

# Annual Puget Sound Recreational Dungeness Crab Creel Report: Summer 2023

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Washington  
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**FISH &  
WILDLIFE**

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# Annual Puget Sound Recreational Dungeness Crab Creel Report: Summer 2023

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# Acknowledging the Indigenous People, Land, and Culture of the Pacific Northwest

Since time immemorial, Indigenous People have graced the Pacific Northwest with rich traditions of many diverse cultures, languages, traditional knowledge expressed artistically and practically with intricate principles passed down throughout generations. As the first stewards of this land, Indigenous People from this part of the world are ancestrally engrained in the very fabric of this region that is known today as Washington State.

Washington Department of Fish and Wildlife (WDFW) acknowledges the American Indian Tribes as the original occupants of this land enjoyed today by all Washingtonians. Their historic reliance to hunt, fish, and gather traditional foods defines their inherent responsibilities to protect and steward the precious resources on the waters and landscape shared today by all Washington residents.

The very survival of the Pacific Northwest Tribes is a testament of resiliency of what they have endured and continue to endure throughout generations on this very landscape. Through scarred valor, many historical encounters of massacre, renunciation of religious freedom, systemic racism, cultural assimilation of native children through institutional residential schools, and the fight for their inherent rights and liberties, they have prevailed. Throughout this tormented history brought by colonization, abrogated treaties, infringement of civil rights, and the salmon protests of the 1960s, the Northwest Tribes and WDFW have founded a commitment of respect, unity, and alliance taught by the realities of the past.

Today tribal governments and WDFW work collaboratively to conserve and manage aquatic and terrestrial resources across the State and practice sound science to ensure successful resource management decisions. The Tribes and WDFW work together to ensure the sustainability of fish, wildlife, ecosystems, and culture for the next seven generations and beyond.

## Acknowledgements

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# Executive Summary

The Washington Department of Fish and Wildlife (WDFW) Puget Sound Shellfish Team implemented creels of recreational crabbers in Puget Sound to monitor fishery compliance, effort, and promote education within the Puget Sound recreational Dungeness crab (*Metacarcinus magister*) and red rock crab (*Cancer productus*) fisheries. Various boat ramps and piers with a range of high to low use volume were monitored from July 1, 2023, through September 4, 2023. Most surveys were conducted between late morning and late afternoon, when crabbing effort is generally highest. In addition to monitoring effort and catch rates, fishery compliance, such as recording of retained Dungeness crab on Catch Record Cards, possession of female and softshell Dungeness crab, and possession of undersized Dungeness and red rock crab was assessed to better understand the extent of undocumented catch, compliance issues, and educational needs. During the summer 2023 crab season in Puget Sound, 30 sites were surveyed, 1,536 boats contacted, 2,282 harvesters interviewed, 2,006 Catch Record Cards checked, and 7,906 Dungeness crab and 1,426 red rock crab sampled for compliance and biological data.

The summer 2023 recreational crab season marked the first year that creels were conducted by full-time WDFW Shellfish staff with the primary task of monitoring Puget Sound’s recreational crab fishery since 2017. The results from the summer 2023 crab creel effort described here are *exploratory* and should guide how a more statistically robust survey design should be implemented in the following years.

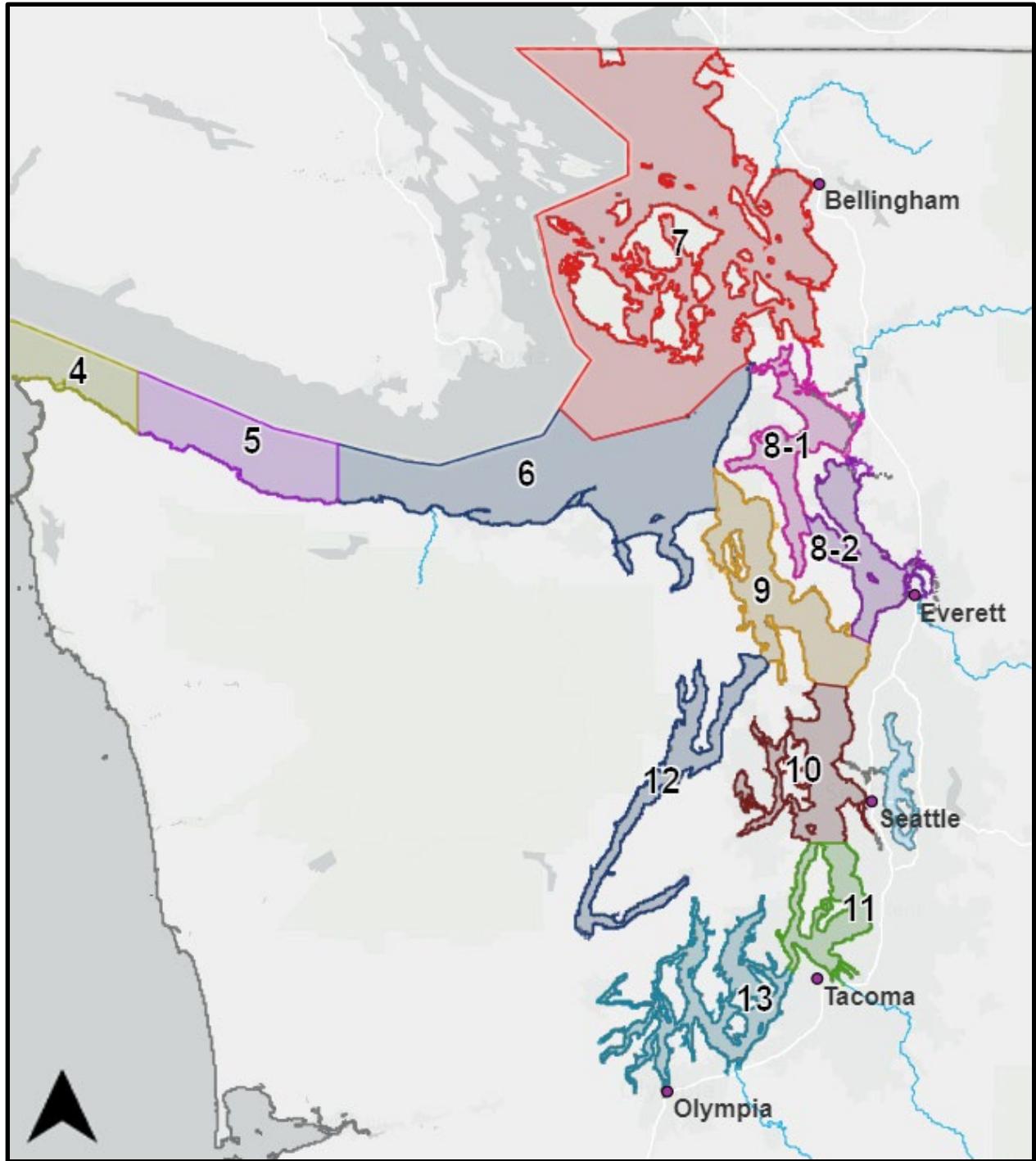
## Introduction

Dungeness crab (*Metacarcinus magister*) are native to Washington and offer highly valued State commercial; State recreational; and Tribal commercial, ceremonial, and subsistence fisheries. Dungeness crab range from central California to the Gulf of Alaska with the range of distribution in Washington State encompassing the waters of Puget Sound, Strait of Juan de Fuca, San Juan Archipelago, and Hood Canal. The Dungeness crab fishery in Puget Sound is managed separately from the Washington coastal fishery, reflected by differences in harvest rules, season lengths, and catch reporting requirements. Further, shellfish in much of western Washington are co-managed by the State of Washington through the Washington Department of Fish and Wildlife (WDFW) and Treaty Tribes in Puget Sound and coastal Washington under Sub-proceeding 89-3 of *US v. Washington* (Rafeedie decision; 1994). Through these treaties signatory tribes reserved the rights to harvest up to 50% of the naturally occurring shellfish within their “usual and accustomed” areas.

The Washington Fish and Wildlife Commission's Puget Sound crab policy (C-3609) directs WDFW staff to maintain a healthy Dungeness crab population while providing both recreational and commercial fishing opportunities. A base summer recreational season typically begins in July and extends through Labor Day; 5 days per week, open Thursday through Monday. When quota remains following the base summer season, a winter recreational season may be conducted; typically, early October through December 31, 7 days per week. In Puget Sound, the daily recreational limit for Dungeness crab is 5 per day and the minimum size limit is 6 ¼ inches across the width of the carapace. All female and softshell crab must be released. In addition, all fishers participating in the State recreational Dungeness crab fishery in Puget Sound must possess a Dungeness crab Catch Record Card (CRC) and immediately record each Dungeness crab retained, including the month, day, and marine area where each crab was harvested. Separate summer and winter CRCs are issued each season of each year. WDFW requires separate summer and winter CRCs to be reported each season by the reporting deadline. Fishers have the option to report their catch online during an online reporting period available at the end of each season or mail their CRC back to the Department at any point during or following the season but prior to the reporting deadline. Alternatively, CRCs can be dropped off at a regional Department office prior to the reporting deadline. This information provides valuable data to WDFW and is used to estimate recreational harvest of Dungeness crab in Puget Sound each year.

## **Puget Sound marine areas and seasons**

Recreational fishing opportunities in the marine waters of Washington are managed using Marine Areas (MA). In Puget Sound, eleven Marine Areas (MA) with defined boundaries are established and provide recreational opportunity for Dungeness crab with seasons that typically vary between areas (Figure1; Table 1). In 2023, MA 13 and MA 12 south of Ayock Point were closed for the summer season as part of continuing annual abundance-related closures. For the summer recreational season, MA 10 and MA 11 opened on July 2; crabbing was only allowed on Sundays and Mondays. MA 7S (Marine Area 7 South) opened July 15, MA 7N (Marine Area 7 North) opened August 20, and all other MAs opened July 1 with the base season open Thursday through Monday each week.



**Figure 1.** Map of each MA found within Puget Sound, Washington. Puget Sound MAs include areas 4 (east of the Bonilla-Tatoosh line), 5, 6, 7, 8-1, 8-2, 9, 10, 11, 12, and 13.

**Table 1.** Summary of recreational seasons by MA for the summer 2023 Dungeness crab fishery.

<b>Marine Area</b>	<b>Season</b>	<b>Weekdays open</b>	<b>Total days Open</b>
<b>4</b>	July 1 - September 4	Thursday - Monday	48
<b>5</b>	July 1 - September 4	Thursday - Monday	48
<b>6</b>	July 1 - September 4	Thursday - Monday	48
<b>7 South</b>	July 15 - September 4	Thursday - Monday	38
<b>7 North</b>	August 20 – September 4	Thursday - Monday	12
<b>8-1</b>	July 1- September 4	Thursday - Monday	48
<b>8-2</b>	July 1- September 4	Thursday - Monday	48
<b>9</b>	July 1- September 4	Thursday - Monday	48
<b>10</b>	July 2 – September 4	Sunday - Monday	20
<b>11</b>	July 2 – August 28	Sunday - Monday	18
<b>12*</b>	July 1- September 4	Thursday - Monday	48
<b>13</b>	None	None	0

