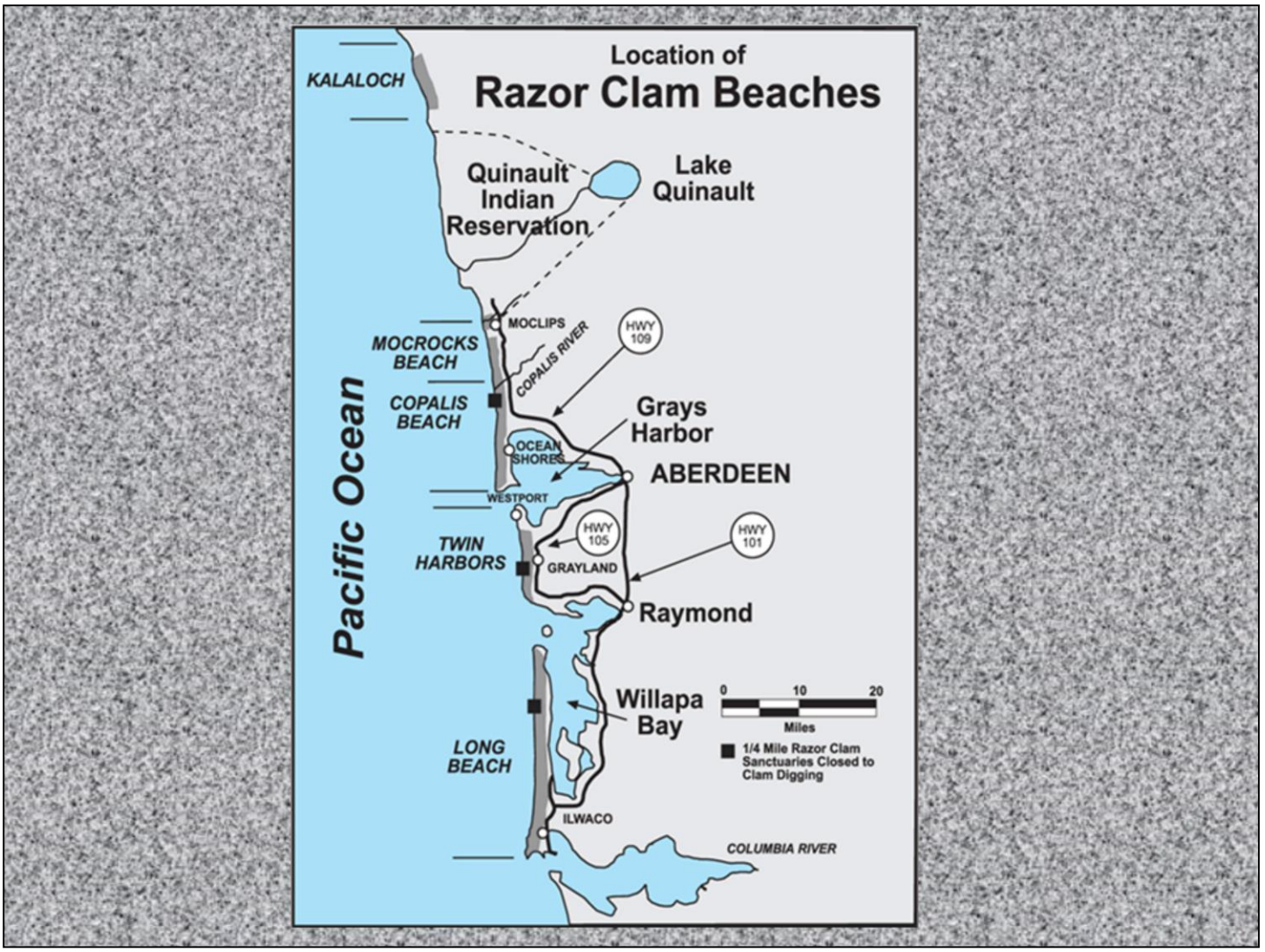
The following presentation is designed to provide you with general information on the management of the recreational razor clam fishery in Washington and specific information on what to expect for the 2020-21 season.

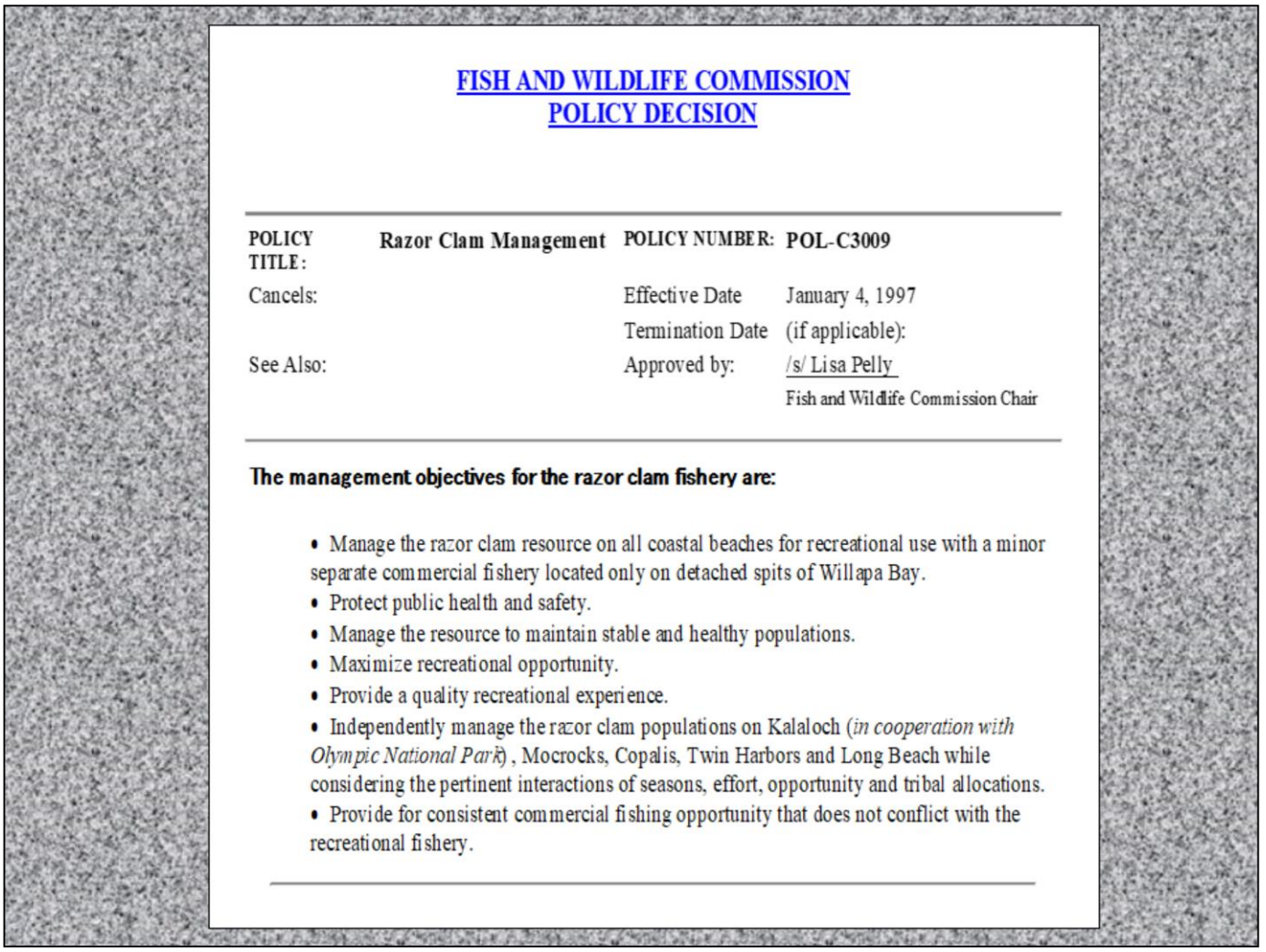
Thanks for taking the time to view this presentation. Any specific comments or questions can be directed to : razorclams@dfw.wa.gov

This presentation is designed to update you on the issues listed above and hopefully spur you to let us know what you think about our management of razor clams and how we can change or improve the work we do. Thanks for taking the time to read through the following information.



Washington's razor clam habitat is divided into five management beaches. From the south, they are: Long Beach (from the Columbia River North Jetty to end of Leadbetter Point); Twin Harbors (from the northern shore of Willapa Bay to the Grays Harbor South Jetty); Copalis (from the Grays Harbor North Jetty to the Copalis River); Mocrocks (from the Copalis River to the south boundary of the Quinault Indian Reservation – just south of the Moclips River); Kalaloch (from Olympic National Park South Beach Campground to Brown's Point, just south of Olympic National Park Beach Trail # 3. Within these five management beaches there are a total of 58 miles of sandy beaches and prime habitat for the Pacific Razor Clam (*Siliqua patula*).

The razor clam fishery in Washington is not only a significant source of revenue for tourism-dependent businesses such as restaurants and motels, but also an important source of community identity and basis for tribal subsistence. Razor clam harvesting, cleaning, cooking, eating, and canning have been an important focus of family relationships and local culture in Washington coastal communities for many generations.



FISH AND WILDLIFE COMMISSION
POLICY DECISION

POLICY TITLE:	**Razor Clam Management**	**POLICY NUMBER:**	**POL-C3009**
Cancels:		Effective Date	January 4, 1997
		Termination Date	(if applicable):
See Also:		Approved by:	/s/ Lisa Pelly Fish and Wildlife Commission Chair

The management objectives for the razor clam fishery are:

- Manage the razor clam resource on all coastal beaches for recreational use with a minor separate commercial fishery located only on detached spits of Willapa Bay.
- Protect public health and safety.
- Manage the resource to maintain stable and healthy populations.
- Maximize recreational opportunity.
- Provide a quality recreational experience.
- Independently manage the razor clam populations on Kalaloch (*in cooperation with Olympic National Park*), Mocrocks, Copalis, Twin Harbors and Long Beach while considering the pertinent interactions of seasons, effort, opportunity and tribal allocations.
- Provide for consistent commercial fishing opportunity that does not conflict with the recreational fishery.

The fishery is managed by WDFW staff with specific guidance provided by the Washington Fish and Wildlife Commission; nine citizen members serving six-year terms who are appointed by the governor and confirmed by the Washington State Senate. For more information see: **https://wdfw.wa.gov/about/commission**

In it's Policy C3009 the Fish and Wildlife Commission has provided seven objectives WDFW uses in managing this fishery.

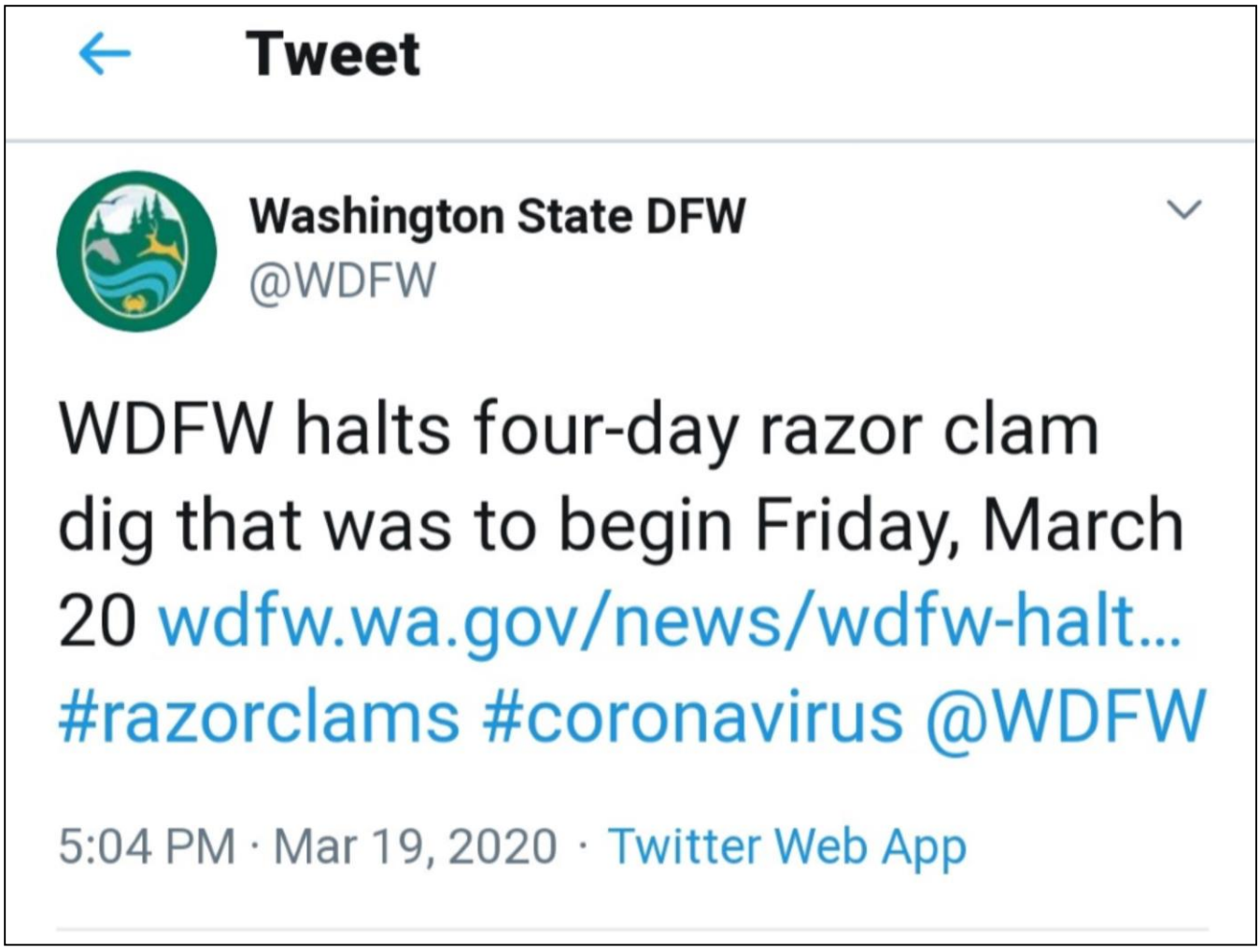
Note that the management of the recreational razor clam fishery at Kalaloch occurs in cooperation with the Olympic National Park.

Washington Recreational Razor Clam Fishery
Summarized by Season (October through May)

season	effort (digger trips)	harvest + wastage (clams)	total harvest days#	fishery value*
1997-98	166,630	1,934,256		$15,128,365
1998-99	*season long closure due to high levels of marine toxins*			
1999-20	192,359	2,531,910		$17,464,305
2000-01	183,375	2,479,525	20	$16,648,646
2001-02	307,314	4,321,274	39	$27,901,088
2002-03	*season long closure due to high levels of marine toxins*			
2003-04	267,053	3,325,575	18	$24,245,785
2004-05	288,516	4,126,870	25	$26,194,415
2005-06	240,768	3,284,198	26	$21,859,366
2006-07	259,847	3,601,239	30	$23,591,552
2007-08	242,317	3,030,840	40	$22,000,000
2008-09	248,728	3,216,167	27	$22,582,056
2009-10	283,444	3,805,228	46	$25,733,927
2010-11	244,428	3,204,311	46	$22,191,658
2011-12	194,976	2,575,693	26	$17,701,903
2012-13	418,999	6,078,109	78	$38,040,988
2013-14	451,046	6,285,205	105	$40,950,540
2014-15	399,698	5,756,496	104	$36,288,647
2015-16	327,545	4,531,856	94	$29,737,864
2016-17	281,374	4,271,280	46	$25,545,991
2017-18	257,004	2,840,843	20	$23,333,435
2018-19	272,962	3,742,861	52	$24,782,265
2019-20	253,927	3,592,727	66	$23,054,074
10-year average	***310,196***	***4,287,938***	***62***	***$28,162,736***
20-year average	***286,326***	***3,901,032***	***48***	***$25,995,618***

This table provides some perspective of how this fishery can vary by season. The number of digging days offered, number of diggers and total harvest are most influenced by the TAC (total allowable catch) that is developed each summer through of coast-wide razor clam stock assessment work. These numbers are also influenced by management changes over these years in the harvest rate WDFW uses to set the TAC. In addition, marine toxin closures, poor weather and surf conditions can also play a significant role each season. You will find more details about all of these topics in the slides to follow. **Note the 2019-20 season closed on March 12, 2020 due to COVID-19. An estimated 420,000 additional diggers trips could have occurred with as much as $38 M in fishery value added had this closure not been in place.**

Overall the 2019-20 season was below average in terms of harvest and effort levels (see page 7). This is due to the early COVID-19 related closure. Projections show that not occurred a total of 675,000 diggers would have been the season total.



The 2019-20 razor clam season was headed toward near record effort (digger participation) and harvest levels as WDFW announced on March 12 that the digs planned to start March 13 would proceed. However, concerns by local governments over large numbers of visitors being drawn resulted in unprecedented moves by them to close all beach access roads. That unfortunately, resulted in our decision to close the fishery the day before it was set to begin.

Washington Recreational Razor Clam

2019-20 Season Totals	***HARVEST***	***EFFORT***	***Average Daily Catch (clams/digger)***	***Total Digging Days***
Long Beach	1,644,196	111,122	13.9	66
Twin Harbors	755,166	56,464	12.8	63
Copalis	725,451	51,380	13.6	31
Mocrocks	467,9153	34,960	13.0	32
Kalaloch	0	0		0
TOTAL	3,592,727	253,927	13.0	

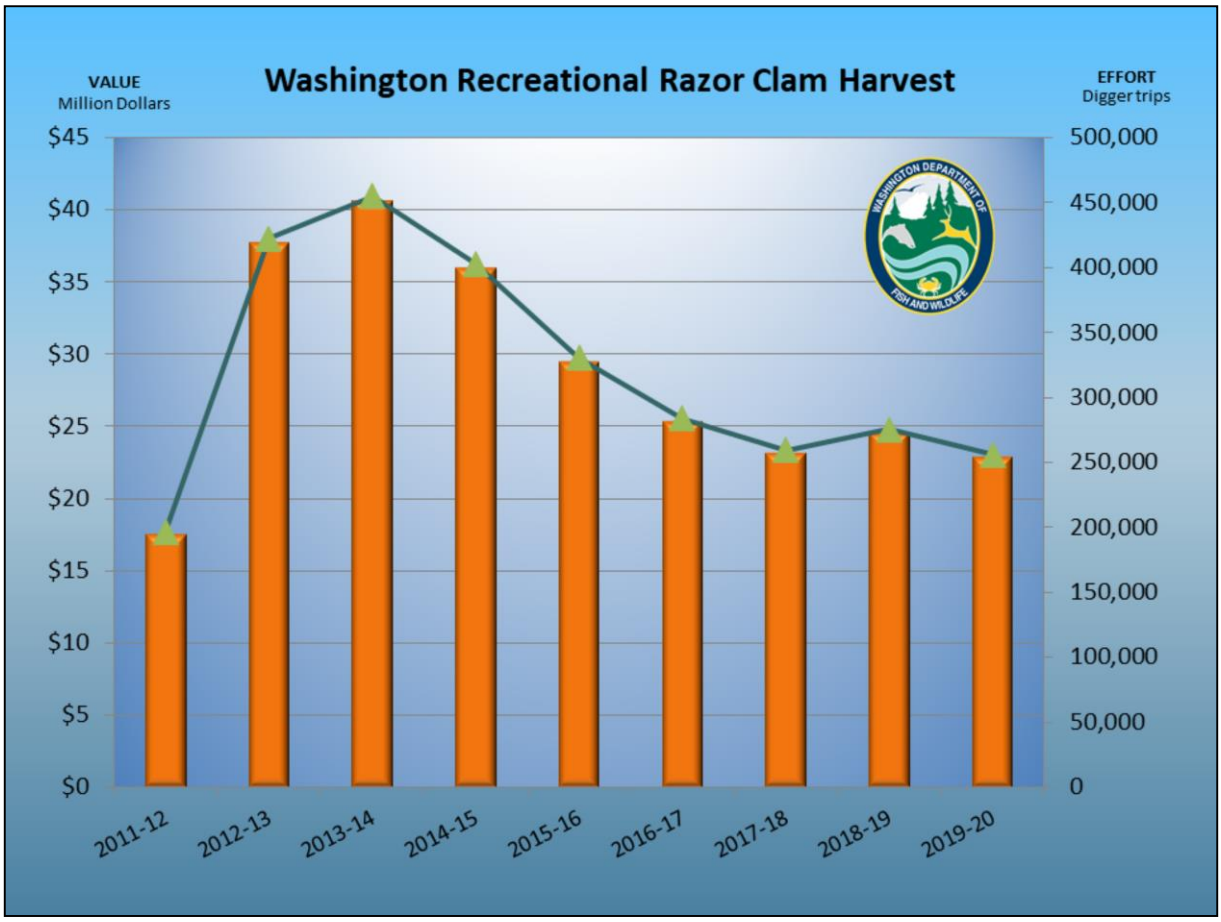
Each of the five beaches is managed separately (see page 3). The Total Allowable Catch (TAC) is determined for each beach using data collected in our annual summer razor clam stock assessment work (discussed more in the slides ahead). As a result, some beaches have more digging opportunities than others.

Note that the harvest listed here includes our estimates of wastage. The CPUE is calculated on the estimate of harvest, minus wastage.

Washington Recreational Razor Clam Fishery
Days Open for Harvest by Season

Beach	2019-20	2018-19	2017-18	2016-17	2015-16	2014-15	2013-14	2012-13	2011-12	2010-11	average
Long Beach	**66**	4	16	11	94	104	72	42	23	35	47
Twin Harbors	**63**	53	18	46	0	104	105	78	26	46	54
Copalis	**31**	20	12	33	18	21	24	28	13	15	22
Mocrocks	**32**	33	20	35	26	43	54	30	20	30	32
Kalaloch	**0**	6	0	2	0	0	0	0	3	12	2

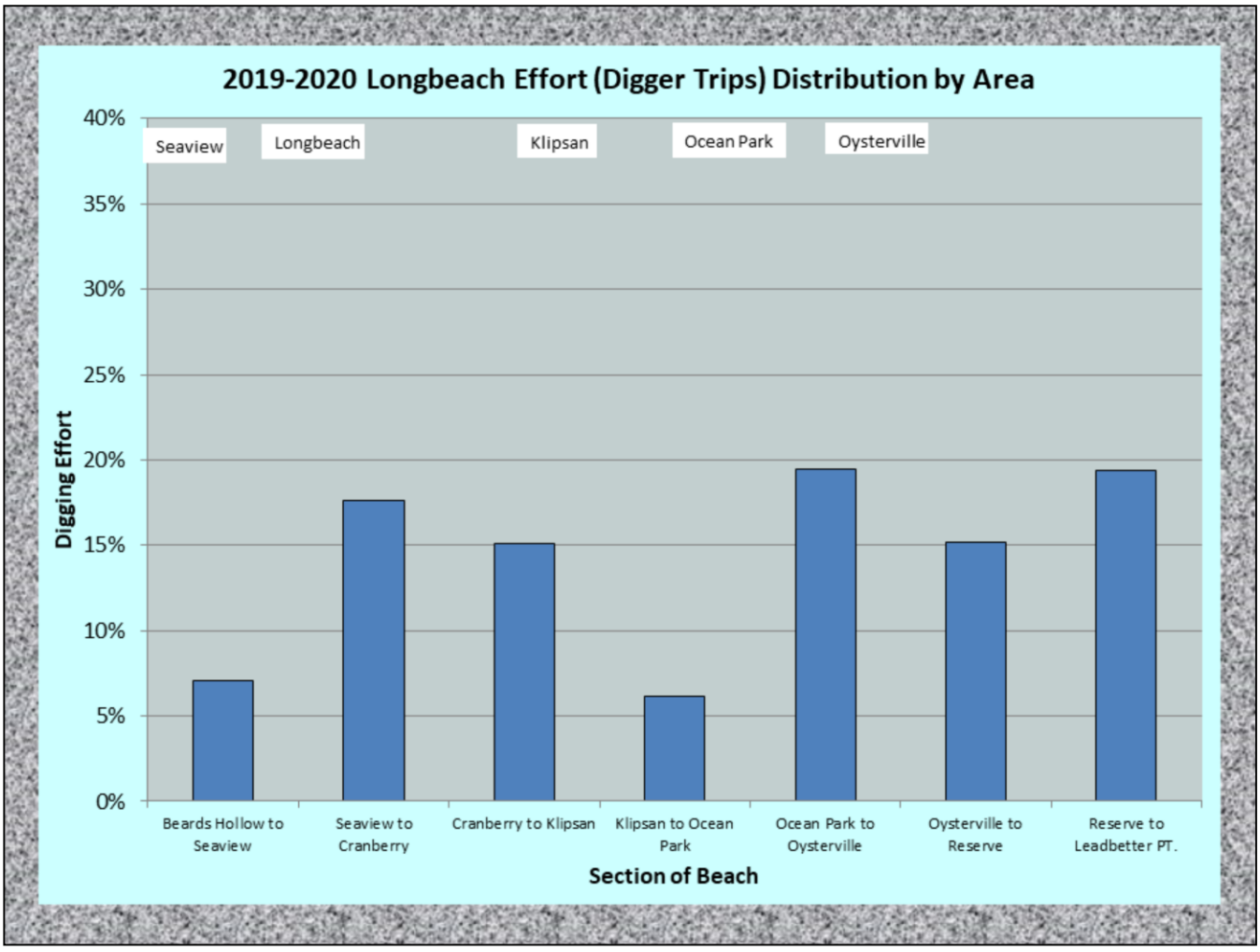
This table and the following chart that follows, provide some additional perspective of how this fishery can vary by season. The number of digging days offered, number of diggers and total harvest are most influenced by the TAC (total allowable catch) that is developed each summer through of coast-wide razor clam stock assessment work. These numbers are also influenced by management changes over these years in the harvest rate WDFW uses to set the TAC. In addition, marine toxin closures, poor weather and surf conditions can also play a significant role each season. In March 2020 we discovered a new impact on the fishery as the COVID-19 pandemic closed all harvest on March 12, 2020. You will find more details about all of these topics in the slides to follow.



