Iowa Tribe of Oklahoma Wind Feasibility Study

IOWAS OF OKLAHOMA

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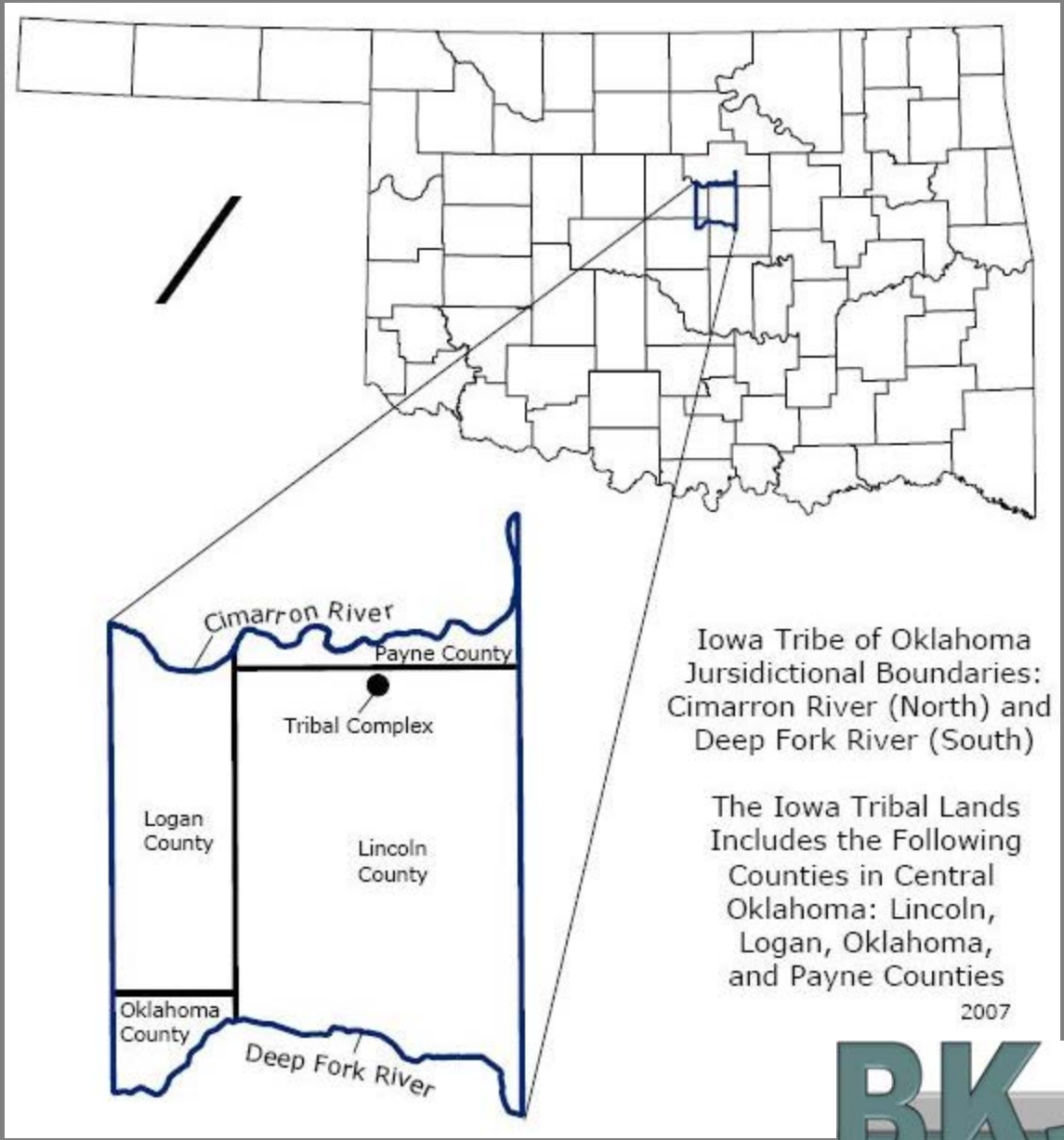
ORGANIZATION