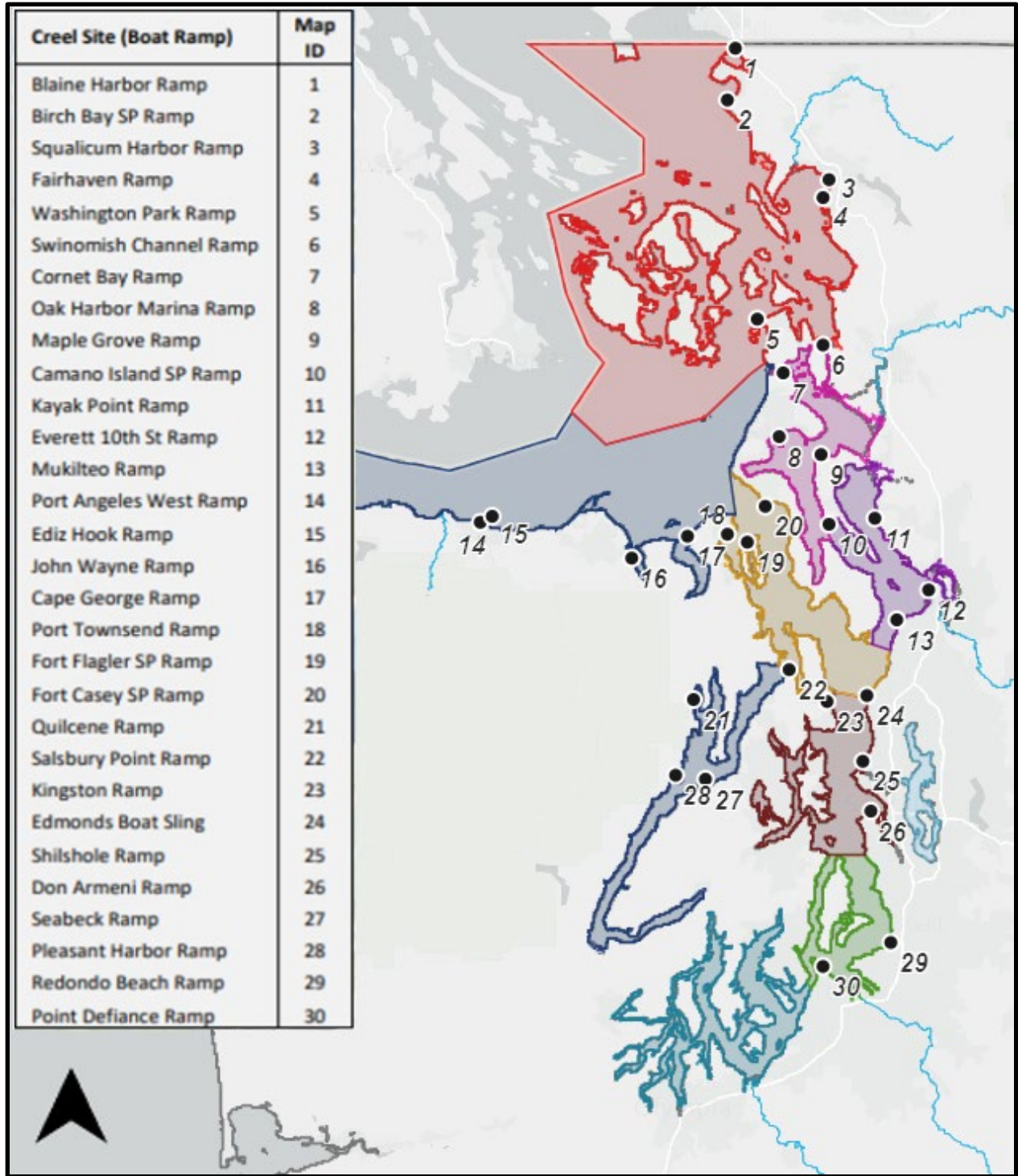
\* The portion of MA 12 south of Ayock Point was closed to recreational crabbing for summer 2023.

## Methods

### Site selection and sampling days

In 2023, WDFW shellfish creel staff intercepted and interviewed fishers at several high-volume boat ramps in MAs 6-12 between July 1 (opening day of the Puget Sound summer recreational crab season for most areas) and September 4 (closing day of the Puget Sound summer season for most marine areas; Figure 2). MA 4 (east of the Bonilla-Tatoosh Line) and MA 5 were not sampled for logistical reasons and MA 13 was not sampled due to continued abundance related closures in this area.

Sampling at high volume boat ramps was the priority for the summer 2023 recreational crab season to maximize interactions with recreational crabbers. Boat ramps were defined as “high volume” using data from creels conducted in 2017 to inform the relative number of users at each boat ramp, the overall size and lane capacity of the boat ramp, and the boat ramps proximity to populated areas. Limited sampling occurred at several piers within Puget Sound to characterize catch and compliance of this user group. Limited site accessibility was a primary concern when selecting candidate sites to sample, thus private docks and marinas were not sampled. Kayak Point County Park closed to the public on July 5, 2023, due to a construction project, and remained closed for the duration of the summer 2023 crab season.



**Figure 2.** Map of creel sampling locations (black points) in MAs 6 through 13 in Puget Sound. See the map legend for the creel location that corresponds to the number on the map.

Sampling occurred only on days the fishery was open. For MAs 6, 7, 8-1, 8-2, 9, and 12 that were open Thursday-Monday, sampling was conducted Thursday-Monday, with a focus on Friday-Monday when fishery effort was assumed to be highest. For MA 10 and MA 11, sampling was focused on both Sundays and Mondays when the fishery was open.

## **Interview process**

See Appendix A to reference the complete WDFW recreational crab creel sampling protocol.

Upon arrival at a site, a sampling station was set up to easily view and intercept boats as they pulled up to the ramp or other access point, without being located in a manner that would create congestion. Boats were intercepted as they returned to boat ramps, smaller non-motorized vessels were contacted as they were preparing to leave the site. During each contact, samplers identified themselves as WDFW staff conducting interviews to collect data on their fishing trip. At least one harvester from each boat was asked by WDFW creel staff whether they had been crabbing (a visual assessment of any crab gear on the boat was used to confirm their response). The interview would proceed once it was confirmed that the intercepted boat had been crabbing regardless of whether their crabbing trip was successful or not. Interviews were only conducted on completed trips for motorized and non-motorized crabbing vessels.

WDFW creel staff used an electronic survey form (*iForms*) to conduct their interviews and record information. The survey form was designed to capture trip information from each boat and catch and compliance associated with each harvester's Catch Record Card and crab. After arriving at a site, a sampler immediately recorded the date, time, and location. Once an interview had been initiated, the boat's trip information was recorded, which included the time the interview was conducted, if any Dungeness or red rock crab were retained, the number of licensed crabbers on the vessel, the number of pots and other types of gear (ring nets, star traps, snares) fished, the marine area and creel area (e.g., sub-area) their gear was set in, and the number of lost pots. Creel staff provided a map to the interviewee when asked what creel area their gear was set in. If crab were possessed on the boat, the interview would proceed to assess each individual harvester's catch. For each harvester with Dungeness crab in their possession, the harvesters were asked if they had their CRC in possession and if creel staff could view it to confirm recording compliance of their current crabbing trip. Samplers then recorded the number of Dungeness crab in possession, the number of Dungeness crab recorded on their Catch Record Card (CRC) for the current trip, the marine area recorded on their CRC for the current trip, the month and day recorded on their CRC for the current trip, the number of previous trips recorded on their CRC, and the number of red rock crab in possession. If no Dungeness crab were possessed, the only information recorded was the number of red rock crab in possession and CRCs were not checked.

After checking each harvester's CRC and documenting the number of crabs in possession, detailed biological and compliance information was recorded from each crab of each harvester. Each sampler was equipped with a standard crab gauge that could accurately measure 6.25 inches, scientific calipers to measure crab to the nearest millimeter, and a bucket and scale that was calibrated prior to use in the field to weigh individual crab to the nearest 0.01 pounds. Harvesters were provided buckets by WDFW creel staff and asked each harvester to put their catch into the bucket to be sampled. For each Dungeness and red rock crab in possession by each harvester, creel staff recorded the sex (male or female), whether it was legal-size or not, and whether it was a soft-shell or hard-shell Dungeness crab. The method used to determine if a Dungeness crab was soft-shell is described in Appendix B and follows the same legal definition as used in the Puget Sound recreational fishery. Due to time constraints, weight (lbs.) and carapace width (mm) measurements of Dungeness and red rock crab were only taken on the catch of every 4<sup>th</sup> boat. At the end of the sampling day, the end time of the creel was recorded, and the survey form was uploaded to the *iForms* database.

Limited sampling was conducted at a few select public fishing piers in close proximity to boat ramps when possible and followed the same general sampling protocol as described above for boat ramps. In contrast to sampling protocols at boat ramps, creel interviews at piers included both completed and uncompleted trips and weight and carapace width measurements were taken on each crab encountered. The pier survey was designed to be a quick 'sweep' of the pier to check catch compliance and the survey would finish once every crabber on the pier was interviewed.

Where possible, any group or person that was participating in the Puget Sound recreational crab fishery out of accordance with the rules and regulations was informed of their non-compliance and educated. For each illegal crab in possession, WDFW creel staff informed the harvester of their non-compliance and recommended they return the crab immediately to the water. If a harvester was new to the fishery or was not familiar with the rules and regulations, they were given a variety of educational materials (See Appendix A for list of educational materials passed out). Additionally, each crabber was given a card focused on reminding harvesters to report their Dungeness crab Catch Record Card, information on how to submit their card, and when the online reporting period will open and close for both summer and winter in 2023.

## **Catch per unit effort (CPUE)**

For the purpose of this report, we examine catch rates of Dungeness crab and red rock crab at the boat level and account for the number of units of gear fished. CPUE was calculated per boat due to observations early on in the study that fishers on a boat do not separate each individual fisher's catch and instead combine all catch into a single container. Therefore, it was



challenging to calculate catch rates per harvester. CPUE was calculated as the total number of Dungeness crab (or red rock crab) retained on a boat divided by the total number of units of gear fished (i.e., pots, ring nets, star traps). Here, CPUE does not consider soak time (i.e., the length of time a boat's gear was set in the water).

## **Descriptive statistics and analysis**

The results described in this report are descriptive and a more statistically robust survey design should be implemented in future surveys. The results below describe patterns and observations from the summer 2023 Puget Sound recreational crab fishery and should guide how future surveys should be conducted. All analyses were performed in R (version 4.0.3; R Core Team 2020) and figures using the R package 'ggplot2'.

## **Results**

### **General sampling statistics and patterns**

#### ***Creel location***

In total, 30 boat ramps were surveyed at least once during the open summer recreational season, 1,536 boats interviewed, 2,282 harvesters interviewed, 2,006 Catch Record Cards checked, and 7,906 Dungeness crab and 1,426 red rock crab sampled for compliance or biological data (Table 2). The six most sampled sites included: Everett 10<sup>th</sup> St. boat ramp (n = 133 hours of creel), Cornet Bay boat ramp (n = 121 hours of creel), John Wayne Marina boat ramp (n = 101 hours of creel), Camano Island State Park boat ramp (n = 51 hours of creel), Squalicum Harbor boat ramp (n = 51 hours of creel), and Salsbury County Park boat ramp (n = 44 hours of creel). Collectively, these six sampling locations accounted for 66% of the total number of both boats interviewed and Dungeness crab sampled.

**Table 2.** Summary of creel effort (days and hours spent creeling), number of boats contacted, number of harvesters interviewed, and number of Dungeness and red rock crab sampled.

