

AGU, Dec. 2014

Hydrokinetic Energy Research in Alaska

Northwest National Marine Renewable Energy Center

University of Alaska Fairbanks



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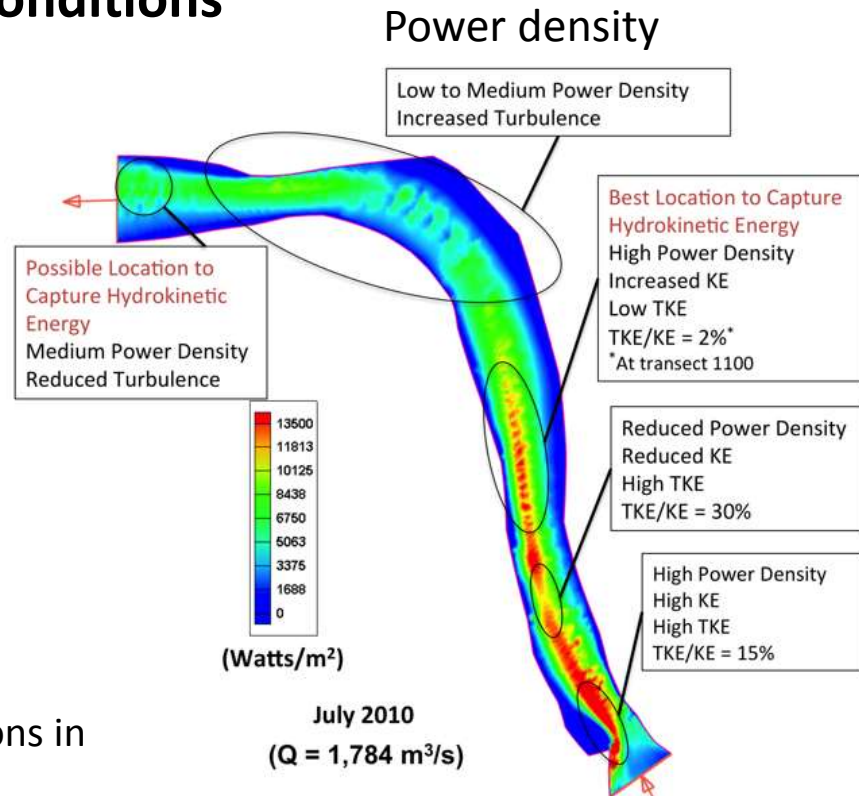
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Tanana River Test Site (PMEC TRTS)

Permitted Site for Hydrokinetic Research and Testing in Natural Alaskan River Conditions

- Complete site characterization
 - Hydrodynamic measurement & modeling
 - Discharge, velocity, sediment, turbulence
 - Endemic fish species
 - Debris (size, type, frequency, location)
- Technology development, testing and modeling
 - Debris modeling and mitigation
 - River energy converter testing
 - Fish interaction monitoring
 - Infrastructure anchoring, deployment and operations in remote communities with islanded grids



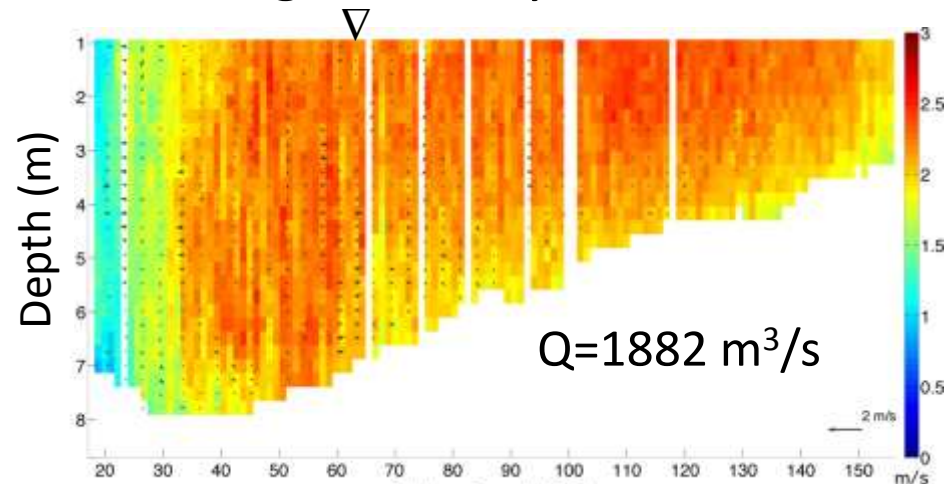
(Modified from Duvoy and Toniolo, 2012)

