April 2017

To My Salmon Fishing Friends:

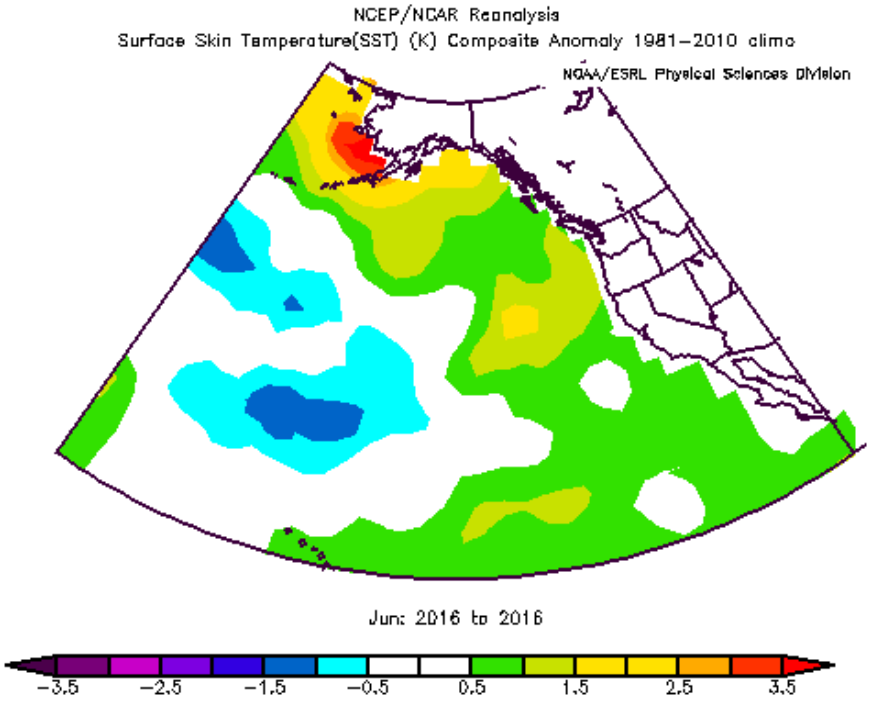
This is the time of year when I go through my journals carefully and try to make sense of the last season.

Summary

Despite my already low expectations the 2016 fishing season was poorer than I had expected. There were some big chinook from the 2011 and 2012 cohorts but few chinook under 40 lbs. Coho were poor, although the coho that I did see were bigger than previous years. It was an off year for pinks. The chum salmon run was fantastic, more chum than I've ever seen in the past, with big chum salmon readily available for most of the summer (think of them as coho on steroids). These are great fighting salmon and good eating if they are processed promptly. However many guests consider chum to be a "trash" fish, and when we had the good fortune to stumble into chum my guests often asked me to pull the gear and try a different spot. It was a difficult year to guide.

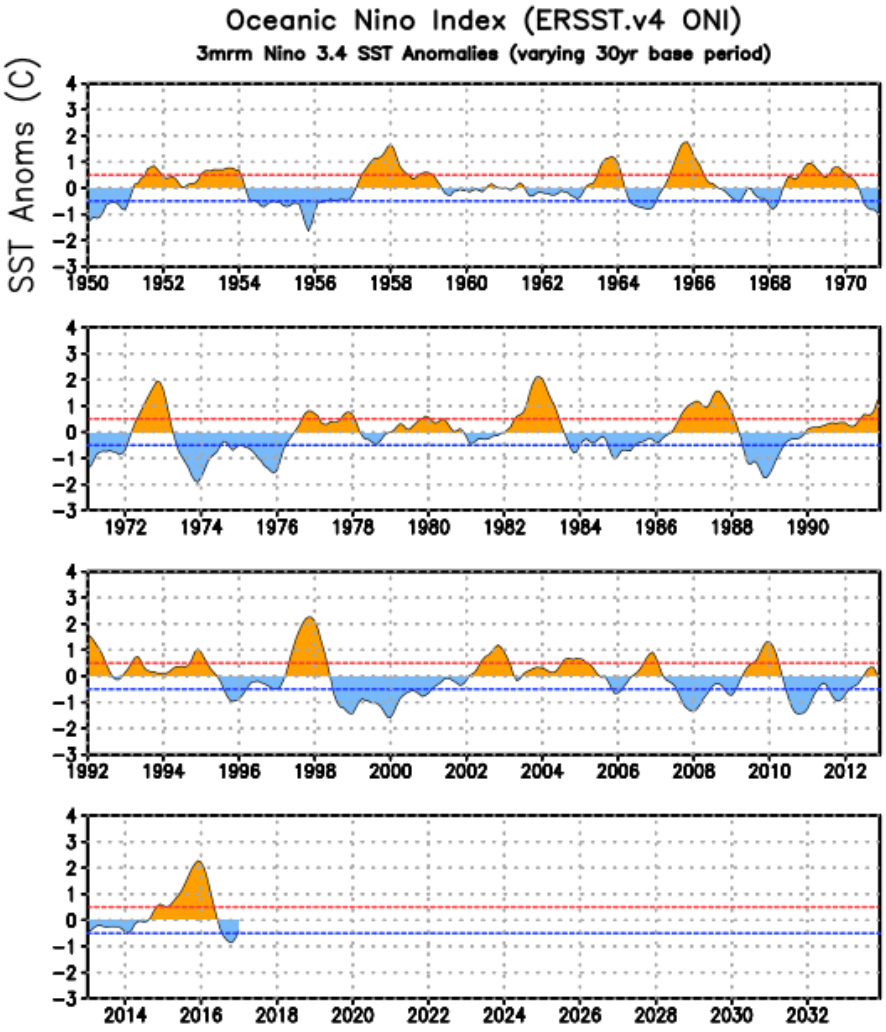
"The Blob" and El Nino

By June 2016 "the blob" of warm water was pretty much gone, although the El Nino which was underway had pushed subtropical water north along the west coast into the Gulf of Alaska.

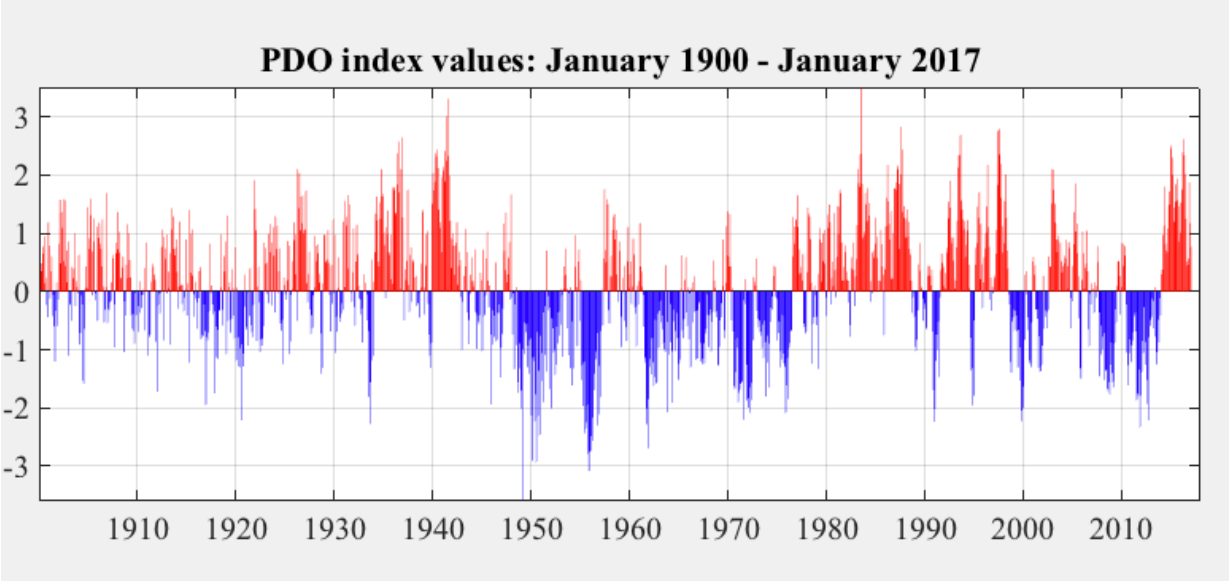


As can be seen in the diagram on the previous page, the water in the Gulf of Alaska was warmer than normal while in the central North Pacific near Hawaii the water was cooler than normal. This generally favours the Alaskan salmon runs while the Oregon and California runs suffer.

