The Boys Are Back in Town: Seasonal Movements, Haul-Out Behavior, and Activity Budgets of Male California Sea Lions (*Zalophus californianus*) in Yaquina Bay

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CALIFORNIA SEA LIONS

California sea lions (*Zalophus californianus*) migrate seasonally northward from breeding rookeries in California's Channel Islands and Baja California, Mexico, to coastal haul-out sites in Oregon, including Port Dock One in Newport's Yaquina Bay (Gearin et al., 2017; NOAA Fisheries, 2026). These nonbreeding aggregations provide opportunities to investigate male social behavior outside the reproductive context. Research at Gulf of California breeding colonies has linked agonistic interactions to environmental and spatial variables, although the mechanisms connecting aggression with population dynamics remain unresolved (Young et al., 2008). Outside breeding colonies, male social associations have demonstrated ecological relevance: social network position, estimated from repeated haul-out co-occurrence, predicted discovery of the Bonneville Dam foraging site and subsequent return (Schakner et al., 2017). Nevertheless, adult and subadult male social relationships remain comparatively poorly described. Examining agonistic behavior in relation to aggregation size at Port Dock One can extend this work through direct behavioral observations of nonbreeding males. As opportunistic predators consuming diverse fish and cephalopod species, California sea lions respond to changes in marine food resources. El Niño–Southern Oscillation (ENSO) phases, the warm water upwelling (El Niño), the cold phase (La Niña), and the intermediate phase (ENSO-Neutral) can influence prey distribution and availability, providing a basis for investigating oceanographic associations with seasonal haul-out timing (NOAA Fisheries, 2026). Repeated monitoring can establish how consistently sea lions use Port Dock One across years.

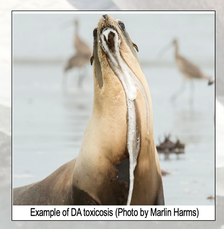
Sea lions also face health risks from infectious diseases, fishing-gear entanglement, injuries, and domoic acid toxicosis. Domoic acid, produced by certain *Pseudo-nitzschia* species during harmful algal blooms, accumulates in prey and can cause disorientation, seizures, neurological damage, and death following consumption (Scholin et al., 2000; Goldstein et al., 2008). Documenting observable concerns at a regularly used haul-out can complement health information obtained from stranded animals, without establishing diagnoses or population-level prevalence.

Purpose

This study examines agonistic behavior, documented health concerns, and seasonal haul-out timing among California sea lions at Port Dock One. Behavioral observations assess how agonistic occurrence varies with aggregation size, while qualitative notes document concerns such as neurological signs, entanglement, vomiting, and injuries. Long-term monitoring, initiated in spring 2025, examines the consistency of seasonal timing across years and its association with regional oceanographic conditions. Together, these observations contribute to understanding nonbreeding male behavioral ecology and provide a site-specific record relevant to conservation and local management.



Example of netting entanglement on a sea lion at Port Dock One



Example of DA toxicosis (Photo by Marlin Harms)



Approximately 300,000 people visit the Port One Dock annually to observe at close range (within 3 meters) the seasonal sea lions. Holly Parker and Lanie Cox, shown to the right, document entanglement pressure, body condition, decibel range, and behavior.

Empirical Questions

Immediate Questions

1. *How does the occurrence of agonistic behavior among male California sea lions at Port Dock One vary with aggregation size?*

2. *What observable health concerns (e.g., neurological signs, entanglement, vomiting, injuries, etc.) are documented among California sea lions using Port Dock One?*

Longitudinal Questions

3. *How consistent is the timing of seasonal haul-out use by California sea lions at Port Dock One across years?*

4. *To what extent do regional oceanographic conditions account for year-to-year differences in seasonal haul-out timing at Port Dock One?*

METHOD

Focal and Scan Sample

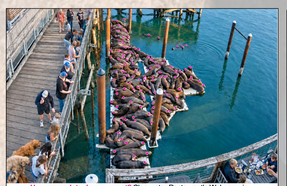
California sea lions (*Zalophus californianus*) were focal and scan sampled at haul-out sites in Yaquina Bay, Oregon ($N \approx 200$ - 400 animals). These sites function primarily as bachelor haul-outs, consisting of adult and juvenile males, while females remain closer to the southern breeding grounds (Oregon Department of Fish and Wildlife [ODFW], 2024).

Study Site

Observations were conducted at two haul-out locations in Yaquina Bay: Port Dock One, where tourists can observe within 3 meters of the basking sea lions, and the rock breakwater and jetty haul-out. Port Dock One was monitored through both in-person observations and the Clearwater Restaurant live webcam, while the breakwater could only be viewed reliably in-situ (see images below).



Clearwater Restaurant's Webcam view of the established focal and scan sampling zones relative to the two sites: A, Breakwater Jetty, and E, The Port One Dock.



How many dots do you count? Clearwater Restaurant's Webcam view and the scan sampling protocol for an aggregate sea lion count.



