



# Recreational shellfish catch and effort surveys in Oregon estuaries

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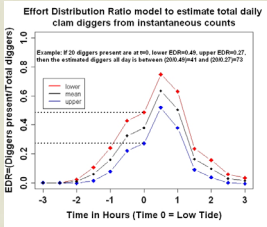
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## Introduction

Oregon Department of Fish and Wildlife's Shellfish Program conducts recreational shellfish surveys to monitor and effectively manage our estuarine clam and crab resources. The Oregon Recreational Bay Clam Survey quantified the effort and catch of clam diggers in Oregon's estuaries in 2008. ODFW regulations limit the daily catch to 20 bay clams (butter, cockle, gaper, littleneck) per person, 12 of which may be gaper clams. Eastern softshell and purple varnish clams are defined as "other clams" for which a daily take of 36 clams/person is allowed. The Oregon Recreational Bay Crab Survey operates in Oregon's estuaries to quantify the effort and catch of Dungeness and other crabs. Baited crab pots or rings set by recreational crabbers are typically deployed during daylight for 1-6 hours and each person is limited to three pots and/or rings. ODFW regulations limit the daily catch to 12 male Dungeness crabs  $\geq 5 \frac{3}{4}$ " (146 mm), and 24 red rock crabs of any size or sex. Both species are open for harvest year-round in the estuaries. These recreational shellfish catch and effort surveys are intended to help ODFW make informed management decisions to protect our estuarine resources.

MRP

CLAMS



## Effort

Instantaneous counts (IC) of bay-wide effort (number of diggers) were conducted on a sample of days with low tides 0.0 ft MLLW and lower. Counts were completed at or near the time of low tide on all clam beds of an estuary. These counts were expanded to estimate whole day effort (WDE) using a formula derived from our Effort Distribution Ratio (EDR) model. The EDR model is the ratio of instantaneous counts every 30 minutes to known census counts of clam digging effort such that  $WDE = (IC/EDR)$ . Effort counts for each bed were stratified by tide (extreme low, moderate low) and day type (weekday, weekend). Mean expanded counts for all days in each stratum were used to estimate unsampled days.

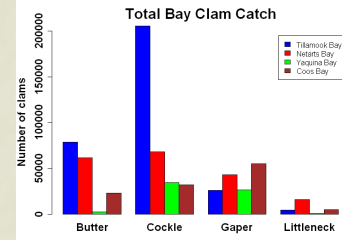
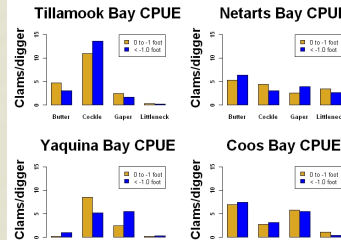
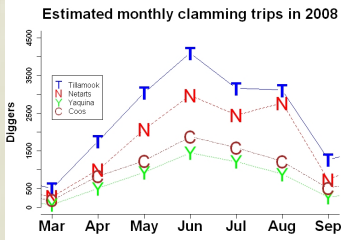
## CPUE

Clam diggers were intercepted upon completion of their trip by samplers in Tillamook, Netarts, Yaquina and Coos bays. The number of each species harvested, length of trip and zip code were recorded. Subsamples of clams of all species were weighed. Catch per unit effort (CPUE) was defined as the total number of clams per trip. For each species of clam and each clam bed, CPUE was calculated within each of four day-tide type strata.

## Total Catch

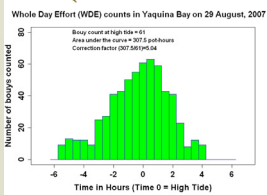
Seasonal CPUE estimates for each estuary multiplied by the total digger-trip estimates yielded estimates of total numbers of clams dug. Combined with mean weights, total harvest (in kg) was estimated. The variability within the EDR model provided an upper and lower confidence interval to the estimate.