This chart and the previous table provide some additional perspective of how this fishery can vary by season. The number of digging days offered, number of diggers and total harvest are most influenced by the TAC (total allowable catch) that is developed each summer through of coast-wide razor clam stock assessment work. These numbers are also influenced by management changes over these years in the harvest rate WDFW uses to set the TAC. In addition, marine toxin closures, poor weather and surf conditions can also play a significant role each season. You will find more details about all of these topics in the slides to follow. **Note the 2019-20 season closed on March 12, 2020 due to COVID-19. An estimated 420,000 additional diggers trips could have occurred with as much as $38 M in fishery value added had this closure not been in place.**

Month	Long Beach	
September 2019	3 Days	Fri-Sun
October 2019	6 Days	Sat-Thu
November 2019	15 Days	Fri; Mon-Sun; Sun-Sat
December 2019	12 Days	Tue-Mon; Mon, Thu-Sun
January 2020	13 Days	Wed-Tue; Tue-Sun
February 2020	11 Days	Thu-Wed; Thu-Sun
March 2020	6 Days	Fri-Wed
Totals:	66 Days	
	Effort = 111,122 digger trips	
	Harvest = 1,644,196 clams	
	(Including wastage of 99,544 clams)	
	Portion of TAC Harvested = 31.6%	

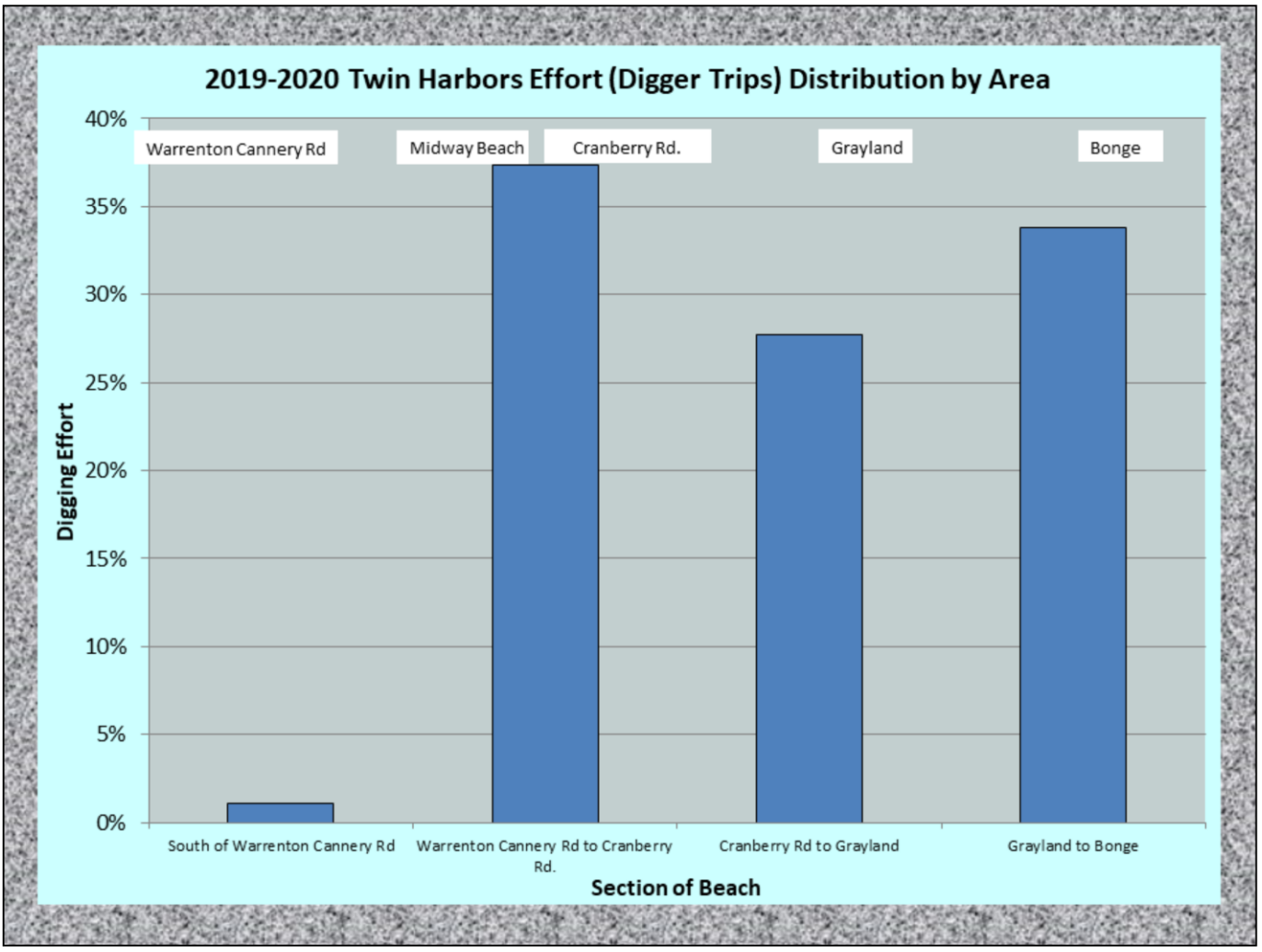
In our 2019-20 update of Long Beach razor clam stocks we pointed out that the 2019 stock assessment results for Long Beach showed a 25 year high number of recruit clams. You can see from this table that was the case. Long beach had more harvest days than any other beach this year, thanks to an early season 3-day morning dig in September, which saw the largest crowds of the season.



The Y-Axis is the percentage of digging effort (totaling 100). The X-Axis is the harvested beach area, moving from south to north (left to right) and broken up into 7 sections. Two thirds of digging effort is concentrated north of Klipsan Approach.

Month	Twin Harbors	
October 2019	6	Sat-Thu
November 2019	15	Fri; Mon-Sun; Sun-Sat
December 2019	12	Tue-Mon; Mon, Thu-Sun
January 2020	13	Wed-Tue; Tue-Sun
February 2020	11	Thu-Wed; Thu-Sun
March 2020	6	Fri-Wed
Totals:	63 Days	
	Effort = 56,464 digger trips	
	Harvest = 755,166 clams	
	(Including wastage of 32,519 clams)	
	Portion of TAC Harvested = 41.0%	

The Twin Harbors enjoyed the second largest harvest opportunity for the 2019-20 season. A strong population of harvestable sized recruit clams allowed for 63 days of digging. The days with the most digger effort were February 8 with 4,700 diggers and March 7 with 4,000 diggers, both Saturdays.

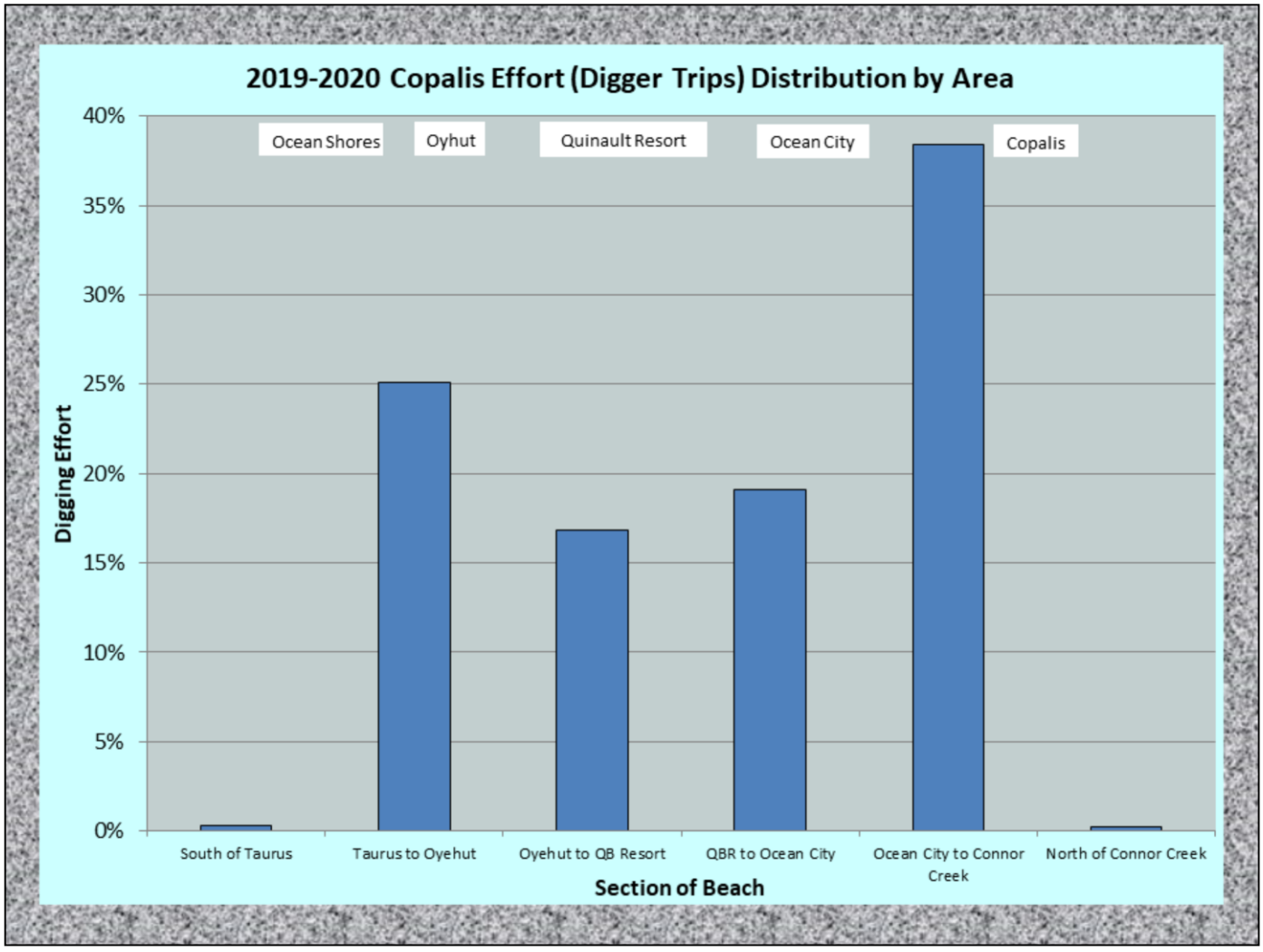


The Y-Axis is the percentage of digging effort (totaling 100). The X-Axis is the harvested beach area, moving from south to north (left to right) and broken up into 4 sections. The most frequented digging area near the Grayland Beach State Park off Cranberry Road.

Month	Copalis	
October 2019	3 Days	Sat, Mon, Wed
November 2019	9 Days	Fri; Mon, Wed, Fri, Sun; Sun, Tue, Thu, Sat
December 2019	5 Days	Wed, Fri, Sun; Thu, Sat
January 2020	6 Days	Thu, Sat, Mon; Wed, Fri, Sun
February 2020	5 Days	Fri, Sun, Tue; Thu, Sat
March 2020	3 Days	Sat, Mon, Wed
Totals:	31 Days	
	Effort = 51,380 digger trips	
	Harvest = 725,451 clams	
	(Including wastage of 27,902 clams)	
	Portion of TAC Harvested = 35.6%	

As many are aware, the Copalis razor clam management beach is one of three beaches WDFW co-manages with tribal governments. The Quinault Indian Nation (QIN) has federally adjudicated fishing rights on this beach and we share the total allowable catch (TAC) 50/50 with the QIN. More details on state/tribal co- management of razor clams in Washington are found later in this presentation.

As we have since the 2015-16 season, during the 2019-20 season some of the harvest schedules on Copalis and Mocrocks were a result of efforts to share weekend days between state and tribal fishers. In all cases diggers saw Mocrocks and Copalis open on alternate weekend days. This is one tool that state and tribal fishery managers can use to provide weekend opportunities to both state and tribal fishers. The Copalis days with the largest crowds during this season were on Saturdays, Oct. 26 (7,348 diggers), Feb. 22 (5,321), and Mar. 7 (6,023 diggers).

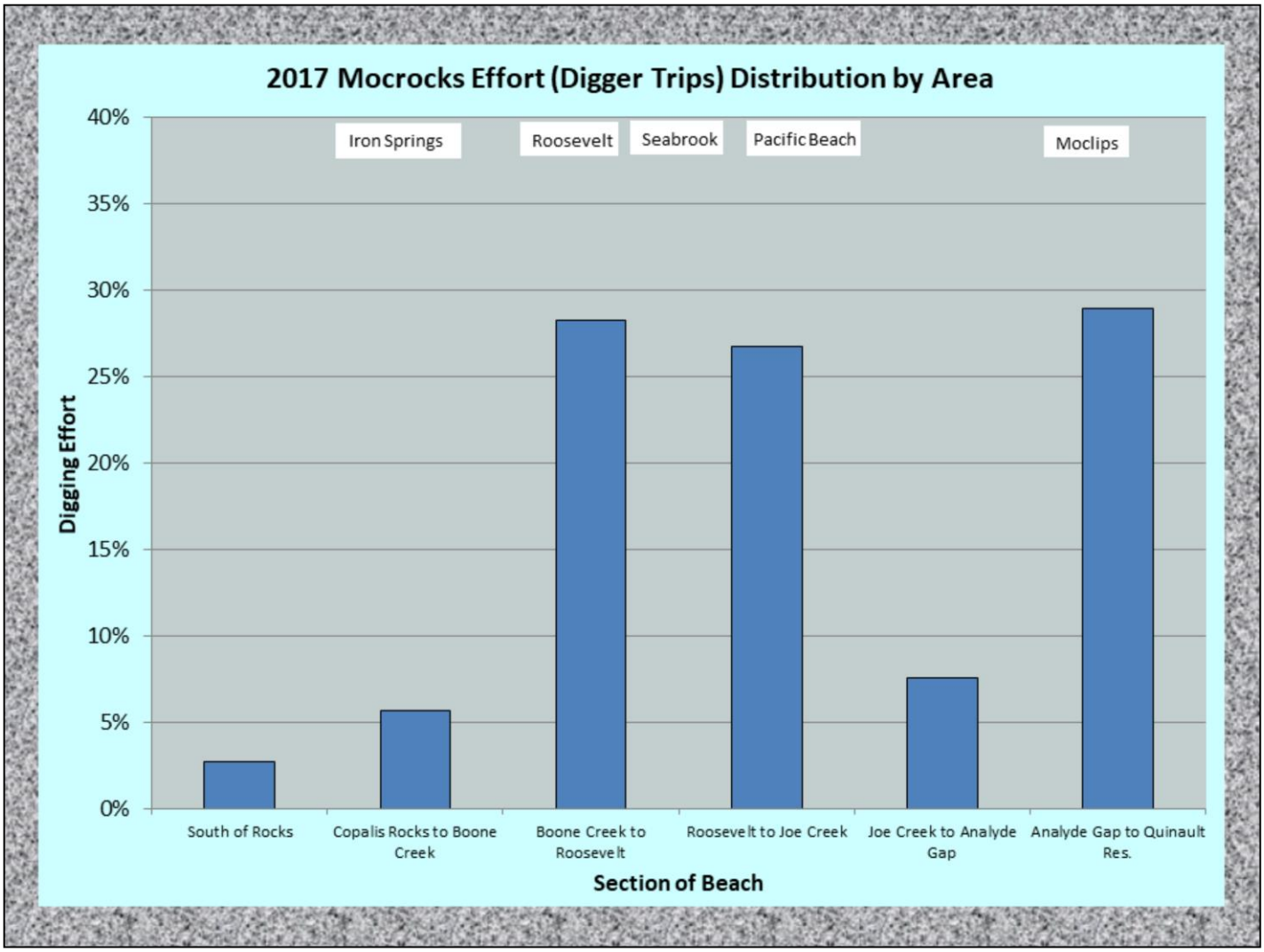


The Y-Axis is the percentage of digging effort (totaling 100). The X-Axis is the harvested beach area, moving from south to north (left to right) and broken up into 6 sections. The most frequented section was between the Ocean City approach to Conner Creek.

Month	Mocrocks	
October 2019	3 Days	Sun, Tue, Thu
November 2019	6 Days	Tue, Thu, Sat; Mon, Wed, Fri
December 2019	7 Days	Tue, Thu, Sat, Mon; Mon, Fri, Sun
January 2020	7 Days	Wed, Fri, Sun, Tue; Tue, Thu, Sat
February 2020	6 Days	Thu, Sat, Mon, Wed; Fri, Sun
March 2020	3 Days	Fri, Sun, Tue
Totals:	32 Days	
	Effort = 34,960 digger trips	
	Harvest = 467,915 clams	
	(Including wastage of 12,745 clams)	
	Portion of TAC Harvested = 28.4%	

As many are aware, the Copalis razor clam management beach is one of three beaches WDFW co-manages with tribal governments. The Quinault Indian Nation (QIN) has federally adjudicated fishing rights on this beach and we share the total allowable catch (TAC) 50/50 with the QIN. More details on state/tribal co- management of razor clams in Washington are found later in this presentation.

As we have since the 2015-16 season, the 19-20 season harvest schedules on Copalis and Mocrocks were a result of efforts to share weekend days between state and tribal fishers. In all cases diggers saw Mocrocks and Copalis open on alternate weekend days. This is one tool that state and tribal fishery managers can use to provide weekend opportunities to both state and tribal fishers. The Mocrocks days with the largest crowds during this season were Sunday Oct. 26 (4,926 diggers), Saturday Feb. 8 (3,975 diggers), and Sunday Mar. 8 (2,940 diggers).



The Y-Axis is the percentage of digging effort (totaling 100). The X-Axis is the harvested beach area, moving from south to north (left to right) and broken up into 6 sections. Majority of digging effort occurred near Roosevelt Beach and Moclips approaches.

Kalaloch remains a puzzle. The 2019-20 population assessment indicated there were a smaller population of small clams. We waited to open hoping to give them time to grow. However, the Covid closure of all recreational fishing derailed any possible opportunity. Razor clams continue to struggle to reach a mature age, or at least a harvestable size on this beach. Our best guess is that there are a combination of forces working to keep Kalaloch razor clam populations unsuccessful.

Now, onto a topic that can really play havoc with shellfish harvesting – as experienced razor clammers know all too well.

Naturally occurring Harmful Algal Blooms (HAB) produce toxins that are ingested by razor clams and then concentrate in their meat tissue.

The razor clam fishery has been closed three times for a full season and many times for shorter periods, due to levels of two marine toxins in razor clam tissue that have exceeded state and federal action levels. Coast-wide since 1992, a total of 20% of all potential harvest days have been cancelled due to marine toxins produced by HAB events.

Domoic Acid

Amnesic Shellfish Poisoning (ASP)

- Produced by a diatom (*Pseudo-nitzschia sp.*)
- Domoic acid - neurotoxin
- Nausea, dizziness, memory loss
- Stroke-like symptoms that can lead to death
- No antidote
- Not destroyed by cooking/freezing
- Not easily detected

The marine toxin domoic acid has been the most prevalent toxin affecting razor clams harvest along the Washington coast. It is produced by a naturally occurring member of the marine plankton community – a diatom – named *Pseudo-nitzschia*. Recent research has lead to better understanding of where these diatoms originate and what oceanographic and weather conditions must be present to allow them to move closer to shore and affect razor clam populations. Since 1992 when domoic acid was first found in razor clam meat tissue a total of 20% of planned razor clam digging opportunities have been lost due to high marine toxin levels, with the vast majority due to domoic acid.

This slide details the dangers domoic acid – in high levels – presents.

PSP Toxin

Paralytic Shellfish Poisoning (PSP)

- Produced by a dinoflagellate (*Alexandrium sp.*)
- Saxitoxin- neurotoxin
- Numbness, finger tingling/toes,lips
- Can paralyze the diaphragm and lead to death
- No antidote
- Not destroyed by cooking/freezing
- Not easily detected

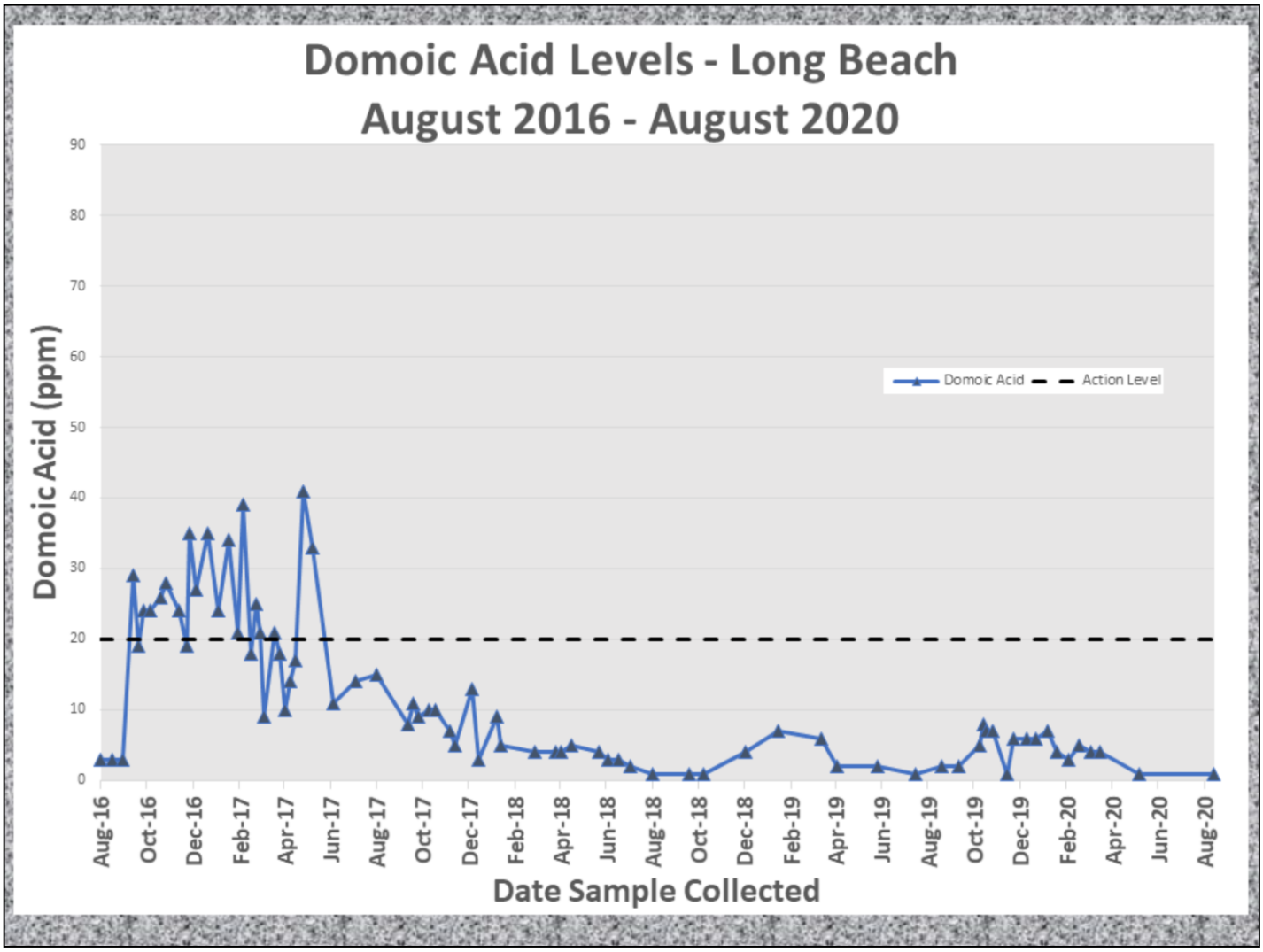
The toxin that causes paralytic shellfish poisoning (PSP) is produced by another naturally occurring member of the marine plankton community. This species is the dinoflagellate named *Alexandrium*. PSP has historically been less of a problem for the razor clam fishery. However, in past seasons there have been razor clam closures due to PSP.

