

WASHINGTON STATE MARITIME CLUSTER



Economic Impact Study :: Companion Report Maritime Cluster Talent Pipeline Findings

December 2013

prepared for  **WORKFORCE**
DEVELOPMENT COUNCIL
OF SEATTLE-KING COUNTY
Our Workforce, Our Future

prepared by  **cai** community
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*Community Attributes tells data rich stories about communities
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Key Facts and Findings: King County Maritime Cluster

Methods

The Talent Pipeline models the demand and supply for key occupations found in Maritime. Some of those occupations, such as Ship Engineers, for example, are exclusively Maritime occupations. Many other occupations, however, are suitable for Maritime but are also suitable for other industry clusters, such as Welders, for example. For those occupations that cross multiple industry clusters, such as Welders, the Talent Pipeline allocates to Maritime a portion of both the forecasted demand and the supply.

Demand

- ➔ **Growth:** Most occupations studied in the Maritime Cluster are projected to grow annually in King County between 2011 and 2021, with average annual growth rate generally slowing from 2016-2021 compared with 2011-2016 (**Exhibit 1** and **2**).
- ➔ **Job Openings:** The Maritime Cluster demand for occupations are projected to produce 554 openings allocated specifically to the Maritime Cluster in King County from 2016-2021. The pool of those same occupations, however, will see 3,048 openings economy-wide, when demand from other clusters, including Maritime are considered. Maritime employers will compete with employers in other clusters in this way.
- ➔ **Highest Demand:** The highest in-demand occupations in terms of annual job openings allocated to the Maritime Cluster include: Sailors and Marine Oilers; Captains, Mates and Pilots of Water Vessels; Meat, Poultry and Fish Cutters and Trimmers; Laborers and Freight, Stock, and Material Movers, Hand; and Ship Engineers. All show forecasted shortages.
- ➔ **Lowest Demand:** Most occupations showing relatively low demand forecasts are occupations prevalent in many other clusters, besides Maritime.

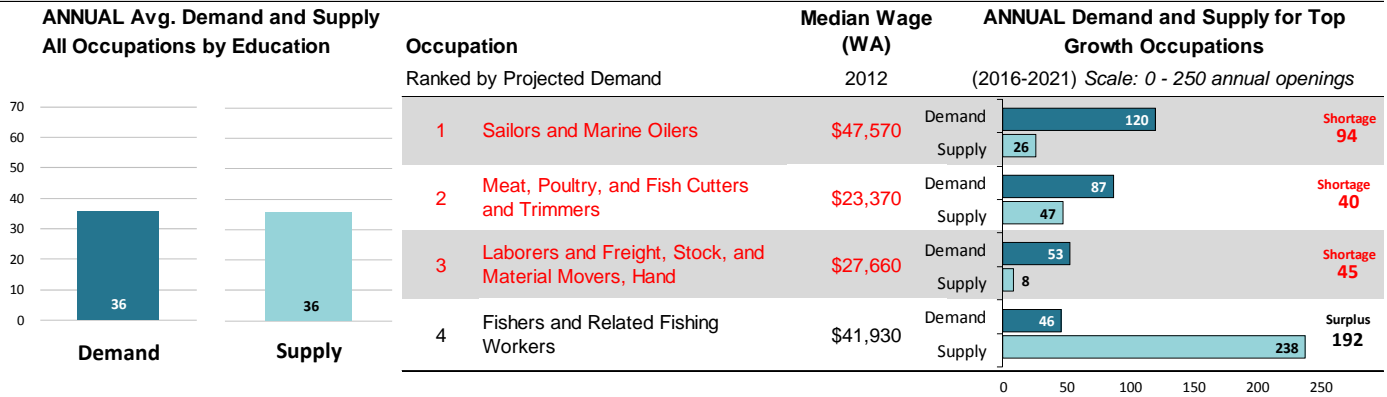
Supply

- ➔ **Supply Gap:** Across all Maritime occupations studied, there is a projected labor shortage of 295 annual openings. Occupations with the three largest shortages are Sailors and Marine Oilers; Captains, Mates and Pilots of Water Vessels; and Laborers and Freight, Stock, and Material Movers, Hand. (**Exhibit 6**).
- ➔ **Greatest Surpluses:** Large surpluses exist for Managers, All Other; Electrical and Electronics Installers and Repairers, Transportation Equipment; and Layout Workers, Metal and Plastic (**Exhibit 7**). For most occupations, this is due to high numbers of degree completions, and not unemployment claims.

