

Tidal Energy Overview

Southeast Conference Mid-Session Summit

February 27, 2013

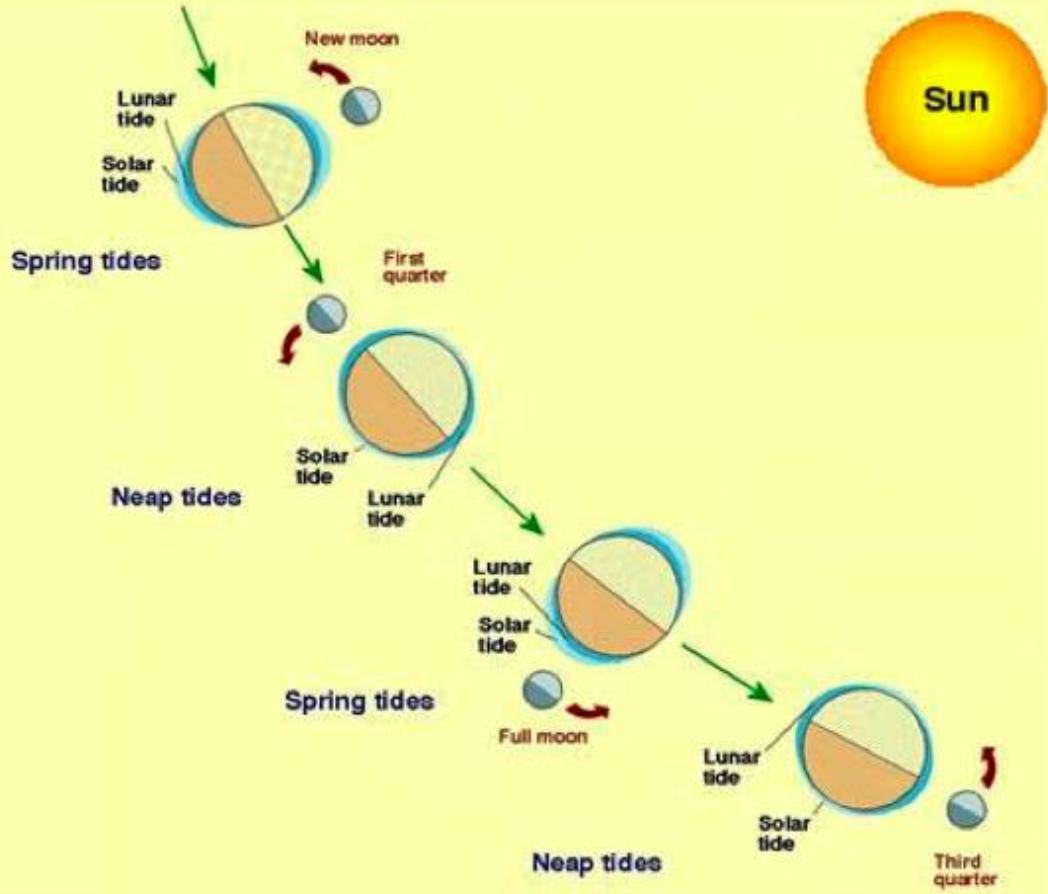


D. Douglas Johnson, Director of Business Development

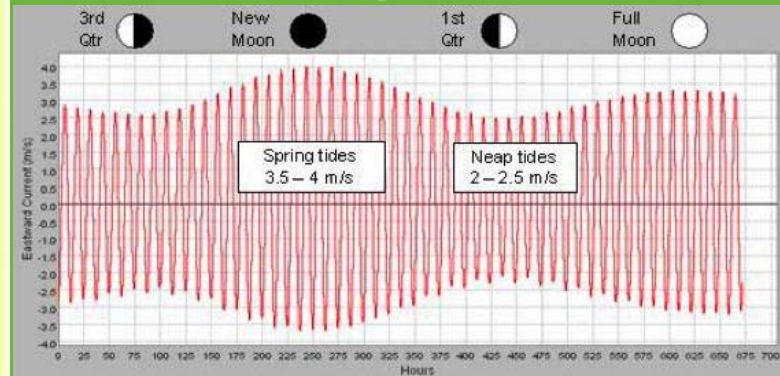
Company Overview

- Ocean Renewable Power Company (ORPC) is a developer of hydrokinetic power systems and commercial projects for tidal, river and ocean current power generation.
- ORPC Alaska is a wholly owned subsidiary of Ocean Renewable Power Company.
- Business development activities are focused on the Bay of Fundy (Maine and Nova Scotia) and Alaska.
- Lead project is the Maine Tidal Energy Project through which ORPC is developing power system technology and project sites. This expertise is being transferred to develop projects in Alaska.
- Founded 2004 - now 28 employees in Maine and Alaska.