Creel location	Hours creeled	Days creeled	Boats sampled	Harvester interviews	Dungeness sampled	Red rock sampled
Everett 10th St Ramp	133	19	367	635	1,918	131
Cornet Bay Ramp	121	16	219	325	1,129	241
John Wayne Marina Ramp	101	14	179	214	546	119
Camano Island SP Ramp	51	7	93	111	342	78
Squalicum Harbor Ramp	51	7	87	150	568	21
Salsbury Ramp	44	6	69	86	191	301
Shilshole Ramp	40	5	65	88	290	82
Port Townsend Haven Ramp	38	8	46	86	296	24
Mukilteo Ramp	32	6	50	63	213	25
Seabeck Ramp	31	5	31	27	53	25
Edmonds Boat Sling	26	6	21	28	83	34
Point Defiance Ramp	24	4	65	100	255	219
Port Angeles West Ramp	22	4	15	9	27	0
Maple Grove Ramp	17	3	43	67	235	10
Washington Park Ramp	14	2	14	22	83	21
Swinomish Channel Ramp	13	2	23	53	200	5
Ediz Hook Ramp	13	3	6	4	10	0
Kayak Point Ramp*	13	2	38	41	84	4
Don Armeni Ramp	12	2	22	35	94	61
Pleasant Harbor Marina	11	2	2	2	3	3
Oak Harbor Ramp	11	2	29	47	155	0
Birch Bay Ramp	9	2	5	12	47	0
Cape George Marina	7	1	2	2	9	0
Kingston Ramp	6	2	12	16	44	11
Blaine Harbor Ramp	6	1	13	28	109	0
Fort Flagler State Park Ramp	5	2	2	5	6	0
Redondo Beach Ramp	5	1	9	11	49	11
Fairhaven Ramp	4	1	5	12	50	0
Fort Casey State Park Ramp	3	1	2	2	7	0
Quilcene Ramp	4	1	2	1	0	0
<b>Total</b>	<b>867</b>	<b>137</b>	<b>1,536</b>	<b>2,282</b>	<b>7,096</b>	<b>1,426</b>

\* Kayak Point County Park closed to the public on July 5, 2023, due to a construction project, and remained closed for the duration of the summer 2023 crab season.

## **Marine Area (MA)**

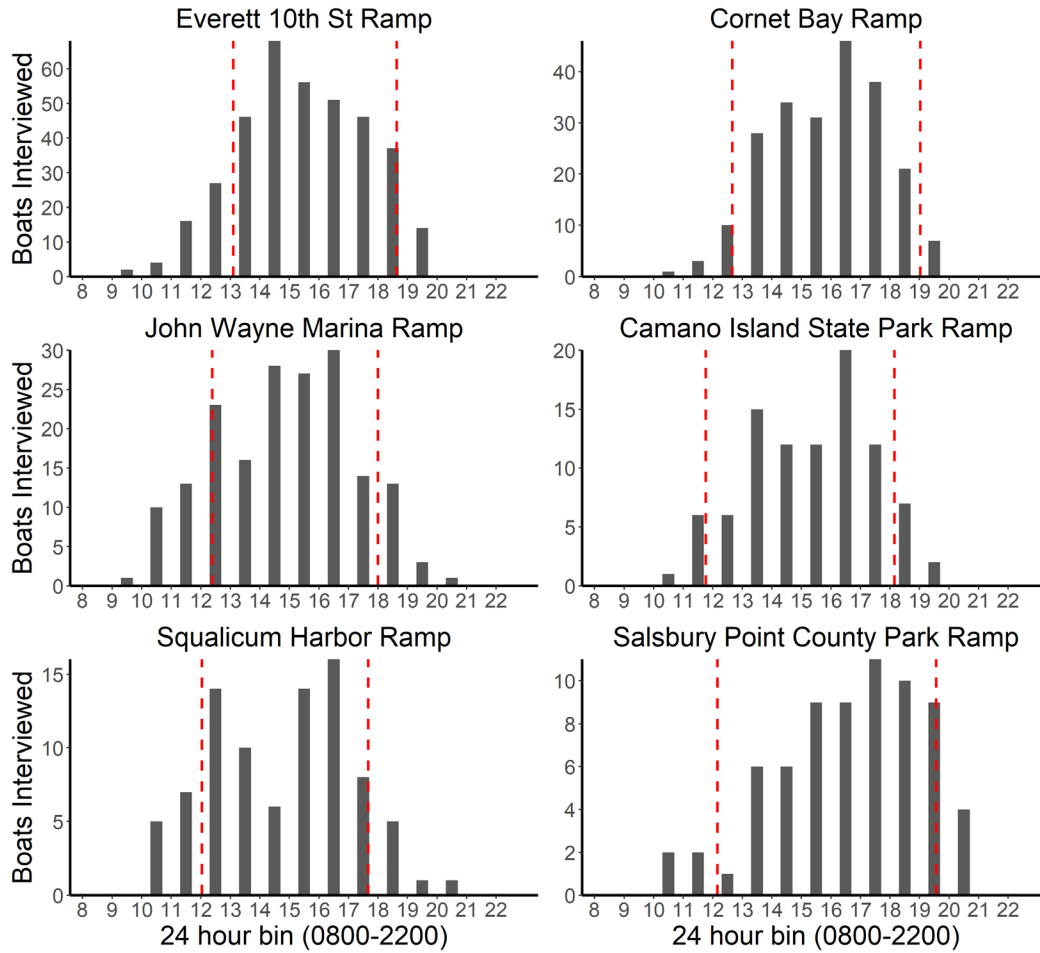
Each MA in Puget Sound, with the exception of MA 4 east of the Bonilla-Tatoosh Line, MA 5, and MA 13, were indicated as areas of harvest by recreational harvesters during creel interviews (Table 3). Due to a greater creel effort at sites located in close proximity to MA 6, 8-1, and 8-2, a higher proportion of boats sampled had indicated one of these MAs as the location of their crabbing trip. Collectively, MA 8-2, MA 8-1, and MA 6 accounted for 66% of the total boats interviewed, 66% of the total CRCs checked, and 55% of the total Dungeness crab sampled, which is consistent with creel efforts by WDFW staff across the MAs. Boat ramps in MA 12 were generally sampled less than other areas due to limited staff availability and lower overall recreational effort. Only 3% of the boats interviewed and 2% of the Dungeness crab sampled came from MA 12.

**Table 3.** Summary of the number of boats contacted, harvesters interviewed, CRCs checked, and Dungeness and red rock crab sampled for compliance and biological data by MA of harvest.

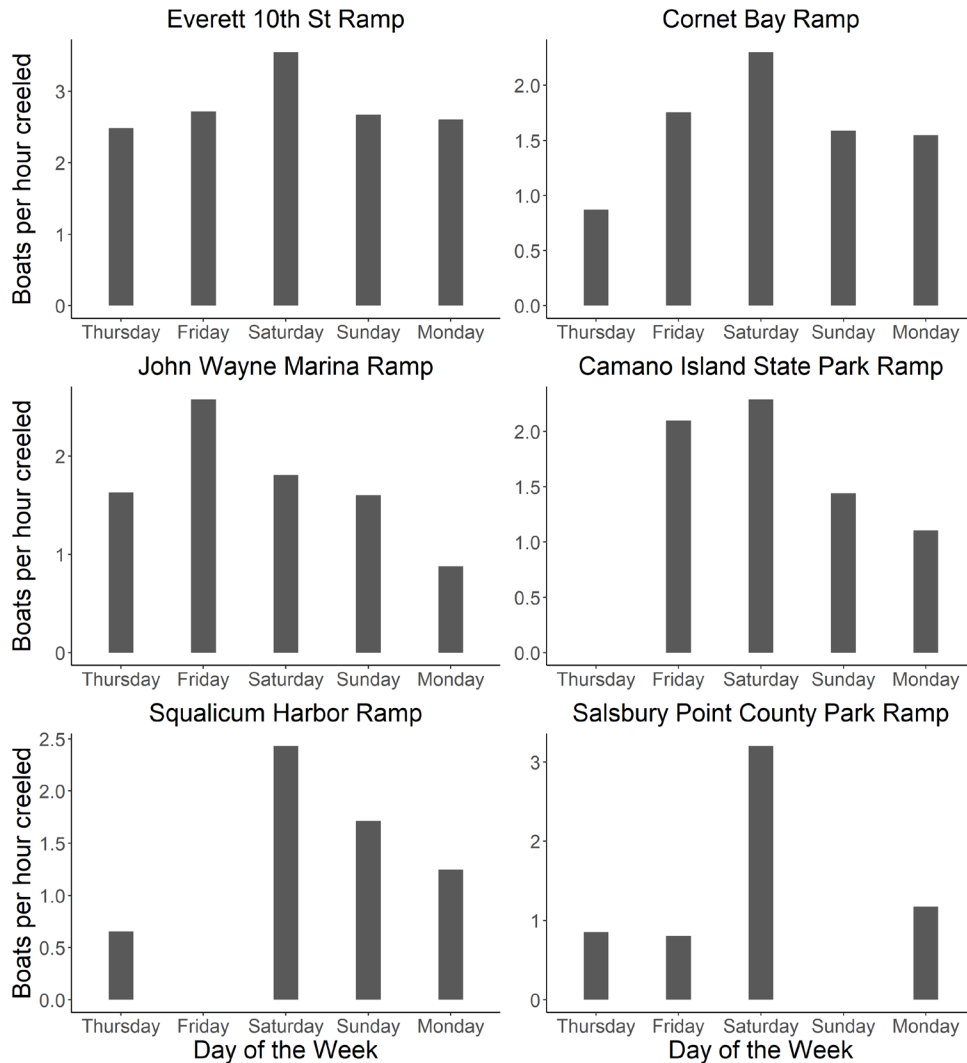
<b>Marine Area fished</b>	<b>Boats contacted</b>	<b>Harvesters interviewed</b>	<b>CRCs checked</b>	<b>Dungeness sampled</b>	<b>Red rock sampled</b>
<b>6</b>	239	287	265	769	126
<b>7</b>	159	294	279	1,096	50
<b>8-1</b>	278	412	369	1,431	245
<b>8-2</b>	502	793	690	2,380	220
<b>9</b>	129	194	167	578	282
<b>10</b>	100	139	115	422	154
<b>11</b>	74	111	84	304	230
<b>12</b>	53	51	37	116	119
<b>Total</b>	1,536	2,282	2,006	7,096	1,426

## **Temporal variability in number of boats interviewed**

The number of boats returning to the dock and finished with crabbing for the day was typically highest between mid- to late- afternoon across most sampling sites (14:00-18:00; Figure 3). The interview rate (boats interviewed per hour spent creeling) varied among both the day of the week and the sampling location (Figure 4). The number of boats interviewed per hour spent creeling was highest on Saturdays and generally lowest on Thursdays and Mondays for MAs that were open to recreational crabbing from Thursday through Monday. The exception was John Wayne Marina, where a higher number of boats were likely to be observed on Fridays.



**Figure 3.** Number of boats interviewed at the six most frequently sampled sites over time (2400-hour clock) for the summer 2023 recreational crabbing season. Dashed red lines represent the average start and end time of a creel at a site.



**Figure 4.** Boats interviewed per hour spent conducting creels at the six most frequently sampled sites by day of the week.

### Creel location and marine area of harvest patterns

Generally, each creel site was associated with a single MA of harvest (Table 4). Only creel sites with close proximity to the boundary of multiple MAs were associated with more than one MA of harvest. For example, boats using the Cornet Bay ramp fished primarily in MA 8-1, followed by MA 6, and a small number in MA 7, whereas boats accessing the water through the Everett 10<sup>th</sup> St ramp fished almost entirely in MA 8-2.

**Table 4.** Total number of boats targeting crab in each creel location by marine area (MA). Only creel locations where at least 10 boats were observed are included in this table. For a specific creel location (boat ramp), dark color shade indicates a larger proportion of boats were observed fishing in that MA.

Creel location	MA 6	MA 7	MA 8-1	MA 8-2	MA 9	MA 10	MA 11	MA 12
Everett 10th St Ramp	0	0	2	356	7	2	0	0
Cornet Bay Ramp	33	13	164	9	0	0	0	0
John Wayne Marina Ramp	178	0	0	0	1	0	0	0
Camano Island State Park Ramp	0	0	38	55	0	0	0	0
Squalicum Harbor Ramp	0	87	0	0	0	0	0	0
Salsbury County Park Ramp	1	0	0	0	48	0	0	20
Point Defiance Ramp	0	0	0	0	0	0	65	0
Shilshole Ramp	0	0	0	0	0	65	0	0
Mukilteo Ramp	0	0	3	44	3	0	0	0
Port Townsend Haven Ramp	1	0	0	0	45	0	0	0
Maple Grove Ramp	1	0	42	0	0	0	0	0
Kayak Point Ramp	0	0	0	38	0	0	0	0
Seabeck Ramp	0	0	0	0	0	0	0	31
Oak Harbor Ramp	0	0	29	0	0	0	0	0
Swinomish Channel Ramp	0	23	0	0	0	0	0	0
Don Armeni Ramp	0	0	0	0	0	22	0	0
Edmonds Marina	0	0	0	0	17	4	0	0
Port Angeles West Ramp	15	0	0	0	0	0	0	0
Washington Park Ramp	1	13	0	0	0	0	0	0
Blaine Harbor Ramp	0	13	0	0	0	0	0	0
Kingston Ramp	0	0	0	0	5	7	0	0

## Compliance - Catch Record Cards (CRC)

### *CRC possession*

A total of 2,164 harvesters that had Dungeness crab in possession were asked to view their summer 2023 Dungeness crab CRC. Of the 2,164 harvesters asked to view their CRC, 95% (n = 2,056) were confirmed to have their CRC in possession and 98% (n = 2,006) of those harvesters complied with the request from WDFW creel staff to view their CRC for recording compliance. Overall, the proportion of harvesters with their CRC in possession and harvesters that complied with the request from WDFW creel staff to view their CRC was high and varied little between the MAs (Table 5).