Hydrodynamic Measurements and Turbulence

Analysis

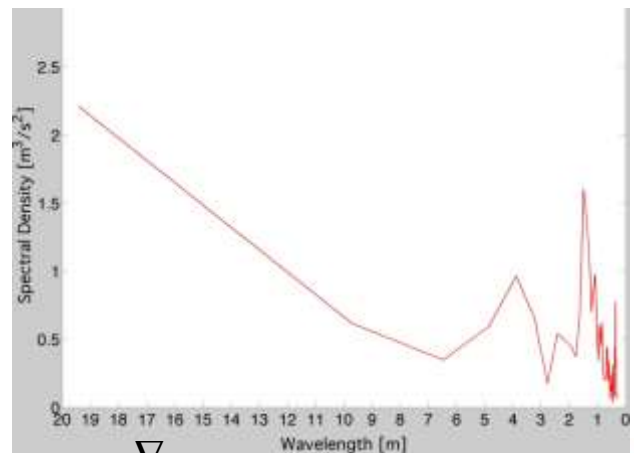
Vertical wavelength of turbulence

Average Velocity [m/s]

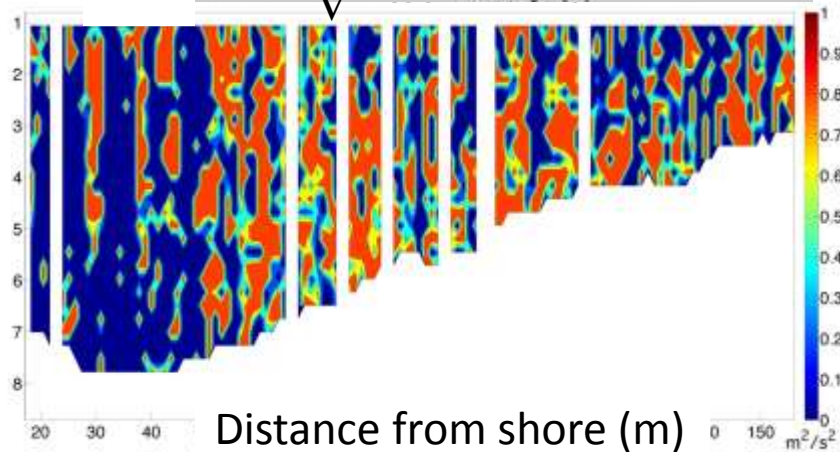


Distance from shore (m)

Cross channel
fluctuations (v'^2 ,
 m^2/s^2)



Depth (m)