Tidal Energy - the Resource

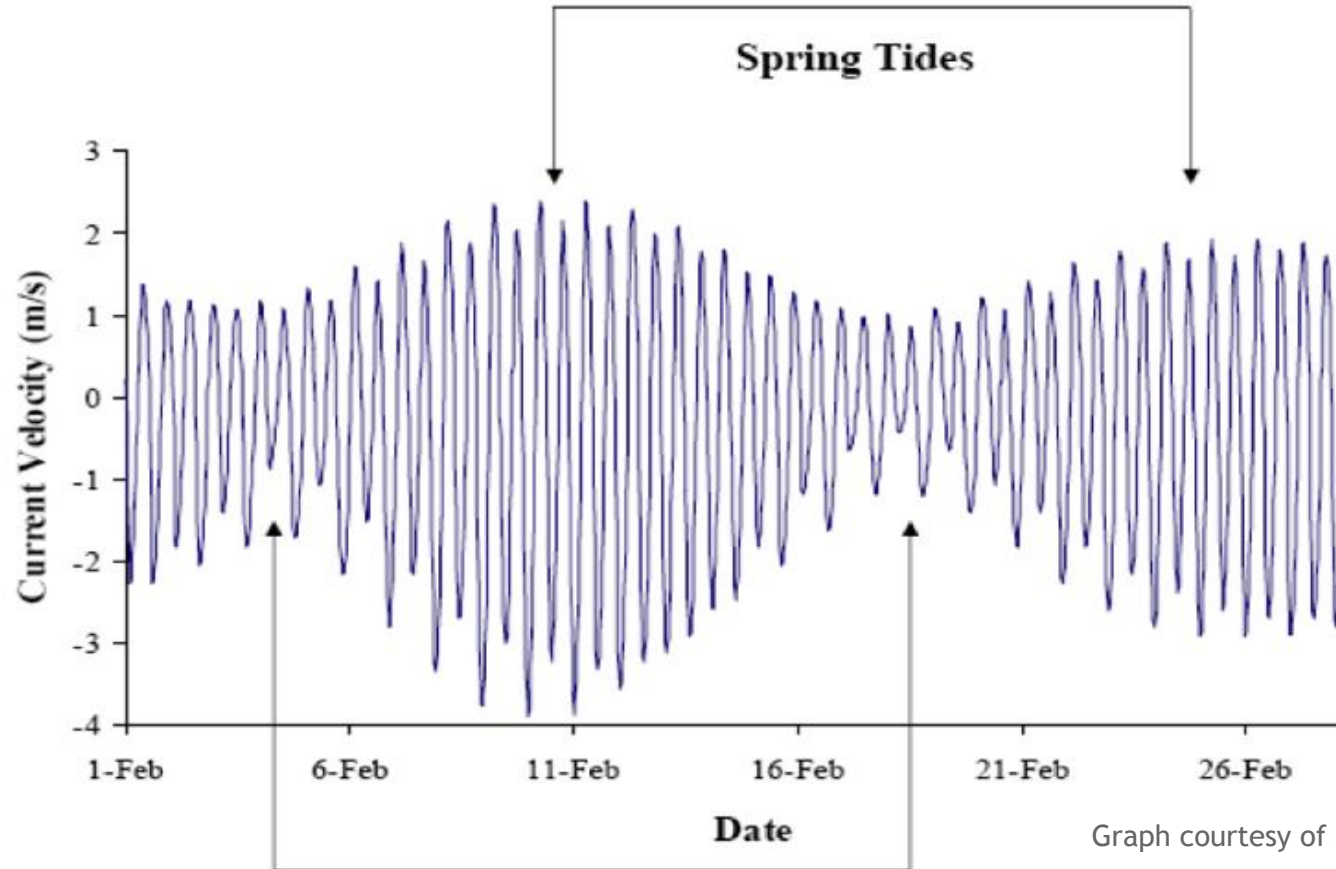


The Tidal Cycle - driven by the gravity of the Moon and Sun



Tidally generated currents

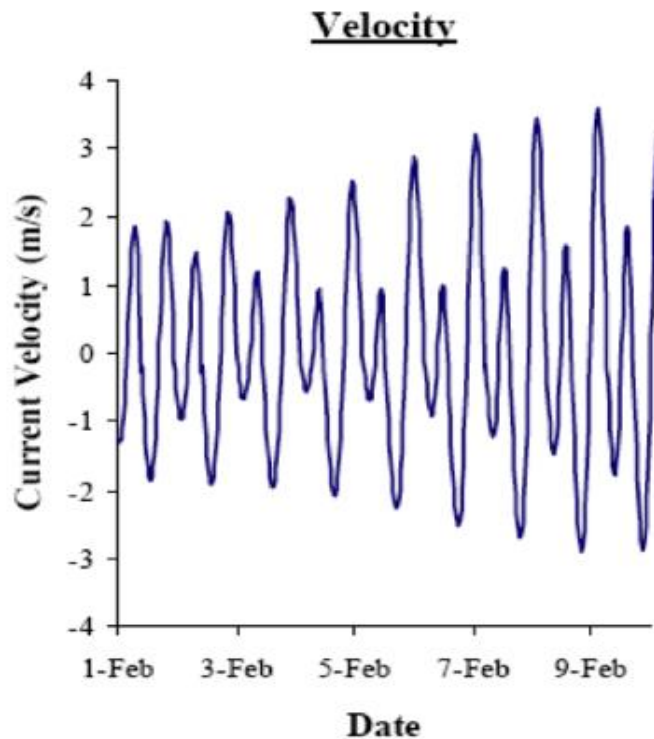
- Tidal currents vary predictably through the lunar cycle