WDFW is required to collect samples per strict WDOH protocol:

To open or remain open, ALL samples must test below The action level…

- Samples from 3 areas per beach.
- 12 adult clams per sample.
- 2 collections 7-10 days apart (often means digging on poorer tides).
- Last collection as close to opening as possible.
- In-season collections also 7-10 days apart.

As a result of concern for the health of the many people who enjoy razor clams, WDFW works closely with staff at the Washington Department of Health (WDOH) to collect and transport clams to the WDOH lab (north of Seattle in Shoreline) for processing. These clams are collected on a strict schedule that allows for the final sample to be collected as close to the day of each period razor clamming is open. This is the reason our openers are always announced as tentative, until final marine toxin results are available."

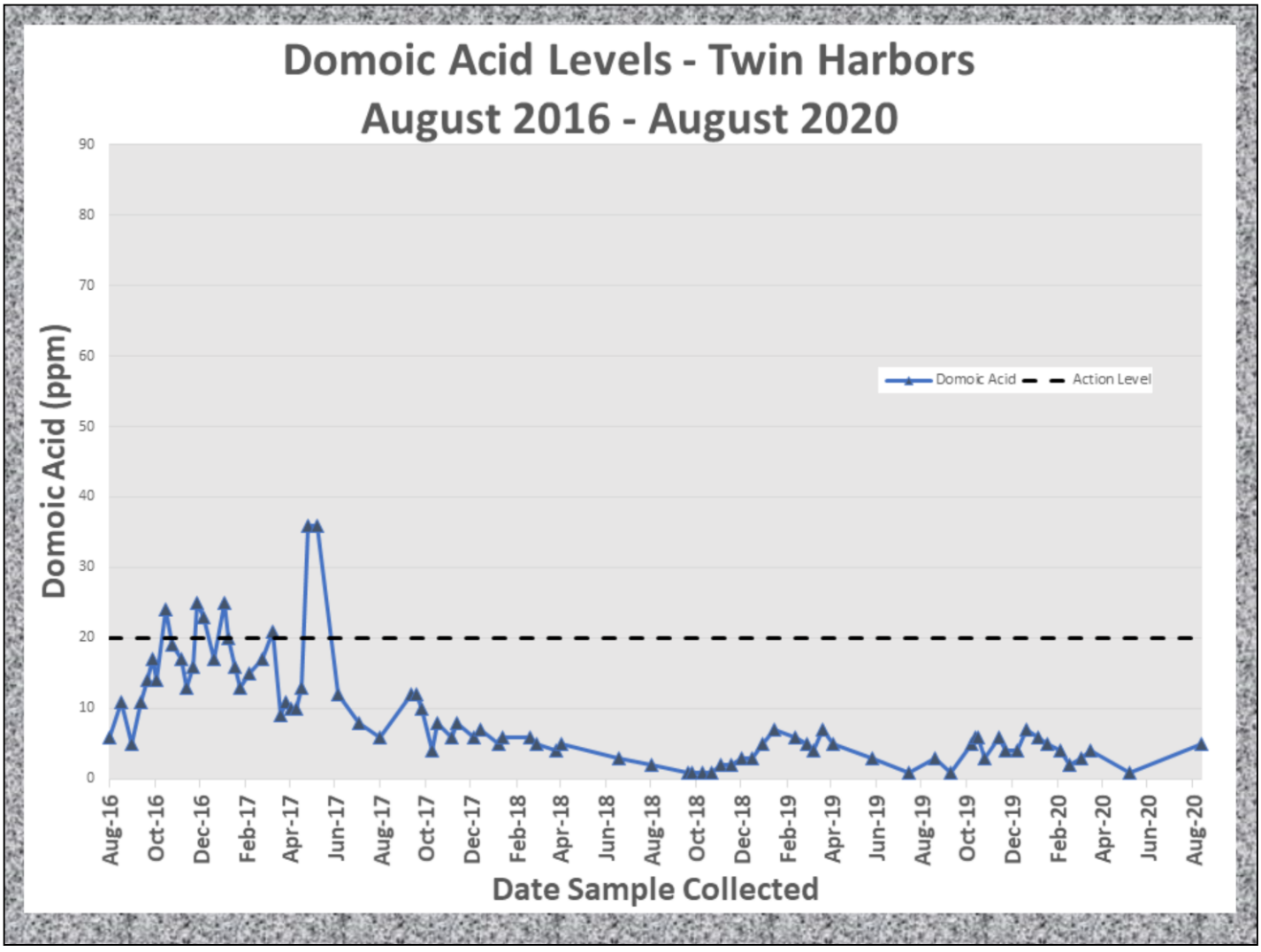


Presented here are Washington Department of Health (WDOH) test results of domoic acid levels found in razor clam meat tissue. The razor clams are collected regularly from each razor clam management beach, by WDFW staff and delivered to the WDOH Public Health Lab in Shoreline, WA. To ensure quick turn-around of the results, WDFW staff often drive the clams directly to the lab as soon as possible after collection. This can be a 4 to 6 hour round-trip depending on Puget Sound traffic conditions, but is necessary to ensures the clams you are taking home are safe to eat.

Recall, before a beach can be opened for the harvest of razor clams, WDOH protocol requires that all razor clam samples collected from that beach must test under the action level (20 ppm for domoic acid; 80 µg/100g for PSP; and 16 µg/100g for DSP) on both of the two required sample collections.

The most recent levels can be found at: **https://wdfw.wa.gov/fishing/basics/domoic-acid/levels**

For more information about domoic acid, see:
https://www.doh.wa.gov/CommunityandEnvironment/Shellfish/RecreationalShellfish/Illnesses/Biotoxins/AmnesicShellfishPoisoning



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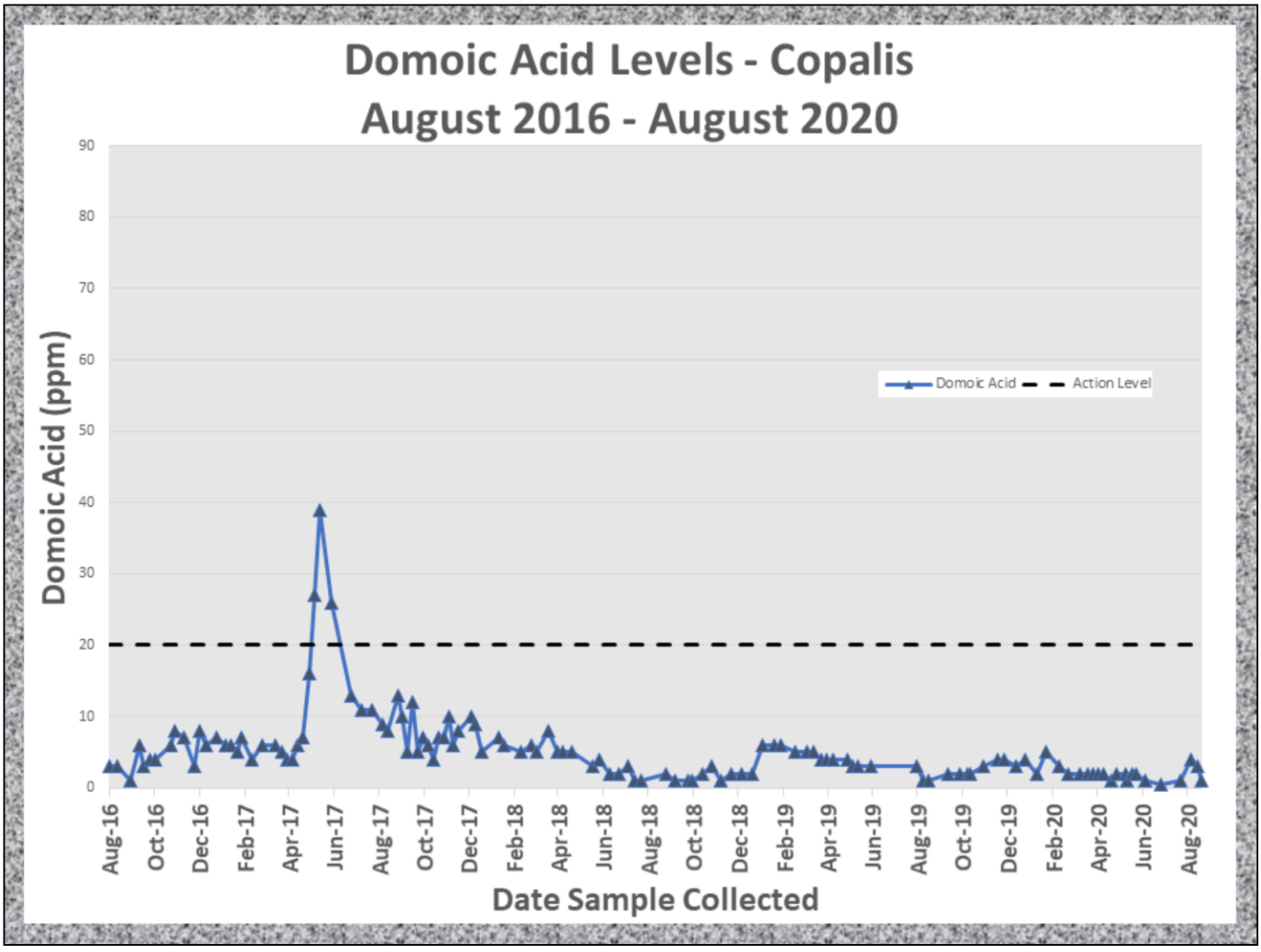

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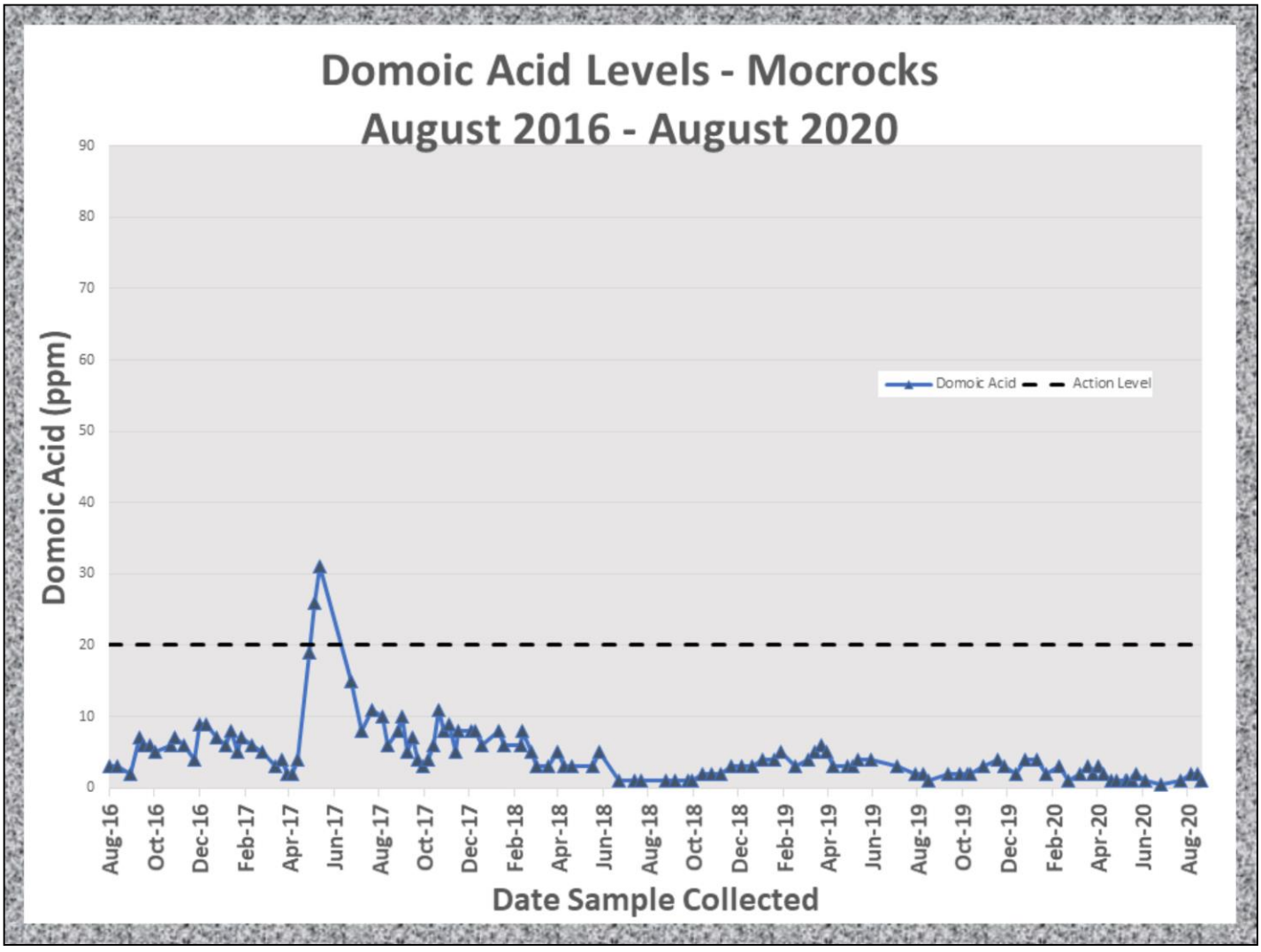

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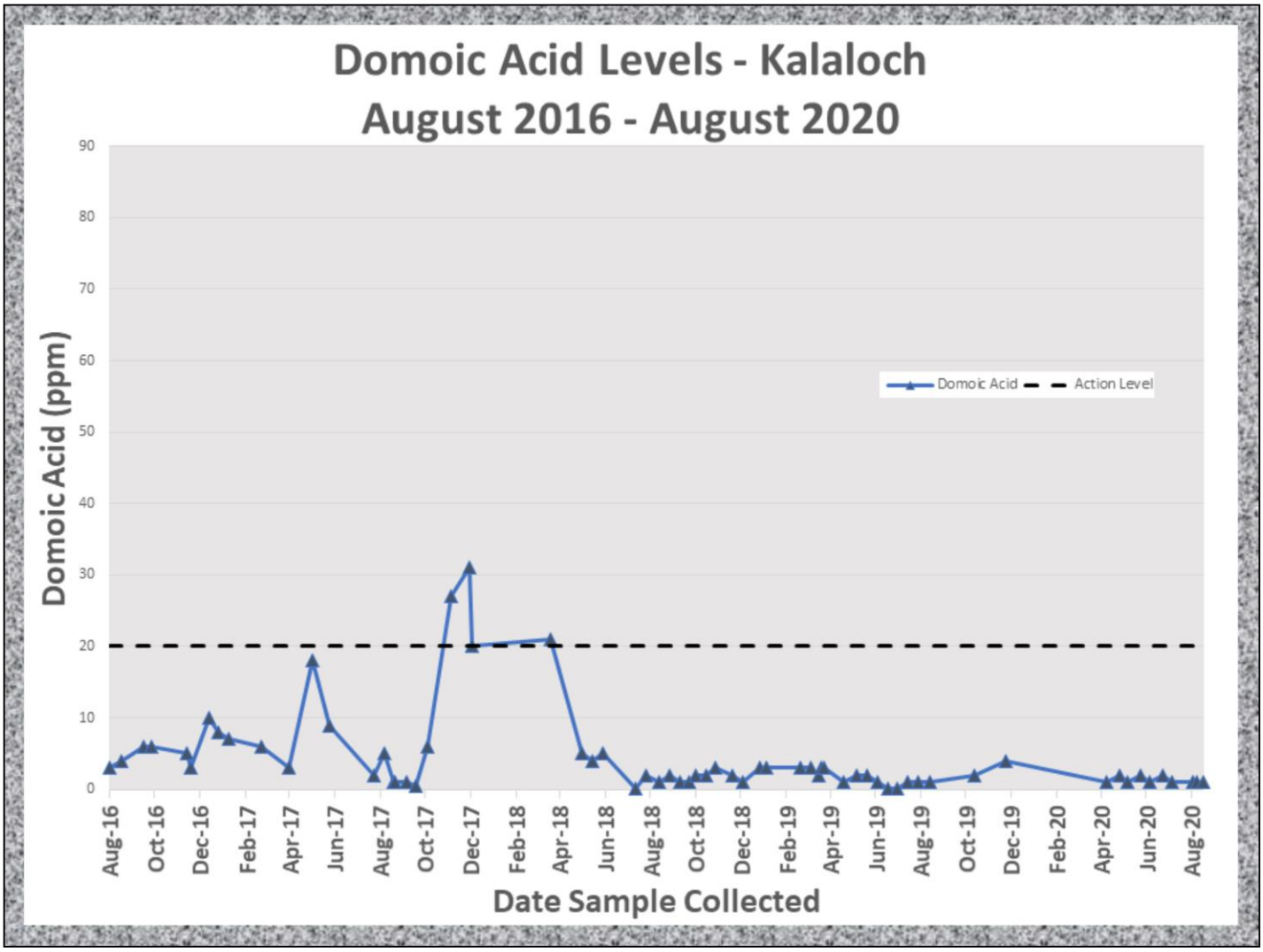

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For more information about domoic acid, see:
https://www.doh.wa.gov/CommunityandEnvironment/Shellfish/RecreationalShellfish/Illnesses/Biotoxins/AmnesicShellfishPoisoning

The impacts of harmful algal blooms (HAB) on razor clam fisheries along the coast of Washington State was the impetus that brought together Seattle based NOAA HAB researchers, University of Washington oceanographers and marine algae experts, state and tribal fishery managers and human health experts to form a successful partnership - the **Olympic Region Harmful Algal Bloom (ORHAB)** project. Beginning in 2000 with five-years of funding from NOAA's Monitoring and Event Response for Harmful Algal Blooms (MERHAB) Program the ORHAB partnership provided for a host of activities that included the necessary scientific equipment and for the unique training of local technicians as HAB specialists. With the end of federal funding and primary reliance on state dollars generated by a surcharge on recreational shellfish licenses, the focus of the partnership is primarily on HAB event prediction and monitoring. These state funds provide for two HAB specialists, one working for WDFW and the other for the University of Washington. In addition, funding from the Quinault Indian Nation (QIN) provides a third HAB specialist who works for QIN. While employed by separate agencies these local experts work closely together to monitor for HAB events along the entire Washington coast. The ORHAB specialists regularly present and discuss their findings with staff biologists and public health experts from WDFW, QIN and the Washington Department of Health (WDOH). In addition, scientists from NOAA and the UW provide oversight and advice on a regular basis. Insight gained from the ORHAB partnership and the recently completed ECOHAB-PNW project has led to a better understanding of where HAB events originate and what environmental factors promote their growth. While much is yet to be learned, we can better manage our important shellfish fisheries because of these insights, good science, and hard work produced by well trained - and locally based - HAB specialists.

WDFW uses standardized processing and analysis of samples to generate data on HABs and the presence of biotoxins. The data received from this monitoring program can provide managers advance notice of pending problems for potential openers as well as give razor clammers a heads up of what may be coming.

For more information see:
http://wdfw.wa.gov/conservation/research/projects/algal_bloom/index.html

Transferring sample dilutions to a microplate

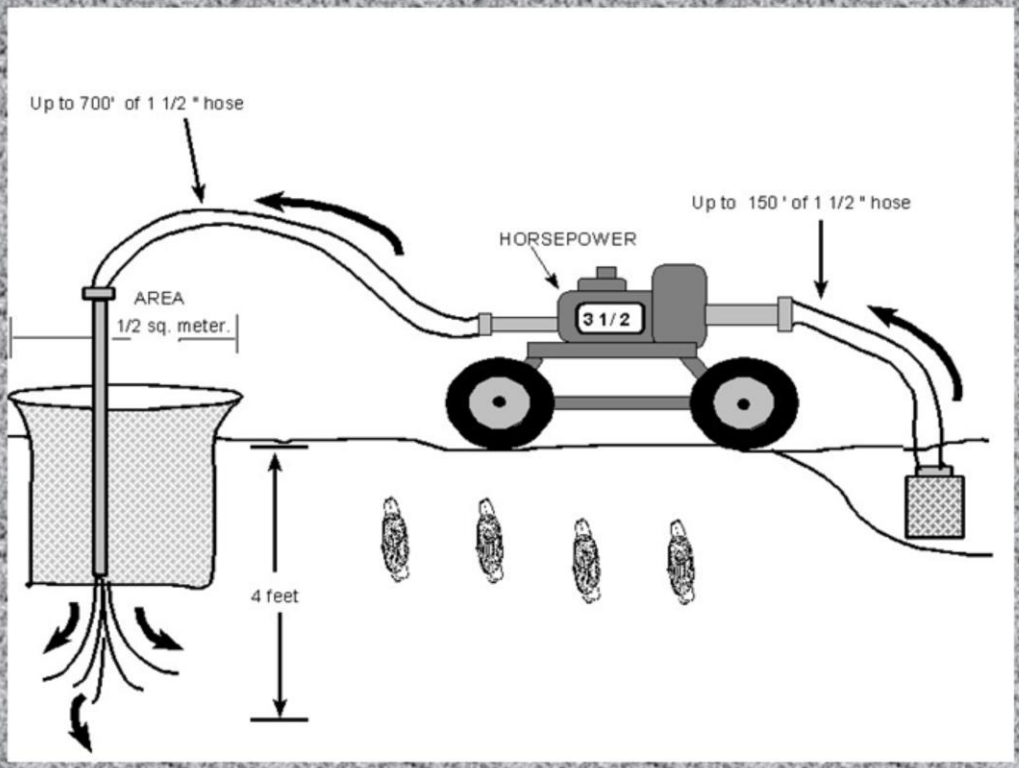
Adding domoic acid control to dilution series

Loading microplate reader

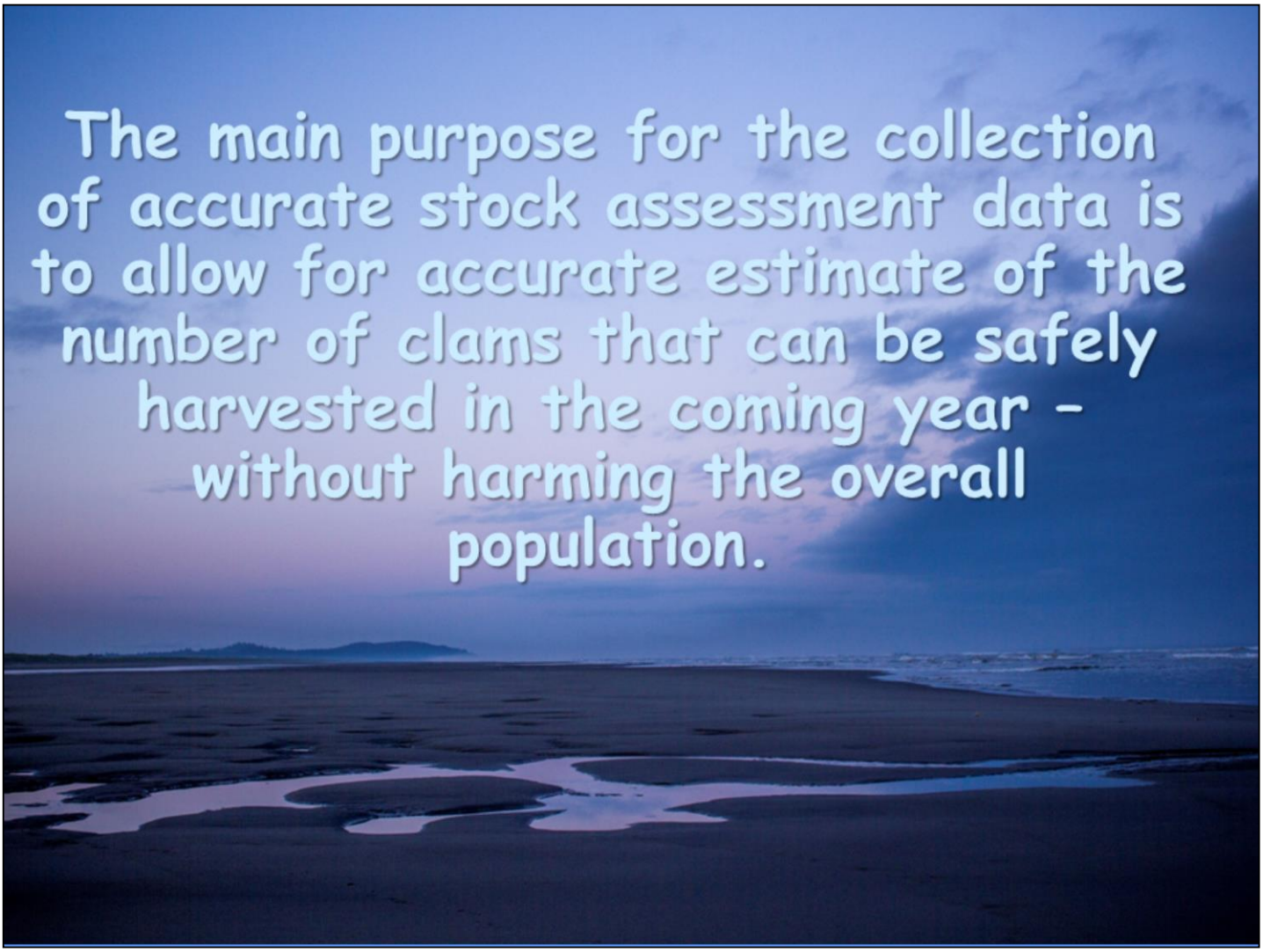
WDFW is now able to conduct a rapid field test using the ELISA method for the presence of domoic acid in shellfish and seawater

One major goal of the ORHAB project has been to develop and implement rapid detection technologies. This technology offers the promise of allowing field staff to determine the presence of toxins in seawater samples shellfish tissue without having to wait for the current time-consuming transport of samples to a distant laboratory. This process does not replace the regulatory testing conducted by the Washington Department of Health, but it does provide managers with an early warning of potential pending HAB issues.