Estuary	Bay Clam Harvest Estimate March-September 2008 (kilograms) (95% CI)			
	butter	cockle	gaper	littleneck
<b>Tillamook Bay</b> (95% CI)	<b>16,300</b> (12,200-29,600)	<b>35,300</b> (26,400-62,500)	<b>10,900</b> (8,300-17,200)	<b>150</b> (110-250)
<b>Netarts Bay</b> (95% CI)	<b>13,800</b> (10,700-19,700)	<b>12,500</b> (9,700-17,500)	<b>25,500</b> (19,900-35,800)	<b>900</b> (700-1,200)
<b>Yaquina Bay</b> (95% CI)	<b>500</b> (400-700)	<b>4,500</b> (3,600-6,400)	<b>12,300</b> (10,000-17,700)	<b>40</b> (35-65)
<b>Coos Bay</b> (95% CI)	<b>8,000</b> (6,000-18,300)	<b>3,300</b> (2,700-6,300)	<b>22,100</b> (17,800-41,500)	<b>300</b> (200-500)



The Oregon Recreational Bay Clam Survey estimates of catch and effort contribute to responsible management of clam resources in Oregon estuaries. This survey, along with commercial bay clam harvest monitoring and other studies, is a critical part of our continuing efforts to protect Oregon's bay clam resources.

CRABS



## Effort

Instantaneous bay-wide counts of bouys on the water and lines on docks at or near the slack current are used to estimate daily effort with an Area Under the Curve (AUC) model. The AUC model was developed from multiple whole day (12 hour) instantaneous counts (IC) of bouys at 30 minute intervals. Whole day effort (WDE) in pot-hours is  $\sum(0.5 \times 30 \text{ min counts})$ , integrating the values for the 12-hour period. A correction factor (CF) for each instantaneous count, in reference to the high or low tide time, is calculated as  $CF = (WDE/IC)$ . Since the fishery is tidal-centric, the peak effort (highest IC and lowest CF values) is near the high or low tide times on any given day. Multiple AUC count days enable the calculation of confidence intervals ( $CF \pm 1.96*SE$ ) for each CF.

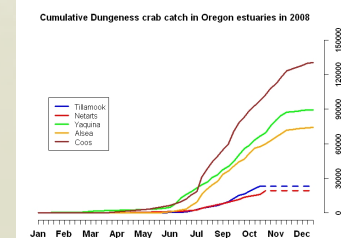
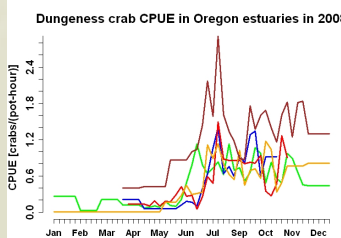
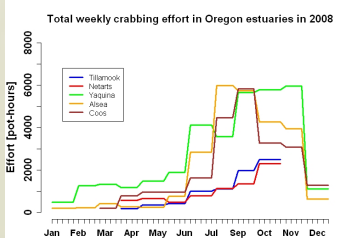
## CPUE

Recreational crabbers were intercepted upon completion of their crabbing trip by samplers in Oregon estuaries. The number of each species harvested, length of trip and zip code were recorded. Subsamples of the catch were measured for carapace width and other factors. Catch per unit effort (CPUE) was defined as the total number crabs per pot-hour. CPUE was calculated weekly during the high effort months (May-November), and monthly during low effort months (December-April).

## Total Catch

Weekly or monthly CPUE estimates multiplied by the total pot-hour estimates yielded estimates of total numbers of Dungeness crabs caught in 2008 (Tillamook Bay and Netarts Bay through October only). Using a length-weight model derived from our crab monitoring program, the total harvest (in kg) can also be estimated. The variability within the AUC model provided an upper and lower confidence interval to the estimate.

Estuary	Dungeness Crab Harvest Estimate 2008 (kilograms) (95% CI)
<b>Tillamook Bay</b> (April-October)	<b>14,300</b> (7,400-21,200)
<b>Netarts Bay</b> (April-October)	<b>11,400</b> (6,000-16,800)
<b>Yaquina Bay</b> (January-December)	<b>52,600</b> (37,900-67,400)
<b>Alesea Bay</b> (January-December)	<b>44,100</b> (29,700-58,500)
<b>Coos Bay</b> (April-December)	<b>78,000</b> (50,700-105,200)



The Oregon Recreational Bay Crab Survey provides estimates of how many people are participating and crab being harvested in the estuarine crab fishery - a valuable fishery to the economy of coastal Oregon. ODFW's Shellfish Program staff use data from the survey to make informed management decisions to protect this resource. In addition to its role in resource management, the survey provides near real-time data of relative crabbing success to the public posted on the Shellfish Program's web page (see "Crabbing Reports" at <http://www.dfw.state.or.us/MRP/shellfish/>).

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