The El Nino which we experienced in 2015 and 2016 was quite separate from the atmospheric effects which generated “the blob”, and the two together were a disaster for west coast and Gulf of Alaska ocean conditions. The 2015/2016 El Nino was of similar intensity and greater duration than the 1997 El Nino, which was the previous strongest El Nino in recent memory (since 1950). Fortunately it ended in mid 2016 and we then entered a mild La Nina period. Conditions this month are ENSO neutral however it appears that another El Nino may begin in late summer or fall.



The Pacific Decadal Oscillation (PDO) index is a measure of water temperature off the coast of Oregon. This index is positive during El Nino episodes (which are harmful to the salmon) and negative during periods of strong upwelling (which are beneficial to the salmon). As can be seen from the diagram below the PDO has been strongly positive during the recent "blob" and El Nino. It is still mildly positive, indicating poor ocean conditions for salmon.



A very useful measure of the health of the oceanic food chain leading directly to salmon is the date of biological spring transition (https://www.nwfsc.noaa.gov/research/divisions/fe/estuarine/oeip/ec-biological-spring-trans.cfm) measured by the Northwest Fisheries Science Center, which is based in Seattle.

During the winter months the current along the California, Oregon and Washington coasts flows north, pushing warm subtropical water and zooplankton with it. The subtropical water has been depleted of nutrients and the accompanying zooplankton species have low food value for salmon. This winter current is called the Davidson Current. Then the onset of sunny spring weather brings winds from the northwest which reverse the direction of the current, now called the California Current. These winds push cooler water from the north and cold water zooplankton species into the area and also cause upwelling along the California and Oregon coasts. The upwelling brings nutrient rich water to the surface which feeds and sustains the summer phytoplankton and zooplankton bloom.

The Northwest Fisheries Science Center measures the date of transition between the winter (warm water) and summer (cold water) copepod species. Several of the cold water copepod species are particularly high in lipids and Omega 3 acids, and when these copepods are plentiful the juvenile salmon grow rapidly and experience low winter mortality. The date of arrival of the cold water copepod

community and the number of days during the summer that they are present are two critical measures of ocean health off the California, Oregon and Washington coasts.

Year	Cold Water Copepod Start	Cold Water Copepod End	Length (Days)
1970	March 20	October 20	214
1971	March 20	6 November	231
1983	July 21	August 19	29
1996	July 3	October 31	120
1997	May 15	August 27	104
1998	September 20	September 24	4
1999	May 14	November 4	174
2000	April 6	October 23	200
2001	March 20	November 7	232
2002	April 18	November 1	197
2003	June 5	October 3	120
2004	May 11	October 14	156
2005	August 26	September 28	33
2006	June 29	October 31	124
2007	March 22	December 31	284
2008	March 4	October 27	237
2009	March 6	December 1	270
2010	June 18	November 24	159
2011	March 23	September 29	190
2012	May 4	October 25	174
2013	April 1	September 26	178
2014	June 11	September 25	106
2015	(did not arrive)		0
2016	(did not arrive)		0

In a normal year the summer (cold water) copepod community arrives in March and is present for 150 to 200 days. However in 2015 and 2016 the cold water communities did not arrive and were not present at all during the year. This is unprecedented and suggests poor survival for juvenile salmon off the California, Oregon and Washington coasts.

In my reading, I've tried to make sense of the many factors which affect the oceanic food chain and the health of the salmon. Here are some of the more important factors:

1. During summer the phytoplankton deplete the surface layer of nutrients. Since the surface layer is warmer than the water below it is very stable, and it requires strong storm winds and big waves to break up this surface layer and mix it with the colder, nutrient rich water below. Strong winter winds set the stage for the spring phytoplankton bloom. Along the BC coast for several years we had weak winter winds which allowed "the blob" to form and grow. Then during the 2015/2016 winter we had many big winter storms which broke up "the blob" and set the stage for an excellent spring diatom bloom. The recent 2016/2017 winter has been similar.

2. Winds drive ocean currents, which can push sub-tropical waters north or cold northern waters south. With the waters come the phytoplankton and zooplankton species, and some of these are healthier for the salmon than others. In general the salmon do best with northern, cold water adapted zooplankton species. During the recent El Nino warm subtropical water was pushed north along the California and Oregon coasts, eventually ending up in the Gulf of Alaska – these conditions ended in mid 2016.

3. Many factors affect salmon abundance, but the most important is how well the baby salmon feed during their first summer in the ocean. If food is abundant and of the right type (cold water copepod species) they will have high survival during the ensuing winter. The best survival strategy for a baby salmon is to grow big fast.

4. Pink and coho salmon spend two summers in the ocean before returning to spawn. To estimate the success of the 2017 pink and coho runs, ocean conditions in spring 2016 (when the smolts migrated down the river and entered the ocean) are critical.

5. Chinook salmon spend two or more summers in the ocean before returning to spawn. Chinook "jacks" (precocious males) return to spawn after two summers in the ocean, with a typical weight of five or six pounds. Trophy chinook (30 to 60 pounds) typically have spent five or six summers in the ocean.

6. Chum spend three or four summers in the ocean and are true generalists. In addition to the normal copepods and euphausiids they are willing to feed on soft bodied prey which are particularly abundant during warm ocean conditions.

During winter 2015/2016 strong storms in the Gulf of Alaska finally mixed the surface layer and dispersed “the blob”, that mass of warm, nutrient depleted water that had been sitting in the North Pacific for the previous two years. This mixing brought nutrient rich water to the surface and during the summer of 2016 sustained a coastal diatom bloom that seemed to go on forever, all good news for the baby salmon.

The diatoms are the basis of the food chain which leads most directly to the salmon. This diatom bloom (a beautiful deep, dark green in colour) usually begins in mid-March and continues until the dissolved silicon in the water is consumed, which on the BC central coast is typically late July. Last summer it was still going strong when I left the lodge at the end of August, longer than any diatom bloom that I have ever seen on the BC central coast.

The two previous summers the dissolved silicon had been consumed by July when the coccolithophore algae (which have calcium shells rather than silicon) took over and bloomed to consume the remaining nutrients. The coccolithophore blooms are a light turquoise in colour and only take place in warm, nutrient poor water. Coccolithophores are very small in size and slip through the baskets of large filter feeders like copepods and euphausiids, and have a negative effect on the food chain which leads to salmon -- the larger zooplankton starve during a coccolithophore bloom. The two previous years had been very poor conditions for herring, sandlance and juvenile salmon, while the summer of 2016 was outstanding.