Status of the Razor Clam Stocks



We now turn our attention to the work WDFW does to annually determine the number of razor clams available on each beach. This cartoon is a simplified version of how our razor clam stock assessment process works. You'll find more details in the following pages.



The main purpose for the collection of accurate stock assessment data is to allow for an accurate estimate of the number of clams that can be safely harvested in the coming year – without harming the overall population.

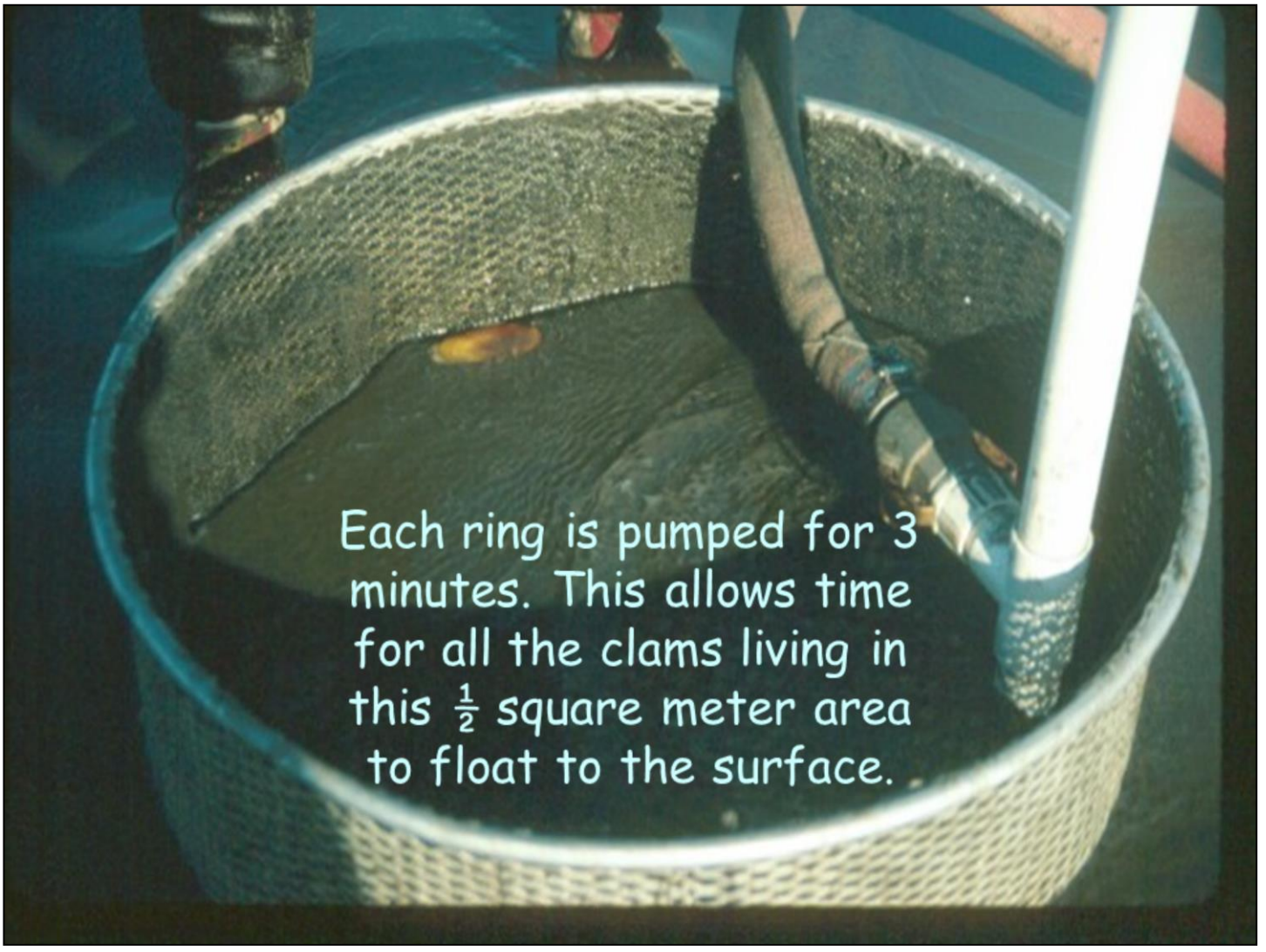
The stock assessment data provides us with estimates of the total number of clams and their average size. We are then able to determine the total number of clams that are at or over 3 inches, this size at which razor clams generally begin to make a clear “show” and are harvestable. The total allowable catch (TAC) for each beach is then calculated “variable” harvest rate applied to the total number of clams at or over 3 inches. See page 38-39 for details.

Know that razor clams that are 3 inches during our summer stock assessment will quickly grow and become a more suitable size as the season progresses.

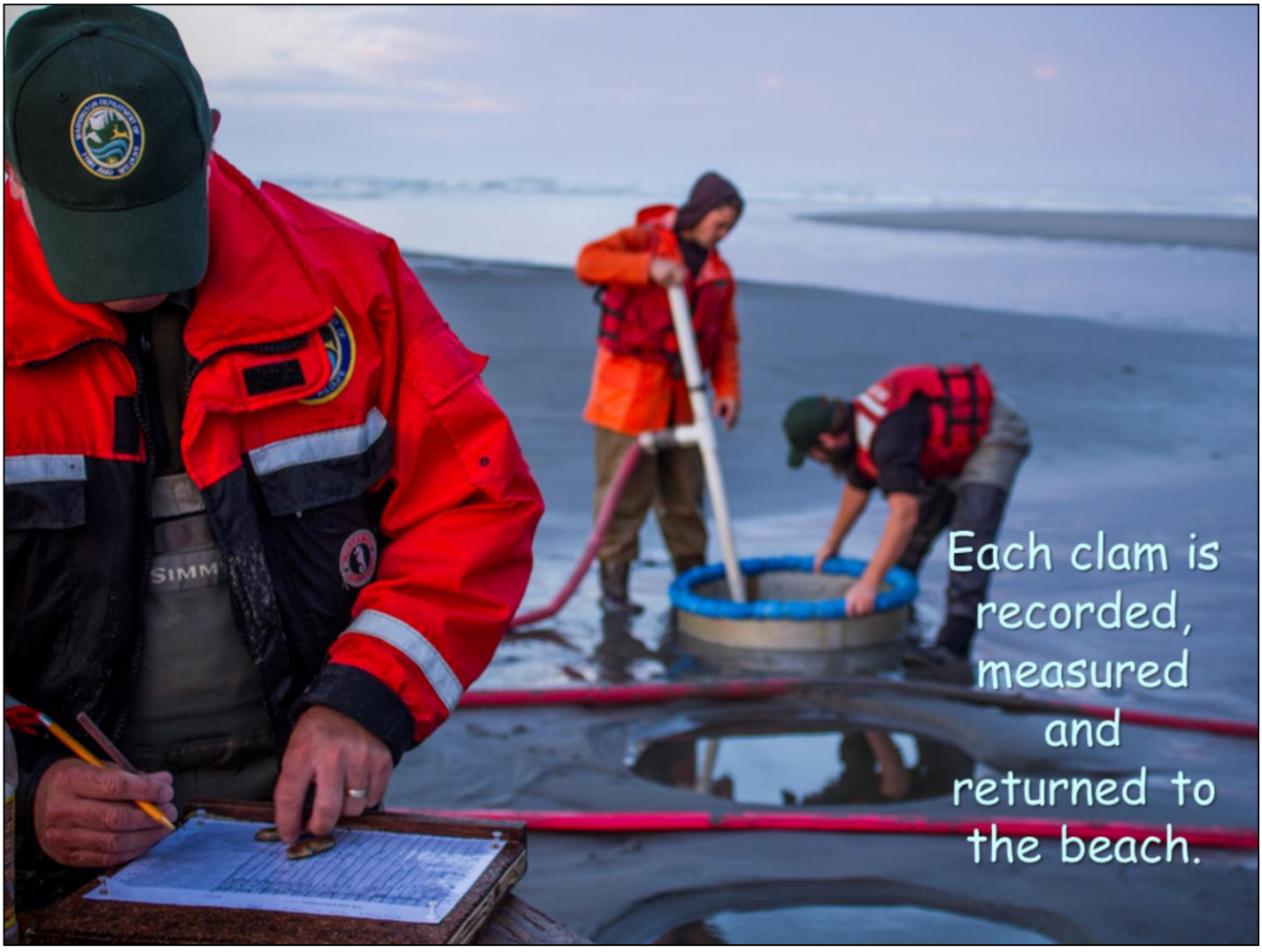
This year's work started on May 8 and was completed on August 30.

Surveying razor clams is not as easy as just digging all the clams in a known area. Razor clam digging requires the clam to "show" and not all clams "show" at the same time. As a result, it is not possible to dig every clam in a known area. The sampling method we use takes this into account and removes all the clams from a known area. WDFW uses the Pumped Area Method of sampling to provide accurate estimates of razor clam density. Read on for more information.

The Pumped Area Method uses water (pumped from the surf or a nearby lagoon) to liquefy the sand within an aluminum ring that is exactly ½ square meter in area. Every clam that is within the area of the ring will float to the surface and can be counted and measured as part of the random sample. The clams sample range in size from full grown adults (152 mm or 6 inches plus) down to very small newly "set" juvenile clams that are as small as 5 mm or ¼ inch and have only recently settled into the sand from the larval stage. This provides us a way to make estimates for both the recruit sized clams (> or = 76 mm or 3 inches) and the pre-recruits clams (<76 mm or 3 inches) . Previously used stock assessment methods did not provide a good bases for estimating pre-recruits.

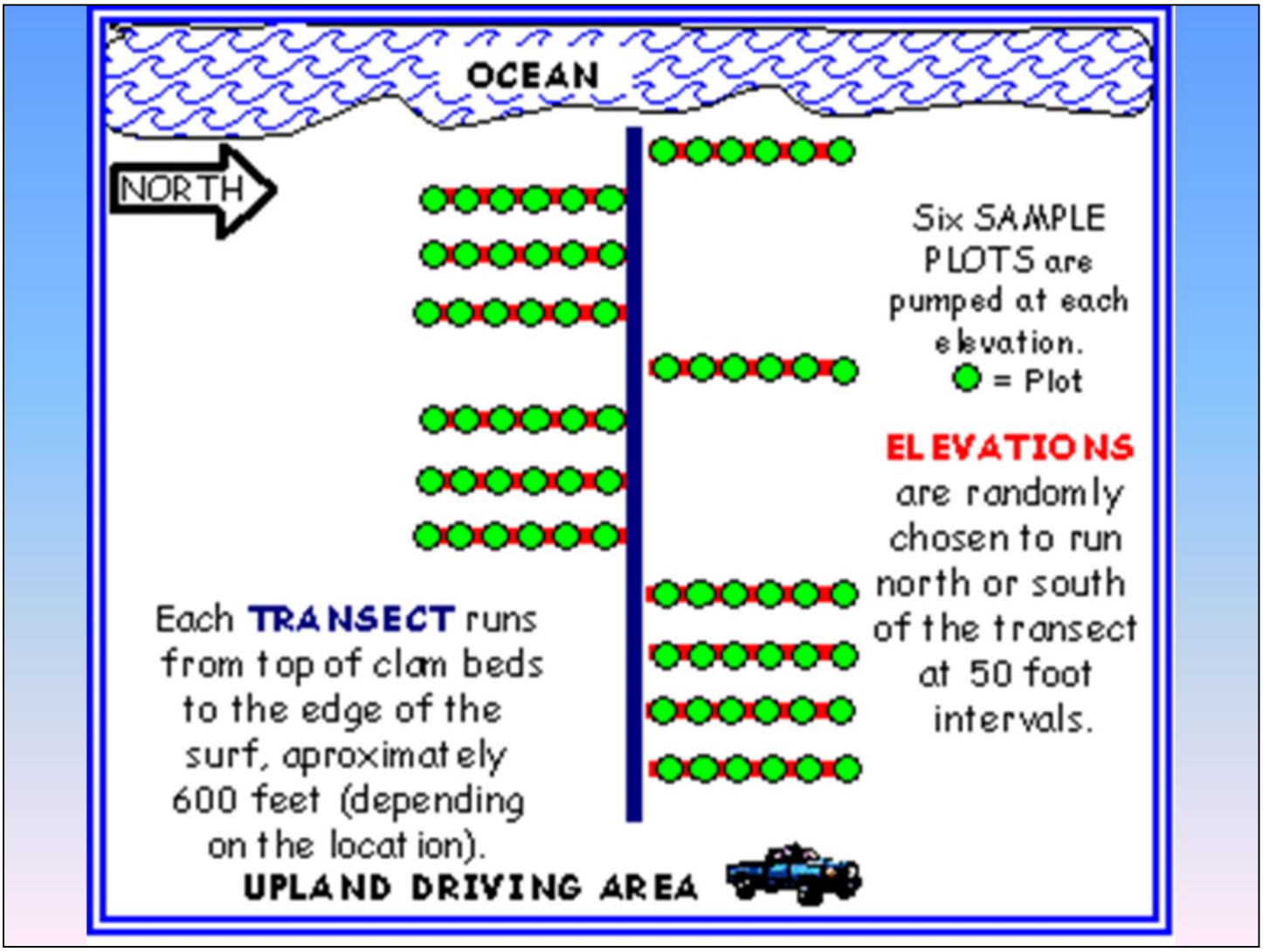


Each ring is pumped for 3 minutes allowing time for all the clams in the area of the ring to float to the surface and be counted.



Each clam is measured and recorded and returned to the beach.

The Pumped Area Method allows biologists to obtain the full data set needed to estimate both recruit clams and pre-recruit clams. This is in contrast with previous razor clam population sampling methods that were unable to estimate pre-recruits.



Each of the five management beaches is sampled with randomly selected transects chosen approximately one-mile apart. The sampling occurs during a good low tide, and begins at the top of the razor clam beds and moves out to the edge of the surf. Six plots (sample rings) are pumped at each 50 foot interval.

A recently produced video that demonstrates the WDFW stock assessment methods is now available on line. This will give you a better picture of the work we do each summer all along the Washington coast to make the best possible razor clam population estimates to be used in the management of the fishery. The video can be found at; http://youtu.be/aC4fu6_8G8I

Or go to https://Youtube.com and search for “Razor clams in Washington Stock Assessment”

How many days can we dig?

Stock assessment data :

1. Estimate of the number clams
2. Estimate of the average size

TAC (total allowable catch) =

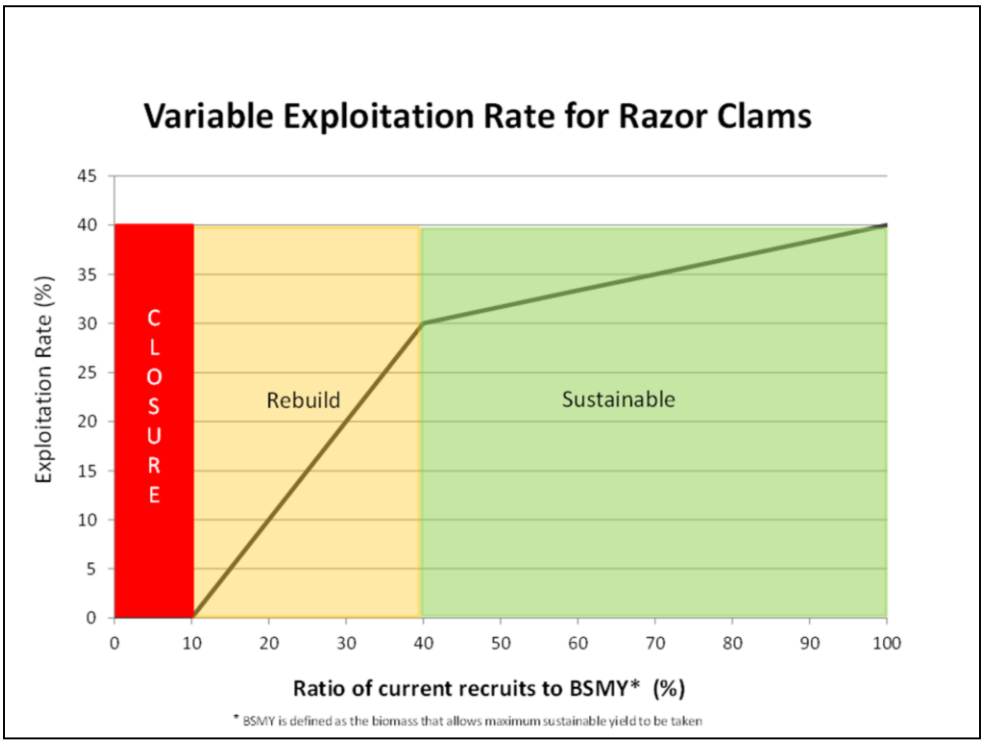
Total clams 3 inches or greater x variable harvest rate.

During the 2012-13 season, WDFW began using a new "variable" harvest rate on two beaches (rather than using a fixed harvest rate of 30%.)

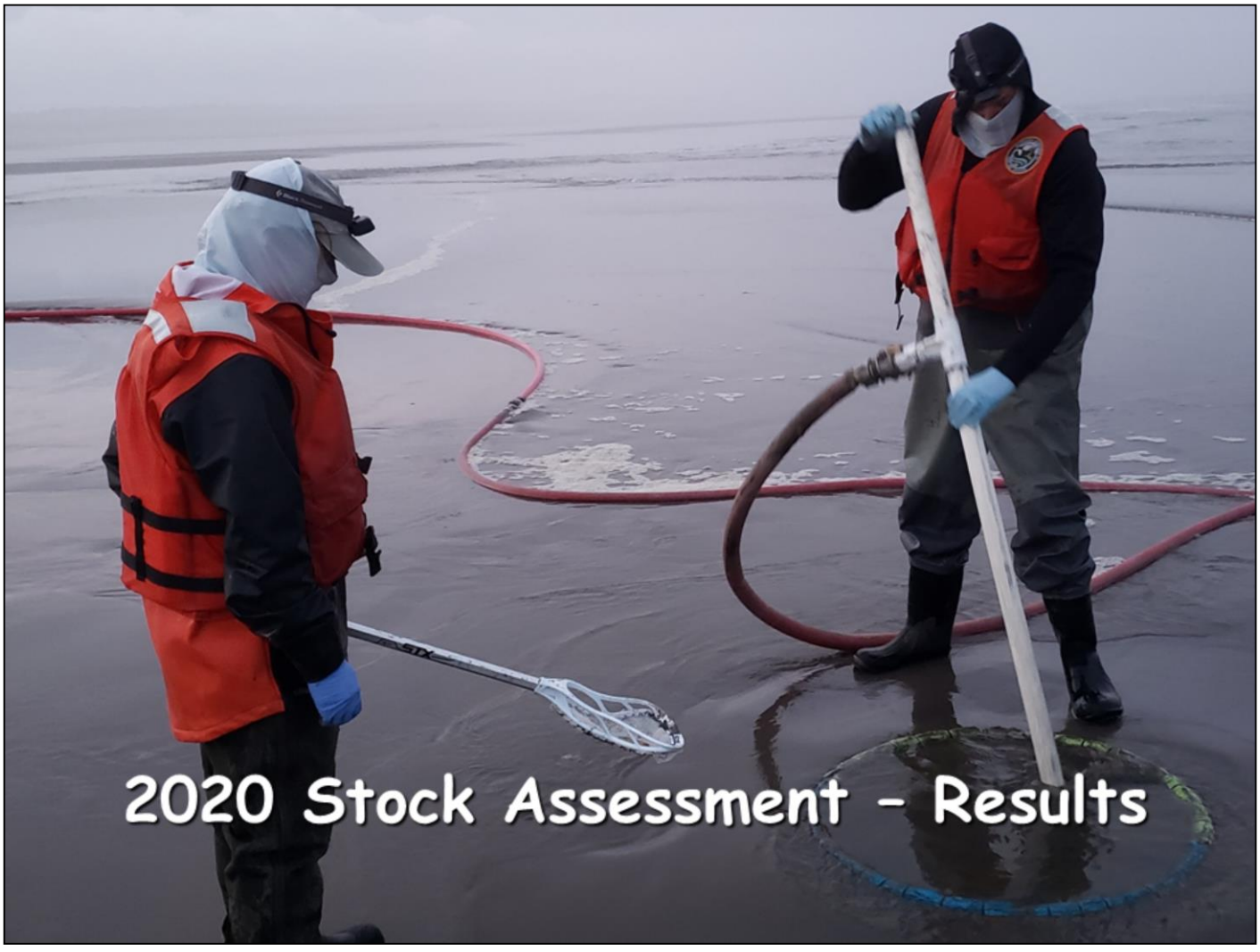
On these beaches we determine the harvest rate based on the ratio of the **current population** of razor clams (as measured by our most recent stock assessment on each beach) and the **highest population** level measured (again on each beach). The maximum harvest rate possible (using the variable harvest rate method) is 40%.

This methods allows for more harvest during times of abundant populations while still preserving the spawning capacity of the population. It also includes an automatic rebuilding strategy (with a reduced harvest rate) during times when stocks are weak.

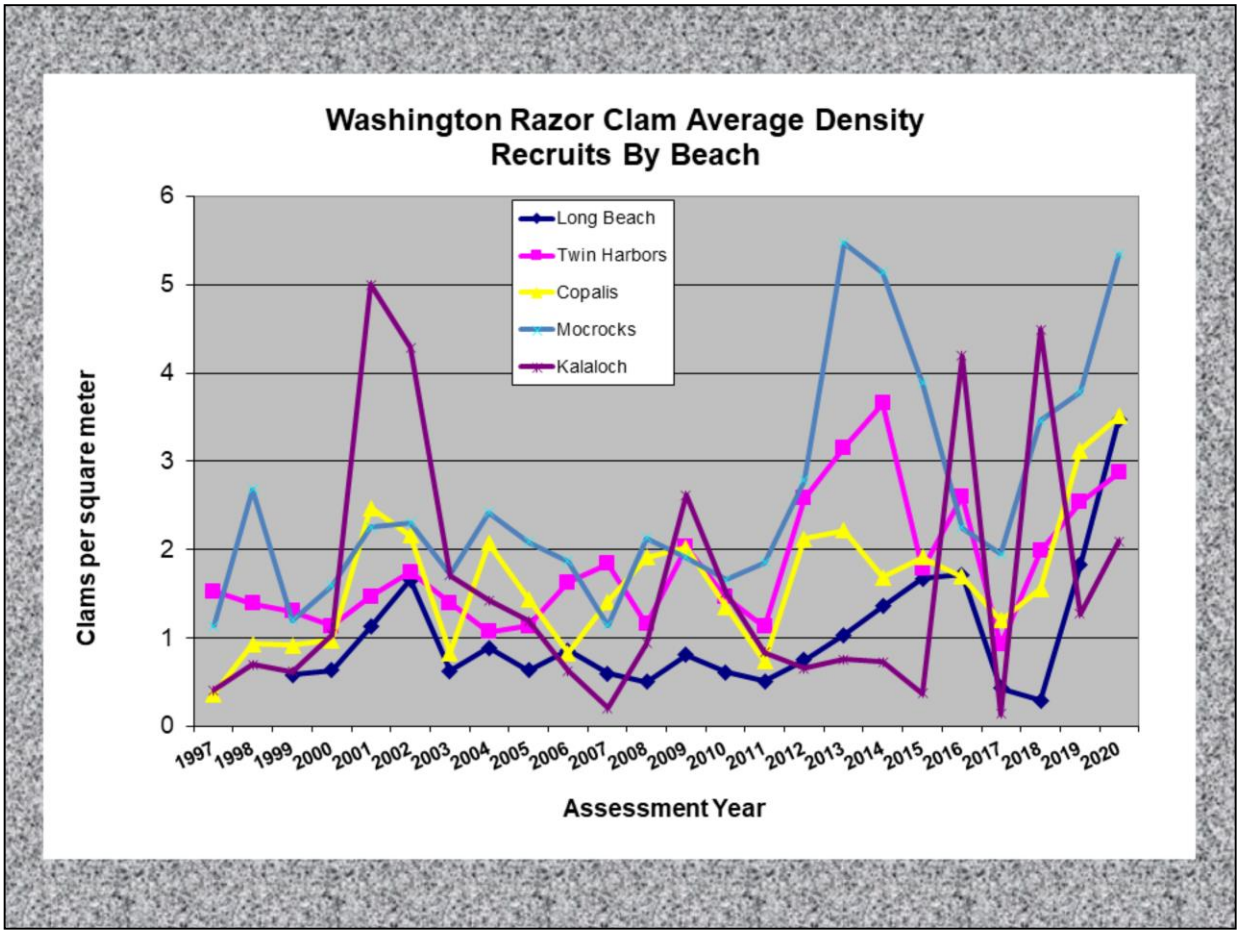
The variable harvest rate is being used to determine the TAC (total allowable catch) for Long Beach, Twin Harbors, Copalis and Mocrocks.



