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Innovation and Opportunity:
Marine and Hydrokinetic Technologies

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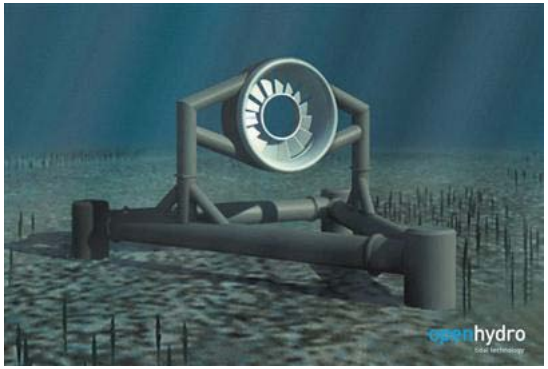
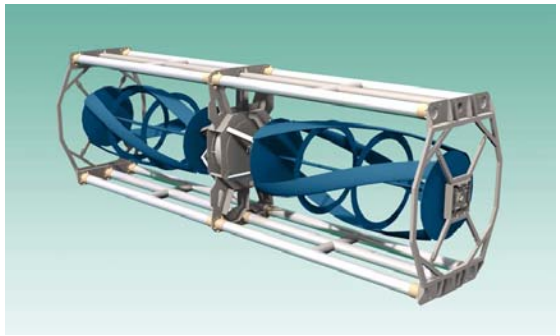
Innovation

- Emerging technologies capture energy from:
  - Waves
  - Open ocean currents
  - Tidal currents
  - Unimpounded rivers





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Opportunity: Riverine and Wave Resource Assessments

- Aggregate naturally available and technically recoverable resources for the U.S.
- Geographic distribution
- Not intended for siting purposes

UNIVERSITY OF ALASKA FAIRBANKS

NREL National Renewable Energy Laboratory Innovation for Our Energy Future

Virginia Tech VT

UAA UNIVERSITY of ALASKA ANCHORAGE

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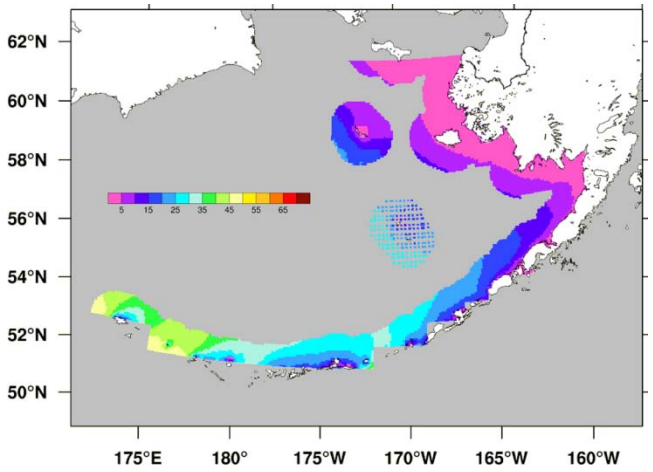
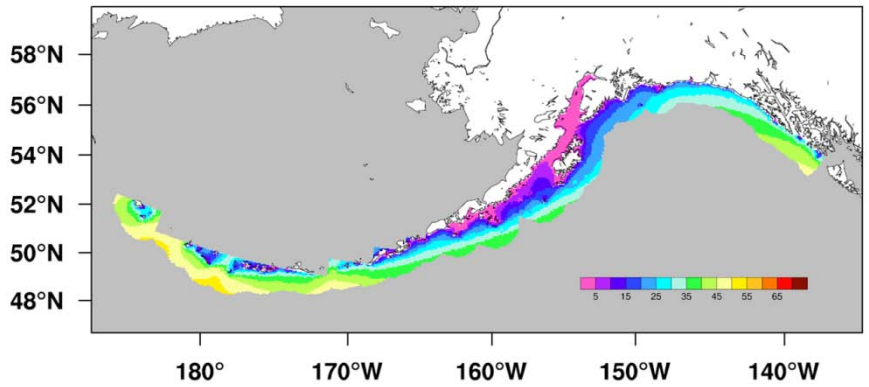
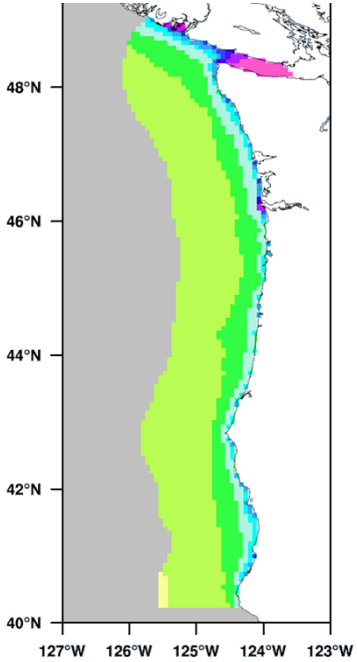
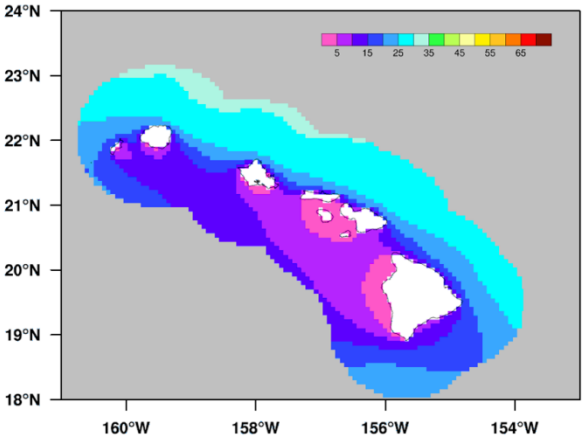
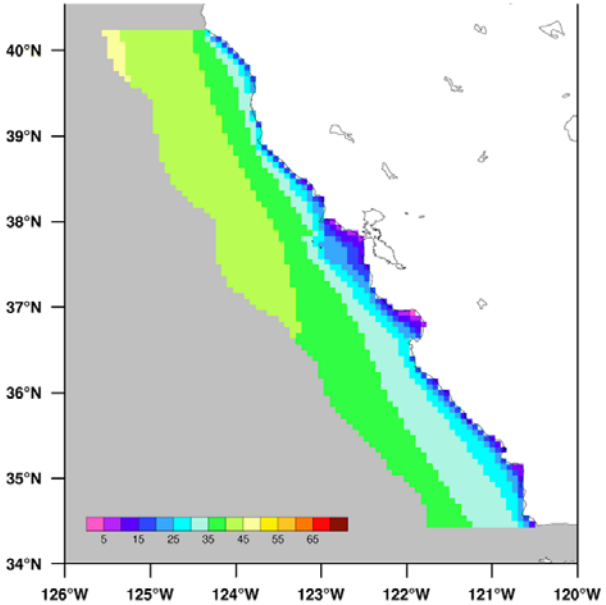
Wave Resource Assessment