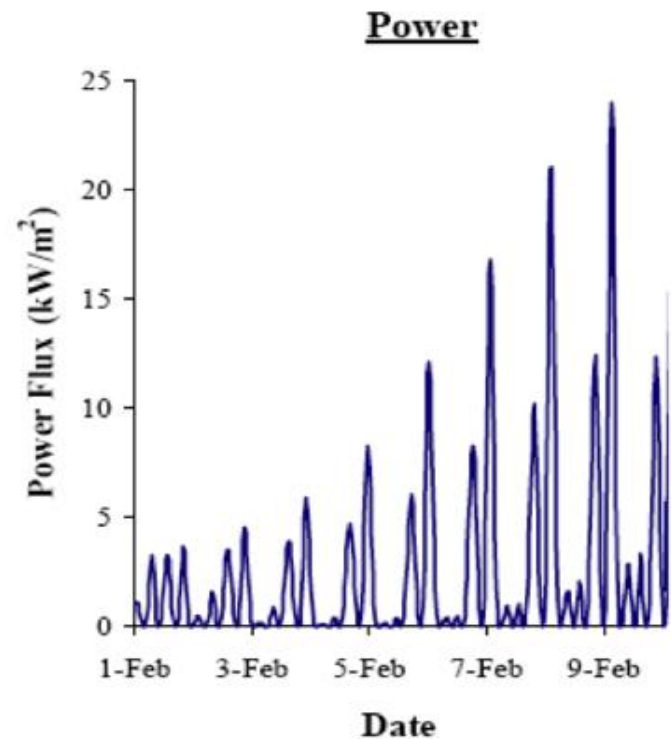
Graph courtesy of Mirko Previsic, EPRI

Velocity to Power

- Power = $\frac{1}{2}$ density x velocity³
- Water is 832 times as dense as air