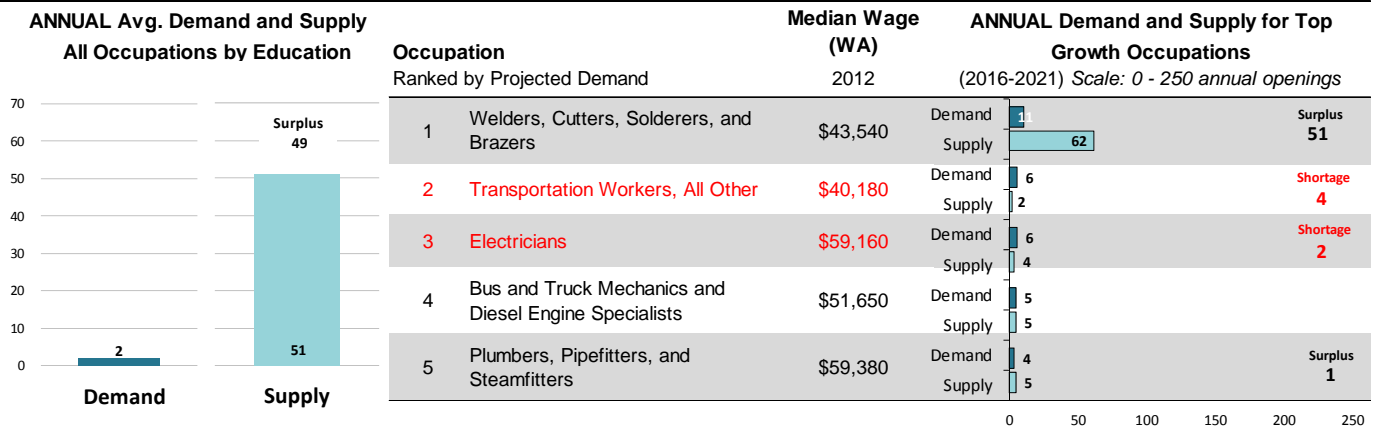
Exhibit 1

Annual Demand and Supply of Selected Occupations Allocated to Maritime Cluster and Ranked by Educational Attainment, King County, 2016-2021

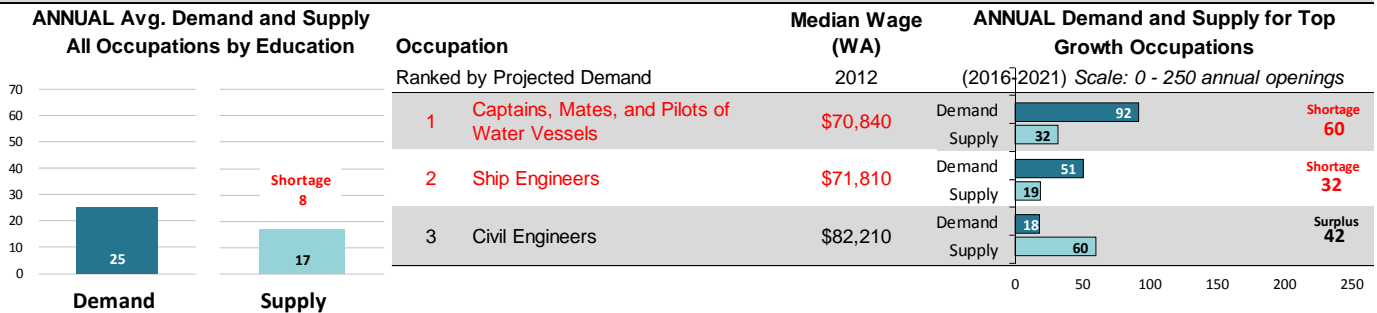
Less than High School



High School Diploma to Associate's Degree



Bachelor's Degree and Above



Source: Community Attributes, WA ESD, WA UI, NCES (2013).

Industry and Occupational Definitions

Maritime-related occupations are estimated to produce nearly 3,048 total openings – economy wide – between 2016 and 2021 in King County. Of that total, 554 openings are expected to be found specifically in the Maritime Cluster. Growth rate for occupations ranked by projected openings is displayed in **Exhibit 2**, and is generally positive for most occupations.

This analysis assigns 42 occupations to the Maritime Cluster, employed across subsector activities, such as Ship and Boat Building, Support Activities for Water Transportation, and others. **Appendix C** contains definitions of select Maritime occupations in this study according to the Bureau of Labor Statistics¹.

Both supply and demand data are allocated to the Maritime Cluster by dividing the number employed in Maritime industries by total employment industry wide. To compare the results of the earlier Maritime Talent Pipeline for Washington State (**Exhibit 8**), statewide percentage in cluster was used for this model (as opposed to countywide). See **Appendix A** for a full list of Maritime occupations and the percent of their employment counted in the Maritime Cluster. The Talent Pipeline model uses projected average annual openings from 2016-2021 by occupation to establish demand; Exhibit 2 shows these raw inputs and Exhibit 3 shows the number of average annual openings per occupation after they have been allocated to the Maritime Cluster.

Occupations in High Demand

Exhibit 1 displays selected Maritime occupations by educational level, their projected supply and demand, and their median salary. Five occupations are estimated to account for nearly 75% of estimated Maritime occupational job openings from 2016-2021 (**Exhibit 3**). These occupations include Sailors and Marine Oilers; Captains, Mates, and Pilots of Water Vessels; Meat, Poultry, and Fish Cutters and Trimmers; Laborers and Freight, Stock, and Material Movers, Hand; and Ship Engineers. The remaining 37 occupations that define the Maritime Cluster in this study are estimated to account for the remaining 27% of employment. Other occupations with high demand are displayed in **Exhibit 3**.

¹ According to BLS, longshoremen are reflected in two categories: Laborers and Freight, Stock, and Material Movers, Hand; and Hoist and Winch Operators

The six occupations with the highest demand from 2016-2021 also account for 75% of estimated Maritime employment in 2016 (**Exhibit 3**). Sailors and Marine Oilers and Fishers and Related Workers are each estimated to employ 16% of the Maritime workforce allocated to the Maritime Cluster in 2016.