**Table 5.** Total number of harvester CRCs checked by creel staff, percent CRCs in harvesters' possession, and percent of harvesters that complied with the request to view their CRC.

Marine Area fished	Harvester CRCs checked	% CRC in possession	% permission to view CRC
6	265	94%	99%
7	279	98%	98%
8-1	369	94%	99%
8-2	690	95%	96%
9	167	97%	99%
10	115	91%	98%
11	84	98%	99%
12	37	95%	97%

### *Unrecorded Dungeness crab*

Recreational harvesters of Dungeness crab in Puget Sound are required to immediately record each Dungeness crab kept onto their CRC when landed. The number of unrecorded Dungeness crab was determined by comparing the number of Dungeness crab in a harvester's possession to what was recorded on their CRC at the time the harvester was contacted and interviewed. Of the 8,355 Dungeness crab observed to be in possession by recreational harvesters between July 1, 2023, and September 4, 2023, 23% (n = 1,921) of Dungeness crab were not recorded on CRCs at the time of the interview. The proportion of Dungeness crab that were not recorded on CRCs varied among the MAs (Table 6). The proportion of Dungeness crab that were not recorded on CRCs was greatest in MA 10, where 39.8% of the Dungeness crab retained were not recorded on CRCs during the time of the interview. In all other MAs, the proportion of unrecorded Dungeness crab ranged from 9.2% (MA 9) to 28.6% (MA 8-2).

The creel efforts described here do not capture instances where recreational harvesters wait to record their catch until off the water at their residence or another location. To attempt to account for this, we calculated the proportion of the successful recreational harvester trips that were not recorded on a CRC at the time of creel interview but were later reported to WDFW. This was calculated by searching the CRC database using a harvester’s document identification number to find if a harvester’s reported trip matched the date and MA of harvest indicated during the creel interview. The method described here found that, despite many unrecorded crabbing trips observed at the time of the creel interview, 56% of those total unrecorded crabbing trips were reported to the department. These results may indicate that many recreational harvesters wait to record their catch until a later time. Alternatively, it may also indicate the presence of our creel staff had a positive influence on whether harvesters record and report their catch at a later time.

**Table 6.** The number and percent of Dungeness crab retained by recreational harvester’s that were not recorded on Catch Record Cards (CRCs) during the time of the interview conducted by WDFW creel staff. The percent of Dungeness crab recorded on summer CRCs is calculated as the total number of unrecorded Dungeness crab divided by the total number of Dungeness crab retained.

Marine Area fished	Total Dungeness retained	Dungeness recorded on CRCs	Dungeness unrecorded on CRCs	% Dungeness unrecorded on CRCs
6	980	842	162	16.5%
7	1,296	1,097	207	16%
8-1	1,553	1,209	357	23%
8-2	2,932	2,121	838	28.6%
9	661	610	61	9.2%
10	483	293	192	39.8%
11	323	243	82	25.4%
12	127	112	22	17.3%

*\*An unrecorded Dungeness crab is defined as a Dungeness crab in possession by a recreational harvester that is not recorded on their Catch Record Card at the time the creel interview was conducted.*

### **Reporting rate of interviewed crabbers**

At the end of the summer 2023 CRC reporting period, the document identification number collected from each harvester was used to calculate the CRC response rate for harvesters interviewed by WDFW creel staff. It was confirmed that 63% of harvesters contacted by WDFW creel staff submitted their CRC to the department. Of the 2,006 CRCs checked, 1,883 were unique to a harvester (some CRCs were checked on multiple occasions) and only 1,814 could be verified in the CRC database likely due to data entry errors in the field.



## **Compliance - crab catch**

### ***Female Dungeness crab***

Retention of female Dungeness crab was rare, representing only 0.23% (n = 16) of the total number of Dungeness crab sampled for compliance or biological data. In most MAs, no female Dungeness crabs were observed (Table 7).

### ***Sub-legal Dungeness crab***

Of the 7,096 Dungeness crab sampled for compliance and biological data, 9% (n = 646) were observed to be below the minimum size limit of 6.25 inches. Although undersized Dungeness crab were observed in each MA, retention of sub-legal Dungeness crab was most frequently observed in MAs 8-1 and 8-2 (Table 7). In MA 8-2, 13% of the total Dungeness crab sampled were below the minimum size limit, compared to only 4% in MA 12 and 5% in MA 6.

### ***Soft-shell Dungeness crab***

Retention of soft-shell Dungeness crab appeared to be the most frequent infraction. Soft-shell Dungeness crab represented 23% (n = 1,665) of the total number of Dungeness crab sampled. Possession of soft-shell Dungeness crab varied by MA (Table 7). MAs 8-1 and 8-2 had the highest proportion of soft-shell Dungeness crabs retained; 28% of the Dungeness crab sampled in 8-1 and 33% in 8-2. MAs 6 and 12 had a much lower proportion of soft-shell crab observed at 10% and 8%.

### ***Sub-legal and female red rock crab***

Of the 1,426 red rock crab sampled for compliance and biological data, 3.7% (n = 53) were observed to be below the minimum size limit of 5 inches. Female red rock crab, although legal to retain in the recreational fishery, represented 5% (n = 72) of the total number of red rock crab sampled for biological data, indicating that male crabs represent the majority of retained red rock crab in the recreational fishery. Possession of sub-legal red rock crab was most frequently observed in MA 8-2, where 11% of the sampled red rock crab were below the minimum size limit of 5 inches (Table 7).

**Table 7.** Sample size and percent occurrence of retained female, sub-legal, and soft-shell Dungeness and red rock crab by recreational harvesters in each MA. The percent of female, sub-legal, and soft-shell crab, indicated in '()', is expressed as the total number of female, sub-legal, or soft-shell crab sampled from recreational harvesters within a MA divided by the total number of Dungeness or red rock crab sampled within a MA. Red rock crabs were not assessed for soft-shell.

Species	Marine Area	Crab sampled	Female crab: <i>n</i> and (%)	Sub-legal crab: <i>n</i> and (%)	Soft-shell crab: <i>n</i> and (%)	
<b>Dungeness Crab</b>	6	769	0 (0%)	35 (5%)	78 (10%)	
	7	1,096	5 (0.5%)	81 (7%)	203 (19%)	
	8-1	1,431	3 (0.2%)	147 (10%)	397 (28%)	
	8-2	2,380	8 (0.3%)	302 (13%)	782 (33%)	
	9	578	0 (0%)	33 (6%)	83 (14%)	
	10	422	0 (0%)	25 (6%)	65 (15%)	
	11	304	0 (0%)	18 (6%)	48 (16%)	
	12	116	0 (0%)	5 (4%)	9 (8%)	
	<b>Red Rock Crab</b>	6	126	3 (2%)	1 (1%)	-
		7	50	1 (2%)	1 (2%)	-
		8-1	245	3 (1%)	12 (5%)	-
		8-2	220	32 (15%)	25 (11%)	-
9		282	10 (4%)	6 (2%)	-	
10		154	11 (7%)	4 (3%)	-	
11		230	12 (5%)	3 (1%)	-	
12		119	0 (0%)	1 (1%)	-	

## Catch and effort patterns

### *Harvesters and gear fished per boat*

The mean number of licensed harvesters per boat and the mean number of units of gear fished per boat were estimated for each MA (Table 8; Figure 5). The mean number of harvesters and units of gear fished varied little among the MAs of harvest. Despite little variation between the MAs, the highest estimated mean number of harvesters and units of gear fished was observed in MA 7 (2.94 harvesters; 3.81 units of gear) and MA 8-2 (2.86 harvesters; 4 units of gear). The estimated number of harvesters and units of gear fished in MA 10 averaged 2.27 harvesters and 3.09 units of gear, representing the lowest average effort per boat among the MAs.

### *CPUE between marine areas*

Catch per unit effort (CPUE) was estimated to describe differences in catch rates between MAs. CPUE was estimated using the total number crab retained per boat divided by the total number of units of gear used and does not incorporate soak time into the calculation.

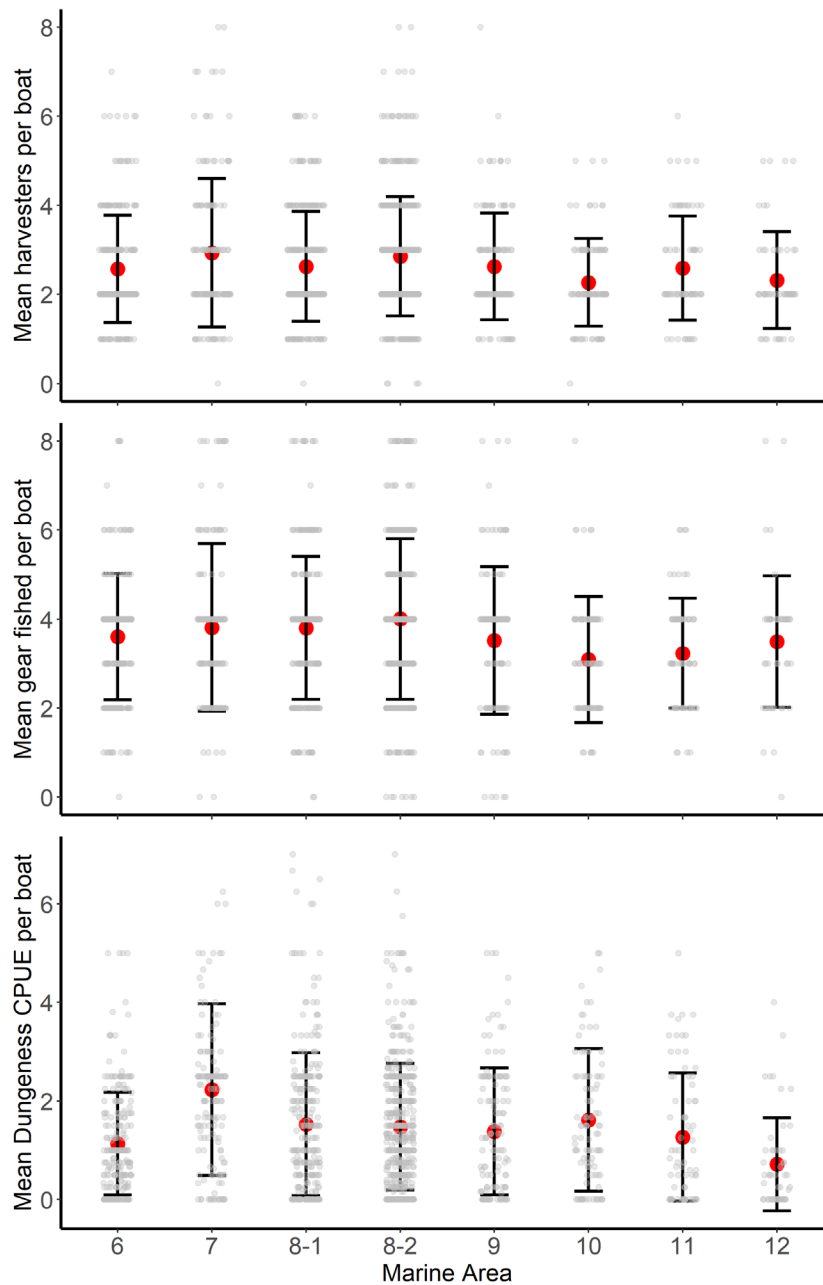
***Dungeness crab.*** Of the 10,108 retained crabs observed through creel interviews, 83% (n = 8,355 crabs) of the catch was comprised of Dungeness crab. Among the 8 sampled MAs, the mean boat CPUE of Dungeness crab ranged from a low of 0.72 retained crab/unit of gear fished in MA 12 to a high of 2.23 retained crab/unit of gear fished in MA 7 (Table 8). Although mean boat CPUE did not vary greatly between the MAs, individual boat CPUE of Dungeness crab varied substantially within a MA (Figure 5).