In Milbanke Sound we saw enormous schools of baby herring and sandlance throughout the area and virtually no mature herring. I have no idea why the mature herring were absent (they migrate, and perhaps they were at the offshore banks where the feeding conditions were even better) but it presented us with very challenging fishing conditions. At the lodge we had two big walk-in freezers piled to the ceiling with cases of fat ten inch herring, while the few salmon in the area were actively feeding on baitfish that were no more than two inches in length.

During the summer we noticed exceptional numbers of chum salmon which were readily available for most of the season. In the North Pacific ocean chum salmon have a more varied diet than the other species of salmon. They eat copepods and euphausiids when available, but are also comfortable with pteropods and soft bodied organisms such as psalps and jellyfish which are ignored by the other salmon. The chum seemed to have prospered during the warm water conditions of “the blob”.

Summary: I believe that ocean conditions off the BC coast are finally changing for the better. The salmon smolts that migrated down the rivers and entered the ocean a year ago encountered excellent conditions and should have had high survival through the winter. This summer I expect large numbers of chinook in the six to ten pound range, and an excellent run of big coho salmon. Since 2017 is an odd year there should be a very strong run (several tens of millions) of pink salmon to the Fraser River. Also there should be another strong return of chum salmon, but don’t expect many chinook salmon larger than ten pounds.

DFO and the 2015 State of the Ocean Report

The Fisheries and Oceans Canada 2015 State of the Pacific Ocean Report is now available at http://www.dfo-mpo.gc.ca/oceans/publications/soto-rceo/2015/index-eng.html . The 2016 report should be available later this year.

Oceanography

Last fall Kim and I spent a few days in Portland, where we visited Powells Books -- my favourite bookstore anywhere. While I was there I stumbled across a copy of "Ocean – Reflections on a Century of Exploration" by Wolf H. Berger. This book was published in 2009 by University of California Press.

I've since read this book carefully, word by word. It is an extraordinary book which provides an overview of oceanographic exploration and discoveries since 1900. It is the single best book on oceanography that I have come across (and I have read many). I strongly recommend it to anyone interested in learning about our oceans, and the recent history of our planet.

West Coast Resorts Whale Channel and Milbanke Lodges

Last fall West Coast Resorts announced that it would be closing the Milbanke Sound Lodge and moving the guest barge to the Haida Gwaii, where it will be operated as an ecotourism lodge. Along with many other staff and guests I found this disappointing.

I first guided at West Coast Resorts Whale Channel in 2009. At the time this lodge started the season in Barnard Harbour in Whale Channel, then each year in mid-July would be towed to Louisa Cove in Milbanke Sound to complete the season fishing the area around Cheney Point.

Like many guides and guests I loved fishing Whale Channel and Caamano Sound because of the sheltered water and incredible wildlife. I found Milbanke Sound to be less interesting and far more crowded, however the run of big chinook salmon in late July and early August was truly exceptional.

During that period West Coast Resorts dominated the Whale Channel and Milbanke Sound areas and was a shining example of a high quality fishing lodge. However the 2008 financial crisis and subsequent reduction in US business hit hard, and in late 2011 the company was purchased by the Haida Enterprise Corporation. From that point on it appeared (to me, as a low level staff) that the company was mainly interested in operations in Haida Gwaii.

Summary: The Milbanke Lodge had many excellent people including managers, guides and dock staff who have moved on to other lodges. I can't list them all here, but special mention to Terry Schultz, Claire Hannigan, Holly, Johnny and Debbie, Rennie, Darryl, Gary, Lyle, Valyrian -- I'll miss working with you. I'll also miss seeing the many loyal customers who have become friends over the years and will now be fishing at other lodges. It's the end of an era, but it will also benefit the rest of the industry.

Daniel Nomura and Black Boxes

I've had several memorable fishing experiences which I think were related to voltage. The first was at West Coast Resorts Milbanke Sound in late August 2009. I was guiding in an eighteen foot welded aluminum boat and we were running stainless steel downrigger cable on both sides. My guests, Darris McDaniel and a friend, were fishing with baitcasting style reels and because I was unfamiliar with the reels I set the cut plugs about six feet behind the release clip (normally I would have set the gear thirty feet back). We were fishing Cheney Point at 27/37 ft, as close to the rocks as I could get, in the half light of dawn on changeover day morning.

Darris and his partner were outstanding fishermen. We made nine passes, the rods twitched eight times and we had eight salmon to the boat. These included a 40 lb spring, a 27 lb spring, another spring in the high teens and five big coho. The smallest was a 16 lb coho. We returned to the lodge for breakfast with a day's limit of fine salmon after just one hour and forty-five minutes of fishing, and almost all of that time was spent fighting salmon.

In retrospect I think that the salmon were attracted to the stainless steel downrigger cable. Welded aluminum boats which have motors properly grounded to the hull often have a natural voltage (measured between the stainless steel downrigger cable and boat ground) of 0.6 volts, which is ideal for chinook salmon. I inadvertently took advantage of this by setting the cut plugs close to the downrigger cable, which more experienced guides would have considered a newbie mistake.

My other experience was a few years later at North King Lodge, fishing with my friend Tom Miller. We had one of the older boats which had braided downrigger cable on the starboard side and stainless steel downrigger cable on the port side. Again it was a welded aluminum boat and the natural voltage might have been in the 0.6 volt range.

During this trip we had excellent fishing and mainly on Tom's rod, which was on the port side. Tom caught many coho and pink salmon, three chinook in the low twenties and one at 41 lbs. He also lost a chinook that went off on a screaming run and wrapped the line on a bottom snag. I think this salmon might have been large as we really didn't stand a chance with it. We both caught our limits but I caught nothing big (other than a 35 lb halibut) and most of the action was on Tom's rod, despite the fact that I was setting the gear for both of us.

I think that in both these cases we benefited from stainless steel downrigger cables and a natural voltage which was near the ideal for chinook salmon. Since that time I've fished at lodges that use only braided downrigger cable.

Then a few months ago I came across Daniel Nomura's Master's Thesis (UBC Zoology 1979) which I have posted on my website http://www.thescienceofsalmonfishing.com/fishing_notes/fishing_notes.htm . It is very interesting reading.

During the 1950s and 1960s commercial trollers had often found that some boats were "lucky" and fished well, while other boats were less successful. Sometimes a top fisherman would upgrade to a

larger boat and find that it did not fish as well as the older boat. Usually the explanation was a combination of electrolysis and electricity leaking into the ocean through ungrounded metal through-hull fittings. In the early 1960s Russell Electronics introduced their "black box", which could be set to control the voltage such that the stainless steel downrigger cables attracted (or at least did not repel) salmon.

Daniel Nomura's father was a commercial troller and Daniel used his boat to conduct tests with a black box in the Strait of Georgia. He first measured the natural voltage of the gear to be 0.3 ± 0.1 volts (by measuring the voltage difference between the stainless steel downrigger cable and the vessel common ground, while the gear was in the water).

He then conducted a control experiment by grounding the trolling gear on both sides to the vessel common ground, which was bonded to the motor, zincs and all metal which contacted salt water. During the control experiment they caught similar numbers of salmon on each side of the boat, indicating there was no bias.

For the main experiment he grounded the gear on one side of the boat and varied the electrical voltage of the gear on the other side using a Russell Electronics black box, while running identical terminal gear on both sides of the boat. Due to the limited time available he only tested voltages of -0.5, 0.5, and 1.0 volts relative to ground (he did not test at 0.6 volts, which today is the recommended voltage for chinook salmon). I should note that grounding the gear on one side was probably a good simulation of using braided Spectra downrigger cable, which does not conduct electricity.