Exhibit 2
Top King County Maritime-Related Occupations, Economy-Wide,
Ranked by Average Annual Total Openings, King County, 2011-2021

Occupation Title	Estimated employment 2011	Estimated employment 2016	Estimated employment 2021	Average annual growth rate 2011-2016	Average annual growth rate 2016-2021	Average annual total openings 2016-2021
Laborers and Freight, Stock, and Material Movers, Hand	15,270	17,591	19,075	3%	2%	867
Electricians	4,369	5,356	5,983	4%	2%	283
Civil Engineers	5,868	6,538	7,006	2%	1%	243
Meat, Poultry, and Fish Cutters and Trimmers	2,893	3,209	3,477	2%	2%	152
Sailors and Marine Oilers	1,936	2,098	2,192	2%	1%	125
Plumbers, Pipefitters, and Steamfitters	2,108	2,529	2,761	4%	2%	124
Welders, Cutters, Solderers, and Brazers	1,827	2,259	2,494	4%	2%	111
Captains, Mates, and Pilots of Water Vessels	1,490	1,718	1,856	3%	2%	102
Logisticians	3,299	3,521	3,605	1%	0%	92
Engineers, All Other	1,865	2,151	2,338	3%	2%	91
Construction Managers	5,806	6,674	6,841	3%	0%	89
Bus and Truck Mechanics and Diesel Engine Specialists	2,268	2,355	2,385	1%	0%	64
Ship Engineers	742	831	886	2%	1%	53
Fishers and Related Fishing Workers	2,218	2,172	2,129	0%	0%	51

Source: WA ESD, Community Attributes (2013).

Exhibit 3
**Top King County Maritime Occupations Allocated to Maritime Cluster,
 Openings 2016-2021 and Estimated Employment, 2016, King County**

Occupation Title	Allocated Openings, 2016-2021	% Openings by Occupation	Allocated Estimated Employment 2016	% Estimated Employment by Occupation
Sailors and Marine Oilers	120	22%	2,010	16%
Captains, Mates, and Pilots of Water Vessels	92	17%	1,556	13%
Meat, Poultry, and Fish Cutters and Trimmers	87	16%	1,846	15%
Laborers and Freight, Stock, and Material Movers, Hand	53	10%	1,068	9%
Ship Engineers	51	9%	803	7%
Fishers and Related Fishing Workers	46	8%	1,972	16%
Civil Engineers	18	3%	495	4%
Welders, Cutters, Solderers, and Brazers	11	2%	233	2%
Crane and Tower Operators	9	2%	209	2%
Managers, All Other	7	1%	197	2%
Transportation Workers, All Other	6	1%	142	1%

Source: WA ESD, Community Attributes (2013).

Supply

The Talent Pipeline model adds completions from accredited educational institutions to annual unemployment claims, by occupation, to estimate supply. As with demand, both raw estimates are allocated specifically to the Maritime Cluster using the aforementioned percentage in cluster. Before arriving at a final estimate for supply, educational completions are mapped to demand for occupational openings, and unemployment claims are adjusted for projected unemployment levels for 2016-2021 (5.3%, based on unemployment forecasts by local economists).

Occupations with high supply include Managers, All Other; Electrical and Electronics Installers and Repairers, Transportation Equipment; Layout Workers, Metal and Plastic; and Fishers and Related Fishing Workers. For the majority of occupations with high supply, completions, not unemployment claims, is driving that number (**Exhibit 4**). **Exhibit 5** displays top Maritime occupational openings (demand) along with the occupation's supply (and the component parts of that supply).

Exhibit 4
Top 10 Highest Supply Maritime Occupations Allocated to Maritime Cluster and
Ranked by Total Annual Supply, King County, 2016-2021

Occupational Title	Completions Allocated to Maritime	Adjusted Annual UI Claims	Total Annual Supply (Allocated Completions + Adjusted UI)
Managers, All Other	855	7	862
Electrical and Electronics Installers and Repairers, Transportation Equipment	558	0	558
Layout Workers, Metal and Plastic	331	3	334
Fishers and Related Fishing Workers	157	81	238
Construction Managers	73	1	74
Welders, Cutters, Solderers, and Brazers	50	12	62
Civil Engineers	57	3	60
Painters, Transportation Equipment	54	3	57
Meat, Poultry, and Fish Cutters and Trimmers	0	47	47
Drafters, All Other	43	1	44

