Port of Port Townsend
Public Workshop
Wednesday, July 12, 2023, 9:30 AM

To be held in person at the Point Hudson Pavilion Building, 355 Hudson Street, Port Townsend
and also online
Via https://zoom.us/ – or call (253) 215-8782, use Webinar ID: 862 6904 3651, Password: 911887

AGENDA

This workshop is open to Commissioners, Management, other Port staff, Consultants and the public. It is not the opportunity to give public testimony, but if Commissioners request input from individuals in the audience, those people may speak. The principal purpose of the workshop is to allow Port staff and the Board of Commissioners to communicate with each other and/or Consultants, answer Commission questions, and get the Commission's opinions and input regarding the subject topic(s).

Commissioners' Seminar DRAFT Agenda

July 24 – 26, 2023
Alderbrook Lodge, Union

Monday, July 24

5:30 pm Reception and dinner at Alderbrook Lodge – *Olympic Ballroom & Terrace*
Spouses/guests invited to this event

Tuesday, July 25

7:00 am Breakfast Buffet – *Mt. Washington Room*

8:15 am **Welcome and Announcements –** *Olympic Ballroom*

8:30 am **What's on Your Mind? Open Discussion Forum**

- *Conversation prompt: One success and one challenge from the past year or the year ahead*
- *NOTE: Will ask each port to speak, rather than each commissioner*

9:30 am **Long Range Planning: Does my Port Need a Strategic Plan**

- *Format: Moderated panel conversation*
- *Two ports speak to their experience; Commissioner and ED from each port*

10:30 am Break

10:45 am **Executive Director Review: How to use your E.D. Review as a strategic planning tool between E.D. & Commissioners**
- *Format: Moderated Panel*

11:45 am Lunch – *Mt. Washington Room*

1:00 pm **Predatory Litigation**
- *Format: Speaker (Associate Member invited to speak)*

2:00 pm **Port Role in Housing**
- *Format TBD*

3:00 pm Break

3:15 pm **Relationship with Cities and Counties**
- *Format: Moderated panel*
- *Two to three ports speak to their experience with local government partners*

4:15 pm Adjourn for the day

5:30 pm Cocktail Hour – *Waterfront Checkerboard*
6:15 – 8:30 pm Dinner Buffet – *Waterfront Checkerboard*

Wednesday, July 26

8:00 am Breakfast Buffet – *Mt. Washington Room*

9: 00 am **Staying in your lane: Commission and Staff, Roles and Responsibilities**
- *Frank Chmelik, CSD and Associates*

10:45 am Break

11:00 am **Take Your Legislator on a Tour – to Know You is to Love You**
- *Kayla Dunlap, Port of Grays Harbor*
- *Chris Herman, WPPA*

12:00 pm Seminar Adjourn

WASHINGTON PORTS

WASHINGTON PUBLIC PORTS ASSOCIATION

Port Governance and Management Guide

A comprehensive, practical handbook to assist port commissioners and senior staff as they govern, manage, and operate Washington State's public ports.

TABLE OF CONTENTS

5. PORT OPERATIONS

"Far and away the best prize that life offers is the chance to work hard at work worth doing."
–Theodore Roosevelt

PORT OPERATIONS

Washington ports have long been considered public enterprises. Since their inception over a century ago, the state's ports have operated at the unique intersection of governmental responsibility and entrepreneurial performance. They are empowered to promote economic development through return-based, market-oriented financial investments. Their historic success in this role has paved the path to additional legislative authority to expand further into the private marketplace.

With this expansion comes the growing challenge of balancing a port's mission in serving its community with the need to generate revenues or margin from its investments. Understanding and maintaining that balance is critical to a port's success and its acceptance by the community and the impacted private sector entities with which it interacts. (This concept of "mission versus margin" is discussed in the Strategic Planning section of Chapter VIII.)

LINES OF BUSINESS (LOB)

Port activities and investments that generate earned revenues while promoting general economic development represent a port's lines of business. They are evaluated on a return on investment (ROI) basis as a definitive and quantifiable metric to gauge their success. LOB port activities include commercial and industrial real estate, marinas, airports, broadband communication, marine terminals, and wastewater treatment. Determining and evaluating a port's LOB performance can be measured based on an individual asset investment such as a shipping terminal, a portfolio of like investments such as commercial real estate, or as a port-wide return on all LOBs combined. (Rates of return are discussed in more detail in Chapter IV.)

TRADITIONAL GOVERNMENTAL ACTIVITIES

Not every operational activity or investment a port makes results in a real financial ROI by generating earned revenues. There are certain port activities that do not generate adequate resources to be self-supporting, much less generate a positive cash flow. These activities can be characterized as more traditionally governmental in nature and must be underwritten by financial resources from port lines of business activities or through property taxes. They include such things as programmatic economic development, parks and open space, and environmental stewardship that is not connected to real property development and reuse. These activities have great public benefit but by their nature are incapable of generating sufficient earned revenues to cover all operating costs and provide a return on capital investment. Traditional governmental activities are important and often very critical to a port's success in promoting economic development and are distinct from lines of business activities. This distinction means that the measurements of success for these traditional governmental activities is more qualitative than quantitative.

In concert, a port's lines of business portfolio and its more traditional governmental activities are the sum of its operations. Chapter V: Port Operations explores the nature of these critical port functions.

It should be noted that there are no legislated requirements or standards for drawing any distinction between lines of business and more traditional governmental activities. However, each port is well-advised to thoroughly understand the design of their operational structure, how it performs financially, and why they have made or are considering specific investments.

As a port considers the breadth and depth of its portfolio and activities there is one other consideration: Ports consistently report that their communities do not completely understand what they do, despite their best efforts at communication and public outreach. This may well be due to the nature of their operations, which are either business-to-business (i.e., wholesale), or they have a more "retail touch" in which there is frequent contact with individual community consumers.

Wholesale business includes such portfolio investments as marine terminals, through which a port has contractual relationships with business and corporate entities. Retail touch-types of operations include portfolio investments such as commercial passenger airports or governmental activities such as parks. These retail touch operations afford an opportunity for people to personally interact with the port while using its facilities, allowing them to experience what the port does for its community. Ports that have little or no retail touch with their communities have less opportunity to directly interact with community members, which can result in less visibility and understanding of a port's role and functions.

This chapter provides a cursory review of the various lines of business and traditional governmental activities in which today's Washington state ports are engaged. They are discussed in descending order based on their prominence in WPPA's 2020 statewide port industry survey. A glossary of relevant terms is provided for each operating area.

Comparative Port Performance Metrics

Assessing the operational efficiency of a port is a local consideration, as the diversity of Washington port activities makes it challenging to identify external comparative performance metrics. The best metric with which to measure the success of a port's lines of business activities is the expected and achieved ROI. While this provides the best internal metric of success the diversity of Washington port activities makes it challenging to identify external comparative performance metrics between ports.

One approach to assessing comparative performance between ports is utilizing the common denominator of port staff size to generate relative and useful metrics. The annual 2019 WPPA Tax Levy and Compensation Report captures the most recent financial performance statistics from Washington's port industry. The raw data in that report reveals that, for the 25 largest Washington ports, the average annual earned revenue per employee* is $373,000, with a range of $88,000 to $1,000,000. In terms of property taxes, the average annual tax receipts per employee** is $129,000, with a range of no taxes collected to $333,000 per employee.

The leveraging of property taxes is often considered an integral financial component in a port's efforts to advance economic development. For these 25 ports, the average dollars of earned lines of business revenue per each tax dollar levied† is $6.20, with a range of $0.27 to $23.25. This ratio can be greatly impacted by a port's policy regarding the use of taxes for lines of business support versus more traditional governmental activities, such as parks and open space.

*Earned revenue per employee = Total port earned revenue from lines of business/Number of port employees

**Annual tax receipts per employee = Annual property tax receipts/ Number of port employees

LINES OF BUSINESS OPERATIONS

Chapter II explored the evolution of port authority—specifically, the expansion of port activities in the private marketplace. This section discusses port lines of business operations in greater detail.

Real Estate

"Real estate is the best investment in the world because it is the only thing they are not making anymore." –Will Rogers

Real estate is a mainstay line of business for port operations. Nearly every port in Washington owns and leases commercial and industrial real estate, and the number of ports operating in commercial versus industrial real estate is about equal. Virtually all ports with a real estate portfolio lease property, and up to 70% routinely buy and sell property.

WPPA's 2019 Real Estate Seminar survey found that one out of five ports responding reported generating 60% to 100% of their total earned revenues from their real estate portfolio. An equal number of ports reported that the revenue generated from their real estate portfolio represented less than 20% of their total earned revenue. WPPA's 2017 economic impact study further revealed that smaller ports obtained virtually all their earned revenue from real estate investments. Large ports, on average, only generated 16% of their earned revenues from real estate, as they are more invested in large-scale transportation activities such as marine cargo and commercial aviation.

WPPA's 2017 Washington State Public Ports Economic Impact and Jobs Analysis

- There were over 3,200 tenants operating through leases on port land. The largest single category was professional, scientific, and technical services, followed by specialty trade contractors.
- Port tenants support approximately 72,000 direct jobs and an additional 104,000 indirect and induced jobs, for a total of over 175,000 jobs. This represents approximately 5% of total jobs in Washington. Industrial and commercial land portfolios account for over half of the jobs for all port activities.
- The average compensation for port tenant workers (including non-monetary benefits) was $73,100 per year.

As part of a lines of business analysis, ports should ask themselves why they operate in real estate. There are two fundamental reasons:

1. To **address demand** for facilities when there is a shortage of available inventory in their community, or when there is a need for a specific building or facility to serve a particular market or transportation sector.

2. As a **generator of earned revenue** to support (a.) the port's overhead costs, (b.) other lines of business activities that are underperforming, or (c.) more traditional governmental activities, such as programmatic economic development. Sufficient earned revenues can reduce or eliminate a port's dependency on property taxes.

Inherent in this discussion is a policy decision about lease rates. Are lease rates to be consistent with the market, theoretically generating a reasonable rate of return on the port's investment? Or are they designed to underwrite the cost to a particular employer, to attract and grow jobs in the community? Both policy positions are valid, yet there can be some uncertainty within a port regarding the targeted purpose and goal of their real estate investments. Because the private development community wants a level playing field, they may be critical of ports that offer below market lease rates, even with the understanding that lower rates can act as an investment designed to fill market or capacity gaps. Port policies that support below-market lease rates for job-producing businesses should be quantitatively articulated and routinely communicated to the public.

WPPA's 2019 Real Estate Seminar survey found that 92% of ports attempted to lease at market rates, which was a dramatic increase from the results of WPPA's 2015 seminar survey, when only 55% of ports attempted to lease at market rates.

A similarly contentious policy decision is whether or not a port will sell property. RCW 53.08 captures ports' authority to acquire and develop certain facilities and to acquire and directly lease lands and property. In response to WPPA's 2019 Real Estate Seminar survey, a quarter of ports reported a policy or an internal understanding that they would not sell property. Three quarters of ports reported securing a tenant before embarking on a new investment, effectively avoiding speculative investment.

The portfolio of real property assets can include these basic development approaches:

- **Curb line down:** Acquiring fully serviced and appropriately zoned land and making it available for lease or sale is a very common approach used by ports. In this approach, the port would acquire raw land, construct the needed infrastructure, and ensure that the asset is properly zoned and all other regulatory issues are addressed. The cost for pursuing this approach is relatively high, considering the possible lag time between the initial investment and the execution of a land lease or sale. Choosing this approach is determined by a port's relative capacity to invest patient capital.
- **Raw land:** Acquiring and making raw, unserved land available for lease or sale is a less common approach ports might use in situations that involve true public private partnership or a joint development agreement with a private party. For example, this approach would apply in the acquisition and lease or sale of a large tract of land that has not been fully serviced with traditional utilities and may not be appropriately zoned for the proposed use. The cost basis for this asset is relatively low.
- **Vertical development, above the curb line:** Acquiring and/or developing buildings and facilities for lease or sale "from the curb line up" is also a very common approach. In this

approach, most infrastructure would be installed and available and the port would build facilities to serve a specialized or specific market, based on market speculation or with a standing lease. Many ports build on speculation, which may reflect their capacity and tolerance for patient capital as the market demand comes to fruition. Unless there is a high-demand market, a less risky approach would be to build vertically only after a lease or sale is executed. This is the "build to suit" model. To allow for this approach, the potential tenant or buyer must have the luxury of a more relaxed operational timeline.

The choice of development approach should fundamentally reflect (a.) the risk tolerance of the port, (b.) its financial capacity, and (c.) the strength of market demand. Consideration should be given to a balanced portfolio that balances higher risk investments with lower risk investments.

Real Estate Development Checklist

Developing and managing port property can be a complex undertaking. It largely depends on the financial health of tenants and buyers, as well as the strength of the real estate market. The following checklist captures the many considerations a port should explore as it contemplates its real estate investments. Not all of these items are applicable to all properties, but this provides a scope of considerations for exploring a specific need or real estate investment.

Land Assemblage

- ❑ Is property acquisition needed to support the project, or does the port have all the land it requires?
- ❑ Do property lines need to be moved or created to support the project, through a lot line adjustment, short plat, long plat, subdivision, or binding site plan process?
- ❑ Is there access to the property through public right of way?
- ❑ Are there any easements on the property that will encumber development?

Land Use and Zoning

- ❑ Does the Land Use Designation in the local jurisdiction's Comprehensive Plan align with the proposed future use?
- ❑ Is the proposed use allowed under current zoning code?
- ❑ Is a Conditional Use approval needed?
- ❑ Are there any zoning overlay districts?
- ❑ Is the project located within a Shoreline Jurisdiction? If so, is it consistent with those requirements?
- ❑ Are there any potential conflicts with adjacent uses?

Infrastructure

- ❑ Is there adequate transportation capacity to serve the development?

- ❑ Are off-site transportation improvements likely?
- ❑ Are transportation impact fees likely?
- ❑ Is there adequate capacity in the water system to serve the development?
- ❑ Are new water rights required?
- ❑ Is there adequate capacity in the sewer system to serve the development, or will there need to be on-site treatment?
- ❑ Do both water quality and water quantity need to be managed on-site?
- ❑ Is there adequate capacity in power systems to support the proposed development?
- ❑ Is there adequate telecommunication capacity to support the proposed development?

Environment and Cultural Resources

- ❑ Has a Phase I Environmental Site Assessment been completed for the property (See Chapter VII)
- ❑ How will any environmental liability be handled in property transactions?
- ❑ Is the property in a flood plain or floodway?
- ❑ Are there any protected critical areas on the property, such as wetlands or Habitat Conservation Areas?
- ❑ Are there any known historic or cultural resources on the property?

As noted earlier, virtually all Washington ports are active in real estate, and some have significant portfolios of industrial and commercial investments. Managing these portfolios can be challenging. WPPA's 2015 port survey revealed that about one half of ports employ a full-time real estate manager. For nearly all ports, a primary focus of the executive director is the oversight of real estate portfolios, which can substantially affect a port's financial performance and contribute to its mission of supporting the economy and promoting job growth.
Port commissions have a defining role in the management and oversight of a port's real estate portfolio, given their final authority to approve all leases and land purchases. However, they may delegate some level of that responsibility to the executive director, as defined in RCW 53.12.270. That delegation should be made carefully and thoughtfully, and staff should clearly understand that their negotiations are subject to commission approval.

The commission is well advised to address leasing issues through adopted financial guidelines, often referred to as leasing policies. Those guidelines should at a minimum address the following points:

- Lease terms
- Expected rate of return
- Specific lease rates

- Rental standards
- Security/insurance standards

While the Commission retains the authority to set terms and conditions, including lease rates, the Washington State Constitution prohibits "the gifting of public funds" by agreeing to below-market rates, such as the infamous $1 lease. Ports should be cautious when setting below-market lease rates.

Real estate properties can be leased for a term of up to 50 years with an additional 30-year extension, for a total of 80 years. Real estate on an airfield can be leased initially for a term up to 75 years.

Clarity is critical to a port's smooth operations. If a port is to achieve its desired outcomes, alignment is vital between the port's commission and staff on the management and expectations of its real estate portfolio.

Asset Maintenance and Management

Regardless of size, managing a real estate portfolio with the accompanying infrastructure can be challenging. Effective asset management, commonly referred to as facility management, is a core fiduciary responsibility of ports, which hold built assets in trust for their communities.

Whether for real estate or other port lines of business and activities, asset management is broadly understood to include the items below. The costs of these should be reflected in the ROI.