Starting with the 2012-13 recreational razor clam season, WDFW has used a modified management strategy. Rather than using a Static Exploitation Rate (ER) of 30%, we have adopted a Variable Exploitation Rate. As a result, the *harvest rate* used to develop the TAC will be *re-calculated* for each beach, each season. That rate will be based on the ratio of the current population of recruit sized clams (clams 3 inches or larger) compared to the entire biomass that allows the maximum sustained yield, or BSMY. The BSMY is practically defined as the highest historical density of clams for each beach. This method has two advantages. It allows the harvest of more clams (to a maximum of a 40% ER) when clam density is high (populations considered to be abundant) and it allows for a reduced harvest levels when densities are lower (smaller populations). When populations drop below 40% of BSMY an automatic rebuilding strategy is employed. Anytime a population drops below 10% of BSMY the fishery will be closed.



The 2020 assessment of razor clam populations in the midst of the Covid-19 Pandemic brought our crews new challenges. After some delay in starting all time for the development of safety protocols and get approval from the WDFW Safety Office, we completed all of our work and none of the our crew became ill. In addition, we recorded some record numbers of clams on some beaches. Read on for the details.



The best way to compare razor clam populations between beaches is to look at the average density (on the razor clam beds over the entire length of each beach) as measured in our annual stock assessment work. This graph displays average density on each beach back over the last ten years. It is clear from this data that razor clam populations naturally change in abundance a fair amount. This is not an unexpected pattern in a shellfish population that is so heavily dependent on favorable oceanographic and weather conditions to allow for successful spawning and setting. As with any natural population, there are also disease processes that contribute to the variability in population levels. The 2020 results show improved populations on all beaches . More details to follow.

The 2020 the average density (clams per square meter) by beach was : Long Beach = 3.47; Twin Harbors = 2.87; Copalis = 3.61; Mocrocks = 5.34; Kalaloch = 2.10

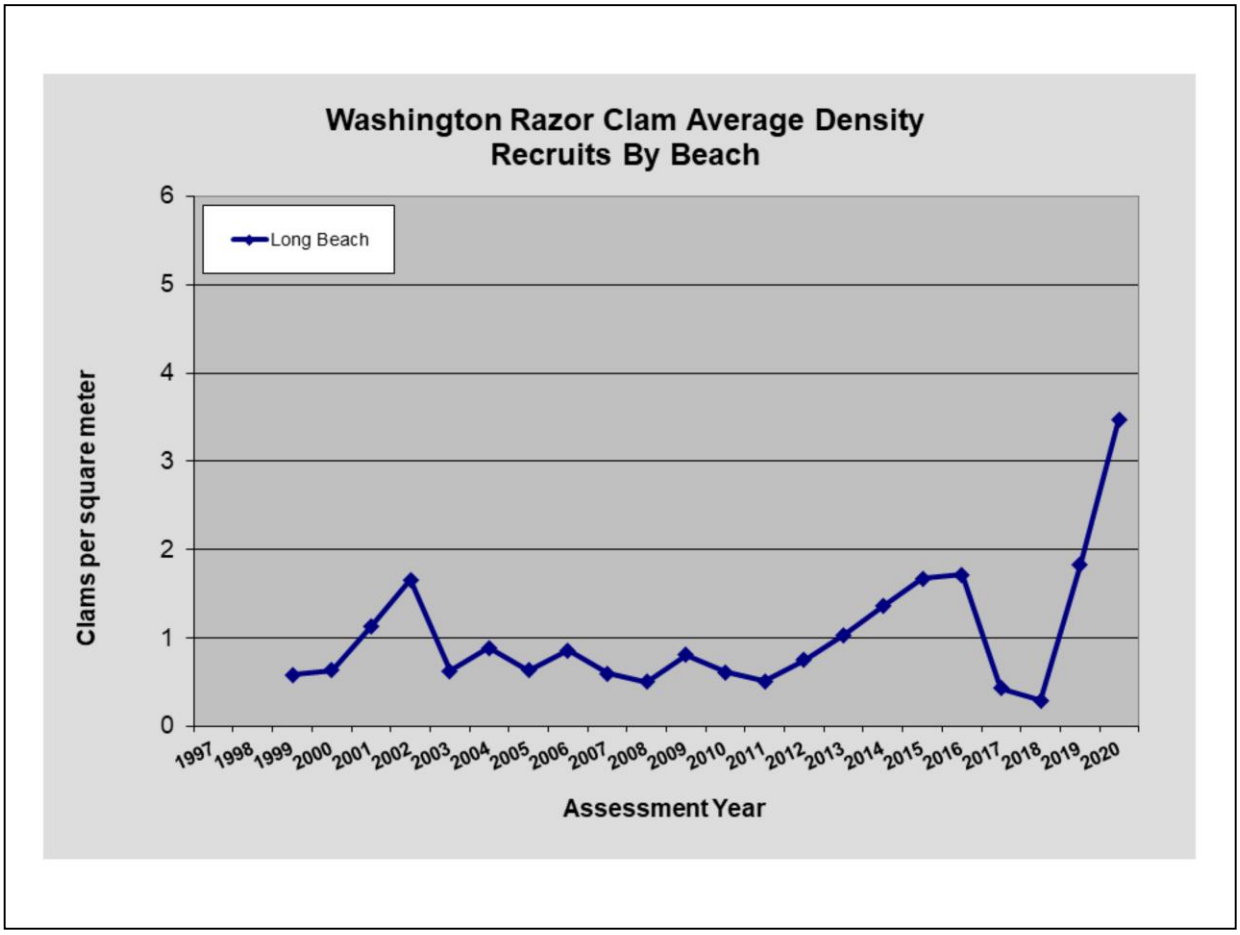
For comparison: The 2019 average densities were; Long Beach = 1.82; Twin Harbors = 2.54; Copalis = 3.12; Mocrocks = 3.78; Kalaloch = 1.30 . The 2018 average densities were; Long Beach = 0.29; Twin Harbors = 1.98; Copalis = 1.55; Mocrocks = 3.46; Kalaloch = 4.50. The 2017 the average density (clams per square meter) by beach was : Long Beach = 0.43; Twin Harbors = 0.92; Copalis = 1.20; Mocrocks = 1.95; Kalaloch = 0.02. The 2016 average density (clams per square meter) by beach was: Long Beach = 1.71; Twin Harbors = 2.60; Copalis = 1.69; Mocrocks = 2.24; Kalaloch = 4.19.

LONG BEACH RAZOR CLAM POPULATION, TOTAL ALLOWABLE CATCH (TAC) AND HARVEST DATA

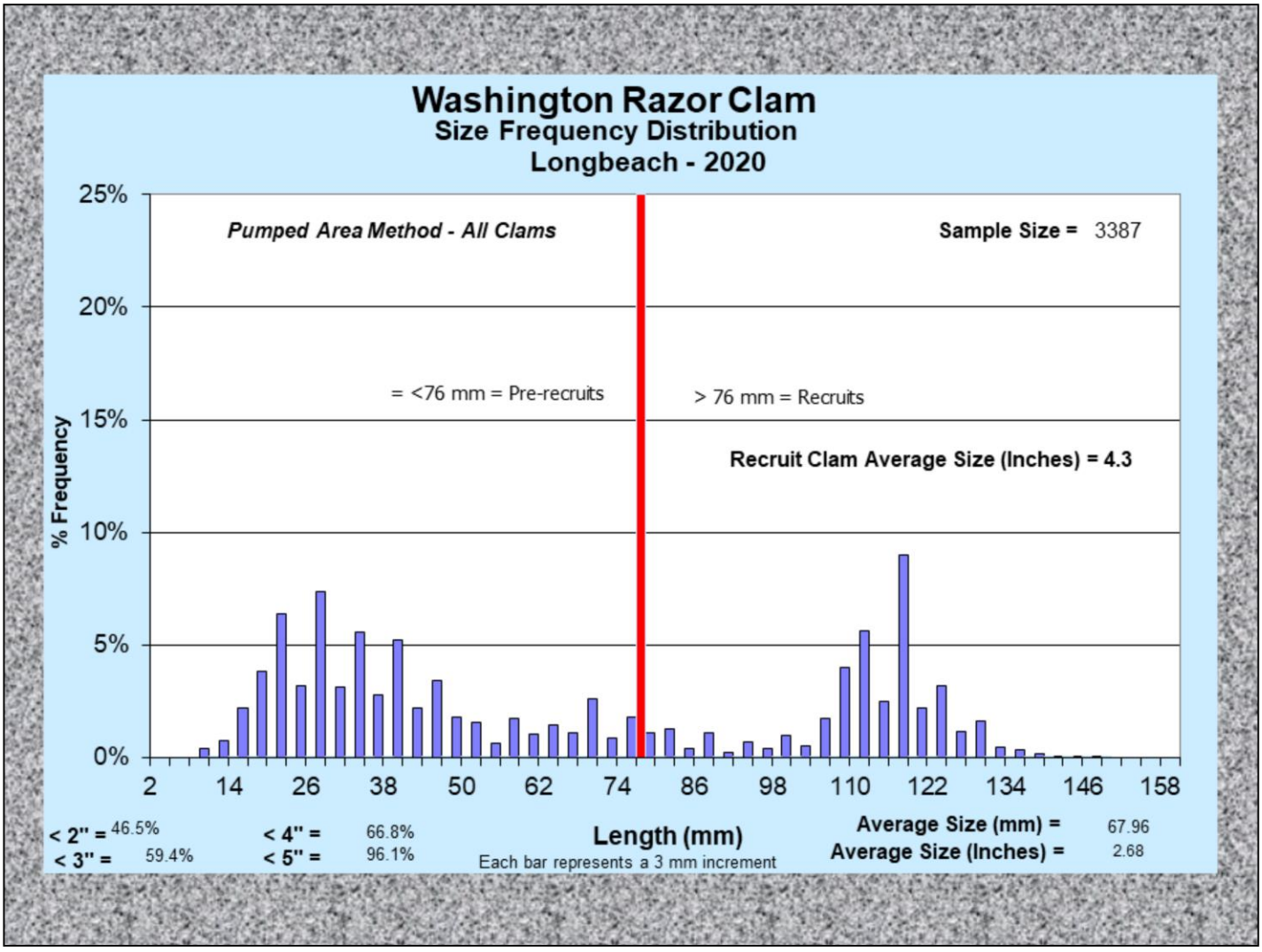
	POPULATION (clams)		TAC (clams)	HARVEST	% of TAC
YEAR	RECRUITS	PRE-RECRUITS	of recruits	TOTAL (clams)	harvested
2016-17	12,239,059	6,099,130	4,895,624	1,604,767	32.7%
2017-18	3,062,033	191,526	872,680	839,747	96.2%
2018-19	2,084,734	9,947,737	333,557	645,290	193.5%
2019-20	13,013,667	25,598,579	5,205,467	1,644,196	31.6%
2020-22	24,791,968	34,470,221	9,916,787		
AVERAGE	**11,038,292**	**15.261,439**		**1,182,750**	

You will recall that the 2019 stock assessment results for Long Beach indicated that the number of harvestable (recruit) size clams was at a 25-year high. We were also encouraged to see a strong stock of pe-recruits. The great news from the 2020 assessment on Long Beach is that the number of recruits in nearly double last year's high with even stronger numbers of the smaller pre-recruits clams which should help maintain strong digging on this beach into the future.

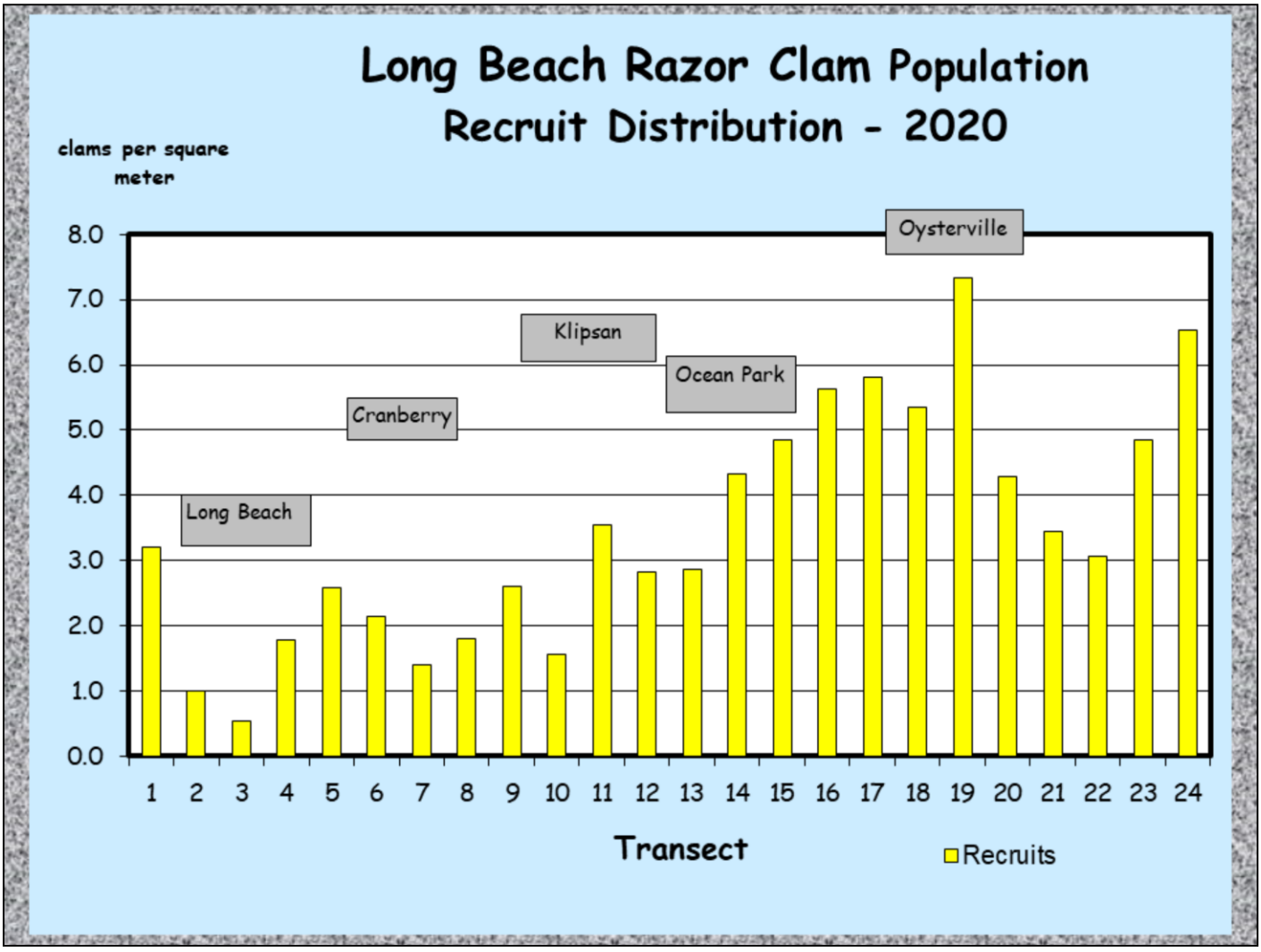
Recall; recruits are defined as clams => 76 mm (3 inches); pre-recruits are < 76 mm (3 inches)."



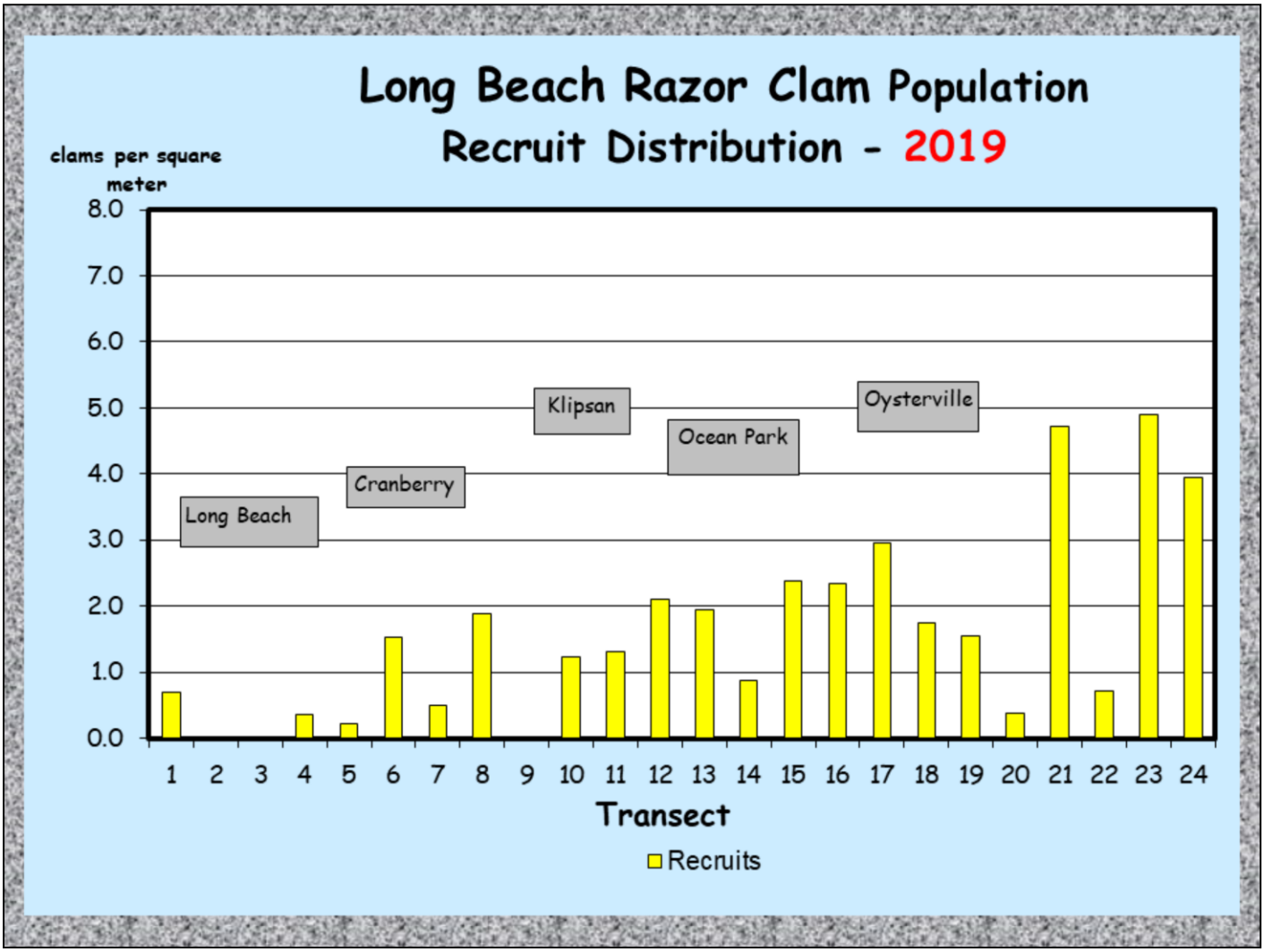
This is the same data that we presented in slide 41, although only the Long Beach historical population densities are included.



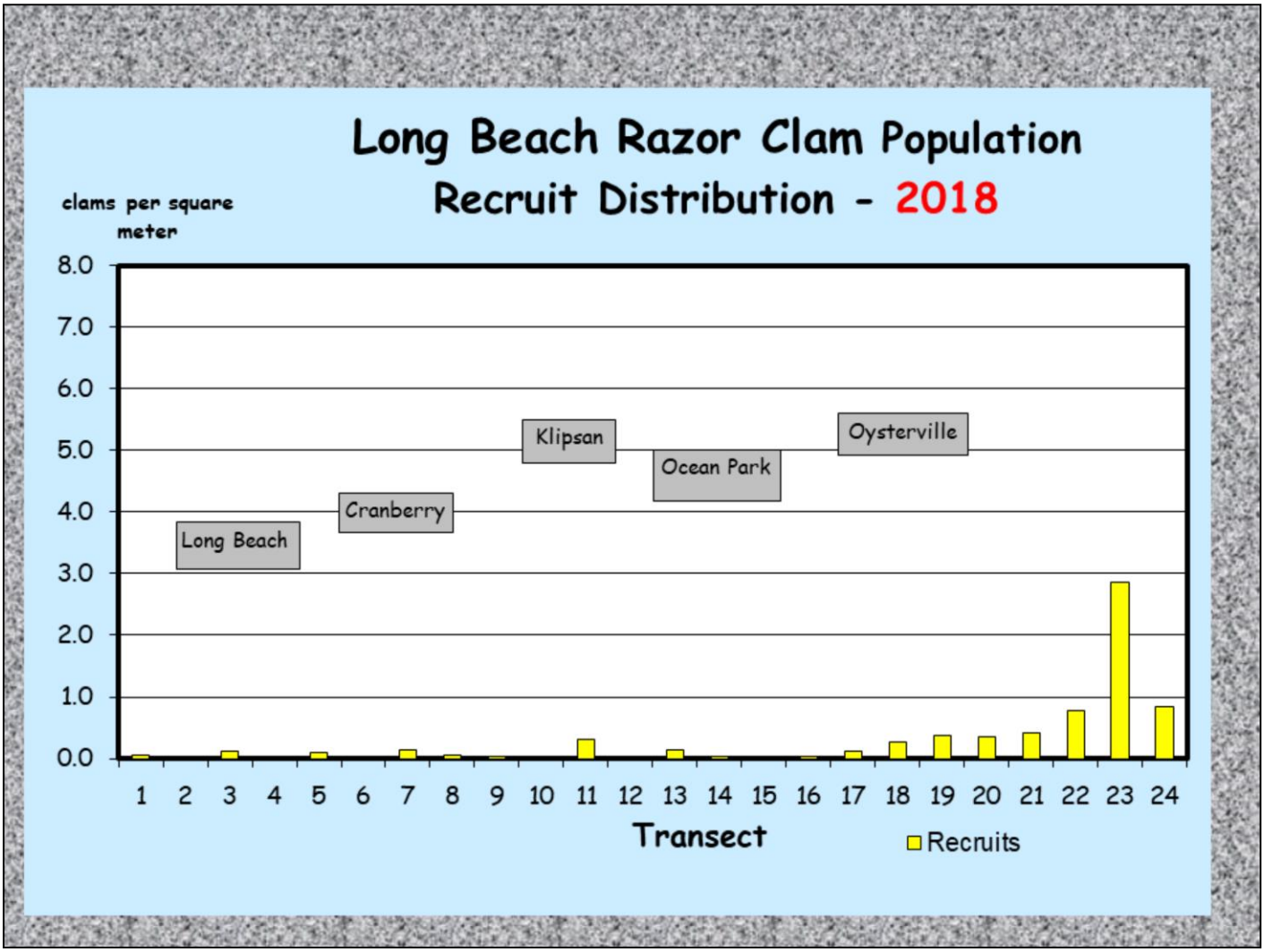
The average size of the Long Beach recruit clams found in our 2020 surveys was 4.3 inches. This compares to the average size in our 2019 surveys was 3.68 inches; 2018 average of 4.2 inches ; 2017 average of 4.5; 2016 average of 4.3; 2015 average of 4.0 inches; and the 2014 average of 3.8 inches.



The 2020 densities show how well the recruit sized clams are spread all along the beach. Note that the density (y-axis) peaks out at 8.0 clams per square meter. If you compare this to 2019, the maximum was 5 clams per square meter.