Testing was conducted on the east side of Gabriola Island, and also at the mouth of the Fraser River by the north and south flats just outside the drop off zones.

Nomura found that larger (non-grilse) chinook salmon preferred the 0.5 volt gear over the grounded gear by a ratio of 2:1, while grilse (immature chinook salmon roughly a foot in length) didn't seem to care. The fishing was not fast – he averaged 6.0 hook-hours per non-grilse chinook salmon.

During this period it was common practice for a commercial troller to run three main lines on each side, and for chinook three to four sets of terminal gear on each main line (a total of 18 to 24 sets of terminal gear). For coho, sockeye and pink salmon commercial trollers typically ran up to nine sets of terminal gear on each main line (a total of 54 sets of terminal gear).

Normal trolling speeds were 3 knots for coho, 2 knots for chinook and 1 knot for pink and sockeye salmon.

Pro-Troll manufactures a more modern version of the "black box" https://www.protroll.com/black-box. I've bought one and tested it in my workshop, and it appears to be a well designed product.

Summary: Running stainless steel downrigger cables with a black box (or taking advantage of the natural voltage of a welded aluminum hull) might double your chances of success. That's not huge, but fishing is a game of probabilities and every little bit helps. When running a black box set the terminal

gear six to ten feet behind the release clip -- the salmon are attracted to the downrigger cable, not fifty feet back. And this summer I'll be giving the Pro-Troll "black box" a try.

Mike Panz

On the morning of August 11, 2012 I was guiding at Cheney Point in the half light of dawn when Mike Panz, in a nearby private boat, hooked up with a big salmon. He worked it out into deeper water and finally two hours later was able to get the salmon to the boat and release it. Craig Freeman (a fellow guide) had been fishing nearby and took this photo which he recently sent me. What a photo!

Mike is a big guy. The salmon was 49 inches in length and 34 inches in girth. Estimated weight using the Department of Fisheries and Oceans formula (which is conservative) was 71 lbs.

The salmon was hooked at 33 ft on a cut plug, at the edge of the kelp in the "Lounge" just north of Cheney Point. Well done Mike, releasing a salmon of that size is an inspiration for the rest of us!

The Plankton Layer

One of the highlights of my summer was becoming friends with Mike Meeker (a fellow guide) and fishing with him at the lodge. Mike is a Newfoundlander with a marvelous accent and has a great way with people, he is an excellent guide. He was new to the lodge and the fishing area so we "buddied up" and he followed me around quite a bit, but he also had no preconceived ideas about where and how to fish and I learned quite a bit from him.

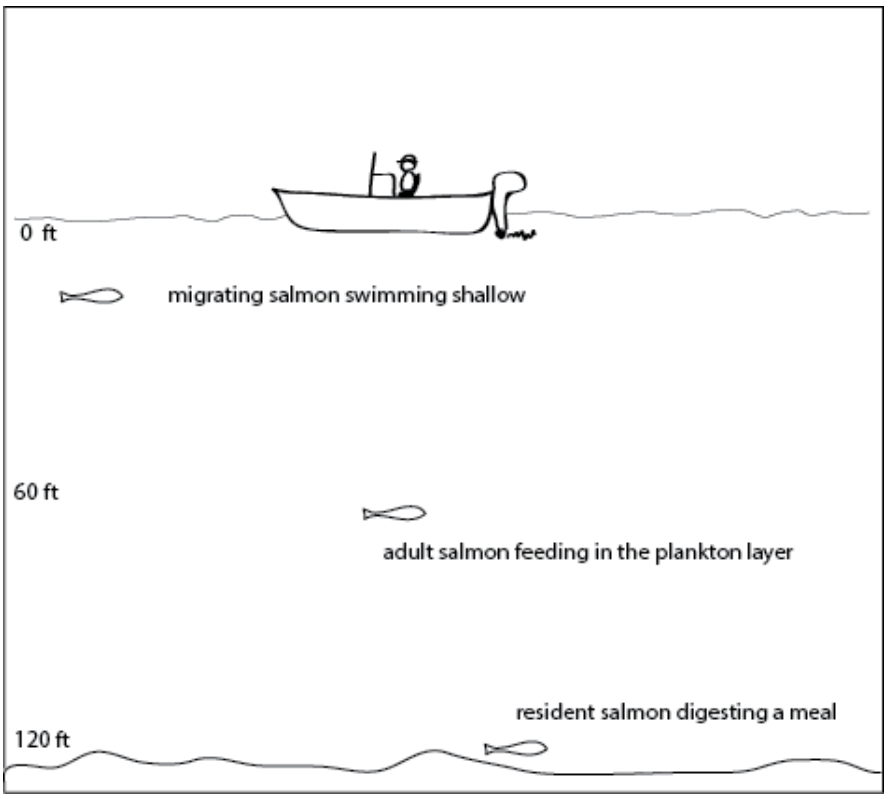
One day he picked up a 30 lb halibut while fishing for salmon at the red can buoy by the end of Rage Reef. Halibut at the can buoy? No, I don't think they are particularly attracted to the colour red. However the dock staff would routinely dump the fish guts from the cleaning station at the can buoy, and that likely brought the halibut in. A new hot spot for Mike!

Then in early July Mike started picking up good salmon at the Notch. The Notch is well known for its extensive kelp beds, and I would normally troll tight to the edge of the kelp with cut plug at depths of 27 and 37 ft. Instead Mike was trolling a half mile offshore with his gear at 60 to 80 ft in water that was 200 to 250 ft deep. I started following him around and was hitting nice salmon as well, but I was puzzled as to why they would be in that location. Then I started seeing small fuzzy markers on my depth sounder.

A few years ago the lodge changed over to the Lowrance Elite 5 depth sounder, which is combined with a chartplotter. It is an excellent unit with a colour display and when properly set up the depth sounder shows a considerable amount of detail. I could spot schools of herring and sand lance and also individual salmon. While fishing with Mike I noticed tiny black markers which I think were individual sand lance, scattered like salt and pepper between 60 and 80 feet on the screen. This occurred mainly at slack tide. After I thought about it I realized that the sand lance and the herring typically hug the bottom out of the current while the tide is running strong, then at slack tide lift off the bottom to feed. I think I was seeing small numbers of scattered sand lance feeding in the plankton layer (herring typically form big schools which on the depth sounder look like dense clouds with a large vertical range – estimating the location of the plankton layer from the position of herring schools is difficult).

The plankton of most interest to sand lance and baby herring are the copepods. Practically everything in the ocean, from larger zooplankton to herring, salmon, sea birds and whales eats copepods. For a copepod, to be seen is to be eaten – they hide in the dark if they can. During the night copepods feed actively on the algae in the surface layer, then at dawn descend in the water column to the point where the light level is approximately 1/1000 that of the surface. In clear water, for example in the tropics, that might mean descending 500 ft. However in our latitudes during a strong diatom bloom (which blocks most of the sunlight in the first thirty feet) they do not need to descend as far, and I think last summer 60 to 80 ft did the job. During the summer Mike and I fished the plankton layer regularly and I followed it as it moved up and down with changing weather conditions. We reliably found chinook salmon in the layer and valued the fact that the fishing area was uncrowded. Over time we started referring to the Notch as "Mike's office".

Summary: Watch the depth sounder carefully for indications of the plankton layer, and consider setting gear in that depth range – it may contain feeding salmon.



