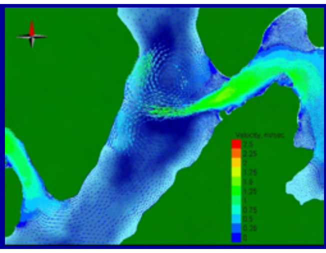


Newsletter for Waterfront Property Owners

Rich Passage
Passenger Only Fast Ferry Study

July 2008
Fourteenth Edition

- **Vessel Design, Optimization, and Construction**
- **New Research Vessel, *RV3***
- **Property Owner Meetings**
- **Field Data Collection and Beach Observations**
- **Impact Assessment Modeling and Threshold of POFF Vessel Operations**

Property Owner Meetings
Dates and Locations

We invite you to attend one of the three property owner meetings held in August:

- **Bainbridge Island**, August 6th, 6:00PM Kitsap Regional Library, Bainbridge Island
- **Port Orchard**, August 20th, 6:00PM Elim Lutheran Church
- **East Bremerton**, August 13th, 6:00PM East Kitsap Regional Library, Sylvan Way

The purpose of the meetings is to present information on the design and construction of the new research vessel, *RV3*, plans for vessel trial operations, an update on beach nourishment, and new results of the impact assessment modeling. We encourage your participation to provide input regarding this study and the plans for future work.

Introduction: The primary objective of the Rich Passage Passenger Only Fast Ferry (POFF) Study is to develop the scientific basis to identify and minimize the potential impacts of candidate POFF vessels on the shorelines of the Seattle-to-Bremerton ferry route. This includes the collection of data and development of predictive tools that can be applied prior to implementing a POFF operation. Not only is the study of relevance to Rich Passage, but the results and methodologies developed have application in any environmentally sensitive area where high-speed passenger ferry or commercial-scale vessel operation is being evaluated. This newsletter shares current results and progress of the study with Rich Passage waterfront property owners.

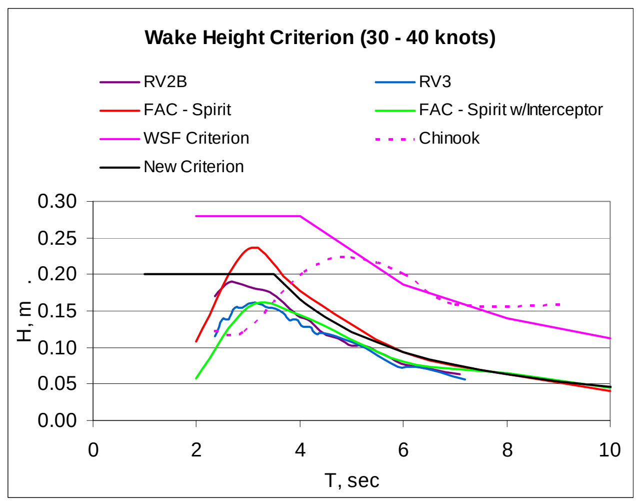
Research Vessel Design and Optimization Study

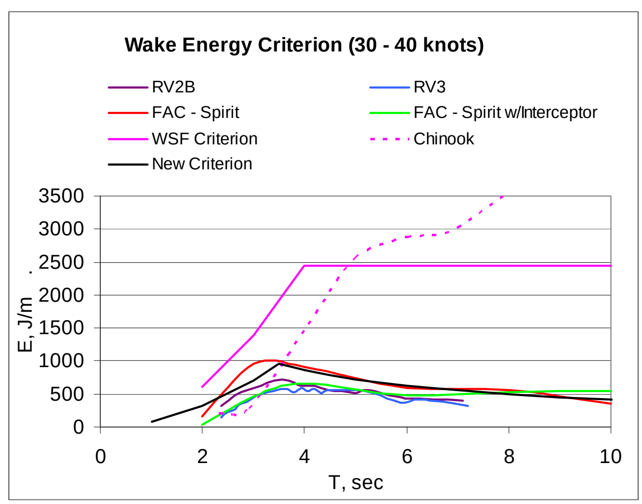
The purpose of the new research vessel (RV) is to provide full-scale validation of the integrated modeling tools that have been developed as part of the research program. These include both the ship design Computational Fluid Dynamics (CFD) models and the impact assessment models.

