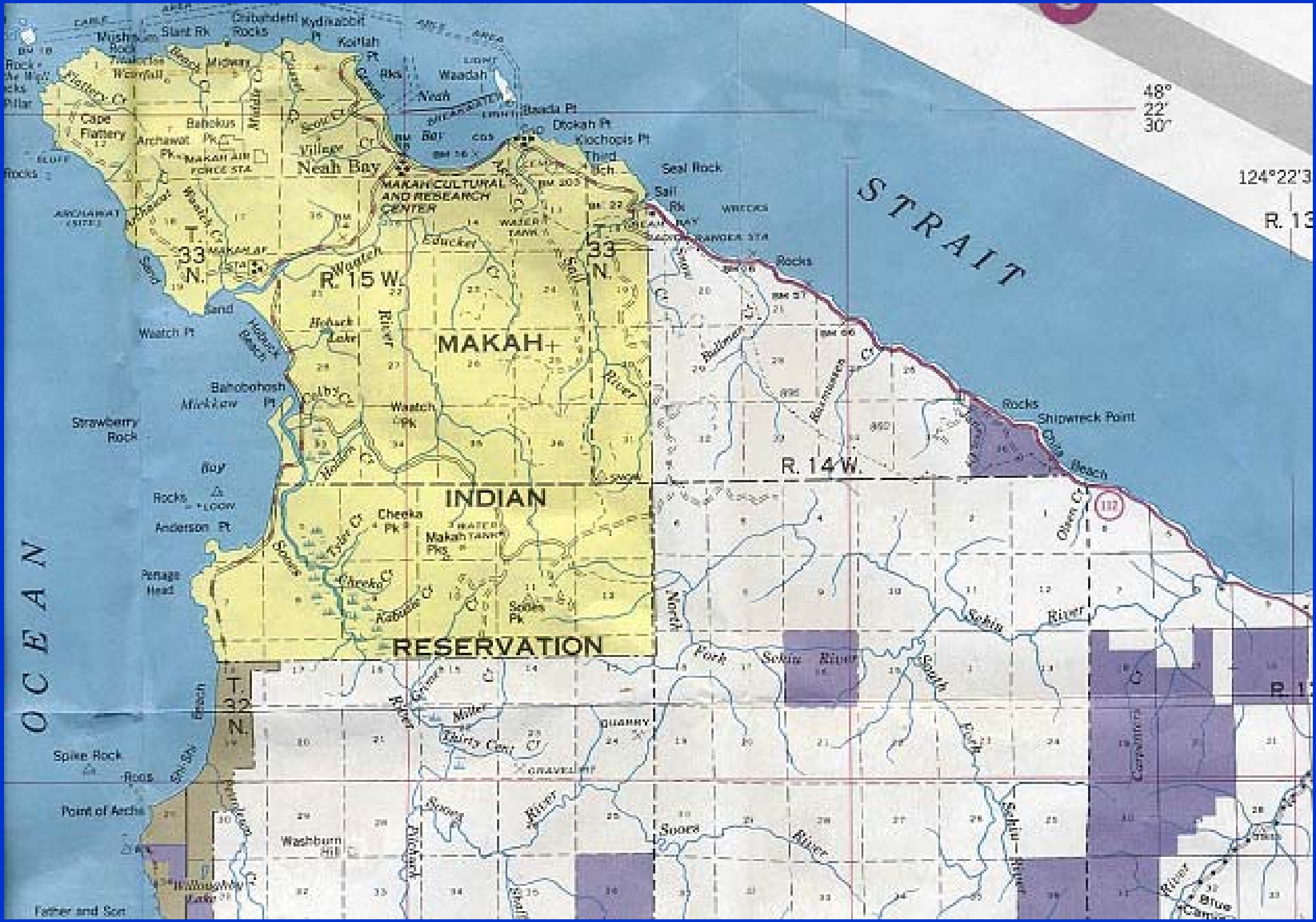
Background

- Enrollment for the Makah Tribe is 2,389
- Reservation is 47 square miles, elevations typically between 500 and 1,000 feet.
- Four major watersheds; over 100" rain/yr.
- 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, Ryland Bowchop	Project manager, Liaison
Springtyme Company, L. L. C.	Robert Lynette	Technical contact, wind consultant
AP&T Solutions, LLC*	Bob Grimm, Larry Coupe	Financial Analyst, Engineer
John Wade Wind Consultant LLC	John Wade	Meteorologist, wind power analyst
Northwest Wildlife Consultants	Karen Kronner	Biologist
Met Tower Services	Mike Sailor	Wind tower installation

Project Objective

Determine feasibility of one or more wind power and/or small hydro installations that could:

- Produce electricity for the Tribe
- Produce power to sell to local utility
- Provide back-up power
- Provide employment during construction & O&M

Project Status – Micro-hydro

- Two potential projects identified.
  - 500 kW, producing approximately 1,300,000 kWh per year
  - 900 kW, producing approximately 3,100,000 kWh per year
- But - both projects would cost too much by wide margins.