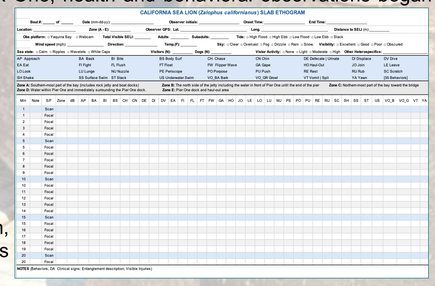
Kiera Pham and Caitlyn Moor Animal Behavior (BIO_PSY425) collect data observational data of the breakwater jetty and haul-out using the behavioral ethogram and activity budget at Dock One, Yaquina Bay, October 4, 2026

Materials

Observers used a behavioral ethogram to identify and record California sea lion behaviors according to defined behavioral codes. Field forms printed on Rite in-the-Rain paper provided a weather-resistant surface for recording behavioral observations, aggregation counts, environmental conditions, and qualitative notes on observable health concerns. A stopwatch tracked elapsed observation time and scheduled sampling intervals. The Decibel Meter for iPhone application provided readings of ambient sound levels in decibels. Observations were entered into an Excel workbook for organization and analysis.

Design and Procedure

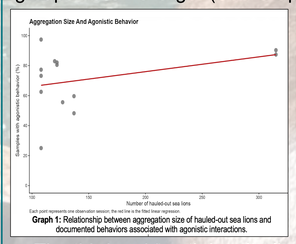
In this longitudinal study at Port Dock One, health and behavioral observations began March 3, 2026, through the Animal Behavior (BIO_PSY 425) collaborative research project and continued through April 17. Summer monitoring occurred daily from June 10 through August 30. In situ behavioral observations resumed in September, including collaborative data collection with the fall class on October 4. During 20-minute behavioral bouts, conducted in person or by webcam, observers recorded group behavior counts every 5-minutes and instantaneous focal behavior every minute. Agonistic encounters were operationalized as closely spaced, conspecific-directed gapes (GA; open-mouth displays), lunges (LU; sudden forward thrusts), bites (BI), or documented pushes involving the same animals. Aggregation size and environmental conditions accompanied behavioral records, while qualitative notes documented neurological signs, entanglement, vomiting, and injuries. Monitoring remains ongoing at regular intervals, with intensified observation beginning in early June to track seasonal movements.



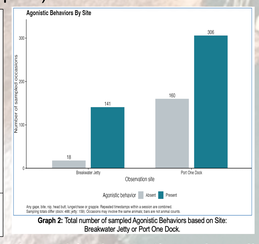
PRELIMINARY RESULTS

An exploratory simple linear regression examined whether aggregation size predicted agonistic behavior occurrence. Each observation session contributed one value representing the proportion of samples in which agonistic behavior was recorded. **Aggregation size did not significantly predict agonistic behavior occurrence**, $F(1, 11) = 1.72$, $p = .217$, $R^2 = .13$. Although the fitted regression line showed a positive relationship, the results did not provide sufficient evidence that agonistic behavior increased with aggregation size (See Graph 1).

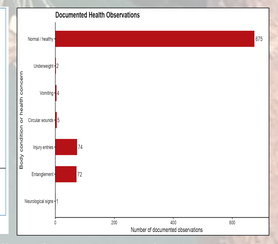
However, an exploratory Pearson Chi-square test found **an association between site (Port One and the Breakwater) and recorded agonistic behavior** (i.e., gape, bite, nip, head butt, lunge/chase, or grapple), $\chi^2(1, N = 625) = 30.83$, $p < .001$, $\varphi = .22$. Although agonistic behavior differed among the recorded aggregation sizes, but it did not steadily increase as groups became larger (See Graph 2).



Graph 1: Relationship between aggregation size of hauled-out sea lions and documented behaviors associated with agonistic interactions.



Graph 2: Total number of sampled Agonistic Behaviors based on Site: Breakwater Jetty or Port One Dock.



The third and fourth longitudinal empirical questions, baseline departure and returns were documented for 2026. The **first recorded absence occurred June 22, 2026,** with zero sea lion observations recorded along the Port One Dock from June 29 through July 20, **followed by the first documented return on July 21**. Recorded attendance subsequently increased. These observations establish an initial seasonal baseline. The fourth empirical question regarding consistency across years and associations with oceanographic conditions, like warm water upwellings, the three remain questions for continued monitoring.

CONCLUSIONS

These results are initial, preliminary findings, they do not reflect end-goal project outcomes, as data is still underway, both by the principal investigators as well as the collaborative science students from the fall 2026, Animal Behavior course. However, the initial face-validity calculations are compelling, particularly in light of body condition. Long-term outcomes may inform local management and conservation efforts by documenting observable health concerns, characterizing agonistic behavior in relation to aggregation size, and establishing patterns of seasonal haul-out use at Port Dock One. Continued monitoring could help identify changes that warrant investigation or coordination with marine mammal response organizations. Over time, examining seasonal haul-out timing alongside regional oceanographic conditions could improve understanding of how sea lions use Yaquina Bay under changing environmental conditions and provide evidence to guide management of this nonbreeding haul-out.

Further, according to NOAA Fisheries, the 2026–2027 El Niño, the warm phase of the El Niño–Southern Oscillation (ENSO), is projected to be a very strong event (2026). Warmer ocean waters can reduce the availability of high-energy prey, increasing the risk of starvation, emaciation, and strandings among California sea lions. Similar effects were documented during previous warming events (NOAA Fisheries, 2026). These risks make continued monitoring at Port Dock One important for documenting seasonal arrival and departure dates, body condition, and observable health concerns as ocean conditions change.

SELECT REFERENCES

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NOTE: ChatGPT (OpenAI) assisted with preparing charts, edits for grammar and spelling. The authors are responsible for the accuracy of the data, analyses, and interpretations presented.