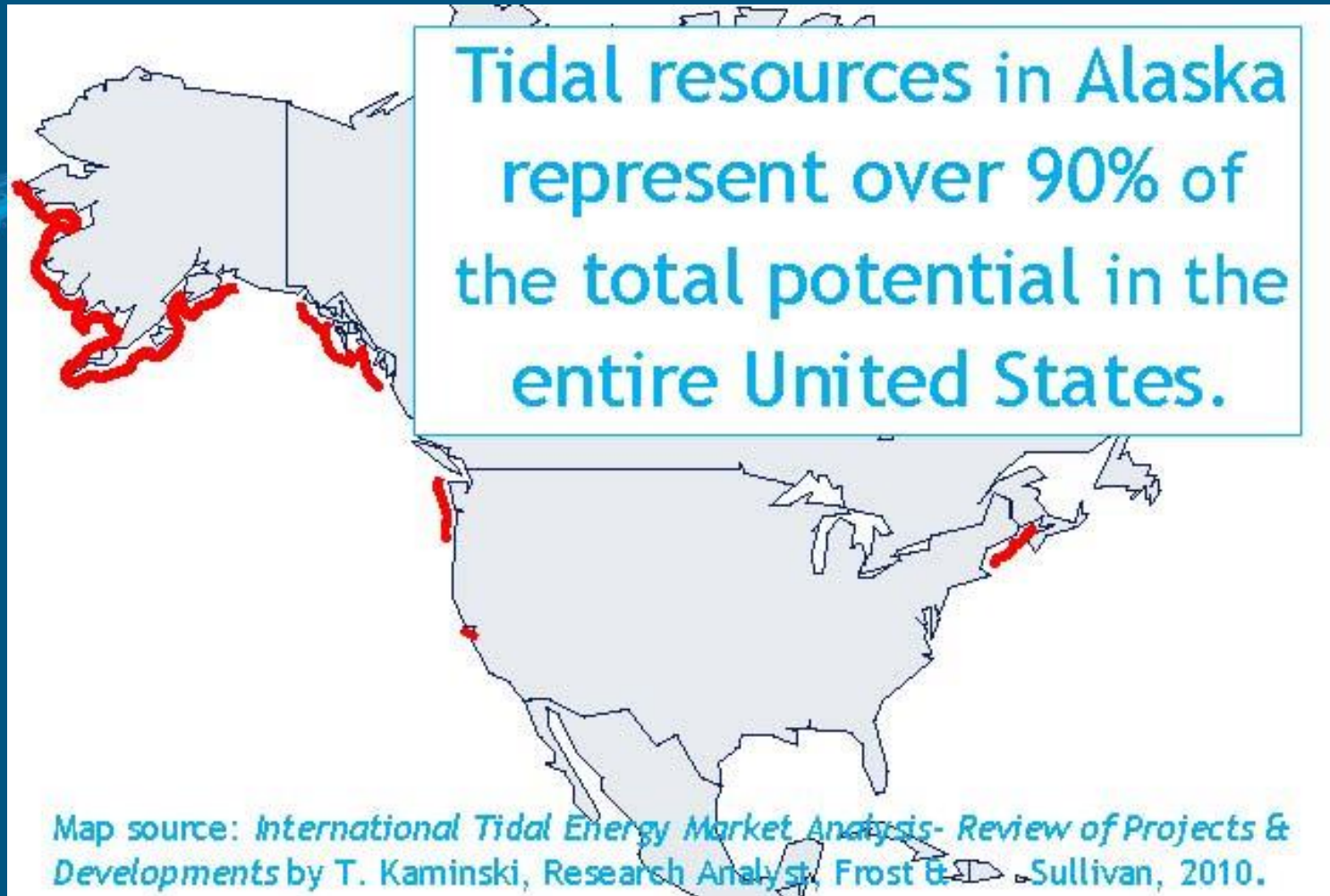


$$P = \frac{1}{2} \rho |V|^3$$



Graph courtesy of Mirko Previsic, EPRI

Tidal Energy - in Alaska ...



