BBNC STORY

"Enriching Our Native Way of Life"

Bristol Bay Native Corporation Mission Statement

Tiel Smith
Resource Manager
BBNC

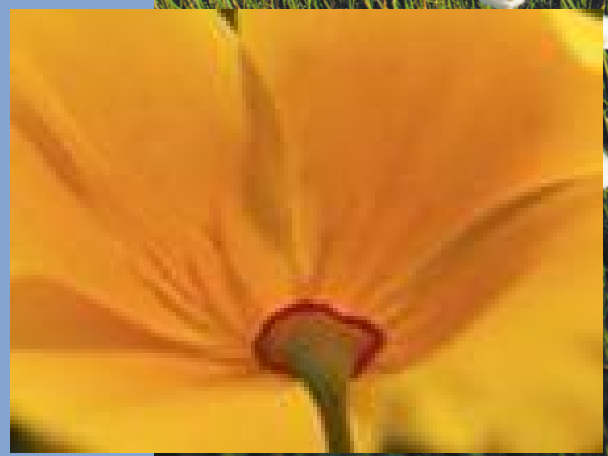
BBNC Story

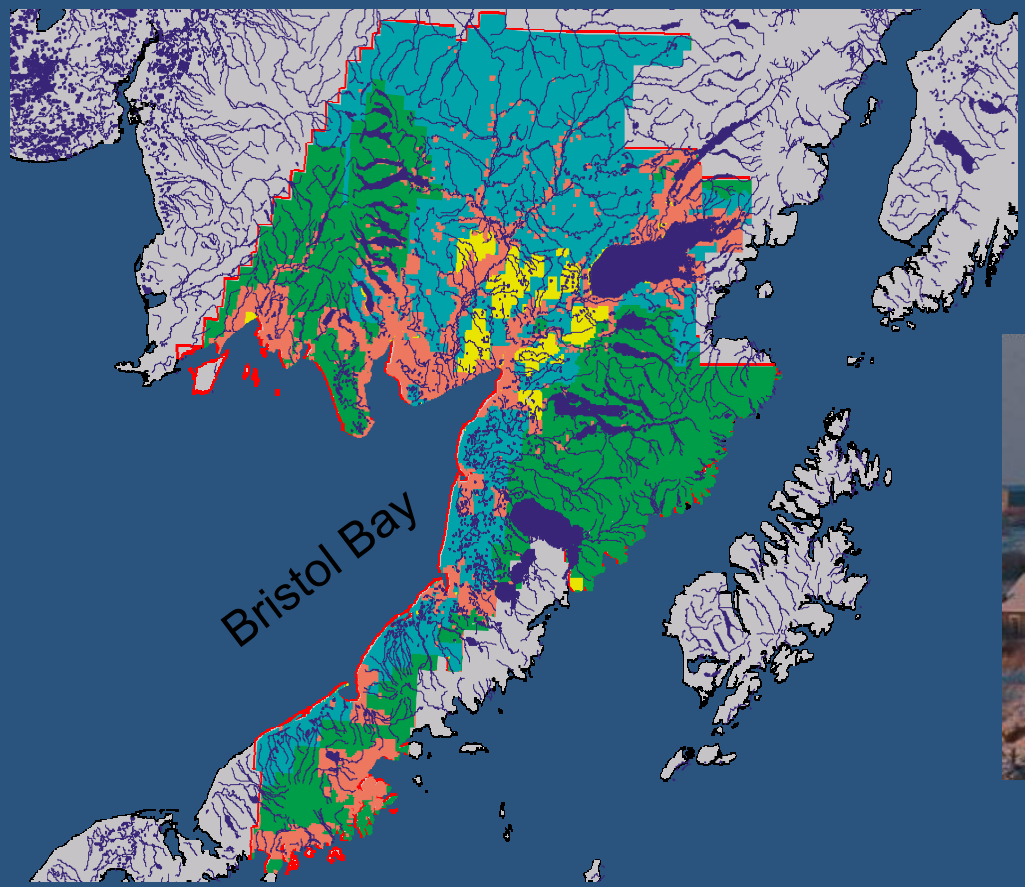
1. Region
2. Corporation

BBNC Story

Region

- 150 miles SW of Anchorage
- 34 million acres
- 29 villages
- Yup'ik, Aleut, and Athabascan
- Salmon watershed





- Conservation Lands
- State Lands
- Native Lands
- Federal Lands

- Subsistence
- Commercial Fishing
- Government
- Tourism
- Construction

BBNC Story

Corporation

- BBNC is one of only four regional corporations to add money to the original shareholders' endowment

