



Tidal Industry Overview - United States

NHA Annual
Conference

April 28, 2010
Washington D.C.

Ongoing Efforts

- Project Examples

- Snohomish PUD
- ORPC
- Verdant
- Maine Maritime

- DOE Initiatives

- Resource/Siting
- Federal Labs
- Technology Development



Admiralty Inlet Pilot Tidal Energy Project



Energy Challenge

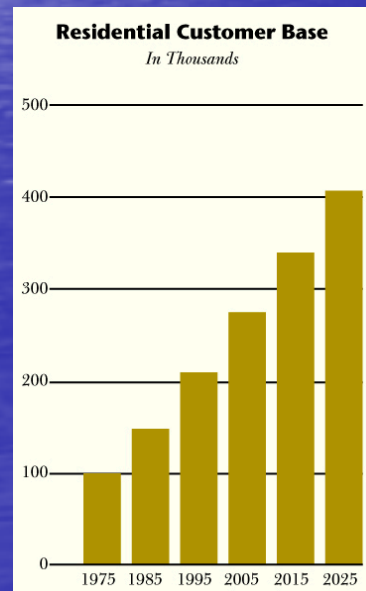
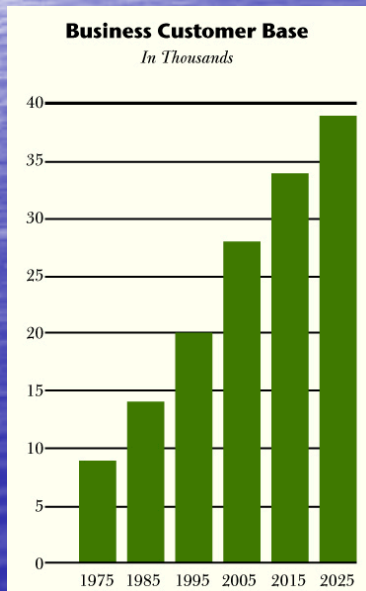


- Service Region Growth

- Region is growing rapidly – several thousand new connections/year
- Load growth of 15 to 20 aMW/year

- Renewable Portfolio Standard

- Requires the addition of ~140 aMW of new renewable resources by 2020.



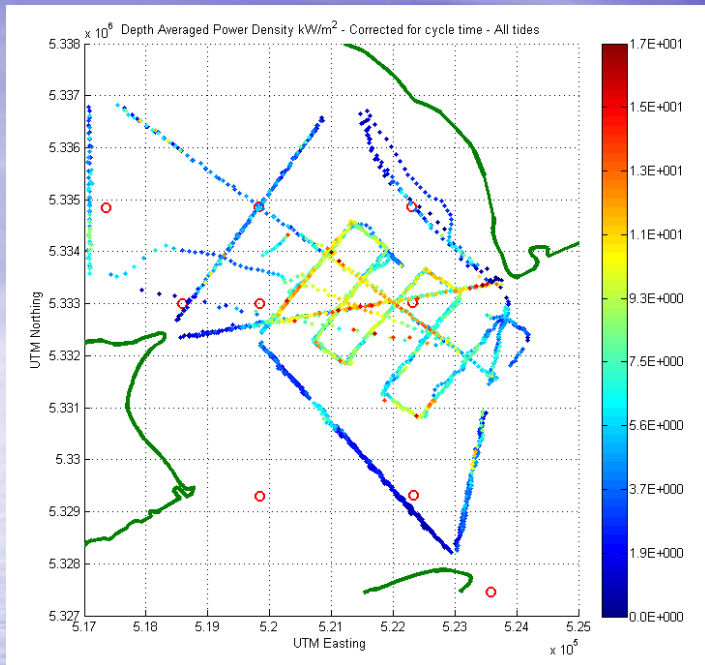
Tidal Energy Exploration Approach



Develop and evaluate a small scale, temporary, grid connected pilot plant at Admiralty Inlet

Objective is to generate scientific data to better evaluate the feasibility of tidal energy as well as the associated risks and benefits