***Red rock crab.*** Red rock crab represented 17% (n = 1,753 crabs) of the total recreational crab retained throughout the creel survey. Among the 8 sampled MAs, mean boat CPUE of red rock crab ranged from a low of 0.09 retained crab/unit of gear fished in MA 7 to a high of 1.25 retained crab/unit of gear fished in MA 11 (Table 8). Retention of red rock crab appeared to be most frequently observed in MAs found in central and southern Puget Sound. In MA 9, 34% of the total observed retained crab was comprised of red rock crab, 50% in MA 11, and 53% in MA 12 (Figure 6). The red rock crab proportions of total catch in MAs to the north were much smaller, where only 4% of the retained crab in MA 7, 8% of the retained crab in MA 8-2, and 14% of the retained crab in MA 8-1 was comprised of red rock crab (Table 8).

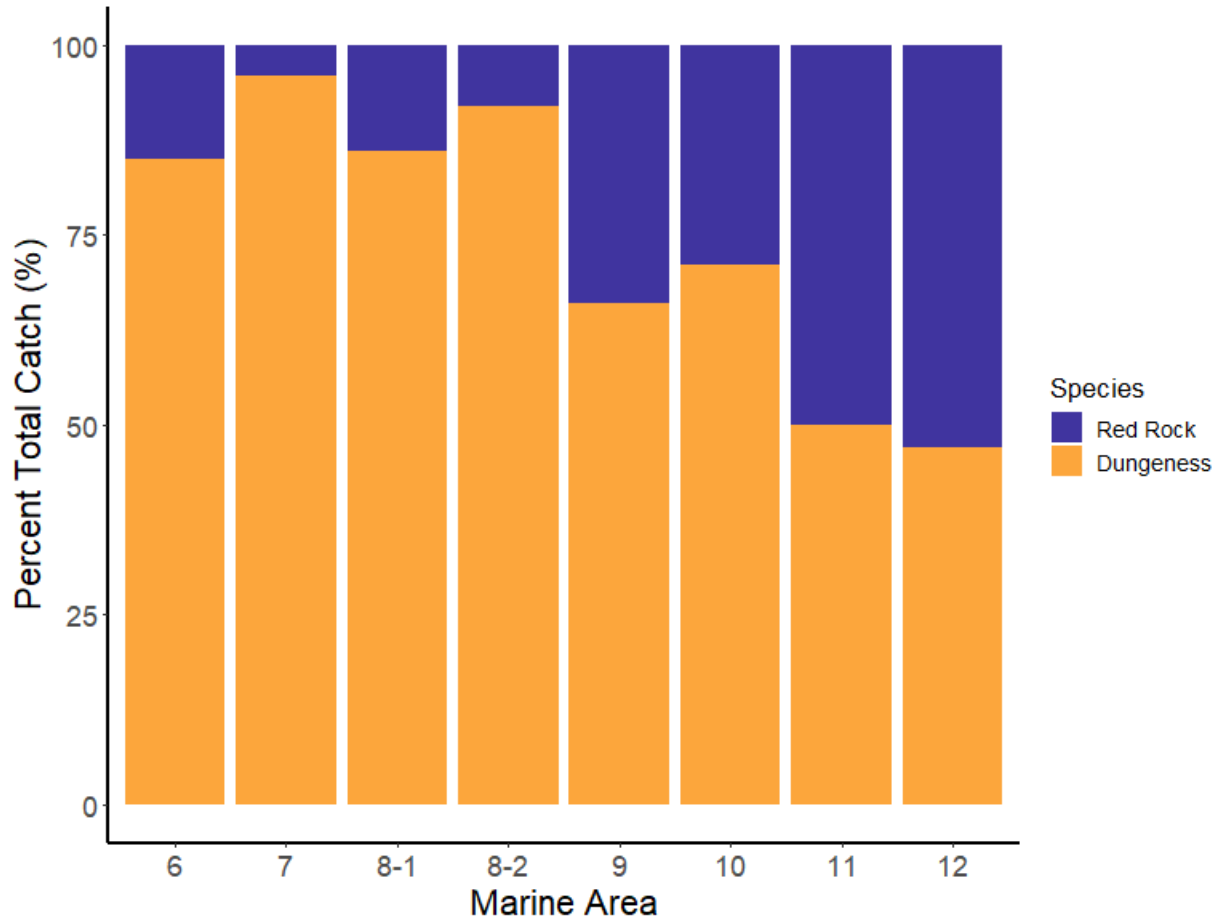
**Table 8.** Depicts the mean number of harvesters, gear used, and CPUE of Dungeness and red rock crab per interviewed boat in each MA. The standard deviation associated with each mean value is indicated in '()'. A harvester is defined as a licensed crabber on board the interviewed boat. A unit of gear includes pots, ring nets, and star traps. Catch per unit of effort (CPUE) is defined as the number of Dungeness or red rock crab caught and retained per boat per unit of crab gear fished. Red rock crab as the percent of total crab retained is calculated as the total number of red rock crab retained by recreational harvesters divided by the sum of the total number of red rock crab and Dungeness crab retained.

Marine Area fished	Mean harvesters per boat	Mean gear fished per boat	Mean Dungeness CPUE	Mean red rock CPUE	Red rock crab as % of total crab retained
<b>6</b>	2.57 (1.2)	3.6 (1.42)	1.14 (1.04)	0.22 (0.67)	15%
<b>7</b>	2.94 (1.66)	3.81 (1.88)	2.23 (1.74)	0.09 (0.28)	4%
<b>8-1</b>	2.63 (1.23)	3.80 (1.61)	1.53 (1.45)	0.26 (0.63)	14%
<b>8-2</b>	2.86 (1.34)	4.00 (1.80)	1.48 (1.28)	0.12 (0.38)	8%
<b>9</b>	2.63 (1.20)	3.52 (1.65)	1.38 (1.29)	0.70 (1.44)	34%
<b>10</b>	2.27 (0.98)	3.09 (1.41)	1.62 (1.45)	0.61 (1.13)	29%
<b>11</b>	2.59 (1.17)	3.23 (1.23)	1.27 (1.30)	1.25 (1.41)	50%
<b>12</b>	2.32 (1.09)	3.49 (1.48)	0.72 (0.94)	0.63 (0.90)	53%

*\*CPUE does not account for soak time of gear.*



**Figure 5.** Interval plots showing mean harvesters, units of gear used, and Dungeness CPUE per interviewed boat  $\pm$  standard deviation (y-axis) by MA (x-axis). A harvester is defined as a licensed crabber on board the interviewed boat. A unit of gear includes pots, ring nets, and star traps. Catch per unit of effort (CPUE) is defined as the number of Dungeness retained per boat per unit of crab gear fished. Red points indicate the mean, gray points indicate observed values, and vertical black lines above and below the mean represent  $\pm$  standard deviation.



**Figure 6.** Proportion of Dungeness and red rock crab expressed as percent of total crab retained by recreational harvesters by MA.

## **Weight and carapace width by marine area**

### ***Dungeness crab***

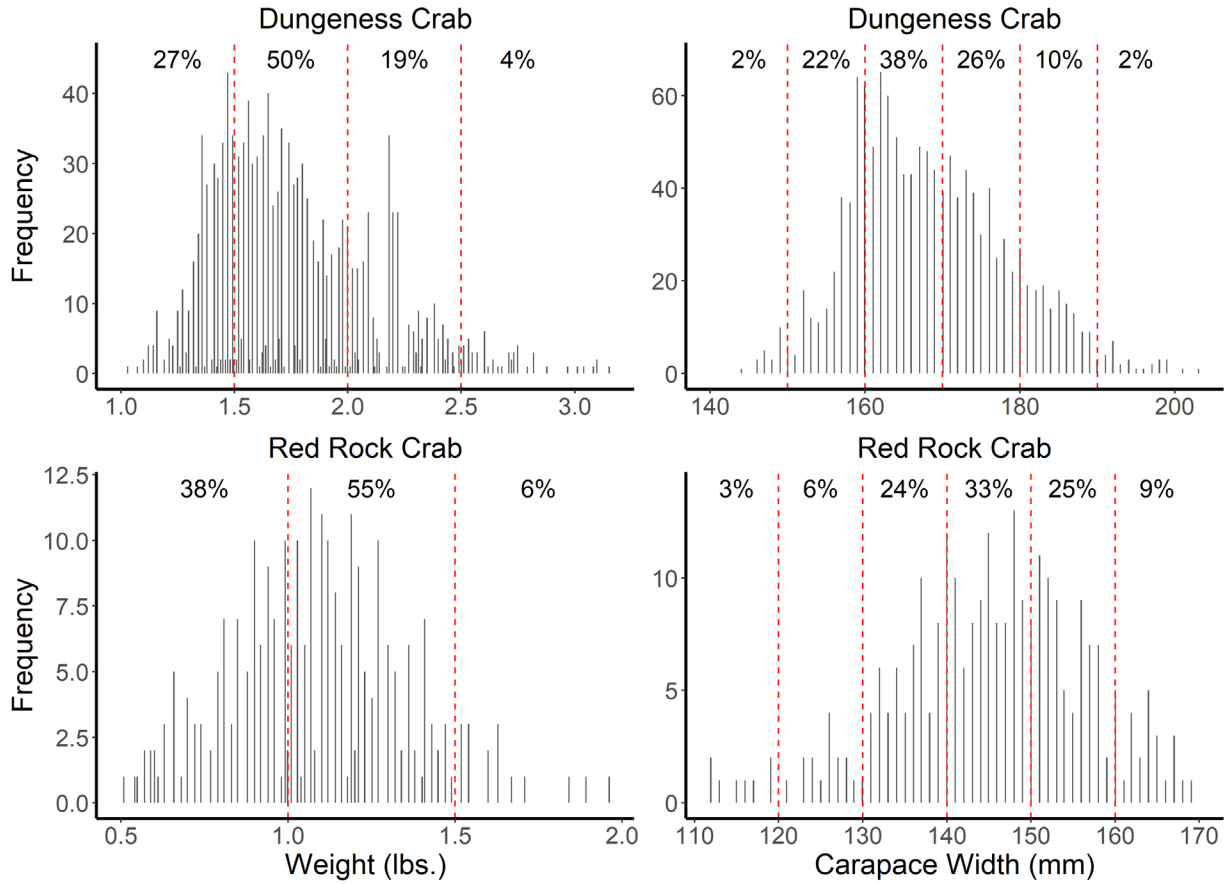
A total of 1,306 Dungeness crab were sampled for biological data by measuring their individual weight (lbs.) and carapace width (mm). Dungeness crab weights ranged from 0.92 lbs. to 3.15 lbs. The weights of all sampled Dungeness crab most frequently encountered were 1.01 - 1.5 lbs. (27%), 1.51 – 2.0 lbs. (50%), and 2.01 – 2.5 lbs. (19%; Figure 7). Dungeness crab carapace widths ranged from 117 mm to 203 mm and those most frequently sampled were 151 – 160 mm (22%), 161 – 170 mm (38%), and 171 – 180 mm (26%).