Migrating Salmon and Resident Salmon

While fishing the plankton layer I saw many markers indicating salmon actively feeding in that layer. However I also noticed occasional large markers at depths of 15 to 30 feet and other markers just above bottom, at depths of 90 to 140 ft. From previous years I knew that the markers along the bottom were probably resident salmon resting or digesting a meal, and the shallow markers were probably large migrating salmon.

Summary: At any given time there may be several different groups of salmon in the area, each with different behaviour. Pick your target and set the gear appropriately.

Salmon at the Halibut Grounds

In Milbanke Sound the “halibut grounds” were a 45 minute run south of the lodge and for safety reasons it was required that two boats travel together. I usually made the trip with Mike Meeker. Once at the grounds we would use the chartplotter and depth sounder to pick a suitable spot in 350 to 500 feet of water and drop our gear. Sometimes we would hit arrowtooth flounder, often small halibut, and

occasionally larger halibut. Once we had two halibut in the twelve to fifteen pound range we would usually head back closer to the lodge for salmon fishing.

One morning Mike had the good fortune of dropping on a spot with suitable halibut which his guests kept, and after a few minutes of fishing he was ready to go home. Meanwhile I dropped repeatedly on small halibut and arrowtooth flounder and my guests wanted to stay. Mike didn't want to sit around doing nothing, so not knowing any better (obviously there are no salmon five miles offshore at the halibut grounds) he set his salmon gear and began trolling circles around my boat – and was quickly into chinook and coho salmon. We pulled our halibut gear and joined him, also catching salmon.

Later it made sense to me. The halibut were resting on bottom at that location because the ocean conditions brought in their feed, the mature herring. Those herring also attracted chinook and coho salmon. We were fishing at the edge of a shelf where the bottom dropped from 300 ft to 600 ft relatively quickly, and it might have been an area where tidal currents drove local upwelling.

Summary: Keep an open mind. Well done, Mike!

Emmabelle

Another day Mike and I fished one of my favourite Milbanke Sound spots for halibut. This is a pinnacle, an underwater peak, with a relatively flat top about a hundred meters in diameter. The top of the pinnacle is 320 ft below the surface.

We hit a series of rockfish, a big skate and a ling cod, then my guest Bill McGeever hooked up with a big halibut. During the half hour that Bill fought the halibut I realized it was probably too big to keep (the limit was 133 cm). When he finally had it to the surface I carefully measured the halibut for length (164 cm or 64.5 inches) then we cut it loose. Back at the lodge I used tables to estimate the weight at about 135 lbs.

Three days later Darryl, our head guide, fished the same pinnacle with Emmabelle, a long time lodge guest. I learned later that Emmabelle was telling people she was "94 years old and holding" but she had actually turned 97 a few months earlier. Emmabelle's fishing method was to sit on the butt of her halibut rod and lift the handle, to slowly lift the bait off bottom. Suddenly the rod tip dove with line screaming off the reel and the butt lifted Emmabelle up into the air. Darryl came to her assistance and eventually took over. When they finally got the big halibut to the surface Darryl measured the length to be 90 inches before releasing it.

My tables didn't go that far and I had to search online to estimate the weight – in the order of 400 lbs. That was a big halibut. Darryl broke the heavy halibut rod during the fight and for the remainder of the 2016 season the rod was proudly displayed in the staff lounge.

Summary: The halibut seem to be getting bigger every year. Well done Emmabelle!

Ocean Sunfish

The same day that Emmabelle caught her huge halibut I fished "Mike's office" in the afternoon. We were running Mike's normal game plan, fishing half a mile from shore in 250 feet of water and running the gear in the plankton layer, between 60 and 80 ft. I was trying to match the small bait with an anchovy but didn't like to use an inline flasher, so instead ran a naked anchovy (wire rigged on a Rhys Davis teaser head) about four feet above a red dummy flasher.

Suddenly the arm of the downrigger started banging up and down, as if the cannonball were dragging on bottom (I knew immediately that wasn't possible). Then the downrigger cable moved forward until the cannonball was well ahead of the boat and out to the side, towing the boat sideways. About eighty feet from the boat there was a huge bubbly swirl about twenty feet in diameter and then the downrigger cable snapped. My guests were just a tad freaked out (and I swear I could hear the theme music from Jaws in the background).

The next day I saw an ocean sunfish about eight feet long in the same area. In hindsight I think the sunfish swallowed the dummy flasher, thinking it was a lion's mane jellyfish (which is big and red). The dummy flasher was connected to the downrigger cable with 200 lb mono, and the downrigger cable was of similar breaking strength.

Another day I saw a red flasher charging along the surface at quite a considerable speed. We tried briefly to catch it, thinking it might be connected to a good salmon, but it was moving too fast for us. I learned later that it belonged to Lyle and the hootchie had most likely been taken by an ocean sunfish.

Summary: Beware of ocean sunfish.

Cheney Point, Four Tyee

My best day of fishing last summer was the morning of August 2. We started with a pass along the inside edge of Rage Reef and found lots of bait but no salmon, so moved to Cheney Point. We were running flasher and anchovy on the inside rod at 37 ft and cut plug on the outside rod at 27 ft.

Ordinarily I would not fish both at the same time because the cut plug works best dead slow, and the flasher/anchovy is usually run much faster. However the lodge motors had a fast idle and pushed the boat at 1.8 to 2.0 knots, which is tough on cut plug but is fast enough to get good action from the flasher. Also I wire rig my anchovy so it spins well on its own and does not rely on the flasher to provide action, so it worked well at slower speeds. Most of the salmon the previous couple of days had been caught on flasher/anchovy. I had also hit a few on cut plug, and I wanted to keep my options open to see which the big salmon prefer.

Just past the rock at Cheney Point we had a hard hit on the flasher/anchovy, but Jim was not watching his rod and missed it. We circled back to repeat the pass, and at the exact spot of the first hit as the three of us were watching the flasher/anchovy rod the tip of the other rod (with cut plug) dove into the

water, reel screaming. I think it was the same salmon. Dale did a great job and we got it to the boat, 37 lbs.

On our next pass a few yards further on Jim hit a big salmon on flasher/anchovy. This one came quickly to the boat but was a very hot fish. There were other boats tight around us and I didn't dare back away from the salmon in case they crossed our line, and we lost the salmon at the boat. In defense of Jim my personal experience is that we hook more salmon when using flashers, but the salmon fight hard against the flasher and are more difficult to land. Big salmon in particular are easier to land with "naked" bait.

On our next pass we didn't get anything. As we made the turn Dale put on a fresh cut plug, a classic chopper, and I probably wrinkled my nose a bit but I was discreet and didn't say anything. My plan was to let him fish it for a few minutes then cut a new bait. However as we made the return pass I saw a "tap, tap" on the rod tip. Dale did a great job of striking the salmon which went deep and charged out into deeper water away from the other boats, then came up. It was a big salmon with violent movements, screaming along the surface with the dorsal fin sticking out of the water and leaving a big wake. After twenty minutes the salmon was beginning to tire and was about thirty feet from the boat when the barbless hooks pulled out, huge disappointment.

At this point we were shaking and pretty much emotionally exhausted. We made a couple more passes then went in to the lodge to weigh and drop off our salmon for processing.

When we came back out Cheney didn't look very busy, so we decided to make another pass. Just beyond the rock where we hit the first salmon we had a violent strike on the cut plug, again with the rod tip buried in the water and the reel screaming. This time I was able to get the salmon out into deep water away from the other boats and Dale did a great job with the rod. Finally we netted him, 34 lbs.