- ✔ **Preventative maintenance** of buildings, facilities, equipment, and infrastructure to (a.) minimize the long-term life cycle cost of the asset, (b.) maximize the length of its useful life, and (c.) ensure that it functions safely and appropriately in support of the activity it is intended to serve.
- ✔ Providing **operative services** that allow the asset to perform on a day-to-day basis as intended. These services vary considerably depending on the type of asset, but they include safety considerations, regulatory compliance, waste handling, landscaping, pest control, cleaning, sanitation, and climate control, to name a few.

The complexity of asset management can be greatly enhanced by a systems approach. Underpinning a systems approach is a streamlined, interactive, location-based inventory of assets that can be visualized to better understand a host of condition and performance metrics. Visualization of key success indicators via a graphics dashboard can be extremely useful for routine commission updates and providing the necessary background on past performance when making forward looking decisions.

Identifying assets by location is a key tool in the effective maintenance and monitoring of a port's assets. Managing by location can be cost effective, reliable, and extremely accurate if using modern GIS software with flexible devices such as consumer tablets. Systems for this application are available off the shelf, and custom programs can be tailored to a specific portfolio. These tools can help to apply a systems approach to many port operations.

The following terms are commonly used in port real estate operations:

Appraised Value: An opinion of a property's fair market value, based on an appraiser's knowledge, experience, and analysis of the property.

Assessed Value: The valuation placed on a property by a public tax assessor for purposes of taxation.

Brokers and Agents: Real estate brokers have extensive formal training in real estate transactional work. They are licensed and often employ a team of real estate agents who work on transactions. Real estate agents are traditionally salespeople who work for a broker.

Building on Speculation: Commonly referred to as "spec building," the situation in which a port invests in vertical building without securing a tenant for the property. It is a higher risk proposition and should be pursued after considerable evaluation of the risk and the port's ability to absorb the risk. It is more common for a port to invest in raw land or curb line down developments.

Capital Lease Payment: A capital lease payment is a one-time tenant lease payment to a port that captures the future stream of rent payments traditionally due on a lease. It is calculated with a discounted cash flow and based on the projected payments over the term of the lease. It can be attractive both to tenants who are financing their investment and to tenant lenders who want to avoid the rent payment obligation, in the event that a tenant defaults on their lease.

Commercial Real Estate: Commercial real estate refers to land and buildings that house businesses, typically include office space, and have light industrial, retail, institutional, and government uses.

Discounted Cash Flow (DCF): A valuation method for estimating the value of an investment based on its expected future cash flows. DCF analysis attempts to evaluate an investment today, based on projections of how much money it will generate in the future.

Fair Market Value (FMV): The accurate representation of a property's value or worth based on market conditions that bracket the purchase price or lease rate. It should be noted that ports are subject to collecting Washington's Leasehold Tax (12.8%) on lease payments. The State assumes the Leasehold Tax is calculated based on FMV, and if the State determines the lease

is below FMV, the port itself may be responsible for the Leasehold Tax differential. Ports may also be subject to criticism from the private sector real estate community if they are leasing below FMV.

Gross Operating Income: The cash flow from an asset before any costs are allocated.

Highest and Best Use: The reasonable, probable, and legal use of vacant land or an improved property, which is physically possible, appropriately supported, financially feasible, and that results in the highest value. This traditional financial margin definition does not always balance with a port's perspective on fulfilling its mission.

Industrial Real Estate: Industrial real estate includes all land and buildings that are utilized or suited for industrial activities. Such activities are defined as production, manufacturing, assembly, warehousing, research, light storage, distribution, and office requirements related to tangible goods rather than service-related users.

Mixed-Use Real Estate: Mixed-use commercial real estate refers to a building or land development that includes both residential and commercial space. For example, a structure with office space on the ground floor and apartment units on the top floor would be considered mixed-use residential or mixed-use office space. Considered as a concept in a 2019 land use study for the Interbay site in Seattle, industrial activities that include on-site workforce housing could promote industrial areas that stimulate jobs and other local business opportunities by allowing a greater mix of related, compatible office, retail, and industrial uses.

Net Return on Investment (ROI): A return metric to gauge an investment's performance by measuring annual net cash against the original cash (equity) investment after all costs are considered, including debt service, overhead cost allocation, and operating expenses. For example: Net Annual Cash ($100,000) / Equity Invested ($1 million) = ROI (10%)

Public-Private Partnerships: Otherwise known as P3, public-private partnerships are contractual arrangements that are formed between public (i.e., ports) and private-sector partners. These arrangements typically involve contracting with a private partner to renovate, construct, operate, maintain, and/or manage a facility or system, in whole or in part. It is common for the port to retain ownership of all or some portion of the real estate asset, with the private party generally investing its own capital to design and develop the properties. Typically, partners share the income resulting from the partnership.

Real Estate Infrastructure: Real estate infrastructure consists of the physical systems that underpin real estate development, including roads, lighting, traffic control, landscaping, broadband and internet connectivity, potable and process water; industrial waste treatment, sanitary sewers and sewage treatment facilities, and storm water treatment, retention, and conveyance.

Residential Real Estate: Residential real estate refers to real estate that is used for residential purposes, including single family homes, condominiums, duplexes, townhouses, and multi-family residencies of varying sizes. As part of a mixed use industrial or commercial project, residential use may be acceptable for ports, but recent court rulings have precluded ports from undertaking standalone residential projects. Ports should carefully consider these rulings for residential use projects.

Marinas

"When you can't control the winds, adjust your sails" –Unknown

The marina industry in Washington represents a broad range of facilities and operations. These include in-water and upland operations that support moorage for recreational and commercial vessels. They range from basic in-water small vessel storage and boat launches to extensive marine complexes that include hospitality, supply, repair, and maintenance services.

WPPA's 2019 Recreational Boating Facility Guide found that 40% of Washington's public moorage slips are operated by port authorities.

Recreational boating is a major industry in Washington, and over half of the State's port authorities are invested in marina facilities that support the recreational boating sector.

- In 2020, some 220,000 recreational vessels were registered in Washington; three quarters of those vessels were located in Western Washington.
- 63% of the recreational fleet is registered in counties that border Puget Sound.
- 95% of recreational boats are less than 26 feet in length and can be trailered.

Washington's commercial fleet is extensive and varied, largely comprised of the fishing fleet as well as other commercial activities such as marine tourism, transportation, spill response, law enforcement, customs, and research. A third of Washington's ports provide moorage facilities to commercial vessels.

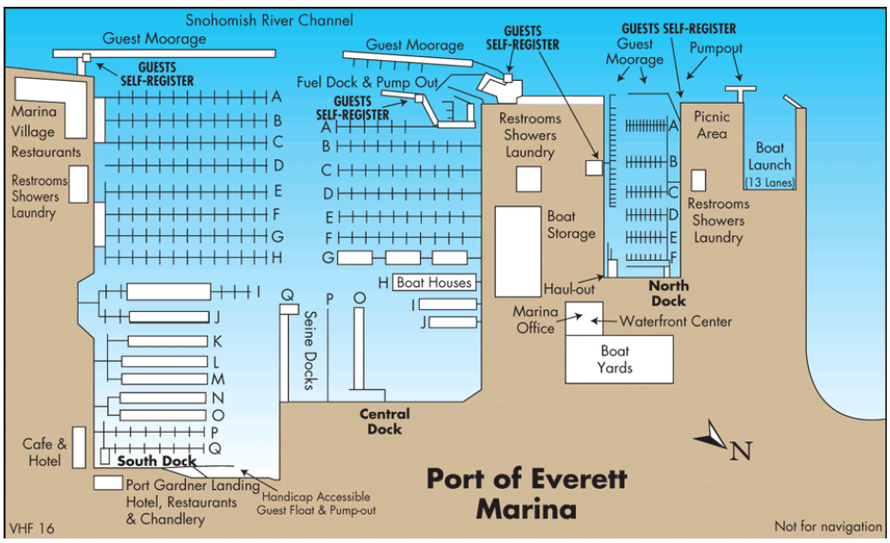
- For more than a century, fishing and seafood processing have been a prominent industry in the commerce and culture of Washington State. Vessels homeported in Washington harvest from a local and regional multi-species fishery that includes groundfish, halibut, albacore, salmon, and shellfish.
- Interstate fleets such as those in the ports of Seattle, Anacortes, Bellingham, and others actively fish the waters off Alaska, California, Oregon, and Canada.
- The Port of Seattle estimates that two thirds of the three hundred commercial fishing vessels homeported in their marinas fish in distant fisheries, such as those in Alaska.
- In total, the Seattle fleet alone supplies over 13% of the nation's commercial fishing harvest.

- Washington's tribal fleet is composed of vessels from 20 Native American tribes. These vessels operate in fisheries that are co-managed by the tribes and supported by the Northwest Indian Fisheries Commission. Many of these vessels are homeported in Washington port marinas.

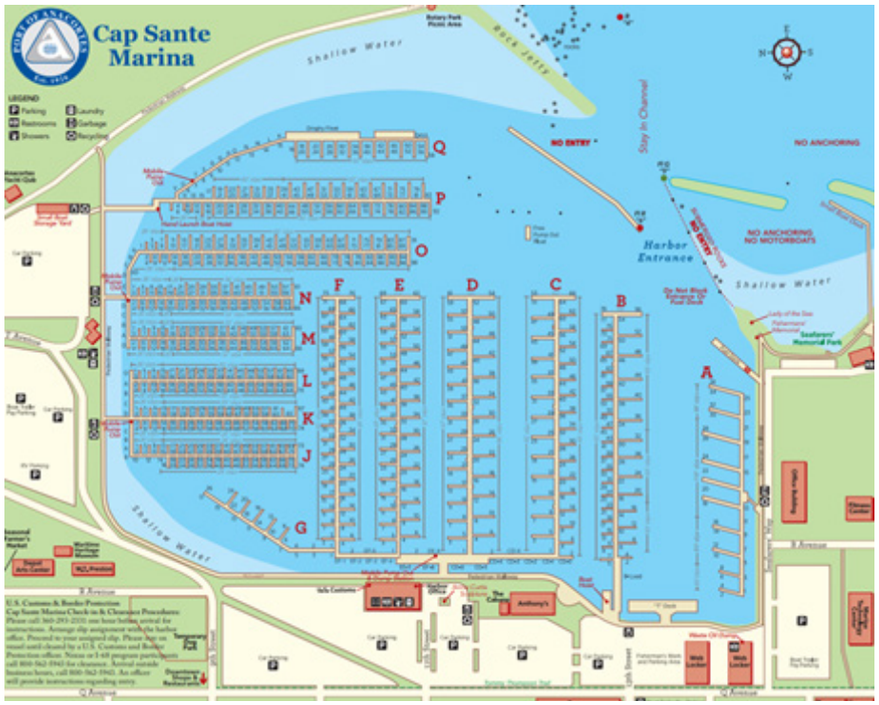
Marinas and the Economy

- In 2018, the recreational boating industry in Washington State had an estimated $6.9 billion impact on the state's economy, with over 22,000 jobs in both the private and public sectors.
- In a 2013 study, the Port of Bellingham estimated that 1,800 direct local jobs were created by commercial fishing, primarily in upland processing activities.
- The fishing and processing industry in Pacific County alone contributes more than $150 million to the local and state economies.
- The health of the many fisheries that support the Washington fishing industry is vital to the state's commercial and recreational fishing industry, which supports 67,000 jobs.
- The average benefit and compensation package in the tourism and recreational boating sector is $48,700.

Marina design and operation is challenging, due to the corrosive and kinetic elements of working in both fresh and salt water, and it encompasses in-water and upland properties that house needed and desired chandlery services. In-water marina design is an established discipline that has evolved over centuries. Preliminary design considerations include (a.) target markets that define vessel demographics, (b.) environmental conditions such as tides, currents, wave surge, and winds, (c.) sea level rise and flooding projections, (d.) depth and draft limitations, (e.) regulatory requirements, and (f.) financing challenges.



The Port of Everett provides a good example of a marina layout for its homeported boaters and transient visitors. It identifies the key services and facilities available to customers and tenants. Image credit: Port of Everett



The Port of Anacortes marina facilities are well laid out, and services are readily available for homeported and transient customers Image credit: Port of Anacortes.

Slip characteristics are largely defined by the targeted vessel demographic. Marina layout is a balancing act that determines the efficient use of surface area for slips and access fairways. Upland development associated with the marina is mostly comprised of land use development efforts.

Specific components of in-water marina design include:

- Wave and tide attenuation structures, such as breakwaters.
- Marina vessel entrance and access.
- Slip, entrance, and fairway depths.
- Slip wind and current orientation, layout, and dimensions.
    - » Access fairways are typically 1.5 to 1.75 times boat or slip lengths.
- Moorage and fendering systems.
- Utilities, including electrical power, potable water, waste handling, and telecommunications.
    - » Electrical power needs are increasing, as larger vessels demand higher amperages.
- Emergency equipment.
- Access to fuel.

Developing on Washington's Shorelines

In concert with Washington State authorities, local communities provide oversight to the development of shorelines for marinas.

The Shoreline Management Act of 1971 (SMA) established a uniform set of rules governing the appropriate uses and development of shorelines throughout the state. The SMA enunciates a state policy for "management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses" (RCW 90.58.020).

Like the policies associated with the use of state owned aquatic lands, the SMA establishes three broad state policies for the use of shorelines:

- Encouragement of water-dependent uses.
- Protection of shoreline resources.
- Promotion of public access.

The SMA created a state-local government partnership that empowered communities to develop shoreline master programs to define policies and uses for local shorelines. The Department of Ecology provides technical assistance to communities and reviews local shoreline programs and permit decisions.

As discussed in Chapter VIII, ports are advised to coordinate with their community partners while developing and updating local shoreline regulations and policies that impact marina, marine terminal, and public access uses.

As regulatory conditions become more and more challenging for siting and permitting in-water facilities such as marinas and rubble mound or sheet steel wave attenuators, there is evidence of a rise in dry stack storage. Dry stack boat storage facilities are limited to power boats and have length restrictions, although newer robotic technologies can accommodate vessels up to 50 feet in length. As compared to in-water facility permitting, dry stack storage can offer reduced complications and arguably fewer environmental impacts. Dry stack storage facilities are most prominent in the southeast U.S., and they offer increased amenities and services to the recreational boater.

Approaches to operating and managing port marinas are as varied and complex as marinas themselves. The facilities, services, and management skills required to operate a recreational marina are somewhat different than those required to operate a commercial marina. Recreational marinas are by nature a hospitality business.

Both types of marina operations are an integral part of the local economy. They are capital-intensive, compete in the marketplace for market share, and may have multiple profit/cost activities that require varying disciplines. There are also seasonal variations that affect the level of periodic marina activity, including fish openings and Pacific Northwest weather patterns. These extremely abbreviated revenue windows can affect income generated from transient moorage and upland business services related to more active boating periods.

A marina's management team should be mindful of two important customer and market concepts:

- **Boats don't spend money, people do.**
- **Boaters see the marina from the water, not the harbor office.**

Both perspectives promote the idea that a marina is a customer-driven business with a distinct element of hospitality, and success is measured at the individual slip level. Marina customers value marina services, safety, moorage and facility functionality, staff responsiveness, and reasonable moorage rates.

Moorage rates are one of the most significant revenue streams at a marina, whether recreational or commercial. There are generally separate moorage rates for permanent, homeported boats and for shorter term, transient use.

There are two basic models for establishing moorage rates for homeported boats. The first model employs a formulaic approach to establish the rates on a **cost recovery basis**, and the second is a **market rate approach.**

The **cost recovery approach** determines annual costs, including (a.) the marina's total operating cost, (b.) capital cost, including debt service and major repairs, and (c.) fair share contribution to the port's overhead and administrative costs, spread out over the gross linear footage for all slips. This approach identifies a cost per foot of moorage and can be further refined by applying a premium to slips with extraordinary beam dimensions. It should be noted that ports utilizing this approach may find that their costs exceed regional market rates.

A sample formula:
(Marina Operating Expenses + Marina Maintenance & Repair Expenses + Allocated Overhead Expenses + Marina Annual Debt Service + Annual Cash Expenses for Capital Repairs) / Total Billable Lineal Feet / 12 = Monthly Mortgage Rate / Foot

The **market rate approach** bases moorage rates on surveys of the relevant competitive markets, establishing the marina's desired position in that market. Ports should be sensitive to the supply and demand dynamics that have recently trended toward higher demand for in-water larger vessel moorage. Because of this trend, ports should consider variable rates that

proportionately increase unit moorage rates for larger vessels. These vessels typically demand greater service levels, require more substantial moorage structures, and occupy greater surface area.

