Yaquina Bay Subtidal Survey: 2026 Data Summary for Bay Clam Populations

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Background and Rationale

In the 1970s, the Oregon Department of Fish and Wildlife (ODFW) partnered with Oregon Sea Grant and the Department of Land Conservation and Development to fund extensive surveys of shellfish populations and estuarine habitats in 15 Oregon estuaries. The results of these studies were published as estuary-specific "Raccoon reports" (Bottom et al. 1979) and the "Hancock report" (Hancock et al. 1979). These decades-old reports are still the primary source for Oregon bay clam population and habitat information, and therefore the need for more recent information is paramount.

This is particularly true for Yaquina Bay located near Newport, Oregon. This bay has a long history of supporting recreational and commercial clam harvest and has experienced increased urbanization and development since the last major resource studies were conducted in the 1970s. Thus, there is a pressing need to update shellfish and estuarine habitat information in this bay. In 2008, the ODFW Shellfish and Estuarine Assessment of Coastal Oregon (SEACOR) project was established to repeat the extensive estuary surveys of the 1970s and update the resource maps and data that are used by state and local governments to better manage estuarine resources. SEACOR conducted shellfish and habitat studies of the intertidal regions of Yaquina Bay in 2012, but funding limitations prevented the inclusion of similar studies in the subtidal regions of the bay. In 2019, SEACOR conducted a limited subtidal survey along a section of the northern shoreline of Yaquina Bay. This permitted SEACOR to update subtidal data for the bay in areas where increased subtidal commercial clamming effort on gaper clam (*Tresus capax*) populations had been occurring since 2018. This survey was used by ODFW to establish a gaper clam quota and a subtidal harvest area for the dive clam commercial fishery (OAR 635-005-0290, OAR 635-005-0355).

A new subtidal bay clam survey was recently conducted in May and June 2026 as part of the ODFW SEACOR 2025-2026 Yaquina Bay estuary assessment. The goal of the survey was to 1) conduct an extensive subtidal survey of bay clams in the subtidal areas of Yaquina Bay to complement intertidal bay clam surveys, 2) assess the status and spatial distribution of bay clam populations in Yaquina Bay, and 3) update biomass estimates for gaper clams to manage the commercial clam fishery. The purpose of this summary is to address goal 3 and portions

of goal 2 to assist the ODFW shellfish program in managing the commercial bay clam dive fishery in Yaquina Bay.

Methods

Study area

SEACOR surveyed the subtidal regions of Yaquina Bay in May and June, 2026. The study focused on five regions of the subtidal areas in the lower estuary which ranged in depth from -3.0 to -9.0 m relative to mean lower low water (MLLW). The deeper end of this depth range was set at a depth that was just shallower than the depths maintained by the US Army Corps of Engineers for the Yaquina Bay main navigation channel. This ensured that all the survey areas in the study avoided regions of the subtidal that may be impacted by recent or active dredging. The five subtidal regions included North Bridge Subtidal (NB_Sub), Breakwater North Subtidal (BWN_Sub), Sally's Bend Subtidal (SB_Sub) on the north shore, Bridge Flat Subtidal (BF_Subtidal), and the combined Idaho Flat and Raccoon Flat Subtidal (IF_RAC_Subtidal) on the south shore of the bay (Figure 1). BWN_Sub region includes the current commercial harvest area and was sampled in the 2019 survey. NB_Sub is the region where the commercial dive clam fishery harvested over 100,000 pounds of gapers in 2018. The BF_Sub region borders the tide flat (Bridge Flat or Bridge Bed) where recreational harvest of gaper clams occurs. All these regions except for NB_Sub border intertidal regions that were sampled in 2025-2026 by the ODFW SEACOR Project for bay clam populations and estuarine habitat in Yaquina Bay. Each of the subtidal regions were subdivided into 3 subtidal depth bins based on hydroacoustic surveys conducted by ODFW during January and February 2026. The subtidal depth bins included Subtidal 1 (Sub 1, -1 to -3m, MLLW), Subtidal 2 (Sub 2, -3 to -5m, MLLW), and Subtidal 3 (Sub 3, -5 to -9m, MLLW). The size of each of the regions and relative proportion in each of the subtidal depth bins differed among regions (Figure 2, Table 1). These differences among areas were used to allocate random sampling points among the regions and subtidal depth bins within regions using a stratified-random sampling design.