The average weight and carapace width of Dungeness crab varied among the MAs (Table 9; Figure 8). The lightest crabs on average were found in MA 8-2 (1.66 mean lbs. per crab) and MA 7 (1.75 mean lbs. per crab), whereas the heaviest crabs on average were found in MAs 12 (2.02 mean lbs. per crab) and MA 6 (1.93 mean lbs. per crab). Mean carapace width of Dungeness crab by MA followed a similar trend, ranging from a mean of 166 mm in MA 8-2 to a mean of 176 mm in MA 12 (Table 9; Figure 9).

### ***Red rock crab***

A total of 273 red rock crab were sampled for biological data by individually measuring their weight (lbs.) and carapace width (mm). Red rock crab taken in the recreational fishery were much smaller compared to Dungeness crab, with weights ranging from 0.38 lbs. to 1.96 lbs. The weights of all sampled red rock crab most frequently encountered were 0.51 - 1.0 lbs. (38%) and 1.01 – 1.5 lbs. (56%; Figure 7). Red rock crab carapace widths ranged from 112 mm to 177 mm and the carapace widths most frequently sampled were 131 – 140 mm (24%), 141 – 150 mm (33%), and 151 – 160 mm (25%).

The lightest red rock crabs on average were found in MAs 8-2 (0.96 mean lbs. per crab) and 8-1 (0.97 mean lbs. per crab), whereas the heaviest crabs on average were found in MAs 12 (1.33 mean lbs. per crab) and 11 (1.22 mean lbs. per crab; Table 9; Figure 8). Mean carapace width of red rock crab by MA followed a similar trend, ranging from a mean of 140 mm in MA 8-1 and 8-2 to a mean of 152 mm in MA 11 and 12 (Table 9; Figure 9).

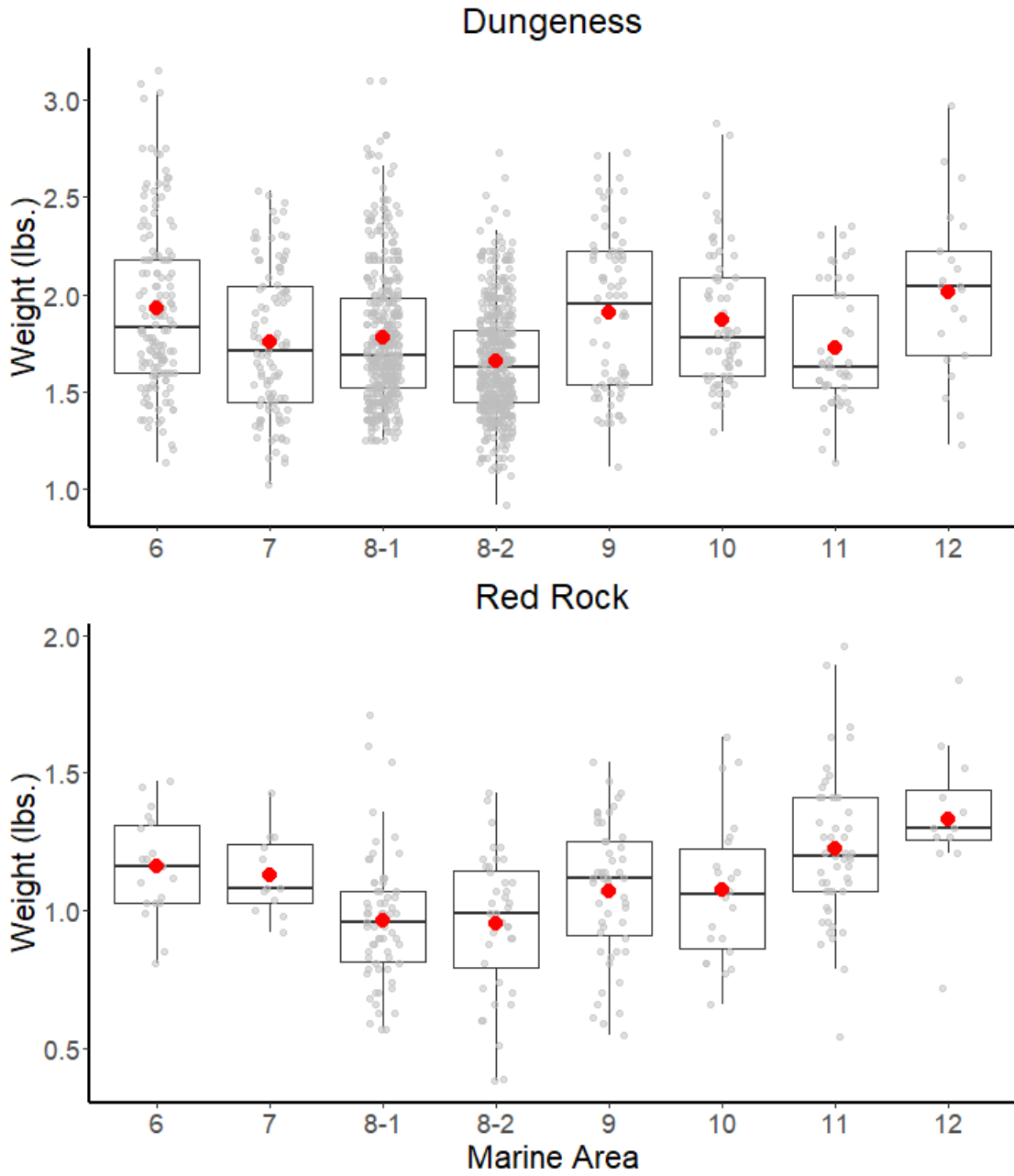


**Figure 7.** Histogram of individual observed weights (lbs.; left panels) and carapace widths (mm; right panels) for Dungeness crab (top panels) and red rock crab (bottom panels). Vertical dashed lines represent weight and width bins. The percent of individual crab found within each weight and carapace width bin is shown.

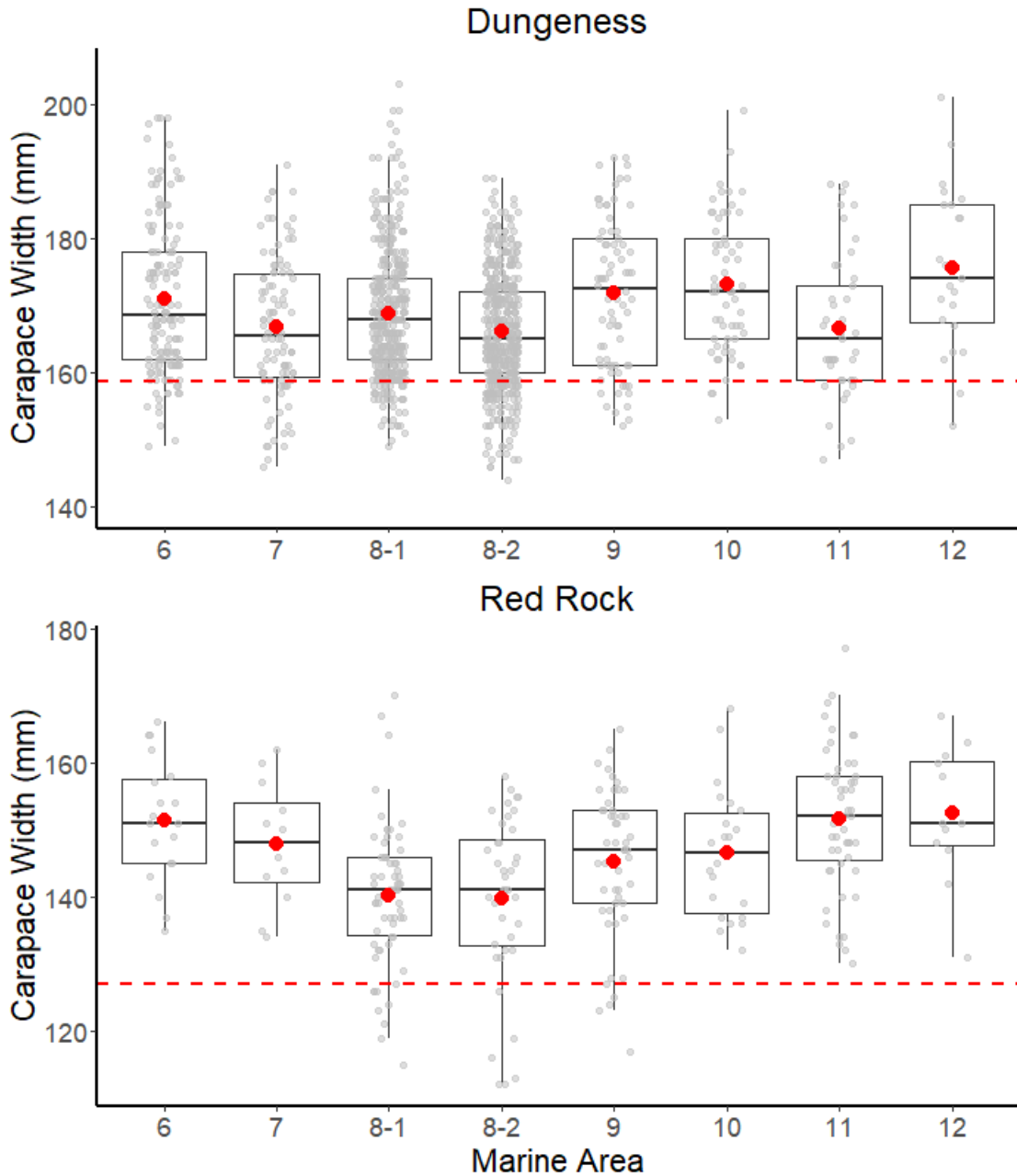


**Table 9.** Sample size of weight (lbs.) and carapace width (mm) measurements, mean values, and range of weights and carapace widths of Dungeness and red rock crab in each MA. The standard deviation associated with each mean weight and carapace width value is indicated in '( )'.

Species	Marine Area fished	Crab weighed and measured	Mean weight (lbs.)	Range of weights (lbs.)	Mean carapace width (mm)	Range of carapace widths (mm)	
<b>Dungeness crab</b>	<b>6</b>	146	1.93 (0.43)	1.14-3.15	171 (11)	149-198	
	<b>7</b>	101	1.75 (0.38)	1.03-2.53	167 (10)	146-191	
	<b>8-1</b>	387	1.78 (0.35)	1.25-3.1	169 (10)	117-203	
	<b>8-2</b>	469	1.66 (0.29)	0.92-2.73	166 (9)	144-189	
	<b>9</b>	76	1.91 (0.41)	1.12-2.73	172 (11)	152-192	
	<b>10</b>	61	1.87 (0.34)	1.3-2.88	173 (10)	153-199	
	<b>11</b>	45	1.73 (0.32)	1.14-2.35	167 (11)	147-188	
	<b>12</b>	21	2.02 (0.44)	1.23-2.97	176 (12)	152-201	
	<b>Red rock crab</b>	<b>6</b>	19	1.16 (0.19)	0.81-1.47	151 (9)	135-166
		<b>7</b>	12	1.13 (0.15)	0.92-1.43	148 (9)	134-162
		<b>8-1</b>	66	0.97 (0.23)	0.57-1.71	140 (10)	115-170
		<b>8-2</b>	40	0.96 (0.26)	0.38-1.43	140 (13)	112-158
<b>9</b>		51	1.07 (0.25)	0.55-1.54	145 (11)	117-165	
<b>10</b>		22	1.07 (0.27)	0.66-1.63	146 (10)	132-168	
<b>11</b>		51	1.22 (0.27)	0.54-1.96	152 (11)	130-177	
<b>12</b>		12	1.33 (0.27)	0.72-1.84	152 (10)	131-167	



**Figure 8.** Boxplots comparing weight (lbs.; y-axis) of Dungeness (top panel) and red rock crab (bottom panel) among the MAs (x-axis). Boxes capture the interquartile range and horizontal solid black lines indicate the median value. Red points indicate the mean and gray points indicate observed values.