The CFD modeling to optimize a new low-wake foil-assisted catamaran continues. The CFD modeling to optimize the hull in terms of wakes and resistance has been completed and Teknicraft Design's naval architect is now busy with the detailed vessel design.

Based on the current schedule, it is anticipated that the construction of the new research vessel could begin as early as September for completion and delivery in approximately June 2009.

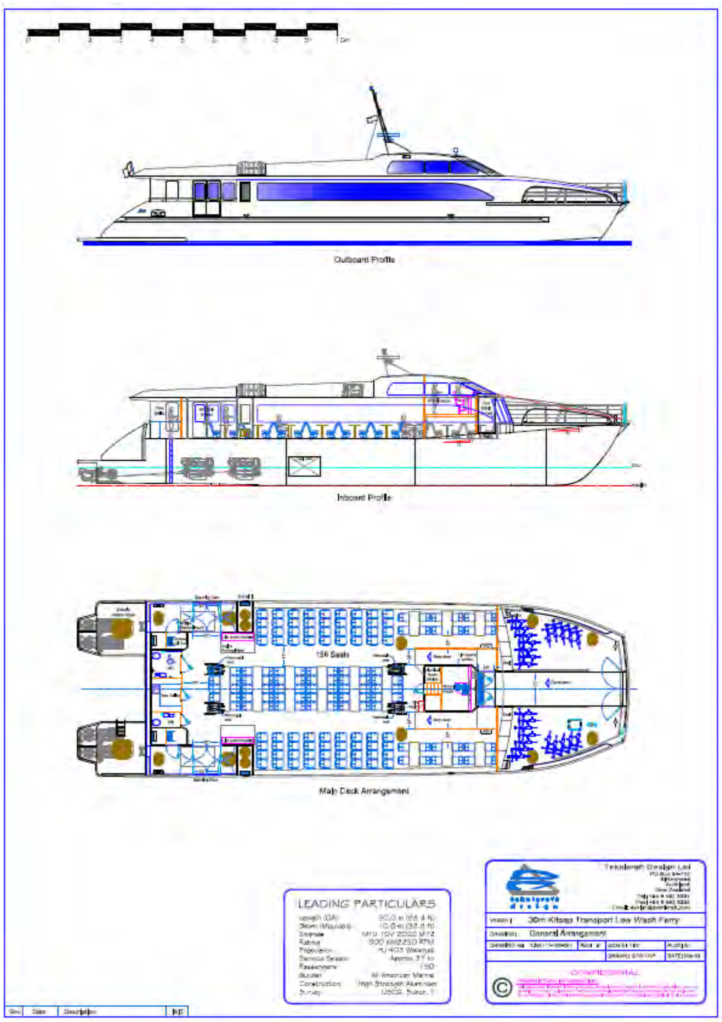
The CFD optimization process indicated that a 30-m hull form achieved the best compromise between wave making and total resistance. Although the new hull design is almost 8 m (26 ft) longer and considerably heavier than the demonstration vessel *Spirit*, the new research vessel is anticipated to have considerably improved wakewash characteristics in terms of both wave height and energy relative to *Spirit* and the other variants that were tested. The predicted wake height and energy at approximately 300 m from the sailing line produced by the new design (*RV3*) based on CFD modeling is shown in comparison with corresponding measured data for *Spirit*, the new wakewash criterion, and an earlier design variant (*RV2B*) in the figures to the right.