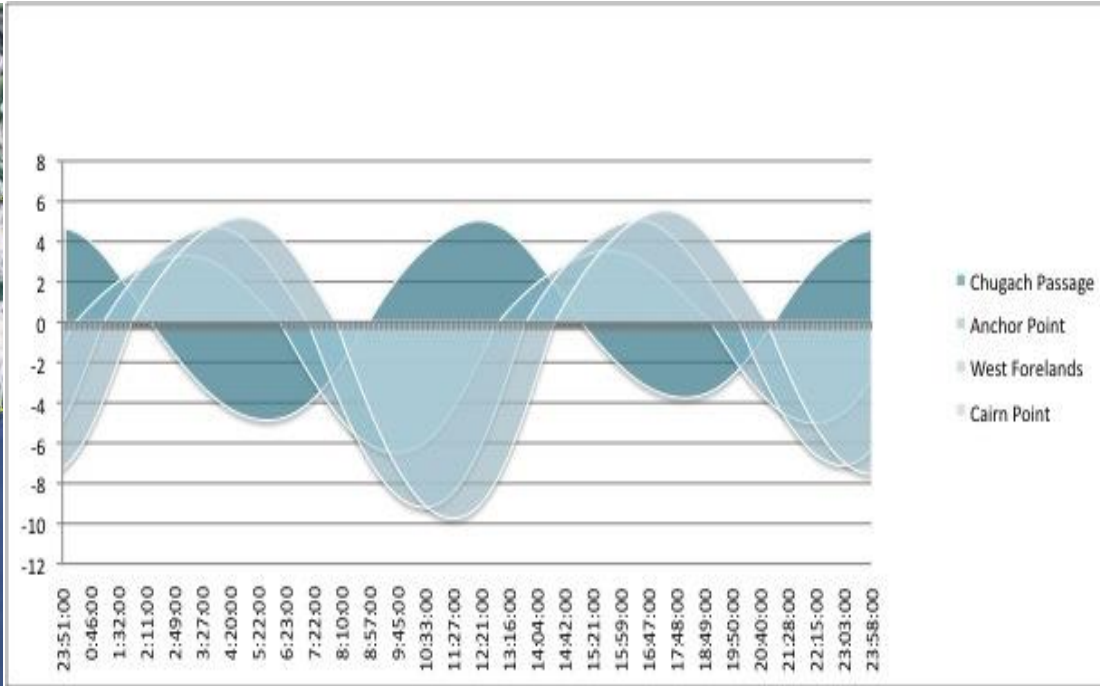
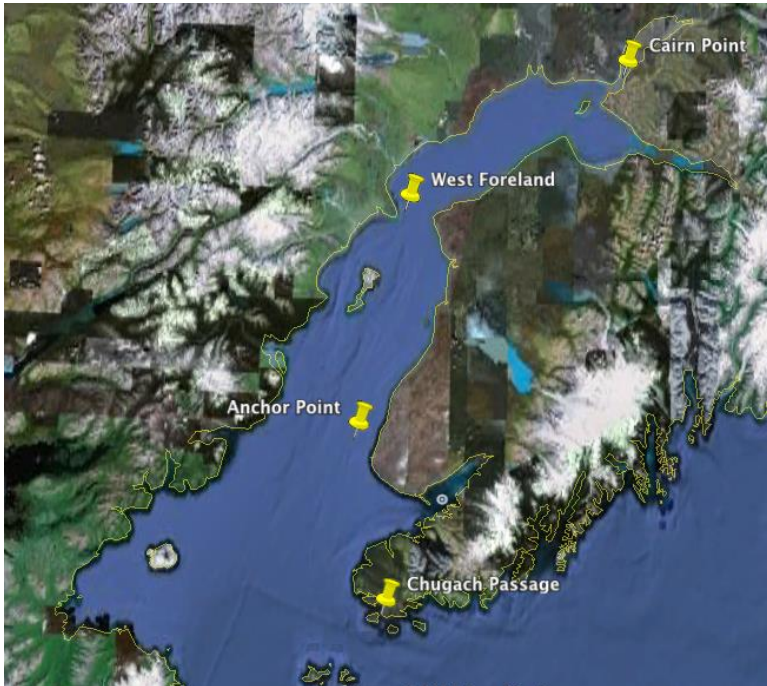
ORPC Alaska's Cook Inlet project sites