For the sake of comparison, we present here the **2019 followed by the 2018** densities of recruit razor clam populations along the entire beach. You can see the dramatic improvement in the number of recruits clams over these last three years.



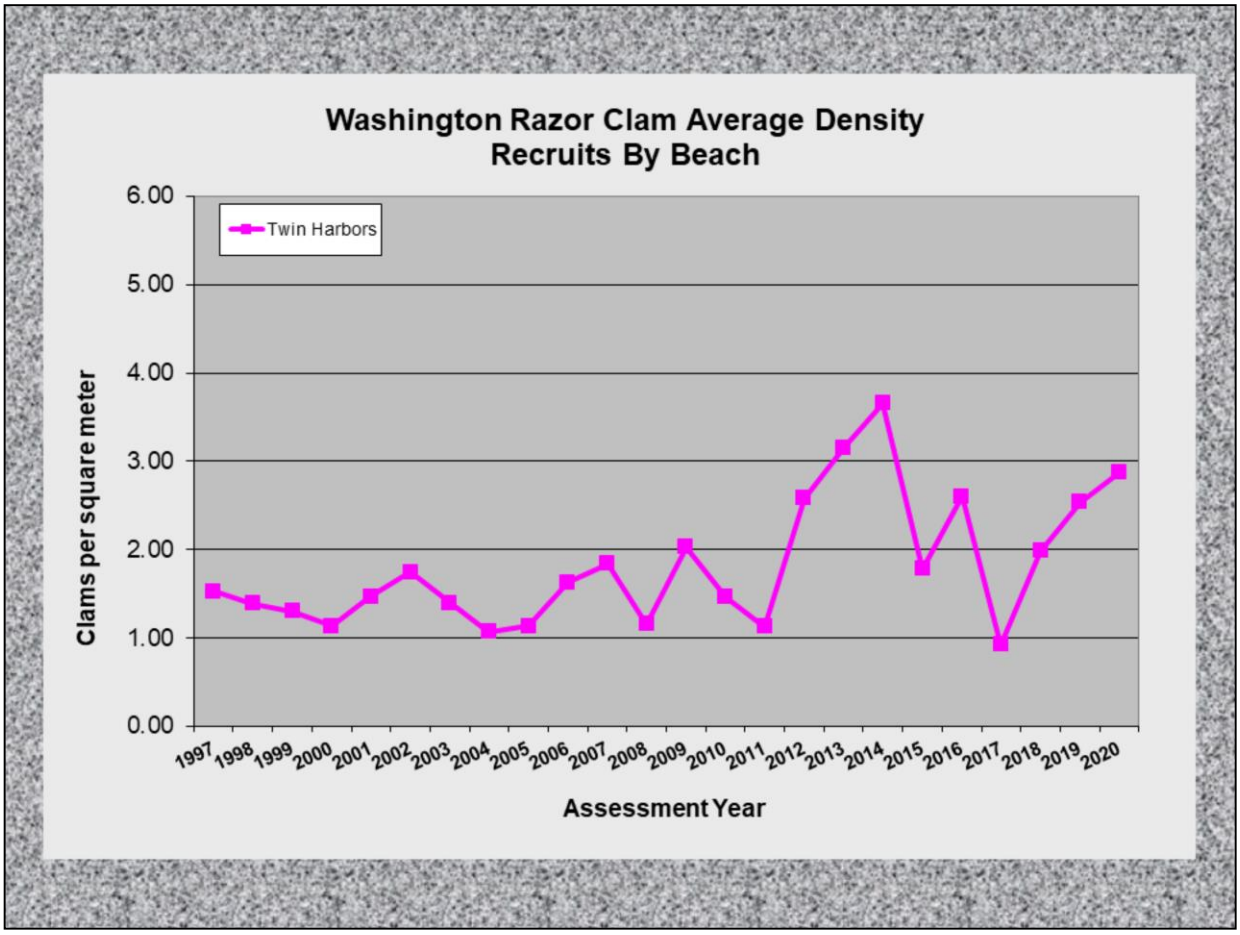
For the sake of comparison, we present here the **2018 preceded by the 2019 and 2020** densities of recruit razor clam populations along the entire beach. You can see the dramatic improvement in the number of recruits clams over these last three years.

TWIN HARBORS RAZOR CLAM POPULATION, TOTAL ALLOWABLE CATCH (TAC) AND HARVEST DATA

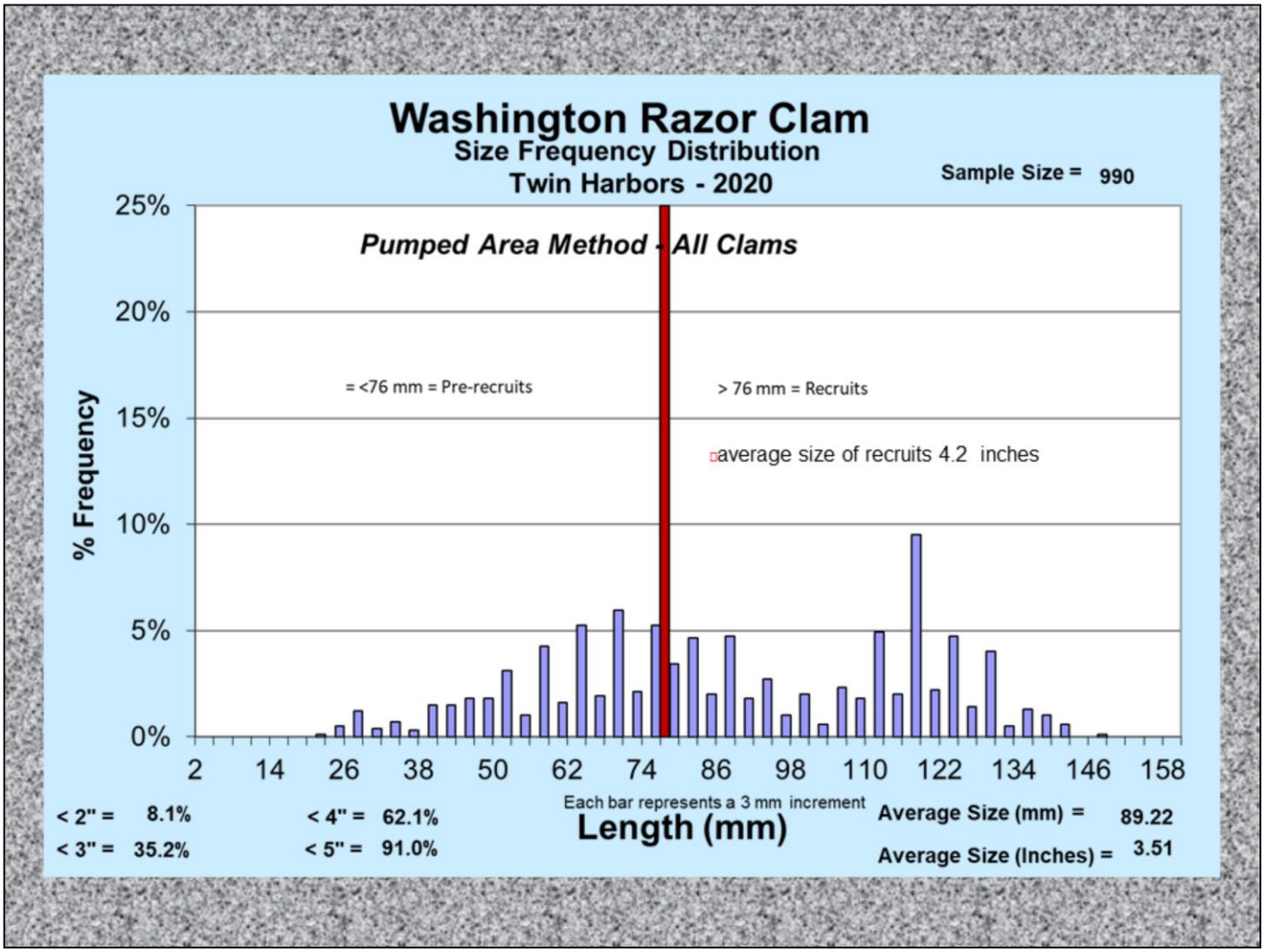
	POPULATION (clams)			HARVEST	
			TAC (clams)	(clams)	% of TAC
YEAR	RECRUITS	PRE-RECRUITS	of recruits	TOTAL	harvested
2016-17	4,741,577	3,069,921	1,896,631	867,450	45.7%
2017-18	1,677,810	1,533,197	506,699	632,295	124.8%
2018-19	3,614,103	1,752,009	1,373.359	1,188,410	86.3%
2019-20	4,608,068	1,391,989	1,843,227	755,166	41.0%
2020-21	5,210,727	2,878,451	2,084,291		
AVERAGE	**3,970,457**	**2,125,115**		**860,830**	

There is definitely some great news here for Twin Harbors diggers. Populations are in good shape and there will a lot of digging days offered in the coming season.

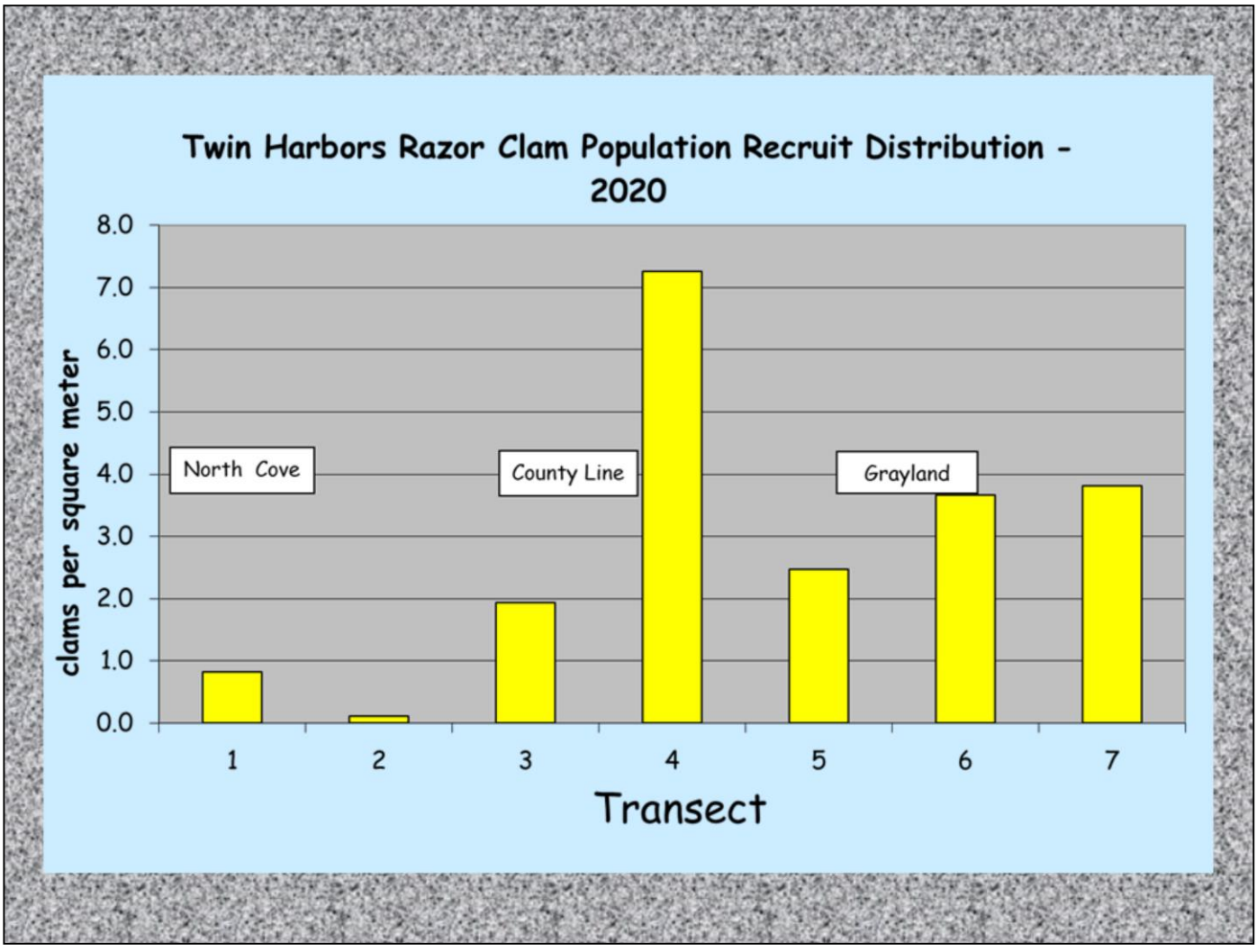
Recall; recruits are defined as clams => 76 mm (3 inches); pre-recruits are < 76 mm (3 inches).



This is the same data that we presented in slide 41, although only the Twin Harbors historical population densities are included.



The average size of the Twin Harbors recruit clams found in our summer 2020 surveys was 4.2 inches. This compares to 4.3 in 2019, 3.9 in 2018; 3.9 inches in 2017; and 4.4 inches in 2016.



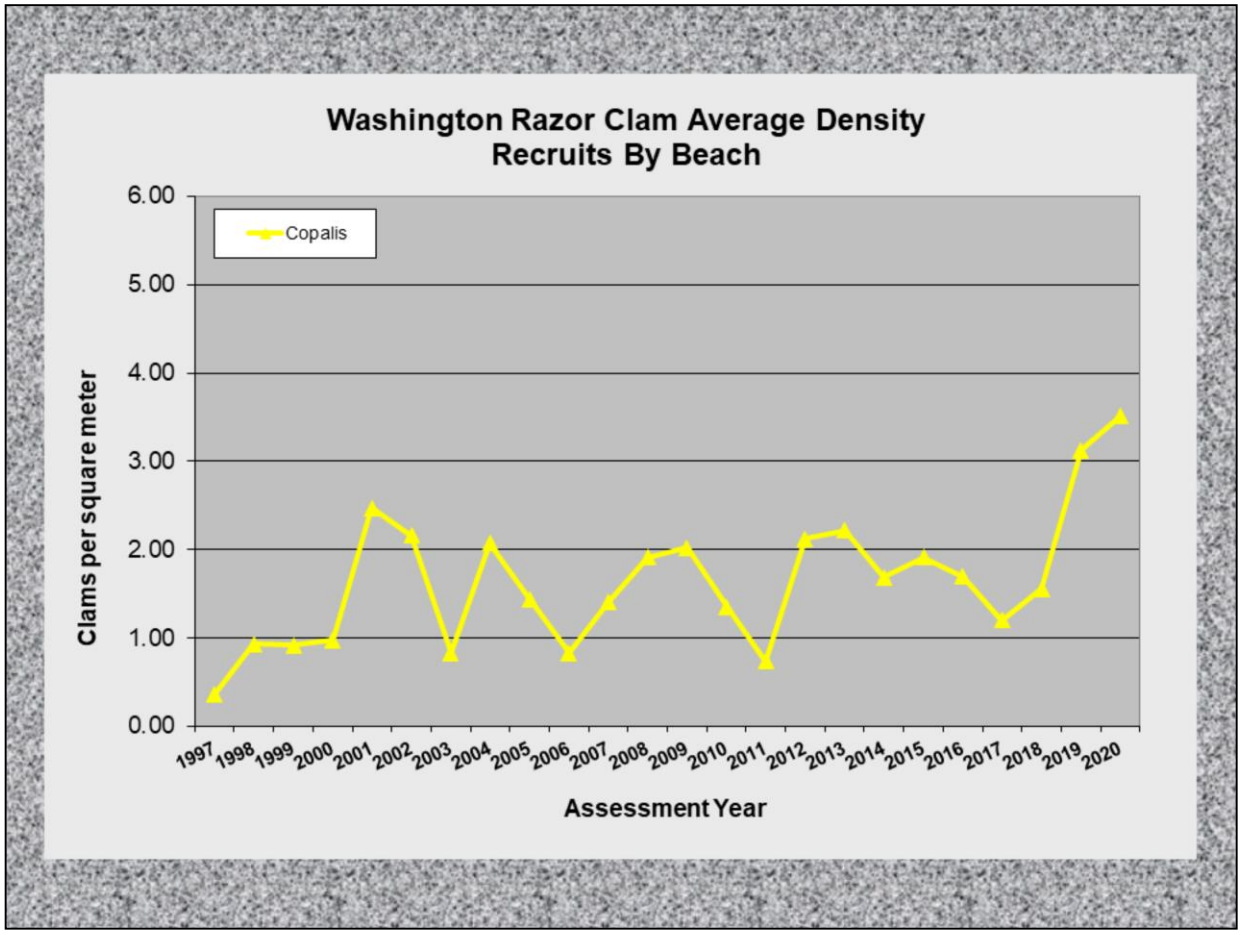
Diggers will find good razor clam populations on most all of the Twin Harbors beach, although digging on the very south end will likely not be good. .

COPALIS RAZOR CLAM POPULATION, TOTAL ALLOWABLE CATCH (TAC) AND HARVEST DATA

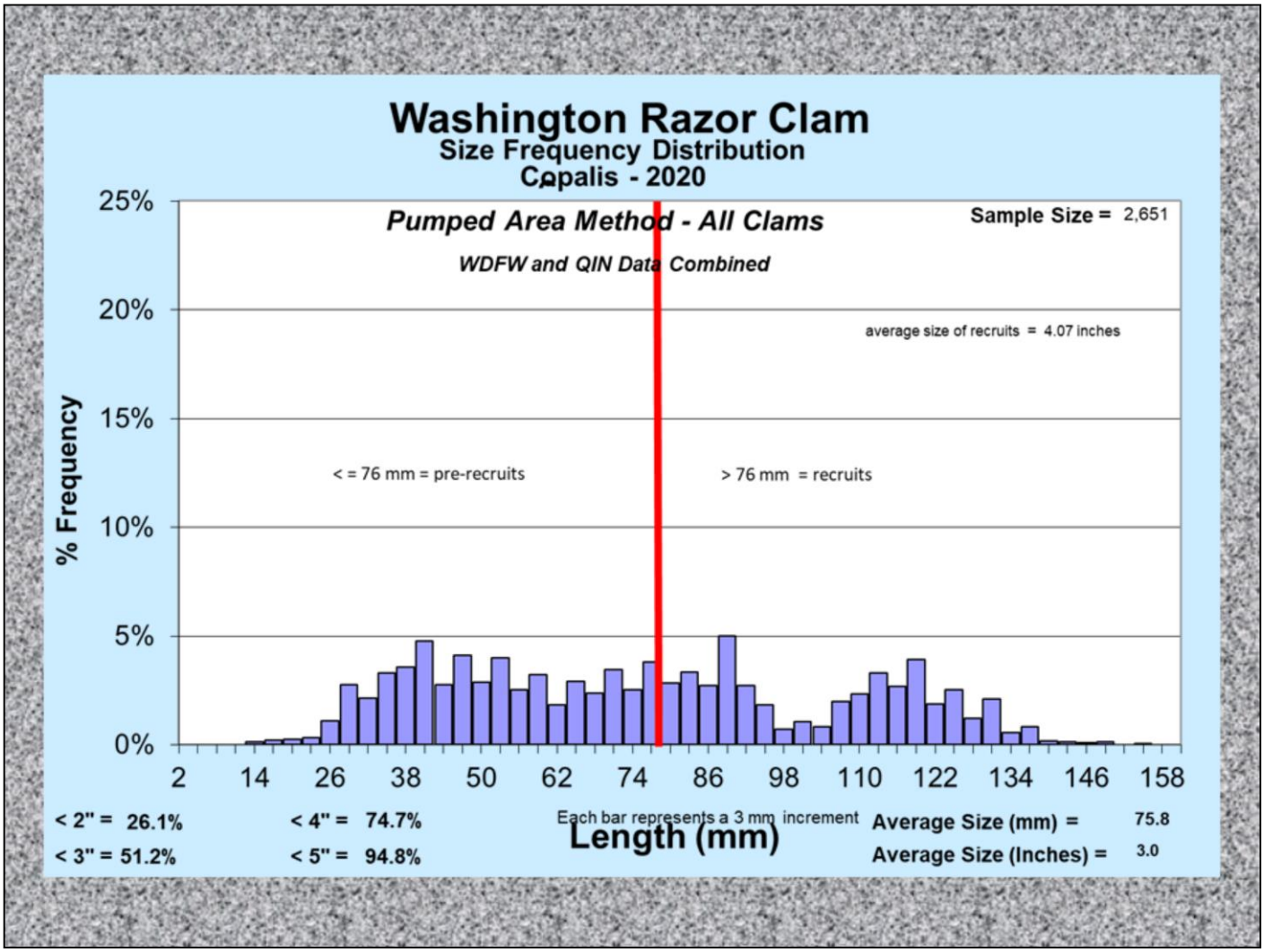
	POPULATION (clams)		Total	State's Share	State's	
			TAC (clams)	*(50% w/*	HARVEST (clams)	% of share
YEAR	RECRUITS	PRE-RECRUITS	of recruits	*adjustments)*	TOTAL	harvested
2016-17	5,708,079	2,780,283	2,083,449	880,571	1,094,571	124.3%
2017-18	4,040,482	6,232,276	1,325,278	591,366	577,191	97.6%
2018-19	5,236,188	8,332,329	1,864,083	860,768	869,470	101%
2019-20	10,536,758	6,375,231	4,214,703	2,036,079	725,451	35.6%
2020-21	11,848,503	12,560,196	4,739,401	2,369,701		
AVERAGE	**7,474,002**	**7,256,063**			**816,367**	

A moderate increase in recruits at Copalis will result in additional digging during the 2020-21 season. In addition, the strong addition of over 12 million pre-recruit clams bodes well for the future.

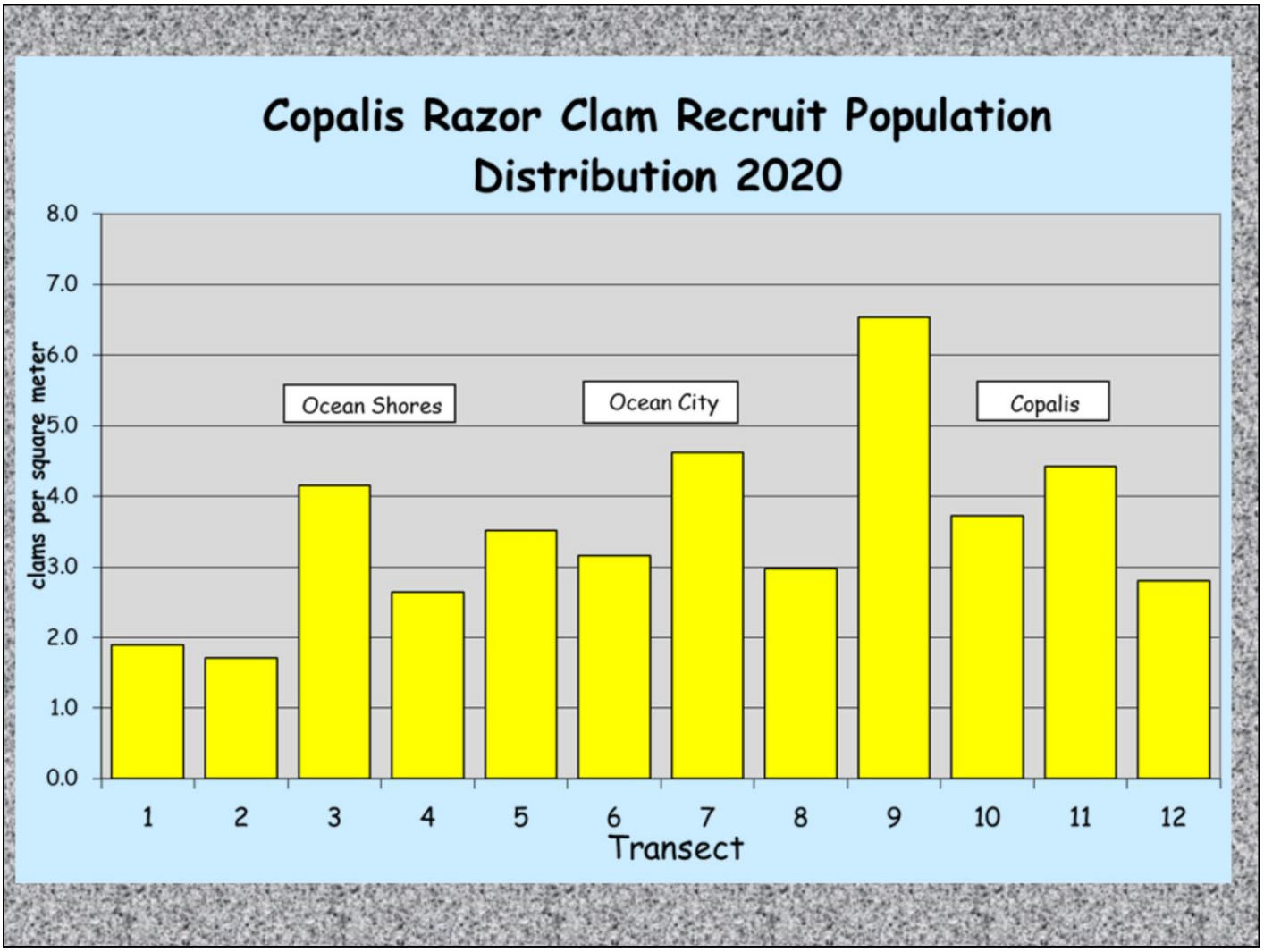
Recall; recruits are defined as clams => 76 mm (3 inches); pre-recruits are < 76 mm (3 inches).