Project Status - Wind

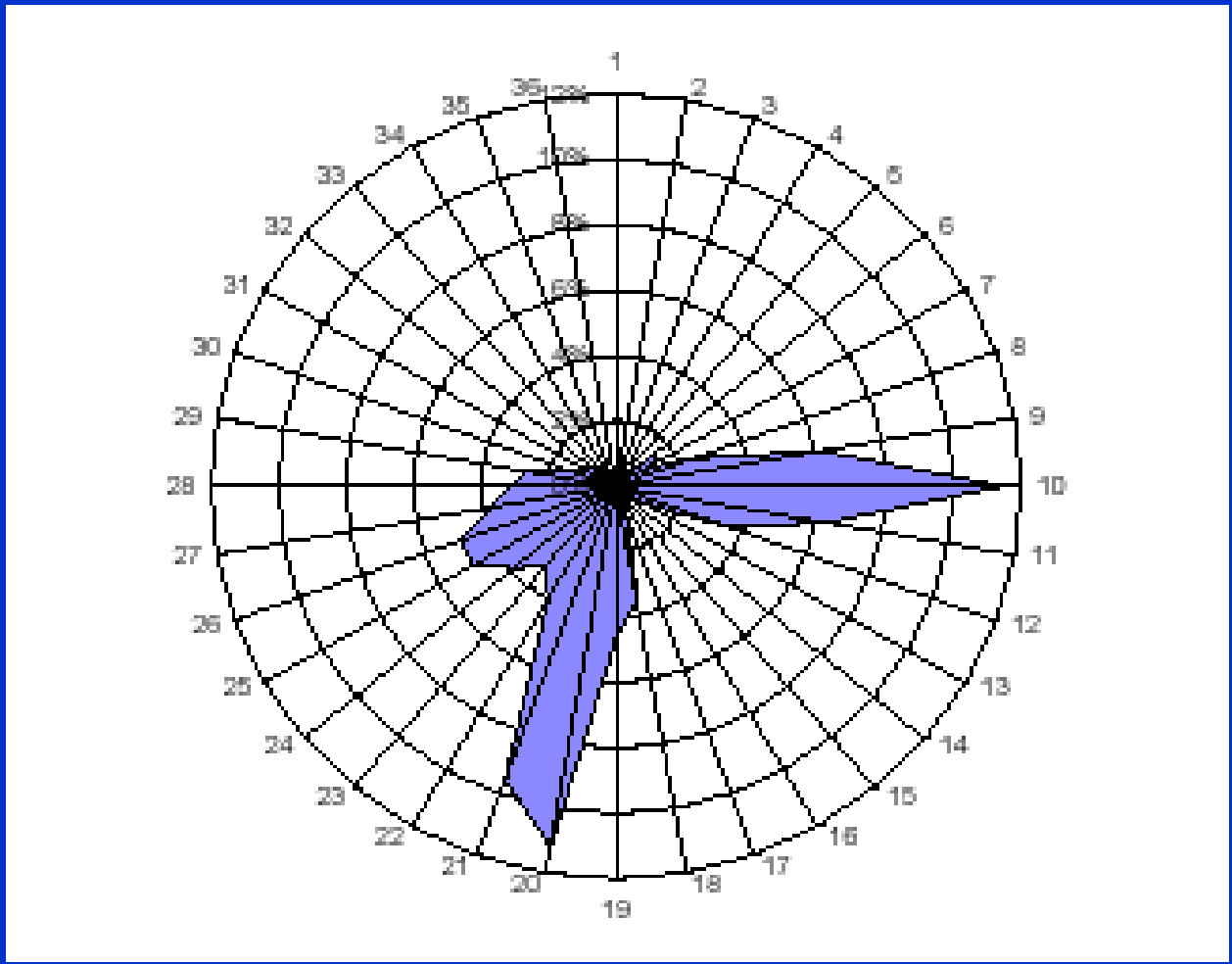
- Two sites for met towers selected in conjunction with wildlife study.
  - 1 -50 meter at 1,200', 1 - 40 meter at 900'
  - Three levels of anemometry on each
- Data collected and analyzed for 13 months.
- Long-term reference data used to see if it was a "typical" year. (It was)
- 100% data retrieval