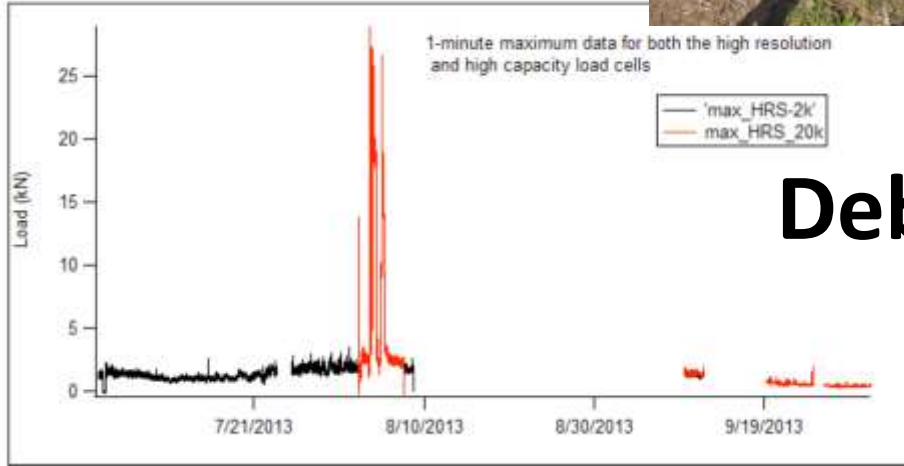
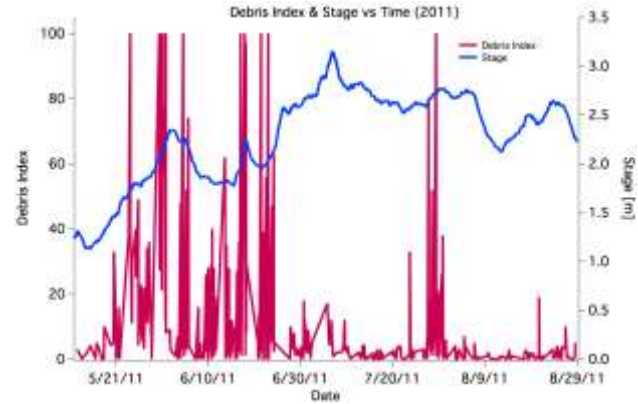
Distance from shore (m)

Interaction



Yukon at Ruby

Characterization



Debris

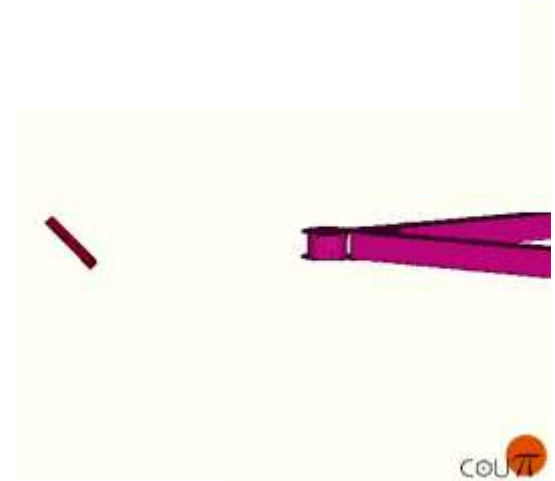
Mitigation



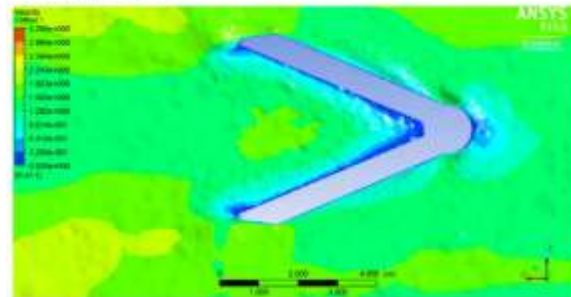
Debris Mitigation Technology Testing and Modeling