Perhaps the flasher/anchovy brought salmon near the boat where they could see the cut plug. The other boats were fishing deeper (generally 60 to 100 ft) so I was able to fish closer to shore, in water the other boats couldn't reach. Perhaps the salmon were jaded after seeing all the flashers and anchovies or hootchies and found my cut plugs to be a refreshing change. At any rate we did very well and had a fun morning.

Summary: Of the five opportunities two were probably the same salmon, and in the end we only got two to the boat. But it was a slow year and they were tyee.

“Fire Crackers”

As I mentioned earlier we had two walk in freezers packed to the ceiling with cases of ten inch frozen herring, while the few salmon in the area were actively feeding on two inch baby herring and sand lance. For the first four weeks of the season we also had frozen anchovies, however these ran out late in July and the senior managers of West Coast Resorts chose to save a few dollars and not resupply. There were thirty guides at the lodge at that time, and most of us were tearing our hair out trying to catch salmon with huge herring better suited for halibut fishing. Sometimes it worked and sometimes it didn’t, but for sure it was a very frustrating experience.

Ryan, one of the relief guides showed us a cut plug technique that he called a “fire cracker”. Many years ago when I mooched live herring in the Pender Harbour area we called the baby two inch herring “fire crackers” and enjoyed using them for coho. I would typically insert a single #12 treble hook across the nose of the live herring, on a six foot leader of 10 lb test line. When a spring or a coho took one of these herring they didn’t nibble, the result was explosive, hence the name “fire cracker” – it was great fun.

Ryan’s technique was to begin with a big herring and dramatically shorten the cut plug by making the angled cut just in front of the anus, cutting off the front two thirds of the herring. The fins were removed with a sharp knife or scissors and the tail reduced in size. The result didn’t look anything like a baby herring but it was considerably shorter than the normal cut plugs and had an odd action that the salmon seemed to like.

One advantage of this technique was that the “fire crackers” had less water resistance and lasted longer than a typical cut plug. In particular they didn’t blow out due to water pressure in the gut cavity and could be run behind a flasher as a replacement for anchovy.

On August 10 at McInnes Island Mike Stewart guided his guests to a 53 lb chinook caught on a “fire cracker” run behind a flasher. This was the largest salmon caught at the lodge last summer.

Summary: I believe that “fire crackers” are a poor imitation of small bait and I would much prefer to use anchovies. However if the lodge management chooses not to stock anchovies and the salmon want small bait, desperation moves are in order – and “fire crackers” work.

Inflatable Life Jackets

These days inflatable life jackets seem to be the standard at many (or most) fishing lodges. I think there are two reasons: lodge guests prefer the inflatable jackets, and since “one size fits all” the lodges don’t need to stock as many life jackets. However maintenance is a serious issue.

Last summer one of the lodge guests fell out of his boat. He was unguided at the time and fishing with his wife, who was at the helm. Apparently he was setting gear and reaching over the side for a cannon ball when he lost his balance in the chop and fell into the water. His wife became somewhat excited (!!!) and called on the radio for help. The guest was wearing an inflatable PFD (lodge standard issue) and pulled the lanyard, but it did not inflate. Fortunately he was able to swim back to the boat and several other boats came to his assistance. Back at the dock a senior guide tested the PFD and it did inflate, but required a fairly strong tug. Put that one down to operator error.

A few weeks later on changeover morning a guest returning from fishing handed me his inflatable PFD, and out of curiosity I felt the jacket to see if there was a CO_2 cartridge. It was not where I expected it to be, so I opened the PFD and found that someone had unscrewed the cartridge and left it beside the lever. It could not possibly have inflated and had been used by a guest for the trip just ending. I then did a quick check of the other guest PFDs (perhaps 50) and found one that had been inflated, then the jacket repacked so it looked normal. This PFD had also been used by a guest on the last trip. By my math 4% of the PFDs used by guests on the last trip could not possibly have inflated, so the failure rate considering other mechanisms (like torn bladders, which I did not test) must be greater than that. I don’t believe that these problems were caused by staff. I believe it was guests monkeying around with the PFDs while on the water.

After this, on changeover day mornings I inspected every inflatable guest PFD. This was very illuminating – almost every trip (twice a week) of the fifty to sixty PFDs in use I found one or two that could not have inflated. Sometimes the CO_2 cartridge was missing, and sometimes the PFD had been inflated and then repacked with a spent cartridge. I could not be sure that the PFDs that passed my inspection would inflate but I was certain that the few that failed my inspection could not possibly inflate. Every trip I would repair the failed PFDs then on the next changeover day I would find more. If I had not done these inspections the failed PFDs would have accumulated, trip after trip, and would have remained in use.

An interesting question is what would be an acceptable failure rate for a PFD? For me, personally, 1% is not acceptable (you are betting your life on this). Perhaps one in a thousand, but I expect that many lodge guests have lawyers who would disagree. I believe that the lodge was taking a huge risk of lawsuits (just one would bankrupt the company) by using inflatable PFDs.

Last summer I was the only person at the lodge, out of more than a hundred guests, guides and dock staff, who wore a floater jacket. My reasoning was simple – if I fall in the water at least I know it will bring me back to the surface. Several times in past years on a hot day I have borrowed a lodge PFD from the guest dry room and twice had PFDs that could not possibly have inflated. That is why I no longer use

lodge PFDs. When guiding I bring a personal Mustang inflatable PFD (which I maintain carefully) for use on hot afternoons, but for most of my fishing I use the Mustang floater jacket which I believe I can trust with my life.

Note that inflatable PFDs are not permitted as airline baggage due to the CO_2 cartridge, which could explode in flight – if you decide to make a lodge trip and for safety reasons bring your own life jacket, make it a floater jacket.

Summary: Floater jackets are best. If you plan to use an inflatable PFD, buy your own and maintain it carefully. If you make a lodge fishing trip as a guest, don't fall out of the boat.