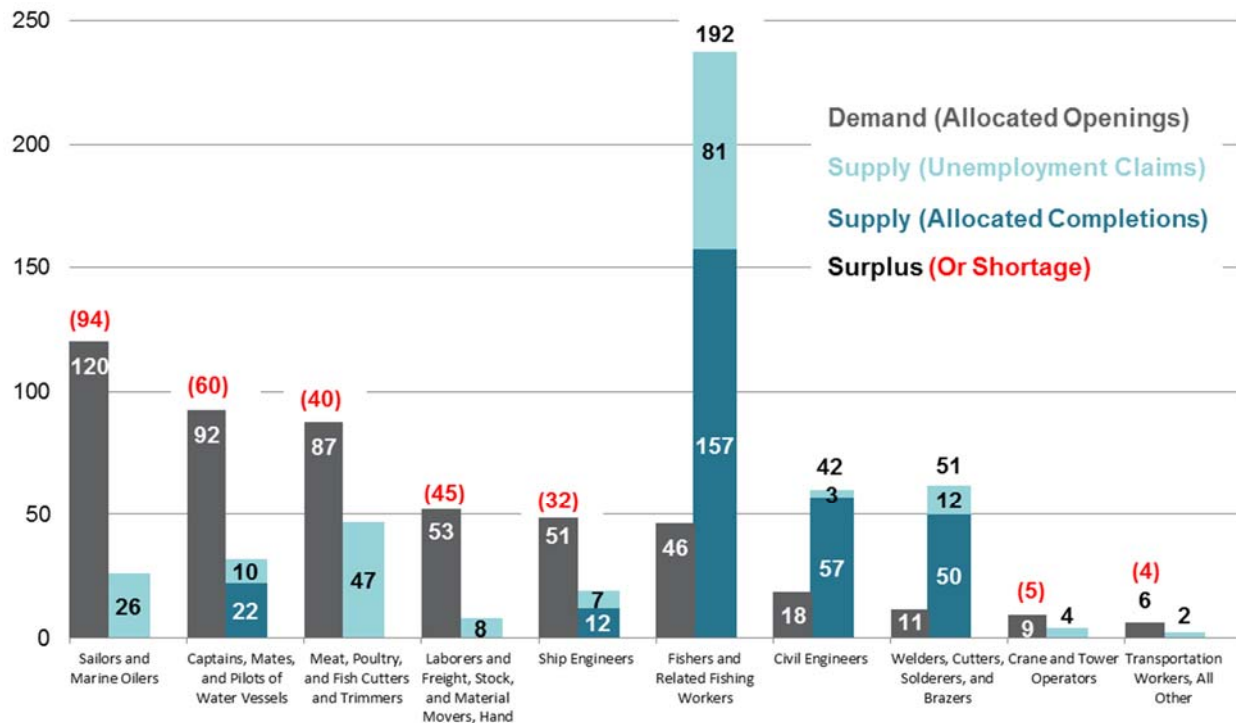
Source: Community Attributes, WA ESD, WA UI, NCES (2013).

Demand vs. Supply

Labor shortages are projected for all of the top five highest demand Maritime occupations (**Exhibit 5**). In total, projected demand for these five occupations is expected to exceed the supply of new workforce talent by over 270 jobs annually.

Labor surpluses are projected as well. The top three occupations with projected surpluses are Managers, All Other; Electrical and Electronics Installers and Repairers, Transportation Equipment; and Layout Workers, Metal and Plastic (**Exhibit 7**). In the case of managers or other non-Maritime specific occupations, we assume this is because there exists a large supply of those in the occupation in general.

Exhibit 5
Annual Demand and Supply for Top Ten Maritime Occupations Allocated to Maritime Cluster and Ranked by Demand, King County, 2016-2021