There is no right or wrong approach to pricing for marina operations. However, as for all lines of business activities, it is important that a port establish its financial goal for investing in this market. Is it (a.) to produce net income for other port uses, to recover all costs and break even, or is it (b.) to support a boating industry or lifestyle that requires a subsidy from other lines of business activities or the taxpayer? As for all lines of business, before establishing moorage rates, a port should confirm why it is in the marina business and how it wants to address its financial investment.

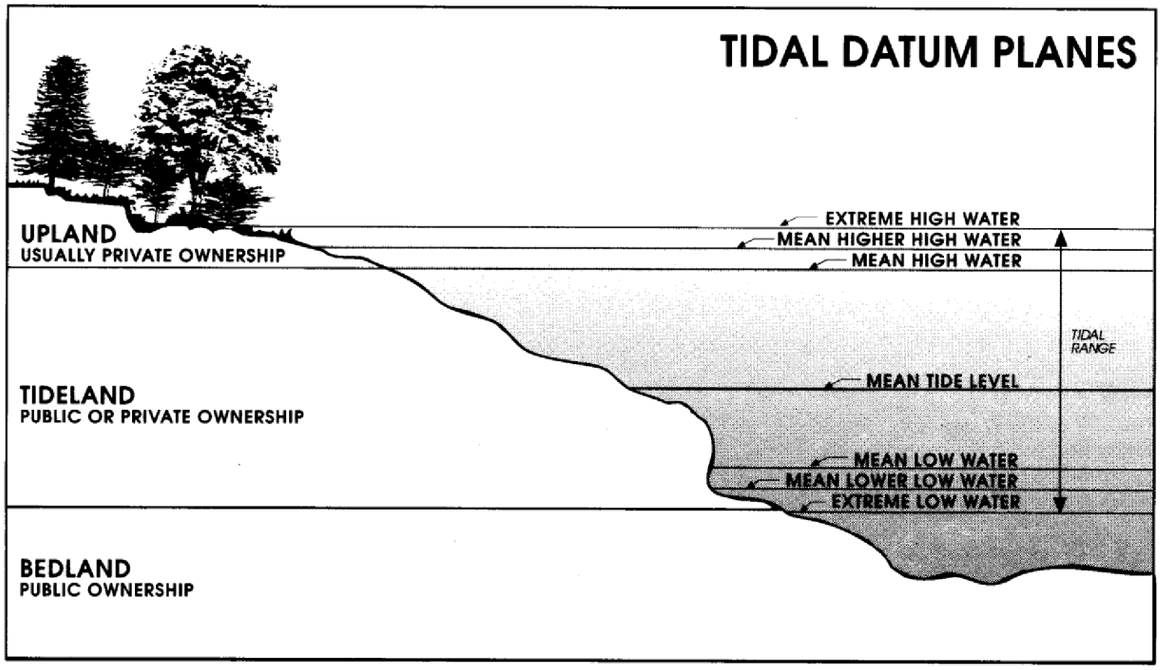
For reference, ports should turn to WPPA's 2019 Marina Committee Recreational Boating Facilities Guide; it provides the most recent statistics on port marinas across the state, including transient and homeport moorage rates.

The non-monetary value of a marina to the character of the community it serves is another key consideration, as marina views and activities are iconic attributes of a waterfront community. This is especially true when considering a marina's public accessibility. Washington State law provides liability insulation for port authorities that allow public access to marina facilities. This access must be balanced with boat owners' concerns for security and safety and their desired level of privacy while at the dock.

Port Management Agreements

Marinas are constructed at the nexus of uplands and tidelands, essentially creating access to navigable waters. Tidelands are the beds of the navigable waters in Washington's rivers, lakes, and marine water bodies. Ownership of these tidelands was originally assigned to the State in 1889. Since that time, Washington has largely maintained ownership of these assets, known as "State Owned Aquatic Lands" (SOAL), but it has also sold off many tidelands to public and private owners.

The responsibility for SOAL policy rests with the Harbor Line Commission, (RCW43.30.150/ RCW 79.92.010), which is also the Board of Natural Resources (RCW43.30.030). The day-to-day management of SOAL is undertaken by the Department of Natural Resources (DNR), under the oversight of Washington's elected Commissioner of Public Lands.



Ivey, Steven. Aquatic Land Boundaries in Washington State. Land Surveyors Association of WA, 2012, 39.

Understanding tides and shoreline relationships

Upland areas are typically defined as property that is above the mean high-water elevation, based on historic tide tables. These properties are usually privately owned.

Tidelands are defined as the area between the mean high-water elevation and the extreme low-water elevation.

Bedlands are defined as submerged properties below the extreme low-water mark.
State owned aquatic lands (SOAL) can take the form of (a.) bedlands that are always submerged, (b.) tidelands that are subject to the ebb and flow of water, and (c.) uplands that have been filled and impacted at the location of the mean high-water elevation. Use of these SOAL by ports can be managed through an agreement with the DNR, called a Port Management Agreement (PMA). The Board of Natural Resources has approved model PMAs, the first of which was adopted in 1984, with an updated version advanced in 1995. Thirty-one Washington ports have adopted PMAs.

It should be noted that a PMA is not a lease agreement between the State and a port to use SOAL. It is an agreement by which the port assumes the role of the DNR and takes on the oversight of SOAL, as if it were the State. In that oversight role, the port has the responsibility to (a.) manage this property in line with state policies, (b.) assume a level of responsibility for its environmental condition, and (c.) assume a perspective that is distinct from its other property management responsibilities.

This discussion of SOAL is applicable to other port uses, including the accommodation of marine terminals and public access such as shoreline parks. The legislative intent is that water-dependent uses of these SOAL will be the priority use.

Water-dependent use refers to a use which cannot logically exist in any location but the water. Examples include but are not limited to:

- water-borne commerce,
- terminal and transfer facilities,
- ferry terminals,
- large vessel construction, repair, and maintenance,
- moorage and launching facilities,
- aquaculture,
- log booming,
- fishing piers, and
- public access.

Non-water-dependent use refers to a use which can operate in a location other than the waterfront.

Examples include but are not limited to:

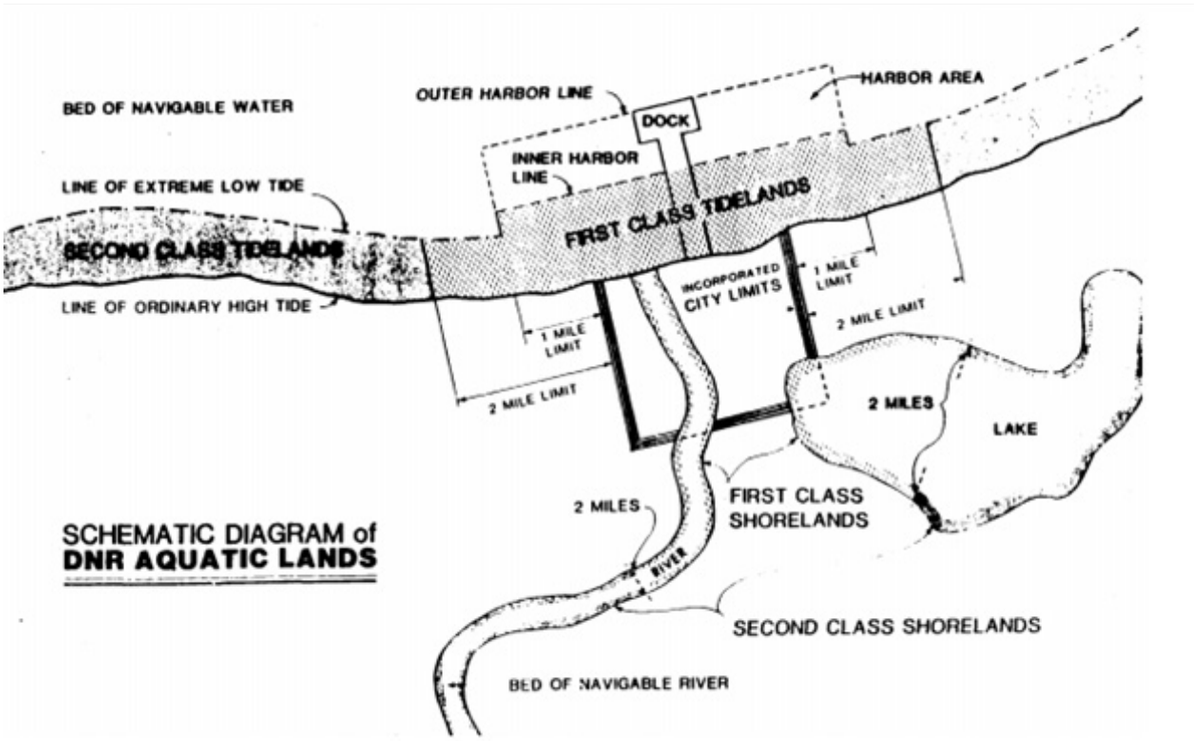
- hotels, condominiums, and apartments,
- restaurants and retail stores,
- small boat storage, and
- warehouses not associated with a marine terminal.

Model PMA's provide guidance in the management and oversight of SOAL, summarized below:

- The original 1984 PMAs had an indefinite term; the 1995 PMA has a 30-year term with a defined renewal process.
- The PMA is accompanied by exhibits that specifically map the subject SOAL. These exhibits identify filled tidelands that would appear to be uplands.
- Authority to manage SOAL is specifically delegated to the port; however, the port must apply state policies, which include using the State's statutory rent formulas and procedures.
- Ports can lease SOAL to third parties. If these leases mandate the termination of the PMA, the lease transfers to the State.
- If a port uses SOAL for its own water-dependent use, such as a marina, there is no rent due to the DNR.
- If a port leases SOAL to a third party for a water-dependent use, the port retains all lease revenues.
- If a port leases SOAL to a third party for a non-water-dependent use, then 85% of the lease revenue is paid to the State.

Current PMAs that were adopted based on the 1995 model are nearing their 20-year expiration. A host of issues are anticipated as the port industry and the DNR begin to negotiate the next generation of agreements. The use of SOAL for non-water-dependent uses is a key consideration.

It is also useful to understand the application and restrictions of the boundaries set by Washington's Harbor Line Commission. Facilities, including fill, are allowed on SOAL with the appropriate permits, inside of the inner harbor line, and when included in a port's PMA with the DNR. There are circumstances in which a port owns the tidelands, fee simple, and does not need a PMA. The inner harbor line is established by the Harbor Line Commission and is between the high-water elevation and the outer harbor line. The harbor area is bounded between the inner harbor line and the outer harbor line. The outer harbor line is set at the discretion of the Harbor Line Commission. Wharves and docks can be constructed between the inner and outer harbor lines, but nothing can be constructed outside of the outer harbor line, as these navigable waters of the State must not be obstructed.



Ivey, Steven. Aquatic Land Boundaries in Washington State. Land Surveyors Association of WA, 2012, 36.

Marinas and the Environment

Port marinas operate in an ecologically sensitive shoreline environment. Over the last several decades, environmental awareness, standards, and practices for marinas and boat operators have grown significantly. The Washington State Department of Ecology (Ecology) established Puget Sound as an official No Discharge Zone under federal and state rules. This rule prohibits ships and boats from discharging raw or partially treated sewage across 2,300 square miles of marine waters, as well as contiguous waters around Lake Washington and Lake Union in Seattle. Graywater from on-board sinks, showers and other non-toilet uses is not restricted by this rule.

Likewise, marinas have embraced a no-discharge standard. Establishing and recognizing conformance to these standards has resulted in the advent of several environmental programs that certify complying marinas.

Envirostars and Clean Marina Programs

Envirostars is a program launched to assist and support Washington businesses in reducing their environmental footprint and protecting their employees. The goals of the program are designed to reduce water and energy use, waste less and recycle more, prevent pollution, use non-toxic substances, support sustainable transportation, and encourage employee involvement in environmental matters.

Also known as Clean Marina, the Clean Marina Washington program was created in 2005 as an expansion of the Envirostars program. Since its inception, partnering agencies have worked directly with ports to develop and implement best practices for preventing marina pollution. As of January 2020, 81 marinas—one third of all marinas in Washington—were flying the “clean marina flag” demonstrating their contributions to preventing pollution and implementing best practices for environmental management.

Among other things, the program has developed standards of practice for:

- Fueling and spills
- Vessel maintenance and cleaning
- Waste management
- Derelict vessels
- Invasive aquatic species
- Float and dock maintenance

Clean Marina is a collaborative partnership between marina managers-owners, state agencies, and nonprofits. Partners include the DNR, Ecology, Sea Grant, Washington Parks, Puget Sound Keepers, the Northwest Marine Trade Association, and Envirostars.

In addition to the Clean Marina program, there are several other initiatives or programs that address the boating and maritime industry, including standards and practices for ports' marine terminals that are discussed further in this chapter:

- **Northwest Marine Trade Association**, whose mission is to promote the growth of recreational boating.
- **Washington Sea Grant**, a research institute at the University of Washington that was created in 1971 to advance the regional understanding and sustainable use of ocean and coastal resources, given that Washington's 15 coastal counties contain 70% of the state's 7.6 million population.
- **Washington Maritime Blue** was formed in December 2017 under the guidance of the Maritime Innovation Advisory Council. Its role is to ensure that Washington will be home to a thriving, sustainable, world-class maritime industry, through 2050 and beyond.

The following terms are commonly used in port marina operations:

Beam: The width of a vessel, which is combined with length to define moorage slip dimensions. Boat Lifts/Haul Outs: Boat lifts or haul outs are often referred to as travel lifts (a manufacturing brand) and consist of rubber-tired, steel-framed structures that lift boats from the water in a sling and place them landside on blocking or dry cradles for maintenance, repair, or off-season storage. They have limited weight and size capacity.

Boatyards and Shipyards: Boatyards and shipyards provide upland maintenance and construction facilities for small and large vessels, respectively. Depending on the size of the vessel targeted, these facilities utilize cranes, rail, and submersible floating docks to transport or lift vessels.

Breakwaters: These are significant marine structures designed to reduce or eliminate tidal and current impacts within a marina, providing calm waters for moorage, maintenance, loading, and unloading within the marina. They are constructed as rubble mound structures, driven sheet piling, or floating wave attenuators, or some combination of these methods. Breakwaters are expensive and require significant permit lead times.

Chandlery Services: A ship chandler is a retail or wholesale dealer that specializes in supplies, commodities, equipment, or services for vessels. Recreational and commercial vessels both require upland chandlery services, such as web lockers for gear storage and maintenance, electronics and equipment suppliers, vessel maintenance and repair contractors, haul outs and boatyards, storage and parking facilities, fuel suppliers, waste pump outs, and more. Vessel owners, crews, and guests also require support services such as food and beverage vendors, temporary accommodations, ground transportation, boat charters, boat dealers and brokers, internet services, yacht and boating clubs, and local upland and weather information. Chandlery

services represent the total of services within or near a marina. Ports frequently supply the built commercial and industrial facilities to accommodate the chandlery market as tenants.

Crabbers: Boats specifically used and designed to catch crustaceans.

Commercial Moorage: There are a variety of operations and commercial vessels homeported in port marinas. The most prominent example is the commercial fishing fleet largely ported in Puget Sound. In addition to commercial fishing vessels, Washington's port marinas homeport a number of other commercial vessels, including vessels for marine tourism, transportation between coastal destinations, research and education, spill response, law enforcement, customs, vessel-based Air BnB, charters, and liveaboards.

Factory Ships: Large vessels that process fish hauls on board and deliver to markets.

First Class Tidelands: Tidal lands in front of the corporate limits of any city, between the line of ordinary high tide and either (a.) the inner harbor line, within one mile on either side of the city limits or (b.) the line of extreme low tide (or mean low tide for properties conveyed by the State prior to 1911), within two miles and outside one mile on either side of the city limits.

Fixed Docks: Fixed docks are typically used for mooring larger vessels and are either piers that protrude from the shoreline, or wharfs that run parallel with the shoreline. Like floats, docks are built of wood, steel, concrete or some combination.

Floats: Floats are docking structures that accommodate tidal ebb and flow. They are attached to wood or steel pilings to control their lateral movement and are constructed of wood or concrete, with concrete obviously having a longer expected lifetime.

Gangways: Gangways are the bridging structures that connect upland shorelines with floating marina facilities. Their length is governed by the extent of tidal fluctuations. Ports should be aware of the requirements of the Americans with Disabilities Act, which mandates accessibility standards for floats and vessel access.