Dive Surveys: Bay clam and Habitat sampling

Dive surveys were conducted in the five subtidal regions over 12 days from May 10 to June 25, 2026. A total of 164 sites were sampled during the study. This included 17 sites in the NB_Sub, 49 sites in the BWN_Sub, 41 sites in the SB_Sub, 29 sites in the BF_Sub, and 28 sites in the IF_RAC_Sub subtidal regions.

Sampling at the dive sites was conducted using contracted divers to collect habitat and clam population data. A stainless-steel ring (0.5 m^2) was lowered to the sediment surface once the site was located by boat GPS. Divers collected environmental and biological data at each dive site within the 0.5 m^2 ring. Environmental variables included substratum type (% cover of

substrate categories: sand and silt, shell, gravel, cobble, and bedrock) and sediment type (sand, sandy mud, mud). The divers also collected a 0.3-liter sample of sediments from the top 0-5 cm of each site for grain size analysis. Biological variables included percent cover

Table 1. *Subtidal region areas within subtidal depth bins sampled during the Yaquina Bay 2026 subtidal bay clam assessment. All areas are reported in hectares. * = the Subtidal 3 depth bin in the IF_RAC_Sub region was not fully sampled and has been excluded from the analyses.*

		Subtidal Region Areas (hectares)				
Bathy Bin	**Bathy Depth (MLLW)**	**NB_Sub**	**BWN_Sub**	**SB_Sub**	**BF_Sub**	**IF_RAC_Sub**
Subtidal 1	-3.0 to -1.0m	2.189	1.997	6.940	5.478	9.113
Subtidal 2	-5.0 to -3.0m	1.708	6.062	10.146	1.838	11.884
Subtidal 3	-9.0 to -5.0m	5.814	19.973	16.997	2.136	16.616*
	TOTAL AREA*	**9.711**	**28.032**	**34.083**	**9.452**	**20.997***

of algae and eelgrass and presence of various shellfish species. Presence of major bay clam species (gaper clams, *Tresus capax*; butter clams, *Saxidomus gigantea*; cockles, *Clinocardium nuttallii*; and native littleneck clams, *Leukoma staminea*) were recorded based on presence of living specimens of these species or identification of visible species-specific siphon "shows" inside or within 2m of the sampling ring. Presence of living specimens of other shellfish species (e.g. Dungeness crab, *Cancer magister*; red rock crab, *Cancer productus*; and burrowing shrimp, *Neotrypaea californiensis, N. gigas* and *Upogebia pugettensis*) were also recorded inside or within 2m of the sampling ring. Divers also took 5 minutes of video at each of the sample sites using GoPro cameras. These videos were used by ODFW to document each of the dive sites, conduct quality control on habitat data recorded by the divers, and expand the macroalgae cover variable to be consistent with SEACOR intertidal surveys (i.e., macroalgal functional groups: sheet, filamentous, branched, rockweed, and leathery algae groups).

Bay clams were extracted for measurement and density measurements at each of the dive sites after the habitat data and samples were collected. Divers used a Venturi suction pump system (after Hancock et al. 1979) to sample shellfish within the 0.5 m^2 ring from the top 1.0 m of sediment. Samples were collected in a bag with a mesh size of 8mm at the end of the Venturi head where water is discharged through the pump system. Shellfish were then sorted to species and measured. Any clam extracted was measured for maximum anterior-posterior length (to nearest 0.1 mm), maximum lateral width (to nearest 0.1 mm), and wet weight (to nearest 0.01 g). Other shellfish such as shrimp and crab were also measured (carapace length or width, wet weight, and sex).