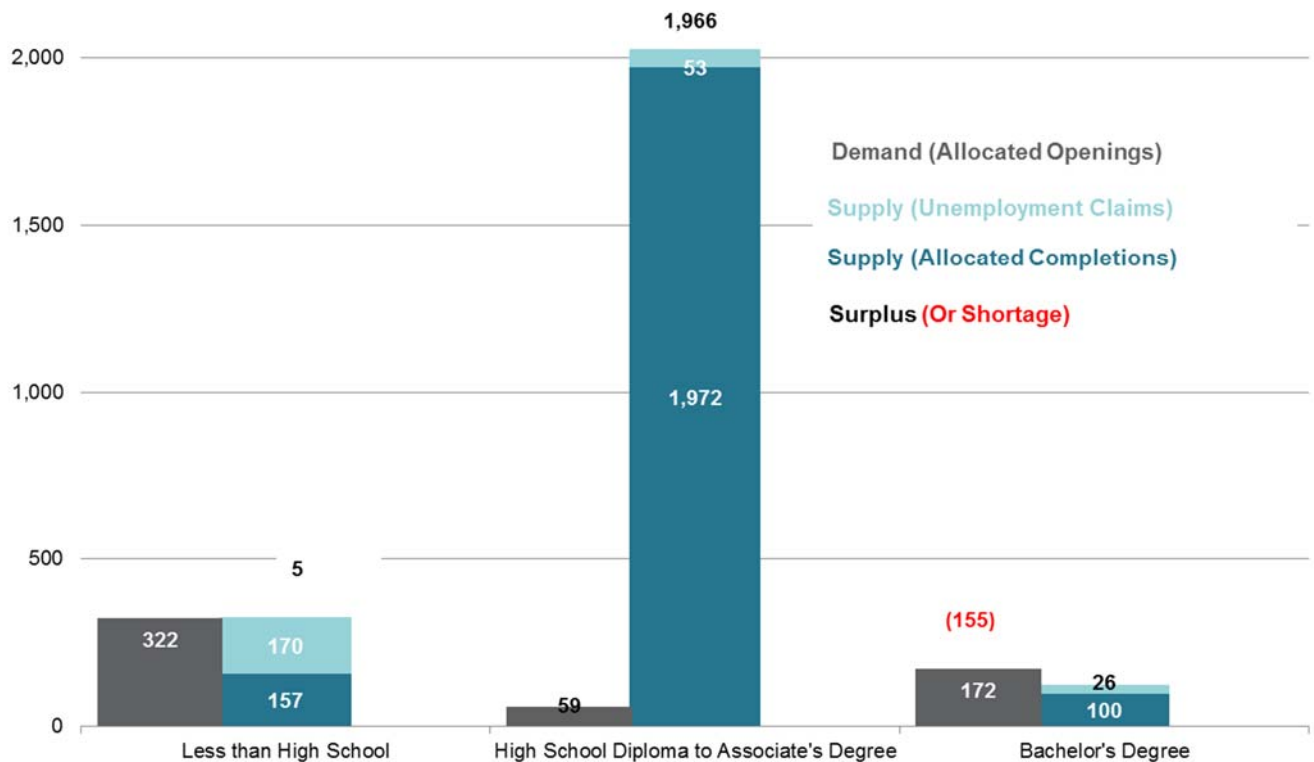


Source: Community Attributes, WA ESD, WA UI, NCES (2013).

Demand vs. Supply by Level of Education

Supply and demand can also be evaluated based on the level of educational attainment necessary to fill projected job openings. **Exhibit 6** below illustrates the average annual total demand (estimated job openings) and supply of educational completions for 2016-2021 across all Maritime Cluster occupations studied, grouped by educational level.

Exhibit 6
Annual Demand and Supply for Maritime Occupations Allocated to Maritime Cluster and Ranked by Education Requirement, King County, 2016-2021
All Maritime Occupations Studied



Source: Community Attributes, WA ESD, WA UI, NCES (2013).

In practice, some occupations may require a higher level of education for a job seeker to be competitive. When the data is categorized according to education level, a significant shortage of Maritime occupations exists for occupations requiring more education. A large surplus exists for those occupations requiring an intermediate level of education (a high school diploma to an Associate's degree). A near equilibrium exists for those occupations requiring an educational level of less than high school diploma, though it is notable that every other occupation in this educational category except Fishers and Related Workers shows a shortage.

Appendix B contains educational, on-the-job training, and work experience needed to attain competency by select Maritime occupation. **Exhibit 7** displays the annual supply and demand for select Maritime occupations from 2016-2021, ranked by educational level.

Exhibit 7
Annual Demand and Supply of Occupations Allocated to Maritime Cluster and Ranked by Educational Attainment and Demand, King County, 2016-2021

Education	Occupation	Demand	Supply	Gap
Less than high school	Sailors and Marine Oilers	120	26	(94)
	Meat, Poultry, and Fish Cutters and Trimmers	87	47	(40)
	Laborers and Freight, Stock, and Material Movers, Hand	53	8	(45)
	Fishers and Related Fishing Workers	46	238	192
	Crane and Tower Operators	9	4	(5)
	Material Moving Workers, All Other	4	4	(0)
	Bridge and Lock Tenders	2	-	(2)
	Hoist and Winch Operators	1	-	(1)
	Cutters and Trimmers, Hand	0	-	(0)
Postsecondary non-degree award	Electrical and Electronics Installers and Repairers, Transportation Equipment	1	558	557
	Commercial Divers	0	1	1
High school diploma or equivalent	Welders, Cutters, Solderers, and Brazers	11	62	51
	Managers, All Other	7	862	855
	Transportation Workers, All Other	6	2	(4)
	Electricians	6	4	(2)
	Bus and Truck Mechanics and Diesel Engine Specialists	5	5	0
	Plumbers, Pipefitters, and Steamfitters	4	5	1
	Cutting and Slicing Machine Setters, Operators, and Tenders	3	1	(2)
	Structural Metal Fabricators and Fitters	3	1	(2)
	Layout Workers, Metal and Plastic	2	334	332
	Riggers	2	10	8
	Painters, Transportation Equipment	1	57	56
	Upholsterers	1	-	(1)
	Motorboat Operators	1	-	(1)
	Motorboat Mechanics and Service Technicians	1	-	(1)
	Surveying and Mapping Technicians	0	1	1
	Boilermakers	0	2	2
	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	0	1	1
	First-Line Supervisors of Farming, Fishing, and Forestry Workers	0	1	1
	Fish and Game Wardens	0	-	0
	Associate's degree	Civil Engineering Technicians	2	-
Drafters, All Other		1	44	43
Construction Managers		1	74	73
Bachelor's degree	Captains, Mates, and Pilots of Water Vessels	92	32	(60)
	Ship Engineers	51	19	(32)
	Civil Engineers	18	60	42
	Marine Engineers and Naval Architects	5	5	0
	Engineers, All Other	3	4	1
	Logisticians	2	1	(1)
	Surveyors	0	1	1

Source: Community Attributes, WA ESD, WA UI, NCES (2013).

Washington State vs. King County Talent Pipeline Results

To compare the results of the earlier Maritime Talent Pipeline for Washington State, statewide percentage in cluster was used to allocate occupations to the Maritime Cluster for this model, rather than using a county-specific percentage in cluster **Exhibit 8** compares the results of the two models. In general, King County's talent pipeline reveals shortages in the same occupations as Washington's model, but more labor shortages are revealed in King County's version that are surpluses in the state model.

Occupations with shortages shown in King County but which show surpluses at the state level include Crane and Tower Operators; Hoist and Winch Operators; Material Moving Workers, All Other; Electricians; Motorboat Mechanics and Service Technicians; Upholsterers; Logisticians; and Civil Engineering Technicians.