- ANCSA capital received:
  - $32 million
  - 3 million acres
- Major investments:
  - Peter Pan Seafoods
    $13 million gain
  - Hilton Hotel $46 million gain

- Revenue ~$900 million
- Investment portfolio >$92 million today
- Dividends have increased steadily from $1 to $8.60 annually—totaling over $65 million since 1971

- Formed educational foundation with endowment in order to grant scholarships:
  - Given over $1 million
- Established shareholder management training program, *Training Without Walls*

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BBNC WINDS

Wind Feasibility Study
Bristol Bay Region
Alaska

Tiel Smith
Resource Manager
BBNC

Doug Vaught
Consultant
V3 Energy LLC

Grant Events

1. Objectives
2. Factors
3. Participants
4. Beginnings
5. Village Reports

Grant

Objectives

- Grant awarded September 2003 thru December 2006
- Install met towers, sensors, and data loggers
- Analyze wind data
- Assess existing power systems
- Survey renewable energy resource possibilities
- Perform computer modeling and economic analyses of wind power viability

Grant

Factors

Site considerations:

- Land ownership and use
- Geotechnology for foundations
- Possible historical and cultural resources
- Bird issues
- Equipment access for construction
- Access to power lines

Grant

Participants

Feasibility Study was cooperative effort financially and technically:

- Bristol Bay Native Corporation: personnel time and travel expenses for met tower installations and modeling and data management
- Alaska Energy Authority: purchase of met towers and data loggers, plus payment for equipment shipping
- Alaska Village Electric Cooperative: labor and other expenses for New Stuyahok and Togiak
- Individual Villages/Local Utilities: labor support and other expenses

Grant

Beginnings

Dillingham
October 2003
Project Kickoff:
SW Alaska Wind Energy Workshop

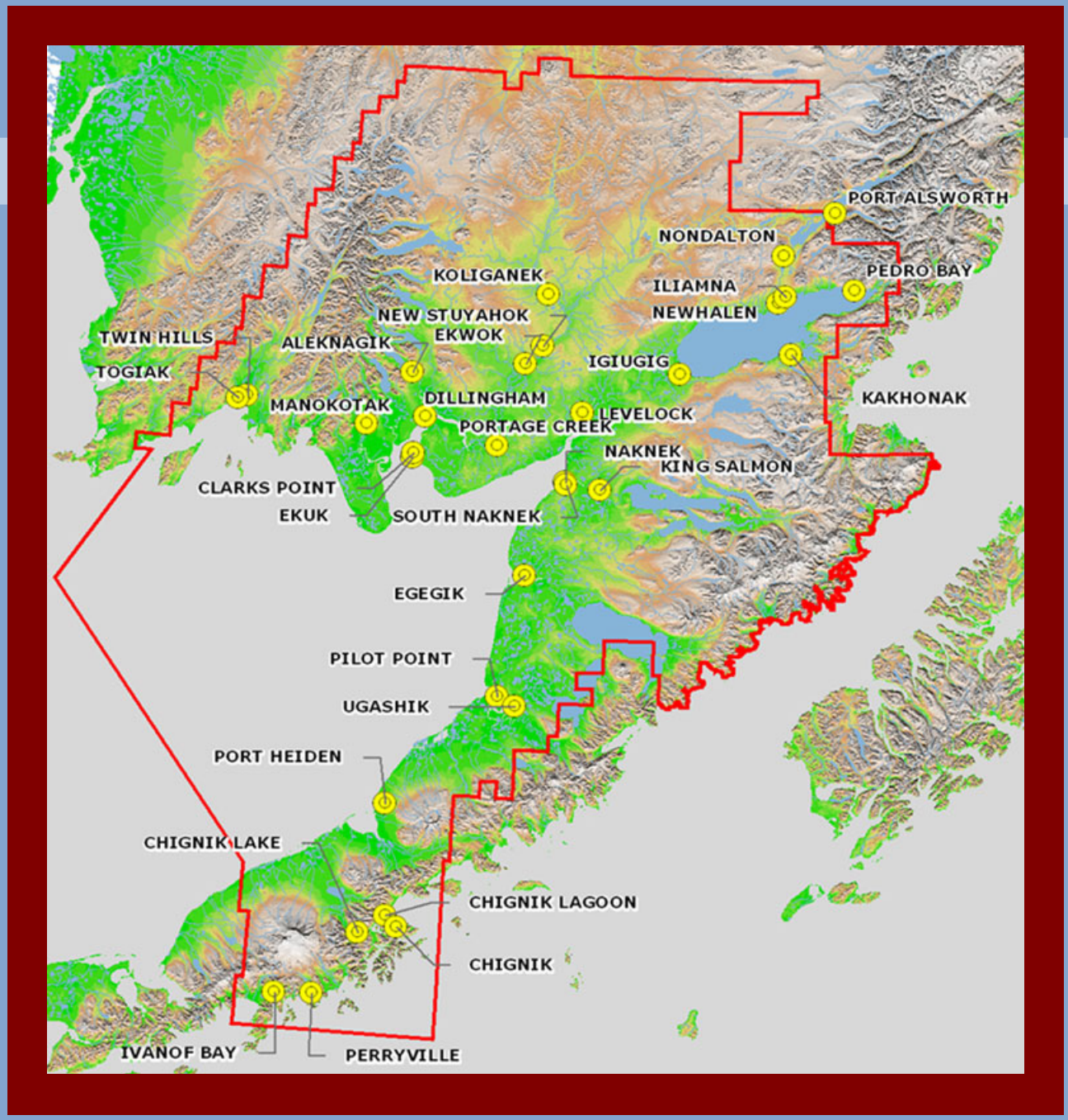
- Collaborative effort of BBNC, AEA, NREL, and 50 participants from W Alaska and Aleutians
- Discussed wind power development in SW Alaska