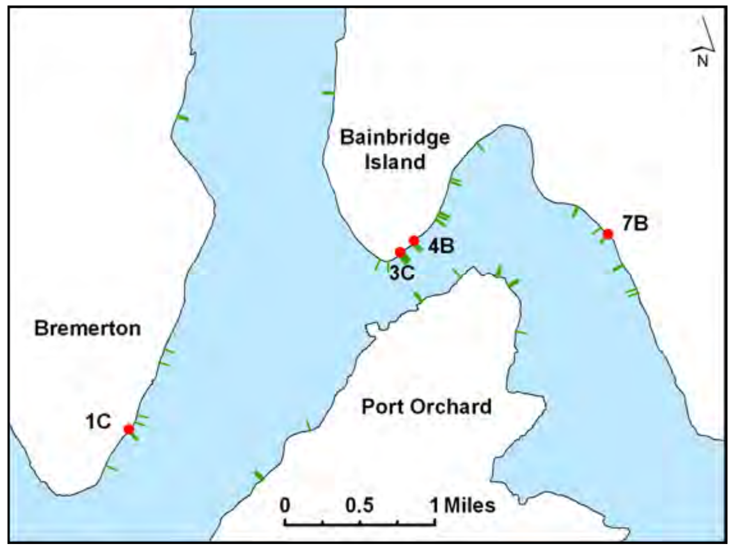
A hull and foil monitoring system will be installed on the new research vessel to provide measurements of the pressure distribution on the surface of the hull and foils, as well as the trim, draft, speed, heave, pitch, roll, and precise position of the vessel, ambient sea conditions, and visual properties of the wake. The monitoring system data will allow a more complete validation of the RANS CFD model (CFDShip Iowa) and in particular quantification of the forces exerted on the hull through a range of operating speeds as well as confirmation of the anticipated vessel performance.

The project team is providing support to Western Washington University's Plastics Engineering Technology group and working with All American Marine and Janicki Industries to design, develop, and construct a dynamic hydrofoil made with composite materials. The composite foil will be designed to reduce weight while maintaining strength, impact resistance, and overall effectiveness. The foil will be equipped with strain and pressure monitoring systems to assess its performance. The foil angle will be dynamically adjustable via an electronic panel mounted at the helm. Research has shown that dynamic adjustment of the main foil can significantly improve the efficiency of the vessel under a range of operating conditions.



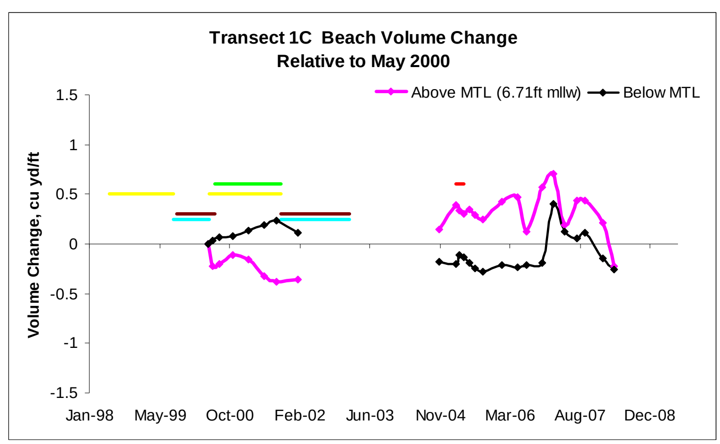
Field Data Collection & Beach Observations

The project team recently collected a series of comprehensive winter beach observations and a series of quarterly profile monitoring surveys, completing four years of seasonal monitoring under the current research program. Beach volume changes above and below mean tide level were calculated for each monitoring site from profile monitoring data. Spatial-temporal series of beach elevations have been derived from ground-based, GPS-referenced photographs at a number of reference locations. The analysis provides insight on regional trends and seasonal and winter storm-induced changes in beach volume. Selected results (locations denoted as red dots on map) are summarized below; results from additional sites (denoted as green lines on map) are available on the project web site.