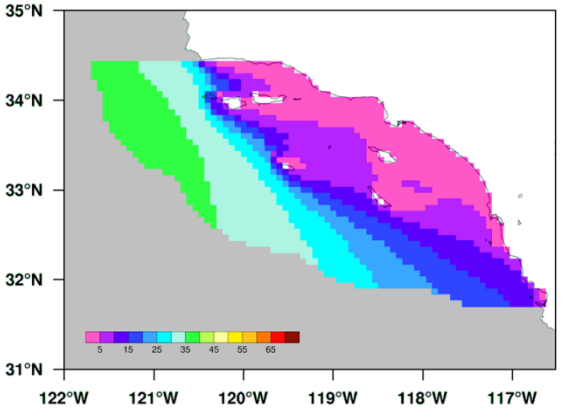












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Wave Resource Assessment

Region	Theoretical Power (Annual Energy, TWh/yr)	Technically Recoverable Power (Annual Energy)	
		TWh/yr	% of Total
West Coast	590	250	21.0
East Coast (ME to NC)	200	130	10.9
East Coast (SC to FL)	40	30	2.5
Gulf of Mexico	80	60	5.0
Alaska (Pacific O.)	**1360**	**520**	**43.7**
Alaska (Bering Sea)	210	100	8.4
Hawaii	130	80	6.7
Puerto Rico	30	20	1.7
Total	**2640**	**1190**	

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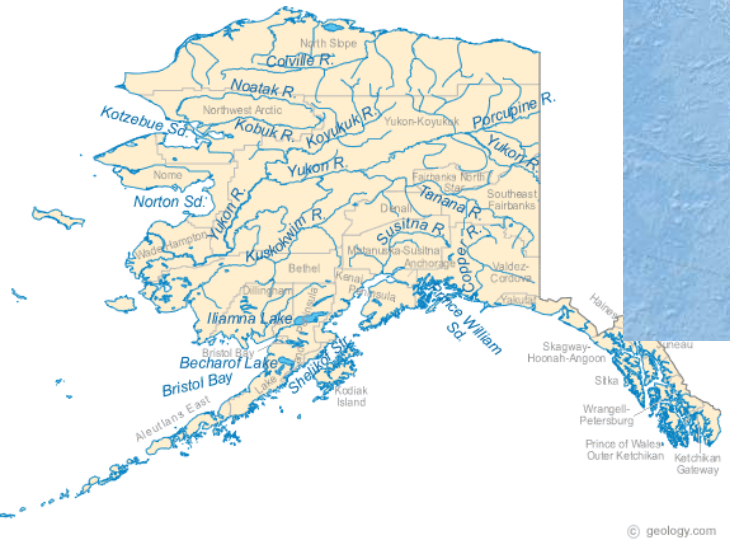
Riverine Hydrokinetic Resources



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Riverine Hydrokinetic Resource Assessment

Hydrologic Region	Theoretical Power (Annual Energy, TWh/yr)	Technically Recoverable Power (Annual Energy)	
		TWh/yr	% of Total
New England	14.4	0.2	0.17
Mid Atlantic	33.5	1.0	0.83
South Atlantic Gulf	38.5	1.2	1.00
Great Lakes	6.2	0.01	0.01
Ohio	**79.2**	**6.9**	**5.75**
Tennessee	20.4	1.0	0.83
Sauris Red-Rainy	1.8	0.03	0.03
Upper Mississippi	47.0	5.1	4.25
Lower Mississippi	**208.8**	**57.4**	**47.87**
Texas Gulf	8.9	0.5	0.42
Arkansas Red	45.1	1.3	1.08
Lower Missouri	79.8	5.6	4.67
Upper Missouri	74.3	2.8	2.34
Rio Grande	29.5	0.3	0.25
Lower Colorado	57.6	3.9	3.25
Upper Colorado	46.9	1.1	0.92
Great Basin	6.9	0	0
California	50.9	0.7	0.58
Pacific Northwest	**296.7**	**11.0**	**9.17**
Alaska	**235**	**20.5**	**17.10**
Total	**1,381**	**119.9**	

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Innovation and Opportunity

- Further innovation is essential to realizing the opportunity
  - Capital cost reduction
  - O&M cost reduction
- Field deployments
  - Increasing project size (device size and number)
  - Increasing duration
- Financing
- Efficient and effective permitting

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Innovation and Opportunity

- Remarkable diversity of devices
  - Immature industry, little to no shake-out
  - Multiple deployment niches

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