RDDP/debris interaction modeling

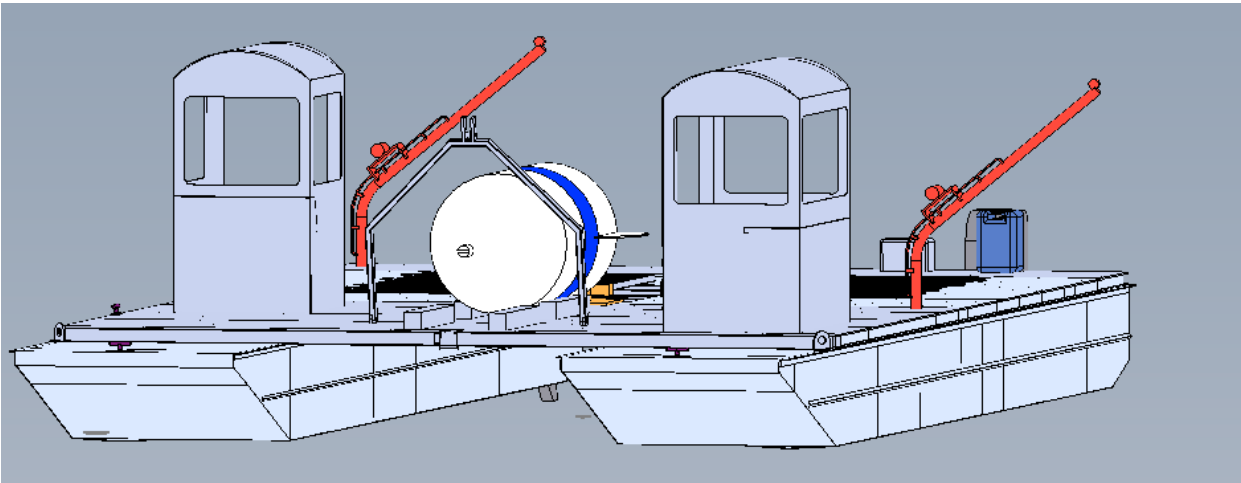
RDDP debris diversion test



Velocity at free surface:



Turbine and infrastructure test and measurement platform



M·J·Murdock
Charitable Trust

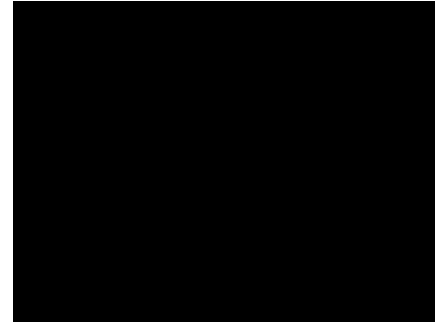


Turbine Testing at the Tanana River Test Site

Turbine Test Platform and RDDP

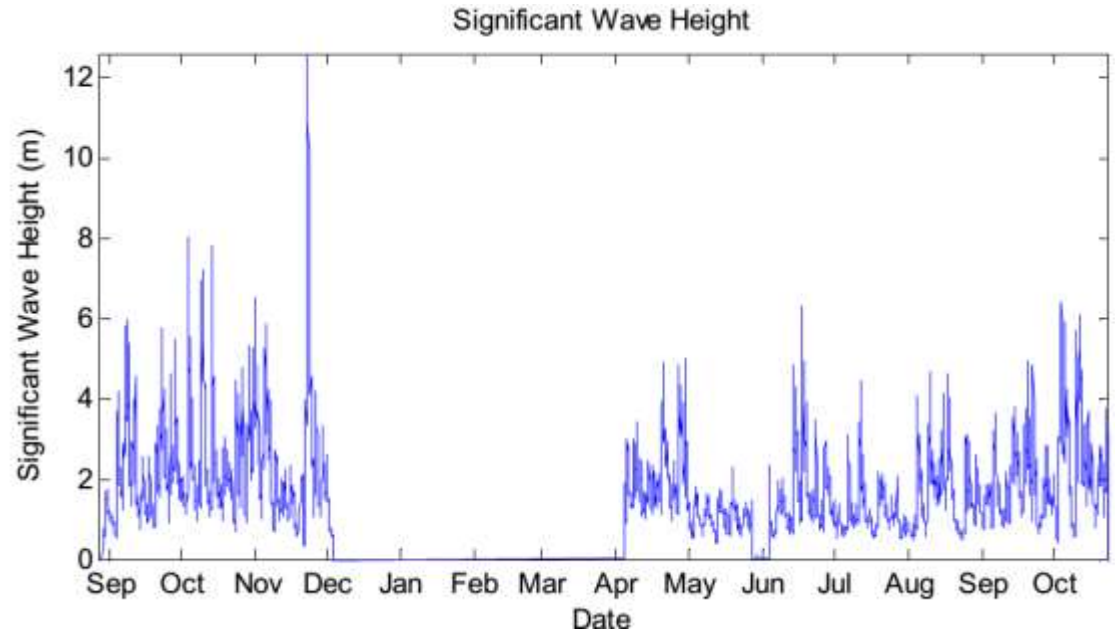


Oceana Turbine Testing

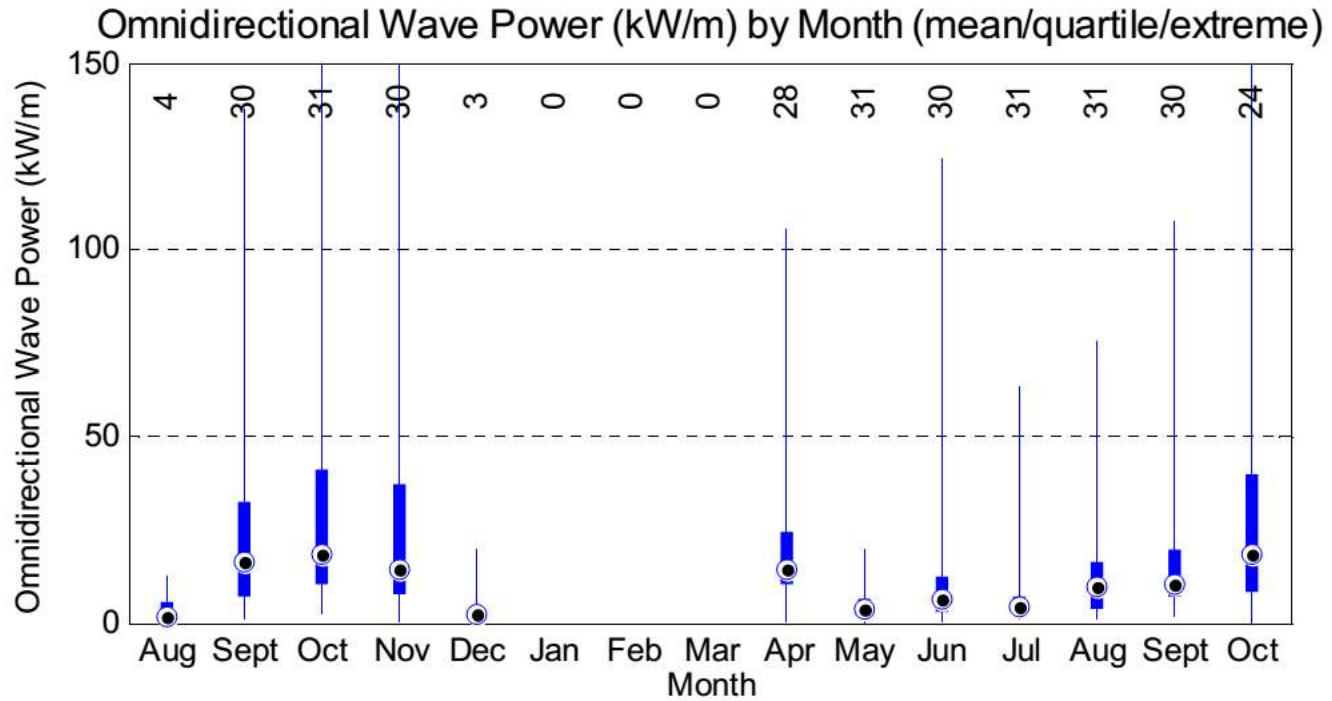


UAA

Mobile Monitoring and Assessments Capabilities: Yakutat Wave Energy Resource Assessment