Gaper clam population biomass was estimated using the weight data from the dive sites. Stock biomass (i.e., total weight of clams) of each subtidal region was estimated using the mean weight (g/m^2) within each region multiplied by the area of the study region. Biomass estimates were then converted from grams to pounds. Similar calculations were performed for the lower and upper 95% confidence intervals of the biomass estimate to incorporate the variability found in these measurements. For clam fishery management purposes, ODFW uses the lower 95% confidence interval of biomass in pounds to set quotas for the commercial dive clam fishery.

Major Findings

Bay clam composition and spatial distribution

Gaper clams (*T. capax*) were the most common species found in the subtidal regions of Yaquina Bay and dominated bay clam biomass in all subtidal regions sampled (Figure 3). Butter clams (*Saxidomus gigantea*) were abundant at some sites but only occurred in 4 of the 164 sampled sites in the survey. Cockles (*Clinocardium nuttallii*) and native littleneck clams (*Leukoma staminea*) were rarely found in the subtidal regions of Yaquina Bay. Regions with the highest biomass and density of bay clams were found west of the Yaquina Bay bridge close to the mouth of the bay.

Gaper clam biomass patterns in the subtidal regions of Yaquina Bay

There were significant differences in mean gaper clam biomass among the subtidal regions sampled in the survey (Two-Way ANOVA $p<0.001$). The regions west of the Yaquina Bay Bridge (BF_Sub, NB_Sub) had the highest density and biomass (Table 2, Figure 3) and had significantly greater mean biomass than the sites further up-bay (SB_Sub, IF_RAC_Sub). There were no significant differences in mean biomass among the three depth ranges (Two-Way ANOVA $p=0.379$) and the interaction of depth and region (Two-Way ANOVA $p=0.357$), so biomass and stock estimates are based on the combined subtidal data within each region. These results indicate that the gaper populations in the subtidal areas of Yaquina Bay are concentrated in the more marine portions of the estuary and are broadly distributed between -1 to -9m depths (relative to MLLW) where those populations occur.

Gaper clam stock estimates

Stock estimates of gaper clams were generally low throughout the bay and consistent with results for mean biomass. The highest stock biomass for gaper clams were found in the NB_Sub, BF_Sub, and BWN_Sub regions (Table 3). Gaper clams were generally rare in the SB_Sub and IF_RAC_Sub regions and stock estimates were <500 pounds for these two regions of the subtidal. It is promising that there is still a significant gaper population in the NB_Sub

Table 2. *Mean weight and 95% confidence interval of gaper clams in sampled subtidal regions (kg m^{-2}). [a] = indicates the lower 95% confidence interval was less than zero.*

	Subtidal Region				
	NB_Sub	**BWN_Sub**	**SB_Sub**	**BF_Sub**	**IF_RAC_Sub**
Mean (kg m^{-2})	2.24	0.60	0.055	1.59	0.13
Low 95% CI	0.21	0.053	0.00053	0.29	0.0[a]
High 95% CI	4.27	1.15	0.11	2.90	0.29

region since this area was the focus of heavy harvest (>100,000 pounds) in 2018. However, it is important to note that this stock biomass (~45,000 pounds) is much lower than previous ODFW surveys in the 1970s (Hancock et a. 1979) when estimated gaper clam stock biomass exceeded 900,000 pounds in this region of the subtidal. ODFW conducted annual follow up studies of gaper clam populations in this region of the bay from 1975-1990 and large populations of gapers were found throughout this time series (e.g., Gaumer and Starr 1982, Gaumer 1990).