- Iowa Tribe of Oklahoma
  - Federally Recognized Indian Tribe
  - Central Oklahoma (between OKC & Tulsa)
  - Strong Commitment to Energy Efficiency & Renewables
- BKJ Solutions, Inc.
  - Tribally Owned Construction Company
  - Construction with USACE, IHS, BIA & Tribe

Iowa Tribe of Oklahoma's traditional jurisdictional lands



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FEASIBILITY GRANT

- Objectives
  - Conduct in-Depth Feasibility Study of Wind Energy
  - Identify & Address Technical Issues Related to Wind Energy Development
    - Land Access
    - Anemometer Siting
    - Interconnect & Transmission Opportunities

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FEASIBILITY GRANT

- Objectives Cont.
  - Address Environmental Issues
  - Educate Stakeholders
    - Iowa Tribal Leadership
    - Iowa Tribal Members
    - Office of Environmental Services
- Goal
  - Quantify Wind Resource Potential
  - Determine if Wind Farm is Option

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BACKGROUND

- Tribal NREL Study
  - ➢2001 Anemometer Study – 5 ms @ 20 Meters
  - ➢Collected Interesting, but Unusable Information
  - ➢Wind Estimated to be 7 to 8 ms at Hub Height
- Anemometer Site Changed Three Times
- HUB Height Changed from 80m to 60m
- SODAR
- Worked Through Changes with DOE
  - ➢NEPA, SOPO & Revised Budget

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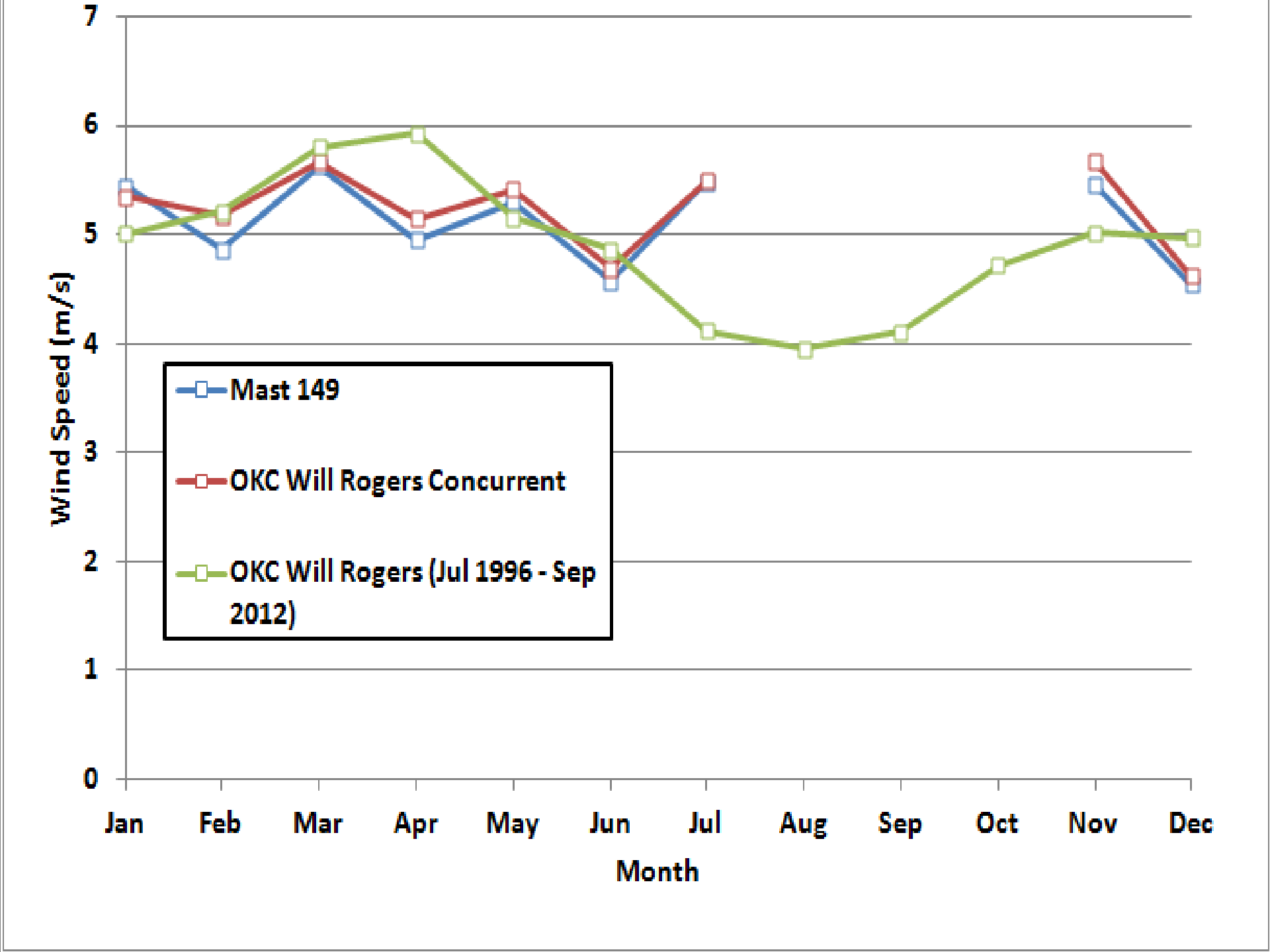
7
6
5
4
3
2
1
0
Wind Speed (m/s)
Mast 149
OKC Will Rogers Concurrent
OKC Will Rogers (Jul 1996 - Sep 2012)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