Islander Fishing Reels

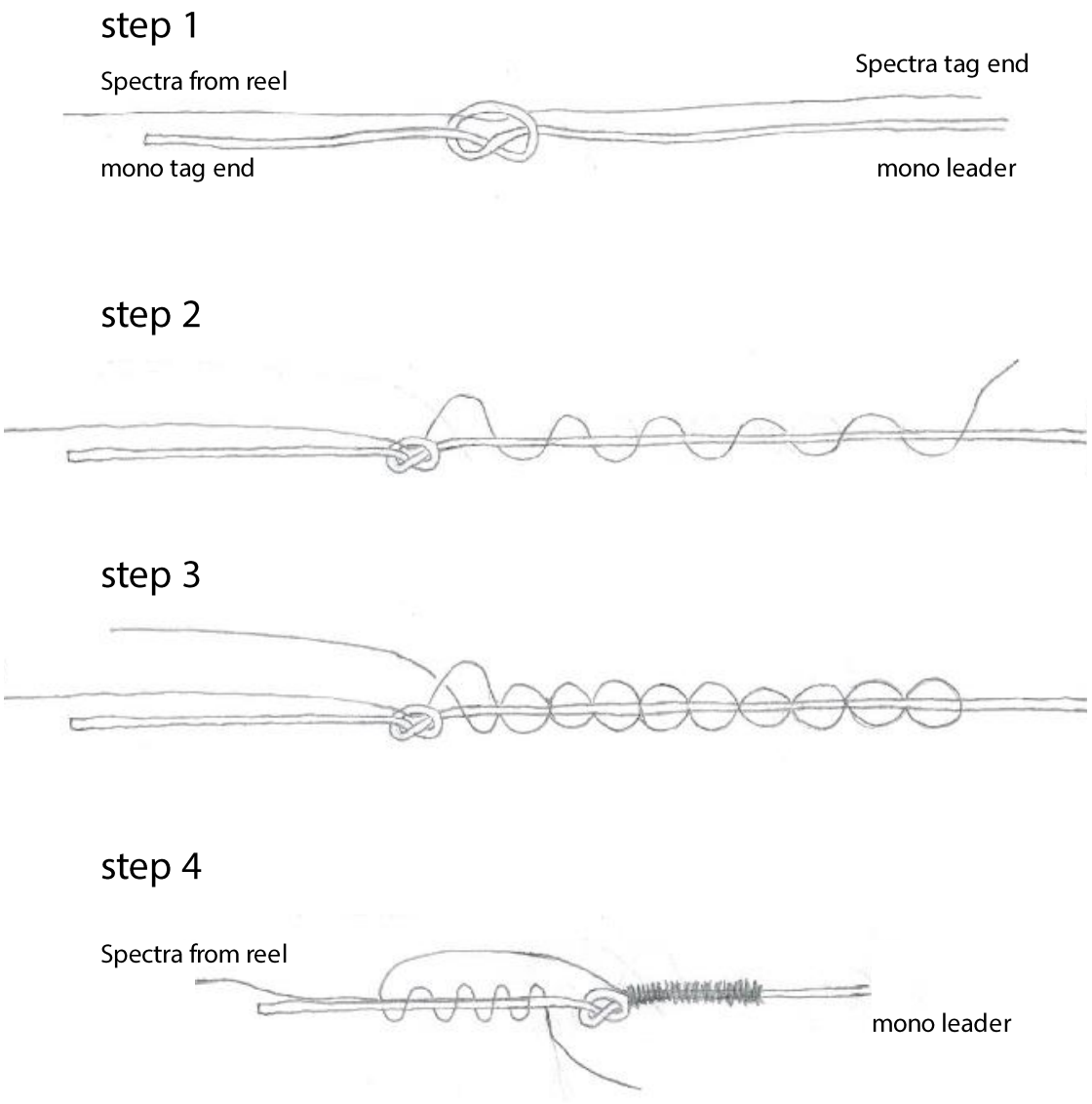
Last summer as a full time guide I was assigned four Islander MR2 reels and was responsible for their weekly maintenance. This involves opening the reel, carefully removing any water and excess grease and applying a very small amount of grease to the internal gears and levers. If the cork drag washer is wet it should be dried (most days this is not possible in the boat) and a few drops of oil applied and spread over the cork. It is important that the cork not have water on it (which would cause it to swell non-uniformly) and must be oiled to repel water. However any grease on the cork will reduce friction and mess up the drag. Finally I would re-assemble the reel and put a drop of oil on each knob, to prevent squeaking. This maintenance is critical and many guides did not maintain their reels. A poorly maintained Islander reel results in lost salmon and is not even useful as a boat anchor.

I also had three Daiwa M-One UTD 400 reels which I rescued from a bin in the tackle room and used on the spare salmon rod in each boat, and for my personal fishing. The Daiwa reels did not require maintenance during the season. On a dry day the drag was almost as smooth as the Islander, and on a wet day it was far superior. They have a loud clicker that the older guests much prefer over the Islander clicker, which is almost silent. And they have hysteresis in the drag (static drag heavier than dynamic drag) which eliminates "reel creep" and makes them suitable for trolling fast.

Summary: The Islander reels are great when slowly mooching a cut plug on a sunny day, but not so good for downrigger fishing when running an in-line flasher or trolling fast. If you own an Islander reel be sure to dry it out and oil the cork drag washer at regular intervals (every trip or two). I prefer the Daiwa for personal fishing – it does not require maintenance and is inexpensive, so after twenty or thirty lodge trips it can be retired and replaced with a new reel. It is also lighter if you are carrying a personal reel to the lodge.

Tony Pena Knot with Lemire Modification

For several years I used the Albright knot for connecting monofilament line to Spectra or braided Dacron backing, however last summer I twice had the Albright knot fail under light pressure. I realize now that the tight bend in the monofilament line is a weak point. I'm guessing that the mono cracks at the bend then slips through the Spectra knot.



Tony Pena Knot with Lemire Modification

I've now gone back to using the Tony Pena knot for connecting monofilament line to Spectra or braided Dacron backing. I had used this knot in the past and found it complicated to tie, which is why I moved to the simpler Albright knot. I guess there's no free lunch -- but I've never had the Tony Pena knot fail.

The Tony Pena knot is a very well designed knot. The Spectra tightens against an overhand knot in the monofilament line. And Lemire added a six turn lock which pulls the tag end of the monofilament tight against the Spectra line, preventing the monofilament tag from sticking out and catching in a rod guide or knocking out a ceramic ring.

Begin with a loose overhand knot about ten inches from the end of the monofilament line. Insert the Spectra from the reel through the overhand knot and pull it about twelve inches beyond. Snug but do not fully tighten the overhand knot. Then form a loop in Spectra at the overhand knot, holding the loop with your thumb and index finger (left hand), and wrap the Spectra around the mono ten or twelve times as shown in Step 2. Hold the last wrap with your thumb and index finger (right hand), release your left hand grip and continue winding another eight or ten wraps back towards the overhand knot as shown in Step 3. Insert the Spectra through the loop next to the overhand knot. Slowly pull on the Spectra from the reel to tighten the Spectra knot -- it should spiral around the mono toward the overhand knot as you snug it tight. Then fully tighten the mono overhand knot.

Finally use the tag end of the Spectra to tie a six turn lock knot on the other side of the overhand knot, which will hold the tag end of the mono tight against the Spectra line so it doesn't catch in a rod guide. Trim the tag end of the mono about one eighth of an inch proud. The Spectra tag end can be left longer as it is very soft and will not catch in a rod guide.

Green Flashers

In September I moored my boat at the Point Roberts Marina and fished both Point Roberts and the mouth of the Fraser River.

I had fished Point Roberts with my father in the early 1960s. At the time it was a very popular spot for summer fishing -- on a weekend there would often be more than a hundred boats fishing the point and many would be catching salmon. Now on a busy day there may be four or five boats and it is more normal to see just one or two. I think part of the reason is the declining salmon runs, and the recent tendency for Fraser River salmon to approach the river mouth from the north (through Johnstone Strait) rather than the south (through the Strait of Juan de Fuca). Two years ago 98% of some salmon runs came the northern route, while in the past it was more typical that more than half of the salmon would take the southern route and pass Point Roberts. My wife claims that I am an incurable optimist – I honestly expect that one of these years the waters of the North Pacific will cool and more salmon will take the southern route. In the meantime Point Roberts is a very quiet and peaceful area to fish.

Several of those days I ran north and fished the mouth of the Fraser River. That was a very different experience – instead of having one or two boats nearby, at the south arm I was in a pack of between forty and ninety boats. And although I did see the occasional salmon caught, considering the large

number of boats the fishing was very slow (one morning I fished among 75 boats for five hours and saw three springs caught).

Most boats were using flasher and anchovy. As a newbie learning the area I did the same and found that in the murky water of the Fraser River discharge flasher colour was important. I had my best success with a glow green anchovy teaser head run behind a Big Shooter UV Jelly Fish Green Onion flasher. This flasher has light green plastic with a green/gold foil on one side and a white glow strip on the other side. It did an excellent job of matching the local water conditions – a deep green Diatom bloom mixed with river silt which was lighter in colour. This flasher out fished my lodge standard green flasher (which I ran on the other side) by a wide margin.