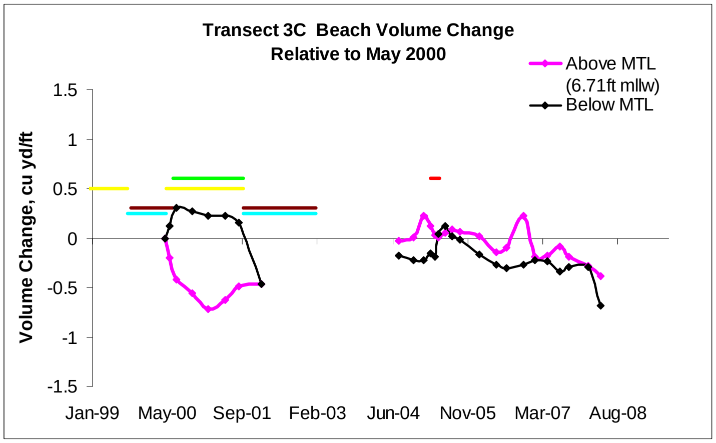
Locations of beach profile monitoring sites discussed below

Site 1 – East Bremerton: The analysis shows accretion of the upper and lower beach between November 2006 and January 2007, despite a winter storm with 10-year return period in December 2006. Beach volume change analysis of multiple beach profile monitoring sites on East Bremerton and Port Orchard shows that the beaches undergo seasonal fluctuations with a net erosional trend over the last two years.

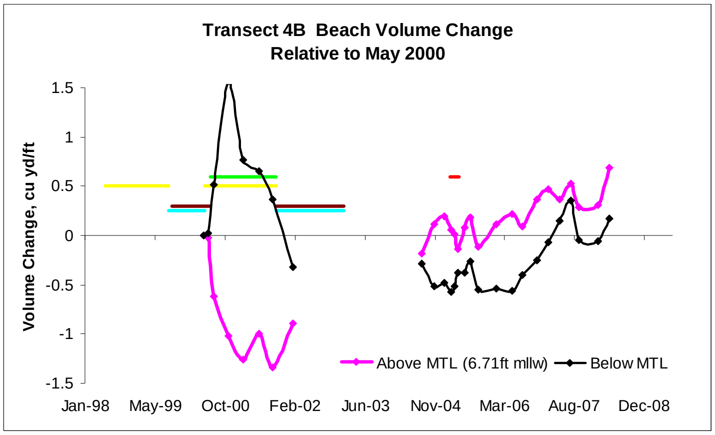


Site 3 – Point White: Large fluctuations in volume above the mean tide level (MTL) occurred between July 2006 and January 2007. There was an initial increase in beach volume above MTL that reached a maximum in November 2006. That interval of accretion was followed by erosion during the December 2006 storm which had a 10-year return period, as seen below in the before-storm (top) and after-storm (bottom) photos. Site 3 shows a net trend of erosion over the last four years due to a lack of sediment supply to the beaches on Point White.

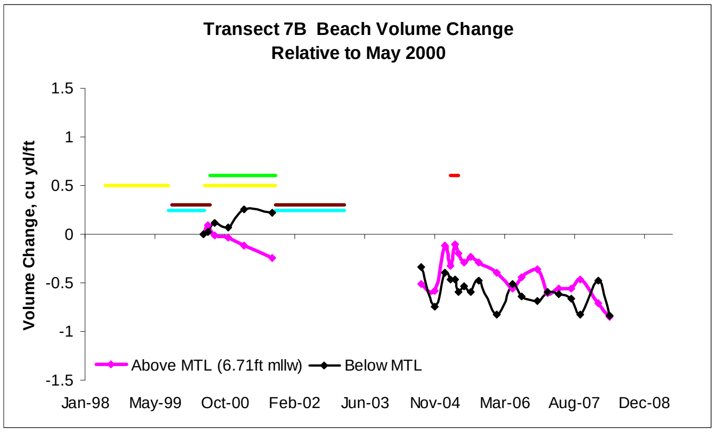
The sediment supply deficit on Point White is anticipated to have an increasing effect on alongshore transport to beaches towards Lynwood Bay over time.



Site 4 – Point White: This site is characterized by small but distinct seasonal fluctuations in beach volume and a net trend of accretion since 2004, in contrast to the erosion at Site 3 which is only 500 ft to the SW. Further to the north along Point White, the beaches appear to be reasonably stable. These observations indicate that sediment is being transported alongshore from Point White towards Lynwood Bay.