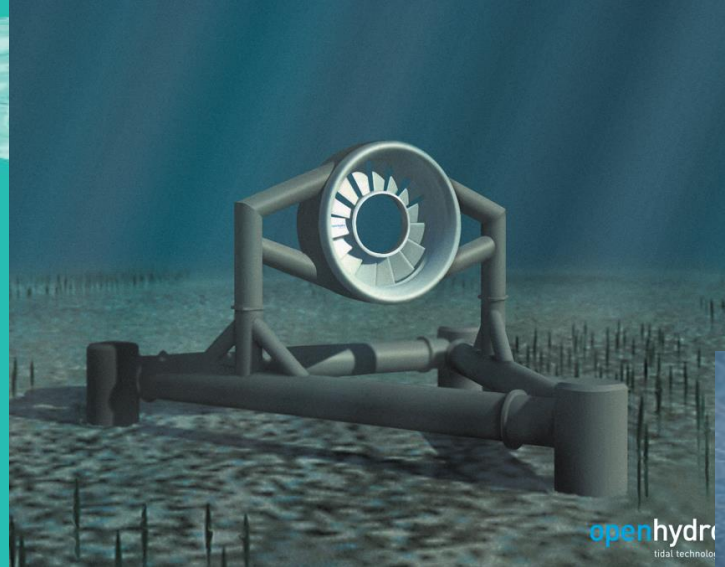
Why Cook Inlet?

- 4th largest tidal range in the world up to 12 meters (40 feet)
- Current velocities up to 10 knots
- Tidal resource is in the vicinity of electrical infrastructure - the Railbelt Grid

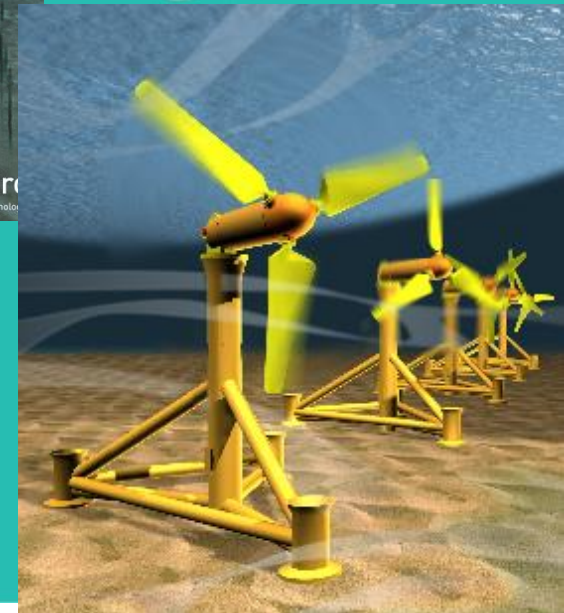
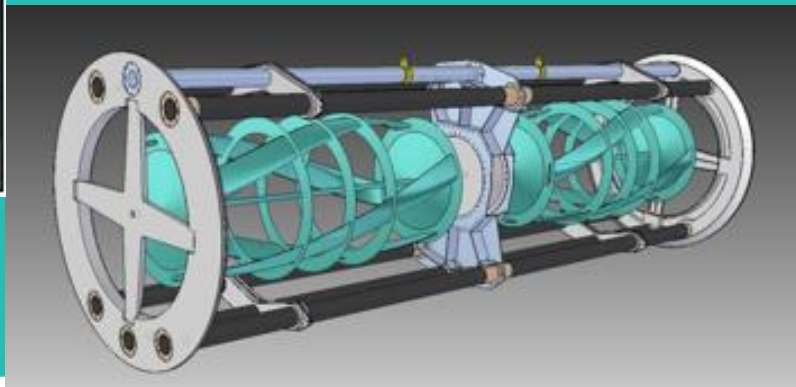
Cook Inlet Tidal Current Phases



Hydrokinetic Turbines



5- 10 years ago ...

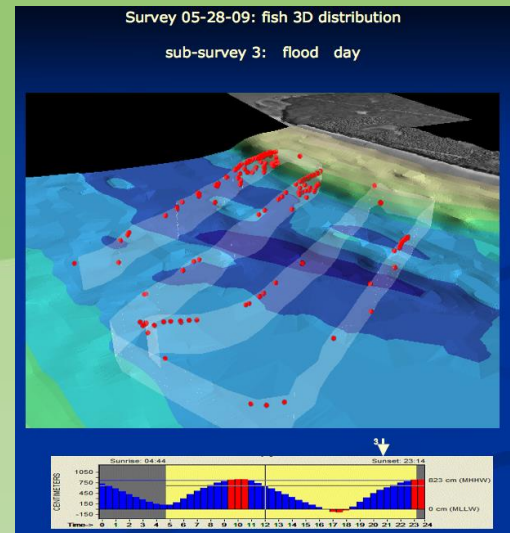


Today!