Gillnetters: Fishing boats that employ the use of a gill net system to capture fish and can be operated manually or automatically. They tend to be smaller boats.

Harbor Area: The area between the inner harbor line and outer harbor line.

Homeporting: Homeporting refers to the port (marina) in which a recreational or commercial vessel is harbored. It is different from registry, which applies to larger vessels. Homeporting is a hospitality business; it requires a marina to provide ancillary support services to the specific vessel type.

Inner Harbor Line: The line established by the State, marking the seaward limit of first- class tidelands or first class shorelands within city limits and within one mile on either side of those city limits.

Launches: Launches or boat ramps are a common fixture for trailered vessels in river and marine bodies of water. They are often outfitted with floats to accommodate transient moorage of vessels. In typical situations, launch fees are not adequate to recover the operating and capital costs of these facilities.

Motorboats: Cabin cruisers, trawlers, and motor yachts are included in this class of vessels. They are powered by gas or diesel fuels and vary significantly in length and beam.
Ordinary High Tide: Also known as mean high tide, the average elevation of all high tides over a period of 18.6 years.

Outer Harbor Line: The outer boundary of the harbor area within city limits, as established by the State. The area beyond cannot be given, sold, or leased by the State.

People Powered Crafts: The use of unpowered small crafts such as rafts, gondolas, kayaks, and paddle boards are on the rise. Their popularity should be recognized in both marina design and operation.

Purse Seiners: Purse seiners are commercial fishing vessels that use seine nets to fish pelagic species of fish found near the surface. Operators can close the capture nets from the bottom and unload them directly into the vessel.

Recreational Moorage: Recreational vessels are not engaged in revenue generating commercial activities. They are maintained for the recreational and travel use of their owners. As boat owner demographics change, there is a growing trend toward multi-party leasing programs for recreational vessels, including their use for weekend getaways without ever leaving the dock.

Riparian: Belonging or pertaining to lands abutting a stream or river.

Sailboats: As the name suggests, sailboats rely on harnessing wind power using cloth or synthetic sails—usually assisted by gas or diesel engines—to power monohull, catamaran, or multihull sailing vessels. Their significant sub-surface keel structures make their marina design requirements (i.e., depth and maneuverability) more significant.

Seaworthy Vessels: A common challenge of port marina operations is defining and mitigating the presence of vessels that are not considered seaworthy. These unfit vessels often threaten to sink at the dock, causing significant physical damage or impacting the environment through unwanted releases of fuels, oils, and waste products. The most common definition of

seaworthy is that the vessel must be capable of leaving and returning to the dock under its own power. Port marina operating policies often define "seaworthy" as a condition determined at the sole discretion of the harbormaster or marina supervisor.

Second Class Tidelands: All tidelands not classified as first-class tidelands.

Submerged Lands: Land that is covered by water some or all of the time.

Tidal Grids: In environments of great tidal variance, tidal grids are fixed structures that accept vessels at high tide, leaving the hull of the vessel exposed for maintenance and repair work as the tide recedes. These are inexpensive, yet limited maintenance facilities.

Transient Moorage: Often referred to as guest or visitor moorage, transient moorage represents the moorage demand of vessels that are transiting through the area and need moorage or have identified the marina as their destination. In Washington, weather conditions dictate that the transient moorage market is seasonally limited to approximately 100 – 120 days of summer, with limited shoulder seasons. Rates for transient moorage are typically higher, as marina owners and operators must recover their costs in less time than for year-round homeported vessels. For this reason, most Washington port marinas focus on homeported moorage, with limited moorage space for transient vessels.

Trawlers: Trawlers are a very common type of fishing boat. They use suspended nets at varying depths to catch an array of fish in shallow and deeper seas.

Uplands: The dry lands bordering a body of water, the outer boundary of which is ordinary high water.

Aviation

"Aviation is proof that given the will, we have the capacity to achieve the impossible."
–Eddie Rickenbacker

In 1910, The Meadows Racetrack along the Duwamish River in Seattle was the premier venue for horse racing in the Pacific Northwest. It was that year that Charles K. Hamilton, an aviator known as the "Crazy Man of the Air," took off from The Meadows and became the first to fly an airplane in Washington state. He was watched by a crowd of thousands. William E. Boeing may have been among Hamilton's spectators.

Despite limited technical developments during World War I, early aviation remained a dangerous business with no safety standards or regulations. The Air Mail Act of 1925 launched the creation of a profitable commercial airline industry and by the 1930's, four major domestic passenger service carriers were airborne. As air travel increased, several federal agencies and programs were created to address safety.

It was not until 1951 that a midair collision of two commercial passenger planes over the Grand Canyon prompted Congress to create the Federal Aviation Agency, which was established in 1958. In 1967, through a consolidation effort, the Department of Transportation was created and the Federal Aviation Agency of the 1950s was renamed the Federal Aviation Administration (FAA). Today, the FAA is responsible for the federal regulation and oversight of civil aviation in the U.S., specifically the operation of the nation's airports.

The U.S. has a well-organized and well-funded system of airports serving the needs of the traveling public and the nation's economy. This national system, the National Plan of Integrated Airport Systems (NPIAS), is managed by the FAA and consists of over 3,300 existing and proposed airports that are eligible for funding under the Airport Improvement Program. The list of eligible airports is updated every two years. There are also more than 16,000 identified airports in the U.S. that are considered non-NPIAS facilities. These are largely general aviation airports and serve an equally important role in serving travelers and the economy.

The FAA Seattle Airports District Office (ADO) is the regional federal office that oversees airport development and funding in the states of Washington and Oregon.

Aviation in Washington State

At the state level, the Washington State Department of Transportation (WSDOT)'s Aviation Division was initially formed as the Washington State Aeronautics Commission in 1947 and operated as an independent entity until 1977. At that time, the Commission was dissolved, and its staff and duties were consolidated—along with the departments of Highways and Ferries and the Toll Bridge Authority—into the newly created Department of Transportation. It was known as the Aeronautics Division until the mid-1990s, when its name was changed to the Aviation Division.

The Aviation Division continues to operate under WSDOT and now falls under the Multimodal, Development and Delivery offices, grouped by transportation modes, construction, safety, and planning. More recently, the Aviation Division has expanded its capabilities to include a staffed airport revolving-loan program, to assist the state in the adoption of advanced air mobility technology, including unmanned aircraft systems, electric fixed wing aircraft, and electric vertical takeoff and landing aircraft (eVTOL). Public-use airports in the state remain a focus of the Aviation Division. The priorities and goals of the WSDOT Aviation Division (also known as WSDOT Aviation) are captured in the Washington Aviation System Plan (WASP), last updated in 2021.

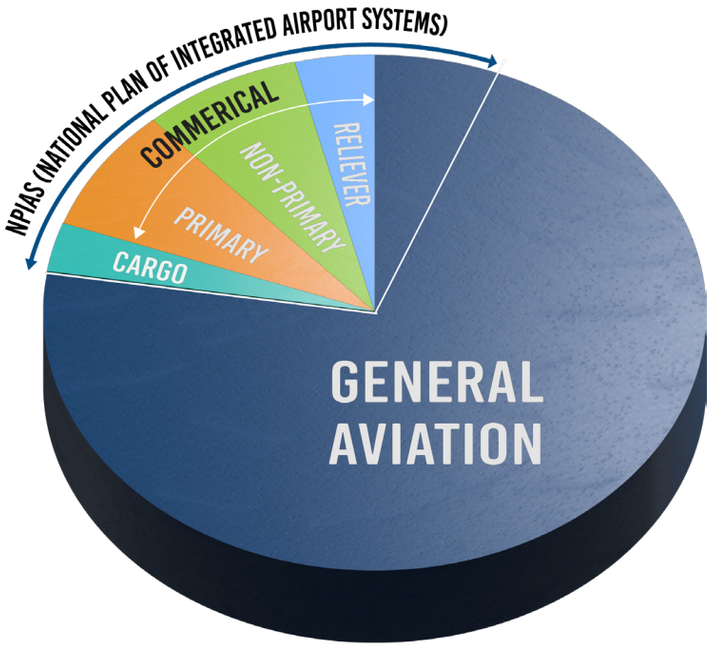
While the FAA provides safety, operational oversight, and funding for the nation's airports included in the NPIAS, the State provides funding and technical support to both NPIAS and non-NPIAS public-use airports in Washington through the WSDOT Aviation Division. In addition, WSDOT Aviation provides coordination for FAA and State funding through the State Capital Improvement Program (SCIP), which collects and prioritizes airport sponsors' five-year project

requirements. WSDOT Aviation also engages with the State's larger commercial passenger airports when circumstances warrant.

One of WSDOT Aviation's focus areas is assisting airports in addressing issues that occur outside of an airport's property lines but could impact aviation activities. Typically, this includes land use issues, such as property development, that could negatively impact airport operations. There are public-use airports in 37 of Washington's 39 counties. Today, 28 ports operate

Aviation Impacts

- Washington's 134 public-use airports account for 407,042 jobs, $26.8 billion in labor income, and $107 billion in total impact to the state's business economy.
- In 2015, construction, wholesale, retail, and services at port-specific airports accounted for 5,790 jobs and more than $3.4 billion in revenue.
- Approximately 16,280 jobs are directly tied to airports and commercial aviation.
- Across Washington, aerospace manufacturing accounts for 3,200 jobs and nearly $1.9 billion in revenue.
- Examples of major Washington industries that utilize air freight exports include aerospace, medical devices, and cherries.
- Air freight exports totaled $9 billion in 2015 and accounted for 13.1% of all exports through port district lands.



The U.S. has a vast airport system serving a variety of needs at the local, state, regional, and national levels.

The FAA utilizes these definitions to distinguish between airport use and size:

- **Commercial:** Refers to publicly owned airports with scheduled air carrier service and at least 2,500 annual enplanements.

- **Primary airports** are commercial passenger facilities with more than 10,000 passenger enplanements per year. Large hub primary airports accommodate more than 1% of the nation's enplanements per year; medium hubs accommodate 0.25 – 1.0%; small hubs accommodate 0.05 – 0.25%; and non-hubs accommodate less than 0.05%, but more than 10,000 enplanements per year.
- **Non-primary commercial service airports** are commercial passenger facilities that accommodate 2,500 – 10,000 enplanements per year. They are also known as non-hubs.
- **Reliever airports** are facilities designated by the Secretary of Transportation to relieve congestion at commercial service airports and provide general aviation access to the general community.

Cargo: Refers to airports that serve aircraft that provide air transportation of cargo with a total annual landing weight of 100 million tons or more. Landing weight refers to the weight of the aircraft transporting cargo within a state, between states, or internationally. An airport can be both a commercial service and cargo service airport.

General Aviation: Refers to public-use airports that do not have scheduled passenger service or that have less than 2,500 annual passenger boardings. These account for approximately 88% of the airports included in the NPIAS.

In addition to these classifications, there are additional FAA categories for non-primary airports, based on the ownership and operation of their general aviation facilities:

National: National airports support the national airport system by providing communities with access to national and international markets throughout the U.S. National airports have very high levels of aviation activity, with many jets and multiengine propeller aircraft.

Regional: Regional airports support regional economies by connecting communities to regional and national markets. They are generally located in metropolitan areas and serve relatively large populations. Regional airports have high levels of aviation activity, with some jets and multiengine propeller aircraft. The metropolitan areas in which regional airports are located can be Metropolitan Statistical Areas with an urban core population of at least 50,000, or Micropolitan Statistical Areas with a core urban population between 10,000 and 50,000.

Local: Local airports supplement local communities by providing access to markets within a state or immediate region. Local airports are most often located near larger population centers, but not necessarily in metropolitan or micropolitan areas. Most flying at local airports

is by piston aircraft, in support of business and personal needs. These airports typically accommodate flight training, emergency services, and charter passenger service.

Basic: Basic airports link the community with the national airport system and support general aviation activities, such as emergency response, air ambulance service, flight training, and personal flying. Most flying at basic airports is self-piloted, using propeller-driven aircraft for business and personal reasons. They often fulfill their role with a single runway or helipad and minimal infrastructure.

WSDOT Aviation updated its state airport classifications in the 2017 WASP, which classified airports based more on their primary aviation activities. Not to be confused with the federal classification system, the state classification system identified:

- **Major Airports:** commercial; aircraft and aerospace manufacturing
- **Regional Airports:** corporate general aviation and passenger commuter service
- **Community Airports:** general aviation, personal use, and pilot training
- **Local Airports:** general aviation personal use, pilot training, and agricultural applications
- **General Use Airports:** general aviation; personal, recreational, and backcountry flights

Airport Planning

"The goal of a master plan is to provide guidelines for future airport development which will satisfy aviation demand in a financially feasible manner, while at the same time resolving the aviation, environmental and socio-economic issues existing in the community." –FAA

Like many port facilities, airports are capital intensive, with high operating and maintenance costs that require rigorous planning and development strategies. Airport planning is a systematic process that establishes guidelines for efficient airport development that is consistent with local, state, and national goals. A key objective of airport planning is to assure the effective use of airport resources to satisfy aviation demand in a financially feasible manner. Airport planning can be as broad as the national system plan or more centrally focused, such as a Master Plan for a specific airport.

Airports are required to have up-to-date Airport Master Plans. Existing or potential shortcomings in an airport or its existing plan trigger the need for an updated Master Plan. These deficiencies can result from demand exceeding capacity, the introduction of new aircraft types, or the emergence of a critical environmental problem. The airport sponsor's strategic vision or business plan for the airport may drive the need for a planning study. In addition, national, state, or regional planners may have identified issues requiring the airport sponsor's attention. Or, in some cases, previous planning efforts may not have effectively studied impacts, market conditions, or other planning considerations.
Undertaking a Master Plan for NPIAS airports is an effort that can be funded by an FAA grant.

However, this requires that the scope of work for developing the Master Plan receive prior approval from the FAA.

The Master Plan process is guided by the FAA and results in projections of future passenger and aviation activity growth and the preparation of an Airport Layout Plan (ALP). The major analytical elements of a Master Plan update include the following:

- Inventory of existing airport conditions
- Aviation activity forecasts
- Demand/capacity analysis
- Facility requirements and identification of issues
- Definition and evaluation of airport development alternatives
- Environmental overview of proposed development
- Airport layout plan
- Capital improvement program

Some planning elements are not eligible for FAA funding. These include:

- Asset management planning
- Aviation business park analysis
- Business plans
- Economic benefit studies
- Information technology (IT) master plan or analysis
- Marketing studies
- Minimum standards development
- Rates & charges analysis
- Rules & regulations development
- Snow removal plans
- Strategic business plans

The Airport Layout Plan (ALP) and the Capital Improvement Plan (CIP), as major components of the Master Plan, are essential keystone documents in obtaining either federal or state grant funding.

Developed as part of the overarching Master Plan process, drawings included in the ALP provide a graphic depiction of existing and proposed airport facilities, as determined by reviewing and analyzing alternatives for activity forecasts and facility requirements. Minor

changes to the ALP are allowable without undertaking a complete Master Plan update, but they do require approval by the FAA.

The ALP should include:

- Comprehensive boundaries and proposed additions to areas that are owned or controlled by the sponsor (i.e., airport owners and operators).
- The location and nature of existing and proposed airport facilities and structures.
- The locations of existing and proposed non-aviation areas and improvements within the airport.

A current, FAA-approved ALP that outlines the proposed airport development is a prerequisite for receiving a grant. Any sponsor who has received a grant for airport development is obligated by grant assurances to regularly update the ALP. In addition, airport planning and development projects that involve federal resources require an environmental determination. Federal regulations necessitate that the FAA evaluate the environmental consequences of all proposed developments on the approved ALP.

The WSDOT Aviation Division will also consider partially funding projects that originate from an airport's ALP and are included in its CIP.

Because of these complexities, it is critical that ports and their advisors coordinate early and often with the FAA and/or the WSDOT Aviation Division, as applicable, to identify significant or evolving planning issues and to determine the type and magnitude of effort required to address them.

