This document addresses the Fanny Bay Oysters talking points about summertime Vibrio season, Paralytic Shellfish Poisoning, and winter noro-virus outbreaks and how to best address customer concerns or questions.

Common customer questions:

Are these oysters safe to eat...I heard there was red tide?

Is it safe to eat oysters in month without an "R"?

Does red tide actually turn the water red?

What is "Red Tide":

The term "red tide" gets used very loosely by customers that are unaware of how shellfish harvesting works and the regulations being followed to ensure safety. Generally when a guest brings up "red tide" they are referring to several natural occurring events such as summer vibrio season, Paralytic Shellfish Poisoning closures, or Norovirus closures. It's best to educate them on what "red tide" actually means, as well as reassure them of our strict safety protocols that are enforced by CFIA and DFO. The term "red tide" evokes a lot of fear for guests that don't know that it is. Technically red tide is a harmful algae bloom that in some areas of the world turns bays into a coppery red color and can cause mass die offs for plants and animal life. Often red tide occurs after flooding events where fertilizers and other human waste run off ends up washing into a body of water and causing a rapidly growing toxic algae bloom. Here on the west coast we don't have the stereotypical "red tide" events as we generally don't have a large population directly polluting the environment (like they do in say Florida... where there have been several red tide incidents in recent memory), but we do have vibrio and harmful algae like PSP that are often referred to as "red tide" by guests and media.

What is Vibrio?:

Vibrio is a naturally occurring ocean bacteria that grows in warmer water. There are over 200 different types of vibrio, some of which are harmful to people but not shellfish, and some that are harmful to shellfish but not people. Along the west coast of North America (BC/WA) we have a type of vibrio called *Vibrio Parahaemolyticus* that grows primarily in the warmer summer months. This type of vibrio is not harmful to shellfish, but it can be harmful to people when ingested in large quantities.

Vibrio parahaemolyticus begins to grow rapidly when water temperatures start to be steadily above 14C. Vibrio can multiply rapidly when at temperatures are warmer for extended periods of time. Once in the water column vibrio will get consumed by the shellfish filter feeding the water and accumulate in the gut of oysters, mussels, clams, etc. The province of BC states that all

shellfish growers must monitor for vibrio between May and September in order to harvest and sell live oysters. Every lot of oysters that is harvested between May 1st - Sep. 30th has to be tested for vibrio levels to ensure it is safe to consume raw. We measure vibrio in a Parts Per Million (PPM) scale. BC CDC states that vibrio levels must be under 100ppm to be considered safe for human consumption.

Vibrio can be cooked out of shellfish and this is why you rarely see vibrio illnesses from mussels and clams as they are cooked before consumption. Oysters, however, are commonly eaten raw so they have testing requirements associated throughout the summer. Vibrio can also be purged from shellfish by storing them in colder waters for several days so they expel the bacteria from their gut.

How shellfish growers can prevent vibrio is by following best practices guidelines for summertime harvesting (Fanny Bay worked very closely with DFO to develop this program that is now an industry standard in BC and across the west coast). These guidelines include taking temperature samples of the oysters at harvest, icing product to ensure it remains cold in transport, purging oysters in deep water trays or in a cold wet storage system (Taylor Shellfish and Fanny Bay uses the wet storage method), tagging the original harvest date and the final release date on the shellfish tag, and holding each lot for vibrio testing that is conducted by CFIA (Canadian Food Inspection Agency). Fanny Bay Oysters does not release any oysters from our wet storage until they have passed their vibrio test, some shellfish producers will release product after they have submitted samples but before they have received results if they feel confident that their product will pass (this practice is not recommended as it often leads to expensive and reputation damaging recalls if the product makes it to the market, but doesn't end up passing their test).