Cook Inlet Environmental Studies

- Pre and post deployment fish studies
- Pre and post deployment Beluga monitoring
 - Visual monitoring
 - Passive Acoustic Monitoring
- Sediment transport modeling
 - Working with UAA researchers to develop modeling and study plan
- \$800,000+ invested in studies



Passive Hydroacoustic Monitoring

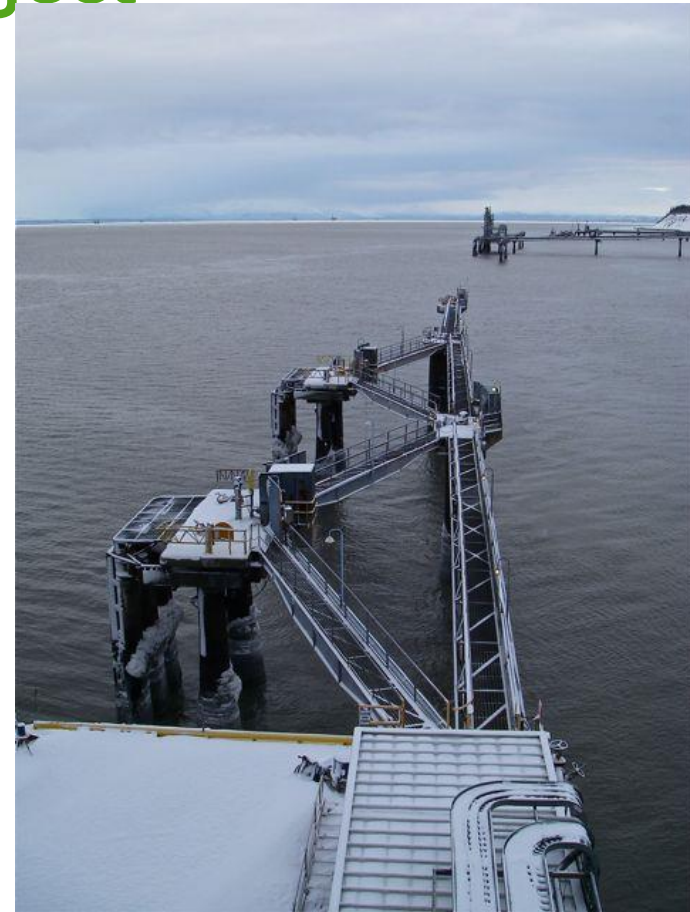
- ORPC Project, DOE funded
 - Directional Autonomous Seafloor Acoustic Recorders (DASARs) - localize beluga vocalizations

- Team CIBA collaboration (ADF&G, NMML, UAF, UH)
 - Ecological Acoustic Recorder (EAR) and C-POD
 - used by Team Cook Inlet Beluga Acoustics



Whale photo credit: NMFS, AK regional office

East Foreland Cook Inlet Tidal Energy Pilot Project Site - Project Development



Economic Benefits



- High quality, sustainable Jobs
- Money to local economies
- Out of state investment
- Exportable expertise
- New materials & fabrication techniques

Economic Impact *Central Alaska Partners, Contractors, Vendors and Consultants*

MatSu Borough

TerraSond

Fairbanks Region

Jon's Machine Shop

University of Alaska Fairbanks

Municipality of Anchorage

ORPC Alaska Office

Alaska Serigraphics
Arctic Office Products
GCI
HDR/DTA
Holloway Associates, LLC
Kinetic Laboratories Inc
LGL Limited
Marsh Creek, LLC
Northwest Arctic Aviation
PND Engineers, Inc.
Restoration Science & Engineering
The UPS Store