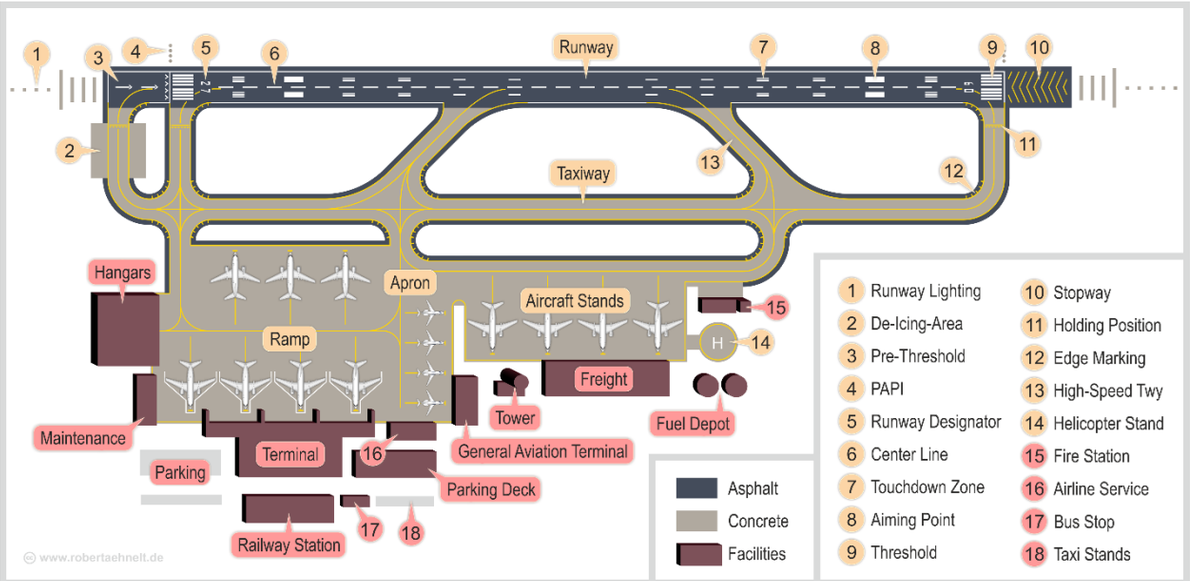


Illustration of commercial airport components. Author: Robert Aehnelt (hyperlink: http://www.robertaehnelt.de/). Source: Airport infrastructure (hyperlink: https://commons.wikimedia.org/wiki/File:Airport_infrastructure.png). License: CC BY-SA 3.0.

Approximately every three years, WSDOT Aviation conducts a system-wide pavement study to assess the relative condition of pavements for selected Washington airports. The program serves to identify system pavement needs, shape programming decisions for federal and state grants, provide information for legislative decision making, and assist airport sponsors in making informed planning decisions. The program also develops accurate pavement inventories and identifies necessary maintenance, repair, rehabilitation, and reconstruction projects.

In addition to proper planning, airport and aviation security are critical to an airport's operation.

Airport security refers to techniques and methods, such as perimeter fencing, that are used to protect passengers, staff, aircraft, and field equipment from accidental or malicious harm from crime, terrorism, and other threats. Aviation security is a combination of measures to safeguard civilian aviation against the threat of any unlawful interference with its safe operation.

The FAA regulates aviation safety and pilot certification, and it operates the nation's air traffic control system, including individual control towers. The Transportation Security Administration (TSA) regulates aviation security and operates the nation's passenger screening checkpoints. Both agencies have distinct roles in the secure operation of an airport.

Grant Funding

Like the state's highway system, Washington's system of public-use airports is a critical component of the state's transportation infrastructure. Also like the highway system, public-use airports require constant maintenance and improvements to meet the needs and demands of the traveling public. Simply put, there is not enough available funding to meet current aviation system needs.

Beyond annual operating revenue streams or ports' ability to borrow through commercial loans based on general obligation or revenue bonds, there are two primary sources of capital for airports:

- The WSDOT Airport Aid Program (AAP) funds airports that are only eligible for this program.
- The FAA Airport Improvement Program (AIP) funds any eligible airport.

Authorized under RCW 47.68.090, the WSDOT AAP is funded by an 11-cent-per gallon fee on aviation fuel, along with aircraft registration fees and excise taxes. It should be noted that commercial aircraft fuel use is exempted from this tax. Any city, county, political subdivision (i.e., port authorities), airport authority, federally recognized Indian tribe, public corporation, or person(s) that owns and operates a public-use airport included in the Washington Aviation System is considered an eligible airport sponsor who may apply for AAP grant funds.

AAP grant funds may be used for the planning, acquisition, construction, improvement, and maintenance of airports. All project work must be available for public use and shown on the approved Airport Layout Plan (ALP). All projects must be included in WSDOT Aviation's five-year SCIP. AAP grant funds cannot be used for private revenue producing structures, such as private hangars.

The SCIP captures airport funding needs for all of Washington's public-use airports. It includes airport project requirements that address both individual airport needs and FAA recommendations for airports in the NPIAS. The SCIP tackles the challenge of strategically targeting limited state and federal resources by better identifying and prioritizing aviation-related projects. This process helps WSDOT Aviation and local governments communicate with decision-makers about the need for continued and increased investments into Washington's airport system.

Each fall, WSDOT Aviation collects CIPs from airport sponsors through Washington's Airport Information System. This alleviates to the burden of duplicating communication with the FAA and WSDOT. Both agencies work together to provide a timely response to airport sponsors regarding their CIP requests.

WSDOT Aviation typically works to balance available AAP funds equally between years. Roughly 50% of the total grant funds available will be programmed during each year of the state's biennium. The maximum grant amount WSDOT Aviation can issue any individual sponsor is $750,000.

Most AAP grants supplement AIP grants. For NPIAS listed airports that receive an AIP grant, WSDOT's AAP works to leverage federal funds by contributing up to five percent of the project cost, with the airport sponsor contributing five percent for a total grant match of ten percent. For non-NPIAS airports, the AAP requires a minimum five percent match from the airport sponsor.

The FAA's grant program includes capital funding for airports in the NPIAS. Eligible projects are identified by the AIP.

For large and medium primary hub airports, the AIP grant covers 75% of eligible costs, or 80% for noise program implementation. For small primary, reliever, and general aviation airports, the grant covers a range of 90-95% of eligible costs, based on statutory requirements.

AIP eligible projects include improvements related to enhancing airport safety, capacity, security, and environmental concerns. In general, sponsors can receive AIP funds for most airfield capital improvements or rehabilitation projects, and in some specific situations, for terminals, hangars, and nonaviation development. In addition, certain planning, surveying, and design efforts may be eligible. Like all federal agency programs, AIP funded projects must also

meet federal environmental and procurement requirements. Operational costs for an airport, such as salaries, equipment, and supplies, are not eligible for AIP funding.

Airports that have accepted federal funds to purchase land or construct facilities are considered federally obligated airports. These airport operators are required to comply with federal grant assurances, some of which relate to tenants and businesses operating on airport property, including outside the fence line.

Significant obligations under these federal grant assurances include:

- Approved uses of airport revenue
- Proper maintenance and operation of airport facilities
- Protection of approaches
- Keeping good title of airport property
- Compatible land use
- Availability of fair and reasonable terms without unjust discrimination
- Adhering to the approved airport layout plan
- Self-sustainability
- Sale or disposal of federally acquired property
- Using acceptable accounting and record-keeping systems
- Compliance with civil rights requirements

Airport Revolving Loan Program

Washington's Community Aviation Revitalization Loan Program was initially established by state Legislature in 2019 and funded with $5 million. The revolving loan program was created to provide alternative funding for revenue producing capital projects that help public-use, general aviation airports become more self-sustainable. Revenue producing projects are generally not eligible for FAA grant funding, and many general aviation airports have limited access to funding resources for these projects.

The legislation directed WSDOT to establish an eight-person board to develop the program and select projects for funding.

This revolving loan program provides loans of up to $750,000 at 2% interest, to airports with less than 75,000 annual commercial enplanements, as reported to the FAA. Loan periods can be set to a maximum of 20 years, with an optional loan repayment grace period of up to three years. Loan recipients must commit to provide public access to the airport for a period of time equivalent to 1.5 times the length of the loan. Eligible projects can include hangars, fueling facilities, business parks on airport property, paid parking facilities, passenger amenities, and

other revenue generating or cost cutting developments that help make the airport more self-sustaining and less dependent on public funding.

Airports must apply to the Board for loan consideration. An application must (a.) be supported by the port district, city, or county in which the project is located, and (b.) clearly identify the source of funds intended to repay the loan.

Although consideration is not limited to the points below, the Board must consider the following criteria when evaluating a loan application:

- A specific private developer or expansion is ready to occur and will occur only if the aviation facility improvement is made.
- The project results in the creation of jobs or private sector capital investment, as determined by the Board.
- The project improves opportunities for the successful maintenance, operation, or expansion of an airport or adjacent airport business park.
- The project results in the creation or retention of long-term economic opportunities.
- The project results in leveraging additional federal funding for an airport.

As of 2020, the program has received 26 applications totaling $14.9 million. The Board has selected and entered into loan agreements for 11 projects totaling $4.7 million. The program's success likely contributed to the loan program being permanently signed into law under SB 5031 in May 2021 and funded with an additional $5 million under SHB 1080.

Commercial Aviation Coordination Commission

Washington's Commercial Aviation Coordination Commission is of particular interest to port authorities. Established by state Legislature, the Commission tasked WSDOT's Aviation Division with providing staff support for coordinating and administering the commission's work. Intended to address the projected need for additional capacity due to ever-increasing air transportation operations in Washington, this work has focused on identifying a location for a new primary commercial aviation facility to alleviate pressure on Seattle-Tacoma International Airport.

By 2023, the Commission will develop that recommendation, and will also recommend additional ways to accommodate capacity needs at other facilities. The results of this effort will undoubtedly have a significant impact on Washington ports.

The following terms are commonly used in airport operations:

Advisory Circular (AC): A series of external FAA publications that distribute non-regulatory information, guidance, and policies.

Air Cargo: All commercial air express and air freight, except for airmail and air parcel post.

Air Carrier: A commercial operator providing transport of passengers or property for compensation or hire, utilizing aircraft with more than 30 seats and certified in accordance with Federal Aviation Regulations.

Air Traffic Control: Air traffic control provides in-flight and on-ground aircraft movement and safety direction.

Aircraft Operation: Any aircraft arrival or departure, including touch-and-go operations.
Airport Layout Plan (ALP): A critical planning tool that depicts existing facilities and planned development for an airport.

Airspace: The area above ground in which aircraft travel. It is divided into corridors, routes, and restricted zones for the control and safety of air traffic.

Apron: A designated area within an airport for the parking, loading, fueling, or servicing of aircraft.

Commercial Aviation: Aircraft activity licensed by state or federal authority to transport passengers and/or cargo on a scheduled or non-scheduled basis.

Deplanement: A term applying to passengers and cargo leaving an arrived aircraft.

Enplanement: A term applying to passengers and cargo boarding a departing aircraft.

Fixed Base Operator: Typically, a tenant or contractor that provides fueling and other services to general aviation and commercial aircraft and pilots.

General Aviation (GA): All aviation activities except those performed by a commercial air carrier or the military.

IFR Conditions: Weather conditions below the minimum prescribed for flight under Visual Flight Rules (VFR).

Instrument Landing System (ILS): A landing approach system that establishes a course and descent path to align an aircraft with a runway for final approach.

Instrument Flight Rules (IFR): Rules that govern flight procedures when ceiling and visibility are below 1,000 feet and three miles, respectively.

Noise Contour: A line connecting points of equal noise exposure.

Operation: Any airborne arrival or departure of an aircraft to or from an airport. “Touch-and-go” practice landings are considered two operations.

Part 139 Airports: Title 14, Code of Federal Regulations, Part 139 (14 CFR Part 139) established certification requirements for airports serving scheduled air carrier operations in aircraft designed for more than 9 passenger seats but less than 31 passenger seats.

Precision Instrument: A term used to describe an approach using horizontal and vertical guidance. This term also describes the runway for using this type of approach and the markings on that runway.

Runway Protection Zone (RPZ): An area off the runway end to enhance the protection of people and property on the ground.

Sponsors: Owners and operators of public airports that receive grants.

Terminal Building: The building on an airport which is used to transition between surface and air transportation.

T-Hangar: A T-shaped aircraft storage building that provides economical shelter for a single aircraft.

Tie Downs: An area on an airport specifically designed for the outdoor storage of aircraft.

Touch-and-Go Operations: An aircraft operation for practice or testing purposes, characterized by a landing touchdown and continued takeoff without stopping.

Traffic Pattern: The flow of traffic that is prescribed for aircraft landing at, taxiing on, or taking off from an airport.

Visual Flight Rules (VFR): Rules under which aircraft are operated by visual reference to the ground and fly on a “see and be seen” principle.

Wind Cone (Sock): Conical wind direction indicator.

Broadband

“The Internet is becoming the town square for the global village of tomorrow.” –Bill Gates

Envisioned as a “galactic network” by MIT professor J.C.R. Licklider and further advanced by the packet switching theory developed by MIT professor Leonard Kleinrock, the early concepts of the internet were born in the 1960s.

Rooted in congressional authority, the Federal Communications Commission (FCC) serves as the country's central regulator of broadband networks. The Telecommunications Act of 1996 generally empowers the FCC to regulate internet service providers (ISPs) similarly to its historic oversight of telephone providers as public utilities.

Today, port broadband investment—primarily in dark (inactive) fiber—is the fastest growing line of business for the state's ports. In 2020, one-third of ports reported being involved in dark fiber, in one capacity or another.

Many consider dark fiber infrastructure investments to be the shipping lanes and rail corridors of tomorrow's economy. It is now considered essential infrastructure. This designation highlights the newest and fastest growing port line of business: data transportation in the information economy. Ports can own any part of the network necessary to create an open access system that reaches all the way to the end user.

Pricing and physical access are two of the most significant user barriers to connecting to this essential infrastructure. Provider monopolies are common in the telecom service industry, particularly in rural markets where potential returns are not sufficient to drive private sector investment in new infrastructure. The combination of outdated infrastructure and lack of market pressure often leads to substandard service levels and higher prices in rural markets.

Broadband capacity and access are better in Washington than in some states, but there's still room for improvement in cost, quality, and last-mile access.

- In early 2021, Speedtest, the global leader in independent broadband testing reported that the United States has the 14th fastest download speed for fixed fiber internet service at 182 Mbps, compared to a worldwide average of 98 Mbps.
- Washington is the 16th most connected state in the United States, with a statewide internet speed average of 60 Mbps. However, there is still a digital divide within the state, as some geographic areas are much less connected than others.
- Even though there are 242 internet providers in the state, there are 338,000 citizens without access to a wired connection capable of at least 25 Mbps in download speeds. There are also 529,000 citizens who currently only have access to one provider, making it impossible for them to switch. Another 103,000 have no wired internet provider at all.
- In 2019, the FCC reported that the digital divide is even greater on tribal lands, with less than half of tribal households having access to high-speed broadband services. Washington State has 29 federally recognized tribes.

As reported by the Washington State Broadband Office in its 2020 Biennial Report, the equitable growth and success of the state's economy will be greatly hampered without equal access to high-quality, affordable broadband, especially in the wake of the COVID-19 pandemic. The 2020 Report, which can be accessed through the Department of Commerce's website, provides a detailed description of broadband coverage, or lack thereof across the state.

The Washington Legislature has set ambitious and essential targets for providing broadband, including that all Washington businesses and residences will have access to at least one broadband provider with download speeds of at least 150 Mbps and corresponding upload speeds.

Internet: Interconnected networks

No party owns the internet. It is a global collection of networks, big and small, that connect to form a single entity: the internet.

Every computer or individual device that is connected to the internet is part of that network. These devices are connected to the internet through an internet service provider (ISP). In work environments, individual computers are frequently connected through a local area network (LAN), which is connected to the internet through an ISP. ISPs provide access to extensive networks at three levels: long-haul networks, middle mile networks, and last-mile networks.

To provide internet service to an end user, an ISP needs access to a complete circuit formed by copper or fiber optic cable that carries data transmissions between an end user and a colocation facility or meet-me space. In turn, that facility houses switching equipment capable of moving data to and from a Point of Presence (PoP), as data is uploaded or downloaded to and from the internet. Data is aggregated at these colocation facilities (also called data centers or central offices) and transferred to long-haul fiber optic networks that carry large amounts of data between the local community and the regional telecom exchange. In Washington, the largest of these facilities is the Westin Exchange in Seattle, where internet traffic is collected, transferred between networks, and routed to internet markets around the world as needed. A smaller, regionally significant exchange also exists in Spokane.

Ports in Washington typically enter the picture at the local colocation facility. These often take the form of a telecom hut and data center, where Port-owned fiber optic cable can connect with an ISP's electronic equipment responsible for data transmission over a lit (active) fiber optic network. Ports are typically engaged in building and operating both mid- and last-mile fiber optic infrastructure to create open access fiber optic networks from a local PoP to an end user.