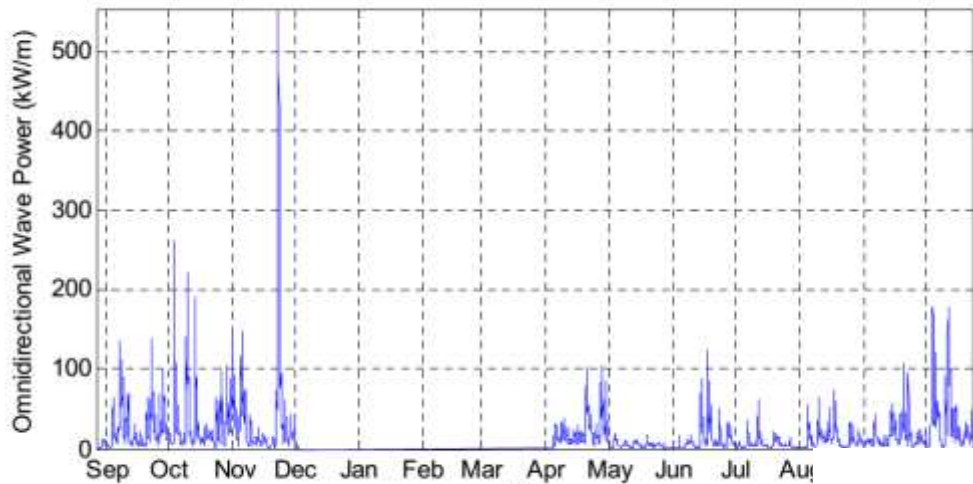


2013-2014



2013-2014

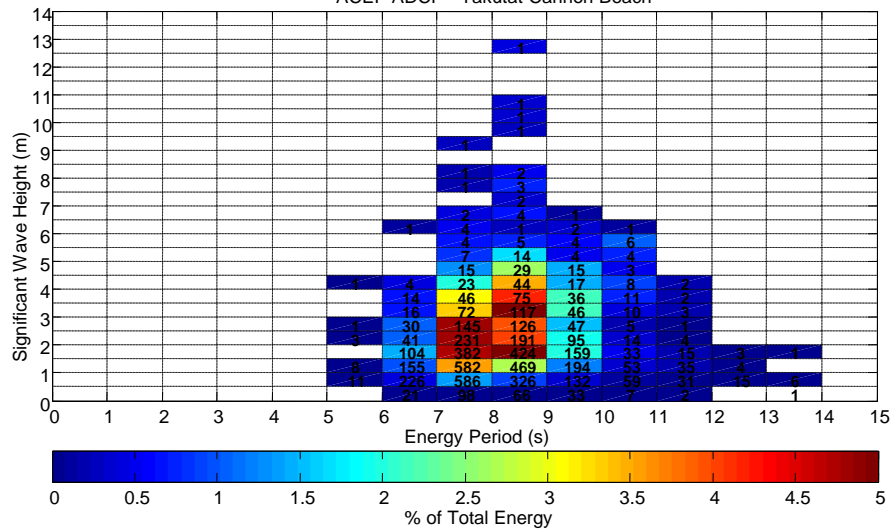
Omnidirectional Wave Power



2013-2014



ACEP ADCP - Yakutat Cannon Beach



SWAN Modeling of Nearshore Resource



Summary

- UAF operates the Tanana River Test Site (PMEC TRTS)
 - Test site for river hydrokinetic energy converters, infrastructure and related technology
 - Development of resource characterization techniques and validation
- Mobile assets suitable for river, tidal and wave resource assessments in remote areas as well as for characterization of debris, bathymetry, sediment and fisheries
- Unique DEM modeling capabilities for analyzing the performance (and design) of hydrokinetic energy infrastructure and technology

Acknowledgements



A special thanks to: the City of Nenana, the Nenana Tribal Council, Jason Mayrand, Victor Lord, Robin Campbell, Inland Barge Service, Charlie Hnilicka, Ruby Marine Inc., Matt Sweetsir, Crowley Marine Services, Endil Moore, Jon's Machine Shop, the City and Borough of Yakutat.