Difficult Terrain

Met Tower Locations

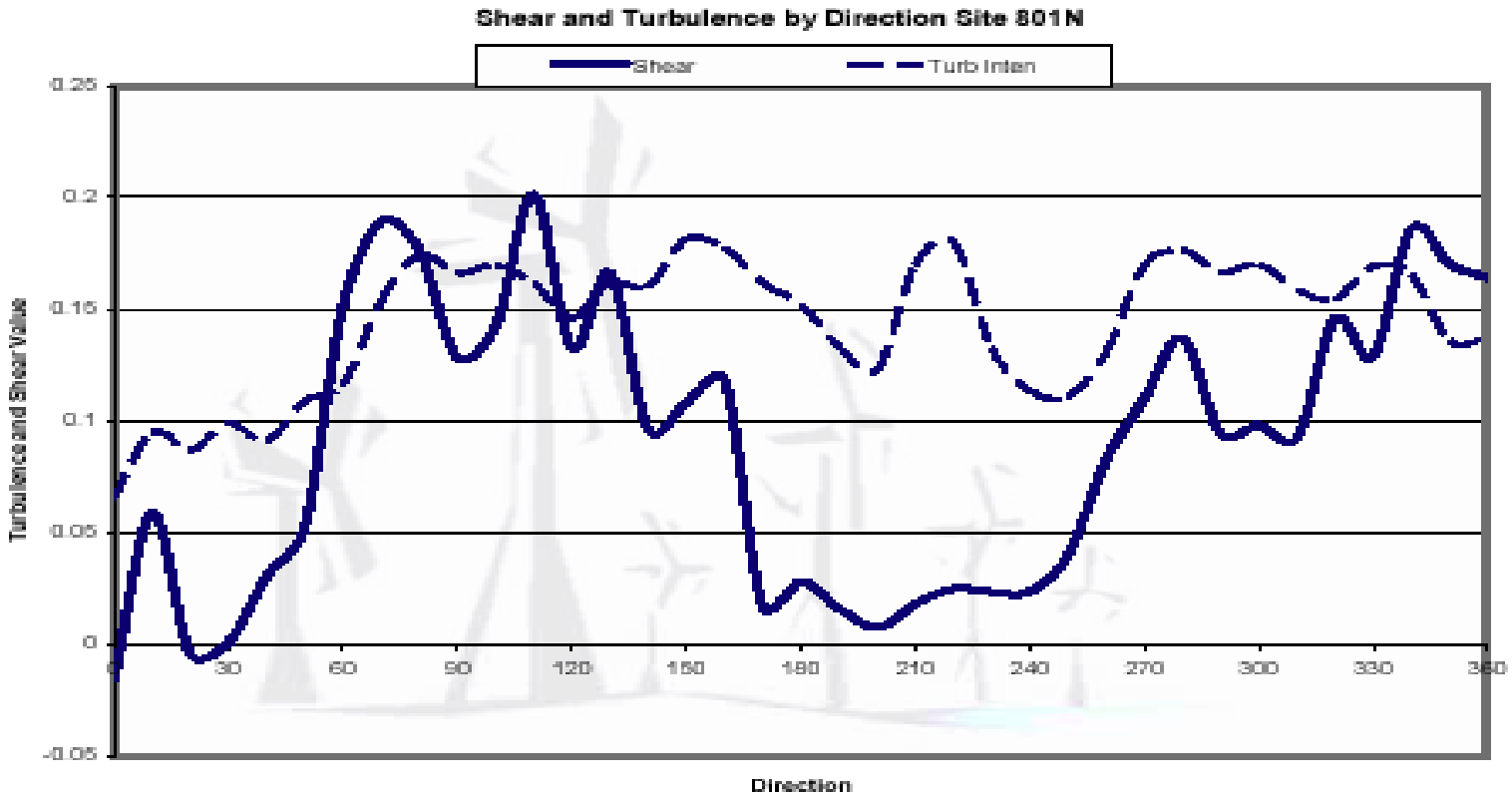
Measurement Results

Wind Direction – Energy Rose N. Site



Measurement Results

Wind Shear & Turbulence – Energy Rose N. Site



Wind Speeds and Energy

- Annual average wind speeds at 65 meters
  - South site: 13.2.mph
  - North site: 13.6 mph
- Using the G.E. 1.5 MW wind turbine yields a gross capacity factor of 0.23, and a net capacity factor of 0.19.

Conclusions

- Site cannot be financed with conventional commercial means based on today's technology. (Needs some financial help.)
- Anemometer stations' data may have value to other entities:
  - Weather forecasting
  - Wind speed forecasting for inland windfarms.

Future Plans

- Investigate supplemental sources for financing.
- Seek other uses for anemometry.
- Document results.
- Additional work ongoing and will be discussed later this morning.