Maritime Wages

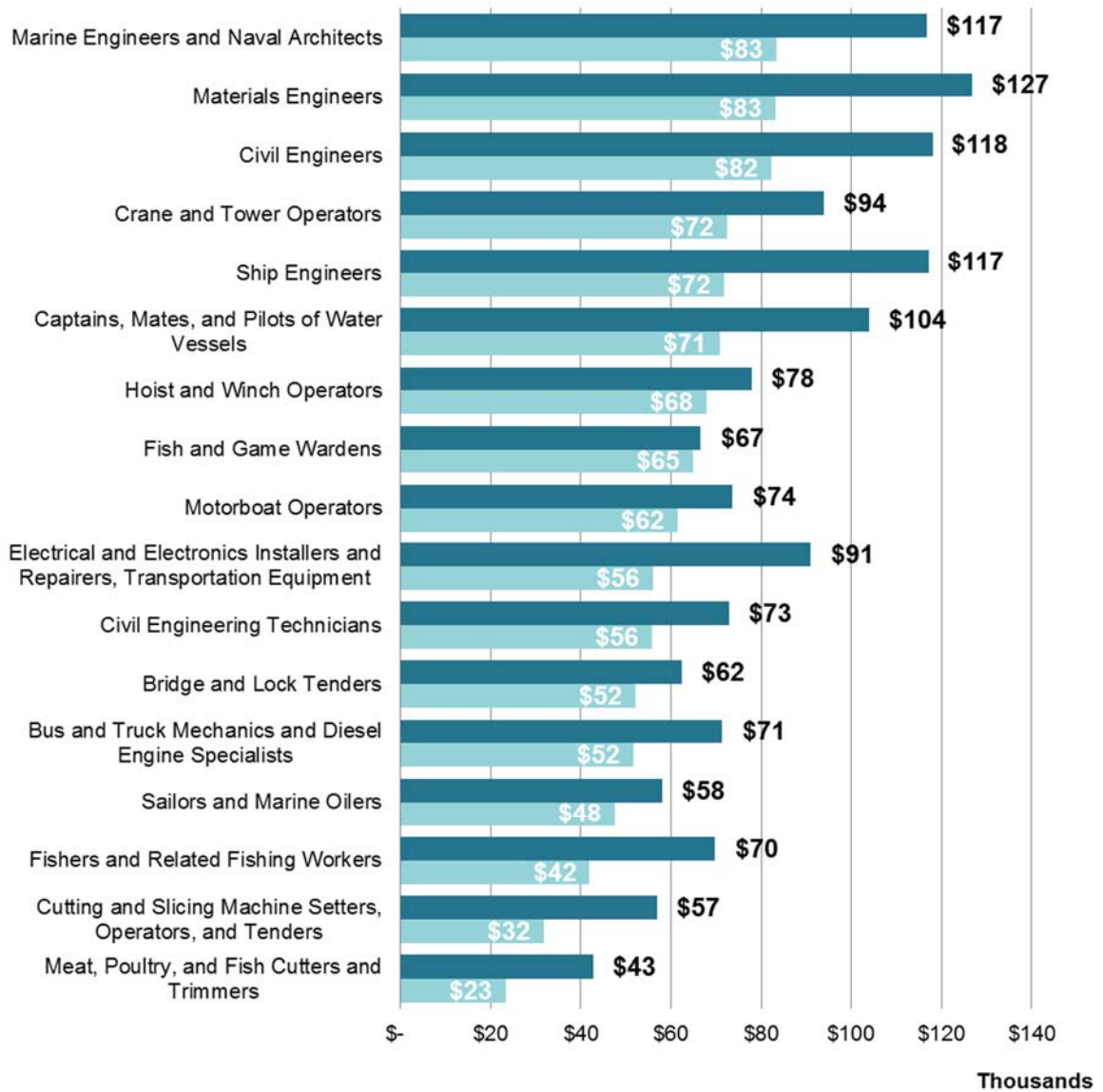
Maritime occupations pay good salaries and offer the ability for advancement to managerial level positions from entry level positions. **Exhibit 9** shows the Washington State median wage by Maritime occupation, as well as the top ten percent wage. Engineers, Pilots, and Hoist and Winch operators are among the top earners in the Maritime Cluster.

Exhibit 8
Annual Demand and Supply of Occupations Allocated to Maritime
Cluster, Washington and King County Comparison, 2016-2021