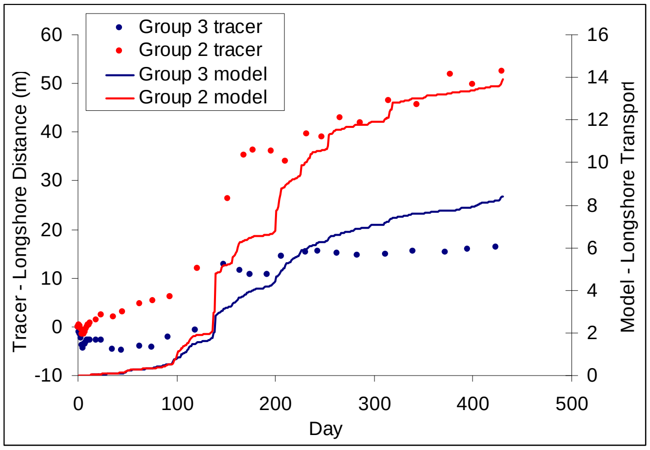
Site 7 – Pleasant Beach: Small but distinct seasonal fluctuations in beach volume occur at this site. A decrease in volume above MTL is in phase with an increase below MTL corresponding to flattening of the beach slope in early winter. The opposite pattern occurs in summer: beach volumes increase above MTL and decrease below MTL resulting in steepening of the profile. The beach volume relative to May 2000 has been decreasing over the last four years, indicating net erosion attributed to a lack of sediment supply and shoreline armouring to the east.



Ground Penetrating Radar (GPR) was applied at selected sites along the shorelines of Bainbridge Island in April to test the feasibility of collecting subsurface image data. Results indicate that the penetration of the radar was limited due to the salinity of the ground water, such that the most valuable data were collected in areas of freshwater runoff from streams and culverts. The latter GPR imagery may help to better understand the history of erosion and deposition of Holocene (recent) sediment on the beach at Point White and to interpret the thickness and internal structure of sand and gravel deposits and the depth to impermeable layers such as Vashon Till. The data will assist in the interpretation of numerical model results which predict the erosion and deposition of beach profiles.

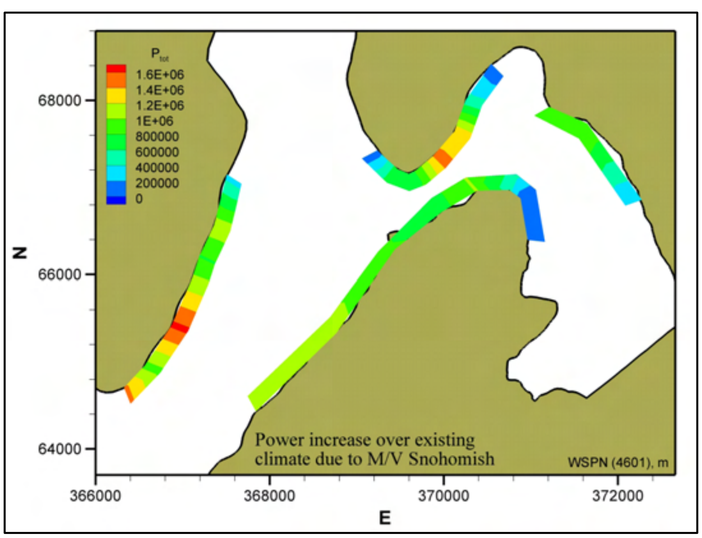
Enhanced Impact Assessment Modeling

We have continued to improve the agreement between longshore transport predictions and gravel tracer measurements on Point White between August 1, 2006 and October 31, 2007. The ability to predict gravel transport is key to understanding the relative impact of high-speed vessels compared with wind waves and wakes from conventional vessels in the study area. By improving the formulas that incorporate sediment size characteristics and bed roughness effects in the models, we were able to achieve significantly improved results compared with long-term gravel tracer measurements.