For each lot of oysters harvested you must submit 5pieces of oysters from that harvest lot for testing, if even one oyster is over 100ppm the whole lot will have to be purged again until all 5 samples come back at an acceptable level. We ship the oyster samples to CFIA who conducts the test at a cost of $250+ per harvest lot. Although the rule from BC CDC states 100ppm it is up to CFIA to enforce the rule and they often are more stringent and will ask the producer to hold for retesting after purging if the results from the tests comes back above 80ppm but lower than 100ppm. Testing can become very costly so many west coast growers will simply close down their operations in the summertime to avoid the hassle and expense. Fanny Bay Oysters has a Quality Insurance Manager, Jeff Armstrong, who oversees our summer vibrio program in house at the main processing facility.

The "don't eat oysters in months without an R" saying comes from both the summer being the primary spawning season for oysters and because of illnesses related to vibrio. Vibrio illnesses used to be more common before monitoring and modern refrigeration became prevalent, now a days there are generally only a handful of illnesses reported in BC in the summer and they come from people harvesting wild oysters off the beach on a hot day when the oyster is probably at its warmest. You can also get ill from vibrio simply by swimming in ocean/bay with an open wound/cut or by swallowing sea water. Restaurant related illnesses associated with vibrio are less common now, but can still occur if the oysters temperature is not kept cold until it is consumed.

For example: *A batch of oyster is harvested in mid July, it's wet stored and tested with a final result of 8ppm vibrio. CFIA allows us to sell the lot of oysters to local restaurants. It travels in a refrigerated van in a box with frozen gel pack to maintain a temperature of 4C or below. Upon*

arrival to "Restaurant A" the oysters are kept in their box in the fridge and then moved on the ice bed before being shucked and served on ice to the customer. The oyster remains around 4C throughout its journey to the customer and no one gets ill.

That same batch of oysters is sold to "Restaurant B", but they take their box and open it, leaving the oysters on the counter at variable temperatures throughout dinner service. The guests being served are sitting on a patio in the hot sun and the ice the oysters are being served on melts quickly. A guest that eats the oysters later feels ill and experiences vibrio symptoms of diarrhea and vomiting within 12-24hrs.

Why did this illness occur? Because vibrio can multiply quickly when at a warmer temperature. If the oysters do not remain cold all the way to the consumer the hard work done by the farmers can easily be undone. The warm room and hot sunshine from the patio allowed the lowered vibrio level in the oysters to multiply to an elevated level leaving the guests at risk of illness.

Vibrio parahaemolyticus can cause diarrhea, abdominal cramps, nausea, vomiting, headache, fever, and chills. The illness is usually mild or moderate and runs its course in 2 to 3 days. Not everyone reacts to vibrio the same way, people with weakened immune systems or taking antacid medication can often be more greatly affected by vibrio. Even though an oyster is under 100ppm it can still cause someone with a sensitive stomach to have a mild reaction, this is why we have a note on our menu that states "consuming raw food can cause foodborne related illnesses". Other types of vibrio from other regions such as the gulf coast or the east coast can cause more severe reactions that can lead to hospitalization. Thankfully each shellfish growing region has its own testing protocols and best practice guidelines that they follow to ensure safety. All oysters that enter Canada must be in compliance with Canadian standards of under 100ppm (Taylor Shellfish has their own wet storage facility that they use for purging in the summer months located in Shelton, WA).

If a customer raises concerns about their oysters in the summer months you can assure them of our practices and testing. You can also let them know that vibrio can be cooked out so if they would prefer, they can order one of the several cooked oyster preparations from the menu.

What is Paralytic Shellfish Poisoning?:

Paralytic Shellfish Poisoning (PSP) is a life-threatening illness caused by a harmful algae bloom. PSP occurs from ingesting shellfish (such as mussels, oysters, and clams) that contain toxins. These toxins can cause severe neurological effects that can lead to death if not treated. On the west coast the name of the harmful algae we see most commonly that causes these toxins is called Alexandrium. When Alexandrium is present in the water column it is fed on by the shellfish that accumulate it in their gut and can store it there for up to 2 weeks. Alexandrium blooms are not temperature specific so they can occur year-round, and although they can happen anywhere they often present themselves in similar areas that are conducive to their growth (this means some areas are more likely to get these blooms more frequently or even for an extended period of time).