Table 3. *Stock Biomass estimates of gaper clams (T. capax) in sampled subtidal regions. Biomass estimates are based on the lower 95% confidence interval of mean clam biomass (pounds m^{-2}). [a] = indicates the lower 95% confidence interval was less than zero.*

	Subtidal Region				
	NB_Sub	**BWN_Sub**	**SB_Sub**	**BF_Sub**	**IF_RAC_Sub**
Mean	4.95	1.32	0.12	3.51	0.29
Low 95% CI	0.47	0.12	0.0012	0.63	0.0[a]
Area (ha)	9.711	28.032	34.083	9.452	20.997
Region Biomass (pounds)	**45,401**	**32,595**	**401**	**59,883**	**0**

Comparison of bay clam stock biomass (2019 vs. 2026)

The BWN_Sub region was also sampled during the recent 2019 Yaquina Bay Subtidal Survey (D'Andrea 2021) and these results were used to establish a commercial dive clam quota in this area in 2020. Cockle clams were not found in this region during the two subtidal surveys (Table 4), and butter clams were rare during both surveys with stock biomass less than 2,200 pounds (Table 5). The density and biomass of these two species are too low to support commercial harvest. The gaper clam biomass in this region has decreased 84% since that previous survey (Table 6). The 2019 survey noted that a large proportion of the gaper population at

the site were larger (>130mm) and presumably older (estimated at 8-13 years) gaper clams (D'Andrea 2021). There may have been some recent years with poor recruitment which have led to a smaller population in the region. This pattern is consistent with other studies of gaper clam populations which have shown intermittent recruitment success and dominance of a few year classes in the reproductive population (Bourne and Smith 1967, Wendell et al. 1976, Hancock et al. 1979). Current sizes of gaper clams in BWN_Sub were all >129mm (mean length = 140.4mm ± 4.5, n=19) which indicated that this region may have had poor recruitment for the last decade.

This pattern may be occurring throughout the subtidal habitat of Yaquina Bay. Figure 4 shows the size frequency of all whole gaper clams measured during the 2026 survey (n=214 clams). The population is heavily weighted towards older individuals (>100mm) with <5% of the current subtidal gaper population in the 0–4-year age classes based on previous size at age studies in subtidal Yaquina Bay (Hancock et al. 1979). These lines of evidence indicate that subtidal gaper clam populations in Yaquina Bay may currently be recruitment limited.

Table 4. *Comparison of cockle (C. nuttallii) stock estimates (pounds) in BWN_Sub region between the 2019 and 2026 subtidal assessments. No cockles were found in this region during the two subtidal surveys.*

	Year sampled	
	2019	**2026**
Mean (pounds m^{-2})	0.0	0.0
Low 95% CI (pounds m^{-2})	0.0	0.0
Area (hectares)	14.626	28.032
Region Biomass (pounds)	**0**	**0**

Table 5. *Comparison of butter clam (S. gigantea) stock estimates (pounds) in BWN_Sub region between the 2019 and 2026 subtidal assessments*

	Year sampled	
	2019	**2026**
Mean (pounds m^{-2})	0.23	0.05
Low 95% CI (pounds m^{-2})	0.008	0.0*
Area (hectares)	14.626	28.032
Region Biomass (pounds)	**2,148**	**0**

* = Lower 95% Confidence interval is less than zero

Table 6. *Comparison of gaper clam (T. capax) stock estimates (pounds) in BWN_Sub region between the 2019 and 2026 subtidal assessments*

	Year sampled	
	2019	**2026**
Mean (pounds m^{-2})	3.49	1.32
Low 95% CI (pounds m^{-2})	1.39	0.12
Area (hectares)	14.626	28.032
Region Biomass (pounds)	**202,659**	**32,595**

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Figure 1. *Study regions for the Yaquina Bay 2026 Subtidal Bay Clam Assessment. NB_Sub = subtidal North Bridge; BWN_Sub = subtidal Breakwater North; SB_Sub = subtidal Sally's Bend; BF_Sub = subtidal Bridge Flat; IF_RAC_Sub = subtidal Idaho and Raccoon Flat region.*

