# A GROUNDBREAKING SHORELINE RESTORATION *on* PUGET SOUND

## BACKGROUND

The Powel Restoration Project was planned, designed, and implemented to restore marine shoreline on private residential property on Port Madison Bay, Bainbridge Island, Washington. The Powel property consists of two parcels, comprising nearly 7.5 acres of land, which is bordered by approximately one-quarter mile of marine shoreline on the east, south and west. With the exception of two small shoreline segments, the entire shoreline was armored with a variety of structures, including rock rip rap revetments, creosote timber walls, rock and mortar walls, concrete walls, and concrete debris. Most of the armor was aged, unattractive, and in a state of disrepair.

The Powel Shoreline Restoration Project was initiated in 2008, when the Powel family requested advice from the Bainbridge Island Land Trust (BILT) on rebuilding failing bulkheads on their shoreline, asking if there was a more conservation-oriented solution for protecting existing infrastructure on their property. BILT and the Powel family had a prior relationship due to the protective conservation easement the family placed on the property with BILT in 1993. BILT engaged a number of professionals for assessment and recommendations. Advisors recommended moving forward with development of a restoration feasibility and design plan. The project is being done in phases: Phase I, Planning and Design; Phase II, Implementation; and Phase III, Maintenance and Monitoring, which has begun and will continue in the future.

Volunteers helped transplant pickleweed (*Salicornia* sp.) — an important native intertidal plant. Monitoring will help determine if this experimental treatment was effective.

The overarching goal of the project is to restore the natural processes, structure, and functions of the shore in a manner compatible with the residential use of the property. The project focuses on recreating shallow intertidal habitat important to juvenile salmonids, particularly ESA-listed Chinook, for migration, feeding, refuge and physiological transition.

Project objectives include:

- Reestablish salt marsh and intertidal vegetation and increase intertidal habitat on the project property by 163 percent — almost tripling the amount onsite prior to the project
- Reestablish sediment erosion, transport and deposition
- Enhance nearly 33,000 square feet of marine riparian habitat vegetation cover by removing invasive/non-native plants and installing over 2650 native trees, shrubs and other plants
- Engage partners
- Educate stakeholders and others
- Showcase this project as an example of what can be done to restore private, residential shore land
- Perform effectiveness and response monitoring to determine success and learn from restoration techniques used

**PHASE I**

# DESIGN

Funding to complete a design was acquired by the Bainbridge Island Land Trust through the Washington State Recreation and Conservation Office (RCO) Salmon Recovery Funding Board/Puget Sound Acquisition and Restoration (SRFB/PSAR) funds. The design process involved extensive participation and input from tribal and permitting agencies, technical advisors, and other stakeholders, including the Powel family. The stakeholder group met eight times during a 12-month period to establish a shared project vision and review various design drafts, offer input on specific design details, ask questions, recommend revisions and resolve differences in preferences for alternative restoration actions, including no action or limits on proposed actions. The final design approved by all parties included engineered drawings, a riparian vegetation enhancement plan, cultural resources findings and recommendations for implementation, a draft monitoring plan, and cost estimates for the implementation of the restoration project. A design report, available at *www.bi-landtrust.org/pdfs/Final_Report_V.14.pdf*, dated May, 2011, was prepared and used as the basis for acquiring implementation funding and for developing Requests for Proposals/Quotes and Scopes of Work for Phase II - Implementation.

Before

After

The photos above and at the top of the next page illustrate before and after armor removal. Armor and fill materials were removed with very little engineered reshaping of the slope. The restoration design emphasized the concept of letting nature reshape the shoreline.