Grant

Village Reports

Villages monitored for wind resource:

- Dillingham/Kanakanak (2 locations)
- New Stuyahok
- Togiak
- Perryville
- Clark's Point
- Koliganek
- Naknek/King Salmon (2 locations)
- Kokhanok



- Wind speed measured at 30 meter height
- Wind power density measured at 50 meters

Dillingham/Kanakanak

Met Tower: Installed 4/23/04 and removed 10/5/05

Utility: Nushagak Electric Cooperative

Wind Speed Avg: 12.5 mph

Wind Power Density: 331 W/m^2

Wind Power Class: 3 (Fair)

Capacity Factor of Wind Turbines:

- NW100/20 at 32 m hub height = 19.4%
- Vestas V27 at 42 m hub height = 25.5%

Stall Controlled Turbine

Pitch Controlled Turbine

Present Status:

- NEC Board decided in March 2006 to not consider wind power but instead concentrate on diesel efficiency
- Strong community interest in wind power combined with fuel price increases may eventually influence the utility to reconsider

New Stuyahok

Met Tower: Installed 10/10/03 and removed 7/7/05

Utility: Alaska Village Electric Cooperative

Wind Speed Avg: 12.7 mph

Wind Power Density: 435 W/m^2

Wind Power Class: 4 (Good)

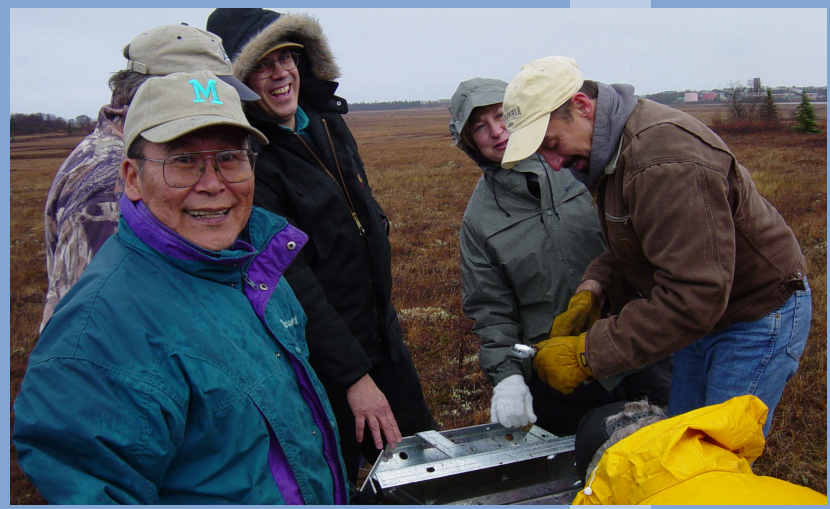
Note: Density and Class were affected by wind shear which skewed the data; both will be recalculated for the final report

Capacity Factor of Wind Turbines:

- NW100/20 at 32 m hub height = 19.3%

Present Status:

- AVEC considering wind/diesel hybrid design for pending powerplant



Togiak

Met Tower: Installed 8/31/04 and still collecting data

Utility: Alaska Village Electric Cooperative

Wind Speed Avg: 12.5 mph

Wind Power Density: 307 W/m^2

Wind Power Class: 3 (Fair)

Capacity Factor of Wind Turbines:

- NW100/20 at 32 m hub height = ~17%

Present Status:

- AVEC considering win/diesel hybrid design for pending powerplant upgrade project

Perryville

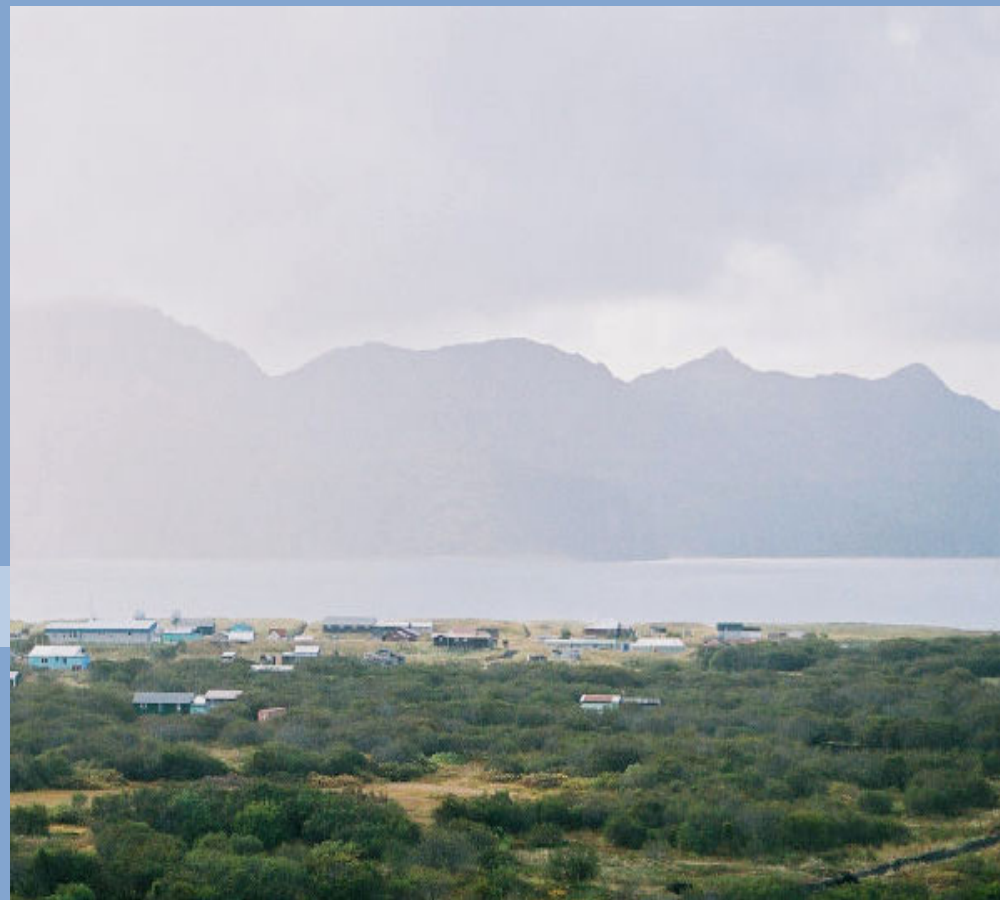
Met Tower: Installed 10/9/04 and still collecting data

Utility: Native Village of Perryville

Wind Speed Avg: 10.6 mph

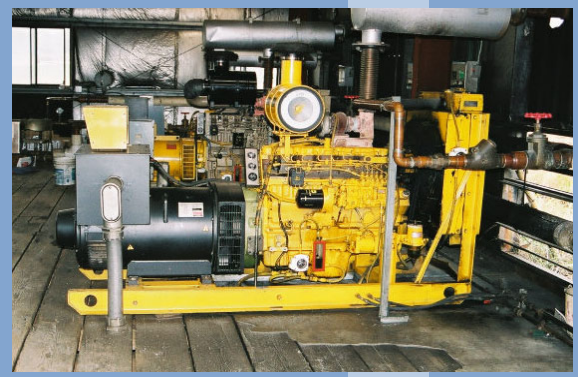
Wind Power Density: 250 W/m^2

Wind Power Class: 2 (Marginal)