This is the same data that we presented in slide 41, although only the Copalis historical population densities are included.



The average size of the Copalis recruit clams found in our 2020 summer surveys was 4.1 inches; compared to 4.2 in 2019; 3.9 inches in 2018; 4.3 inches in 2017; 4.4 inches 2016.

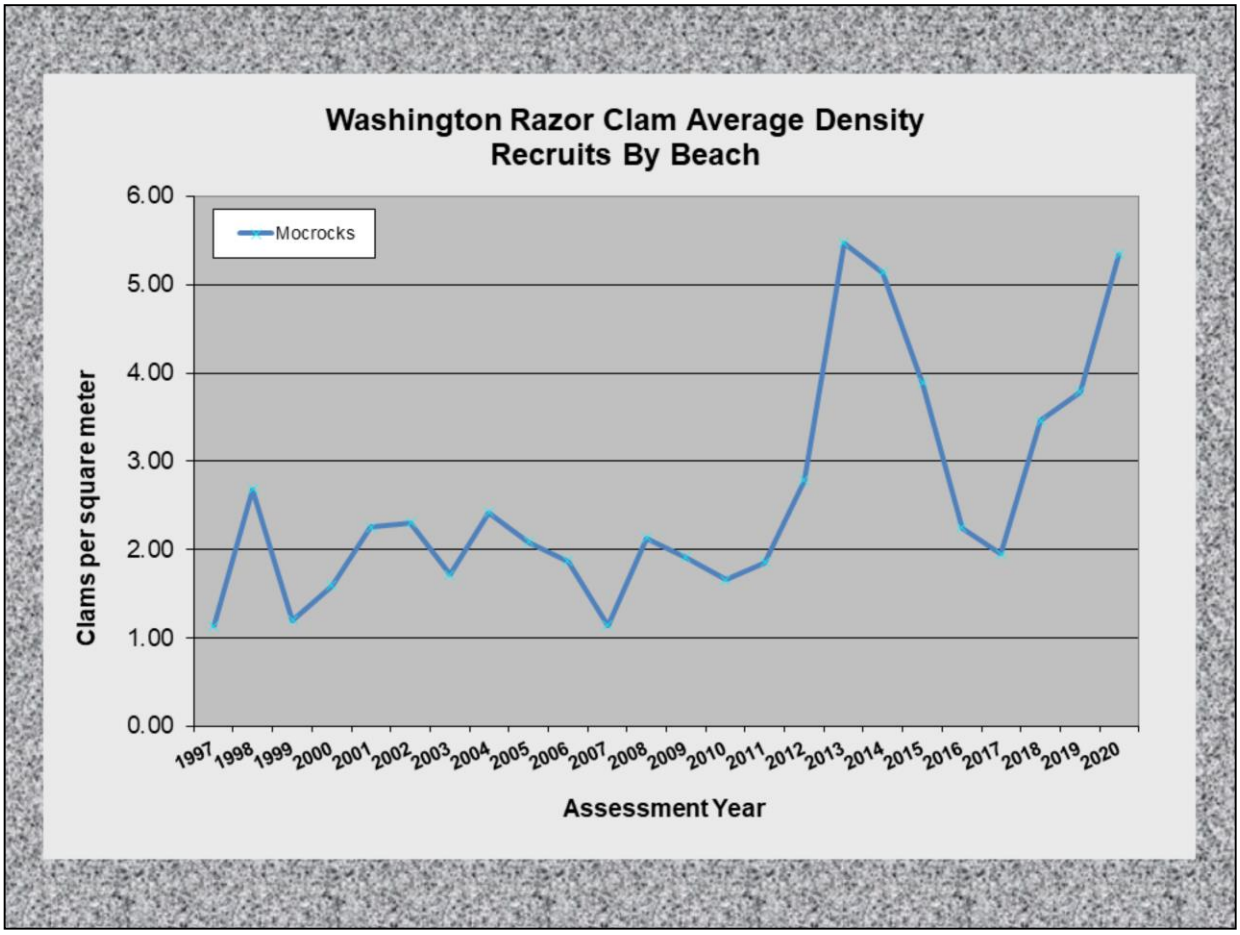


Digging should be very good in most areas of the Copalis beach during the 2020-21 season with strong densities of recruit clams is almost all areas.

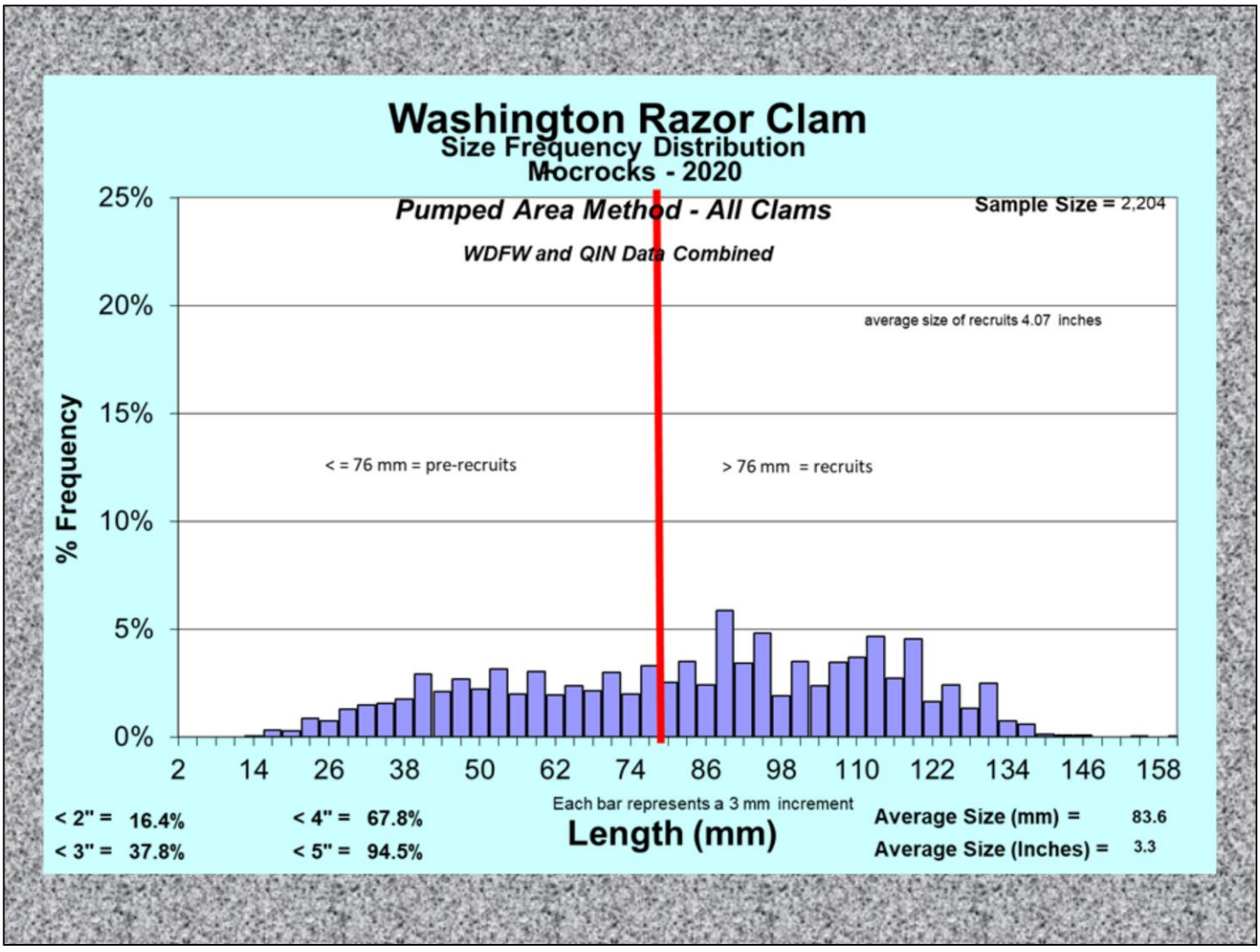
MOCROCKS RAZOR CLAM POPULATION, TOTAL ALLOWABLE CATCH (TAC) AND HARVEST DATA

	POPULATION (clams)		Total	State's Share	State's	
			TAC (clams	*(50% w/*	HARVEST (clams)	% of share
YEAR	RECRUITS	PRE-RECRUITS	of recruits	*adjustments)*	TOTAL	harvested
2016-17	4,893,087	975,023	1,883,838	941,919	706,083	75.0%
2017-18	4,253,303	11,427,124	1,556,709	778,355	791610	101.7%
2018-19	7,536,298	6,947,904	3,014,519	1,507,260	1,146,233	76.0%
2019-20	8,249,452	7,500,707	3,299,781	1,649,890	467,915	28.4%
2020-21	11,653,105	7,140,413	4,661,242	2,330,621		
AVERAGE	**6,681,502**	**6,465,320**			**791,610**	

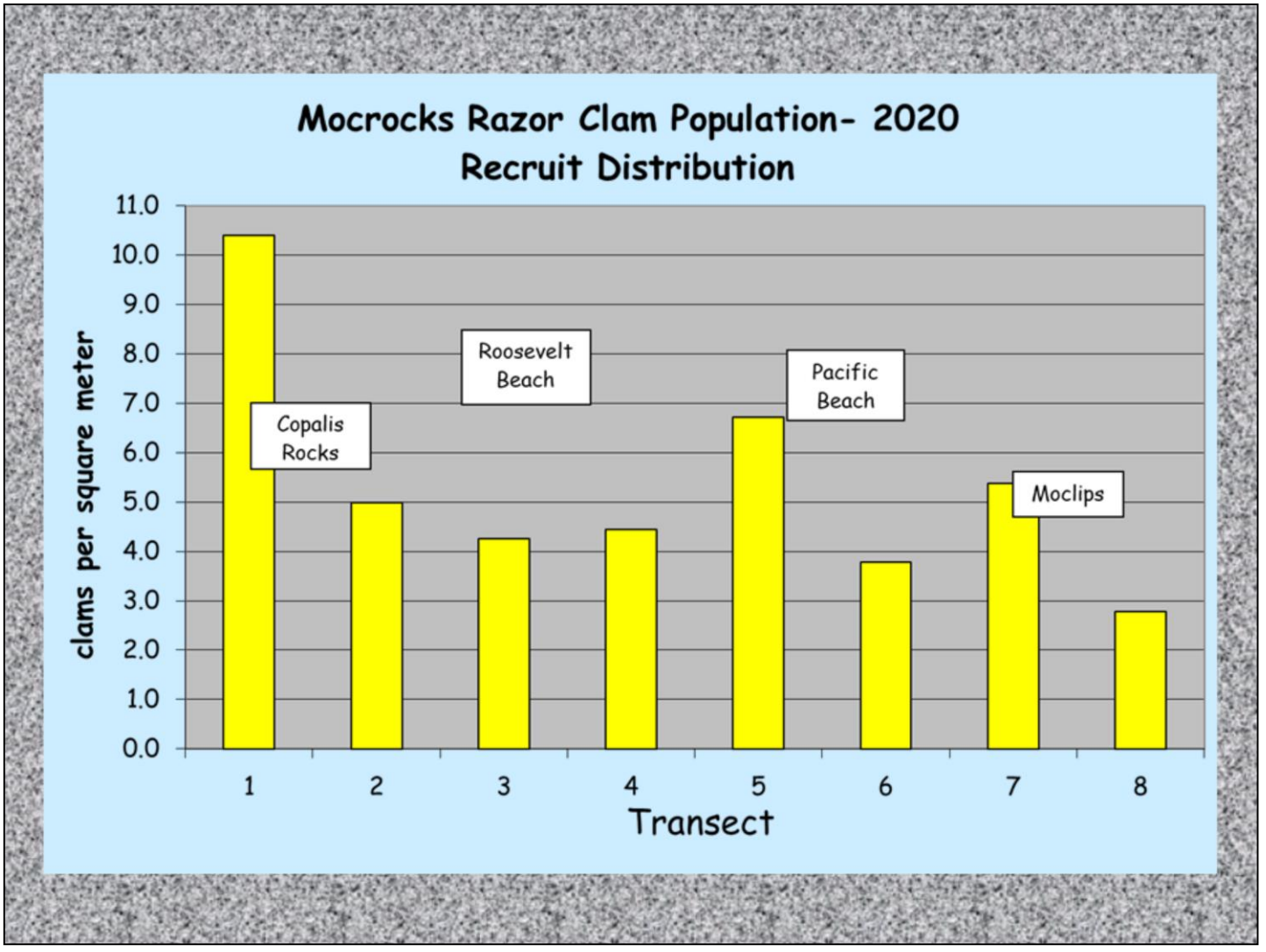
The 2020 stock assessment on Mocrocks shows a large increase in recruits clams which is a result of the significant increase pre-recruits found during the 2019 assessment, which was also a strong population.



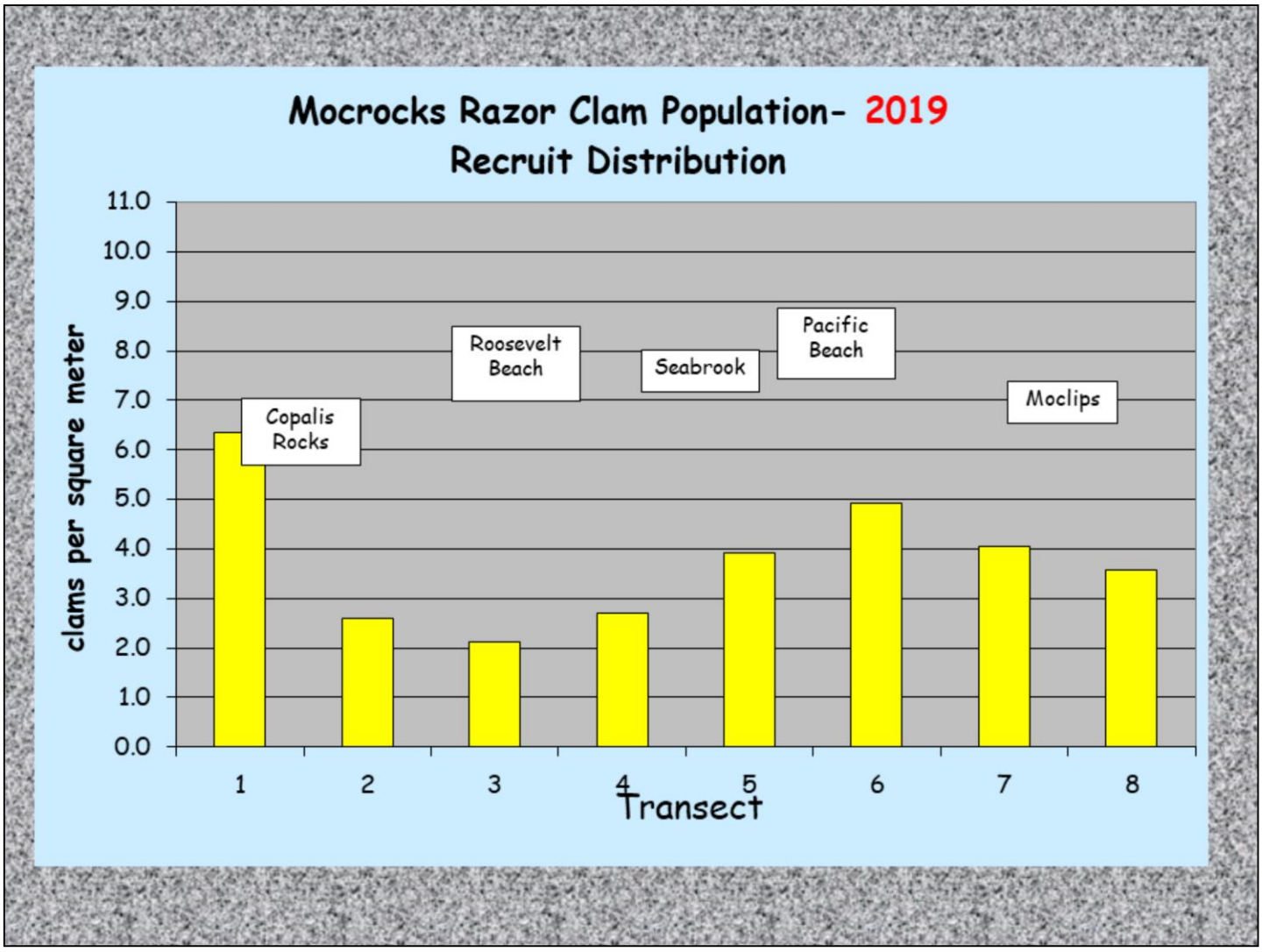
This is the same data that we presented in slide 41, although only the Mocrocks historical population densities are included.



The average size of the Mocrocks recruit clams found in our 2020 summer surveys was 4.1 inches. This compares to 4.3 in 2019; 3.7 inches in 2018; 4.2 inches in 2017; and 4.7 inches in 2016.



The Mocrocks densities on recruit clams are historically more consistently strong than any other razor clam management beach. The 2020 densities tells us again that digging will be very good on this beach. Compare this to the 2019 distribution in the next slide and you can see the changes in abundance.



Compare this 2019 distribution to the 2020 distribution in the previous slide and you can see the changes in abundance..

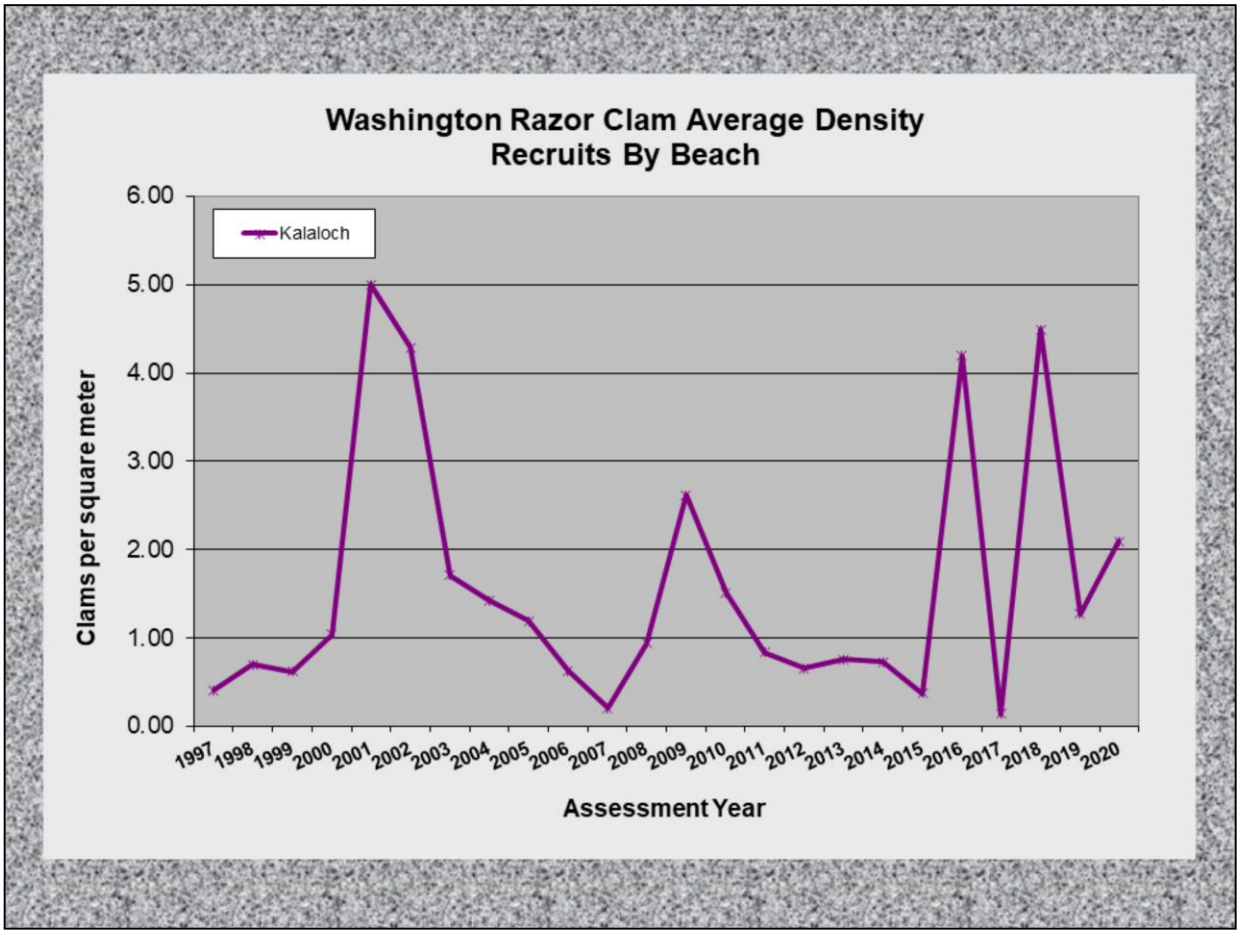
KALALOCH RAZOR CLAM POPULATION, TOTAL ALLOWABLE CATCH (TAC) AND HARVEST DATA

	POPULATION (clams)		TAC (clams) harvest rate 25.4%	50%	State's HARVEST (clams)
YEAR	RECRUITS	PRE-RECRUITS	of recruits	SHARES	TOTAL
2016-17	5,715,655	985,530	1,451,776	725,888	1,410
2017-18	192,476	100,324,349	48,8898	24,444	0
2018-19	6,121,148	1,868,151	1,554,772	777,386	3,599
2019-20	1,728,824	10,990,139	439,121	219,561	0
2020-21	2,854,354	7,215,994	725,006	362,503	
AVERAGE	**3,322,491**	**24,276,833**			

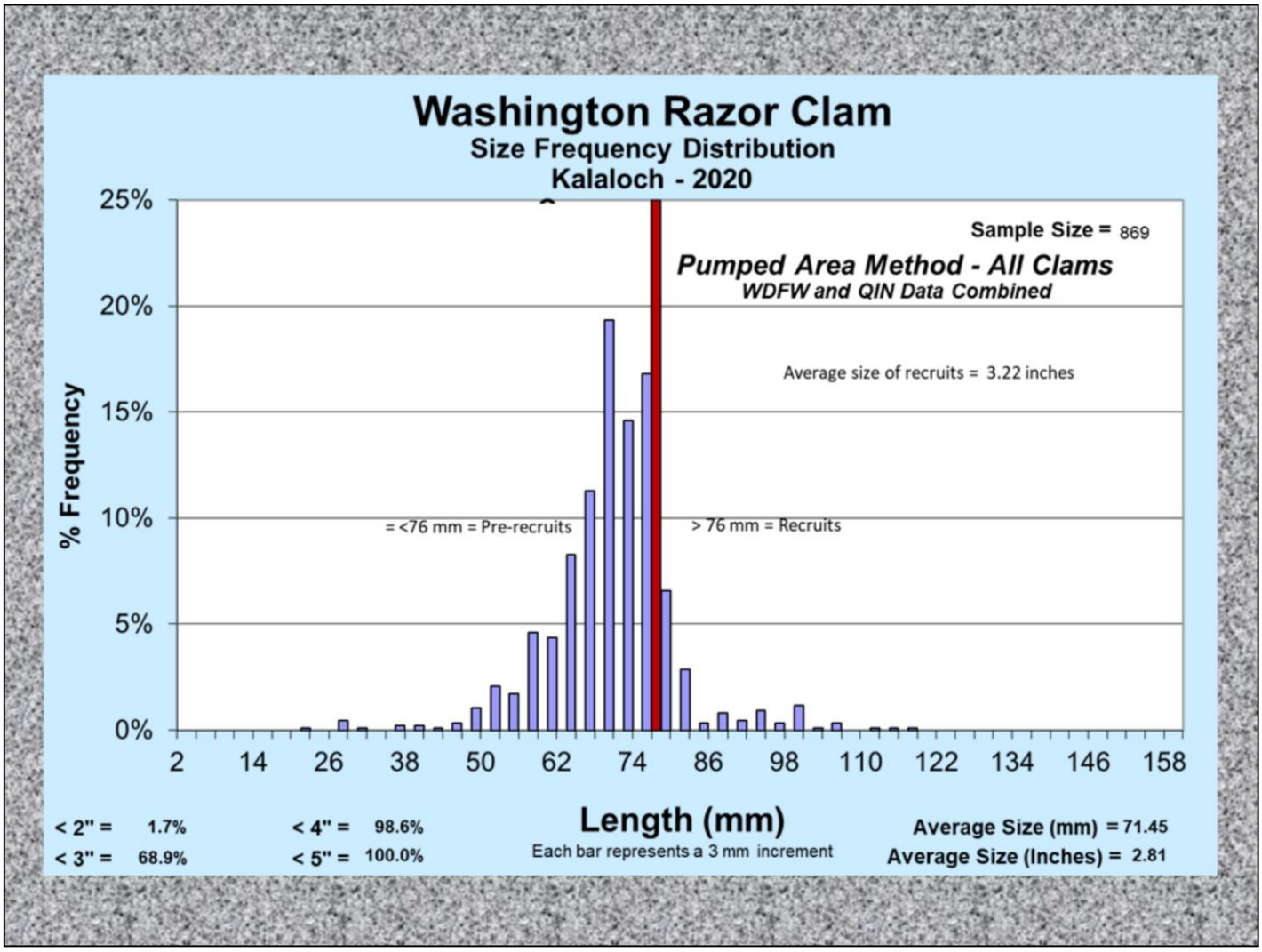
The “on-again/off-again” nature of razor clam populations at Kalaloch seems to continue. While we found a nice population of razor clams at the time of our summer assessment at Kalaloch, you’ll see in the next slide that they are very small. No digging has yet been scheduled for this beach and we are interested to know what you think about making the trek out to this beach to dig clams that average of just 3.2 inches or smaller, with very few clams even a little larger?