Occupation	Washington State			King County		
	Demand	Supply	Gap	Demand	Supply	Gap
Commercial Divers	0	1	1	0	1	1
Electrical and Electronics Installers and Repairers, Transportation Equipment	4	1,042	1,038	1	558	557
Bridge and Lock Tenders	2	-	(2)	2	-	(2)
Crane and Tower Operators	24	319	295	9	4	(5)
Cutters and Trimmers, Hand	0	-	(0)	0	-	(0)
Fishers and Related Fishing Workers	123	396	273	46	238	192
Hoist and Winch Operators	5	55	50	1	-	(1)
Laborers and Freight, Stock, and Material Movers, Hand	117	43	(74)	53	8	(45)
Material Moving Workers, All Other	12	25	13	4	4	(0)
Meat, Poultry, and Fish Cutters and Trimmers	173	119	(54)	87	47	(40)
Sailors and Marine Oilers	140	100	(40)	120	26	(94)
Boilermakers	1	9	8	0	2	2
Bus and Truck Mechanics and Diesel Engine Specialists	14	27	13	5	5	0
Cutting and Slicing Machine Setters, Operators, and Tenders	7	4	(3)	3	1	(2)
Electricians	15	36	21	6	4	(2)
First-Line Supervisors of Farming, Fishing, and Forestry Workers	5	65	60	0	1	1
Fish and Game Wardens	3	307	304	0	-	0
Layout Workers, Metal and Plastic	9	1,184	1,175	2	334	332
Managers, All Other	15	1,783	1,768	7	862	855
Motorboat Mechanics and Service Technicians	2	6	4	1	-	(1)
Motorboat Operators	3	-	(3)	1	-	(1)
Painters, Transportation Equipment	3	95	92	1	57	56
Plumbers, Pipefitters, and Steamfitters	14	27	13	4	5	1
Riggers	13	21	8	2	10	8
Structural Metal Fabricators and Fitters	7	17	10	3	1	(2)
Surveying and Mapping Technicians	1	2	1	0	1	1
Transportation Workers, All Other	13	9	(4)	6	2	(4)
Upholsterers	4	17	13	1	-	(1)
Welders, Cutters, Solderers, and Brazers	35	269	234	11	62	51
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	1	5	4	0	1	1
Captains, Mates, and Pilots of Water Vessels	108	59	(49)	92	32	(60)
Civil Engineers	39	113	74	18	60	42
Engineers, All Other	5	9	4	3	4	1
Logisticians	4	19	15	2	1	(1)
Marine Engineers and Naval Architects	9	7	(2)	5	5	0
Ship Engineers	57	39	(18)	51	19	(32)
Surveyors	1	2	1	0	1	1
Civil Engineering Technicians	7	12	5	2	-	(2)
Construction Managers	2	174	172	1	74	73
Drafters, All Other	2	143	141	1	44	43

Source: Community Attributes, WA ESD, WA UI, NCES (2013).

Exhibit 9
Select Economy-Wide Maritime-Related Occupation Annual
Wages, Median and Top 10%, Washington State, 2012



Source: Washington State ESD (2012).

Appendix A
All Maritime-Related Occupations,
Total in Washington Economy-Wide, and in Maritime Cluster,
2016-2021

Occupational Title	Total in WA	Total in Cluster	% in cluster
Construction Managers	4573	50	1%
Managers, All Other	7820	163	2%
Logisticians	6837	181	3%
Surveyors	863	14	2%
Civil Engineers	12782	967	8%
Marine Engineers and Naval Architects	668	263	39%
Materials Engineers	1188	22	2%
Engineers, All Other	3622	115	3%
Drafters, All Other	718	52	7%
Civil Engineering Technicians	2311	285	12%
Surveying and Mapping Technicians	1101	24	2%
Fish and Game Wardens	117	117	100%
First-Line Supervisors of Farming, Fishing, and Forestry Workers	3268	139	4%
Fishers and Related Fishing Workers	2102	1908	91%
Boilermakers	356	17	5%
Electricians	12394	253	2%
Plumbers, Pipefitters, and Steamfitters	7126	225	3%
Electrical and Electronics Installers and Repairers, Transportation Equipme	470	158	34%
Bus and Truck Mechanics and Diesel Engine Specialists	6017	426	7%
Motorboat Mechanics and Service Technicians	433	55	13%
Commercial Divers	194	1	1%
Riggers	725	391	54%
Structural Metal Fabricators and Fitters	1232	143	12%
Meat, Poultry, and Fish Cutters and Trimmers	5569	3204	58%
Welders, Cutters, Solderers, and Brazers	5267	543	10%
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	553	13	2%
Layout Workers, Metal and Plastic	730	422	58%
Upholsterers	479	100	21%
Cutters and Trimmers, Hand	295	1	0%
Cutting and Slicing Machine Setters, Operators, and Tenders	1272	265	21%
Painters, Transportation Equipment	1686	184	11%
Sailors and Marine Oilers	2352	2253	96%
Captains, Mates, and Pilots of Water Vessels	1658	1502	91%
Motorboat Operators	59	59	100%
Ship Engineers	865	836	97%
Bridge and Lock Tenders	67	63	94%
Transportation Workers, All Other	905	279	31%
Crane and Tower Operators	1488	588	40%
Dredge Operators	17	1	6%
Hoist and Winch Operators	144	114	79%
Laborers and Freight, Stock, and Material Movers, Hand	38143	2316	6%
Material Moving Workers, All Other	857	614	72%

Source: Community Attributes, WA ESD Industry Occupation Matrix (2013).