Capacity Factor of Wind Turbines:

- NW100/20 at 32 m hub height = 14.7%



Present Status:

- Perryville motivated to build a renewable energy project, but wind resource is too low for wind power
- NOTE: At the beginning of the grant, we thought Perryville would have the best wind

Clark's Point

Met Tower: Installed 7/6/05 and removed 7/12/06

Utility: City of Clark's Point

Wind Speed Avg: 15.6 mph

Wind Power Density: 420 W/m^2

Wind Power Class: 4 (Good)

Capacity Factor of Wind Turbines:

- NW100/20 at 32 m hub height = 30.9%

Present Status:

- No project planned at this time
- Clark's Point was the second best site tested for the grant project

Koliganek

Met Tower: Installed 7/8/05 and removed 7/13/06

Utility: Koliganek Village Council

Wind Speed Avg: 12.9 mph

Wind Power Density: 319 W/m^2

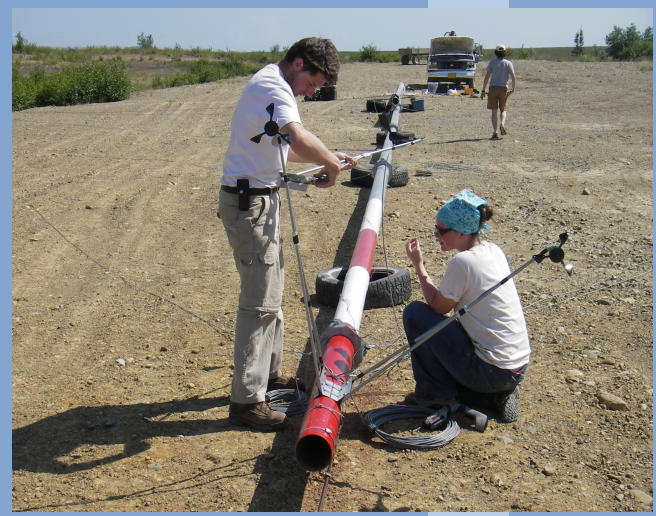
Wind Power Class: 3 (Fair)

Capacity Factor of Wind Turbines:

- NW100/20 at 32 m hub height = 20.2%

Present Status:

- No project planned at this time



Naknek

Met Tower: installed 7/27/04 and removed 7/19/06

Utility: Naknek Electric Association

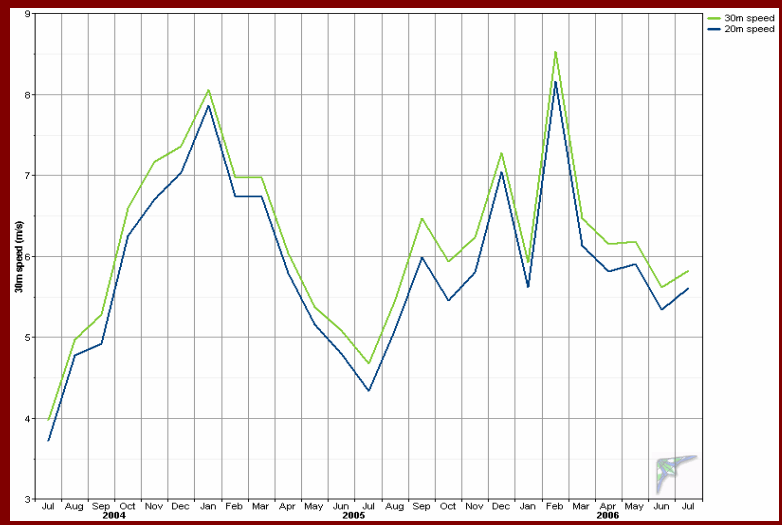
Wind Speed Avg: 13.9 mph

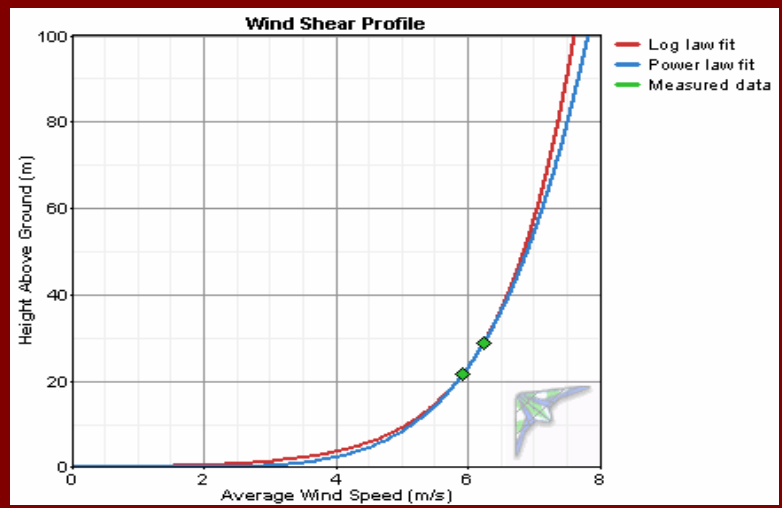
Wind Power Density: 383 W/m^2

Wind Power Class: 3 (Fair)

Capacity Factor of Wind Turbines:

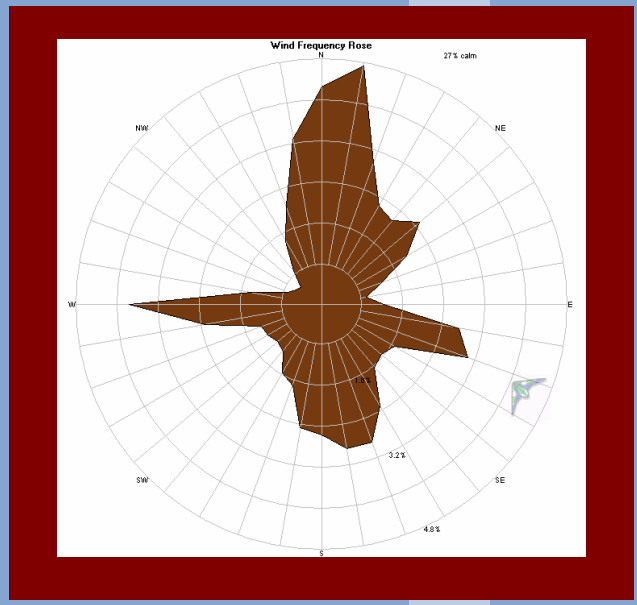
- NW100/20 at 32 m hub height = 25.2%

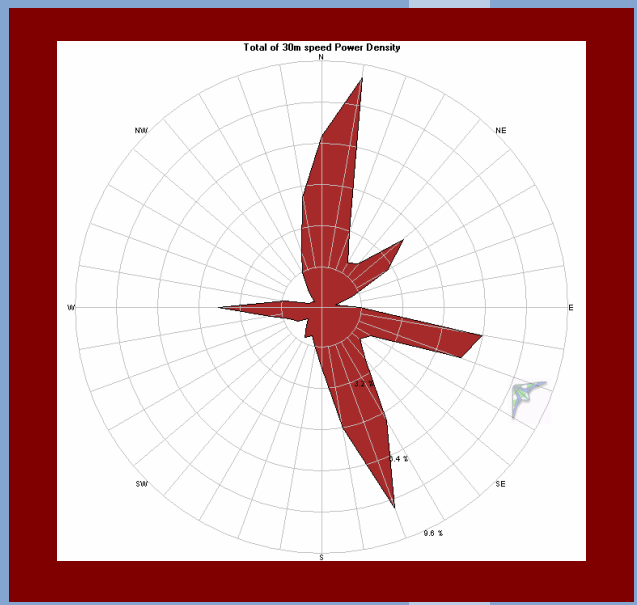




Present Status:

- NEA is interested in a wind turbine project
- The met tower was moved to a new site in July 2006 for wind resource assessment
- Wind resource assessment will continue past the end of the grant





