

Table 1. Puget Sound kelp knowledge gaps

Topic	Gaps	Available Information*
Kelp	<ul style="list-style-type: none"> • Distribution and trends • Invasive species • Turf assemblages • Trophic contributions • Habitat functions and services • Microbiome • Disease • Competition 	<ul style="list-style-type: none"> • Historic distribution data and charts • Traditional ecological knowledge • Existing underwater towed and drop camera footage • Dive survey data
Canopy Kelp – <i>Nereocystis leutkeana</i>	<ul style="list-style-type: none"> • Temperature tolerances • Distribution and trends • Impacts of kelp crab <i>Pugettia producta</i> • Bed connectivity • Genetic variation • Microbiome • Disease • Microscopic life stage ecology (thresholds, delayed development, etc.) 	<ul style="list-style-type: none"> • Historic distribution data and charts • Traditional ecological knowledge
Kelp Communities	<ul style="list-style-type: none"> • Invertebrate community and abundances • Fishery impacts • Grazing impacts (urchin, kelp crab, smaller invertebrates) • Salmon, rockfish, and forage fish use 	<ul style="list-style-type: none"> • Dive survey data • Historic fishery data
Ecosystem Services	<ul style="list-style-type: none"> • Nutrient filtration • Ocean acidification amelioration 	<ul style="list-style-type: none"> • Atlantic and California kelp
Kelp Economics	<ul style="list-style-type: none"> • Fishery contributions • Water quality improvement 	<ul style="list-style-type: none"> • Market value of pollution mitigation and cleanup
WA State Policy	<ul style="list-style-type: none"> • Kelp mariculture permitting and regulations • Hydraulic Permitting in relation to kelp distributions and impacts • Restoration permitting • Harvest regulations, monitoring and enforcement • Conservation regulations • Over-water structure permitting 	<ul style="list-style-type: none"> • Eelgrass-associated regulations that mention macroalgae • WDFW enforcement data • State park harvest information

Topic	Gaps	Available Information*
Human Impacts	<ul style="list-style-type: none"> • Shoreline armoring (subtidal effects) • Overwater structures • Pollution • Boat traffic • WWTP effluent 	<ul style="list-style-type: none"> • Existing environmental monitoring data available from NOAA, WA-DNR, WA-DOE, and WA-DOT and others. • WWTP discharge data and locations
Restoration	<ul style="list-style-type: none"> • Site selection • Out-plant methods • Site enhancement • Invasive species management (macroalgae) • Ecosystem services of kelp mariculture 	<ul style="list-style-type: none"> • Nile Creek <i>Nereocystis</i> restoration project, British Columbia • Atlantic seaweed mariculture industry

* Includes currently available data that may provide possible insight but first requires analysis and synthesis. This section does not include current research by a number of students and researchers in the greater Salish Sea region.

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