Summary: I'm looking forward to trying the Green Onion flasher on the BC Central Coast this summer.

Fraser River South Arm Dynamics

During my winter reading I learned that the physical oceanography of river mouths can be quite complex. Fresh water is less dense than salt water and forms a layer on top, and if the two layers vary in density by more than 1% (and they usually do) they tend not to mix – so this layer of fresh water sitting above the salt water can persist for quite a while and is only slowly mixed by strong tidal action and storm winds.

During an ebb tide the salt water layer withdraws and the water at the river mouth is mainly fresh. After low slack the flood tide forms a wedge of salt water which approaches shore, pushing the layer of fresh water above it and stopping the river flow.

Summary: On the ebb tide the water near shore is fresh and may be uncomfortable for salmon which are adjusting to brackish water prior to entering the river – it may be better to fish further from shore in deeper water. On the flood tide many salmon will move toward the river mouth, riding the wedge of salt water which is under the surface layer of fresh water. At this time consider fishing closer to shore. Many of the acclimating salmon may be in the brackish water at the interface between the fresh and salt water layers or moving between the two layers.

Jugheads

Gary, who works in the Steveston Marine store in Langley introduced me to a new fishing lure called the Jughead: http://www.jugheadshaker.com/.

In the late 1960s I used a similar plastic head on a silvery mylar hootchie to fish coho during the late spring, and it was dynamite. The mylar hootchie had a bit of red and I fished it naked, without a flasher, just behind the propeller wash and a few feet under the surface. The plastic head gave the hootchie an erratic wobbling action like a plug, and I think the coho were attracted to it because the Euphausiids (which are red in colour) were massing near the surface at the time. I often had better fishing on that center rod than both outside rods, which were running deeper with herring strip, combined.

I have not tried the Jughead yet but it looks promising. Last September Gary picked up a chinook in the low 40s at the mouth of the Fraser, fishing an anchovy with Jughead about six feet behind a flasher. He later told me that he was using Pro-Cure Brine'N Bite Chartreuse Glow bait brine and dye at the time.

Summary: I plan to try the Jughead bait heads this summer, with both anchovy and medium size herring. I've also bought some of the Pro-Cure Brine'N Bite Chartreuse Glow bait brine and will try it as well.

Global Warming and Salmon

The world is becoming warmer and the evidence is overwhelming that this is caused by increasing concentrations of carbon dioxide gas in the atmosphere. I agree with the 97% of scientists who believe that global warming is manmade and a direct result of the Industrial Revolution, which is ongoing.

The earth is 4.5 billion years old and life has been present for about 3.8 billion years. The early climate of the earth was hot, with much volcanic activity which vented carbon into the atmosphere mainly in the form of carbon dioxide. The CO_2 then reacts with rocks on land through weathering, and in the ocean is taken up by phytoplankton to form sediments on the ocean floor. The balance between the supply and sequestration mechanisms determines the carbon dioxide level of the atmosphere, which through the greenhouse effect has a big impact on the temperature of the earth's surface. The presence or absence of greenhouse gases can impact the earth's temperature through a range of approximately 32^{o}C (not a misprint!).

The natural removal of carbon dioxide from the atmosphere is a very slow process and takes millions of years. However the earth's core is slowly cooling and volcanic activity is becoming less with time, reducing the amount of carbon vented to the atmosphere. The very long term trend is for diminishing atmospheric carbon dioxide levels and the eventual extinction of plant life on earth. With the loss of plants atmospheric oxygen will also disappear and life on earth will become extinct.

At the same time the sun's output is increasing. It is now about 4% brighter than when the earth was formed and this has partially compensated for the reduced greenhouse effect as CO_2 levels drop.

By about 100 million years ago the earth was still warm and the atmospheric CO_2 level had dropped to about 1000 ppm. There were no permanent icefields or glaciers, at high elevations or at high latitudes. Those drawings of dinosaurs living in a tropical climate were accurate, as the climate was tropical pretty much everywhere. The asteroid strike 66 million years ago that coincided with the extinction of the dinosaurs landed at the edge of a tropical rainforest.

About 40 million years ago the Antarctic ice sheet began to form and the deep ocean turned cold (today the water at the deepest points in the ocean is just above freezing). This was largely the result of a further reduction in the carbon dioxide level (less greenhouse effect) but ancillary causes were the movement of the continents due to plate tectonics and small changes to the earth's orbit. Ocean productivity increased enormously and supported the development of herring-like fishes and large

predators such as whales. Beginning about a million years ago small ice age fluctuations gave way to big ones in a cycle of about 100,000 years, roughly corresponding to the regular changes in eccentricity of earth's orbit around the sun. Carbon dioxide levels cycled between 180 ppm during glaciation periods and 280 ppm during interglacials such as today.

The rise of mammals and humans was almost certainly enabled by the cooling period that brought on the ice ages. Reptiles and dinosaurs do well in warm climates. Mammals do a better job of controlling their body temperature and have a competitive advantage in colder climates. Humans migrating out of Africa were shaped culturally by the needs of adapting to colder regions, where they prospered.

The last major interglacial, when the climate was as warm or warmer than today, was 123,500 years ago. When I was growing up in the 1960s the scientific literature said that based on the changing eccentricity of the earth's orbit the climate was cooling and we were heading into another glaciation period (actually we are overdue), but that was before scientists became aware of the CO_2 buildup caused by the Industrial Revolution.

In the 1750s the atmospheric CO_2 level was 280 ppm and today it is slightly above 400 ppm. In geological context this is rapid change and if the amount of CO_2 in the atmosphere were to stabilize at the present level the earth's climate will likely take several thousand years to reach equilibrium (as an example fresh water introduced to the ocean from a melting icecap requires in the order of a thousand years to mix). In effect we are winding the clock back to that time in the past when the CO_2 level was last at 400 ppm – about 3 million years ago – and the earth was a very different place. At that time the atmosphere had about 365 to 410 ppm of carbon dioxide and the average temperature was 3 to 4 degrees C warmer. Sea levels were 25 meters higher.

An implication of this is that after reaching equilibrium it may require a further 3 million years for the earth to recover and consume the excess carbon dioxide through natural processes – that's how long it took the last time. It's like hitting the restart button on your computer then waiting for the operating system to reboot, except this time it may take 3 million years. Not a big deal on the geological scale, but still a long time.

Summary: The equatorial regions will warm a little and the polar regions will warm a lot, reducing the temperature differential between the equator and the poles which drives our weather. Ocean winds, in particular the westerlies and the trade winds will on average be weaker. There will be less upwelling and ocean productivity will drop considerably, which in turn will reduce the ocean's ability to absorb CO_2 from the atmosphere. Diatom production and the oceanic food chain which leads most directly to the salmon (as well as sea birds, tuna, seals and whales) will decline considerably. Salmon may survive as a species but there will be a lot fewer of them -- get your fishing in now.

My Website

I welcome you to visit my website (www.thescienceofsalmonfishing.com) where you can check out the book and read my fishing notes from previous years.

If you've had a chance to read the book please send me an email, I am very interested in your comments. And if you have already sent me your comments, many thanks. I take all comments seriously. I've made a few changes to the book this year but they are all minor and most of the new information is included in this document.

Have a great summer and I hope to see you on the water.

Bill Haymond