Fairbanks

Nenana

Anchorage

Kenai

Homer

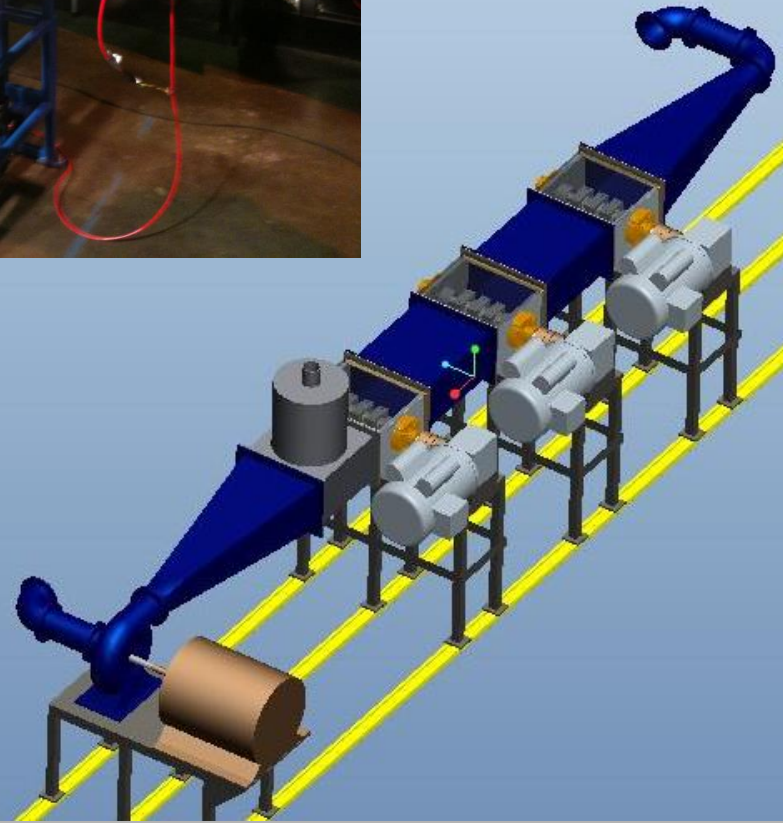
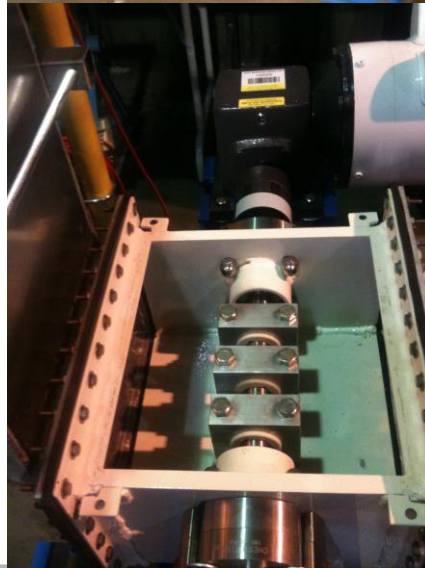
Kenai Peninsula Borough

Aquacoustics, Inc.
Specialty Electric Supply
Scott Dickerson Photography



ORPC Alaska is already bringing R&D funding to AK

- \$600,000 (DOE): beluga monitoring
- \$240,000 (DOE): state-of-the-art flume at UAA to understand effects of silt bearings and seals
- \$830,325 (Denali Commission EETF): Phase 1 of the Nenana Project



Southeast Alaska Tidal Energy Resources

Source Google Maps






Southeast Alaska Tidal Energy Potential

Source EPRI 2006

Site	Cross Section ¹ m ²	Average Depth ² m	Power Density ³ kW/m ²	Channel Power ⁴ MW
<i>Cross Sound and Icy Strait</i>				
South Passage (Icy Strait)	380,000	87	1.3	480
North Passage (Icy Strait)	490,000	110	0.9	420
South Inian Pass	34,000	46	4.3	150
North Inian Pass	660,000	230	2.5	1600
<i>Wrangell Narrows</i>				
Turn Point	4700	6.8	1.8	9
South Ledge	4800	5.5	2.6	12
Spike Rock	3500	4.8	2.6	9
<i>Chatham Strait</i>				
Kootznahoo Inlet ⁵	3100	12	7.4	23
<i>Peril Strait</i>				
Sergius Narrows	5600	11	4.5	25
<i>Prince of Wales Island</i>				
Tlevak Narrows	12,000	18	1.5	18
Tonowek Narrows	15,000	18	0.7	11

A graphic of water splashing across the top of the slide, rendered in various shades of blue.

ORPC is committed to bringing the economic, environmental and energy diversity benefits of tidal and river hydrokinetic energy projects to Alaska...

You can help in make it a reality!