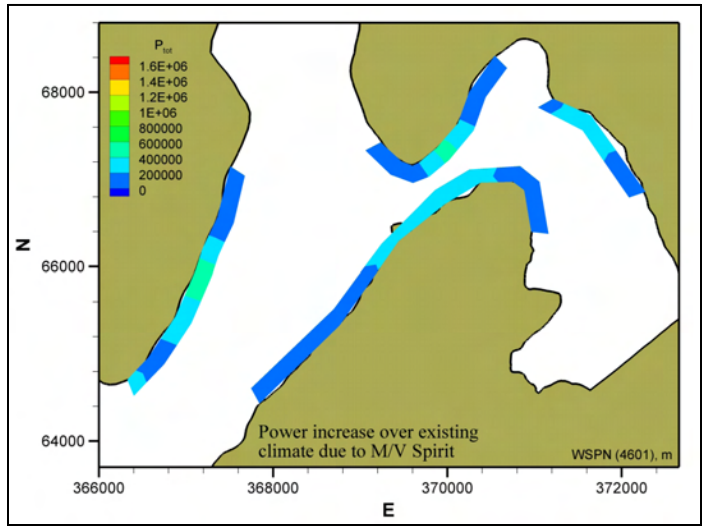


The validated models provide indicators of environmental impact such as longshore transport potential, wake power, and beach scour at the toe of bulkheads that allow direct comparisons between various POFF and non-POFF vessel operations and wind waves. Wake power, for example, is a metric that can be used to scale the potential impacts of any given POFF operation against the measured impacts of the Chinook-class POFF operation.

For example, we calculated the total power added to the existing summer wind wave and car ferry wake climate by a WSF Chinook-class vessel (Figure A) and *Spirit* (Figure B) over a period of six months. This shows that a Chinook-class vessel (*Snohomish*) would add considerably more power to the nearshore climate than *Spirit* over the same interval.

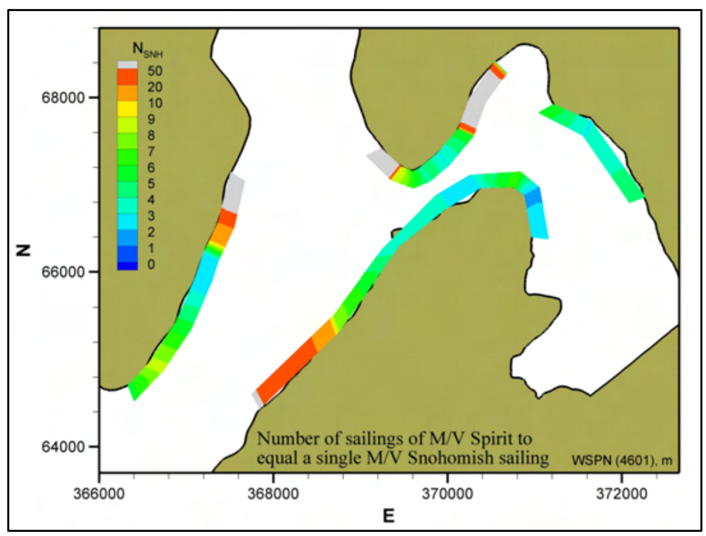


A. Absolute change in total power due to Snohomish



B. Absolute change in total power due to Spirit

A comparative analysis between the power added by *Snohomish* as opposed to *Spirit* quantifies the number of sailings of *Spirit* that would produce the same amount of wake power along the shoreline as a single sailing of *Snohomish* (Figure C). This type of analysis provides a basis for establishing the number of runs that could be made by the new research vessel *RV3* (or any candidate vessel) without causing significant impact on the route. The WSF POFF operation ran 28 one-way trips per day, and a trial operation of 10 one-way trips per day is proposed for *RV3*, which is anticipated to have lower wake wash than *Spirit*. This approach will be tested and validated during the planned impact studies with *RV3* and results incorporated into the development of the criteria for potential high-speed POFF operations.



C. Number of sailings of Spirit to equal power generated by a single sailing of Snohomish

Website, Project Information & Feedback

Property owner participation is essential to the success of our research program and we encourage your input regarding this study and the plans for future work.

Further information on the study can be obtained from the project website: www.pugetsoundfastferry.com or by sending e-mail to:

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Jessica Côté at jessicac@pie-pllc.com