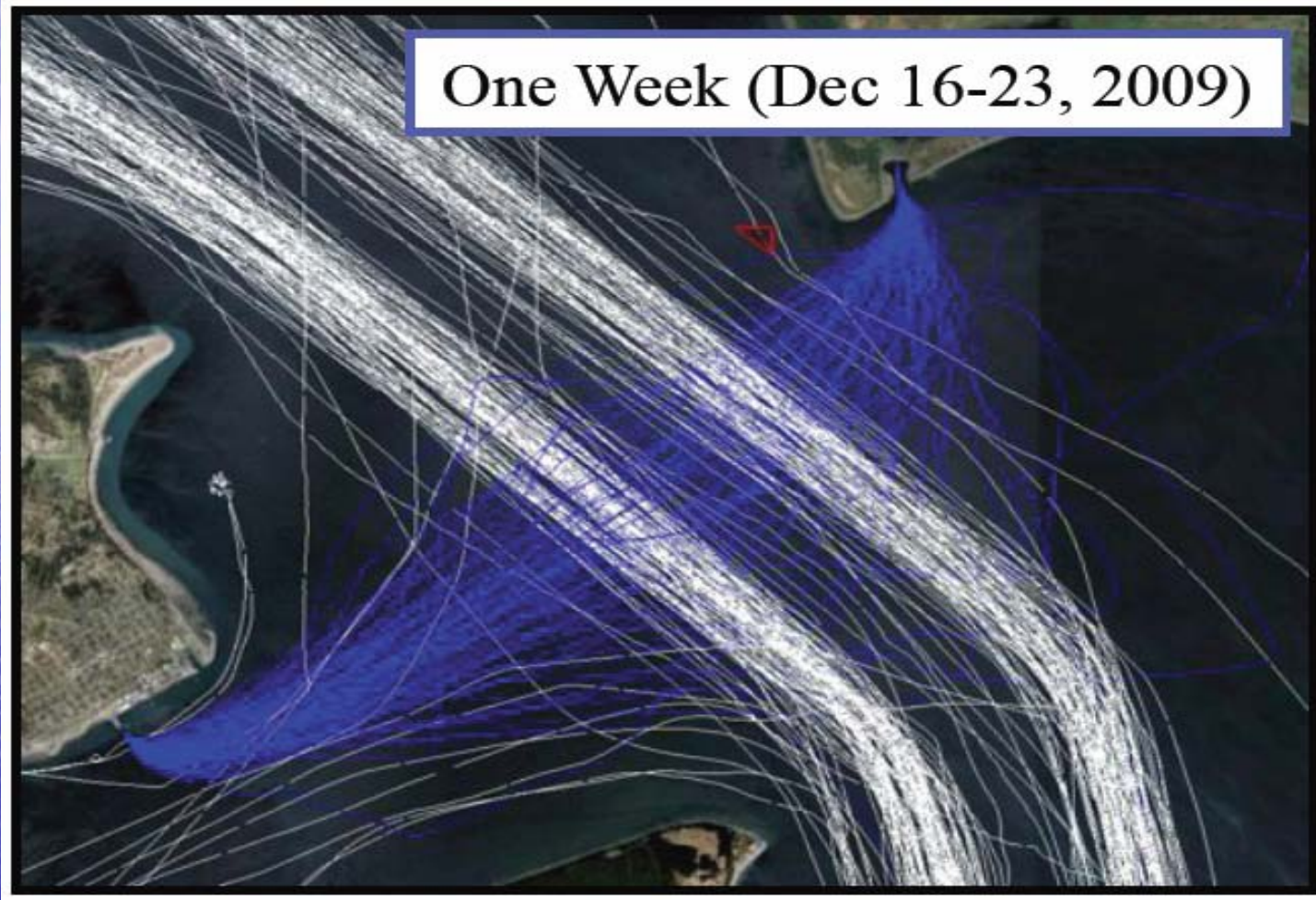
Admiralty Inlet Siting



- Reviewed locations
- Very good tidal current regime
- Commercial waterway
- Suitable depth/bathymetry
- Adequate grid interconnection options
- Very large site
- Over 100 meetings and presentations with 50+ different stakeholder groups