Before

After

Before

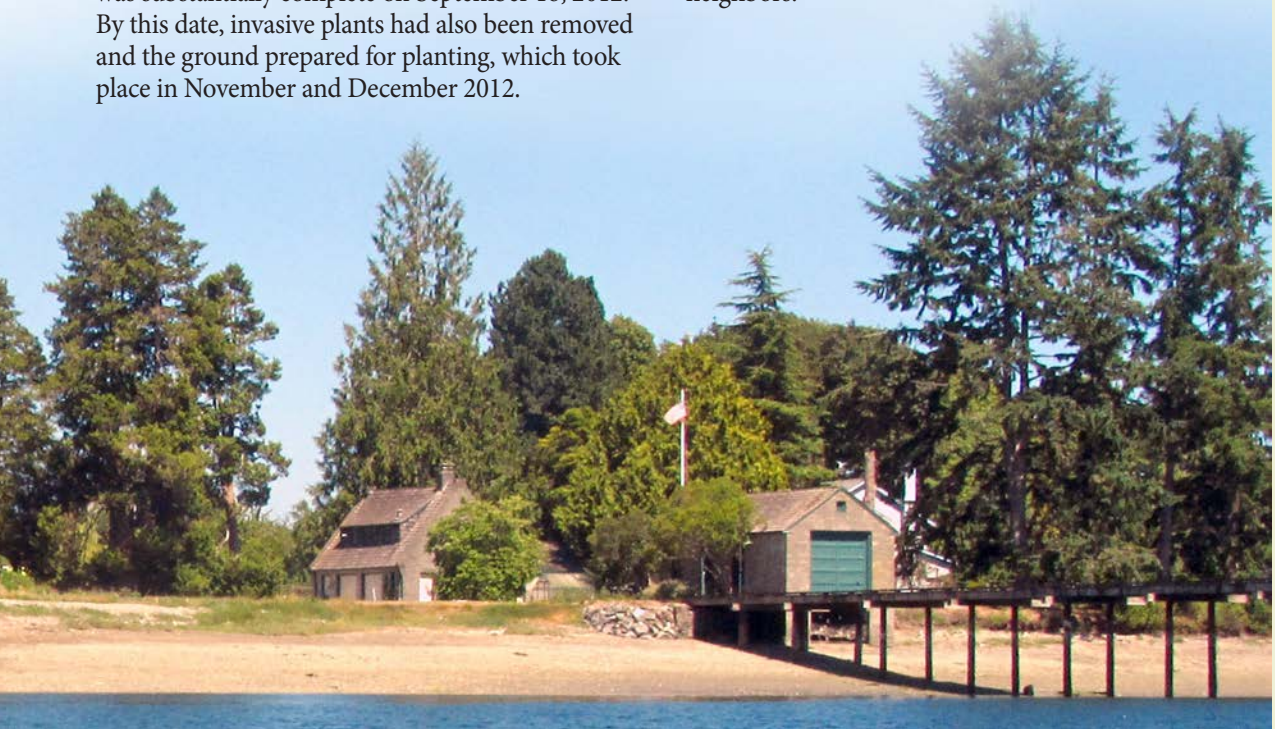
After

**PHASE II**

# IMPLEMENTATION RESULTS

Upon agreement of all stakeholders, BILT applied for and received funding from the SRFB/PSAR for restoration implementation. Restoration enhancement elements of this phase of the project included shore armor and fill removal, invasive plant removal, riparian planting, and other project elements. Another element of the project (not covered by grant funds) included an amendment — agreed to by the landowners and BILT — to the original conservation easement on the property, enhancing the protection of the shoreline and riparian habitats — forever. BILT was the project sponsor and co-manager with Washington Sea Grant providing technical assistance and project management services. The Powel family and BILT also contributed towards the costs of project implementation, along with a number of expert volunteers who donated their time. Contractors were hired for the armor and fill removal, vegetation work, cultural resources monitoring, and project engineering and implementation oversight. Removing over 1,500 linear feet of armor began on August 28, 2012 and was substantially complete on September 18, 2012. By this date, invasive plants had also been removed and the ground prepared for planting, which took place in November and December 2012.

Over 1,500 lineal feet of shore armor were removed along with associated fill, resulting in a 163 percent increase in intertidal area and salt marsh; 33,000 square feet of riparian area were cleared of invasive plants and replanted with native vegetation; existing infrastructure remains protected. This was all done within the predicted budget and timeframe. Shoreline restoration on private residential property is critical for achieving Puget Sound salmon recovery goals and restoring shoreline ecological functions. In order to engage private landowners in these efforts, it is important to combine restoration actions that are compatible with residential living. To replace the bulkhead would have cost approximately $300 per foot, plus the cost of debris removal and disposal, for an estimated cost of $512,000. At this site, restoration was not only less expensive, but provided many ecological benefits, for which it is difficult to assign a dollar value but which will pay dividends in perpetuity. The result is a more resilient, ecologically functioning shoreline that is aesthetically pleasing to the landowners and neighbors.