Month-Year	Mast 0149	
	57.4-m Speed (m/s)	Data Recovery
Nov-11	5.69	88.5%
Dec-11	4.54	99.8%
Jan-12	5.45	100.0%
Feb-12	4.87	100.0%
Mar-12	5.63	100.0%
Apr-12	4.95	100.0%
May-12	5.31	100.0%
Jun-12	4.57	100.0%
Jul-12	5.48	6.5%
Period of Record	5.12	99.5%
Annualized Speed	N/A	

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Site Information:

Project: JCI Iowa Tribe, OK

Location: OK, USA

Elevation: 281m

Sensor on channel 1:

NRG #40C Anem m/s

Height: 57m

Serial #: 184604

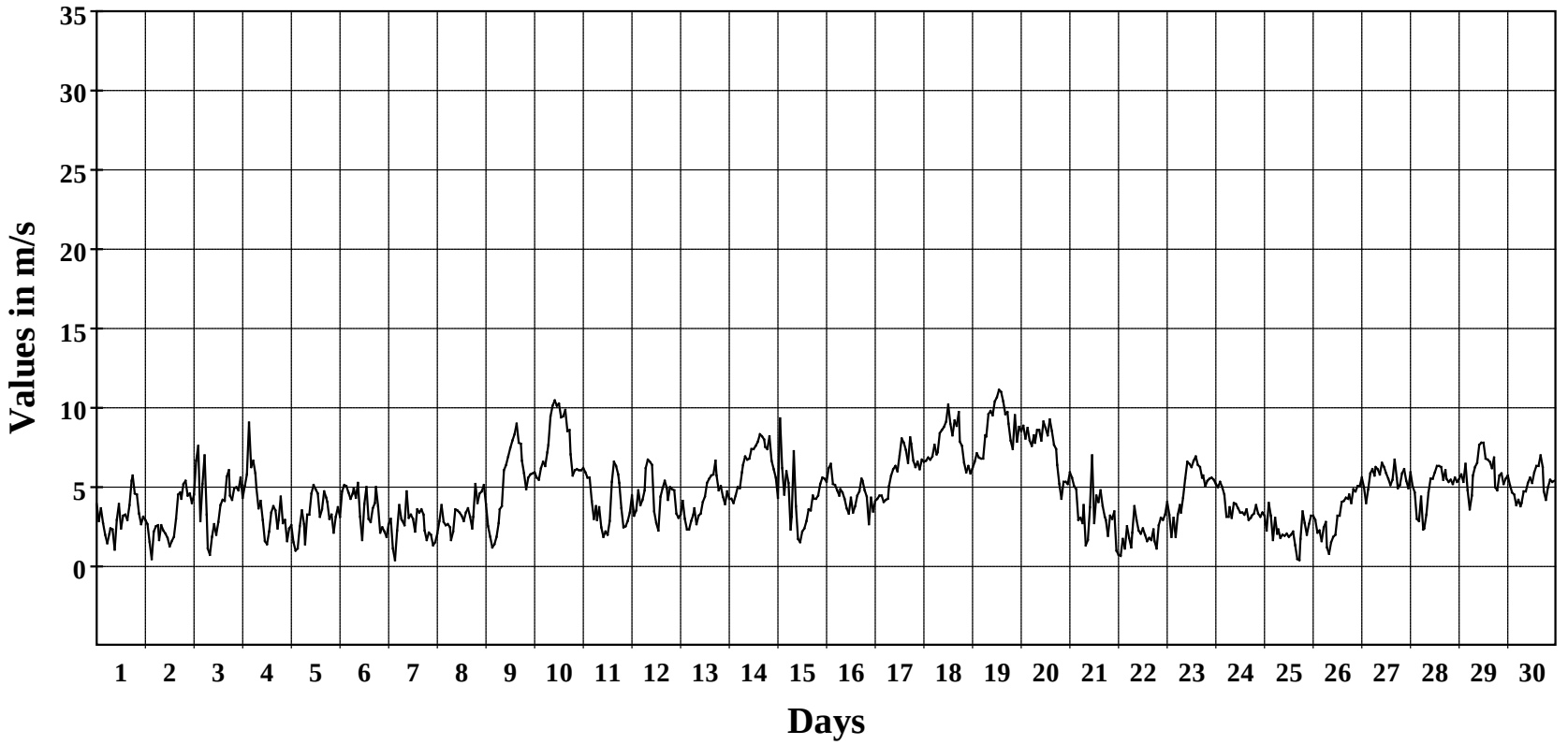
June 2012

Hourly Averages Graph Ch 1

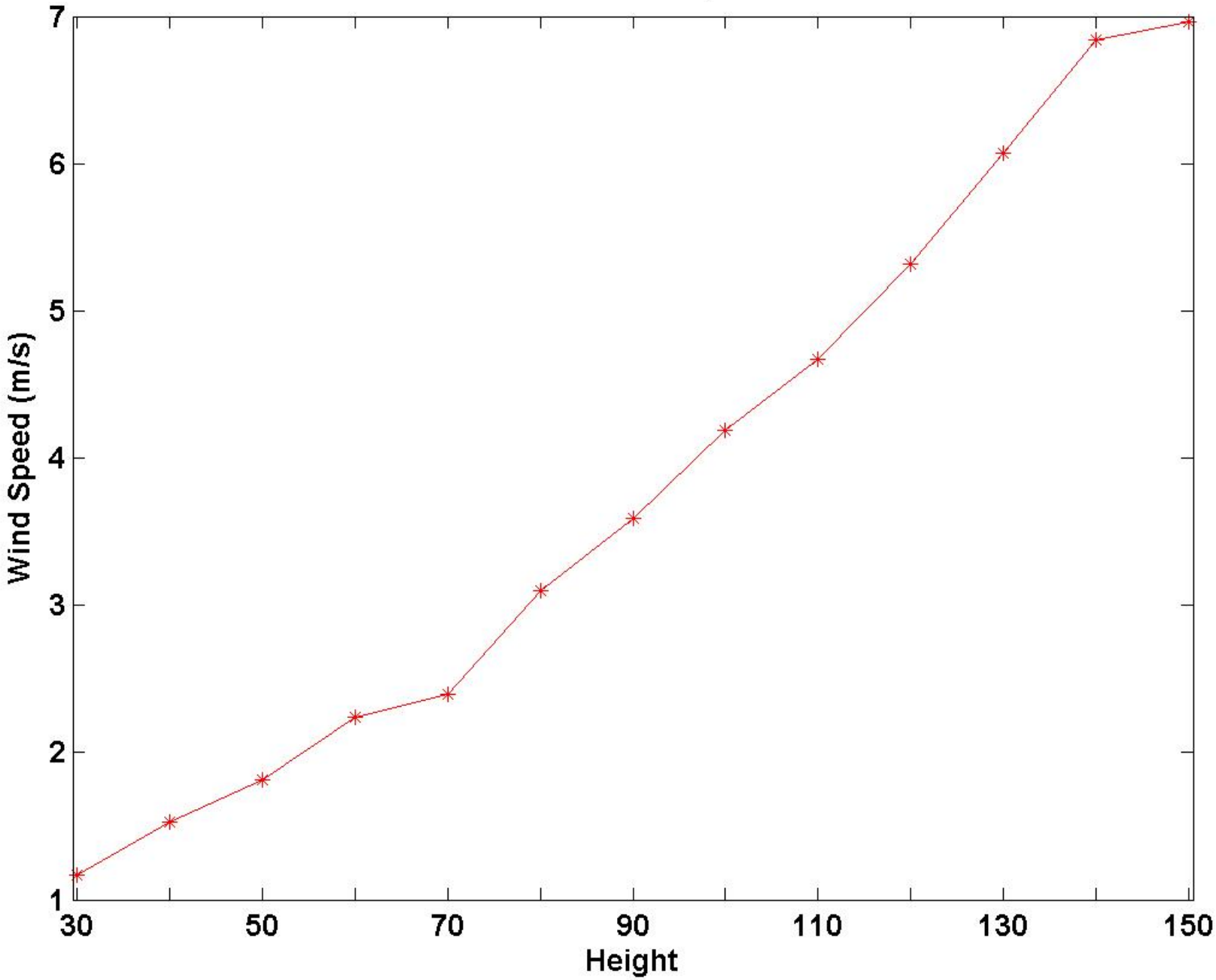
SITE 0149

JCI Iowa Tribe, OK

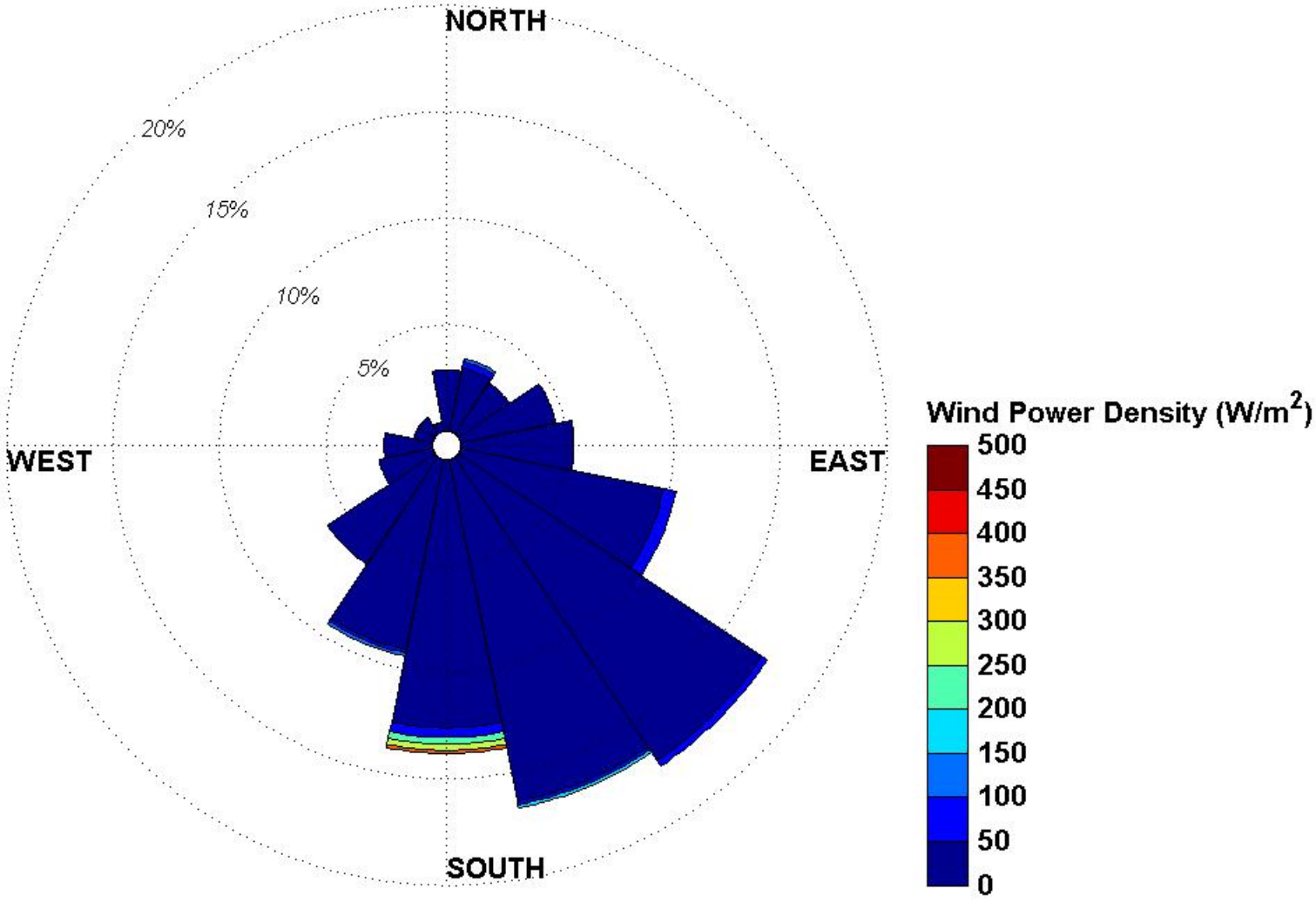