Recall; recruits are defined as clams => 76 mm (3 inches); pre-recruits are < 76 mm (3 inches).

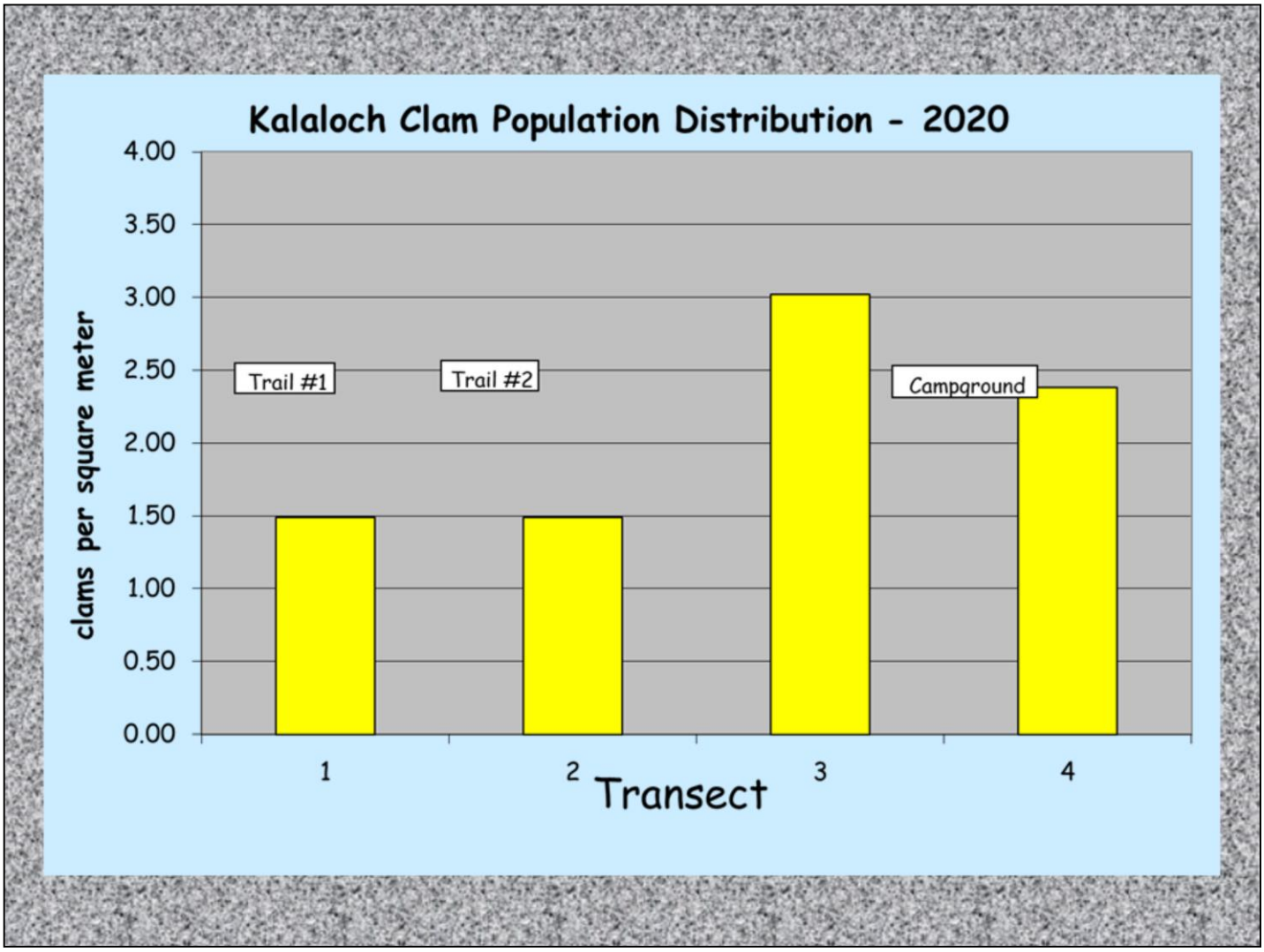
Because Kalaloch lies within the boundaries of the Olympic National Park, their staff works closely with WDFW staff in the management of the recreational fishery here. WDFW has the lead in the population assessment work. ONP has the lead in harvest monitoring and enforcing the recreational fishery. Both groups work together to set specific dates when harvest will occur on this beach.



This is the same data that we presented in slide 41, although only the Kalaloch historical population densities are included.



The number of recruit clams found at Kalaloch in July 2020 were once again very small. Those we found in our survey transescts had an average size of just 3.2 inches., mixed in with a much higher frequency of much smaller 2 to 3 inches clams.

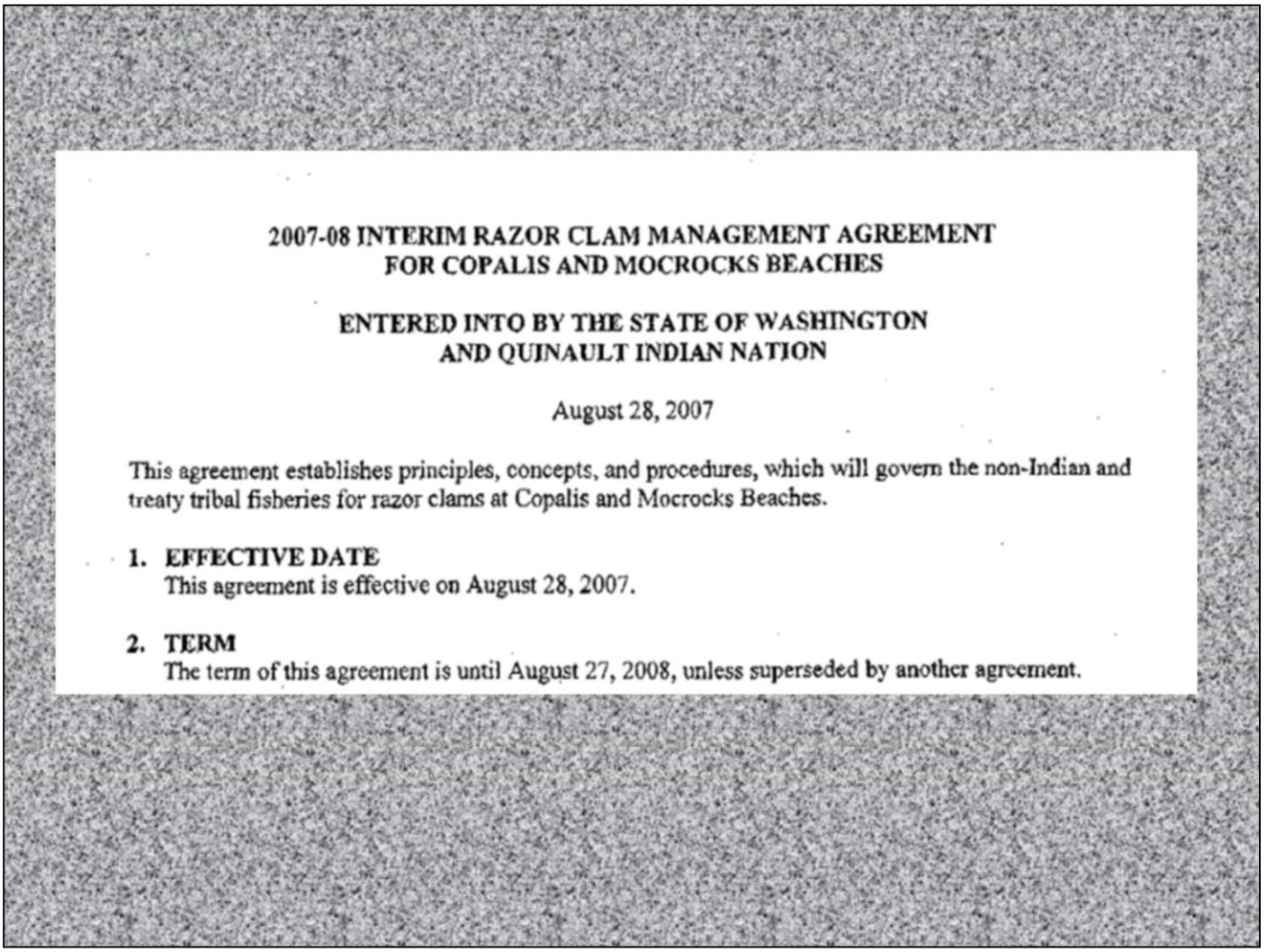


The densities of recruit clams (those greater than 3 inches) have improved some along Kalaloch beach, but they remain small.

As was mentioned earlier, WDFW works closely with two coastal tribes in the management razor clam populations.

The Quinault Indian Nation (QIN) shares the labor of the stock assessment work - with their own crews of biologists and technicians who also use the Pumped Area Method. Working side by side QIN and WDFW staff assess razor clam populations at Copalis, Mocrocks and Kalaloch. On each of these beaches half of the sample transects are completed by QIN staff and half by WDFW staff. The data is pooled and a joint population estimate is made.

At Kalaloch, the Hoh Tribe provides additional staff to assist in the assessment on that beach. Because there is no vehicle access on the Kalaloch beach – having extra people available to move the gear up and down trails to the beach is critical to the success of the work.



2007-08 INTERIM RAZOR CLAM MANAGEMENT AGREEMENT
FOR COPALIS AND MOCROCKS BEACHES

ENTERED INTO BY THE STATE OF WASHINGTON
AND QUINAULT INDIAN NATION

August 28, 2007

This agreement establishes principles, concepts, and procedures, which will govern the non-Indian and treaty tribal fisheries for razor clams at Copalis and Mocrocks Beaches.

1. **EFFECTIVE DATE**
   This agreement is effective on August 28, 2007.

2. **TERM**
   The term of this agreement is until August 27, 2008, unless superseded by another agreement.

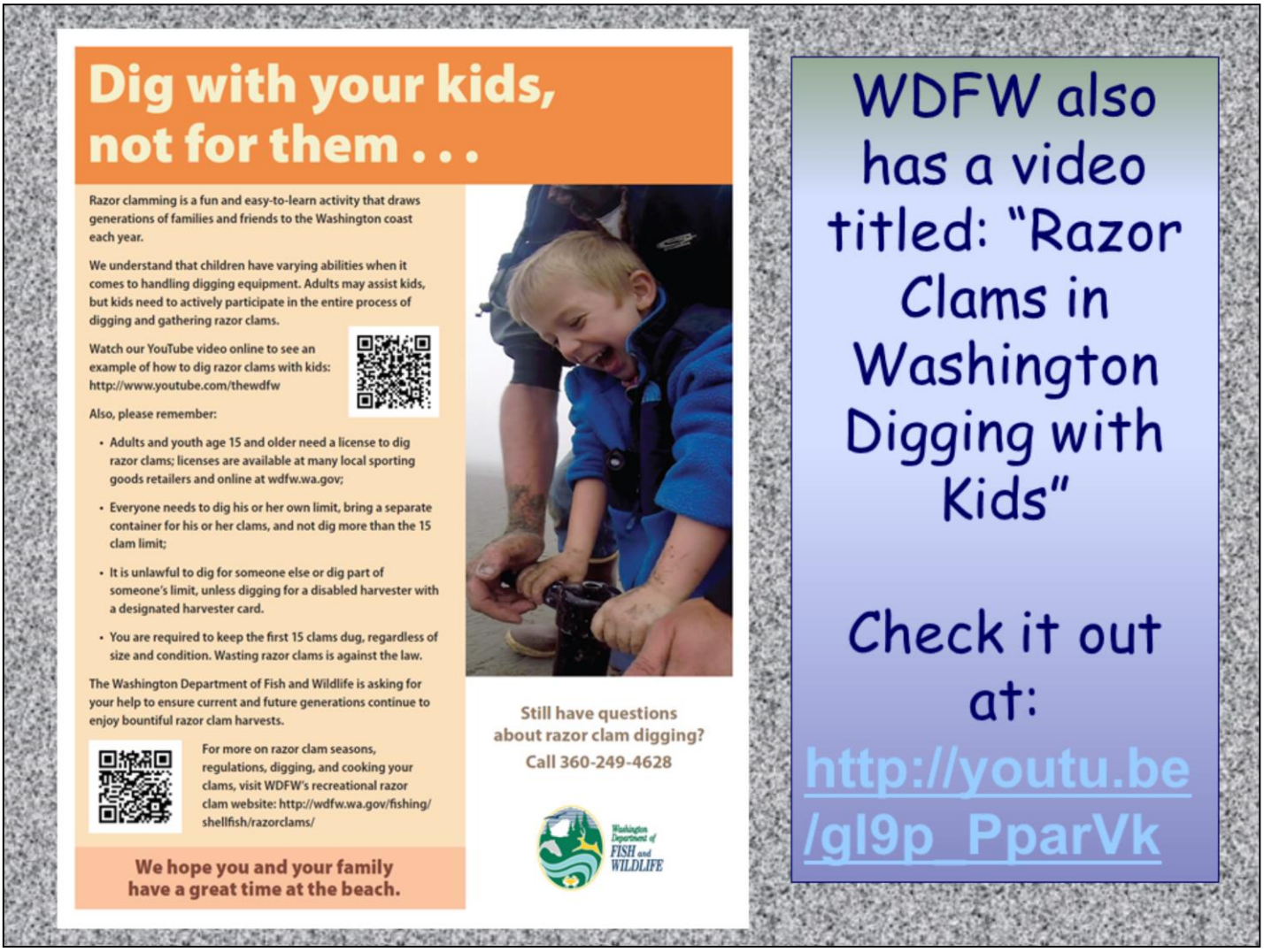
Each year in August WDFW and the costal tribes sit down and discuss the population estimates and proposed total allowable catch (TAC) for the co-managed beaches; Copalis, Mocrocks and Kalaloch. The result of those discussion is a an agreed to Fishery Management Plan signed by policy representatives of each group that guides the management of the fisheries in the coming season.

	2020-21 TAC Share (clams)	Projected daily harvest (clams)
Long Beach	9,916,787	45,000
Twin Harbors	2,084,291	20,000
Copalis	2,369,701	43,000
Mocrocks	2,330,621	26,000
Kalaloch	362,503	

This is a recap of the Total Allowable Catch that will guide WDFW during the 2020-21 season. We also list here our projected average daily catch, by beach. Note that the average daily catch includes days with large crowds, excellent weather and good digging success and days with fewer people or poorer success (usually due to bad weather). It can be tricky to project this number, and we find daily harvest goes down when we have more days to offer.

We are pleased to offer you a new video that should help new diggers learn how to dig razor clams. See it at: https://youtu.be/RBM9b5r6rMQ Or search You Tube for "Digging Razor Clams in Washington"

If you are one of our first time diggers we want to welcome you to this fun recreational activity that anyone can easily learn to do. After you've watch this video, and have additional questions, feel free to contact us at the email or phone numbers listed later in this document. Another good piece of advice, if you are on the beach and struggling to successfully dig clams, look around for an experienced digger and ask for advice. Most diggers are friendly and will be more than willing to give you some on-the-spot pointers. To you "old salts" who can dig a clam without blinking – consider offering some advice to those who might be new to razor clamming and look like they could use a few pointers.



Razor clamming is a fun and easy-to-learn activity that draws generations of families and friends to the Washington coast each year. We understand that children have varying abilities when it comes to handling digging equipment. Adults may assist kids, but kids need to actively participate in the entire process of digging and gathering razor clams. Check out the video at: http://youtu.be/gl9p_PparVk Also, please remember:

• Adults and youth age 15 and older need a license to dig razor clams; licenses are available at many local sporting goods retailers and online at wdfw.wa.gov;

• Everyone needs to dig his or her own limit, bring a separate container, and not dig more than the 15 clam limit;

• It is unlawful to dig for someone else or dig part of someone's limit, unless digging for a disabled harvester with a designated harvester card.

• You are required to keep the first 15 clams dug, regardless of size and condition. Wasting razor clams is against the law. The Washington Department of Fish and Wildlife is asking for your help to ensure current and future generations continue to enjoy bountiful razor clam harvests. For more information on razor clam seasons, regulations, digging, and cooking your clams, visit WDFW's recreational razor clam website: http://wdfw.wa.gov/fishing/shellfish/razorclams/

Washington 2020-21 Recreational Razor Clam

Page 1 of 4

Tentative* Fall Harvest dates

**Pending final marine toxin test results*

NOTE: open beaches vary by day. Please pay close attention to this list of dates and beaches open.

AM TIDES ONLY

Sept. 16, Wednesday, 6:17 am, -1.0 feet; Long Beach, Twin Harbors, Copalis

Sept. 17, Thursday, 6:58 am, -1.0 feet; Long Beach, Twin Harbors, Mocrocks

Sept. 18, Friday, 7:39 am, -0.8 feet; Long Beach, Twin Harbors, Copalis

Sept. 19, Saturday, 8:19 am, -0.3 feet; Long Beach, Twin Harbors, Mocrocks

PM TIDES ONLY

Sept. 20, Sunday, 9:43 pm, -0.8 feet; Long Beach, Twin Harbors, Copalis

Sept. 21, Monday, 10:37 pm, -0.8 feet; Long Beach, Twin Harbors, Mocrocks

Sept. 22, Tuesday, 11:37 pm, -0.3 feet; Long Beach, Twin Harbors, Copalis

Page 1 of 4. These dates remain tentative until final marine toxin tests have been completed, generally 5 days before the opening is scheduled to occur. This is to ensure the clams you harvest are safe to eat.

Feed back WDFW has received over the last several years is that most clam diggers like the season structure we've been using that allows for a few days of digging – each month – on as many beaches as possible.

Many coastal businesses have also said that such a season structure helps them by drawing people to coastal communities during periods of the year when fewer people would normally visit.

We are always open to suggestions and would be happy to hear any ideas about what might work better for you.

Page 2 of 4. These dates remain tentative until final marine toxin tests have been completed, generally 5 days before the opening is scheduled to occur. This is to ensure the clams you harvest are safe to eat.

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Nov. 13, Friday, 4:58 pm, -0.3; Long Beach, Twin Harbors, Mocrocks

Nov. 14, Saturday, 5:45 pm, -1.3; Long Beach, Twin Harbors, Copalis

Nov. 15, Sunday, 6:32 pm, -1.7; Long Beach, Twin Harbors, Mocrocks

Nov. 16, Monday, 7:19 pm, -1.8; Long Beach, Twin Harbors, Copalis

Nov. 17, Tuesday, 8:06 pm, -1.6; Long Beach, Twin Harbors, Mocrocks

Nov. 18, Wednesday, 8:56 pm, -1.1; Long Beach, Twin Harbors, Copalis

Nov. 19, Thursday, 9:47 pm, -0.5; Long Beach, Twin Harbors, Mocrocks

Dec. 1, Tuesday, 7:14 pm, -0.4; Long Beach, Twin Harbors, Copalis

Dec. 2, Wednesday, 7:51 pm, -0.4; Long Beach, Twin Harbors, Mocrocks

Dec. 3, Thursday, 8:30 pm, -0.3; Long Beach, Twin Harbors, Copalis

Dec. 4, Friday, 9:12 pm, -0.1; Long Beach, Twin Harbors, Mocrocks

Page 3 of 4. These dates remain tentative until final marine toxin tests have been completed, generally 5 days before the opening is scheduled to occur. This is to ensure the clams you harvest are safe to eat.

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Dec. 12, Saturday, 4:44 pm, -0.8; Long Beach, Twin Harbors, Mocrocks

Dec. 13, Sunday, 5:32 pm, -1.4; Long Beach, Twin Harbors, Copalis

Dec. 14, Monday, 6:19 pm, -1.7; Long Beach, Twin Harbors, Mocrocks

Dec. 15, Tuesday, 7:05pm, -1.7; Long Beach, Twin Harbors, Copalis

Dec. 16, Wednesday, 7:50 pm, -1.5; Long Beach, Twin Harbors, Mocrocks

Dec. 17, Thursday, 8:35 pm, -1.0; Long Beach, Twin Harbors, Copalis

Dec. 18, Friday, 9:21 pm, -0.4; Long Beach, Twin Harbors, Mocrocks

Dec. 28, Monday, 5:43 pm, -0.2; Long Beach, Twin Harbors, Copalis

Dec. 29, Tuesday, 6:20 pm, -0.5; Long Beach, Twin Harbors, Mocrocks

Dec. 30, Wednesday, 6:57 pm, -0.7; Long Beach, Twin Harbors, Copalis

Dec. 31, Thursday, 7:34 pm, -0.7; Long Beach, Twin Harbors, Mocrocks

Page 4 of 4. These dates remain tentative until final marine toxin tests have been completed, generally 5 days before the opening is scheduled to occur. This is to ensure the clams you harvest are safe to eat.

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We are always open to suggestions and would be happy to hear any ideas about what might work better for you.

Thank you for taking the time to review this presentation. We are interested in your opinions regarding our management of the razor clam resource and specifically any suggestions or comments you have on the way we might structure the remaining dates for 2019-20 season.

Email your comments to : **razorclams@dfw.wa.gov**

To be added to our e-mail update list, please send an email request to: razorclams@dfw.wa.gov

Below is an excerpt of a message sent out to this list;

On Apr 4, 2017, at 3:44 PM, Ayres, Daniel L (DFW) <Daniel.Ayres@dfw.wa.gov> wrote:

You are receiving this message because you have expressed interest in Washington State's recreational razor clam fishery. If you do not wish to receive future messages, please reply by return e-mail.

SEASON UPDATE: We are happy to be able to finally include Long Beach in a razor clam opener. Not wanting to delay any longer than needed, Long Beach joins Twin Harbors in opening tomorrow (4/12). Copalis and Mocrocks will also open as previously scheduled. See the details below.

- April 12, Wednesday, 8:08 a.m., 0.0 feet; Twin Harbors, Long Beach
- April 13, Thursday, 8:43 a.m., 0.0 feet; Twin Harbors, Copalis, Long Beach
- April 14, Friday, 9:18 a.m., 0.1 feet; Twin Harbors, Mocrocks, Long Beach
- April 15, Saturday, 9:55 a.m., 0.3 feet; Twin Harbors, Copalis, Long Beach
- April 16, Sunday, 10:36 a.m., 0.5 feet; Twin Harbors, Mocrocks, Long

beach must test under the action level (20 ppm for domoic acid; 80 µg/100g for PSP; and 16 µg/100g for DSP) on both of the two required sample collections.

Note that in all of these samples; only razor clam meat tissue is tested.

The following samples collected on April 9, 2017

Long Beach Area E (north):

- domoic acid = 10 ppm
- PSP = < 38 µg/100g
- DSP = none detected

Long Beach Area OY (middle):

- domoic acid = 9 ppm
- PSP = < 38 µg/100g
- DSP = none detected

You may be interested to know that we maintain an email distribution list for anyone specifically interested in razor clam related issues. The periodic updates sent out using this list include information on season openers, marine toxin levels and other pertinent topics. If you are interested in having your email address added to this list, please let us know by sending an email request to: razorclams@dfw.wa.gov

Thanks again for visiting this presentation!

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Montesano, WA 98563 USA
Telephone: 360-249-4628 (ext. 209)
Daniel.Ayres@dfw.wa.gov