Ports may also choose to own and operate the local colocation facility. This is often an essential component of the Port's telecom network, as it allows the Port to sell rack space to any ISP in an open access manner, such that any provider can stage electronics and access network infrastructure. An ISP purchasing rack space in a port owned colocation facility will

also need to purchase backhaul capacity on one of the few long-haul networks (owned by large telecom carriers) throughout the state, to facilitate the movement of data from their local network operated on port infrastructure to the regional telecom exchange.

Washington state ports were first granted statutory authority to build, acquire, and operate telecommunications systems in 2000. At that time, their powers were limited to rural ports providing wholesale telecommunications services. In 2018, this wholesale authority was expanded to all ports in the state, including the authority to work within or outside their district, but clarified to apply solely to the leasing of dark fiber optic infrastructure. In 2021, HB 1336 granted legal authority to municipalities (including ports) to offer retail broadband service to subscribers in the same manner as a private internet provider.

In the last 20 years, Washington ports exercising their telecom authority have focused on leasing dark fiber infrastructure on an open access platform to retail service providers. Leasing dark fiber is similar to the traditional port business of leasing brick and mortar buildings and other tangible infrastructure. Through public ownership of the physical infrastructure, ports can reduce significant barriers to entry for ISPs looking to enter a new telecom market: the capital costs and right-of-way access necessary to build this infrastructure. By operating the network in an open access manner, such that any licensed retail provider can lease fiber and colocation space on a non-discriminatory basis and at fair prices, the model encourages competition in underserved markets, which in turn drives higher service levels and lower pricing for end users.

It remains to be seen how the addition of retail authority will affect the work of ports engaged in telecom. In markets where there is no viable ISP ready and able to provide services, it may make sense for a port to purchase the electronic equipment necessary to operate a lit fiber optic network and assume the role of ISP themselves, as some public utility districts (PUDs) around the state have done. In other cases, the expanded authority may allow ports to work directly with other government entities, or to pursue federal funding currently available only to retail service providers.

Given that telecom is a dynamic industry, ports should consider the risks as much as the benefits of investing in broadband. What is true of this industry today may not be true tomorrow: Mergers, acquisitions, shifts in private sector business models, and aggressive tactics to push out competition can all upset the market. Electronics quickly become obsolete and regularly require new investments. These risks can be somewhat mitigated if ports limit their investment to fiber optic cable ownership and avoid electronics.

Ports are managing these risks through collaborative partnerships. Examples include SkagitNet LLC, a partnership between the Port of Skagit and the Skagit PUD to construct and operate fiber infrastructure, and Petrichor LLC, a multiport partnership led by the Port of Whitman to connect underserved communities throughout the state. Ports considering investments in broadband should participate in the WPPA broadband committee to learn more and share in the combined

knowledge and resources of the state's port industry.

Broadband funding can be supplemented by available grant programs. Most notably, Washington's Community Economic Revitalization Board (CERB) and Public Works Board (PWB) offer ports competitive grants and low interest loans to promote the expansion of access to broadband service. Both programs can be used for feasibility planning studies as well as construction, and both programs focus their impact on rural markets and unserved or underserved communities. The PWB program also prioritizes tribal community needs, while CERB prioritizes business connectivity and job creation.

In RCW 43.160.020, rural populations are defined as those counties with a density of fewer than 100 persons per square mile, or a county smaller than 225 square miles. In addition, cities within an urban county with a population of less than 20,000 are considered eligible for funds.

Like other targeted infrastructure needs, Washington's broadband loan and grant programs are augmented by federal resource sharing. Federal participation can be significant, as broadband is a high national priority as the nation emerges from the COVID-19 pandemic, with connectivity spotlighted as an essential service.

Of all the port operational lines of business, broadband is expanding the fastest, largely due to demand, its potential impact on the economy, and policy shifts in favor of publicly owned infrastructure that is operated on an open access business platform.

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A Short History of Wireless Communications

A cellular network or mobile network is a wireless communication network. While physically wired internet service is the focus of this section, mobile telecommunications are critical to port operations, which makes an understanding of the growth in wireless technology valuable. “G” stands for generation, as mobile networks upgrade their infrastructure, and new levels of connectivity emerge that move more data faster.

1G - First Generation (Late 1970s – 1980s)

This was the first generation of cell phone technology. The very first generation of commercial cellular network was introduced in the late 1970s, with fully implemented standards being established throughout the 1980s. 1G is an analog technology, and because the internet did not yet exist commercially, 1G phones were used for voice only.

2G - Second Generation (Early 1990s)

Cell phones received their first major upgrade when they went from 1G to 2G. The main difference between 1G and 2G mobile telephone systems is that the radio signals used by a 1G network are analog, while 2G networks are digital. This allowed for communicating by text as well as by voice.

3G - Third Generation (Late 1990s – early 2000s)

This generation set the standards for most of the wireless technology on the market. Web browsing, email, video downloading, picture sharing, and other Smartphone technology were introduced in the third generation. Introduced commercially in 2001, the goals for third generation mobile communication were to facilitate greater voice and data capacity, support a wider range of applications, and increase data transmission at a lower cost. It allowed cell phones to connect to the internet.

4G - Fourth Generation (Late 2000s)

Compared to 3G, 4G is a very different technology, made practical only by advancements to wireless communication technology in the early 2000s. Its purpose is to provide high speed, high quality, and high capacity to users while improving security and lowering the cost of voice and data services. Practically speaking, it permitted the transmission of high-definition mobile TV, gaming services, video conference calls, and podcasts.

5G - Fifth Generation (Now)

With an emphasis on speed, 5G is the newest generation, but the benefits of a fast 5G network go beyond downloading videos and games—commercial applications are vast. The speed and low latency of 5G are expected to help transform virtually all industries, ranging from manufacturing to healthcare. 5G technologies will support autonomous vehicles, more sophisticated robotics, medical innovation, aviation, and much more.

The following terms are commonly used in the broadband industry:

Bandwidth: How much data can be transferred at one time; usually measured in Mbps (megabits per second). Bandwidth is often confused with internet speed.

Backbone: The internet is really a network of networks, and the large trunk lines that connect them are referred to as the “backbone.” It can also be thought of like the highway system: the interstate highways are the backbones that connect regions with highway networks of their own.

Broadband: High speed internet service.

Cable Internet: Cable is a high-speed connection that enables users to access the internet. It uses the same type of cable connection to access cable TV.

Colocation Facility: A data center where ISPs can rent rack space to connect computing electronics with fiber optic cable, for the purposes of moving internet data between networks or server storage. Also called meet-me spaces, carrier hotels, or central offices (a legacy telephone term).

Cloud Storage: Third party servers that are made available for digital data/file storage.

Dark Fiber: Pre-existing underground infrastructure (fiber optics) that does not yet have the hardware or software to enable it to run internet services.

Data: A general term to describe content that someone might upload or download to their computer or phone via the internet, such as videos, emails, web pages and music.

Dial Up: A type of internet connection that uses the phone lines. Dial up is the slowest, cheapest form of internet access.

Fiber Optics: A type of internet connection that is made up of thin glass fibers that transmit data.

Hotspot: An area where there is a wireless (Wi-Fi) internet signal.

Internet Protocol: The computer language that allows all the above-mentioned technologies to speak to each other. Before the invention of Internet Protocol (IP), telephone networks could only transfer data on other telephone networks, cable networks on other cable networks, and so on. IP makes the transfer of data technology-neutral, allowing networks everywhere to transfer data anywhere.

Internet Service Provider (ISP): A company that provides internet access.

Local area network (LAN): A collection of devices connected together in one physical location, such as a building, office, or home. A LAN can be small or large, ranging from a home network with one user to an enterprise network with thousands of users and devices in an office or school.

Last-mile: The term that describes the last link connecting the provider's network to the customer's premises, either a house or a business. The last mile is the most expensive part of the network to build or upgrade, because of the number of units involved.

Latency: The amount of delay for data to make a round trip. Usually measured in milliseconds.

Megabits per second (Mbps): The measure of broadband speed.

Modem: A piece of equipment that changes analog waves to digital, so they can display on your computer. A modem connects you to the internet.

Open Access Network: A fiber optic network in which individual fiber optic strands are leased to any internet service provider, without discrimination, at fair pricing.

Peering and transit agreements: Agreements that govern moving one entity's data traffic over another entity's network. With peering agreements, network owners allow each other's traffic to move over their networks at no cost or in a cost-sharing arrangement. With transit agreements, the entity that wants to move the data (i.e., an ISP or a content provider like Netflix) must pay the network owner to use their network.

Point of Presence (POP): A point of presence is a demarcation point, access point, or physical location at which two or more networks or communication devices share a connection.

Router: An optional piece of equipment that sits between your modem and computer and transfers the wireless signal to other computers on your network.

Wi-Fi: A term used for wireless internet or wireless signal.

Wireless: A short name for fixed wireless, as opposed to mobile wireless. Fixed wireless technology transmits data between two fixed antennas using radio waves, including microwaves. Unlike Wi-Fi, the radio beams are often kept narrow to keep up the strength of the signal. Antennas are preferably set up high on buildings, since line of sight is necessary.

Marine Terminals

"For the only way in which a durable peace can be created is by worldwide restoration of economic activity and international trade." –James Forrestal

Approximately one third of the state's ports operate commercial cargo marine terminals, according to WPPA's 2020 survey, and about one out of seven operate passenger facilities. Whether providing cargo or passenger facilities, port marine terminals are an integral component of Washington's economy.

Marine Cargo and Passenger Trade in Washington

- Economic activity from marine terminal operations supports 3,300 direct jobs, with a further 6,300 jobs supported through secondary impacts from wage spending by marine terminal employees and business-to-business spending from marine terminal companies. This results in a total of 9,600 jobs that are supported by marine terminal operations on port district lands.
- In 2016, the state of Washington exported $79.6 billion in goods.
- Customers in 214 countries and territories buy Washington-made goods and services.
- Washington is the 9th largest exporter of agricultural goods.
- Following the COVID-19 pandemic, the state of the international trade economy is in flux, and there is a new focus on international trade balances and national trade and tariff polices.
- In addition to international trade, domestic trade with Hawaii, Puerto Rico and Alaska is significant.
- The average benefit and compensation package for port tenant workers in the maritime sector is $103,200.
- From 1999 to 2015, the number of cruise ship passengers who visit Washington through the Port of Seattle has increased from 7,000 to 898,000, a compound annual growth rate of 35.9%.
- For every cruise ship that sails from Seattle, passengers collectively spend an average of $400,000 in Washington at other businesses and attractions. In 2015, cruise ships that homeported in Seattle supported $77.5 million in visitor spending in the region on such items as accommodations and retail purchases.

Marine terminal development is a well-established yet complex endeavor. This complexity is driven by the long lead times to navigate permitting and regulatory issues, as well as the very high capital cost for construction and ongoing dredging and maintenance. Whether developing cargo facilities, ranging from river barge facilities to post Panamax complexes, or river or coastal passenger terminals, the following fundamental design considerations apply to most projects:

- Understanding the current and future market demand, with a temporal adjustment that takes long lead times into account.
- Establishing a realistic timeline that factors in the multi-year nature of these projects.
- Selecting appropriate facility location that considers both upland and in-water connectivity.
- Identifying the vessel type likely to serve the targeted market, today and in the future. The expected vessel inventory will inform the design process regarding berth design, shoreside loading/unloading equipment, depths, and docking systems.
- Evaluating the upland connectivity and land-side transportation modes that economically support the movement of goods or passengers.
- Determining the capacity needs for upland storage and transfer facilities, including required infrastructure.
- Identifying the operating approach to the facility and whether the port's role will be as operator or landlord.
- Considering a public-private partnership to help mitigate the permitting and financial risk.
- Developing a plan of finance for the facility.
- In large or controversial projects, capturing preliminary decision data in a risk assessment accompanied by a public outreach strategy.

Key to developing marine terminals on Washington's shorelines are the regulatory environment and the proprietary framework on the use of aquatic lands. The use of state owned aquatic lands through a port management agreement (PMA) is discussed earlier in this chapter.

The complexities, investment needs, and timeframes for marine terminal development are substantial. Investments for new or expanded marine terminals and associated facilities, whether cargo or passenger, will require extensive engagement with an experienced team of consulting professionals.

Marine Cargo

More than 80% of the world's purchasing power resides outside of the U.S., so the nation's economic wellbeing is largely dependent on maintaining participation in the international marketplace. Washington ports play a key role in the state's international trade profile.

Marine terminals are supported by extensive rail, truck, and barge networks that move cargo to and from inland destinations. Rail is typically utilized for moving cargo more than 500 miles, or for moving heavier commodities over short distances. Long-haul rail segments are operated by some 700 railroads that operate common carrier freight service in the U.S. on over 160,000 miles of track. Of these railroads, there are a handful of Class I railroads (seven in the U.S. and Canada), and there are 22 regional and 584 local/short-line railroads.

Whether in the marine terminal or in a satellite location, rail terminal facilities are used for interim storage, loading or unloading, and transloading activities in support of the movement of cargo. A number of Washington ports have developed rail infrastructure to connect their terminals to the Class I Carriers. These range from simple dead-end spurs to extensive corridors that enhance the competitiveness of their cargo operations.

Trucks are used primarily to move cargos within the state and can accommodate varying weights. Trucks move an estimated 70% of breakbulk cargo and an estimated 95% of all logs transported. Barges connect the Upper Columbia and Snake rivers with the Lower Columbia River, forming a critical connection for wheat farmers. The Columbia-Snake River System allows Washington-grown agricultural products to move from farm to domestic and international markets, and it creates price competition between modes of transportation.

Public ports have taken two distinct approaches to operating and managing their cargo facilities. The first is as a **landlord port,** in which the port leases the underlying property or built facilities to private marine terminal operators (MTOs). These MTOs might focus on a particular commodity, be affiliated with a specific cargo carrier, or handle a diversity of commodities. Due to the capital cost of commodity handling equipment, these leased terminals are traditionally focused on one type of commodity. Commodities may include container, dry bulk (e.g., coal, grain), liquid bulk (e.g., petroleum, chemicals), break bulk (e.g., large machinery, steel), or roll on-roll off (e.g., automobiles). The MTO is often a stevedoring company.

The second approach is as an **operating port,** in which the port authority owns the handling equipment, negotiates contracts, retains the necessary labor, and manages the loading and unloading process.

Nearly all port cargo operations in Washington, Oregon, and California utilize organized labor, whether they are a landlord port or an operating port. This is very different from U.S. Gulf and East Coast port operations, which include multiple unions as well as non-union operations. There is little doubt that marine terminal development is challenging, largely because of the risks associated with permitting these facilities. Ports are advised to proceed with caution and consider joint venture partnerships with the private sector to mitigate the inherent risks.

Passenger Terminals

Marine passenger terminals fall into two fundamental categories.
Cruise terminals come in many sizes. These facilities can accommodate small and large vessels engaged in travel tourism, whether localized or interstate. Localized waterborne tourism includes such activities as whale watching, event tours, and marine ecological education.

Ferry terminals are characterized by commuter traffic that is local, regional, or interstate.

In addition to the traditional marine infrastructure required to accommodate these specialty vessels, there are a host of hospitality and service facilities that passengers expect. For instance, site development includes extensive accommodation of vehicle parking, and location decisions are often driven by upland surface transportation options such as passenger rail, bus lines, and connector roads. Passenger rail service in the U.S. is largely provided by Amtrak, although there are other private and public carriers.

Like cargo terminals, these passenger facilities are capital intensive. Ferry terminals are often financially underpinned by local or governmental transportation agencies such as the Alaska Marine Highway System in Bellingham. There is a growing resurgence in small commuter facilities, reminiscent of the “Mosquito Fleet” that operated in Puget Sound between the 1880s and the 1920s. Cruise terminals are supported through contracts with cruise lines.

Ferry terminals and cruise terminals are significant to the local economy, by supporting either the day-to-day transportation needs of local commuters or jobs connected to the growing tourism industry.

Safety and Security

There are two significant federal agencies that are notably involved in the oversight of the U.S. maritime industry: The Federal Maritime Commission (FMC) and the Department of Transportation Maritime Administration (MARAD). Created in 1961, the FMC works to ensure that a competitive and reliable international ocean transportation supply system supports the U.S. economy and protects the public from unfair and deceptive practices associated with the waterborne movement of international trade. MARAD was created in 1950. It supports the availability of maritime transportation infrastructure and further promotes and fosters the maritime industry to meet the nation’s economic and security needs. MARAD is an excellent resource for Washington ports considering federal grant support for their maritime facilities.