Average Hourly Values



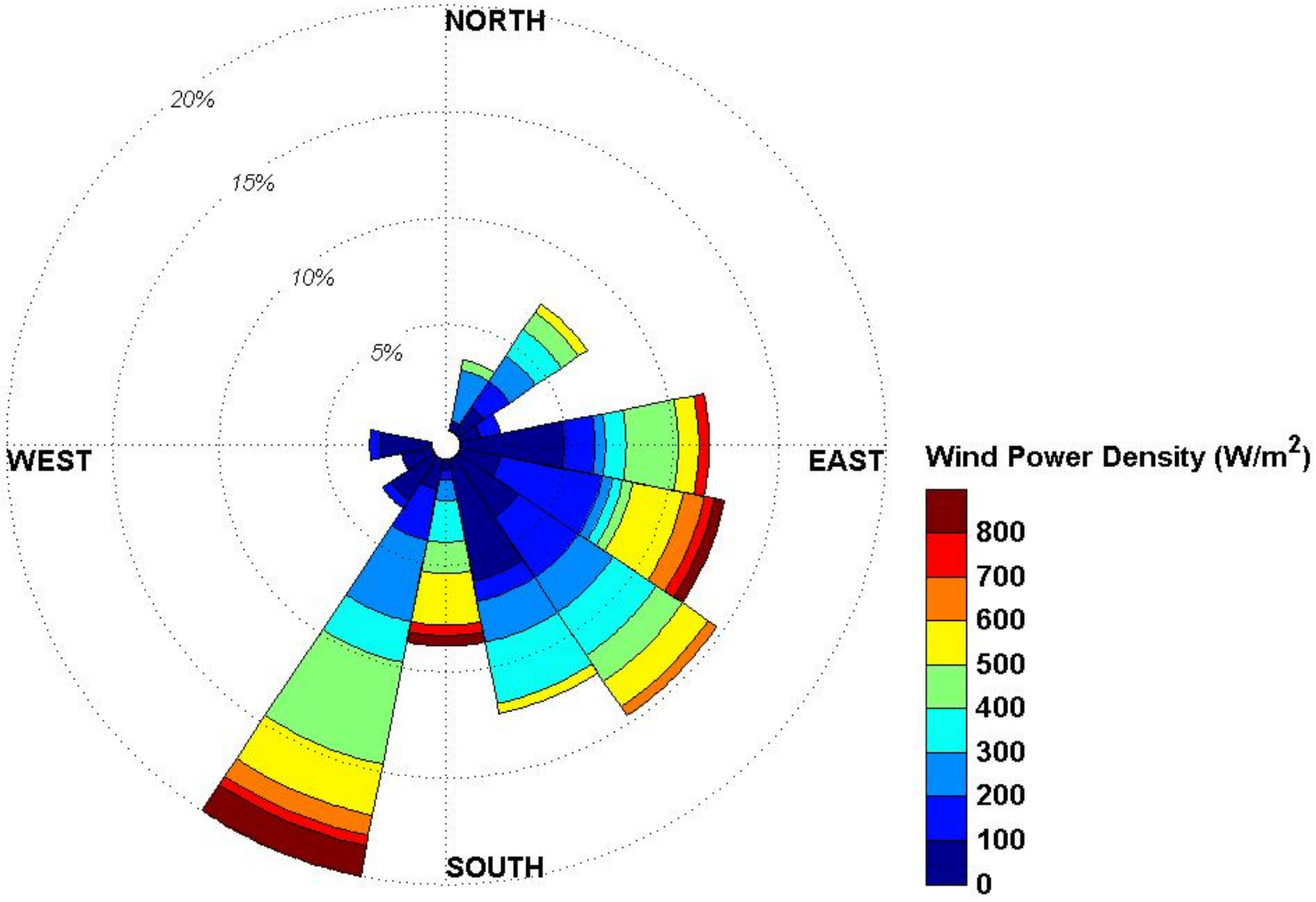
Average Value: 4.7


06/01/12 - 06/30/12 Mean Wind Speed from ASC Sodar
Wind Speed (m/s)
Height
1
2
3
4
5
6
7
30
50
70
90
110
130
150

06/01/12 - 06/30/12 Perkins, OK ASC #44000 60m Wind Power Density Rose



06/01/12 - 06/30/12 Perkins, OK ASC #44000 150m Wind Power Density Rose



Preliminary Results

- Wind Data Not Supporting Current Location
  - Wind Speed too Low
  - Favorable at Higher Elevation, But Costly
  - Topographical Obstructions
  - Transmission (Substation Required)
- Wind Near Complex Expected to Be Better
  - Higher Elevation
  - Fewer Obstructions
  - Substation to North Within 2.5 Miles
  - Wind Map