All shellfish harvesting areas (which are coded under the DFO mapping system) are required to submit regular weekly shellfish samples to CFIA ensure that there are no elevated Alexandrium levels in their harvest area. Any levels above 80ppm from a sample will trigger a shellfish harvest closure. Any PSP closure requires 3 weeks of consecutive clean samples to reopen the harvest area. This is a standard that is held by the US and Canada. PSP cases are very rare due to the high level of testing requirements to harvest shellfish.

PSP symptoms include:

- Tingling (pins and needles feeling or paresthesia)
- Numbness, spreading from lips and mouth to face, neck and extremities
- Dizziness
- Arm and leg weakness, paralysis
- Respiratory failure and in severe cases, death
- Headache
- Nausea
- Vomiting

Symptoms start quickly, median time between ingestion and onset is 1 hour (between 30 minutes to 3 hours). Progression and intensity of symptoms vary with the intensity of the toxin poisoning. In severe cases, muscle paralysis, respiratory failure and death can occur within 12 hours.

PSP toxins can NOT be cooked out of shellfish. If guests express concern about PSP you can ensure them we only harvest from open and tested approved harvest areas and we keep up to date with all required monitoring to ensure guest safety.

Fun fact: before modern testing the indigenous people of the pacific northwest would commonly feed shellfish to pet birds like seagulls or crows and watch to ensure they didn't exhibit any PSP symptoms/die before they consumed shellfish. This is practice was used for thousands of years and was used by the Europeans when they came to the west coast until testing was developed in the late 1960s to monitor for PSP.

How can an oyster give you noro-virus?:

Oysters are filter feeders so they suck in the water around them to find algae to feed on. This means they also can suck in other microscopic things that are in the water column as well, such as natural bacteria (vibrio) or waste water from near by populations. Most oyster farms are located further away from major populations for this exact reason, water quality is key to maintaining a healthy and safe to consume shellfish. Noro-virus can enter the water through human waste.

In more rural areas this generally means boats that improperly dispose of their on board waste water, or a crew member that was sick over the side of the boat, but in more populated areas it can come from untreated sewer water, old or failing septic systems. Once an oyster has been

contaminated with norovirus it takes approximately 2 weeks to purge that from the oysters gut. Testing for noro-virus is becoming more refined as it's become a more frequent global issue as populations grow, but the test currently can only detect noro-virus's presence, it can't actually detect if the virus is alive or dead. These tests are also very expensive and take a long time to culture in a lab, so most monitoring for noro-virus is primarily done by water sample testing for fecal-coliform and ecoli on a weekly basis through CFIA. Each harvest area must submit sampling to remain open for harvesting shellfish. If more than two confirmed illnesses are reported to BC CDC within a two week period from the same lot of oysters that harvest site will be closed pending an investigation and re-sampling.

What do I do if a guest calls in and says they got sick?

If a guest thinks they are ill from consumption of raw seafood you should advise them to seek medical attention if they still are unwell. Take their name, phone number, what they ate and when they ate and report back to a manager with the information so they can pull the tags from the seafood they ate and alert the companies that seafood was purchased from.

If the guest goes to the doctor, they will take a stool sample to confirm the presence of vibrio or noro-virus, or assist with any PSP related treatments. Medical professionals will need to be notified by the guest that they consumed raw seafood. If the results are positive then the doctor will report that illness to Coastal Health and they will follow up with an inspection and alert CFIA. We keep a detailed log of any complaints that come to us so when CFIA comes to inspect, we already have all the information they might be looking for.

At the end of the day...

To sum up this long document I think it's best to state that oysters and other shellfish are one of the most highly regulated food items on the market, and Fanny Bay Oysters & Taylor Shellfish have a high standard for safety and quality that often is the industry leader. We take guest safety as a high priority and want to ensure that any experience with our food is a positive and healthy one.