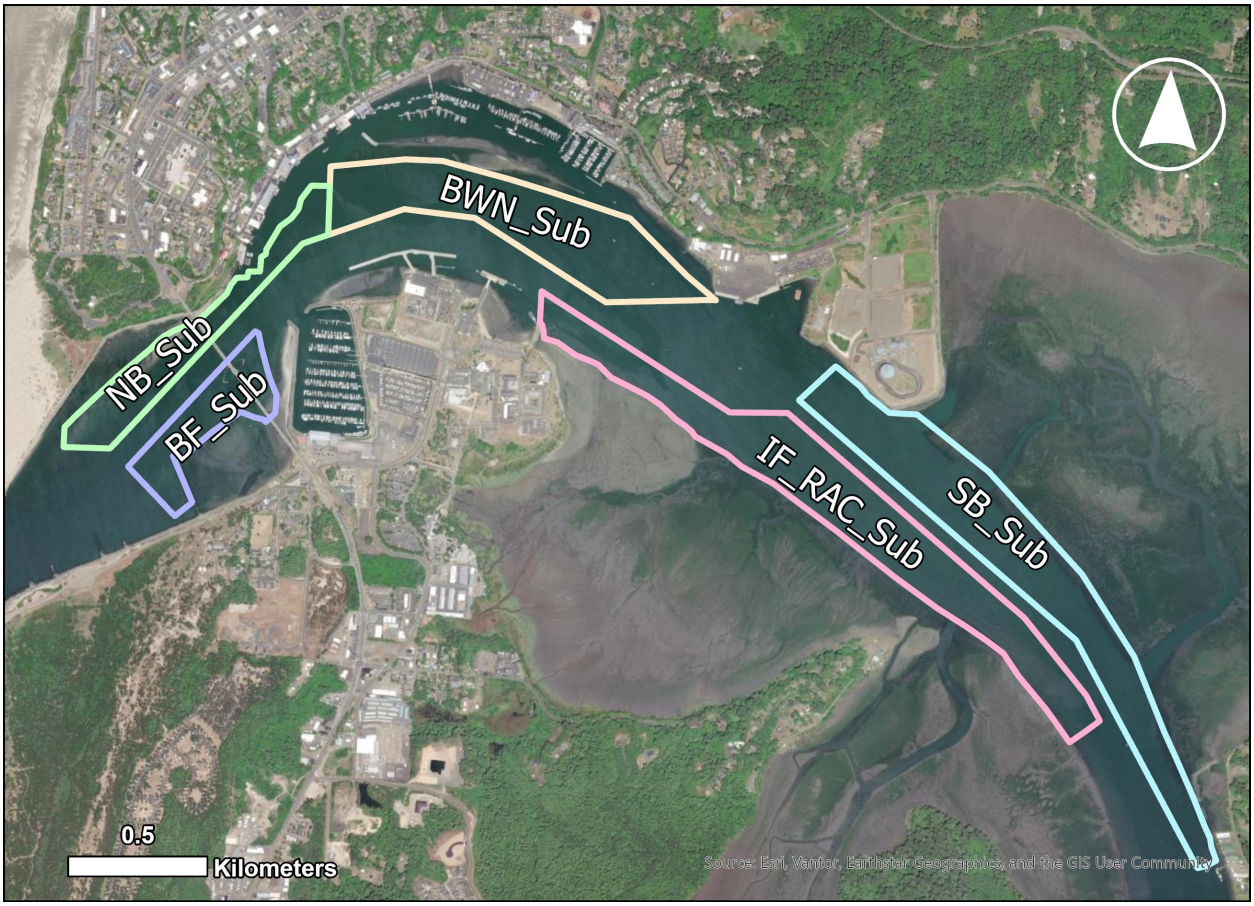

Figure 2. *Sample sites (white points) and depth bins (see legend) for the (A) NB_Sub, BWN_Sub, and BF_Sub regions, and (B) SB_Sub and IF_RAC_Sub regions.*