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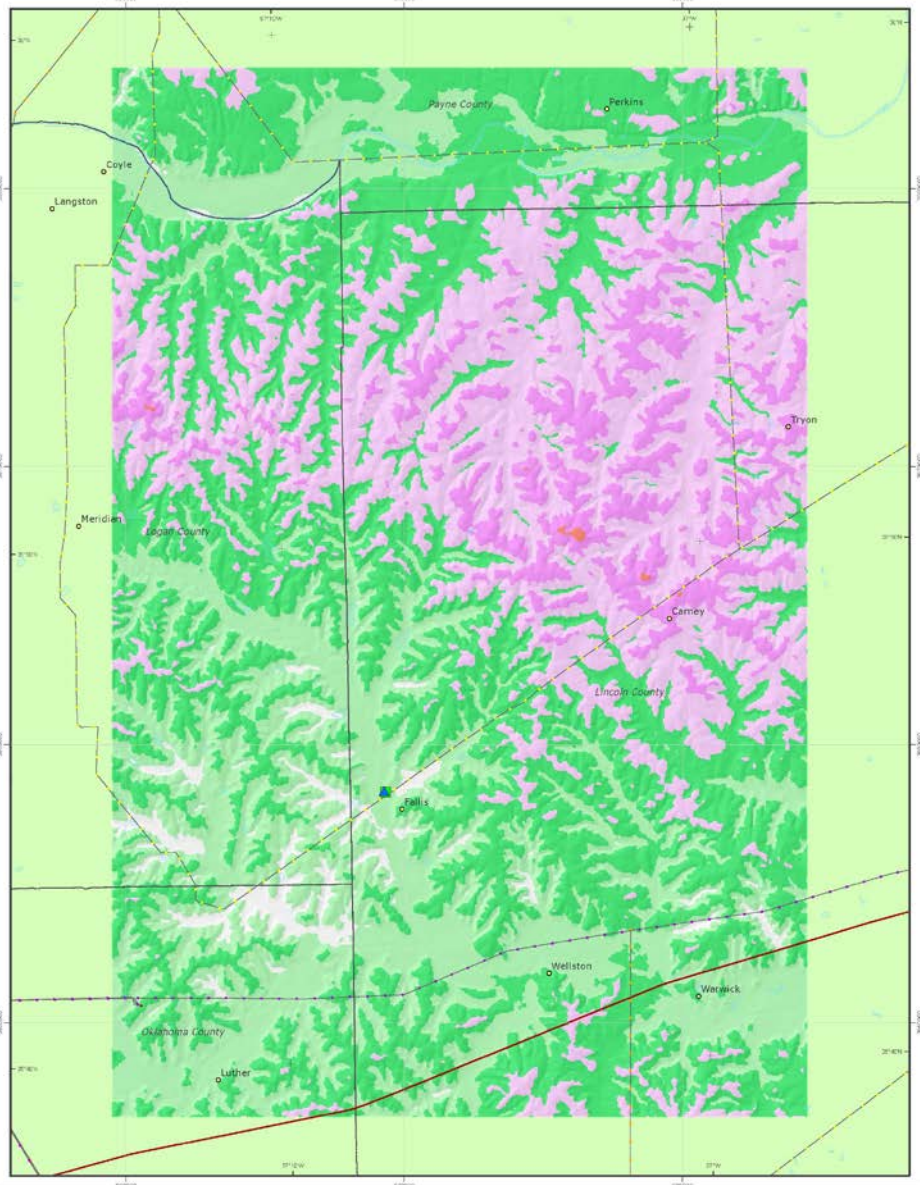

WIND RESOURCE OF THE IOWA TRIBE OF OKLAHOMA WIND PROJECT

Mean Annual Wind Speed at 80 Meters

Inset

Legend

Mean Annual Speed at 80 m

m/s	mph
< 5.75	< 12.9
5.75 - 6.00	12.9 - 13.4
6.00 - 6.25	13.4 - 14.0
6.25 - 6.50	14.0 - 14.5
6.50 - 6.75	14.5 - 15.1
6.75 - 7.00	15.1 - 15.7
7.00 - 7.25	15.7 - 16.2
> 7.25	> 16.2

Measurement Location
- Meteorological Tower
- Sodar
- City
- Interstate
- State Boundary
- County Boundary
- Water Body

Transmission Category
- Under 100 kV
- 100 kV- 161 kV
- 345 kV
- Step-Up

Product

Wind Resource Map

Originator

Disclaimer

Reference

AWS Truepower

Where science delivers performance.

Lessons Learned

- Find the Best Area to Place Met Tower
  - Land
  - Use Existing Wind Data
  - Transmission Opportunities
- Use a Redundant System
  - SODAR with Met Tower is a Great Combination
  - Data Correlation / Redundancy
  - Avoids Collection Disasters (Logger & SODAR)
- Find the Best Resources
  - Hire Expertise to Avoid Future Headaches

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Activities to Come

- Move SODAR Unit near Complex
  - Collect Data
  - If Favorable, Erect Met Tower
- Analyze Complete Year of Data
- Decision About Project Direction
- Generate Final Report
  - Wind Analysis
  - Site Analysis
  - Transmission Considerations
  - Environmental Impact

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FINAL THOUGHTS

- Gather Information from Multiple Sources
- Challenge the Information
- Anticipate Surprises / Nothing will Go as Planned or Budgeted
- Consider Purchasing Used Equipment
- Work with the DOE
  - Supportive & Knowledgeable
  - Have Patience
  - Visit DOE in Golden to Resolve Issues in person

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