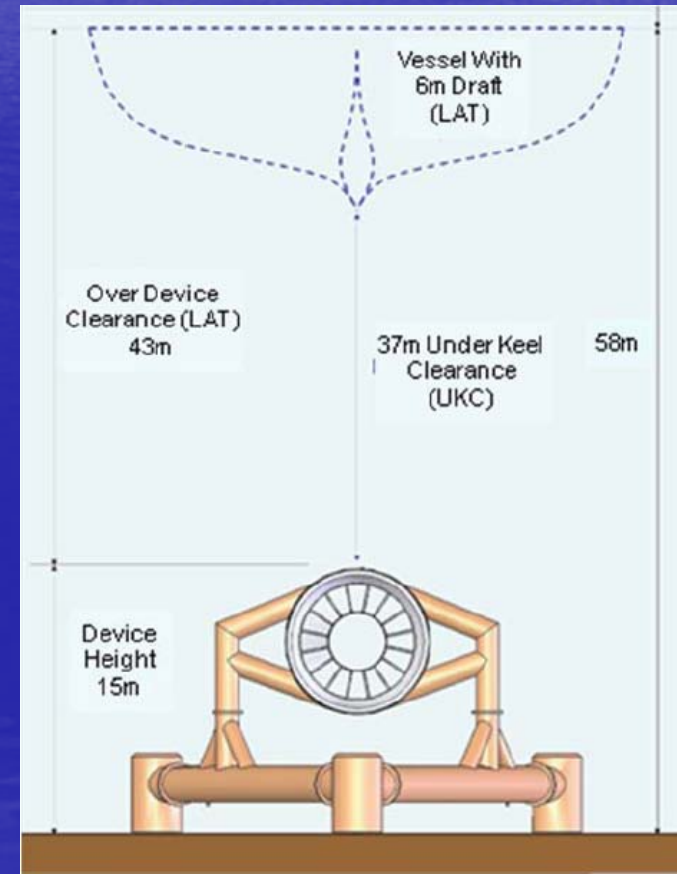


Vessel Traffic



OpenHydro Tidal Turbine Technology

- Undergone testing at the European Marine Energy Center (Orkney Islands, Scotland) since 2006
- Hundreds of hours of turbine operation monitored with no adverse fish or marine mammal interactions
- Shrouded turbine utilizes vanes with no exposed tips, runs at low speed without cavitation, requires no oil/grease lubrication
- Requires no piling, pinning, or drilling in the seabed; both the device and the foundation are designed to be completely removable.

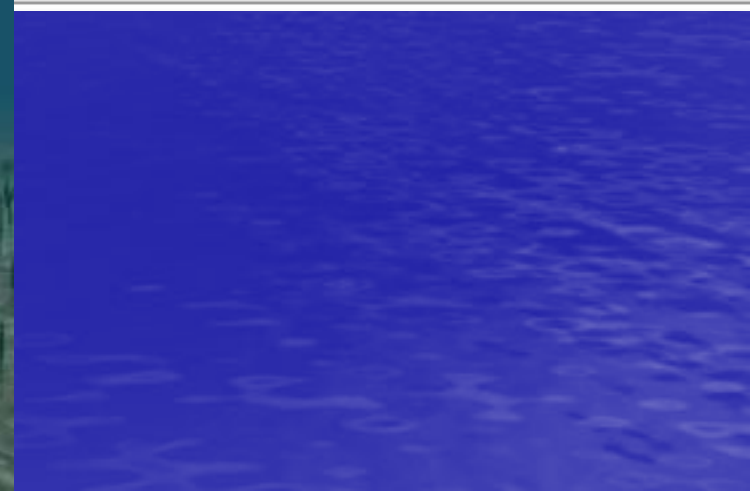
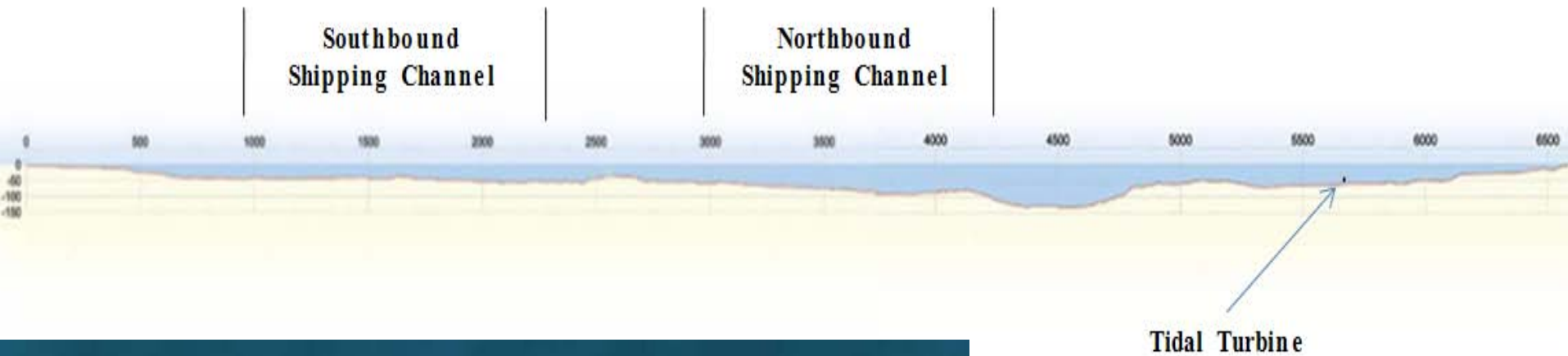


Bay of Fundy Deployment



Admiralty Inlet Project proposes the temporary installation of two 10-meter, grid connected OpenHydro turbines.