"Restoration requires a permanent commitment to riparian areas and the sacrifice of land uses inconsistent with preserving them. Understanding the trade-offs, deciding on what uses can be sacrificed where, and detailed mapping are essential parts of planning for a restoration project. As for the direct costs themselves, the restoration route raised many questions that we did not have the expertise to deal with.

Even if a landowner is committed to the idea of restoration (not all are and even within our family there are different views), it is not a simple matter and requires a multi-disciplinary approach. For example, consider the number of separate agency jurisdictions, permitting requirements and work contracting sources that were involved. That alone would be daunting to any landowner. BILT was a great help in pulling together all the pieces — technical, financial, compliance, and work contracting — and managing the project. I am sure we could not have done it without them. The resources BILT was able to line up were extensive in their breadth and impressive in their expertise."

Jake Powel,
family member and
landowner

PHASE III

# MAINTENANCE AND MONITORING

Restoration projects are not finished when the construction and planting are done. Ongoing maintenance is necessary to ensure that items such as non-native fill deposited on the beach are removed and native plants in the riparian area receive the regular watering and weed removal they need to thrive. The landowners are on the property at all times and can observe changes and needs — an essential component of project success. BILT maintains a perpetual presence through its conservation easement and role as project sponsor and manager.

Ongoing monitoring is essential to understand the recovery response, determine what improvements might be made, and inform future shoreline restorations. Monitoring also lets volunteers get involved and learn about the nearshore environment. Project consultants are performing short-term monitoring, but BILT and WSG also take a longer view. "We'll be able to come back 10 years from now" and see how the recovery has progressed, says WSG water quality specialist Jeff Adams.

Although no funding has currently been provided for monitoring, Adams leads a team of about 20 dedicated volunteers, some from BILT and some from the Kitsap Beach Naturalists program, who periodically survey physical and biological changes along the shore. They measure the beach's vertical profile at 10-foot intervals and record what flora and fauna have reestablished themselves in the riparian, saltmarsh and intertidal areas. So far the riparian area shows the most change, reflecting the extensive removal of invasive plants and planting of native species. Saltbush (*Atriplex patula*) has been especially successful at colonizing the new saltmarsh habitat, and pickleweed (*Salicornia* sp.) has also fared well.

The monitors and landowners were particularly pleased to see a killdeer set her nest near the high-tide line and successfully incubate, hatch, and fledge her brood. A year earlier, a bulkhead stood on that spot.

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**Citation**

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## POWEL SHORELINE RESTORATION PROJECT PARTNERS/ PARTICIPANTS

**Bainbridge Island Land Trust** • Stakeholder/Project Sponsor and Manager, obtained funding and secured matching funds and services, performed contracting, community outreach/communications, volunteer coordination, and landowner relations functions

**The Powel Family** • Property Owner/Stakeholder, provided matching funds, extensive involvement with contractors and ongoing project maintenance elements

**West Sound Watersheds Council** • Technical review and approval

**Washington Sea Grant/ UW** • Project management and technical assistance, implementation oversight, education, monitoring, reporting, outreach/communications

**Washington Recreation and Conservation Office; Salmon Recovery Funding Board; Puget Sound Partnership** • Funding through Puget Sound Acquisition and Restoration Fund , community outreach

**Suquamish Tribe** • Stakeholder; natural and cultural resources

**Washington Department of Fish and Wildlife** • Stakeholder; natural resources and regulatory

**City of Bainbridge Island** • Stakeholder; regulatory

**U.S. Army Corps of Engineers** • Stakeholder; regulatory

**Coastal Geologic Services** • Contractor; Engineering/Design

**Cultural Resource Consultants** • Contractor; Cultural Resources

**JTC Marine and Sound Rock Marine** • Contractor; armor and debris removal

**Sound Native Plants** • Contractor; invasive plant removal/native plantings, maintenance and monitoring

**Dukes Construction** • Contractor; fish screen installation

**Kitsap Beach Watchers/Volunteers** • Monitoring

**Media Alley** • Videography

BAINBRIDGE ISLAND LAND TRUST

THE POWEL FAMILY

COASTAL GEOLOGIC SERVICES

SNP Sound Native Plants

PugetSoundPartnership

Sea Grant Washington

*wsg.washington.edu*

Suquamish Tribe

WASHINGTON STATE Recreation and Conservation Office

Photo credits: Jeff Adams, Jonnie Dunne, Brenda Padgham, Paul Brians, Thomas Fenwick, and Jim Brennan and Eric Scigliano, WSG