In addition, there are two federal agencies that oversee the security and safety of the maritime sector; the U.S. Coast Guard and Customs and Border Protection. Considered a military operation as it can be redirected to a traditional defense role, the Coast Guard is the nation’s oldest seagoing service. It is responsible for search and rescue, maritime law enforcement, care and maintenance of maritime aids to navigation, ice breaking, environmental protection,

and port security. Customs and Border Protection is charged with providing a comprehensive approach to border management and control, combining customs, border security, and agricultural protection into one coordinated and supportive effort. At maritime facilities, they screen all foreign visitors and employees, returning Americans, and imported cargo.

The following glossary of terms are commonly used in the operation of marine terminals:

Apron: The area immediately in front of or behind a wharf shed, on which cargo is handled. On the "front apron," cargo is unloaded from or loaded onto a ship. Behind the shed, cargo moves over the "rear apron" into and out of rail cars or trucks.

Backhaul: To haul a shipment back over part of a route which it has already traveled; a marine transportation carrier's return movement of cargo, usually opposite from the direction of its primary cargo distribution, or head haul. Backhaul rates are typically less than the head haul, but having a backhaul cargo can often make the difference between a profitable voyage and taking a loss.

Barge: A large, flat-bottomed vessel used to carry cargo from a port to shallow-draft waterways. Barges are not self-propelled; they are pushed or pulled by tugboats.

Berth: (verb) To bring a ship to a berth. (noun) The wharf space at which a ship docks. A wharf may have two or three berths, depending on the length of incoming ships.

Beneficial Cargo Owner (BCO): The BCO is the party that ultimately owns the product being shipped. This can be different from either the producer or the ultimate consumer. This is an important distinction, as this is the party that the port will often negotiate with as it seeks to develop its property.

Bill of Lading: A contract between a shipper and carrier, listing the commercial terms for moving freight between specified points.

Bollard: A short, stout device (resembling a fire hydrant) used to secure a vessel's mooring lines to the dock or wharf.

Bonded Warehouse: A building designated by U.S. Customs authorities for storage of goods without payment of duties to Customs until goods are removed. See also Foreign Trade Zone (FTZ).

Box: Slang term for a shipping container.

Breakbulk Cargo: Any cargo that doesn't easily fit into a container. This non-containerized cargo can be shipped in large wooden crates, bales, pallets, or other units to be loaded onto or

discharged from ships or other forms of transportation. Examples include structural steel like I beams, steel coils, pipe, machinery, linerboard, and wood pulp.

Broker: A person who arranges for transportation of loads for a percentage of the revenue from the load.

Bull Rail: The edge of the dock or wharf that is closest to where a vessel is moored. This rail, historically made of a large timber (16" x 16"), is today made typically of concrete. The bull rail established the demarcation line between work on the docks and work aboard the vessel, a distinction in common use with longshore labor.

Bulk Cargo: Loose cargo (dry or liquid) that is loaded (shoveled, scooped, mechanically conveyed, or pumped) in volume directly into or out of a ship. Examples include grain, coal, and oil.

Cargo: The goods or products carried by a ship, barge, train, truck, or plane. See also Freight.

Consolidator: The person or firm that consolidates cargo from shippers into a container that will deliver the goods to several buyers.

Container: A shipping container is a box made of aluminum or steel used to transport cargo by ship, rail, truck, or barge. Common dimensions are 20' x 8' x 8' (called a TEU or twenty-foot equivalent unit). Typical lengths also include 40', 45', and 53'.

Container Terminal: A specialized facility where ocean container vessels dock to discharge and load containers. Specialized cranes are used to load and unload containers. These cranes have a safe lifting capacity of 35-40 tons, with booms reaching up to 120 feet to reach the outside cells of vessels. Most of these cranes operate on rail tracks or have articulating rail trucks on each of their four legs, enabling them to traverse along the terminal and work various bays on the vessel. This also more than one crane to work a single vessel simultaneously. Most terminals have direct rail access and container storage areas and are served by highway carriers.

Cruise: At least one night on board on a seagoing vessel that has a capacity of at least 100 passengers. Transportation (the cruise ship) is the core element of the experience instead of a simple conveyance.

Customs Broker: This person prepares the needed government documentation for importing goods. The broker (also known as a customhouse broker) is licensed by the Treasury Department to clear goods through U.S. Customs.

Demurrage: A penalty fee assessed when cargo is not moved before the free time allowance

ends. Demurrage can be assessed to vessels, railcars, and cargo sitting idle at a port storage area.

Dock: (verb) To bring in a vessel to tie up at a wharf berth. One parks a car but docks a ship. (noun) A structure built along or at an angle from a navigable waterway, so that vessels may lie alongside to receive or discharge cargo. Sometimes, the whole wharf is informally called a dock.

Dock Workers: The general term for people who work on and around the docks. See also Longshoremen and IWLU.

Dockage: A charge by a port authority for the length of water frontage used by a vessel tied up at a wharf.

Draft: The depth of a vessel, taken from the level of the waterline to the lowest point of the hull.
Drayage: Transport by truck for short distances, i.e., from wharf to warehouse.

Dry Bulk: Minerals or grains moving without mark or count. Examples are potash, industrial sands, wheat, soybeans, and peanuts. These commodities can be loaded from storage piles in the vicinity of the dock or directly from trucks or railcars, without intermediate storage.

Duty: A government tax on imported merchandise.

Elevator: A complex including storage facilities, computerized loading, inspection rooms, and docks to load and unload dry bulk cargo such as grain.

Fender Piles: The pilings on the outer edge of the wharf function like the fenders on a car. They are there to absorb the shock of a ship as it docks at the wharf and to protect the structural pilings that support the wharf. If the fender piles are made from timbers, they are called sacrificial piles since they are designed to be discarded after they are broken.

Foreign Trade Zone (FTZ) A foreign trade zone (FTZ) is a site within the U.S. (in or near a U.S. Customs port of entry) where foreign and domestic goods are held until they ready to be released into the economy. If the final product is imported into the U.S., duties and taxes are not due until the goods are released into the U.S. market. Merchandise may enter a FTZ without a formal Customs entry or the payment of Customs duties or government excise taxes. In the FTZ, goods may be stored, tested, sampled, repackaged or relabeled, cleaned, combined with other products, repaired or assembled, etc.

Freight: The goods or cargo moved by a vessel or other mode. Freight can also be used to describe the amount of money the vessel owner is paid to move the cargo.

Freight Forwarder: An individual or company that coordinates the movement and storage of cargoes. See also Customs Broker.

Head Haul: The primary cargo movement from origin to destination. If it were not for the head haul cargo, the carrier would not consider the voyage. Once a head haul cargo is under consideration, carriers will try to book a backhaul cargo to make the overall voyage more profitable.
Intermodal: Technically, intermodal shipping simply refers to moving freight by two or more modes of transportation. Typically, goods will remain in the same container.

International Longshore and Warehouse Union (ILWU): The predominate dockside union on the U.S. West Coast.

Landlord Port: At a landlord port, the port authority builds the wharves, which it then rents or leases to a terminal operator, usually a stevedoring company. The operator invests in cargo handling equipment (i.e., forklifts, cranes, etc.), hires longshore laborers to operate lift machinery, and negotiates contracts with ocean carriers (i.e., steamship services) to handle the unloading and loading of ship cargoes. See also Operating Port.

Longshoremen: Dock workers who load and unload ships or perform administrative tasks associated with the loading or unloading of cargo. Longshore gangs are hired by stevedoring firms to work the ships. See also Dock Workers and ILWU.

Manifest: The ship captain's list of individual goods that make up the ship's cargo. This formal document is often prepared by a Freight Forwarder or a Customs Broker.

Marine Terminal Operators (MTOs): MTOs lease property or built facilities from a port and provide the labor and equipment to manage cargo handling operations for carriers.

Operating Port: An operational port in which the port authority builds the wharves, owns the cranes and cargo-handling equipment, and hires the labor to move cargo in the sheds and yards. A stevedore hires longshore labor to lift cargo between the ship and the dock, where the port's laborers pick it up and bring it to the storage site. See also Landlord Port.

Pier: A structure which juts out into a waterway from the shore, for mooring vessels and cargo handling. Sometimes called a finger pier.

Project Cargo: This type of cargo is typically oversized and/or very heavy. It is typically part of a large capital project and can be either an import or an export. A special corridor for this type of cargo has been developed in the Columbia River area called the high, wide, and heavy corridor: www.hwhcorridor.com.

RoRo Cargo: Wheeled cargo, such as tractors and automobiles, that roll on and roll off a ship or barge.

Spur: A short, usually dead-end section of track used to access a facility or loading/unloading ramp. It also can be used to temporarily store equipment.

Stevedoring Services: The organization and management of loading and unloading marine cargo, including managing upland material storage, handling in preparation for dockside work, and retaining the necessary labor and equipment.

Tariff: The schedule or system of duties imposed by a government on the import/export of goods; also, the charges, rates, and rules of a transportation company, as listed in published industry tables.

TEU: A 20-foot standard unit to describe a ship's carrying capacity or a terminal's capacity. A standard forty-foot container equals two TESs.

Tonnage: This word has multiple meanings in the marine world:

A. Cargo Tonnage: Ocean freight is frequently billed based on weight or measurement tons. Weight tons can be expressed in terms of short tons of 2,000 pounds, long tons of 2,240 pounds, or metric tons of 1,000 kilograms (2,204.62 pounds). Measurement tons are usually expressed as cargo measurements of 40 cubic feet (1.12 cubic meters) or cubic meters (35.3 cubic feet).
B. Vessel Tonnage: The carrying capacity of a vessel is referred to as her "deadweight tonnage" (dwt). Typical smaller cargo vessels in the Pacific Northwest (PNW) are in the "handy size," roughly 30,000 dwt. Larger containerships in the PNW can reach up to 150,000 dwt. The volumetric measure of a vessel is referred to as her "gross registered tonnage" (grt), which is a measurement sometimes used in the grain trade, and for some RoRo operations.

Transit Shed: The shed on a wharf is designed to protect cargoes from weather damage and is used only for short-term storage. Warehouses operated by private firms house goods for longer periods.

Tugboat: Strong v-hull shaped vessels used for either maneuvering ships into and out of port, or for towing barges. Large vessels do not possess adequate maneuverability to safely come alongside docks. Tugboats provide additional power and finesse to safely moor vessels. Towboats are tugboats that have a square front, making them especially efficient for pushing barges through inland waters. Towboats can also be used for assisting large vessels in mooring to a dock.

Unit Train: Also called a block train, a unit train carries a block of railcars from one point of origin to one destination point, without any intermediate sorting. Railroads use unit trains to reduce their operating costs, and (in theory) pass some of these savings on to the cargo owner. Over time, unit trains have become longer and longer, which has put significant stress on marine facilities that are expected to accommodate these longer trains, which today can run up to 10,000 feet.

Wharf: The place at which ships tie up to unload and load cargo. The wharf typically has front and rear loading docks (aprons), a transit shed, open storage areas, truck bays, and rail tracks.

Wharfage Fee: A charge assessed by a pier or wharf owner for handling incoming or outgoing cargo.

Pollution Control Facilities (Wastewater)

"Water is life's matter and matrix, mother and medium. There is no life without water." –Albert Szent-Gyorgyi

To facilitate food production and processing, public port districts make significant investments in supportive infrastructure, including process water treatment. These pollution control facilities include a host of waste management, control, and disposal technologies designed to reduce or eliminate pollution. Washington ports are leaders in this arena, employing new technologies such as UV treatment as an alternative to chlorination and exploring the re-use of digestor off-gases for industrial purposes.

Supporting the Agriculture Sector

- Washington is home to some of the most productive agricultural regions in the world, producing more than 300 crops each year.
- In the last decade, 2,000 new jobs have been created on the 250-acre Port of Pasco processing center, representing 6% of total employment in Franklin County.
- In 2020, the Port of Sunnyside expanded its treatment capacity to include a new membrane reactor system which will double the capacity of its current treatment plant in support of an expanding portfolio of processing tenants.
- The Port of Mattawa expanded their specialized treatment of wine effluent, and the local processor grew from 60 jobs to over 400 full- and part-time positions in a decade.

Wastewater generated from food production and agricultural activities is among the most difficult and costly waste to manage. This type of wastewater can contain large quantities of nutrients, organic carbon, nitrogenous organics, inorganics, and suspended and dissolved solids, and it has high biochemical and chemical oxygen demands. It must be treated to levels that will not damage receiving waters due to excessive nutrients or oxygen demand when directly discharged. The discharge from these facilities is subject to effluent guideline requirements and National Pollutant Discharge Elimination System (NPDES) permits. Plant-food processing wastes are typically lower strength and greater volume than animal processing and animal production.

There are readily available treatment technologies including both oxidative and anaerobic processes. Designing these facilities is a large economic development consideration for ports, as they are traditionally in support of advancing an industry and its associated jobs. Like many technology-based facilities, industrial wastewater treatment plants depend on location decisions and demand contractual considerations, due to high capital costs, possible long-term indebtedness, and stability of the target market.
Operating a pollution control facility requires special expertise and training. Ecology is responsible for the certification of waste treatment facility operators and provides additional ongoing training.

The following terms are commonly used in the operation of wastewater treatment facilities:

Aeration: The process of adding air to water. In wastewater treatment, air is added to refresh wastewater and to keep solids in suspension. With mixtures of wastewater and activated sludge, adding air mixes and provides oxygen for the microorganisms treating the wastewater.

Anaerobic Digestion: Wastewater solids and water (about 5% solids, 95% water) are placed in a large tank where bacteria decompose the solids in the absence of dissolved oxygen.

Biochemical Oxygen Demand (BOD): The rate at which organisms use the oxygen in water or wastewater while stabilizing decomposable organic matter under aerobic conditions. In decomposition, organic matter serves as food for the bacteria, and energy results from its oxidation. BOD measurements are used as a measure of the organic strength of wastes in water.

Biosolids: A primarily organic solid product produced by wastewater treatment processes that can be beneficially recycled. The word “biosolids” is replacing the word “sludge.”

Chlorination: The application of chlorine to water or wastewater, generally for the purpose of disinfection, but frequently for accomplishing other biological or chemical results.

Digester: A tank in which sludge is placed to allow decomposition by microorganisms. Digestion may occur under anaerobic (more common) or aerobic conditions.

Effluent: Wastewater or other liquid—raw (untreated), partially, or completely treated—flowing from a reservoir, basin, treatment process, or treatment plant.

Headworks: The facilities where wastewater enters a wastewater treatment plant. The headworks may consist of bar screens, comminutors, a wet well, and pumps.

Influent: Wastewater or other liquid—raw (untreated) or partially treated—flowing into a reservoir, basin, treatment process, or treatment plant.

National Pollutant Discharge Elimination System (NPDES) Permit: This permit is the regulatory agency document issued by either a federal or state agency, designed to control all discharges of pollutants from all point sources and storm water runoff into U.S. waterways. A treatment plant that discharges to a surface water will have a NPDES permit.

Primary Treatment: A wastewater treatment process that takes place in a rectangular or circular tank and allows the substances in wastewater that readily settle or float to be separated from the water being treated.

Traditional Governmental Activities

As discussed earlier, not every operational activity will result in a real financial ROI by generating earned revenues. There are certain port activities that do not generate adequate resources to be self-supporting, much less generate a positive cash flow. These activities must be underwritten by financial resources from port lines of business activities or through property taxes. These are characterized as traditional governmental activities.

Programmatic Economic Development

"You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete." –R. Buckminster Fuller

Economic development is a primary function of Washington ports; virtually all ports are active in one way or another. It is defined as a concerted effort by local, state, and federal agencies, including ports, to influence the direction of private and public investment toward opportunities and outcomes that lead to sustained economic growth and job creation.

Economic development by ports is advanced in two ways:

- Investment in brick and mortar facilities and assets such as marine terminals and real estate that create jobs and stimulate the economy, as described earlier in this chapter. These are a port's lines of business.
- Financial support and engagement in programmatic efforts, typically in concert with other agencies, not-for-profit organizations, and educational institutions, that focus on local and regional efforts to create jobs and stimulate the economy. This is a port engaging in traditional governmental operations.

Washington statutes firmly state that it is "in the public purpose for all port districts to engage in economic development programs." (RCW 53.08.245) To achieve this, ports may contract with nonprofits, private parties, and other public entities. Washington ports have historically focused on the role of job creation in programmatic economic development, and they are specifically authorized to engage in occupational job training and placement, job advancement and retention, pre-apprenticeship training, and other education programs. While workforce development is a key focus, ports participate in a host of other programmatic activities, including private investment attraction, business expansion, studies, and regulatory impact analysis.