Kokhanok

Met Tower: Installed 8/12/04 and removed 6/14/06

Utility: Kokhanok Village Council

Wind Speed Avg: 17.2 mph

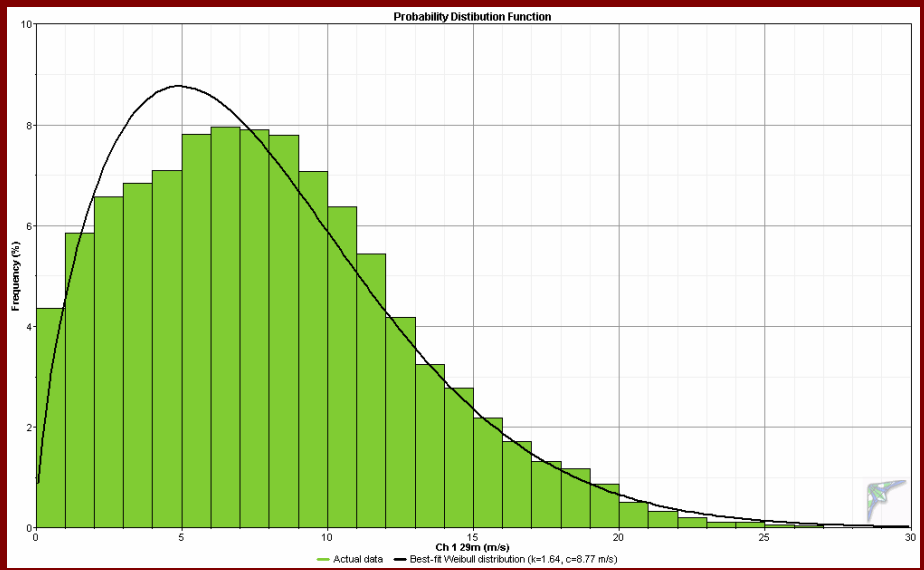
Wind Power Density: 704 W/m^2

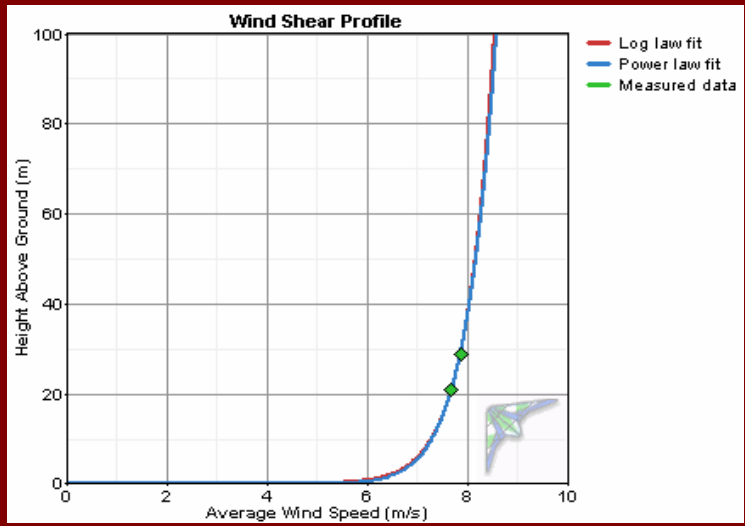
Wind Power Class: 6 (Outstanding)

Capacity Factor of Wind Turbines:

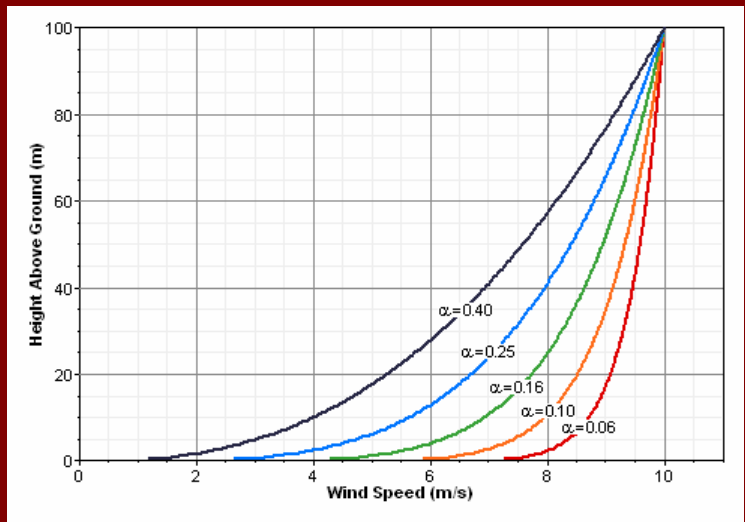
- NW100/20 at 32 m hub height = 38.8%

Probability Distribution of Wind Speeds



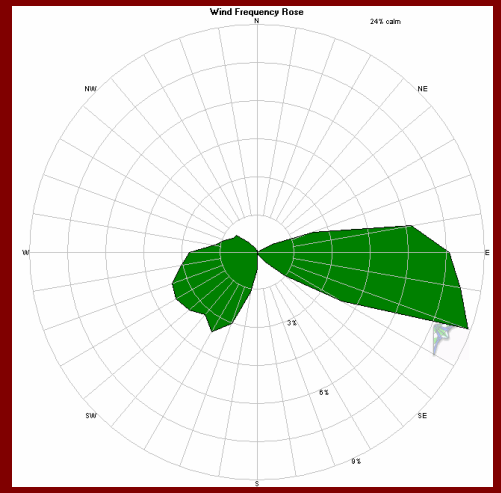


Wind Shear Profile

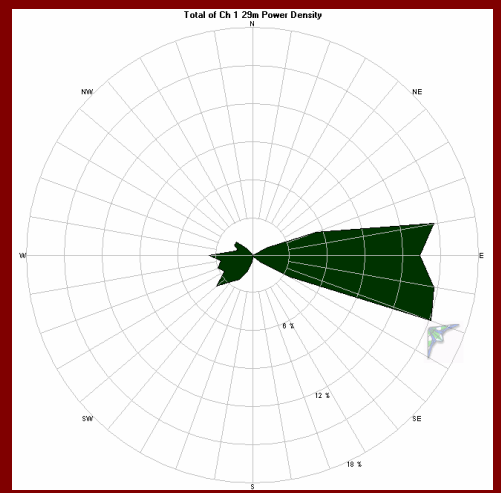


Present Status:

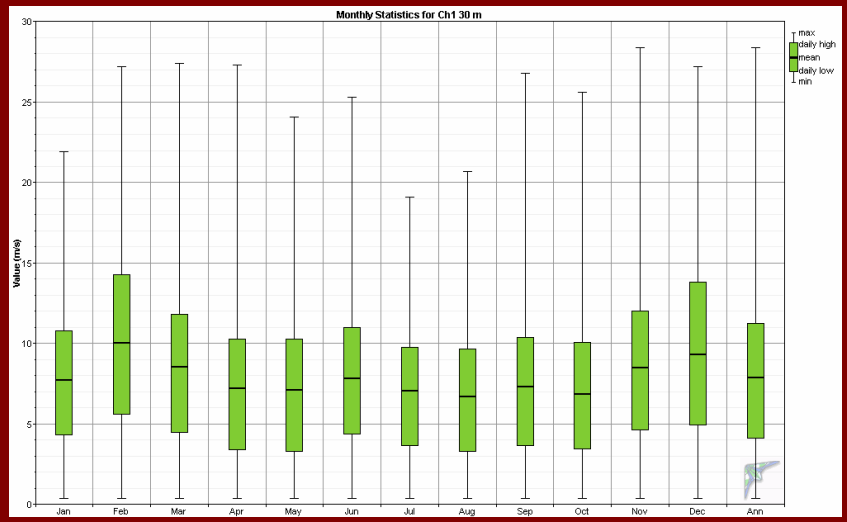
- Kokhanok has the highest winds measured in the grant
- Received a $148,000 state grant in July 2006 to begin a wind power project
- Total project cost likely to be ~$500K range



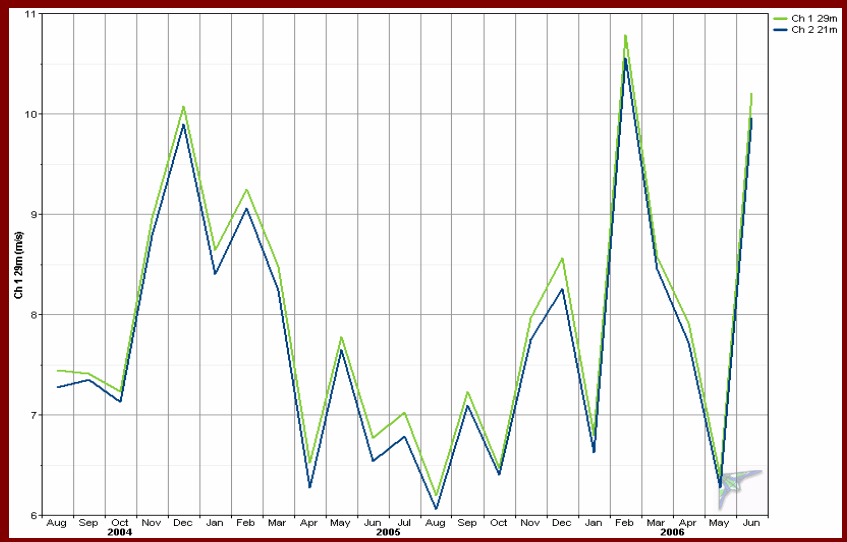
Wind Frequency Rose



Power Density Rose



Monthly Wind Speed Averages



Turbulence Intensity