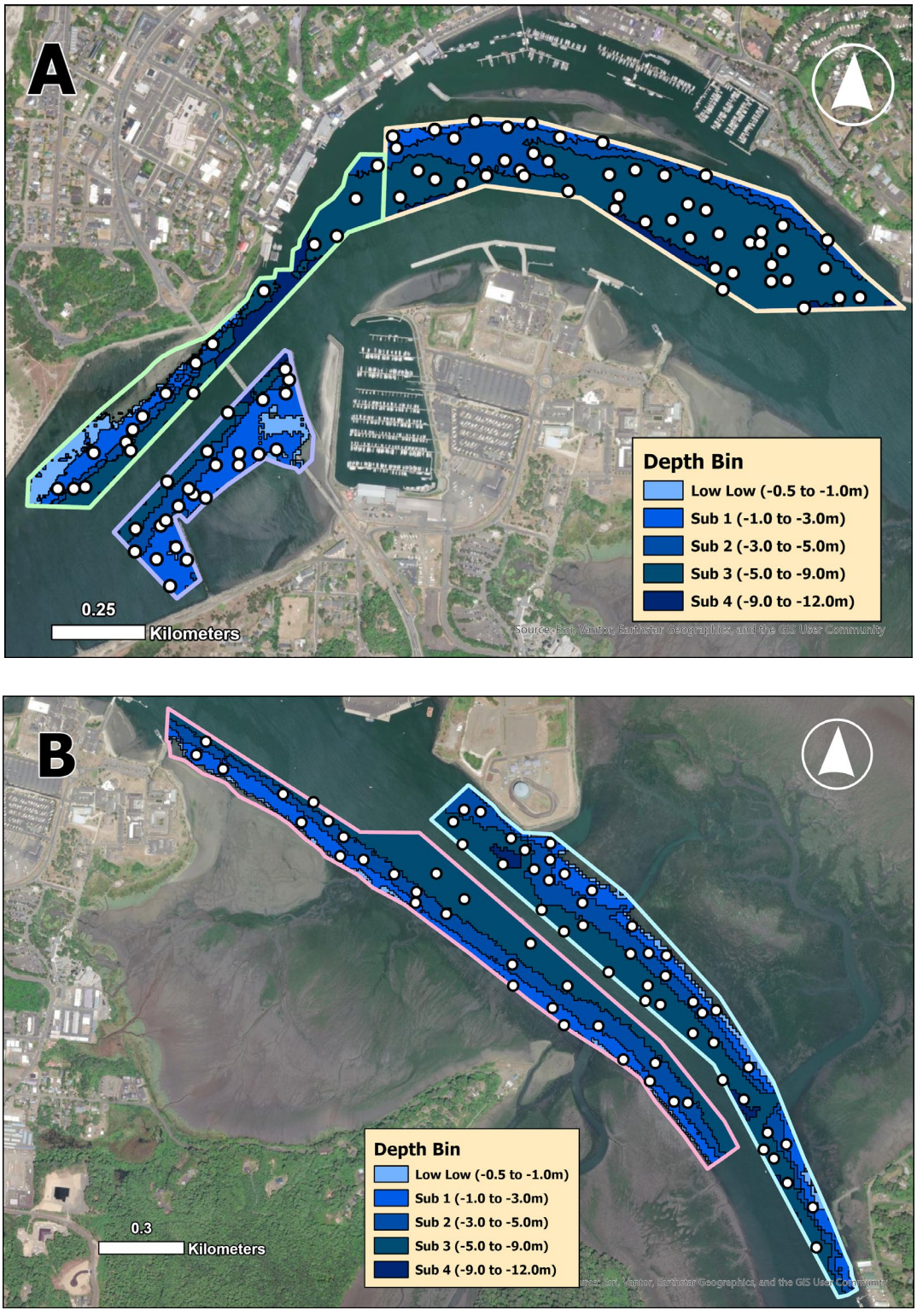

Figure 3. *Bay clam composition and relative biomass observed in the (A) NB_Sub, BWN_Sub, and BF_Sub regions, and (B) SB_Sub and IF_RAC_Sub regions. Size of point is scaled to biomass (kg m^{-2}) at the site. Gray points are sites with no bay clams.*