There are a number of ports selected to fill a more defined economic development role in their community by serving as their county's Associate Development Organization (ADO). ADOs serve as the local economic development partner for the Washington State Department of Commerce. These ADOs are designated by each county to coordinate business recruitment, retention, and expansion activities within their service area(s), as well as to provide export assistance. ADOs also support research, planning, and implementation of regional and local economic development strategies.

Programmatic economic development is a far-reaching and often complex topic. Chapter VI is dedicated to this topic and includes a complete glossary of terms.

Parks, Recreation, and Open Space

"City parks serve, day in and day out, as the primary green spaces for the majority of Americans." –Bruce Babbitt

From major metropolitan areas to rural towns, the character of our urban parks has evolved over the last century and a half. In her article on Urban Parks of the Past and Future, Professor Galen Cranz of the University of California, Berkeley, identified distinct periods in this evolution.

From the mid-1800s to roughly 1900, large parks located on the edge of urban areas were the core of the **Pleasure Grounds era**, with pastoral landscapes that offered interaction with nature without venturing too far into the wilderness. These were the designs of great park architects such as Fredrick Olmsted. But these parks were hard to get to, and in the late 1800s, the nation saw growth in small parks that were located closer to tenement districts that housed the growing numbers of industrial workers. These small parks led to the **Reform Park era**, intended to provide places to congregate and socialize, largely targeted to growing immigrant communities.

In 1930, a new era was ushered in, led by Robert Moses, the renowned New York commissioner of parks. He recognized the need and demand for more recreational opportunities and solidified the notion that parks and open space are a true governmental activity. The **Recreational Facility era** saw growth in public stadiums, sports facilities, and more active

interaction with park users. This new view of public recreation gave way to the **Open Space era** of trails and green space associated with other land uses such as today's marinas, terminals, and mixed-use developments.

Washington ports are authorized to develop and operate public park and recreation facilities when they support and enhance the utilization of (a.) harbors, (b.) wharves and piers, (c.) air, land, and water passenger terminals, and (d.) transfer terminals (RCW 53.08.260). As discussed further in Chapter VIII, Washington's Shoreline Management Act (SMA) requires public access along state shorelines where it is not incompatible or unsafe with the adjoining uses. SMA also allows ports to develop open space and parks as public access mitigation for the construction of shoreline facilities such as marine terminals.

Ports must receive approval to develop park facilities from the regional parks department (county, city, parks and recreation, or another responsible district). Many city and county comprehensive plans under the Growth Management Act contain open space and park sections. As those plans are developed, ports have an opportunity to include their own park plans in these area comprehensive plans. Ports are also advised to include planned improvements in their Comprehensive Scheme of Harbor Improvements.

For a long time, parks were thought of simply as places for recreation, preservation of open space, and social gatherings. However, the role of parks in cities and urban metropolitan areas has become much greater as the scope and impact of parks increasingly influences quality of life, economic development, health, and many other aspects of urban life.

Parks contribute to a port's community in the following ways:

- **Economic development:** The social benefits of parks are well understood, but the economic contribution by parks is less visible. By speaking directly to tourism and enhancing the attractiveness of an area and its contained assets, parks and open space contribute to economic development and are often anchors in attracting private investment.
- **Green infrastructure:** These open spaces can serve as buffers for flooding and sea level rise, as they (a.) protect built assets, (b.) perform as cost-effective critical components in stormwater control, management, and treatment, and (c.) function as active irrigation installations.
- **Healthier population:** With increasing health care costs and a growing awareness of the benefits of an active lifestyle, parks and open space offer spatial opportunities for recreation and activity.
- **Educational opportunities:** Parks, trails, and open space can utilize interpretive postings to educate the users and visitors about the natural and built environment. These are opportunities for the port to tell their story, as well: a story of contributing to the economy while enhancing the natural environment.

The Port of Kalama has developed a 24-acre active recreational facility, including an exhibition area. Image credit: Port of Kalama

Urban planners now view parks and open space as serving a healthy economy. They can catalyze a community by bringing attention to the important economic work of adjacent commercial and industrial facilities, soften the landscape of the built environment, provide a platform to communicate to the community, and act as mitigation investments that advance economic development.

Parks and the Economy

- Parks and recreation improve the quality of life in communities and benefit the local economic development of a region. More than 80% of corporate executives responding to a 2019 Area Development survey rated quality-of-life features as an important factor when choosing a location for a headquarters, factory, or other company facility.
- 94% of adults responding to the March 2020 National Recreation and Park Association (NRPA) Park Pulse poll support their local government investing in infrastructure improvements that promote economic activity in their community.
- Researching visitor spending, an August 2017 NRPA Park Pulse poll found that people seek out park and recreation amenities such as beaches, parks, trails, and secluded, relaxing places when choosing a travel destination.

Today's Washington ports view their park and open space facilities as amenities to support commercial development and tourism and to accommodate local events. They can also be a significant lifestyle draw when attracting new or expanding employers.

The state Recreation and Conservation Funding Board was created in 1964 by a vote of the citizens of Washington. The governor-appointed board is composed of five citizens and the directors (or designees) of three state agencies: Department of Fish and Wildlife, Department of Natural Resources, and the Parks and Recreation Commission. The Funding Board has four broad grant programs available to ports, including:

- Boating facilities.
- Land and water conservation.
- Off road vehicle activities.
- Wildlife and recreation, including funds for trails, parks, and water access.

The following terms are commonly used in the development and operation of parks and open space:

Access: The public's ability to physically use land or water.

Active Recreation: Recreation that is predominately powered by human muscle.

Bioretention: A versatile stormwater treatment system that collects, filters, and infiltrates stormwater runoff from impervious surfaces.

Bioswales: Channels that collect runoff from small drainage areas. Bioswales differ from other bioretention practices, as they are designed to be conveyance treatment devices, not storage devices.

Constructed Wetlands: These manmade wetlands mimic the functions of natural wetlands to capture runoff, improve water quality, and provide wildlife habitat. Constructed wetlands filter stormwater by slowing down water flow and trapping sediments and pollutants.

Dispersed: Recreation that is scattered or spread across the landscape and not concentrated at a specific site. Examples include trail uses, camping, walking, cycling, and jogging.

Natural Areas: Also referred to as natural resource areas, natural areas are lands set aside for preservation of significant natural resources, remnant landscapes, open space, and visual aesthetics or buffering.

Park: Land or an area set aside for a special purpose, particularly for leisure or recreation.

Passive Recreation Areas and Trails: Passive recreation areas are generally minimally developed or undisturbed natural areas that allow for nonspecific uses requiring little dedicated infrastructure or space.

Permeable Pavements: This pavement alternative infiltrates, treats, and/or stores rainwater where it falls. Permeable pavements provide an alternative to conventional pavement systems and can be made of pervious concrete, porous asphalt, or permeable interlocking pavers.

Rainwater Harvesting: Collecting or storing rainwater for later use, such as for irrigating lawns or gardens.

Recreation: Those leisurely and voluntary activities that aid in promoting entertainment, pleasure, play, relaxation, or instruction.

Trail: A path, route, way, right-of-way, or corridor that is posted, signed, or designated as open for travel or passage by the public, but not normally designated as open for the transportation of commercial goods or services by motorized vehicles. A trail is a recreational facility that also can serve as a non-motorized route for transportation.

Urban Tree Canopy: The structure of a tree that reduces and slows stormwater by intercepting precipitation in leaves and branches. Tree roots stabilize soil; trees also take in carbon dioxide and release oxygen.

Vegetated Buffers: Healthy, vegetated buffers adjacent to waterways improve water quality and overall stream health by filtering and slowing stormwater runoff.

Environmental

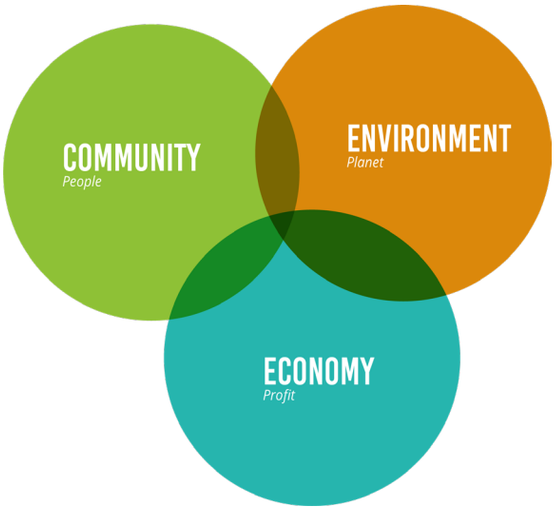
"The nation behaves well if it treats its natural resources as assets which it must turn over to the next generation increased, and not impaired, in value." –President Theodore Roosevelt

In contrast to the built environment, the natural environment encompasses all living and nonliving things that occur naturally. It includes the interaction of all living species, climate, weather, and natural resources that affect human survival and economic activity. As community and economic developers, Washington ports undoubtedly find themselves at this intersection of the environment and the economy.

The nation's awareness of the value of the natural environment grew throughout the twentieth century, reaching the national stage in the 1960s and 1970s.

Published in the early 1960s, Rachel Carson's book Silent Spring advanced the notion that technological progress and industrialization is so fundamentally at odds with natural processes that it must be regulated and curtailed. In June 1969, following decades of industrial pollution

on Cleveland's Cuyahoga River, an oil spill burst into flames; the image was captured on the cover of Time magazine. Earth Day was first recognized in April 1970, created by Wisconsin Senator Gaylord Nelson, who strongly advocated for increasing environmental awareness across the country, forcing the issue into the national agenda.



The National Environmental Policy Act was signed into law by President Richard Nixon in early 1970. Later that year, he created the Environmental Protection Agency (EPA) to consolidate several federal agency environmental responsibilities into one organization. Appointed by President Nixon, the first EPA administrator was William Ruckelshaus who, after his public service career, practiced law in Seattle and continued to be a voice for environmental protection. He served several other presidents in a variety of environmentally related capacities, including Presidents Reagan, Clinton, and Bush, before receiving the Presidential Medal of Freedom from President Barack Obama in 2015.

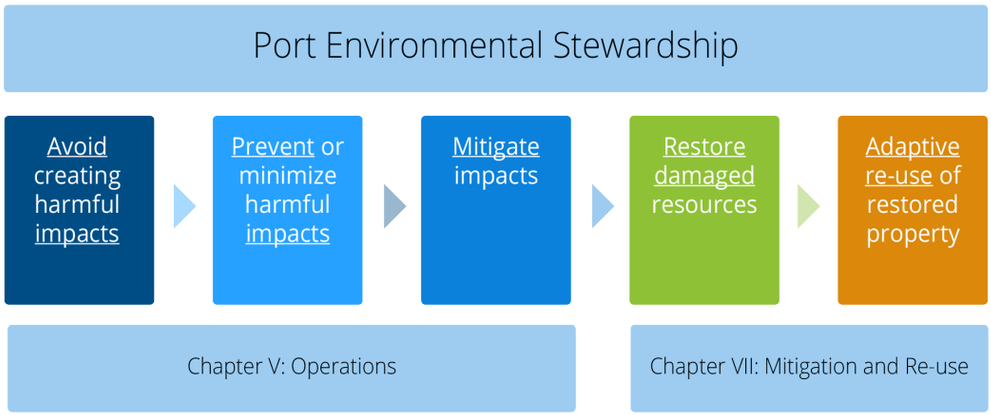
This rise in **environmental stewardship** has become part of a port's triple bottom line consideration in its decision making: people, profit, and the planet, otherwise known in the port industry as community, economy, and the environment.

The principles of environmental stewardship include:

- Expressing, as an organizational value, commitment throughout the organization to **sustainable design, development, and operation of port assets.**
- Adhering to a commitment of ensuring **compliance with environmental regulations** for port operations and tenant activities.
- Developing and fostering implementation of **environmental management systems and policies** which create standards for pollution prevention, energy efficiency, and improved environmental performance.
- Creating and energizing strategic **goals for reducing the ecological footprint** of port operations.
- **Demonstrating environmental leadership** within the community and industries in which a port operates. Port leadership and participation in addressing environmental challenges is typically focused on climate change, sea level rise, air pollution, and water quality degradation.

The hierarchy of environmental stewardship as laid out below provides guidance to ports as they make decisions that have an environmental consideration:

1. **Avoid harmful impacts** from the port's actions, investments, and operations.
2. If avoidance is not possible, **prevent or minimize harmful impacts.**
3. If there are unavoidable harmful impacts, **mitigate those impacts** at a greater than 1:1 ratio.
4. If there have been harmful impacts, **restore the damaged resources** when possible through remediation.
5. When designing remediation, consider the **adaptive re-use of the restored property** to a community asset (i.e., parks or open space) or an economic contributor, or by returning it to natural pre-development conditions.



Washington ports are arguably the state's largest landlord of commercial and industrial properties, hosting a wide range of property uses through leases. Those tenants are often engaged in activities that have the potential to negatively impact the environment. To manage potential impacts, ports are well advised to adopt policies and programs to proactively oversee their tenant's activities and correct potentially damaging behavior and processes.

Commonly known as environmental compliance assessment programs, these programs monitor tenant activities through regular on-site inspections, include compliance language in lease documents, and provide education and information on best management practices.

Ports should note that under Washington state law, there is "joint and several liability" for any environmental damage incurred on port property. Essentially, the legal construct is that as property owner, the port is 100% liable for the actions of its operators (tenants). As operators, tenants share that same 100% liability. There has been significant administrative and judicial clarity on this joint liability; nonetheless, ports are well advised to avoid complacency in this regard.

The key environmental issues facing today's ports that are monitored by port staff and the WPPA Environmental Committee include, but are not limited to:

- **All known, available, and reasonable methods of prevention, control, and treatment of stormwater (AKART):** These stormwater standards apply to point and non-point discharge of stormwater in boatyards, marine terminals, marinas, commercial and industrial properties, and airports.
- **Changes in environmental liability and case law.**
- **Climate change:** Adaptation and mitigation.
- **Coastal flooding:** Changes to policies and rules regarding coastal flood maps.
- **Derelict vessels:** Grants and management.
- **Dredge Material Management Program (DMMP):** Puget Sound and the Columbia River.
- **HPA:** Hydraulic Project Approvals.
- **Invasive species:** Expansion and impacts.
- **Marine Spatial Planning:** Balancing human activity and the marine environment.
- **Model Toxics Control Act (MTCA):** Stability and availability of grant funding for remediation.
- **Natural resource damage:** Policy and approaches.
- **No Discharge Zone:** Impacting waters of Puget Sound, as determined by the Department of Ecology.
- **Oil spills:** Regulations.
- **Puget Sound Partnership:** Programs and projects.
- **Solid waste management.**
- **State Environmental Policy Act (SEPA)**: Oversight and expansion.
- **Wetlands:** Rule making and permitting.

Environmental considerations are a far-reaching and often complex topic. Washington ports have pursued a growing commitment to environmental stewardship as community support and expectations have shifted to prioritize a proactive environmental agenda. The statewide port industry has embraced that priority. While stewardship, including a strong commitment to prevention, is foundational to that responsibility, the remediation of historically contaminated property has been championed by the state's ports.

Chapter VII is dedicated to the topic of mitigation, restoration (remediation), and adaptive re-use of environmentally impacted property. Property remediation and re-use is a distinct environmental function within a port and crosses over to other lines of business. The availability of unique grant funding programs in Washington through the Department of Ecology has created a unique focus for ports as they navigate the adaptive re-use of contaminated

property. The breadth of port involvement in this environmental focus area warrants the in-depth discussion in Chapter VII.

The following terms are commonly used in discussions about port environmental considerations. An expanded glossary of terms is presented in Chapter VII.

Sustainable Development: Traditionally defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Environmental Management: Managing natural resources through policies and practices designed to protect natural values and resources while providing a platform for economic use.

Direct Climate Impacts: Changes that occur as a result of warming trends, cooling trends, or extreme weather events. Examples include a lack of snow to operate mountain resorts, melting glaciers in mountainous regions, and floods, landslides, and wildfires.

Indirect Environmental Change Impacts: These are the byproducts of climate change. Global temperature changes may create water shortages, a loss of biodiversity, impacts to landscape aesthetics, and damage to infrastructure through extreme weather events.

Ecological Footprint: The impact of a person, community, or activity on the environment, expressed as the amount of biologically productive land and water required to produce the goods consumed and to assimilate the wastes generated.

Environmental Stewardship: The responsible use and protection of the natural environment, through conservation and sustainable practices that enhance ecosystem resilience and human well-being.

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