Admiralty Inlet Cross Section



Existing Information Summary

- WDOE water quality monitoring stations in Admiralty Inlet
- UW PRISM water quality monitoring station in Admiralty Inlet
- 50 WDFW bottom trawls in Admiralty Inlet from 1987 to 2008 – fish and invertebrates
- WDFW video sampling in Admiralty Inlet 1995 (52 stations) and 2001 (28 stations) – fish and invertebrates
- Annual commercial harvest (tribal and non-tribal) of marine shellfish and fish (1997-2007)
- Depth distribution of juvenile salmon from mid-channel sampling in the Strait of Georgia and Puget Sound
- Review of rockfish data from recreational catches in Puget Sound, 1965-2001
- Recreational salmon fishing records, Admiralty Inlet
- Nearshore sampling conducted in Admiralty Inlet by the Suquamish Tribe and WDFW in 2007 and 2008
- Review of WDFW vessel surveys conducted in Admiralty Inlet 1992-2004 - marine mammals and seabirds
- Review of WDFW pinniped haulout database
- NMFS-complied data on SRKW sightings in Admiralty Inlet, Puget Sound, and the Strait of Juan de Fuca
- Description of current seasonal presence of SRKWs in the immediate Project area and level and variability of background noise
- Gray whale sightings assessment, 1998
- Public recreational land-based whale surveys conducted during 2005 and 2006
- Three years of continuous daytime video monitoring of marine life at the EMEC OpenHydro turbine
- Monitoring of noise produced at EMEC 6-meter diameter OpenHydro turbine
- Bay of Fundy EA for deployment of OpenHydro turbine
- OpenHydro particle flow analysis modeling
- Derelict fishing gear database for Admiralty Inlet and Puget Sound

Preinstallation Studies

Marine Mammals Study Plan:

- Historical review and analysis of Orca Master Database and supplemental sightings databases. Complete.
- Passive Acoustic Monitoring (T-Pod, C-Pod, cabled Port Townsend hydrophone). Began May 2009; to continue through August 2011.
- Active Observations (boat-based follows, vertical depth detection arrays, land-based observations, incidental observations, haulout counts). Expected completion April 31, 2010.
- Geophysical and Bathymetric Study Plan
 - High-resolution multi-beam bathymetric surveys, sub-bottom profiling, side-scan sonar, bottom grab, and magnetometer surveys of deployment site on potential cable runs. Complete.
 - ROV video characterization of deployment site. Partially complete.
 - ROV survey of cable route. Summer 2010.

Preinstallation Studies

Aquatic Species Study Plan:

- Mobile and fixed hydroacoustics sampling - four hydroacoustic surveys to characterize fish density and spatial distribution during differing tidal conditions. Completed February 2010.
- Tagged fish assessment – deployed NMFS receiver in Project area; coordinated with POST on 13-receiver string crossing Admiralty Inlet. Ongoing (few traceable hits recorded).

• Underwater Noise Study Plan

- Stationary hydrophone deployed at project site - describe sound pressure levels and key elements of ambient noise. Began May 2009, to continue through August 2011.
- Mobile underwater noise surveys – provide spatial description of underwater noise. Completed February 2010.

Preinstallation Studies

Water Quality Study Plan:

- Shipboard measurement of water quality vertical profiles for temperature, salinity, dissolved oxygen, and pH. Completed February 2010.
- CTD sensor deployed on the seabed to collect temperature and salinity data in April, 2009. Higher precision CTDO (also measures dissolved oxygen) deployed August 2009. Ongoing.

NNMREC Hydrodynamic Modeling Study:

- Stationary ADCP deployed in April 2009 for site-specific measurements of tidal resource. To continue through August 2011.
- Mobile shipboard ADCP surveys for spatial information on tidal resource. Completed February 2010.

NNMREC Acoustic Effects Study:

- Automatic Information System receiver to measure ship traffic in Project vicinity. To continue through August 2011.
- Short-term playback of turbine noise to characterize noise propagation. Schedule subject to NMFS IHA timeline.
- Testing of land-based infrared camera for marine mammal detection.

FERC Licensing Process



Hydrokinetic Pilot Project Licensing Procedures