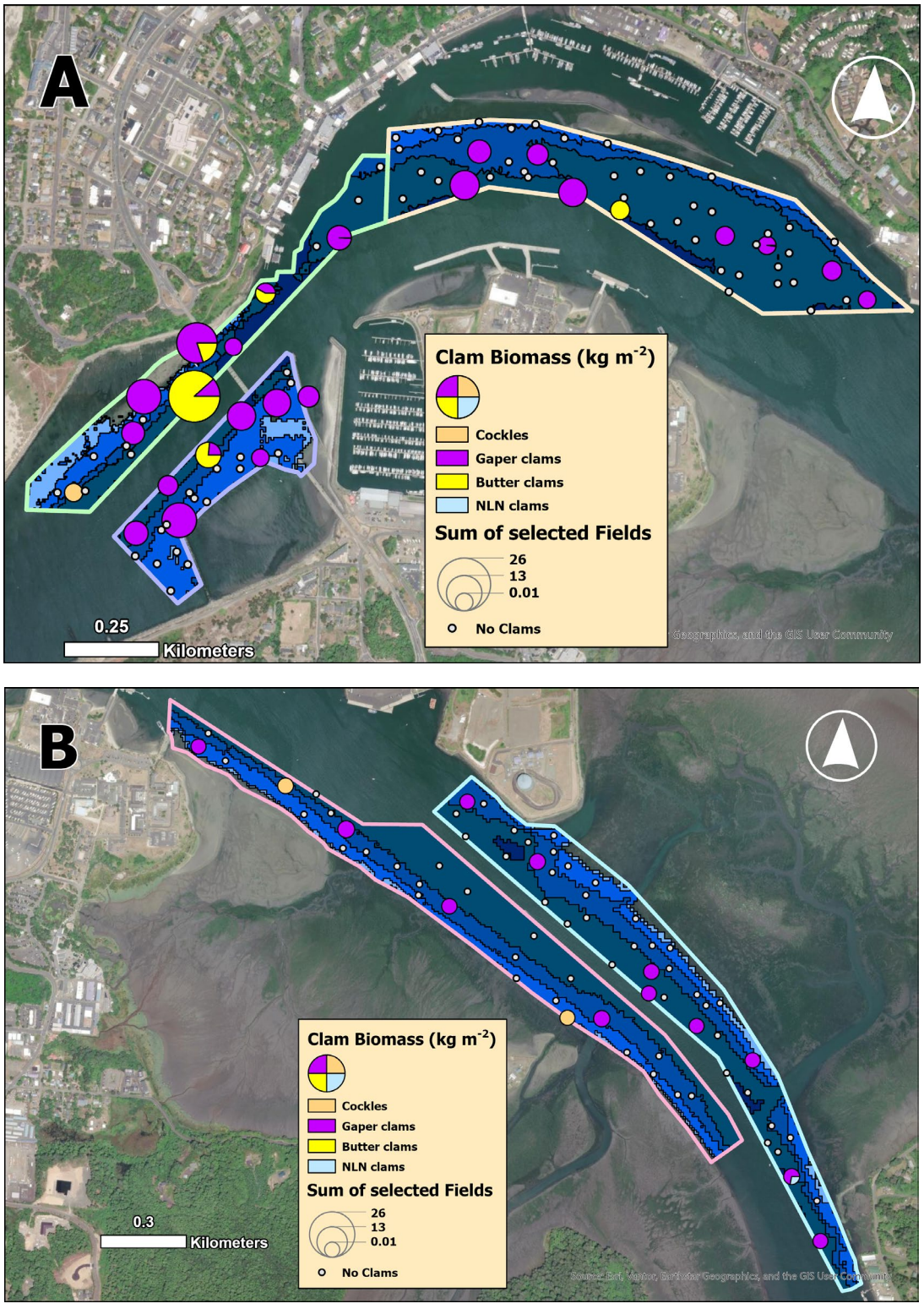

Figure 4. *Size frequency of Yaquina Bay subtidal gapers (all regions) during the 2026 Yaquina Bay Subtidal Assessment.*