Appendix B

Select Maritime-Related Occupations, Education, Work, and On the Job Experience Required

Typical education needed for entry	Occupation Title	Work experience in a related occupation	Typical on-the-job training needed to attain competency in the occupation
Less than high school	Fishers and Related Fishing Workers	None	Moderate-term on-the-job training
Less than high school	Meat, Poultry, and Fish Cutters and Trimmers	None	Short-term on-the-job training
Less than high school	Cutters and Trimmers, Hand	None	Short-term on-the-job training
Less than high school	Sailors and Marine Oilers	None	Short-term on-the-job training
Less than high school	Bridge and Lock Tenders	None	Short-term on-the-job training
Less than high school	Crane and Tower Operators	1 to 5 years	Long-term on-the-job training
Less than high school	Material Moving Workers, All Other	None	Short-term on-the-job training
Less than high school	Hoist and Winch Operators	None	Moderate-term on-the-job training
Less than high school	Laborers and Freight, Stock, and Material Movers, Hand	None	Short-term on-the-job training
Postsecondary non-degree award	Electrical and Electronics Installers and Repairers, Transportation Equipment	None	Long-term on-the-job training
Postsecondary non-degree award	Commercial Divers	None	Moderate-term on-the-job training
High school diploma or equivalent	Managers, All Other	1 to 5 years	None
High school diploma or equivalent	Surveying and Mapping Technicians	None	Moderate-term on-the-job training
High school diploma or equivalent	Fish and Game Wardens	None	Short-term on-the-job training
High school diploma or equivalent	First-Line Supervisors of Farming, Fishing, and Forestry Workers	1 to 5 years	None
High school diploma or equivalent	Boilermakers	None	Apprenticeship
High school diploma or equivalent	Electricians	None	Apprenticeship
High school diploma or equivalent	Plumbers, Pipefitters, and Steamfitters	None	Apprenticeship
High school diploma or equivalent	Bus and Truck Mechanics and Diesel Engine Specialists	None	Long-term on-the-job training
High school diploma or equivalent	Motorboat Mechanics and Service Technicians	None	Long-term on-the-job training
High school diploma or equivalent	Riggers	None	Short-term on-the-job training
High school diploma or equivalent	Structural Metal Fabricators and Fitters	None	Moderate-term on-the-job training
High school diploma or equivalent	Welders, Cutters, Solderers, and Brazers	Less than 1 year	Moderate-term on-the-job training
High school diploma or equivalent	Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	None	Moderate-term on-the-job training
High school diploma or equivalent	Layout Workers, Metal and Plastic	None	Moderate-term on-the-job training
High school diploma or equivalent	Upholsterers	None	Moderate-term on-the-job training
High school diploma or equivalent	Cutting and Slicing Machine Setters, Operators, and Tenders	None	Short-term on-the-job training
High school diploma or equivalent	Painters, Transportation Equipment	None	Moderate-term on-the-job training
High school diploma or equivalent	Motorboat Operators	None	Short-term on-the-job training
High school diploma or equivalent	Transportation Workers, All Other	None	Short-term on-the-job training
Associate's degree	Construction Managers	More than 5 years	None
Associate's degree	Drafters, All Other	None	None
Associate's degree	Civil Engineering Technicians	None	None
Bachelor's degree	Logisticians	1 to 5 years	None
Bachelor's degree	Surveyors	None	None
Bachelor's degree	Civil Engineers	None	None
Bachelor's degree	Marine Engineers and Naval Architects	None	None
Bachelor's degree	Engineers, All Other	None	None
Bachelor's degree	Captains, Mates, and Pilots of Water Vessels	None	None
Bachelor's degree	Ship Engineers	None	None

Source: Community Attributes, WA ESD, WA UI, NCES (2013).

Appendix C

Definitions of Select Maritime-Related Occupations according to BLS Occupational Employment Statistics

53-5021 Captains, Mates, and Pilots of Water Vessels

Command or supervise operations of ships and water vessels, such as tugboats and ferryboats. Required to hold license issued by U.S. Coast Guard. Excludes "Motorboat Operators" (53-5022).

53-7062 Laborers and Freight, Stock, and Material Movers, Hand

Manually move freight, stock, or other materials or perform other general labor. Includes all manual laborers not elsewhere classified. Excludes "Material Moving Workers" (53-7011 through 53-7199) who use power equipment. Excludes "Construction Laborers" (47-2061) and "Helpers, Construction Trades" (47-3011 through 47-3019).

51-4192 Layout Workers, Metal and Plastic

Lay out reference points and dimensions on metal or plastic stock or workpieces, such as sheets, plates, tubes, structural shapes, castings, or machine parts, for further processing. Includes shipfitters.

17-2121 Marine Engineers and Naval Architects

Design, develop, and evaluate the operation of marine vessels, ship machinery, and related equipment, such as power supply and propulsion systems.

47-2152 Plumbers, Pipefitters, and Steamfitters

Assemble, install, alter, and repair pipelines or pipe systems that carry water, steam, air, or other liquids or gases. May install heating and cooling equipment and mechanical control systems. Includes sprinklerfitters.

53-5011 Sailors and Marine Oilers

Stand watch to look for obstructions in path of vessel, measure water depth, turn wheel on bridge, or use emergency equipment as directed by captain, mate, or pilot. Break out, rig, overhaul, and store cargo-handling gear, stationary rigging, and running gear. Perform a variety of maintenance tasks to preserve the painted surface of the ship and to maintain line and ship equipment. Must hold government-issued certification and tankerman certification when working aboard liquid-carrying vessels. Includes able seamen and ordinary seamen.

53-5031 Ship Engineers

Supervise and coordinate activities of crew engaged in operating and maintaining engines, boilers, deck machinery, and electrical, sanitary, and refrigeration equipment aboard ship.