**Figure 9.** Boxplots comparing carapace width (mm; y-axis) in Dungeness (top panel) and red rock crab (bottom panel) among the MAs (x-axis). Boxes capture the interquartile range and horizontal solid black lines indicate the median value. Red points indicate the mean and gray points indicate observed values. Horizontal dashed red lines indicate the minimum size limit for either Dungeness (158.75 mm) or red rock crab (127 mm).

## Pier sampling

Pier sampling was conducted on a limited basis. Six different piers were sampled throughout the 2023 Puget Sound summer recreational crab season in 5 different MAs. Fifteen different date-site combinations were sampled contacting a total of 68 pier crabbers of which 22 had Dungeness crab in their possession. Of the 22 pier crabbers that had Dungeness crab in possession, 77% (n = 17) had a Dungeness crab CRC in possession (Table 10). Of the 36 total Dungeness crab sampled, 16 Dungeness crab were under the minimum size limit of 6.25 inches, 12 Dungeness crabs were observed to be soft-shell, and no females were observed. Among the 6 piers, 127 red rock crab were sampled of which 7 were female and 17 were below the minimum size limit of 5 inches (Table 11).

**Table 10.** Sampling frequency of recreational harvesters at pier locations, number of harvesters interviewed, and number of catch record cards (CRCs) checked during the summer 2023 Puget Sound recreational crab season. Only harvesters with Dungeness crab in possession were asked to view their CRC.

Pier location	Marine Area	Days sampled	Harvesters interviewed	CRCs checked
Cornet Bay Fishing Pier	8-1	6	29	10
Port Angeles Fishing Pier	6	5	7	4
Edmonds Fishing Pier	9	2	7	0
Shilshole Fishing Pier	10	2	8	0
Fort Flagler Fishing pier	9	2	9	0
Kayak Point Fishing Pier	8-2	1	8	3

**Table 11.** The total number of Dungeness and red rock crab sampled, and the number of sub-legal, soft-shell, and female crab retained by recreational harvester at each pier location. Red rock crabs were not assessed for soft-shell.

Species	Pier location	Total crab sampled	Female crab sampled	Sub-legal crab sampled	Soft-shell crab sampled
<b>Dungeness Crab</b>	<b>Cornet Bay Fishing Pier</b>	26	0	12	11
	<b>Port Angeles Fishing Pier</b>	5	0	3	1
	<b>Edmonds Fishing Pier</b>	0	0	0	0
	<b>Shilshole Fishing Pier</b>	0	0	0	0
	<b>Fort Flagler Fishing pier</b>	2	0	1	0
	<b>Kayak Point Fishing Pier</b>	3	0	0	0
<b>Red Rock Crab</b>	<b>Cornet Bay Fishing Pier</b>	66	0	7	-
	<b>Port Angeles Fishing Pier</b>	8	0	0	-
	<b>Edmonds Fishing Pier</b>	10	4	4	-
	<b>Shilshole Fishing Pier</b>	18	1	6	-
	<b>Fort Flagler Fishing pier</b>	22	0	0	-
	<b>Kayak Point Fishing Pier</b>	3	2	0	-

## Aerial survey of effort

Aerial flights were conducted to observe on the water crabbing effort through counts of crab buoys. Flights were conducted in MAs 8-1 and 8-2 on August 25, 2023, September 1, 2023, and September 2, 2023, and typically lasted 30 minutes in both MAs. MA 9 was flown on September 1 and 2, 2023, and each survey lasted about one hour. Crab buoys were counted in each creel area to assess spatial variability in effort (see Appendix C for map of flight routes and boundaries of creel areas).

The number of crab buoys observed on Fridays (August 25 and September 1) ranged from 306 buoys in MA 8-1 to 402 buoys in MA 8-2 (Table 12). Effort increased on Saturdays, Sept. 2, where the number of crab buoys observed ranged from 658 buoys in MA 8-1 to 1,084 buoys in MA 8-2. Among the areas, MA 8-2 saw the greatest effort in terms of crab buoys counted, followed by MA 9, and MA 8-1. Effort was highest in sub-areas 26A-9 and 26A-2 in MA 8-2, 25C-1 and 25D-1 in MA 9, and 24C-1 and 24C-6 in MA 8-1 (see Appendix C for sub-area locations within each MA).

**Table 12.** Date and time of the three flights conducted in marine areas 8-1, 8-2, and 9 to observe crabbing effort through counts of crab buoys. The start and end time of the flights is shown in a 2400-hour clock. No flights were conducted in Marine Area 9 on August 25, 2023, due to poor weather.

Date	Weekday	Marine Area	Start and end time of flight	Count of crab pot buoys
Aug. 25, 2023	Friday	8-1	13:06-13:25	306
		8-2	12:44-13:00 13:33-13:42	402
Sept. 1, 2023	Friday	8-1	13:29-13:57	317
		8-2	13:16-13:26 13:59-14:22	402
		9	12:18-13:10	359
Sept. 2, 2023	Saturday	8-1	13:34-14:05	658
		8-2	13:21-13:29 14:07-14:33	1,084
		9	12:16-13:15	684

## Summary

The Puget Sound recreational crab creel survey from July 1, 2023, to September 4, 2023, marked the first year that surveys of recreational crabbers by WDFW shellfish staff have been conducted since 2017. The survey indicated not only variability in catch rates, effort, and mean weight and carapace width of Dungeness crab among the MAs but also areas where compliance is lacking, and education and outreach should be focused. The survey also provides fisheries-related information on the recreational fishery of red rock crab, where data is generally limited in Puget Sound. Data collected from the summer 2023 season will inform the development of a more robust survey design to be implemented in the following years.

There were several positive results from the creel survey. Over 95% of harvesters had their Catch Record Card in possession during creel interviews and 98% of harvesters complied with the survey questions without issue. Moreover, we gained valuable data about compliance challenges (e.g., unrecorded Dungeness crab, retention of sub-legal and soft-shell Dungeness crab). Additionally, the results of this pilot year indicate that the presence of WDFW creel staff at high-volume boat ramps had a positive impact on whether recreational harvesters reported their CRC to the department. Despite an overall 44% reporting rate of CRCs for the summer 2023 season, 63% of harvesters interviewed by creel staff returned their CRC to the department. Outreach focused on reminding harvesters to report their catch record card will continue to be prioritized in future creel surveys.

Compliance with recording Dungeness crab onto a Catch Record Card immediately once retained continues to be a challenge in the recreational crab fishery in Puget Sound. This compliance challenge was evident in MA 10, where 40% of all crab retained by recreational fishers were not recorded on CRCs during the time of the interview. Despite this, our creel efforts would not have captured instances where recreational crabbers wait to record their catch until off the water and at their residence and does not provide a true estimate of unrecorded catch. Recording compliance should only improve with continued creel efforts, education, and reminders to record their catch immediately after retention of each Dungeness crab.

The Puget Sound recreational Dungeness crab fishery is one of the most popular sport fisheries in Washington state, with an average of 212,966 summer crab endorsements sold each year since 2007. Therefore, maintaining a presence by WDFW crab creel staff to monitor the fishery, collect catch and compliance data, and educate and answer harvester questions is an extremely valuable program that should be conducted each year. Due to the dynamic nature of the fishery, one season of creel data is not sufficient to characterize the recreational Dungeness crab fishery in Puget Sound. Additionally, continuing to establish the presence of WDFW staff at high-volume boat ramps each year will likely improve compliance and maintain a positive relationship between WDFW and recreational participants.

Future surveys should consider adopting a stratified sampling design and increasing the sampling of user groups other than primarily high-volume boat ramps. It was clear from the survey that effort and compliance vary throughout the time of day, day of week, and extent of the season. Piers were sampled at a much lower frequency, while no sampling could be conducted at private marinas, despite these user groups having high participation in the Puget Sound recreational crab fishery.



# Appendix A

## Appendix A. 2023 Puget Sound Recreational Crab Creel Sampling protocol.

1. **Before leaving the office:** Check that all your gear is organized and in possession, you have signed out an available vehicle, and your scales are calibrated using the calibration weights.
2. Throughout most of the sampling season, creel staff will work in pairs (one recording data and the other checking Catch Record Cards and catch). You might be assigned to work alone at sampling sites that experience little boat traffic.
3. Be at your designated sampling site in a timely manner. Check the schedule to see if you have been assigned (and your sampling partner) to arrive and leave your sampling site at a specific time. Set up your station and have your gear ready at the best spot to easily view and intercept boats as they pull up to the ramp or other access point, but where it will not create congestion.
4. Interview questions are designed to capture information related to the trip (e.g., the boat), compliance associated with each harvester's Catch Record Card, and their crab. See the conceptual model below of how interviews will proceed, and order of data collected:



5. Only interview boats and harvesters that **attempted to go crabbing** (e.g., retrieved their crab pots) **and are done fishing for the day**. The definition of a completed trip: Finished fishing for the day and pulling the boat out of the water at your sampling site (or mooring the boat at your sampling site). Do not interview boats and harvesters that went out only to drop crab gear overnight.
  - Please interview all boats regardless of whether their trip was successful or not. You can still gather valuable data related to their unsuccessful crabbing trip.
  - You may encounter crabbers from kayak, paddleboard, scuba, snorkel, or intertidal wading. Please record trip information for these groups the same way you would treat a boat.
  - **Pier sampling:** See the "2023 Crab Creel PIER Sampling Instructions"
6. To record data, you can either use **paper forms** or the **iform app**.

7. Once you arrive at your creel location and your gear is ready, select the “**CRAB CREEL FORM**” (if using iForms) and complete the header fields: **Creel Date**, **Creel Start Time**, **Creel Location**, and **Creeler Name**. In **Weights in pounds or grams**, select what units you will be using to collect weight data (pounds, grams, or no scale).

Note: If you are sampling a location that is not on the “**Creel Location**” list select ‘Not-On-List’ and a **New Creel Location** field will appear. You can type in the new location name into this field. Follow the same steps if you are a new creeler and your name is not on the “**Creeler Name**” list.

8. Intercept each boat at your location to request an interview after they have pulled their boat out of the water or tied up and are proceeding to get their vehicle and trailer. Identify yourself as an employee of the state and WDFW and politely ask them if they have been crabbing today and to take a moment to answer some questions regarding their trip. Be sure to explain what we are doing and why. Direct fishers to your sampling station or the best place to ask questions and record data. We are interested in obtaining high quality data so no need to try to intercept EVERY fisher (at some locations it will be impossible to interview every fisher). If there are multiple fishers on board, you can start the interview with one individual while the others are walking to get their vehicle and trailer.
9. Avoid excessive discussion with the public if it will delay accomplishing your task. If necessary, hand them a business card that contains contact information for the general recreational crab email.
10. If at any point the person being interviewed becomes abusive or combative then end the interview...your safety is top priority. Leave the scene and contact a supervisor on your list of telephone contacts when it is safe to do so.
11. **Boat/Trip information:** When you are ready to begin your first interview of the day, select the **Collect Trip Data** Subform field. The questions in this subform are focused on collecting trip information from this boat (this information is not unique to each harvester – anyone can answer these questions, but the boat operator is usually best):
  - a. **Time of interview:** Select the time you started interviewing this boat.
  - b. **Did they keep any Dungeness crab or red rock crab?** Select **Yes** or **No** if anyone on this vessel had Dungeness or red rock crab in possession. If no crab were kept from this trip, ask the remaining questions on this subform and end the interview by hitting ‘Done’. This information is still useful even if it was an unsuccessful trip.
  - c. **Is this a motorized vessel?** Select **Yes** or **No**. Select no if using a kayak, paddleboard, intertidal wading, scuba, etc. Note: If you select No a new field will appear where you can type in the method of harvest.

- d. **Number of crabbers on this vessel?** Enter the number of licensed crabbers on this vessel attempting to harvest crab. Note: Enter 1 if contacting a single person kayak/paddleboarder, intertidal wader, scuba diver.
- e. **Number of crab pots fished?** Enter the number of crab **POTS** fished (including pots that were lost).
- f. **Number of other units of crab gear fished?** Enter the number of other units of crab gear fished (including gear that was lost). This includes ring nets, star traps, and crab snares.
- g. **Marine Area the crab gear was set in?** Select the Marine Area their crab gear was set in. Note: If fishing multiple MA's, select the area the majority of their gear was set in.
- h. **Catch Area the crab gear was set in?** Select the Catch Area their crab gear was set in. Note: If fishing multiple Creel Areas, select the area the majority of their gear was set in.
- i. **Are the majority of crab stored in a livewell?** Select **Yes** or **No**.
- j. **Number of pots that were lost today?** Enter the total number of pots that were lost today during this trip.

**12. Interviewing each harvester and collecting CRC data:** Now you can interview each harvester on this vessel to collect compliance data on their Catch Record Card (CRC). While interviewing the first crabber, have everyone start separating their own retained crab into buckets (one bucket per harvester if their crab will fit into one bucket). Select the **Collect Harvester CRC Data** Subform field and ask each question:

- a. **Did this individual keep any Dungeness crab?** Enter **Yes** or **No**. If they did not keep any Dungeness crab, they are not required to record information on their Catch Record Card, please skip to interview question **12k**.
- b. **Do they have their 2023 Dungeness crab Catch Record Card (CRC) in possession?** Enter **Yes** or **No**. If they do not have their CRC in possession proceed to question **12J**.
- c. **Now, ask if you can review information recorded on their CRC. Did they give you permission to view it?** Enter **Yes** or **No**.

**CRC TRIP DATA:** If they give you permission to view their CRC, record the following information written on their CRC for the **current trip**:

- d. **Record the Document ID.** This is an 8-digit number that starts with D00 at the top of their CRC. D00 will be auto populated on the form.
- e. **Marine Area Recorded on CRC.** Select the Marine Area recorded on their CRC. Note: If this is left blank, select 99. If a Marine Area or number is recorded that is not a Puget Sound Marine Area (e.g., coastal Marine Area), select Other.
- f. **Month Recorded on CRC.** Note: If this is left blank or a number other than 1-12 is recorded, enter 99.

- g. **Day Recorded on CRC.** Note: If this is left blank or a number other than 1-31 is recorded, enter 99.
- h. **Number of Crab Recorded on CRC.** Enter the number of crabs recorded on their CRC. If there is a discrepancy between the number of crabs marked (X) and the number of crabs totaled, enter the highest number between the two. Note: If this is left blank, enter 0.
- i. **Number of successful trips recorded prior to the current trip recorded on their CRC.** Tally the number of **successful** trips filled in **prior** to today's current trip. A successful trip is defined as at least one crab recorded on their CRC.

Now, hand the CRC back to the owner. Again, if you have not already done so, please have each harvester separate THEIR catch into buckets (one bucket per harvester).

**If their crab is stored in a livewell:** You can ask them to pull their catch out and separate the catch into separate buckets for each harvester. If they are not willing to pull their crab out of the livewell, please do not board their vessel or push it any further. Only sample crabs from a livewell when the harvester is willing to pull their crab out themselves.

- j. **Number of Dungeness crab in possession.** Select the number of Dungeness crab in possession. You must confirm this number by counting their Dungeness crab. Do not take their word for it. Note: If you select 5+ Dungeness crab, a new field will appear asking you to manually enter the number in possession.
- k. **Number of red rock crab in possession.** Select the number of red rock crab in possession. You must confirm this number by counting their red rock crab. Do not take their word for it. Note: If you select 6+ red rock crab, a new field will appear asking you to manually enter the number in possession.

13. **Sampling Crab.** Now you can sample each crab from each harvester interviewed.

**Rules and Protocols for sampling crab:**

1. Please obtain **sex**, **shell condition**, and **legal vs. sublegal** data on **EVERY** crab from **EVERY** harvester interviewed.
2. **When sampling crab, do not sample only a portion of a harvesters catch or only a portion of the harvesters on the boat.**
3. At locations that are busy, target approximately every **4<sup>th</sup>** boat to obtain a **weight** (in pounds or grams) and a measurement of the **carapace width in millimeters (mm)** for each crab. Note: You will not record legal vs. sublegal if you are obtaining a measurement of carapace width in mm. You can keep track of what boat you are on by using your hand-held counter and tally each boat interviewed to obtain a weight and carapace width measurement in mm for every 4<sup>th</sup> boat.
4. **If you have time**, you can obtain a weight and measurement of the carapace width in mm at a higher frequency.

5. **Dungeness crab is the highest priority!!! If time has become an issue, please prioritize Dungeness crab over red rock crab.**
6. Have your gloves, crab tongs, calipers, buckets, and scale ready.

Select the **Collect Crab Data** subform field and record the following information for each crab (Note: each crab will be a single record on this form):

- a. **Are you obtaining a weight and/or measuring carapace width in mm?** Select **Yes** or **No**. If you select Yes, you will NOT fill out question 13e. If you select No, only fill out questions 13b-13e.
- b. **Species:** Select **Dungeness** or **red rock**.
- c. **Sex:** Select **male** or **female**.
- d. **Shell condition:** Select **soft-shell** or **hard-shell** for Dungeness only.
- e. **Legal size or Sub-legal:** Select **Legal** or **Sub-legal**. Use a crab gauge for this.
- f. **Carapace width (mm):** Using the large scientific calipers, measure the crab to the nearest mm (do not include the outermost points of the crab).
- g. **Weight:** Ensure the crab is completely drained of water before weighing. If a crab was pulled directly out of water, let the crab drain as much as possible by holding the mouthparts of the crab face down to drain (about 10 seconds or until a slow drip). *Tare your scale, and/or make sure to subtract the weight of the container so it is not included in the recorded weight. Ensure you are in the correct units!! DO NOT WEIGH CRABS IF THEIR CARAPACE (BACK) WAS REMOVED!!*
- h. **Are any limbs missing?** Select **YES** or **No**. If a limb is vestigial select no.
- i. **What limbs are missing?** This field will only show if you answered Yes to question 13h. Use the laminated crab limb number diagram to select the limb numbers that are missing. Select 1-10 (all that apply).

### **Education Materials**

1. **Reporting Reminder/Information Index Cards.** Please give an index card to **EVERY** crabber interviewed. The primary purpose of this material is to remind each crabber to submit their Catch Record Card during the online reporting period.
2. **Crab gauges.** Crab gauges are limited. Please only hand out gauges to crabbers that do not possess a gauge and/or are not properly measuring their crab.
3. **New crabber packets (brochure, rot cord, information cards):** New crabber packets are limited. Please give a crabber packet to harvesters that are new to the fishery or have indicated they don't fully understand certain rules or safe practices.
4. **Crab email business card:** Please give a contact card to any member of the public that has questions you cannot answer or don't have the time to answer.
5. **Washington sport fishing rules 2023-2024 pamphlet.**

## Appendix B

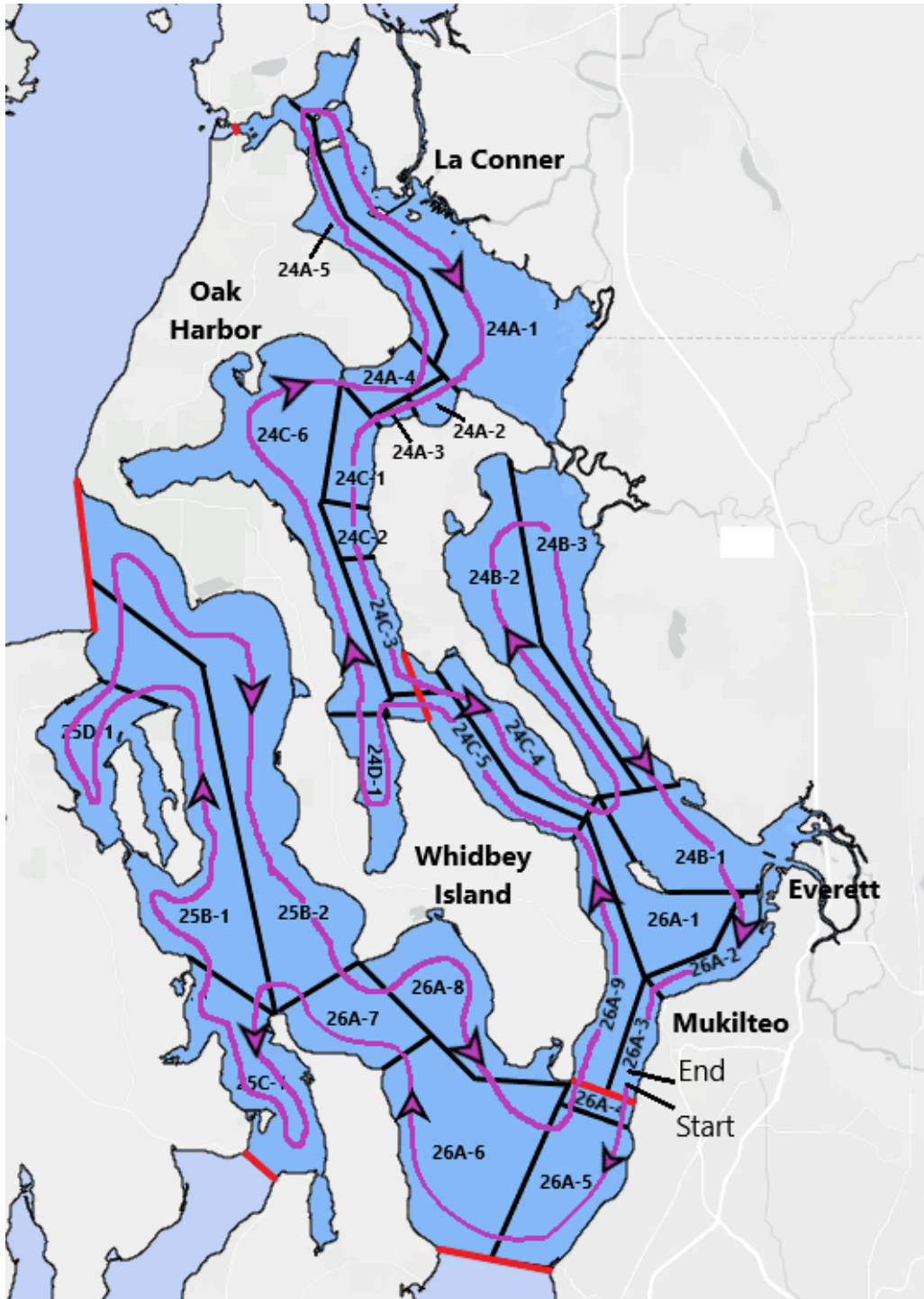
**Appendix B.** Sampling instructions for checking for soft-shell Dungeness crab.

1. Grab the crab from the back and turn it upside down so the abdomen of the crab is facing up.
2. Carefully push the 'elbow' of one claw towards the mouth of the crab, exposing the area of the shell that is typically covered by the claw.
3. Press the shell with your thumb at the point shown below, gradually increasing the pressure. If the shell flexes, bends, or gives in at approximately over 1 millimeter, it is a soft-shell crab. If the shell has not flexed and you have reached the point at which you would have easily crushed a tough peanut, then you have a hard (and legal) crab.
4. Soft-shell crab may also feel lighter than expected and be white on the abdomen. The shells of hard-shell crabs tend to be a darker yellowish brown and are often covered with barnacles and algae.



# Appendix C

**Appendix C.** Map of flight routes for conducting aerial effort counts in Marine Areas 8-1, 8-2, and 9. Red lines indicate boundaries of marine areas, black lines indicate boundaries of catch areas, and the purple lines indicates the flight route with start and end locations. Arrows indicate the direction of the flight.





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