Fish Topic by Species

Salmon

Salmon Olfaction

Salmon *(salmonidae)* begin their lives in freshwater stream beds, where they stay from several days to as long as two years, depending upon the species. Prior to migration, the young fish enter a physiological stage known as smoltification, which prepares them to survive in marine water. Then the salmon migrate to the sea and remain there for two to eight years, eating and gaining weight until they reach sexual maturity.

Oceanic salmon live in large groups that wander throughout the northern Pacific Ocean and into the Bering Sea, as far as 1000 miles or more away from their birth streams. Yet, despite their wanderlust, reproductively mature salmon overcome enormous challenges to return to their natal streams to spawn.

How do salmon find their way back home to spawn? It has been “common knowledge” for more than 100 years that when migrating adult salmon enter fresh water, they rely primarily upon their sense of smell (olfaction) to locate their birth streams where they will breed. But this hypothesis was not formalized until 1951, when two zoologists, Arthur Hasler and Warren Wisby, who were then at the University of Wisconsin-Madison, proposed that salmon have such a keen sense of smell that they can distinguish their home stream from the thousands of other suitable spawning streams by identifying and following their natal stream’s scent.

This hypothesis was first tested in 1954, when Hasler and Wisby captured migrating salmon and plugged their nostril (olfactory pits) before releasing them downstream. The salmon with plugged olfactory pits took the wrong fork in the stream about half the time, which is what you would expect if they were randomly choosing. Fishes without plugged olfactory pits returned to the correct stream fork nearly 100% of the time.

According to Hasler and Wisby’s Olfaction Hypothesis, young salmon imprint upon the unique scent of their natal streams when they are smolts. The olfactory hypothesis proposed that each stream’s drainage area has a unique combination of rotting vegetation, insects, fish and dust released from local rocks and soils. But which molecules provide the salmon with their informational cues? Maybe one such molecule type is amino acids: there is mounting evidence that individual amino acids (those basic building blocks of all proteins) dissolved in the water may provide important information to salmon, which they detect through olfaction.

As any fisherman can tell you, fish are very sensitive to odors, particularly the scent of their predators. In the November 1978 issue of *Pacific Search*, author C. Herb Williams described a Canadian study where a nearly homeopathic solution containing one part of human skin dissolved in 80 billion parts of water was dumped into a river. Astonishingly, the scent from this solution was sufficient to stop migrating salmon for as long as half an hour. Additional experiments by Canadian scientists show that salmon will either slow or stop their migrations when certain human smells are present in the water, and trout — another salmonid — show distinct flight responses when a fisherman washes his hands upstream.

This offensive scent was identified as the amino acid, serine, which — because human skin contains serine — has led to some fishermen to refer to this as “the serine problem”. The amount of serine in human skin depends upon the sex, age and race of the individual — interestingly (and appropriately), the worst “serine offender” are adult white human males.

Even though it is poorly understood at present, we know that olfaction plays a crucial role in the life cycle of salmon. These fish rely on scent for nearly every aspect of their lives, from locating food to avoiding predators. They travel thousands of miles during their lifetimes and rely upon their discerning sense of smell to bring them home again.

How Scents Affect Salmon Fishing

In the high tech world of salmon fishing, bait companies such as ProCure, spend millions of dollars on research, development, and testing of scents and attractants. Many anglers believe in them and still others do not. These specialty oils and scents may be great tools but there is also a simple low-tech solution for improving your fish-catching experience. Many anglers have negative scents that may be spoiling their chances for a really good day of salmon catching. It is the scent they have on their hands and equipment.

In the past years there have been numerous studies conducted on fish and how they respond to certain chemical odors. Only the uninformed angler realizes that the obvious smell-residue of gassing up the boat, putting on sun cream, the pastrami sandwich just eaten all will add additional foreign flavors to your hands. Any of these may be totally nasty to the fish you want to catch. It is these same hands that will hold your fishing gear. Simply washing your hands often can reduce this contamination problem. There are products such as fisherman's soap, and dish detergents such as Lemon Joy or Lemon Sunlight, which have become just another tool for the educated angler. These products clean, rinse easily and leave no residual odors.

Studies have also pointed out that people in general naturally produce offensive chemicals that fish will also avoid. This scientifically proven offensive chemical found on most fishermen's hands is identified an amino acid called *Serine*. In tests, salmon avoided even small concentrations of this chemical. It is becoming quite common to see salmon anglers using rubber gloves to bait and handle their bait, plugs and lures. It appears that salmon are especially shy of scents that do not 'belong' and probably a lot of our other fish as well respond negatively to these 'off' smells.

Another turn-off for salmon is the quality and freshness of the bait used to wrap plugs. Frozen baits like sardines that have been defrosted, then refrozen, are often subject to decay and offensive smelling to salmon depending on how long unfrozen. Bacteria in the interior of all fish start to atrophy the flesh upon death. Heat from the sun speeds up the decaying of bait this also includes roe. No matter what is done - if bait is spoiled it will not be effective and spoilage does not need to be obvious to us. The chemical smell is there long before the human nose can distinguish it. Always use fresh, high quality baits and keep them well cooled during the fishing day. That precious bait oil and scent you have had in your tackle box for months may have spoiled. Since these products smell bad to begin with, it is always a good idea to buy fresh scents since these products have a limited life and at some point they too become old and deteriorate.

There is even more to be concerned with offensive smells that salmon avoid. How regularly do you really clean your fishing rods? Especially the cork butt and reel you handle every day of fishing? Over a period of time your fishing equipment will no doubt have a buildup of contaminates such as sweat *(and Serine)*, bait residue, scent tracks, and many other foreign chemicals. These contaminants and other organics will decay and become a source of bacteria and spoilage repulse salmon.

To reduce contamination, wash your fishing equipment regularly with a good, easy rinse detergent. Use a kitchen brush and scrub everything… pole, guides, reel seat and cork butt. Don't forget that reel; it is another prime area for oils and other smelly, sticky goo to hide. Rinse everything well after cleaning.

Natural porous cork handles are a prime home for foul smelling bacteria. At times wash rod handles in a bleach solution then rinse them thoroughly. This will not only cleans it but will kill any bacteria imbedded in the cork.

Fishing can be a challenge, but you can increase your chance for more productive days. Good, fresh bait is the first step. Then you need to reduce or eliminate fish offensive scents. Wash your equipment, hands, and anything else that comes in contact with bait and your tackle. If you don't already use a bait oil or scent give them a try. Give those fish something new to smell and help mask the human odor and anything else your hands may have acquired. These simple changes could mean the difference between an average fishing day or fantastic day of catching!

Fish have left and right nostrils located above their mouths. There are two openings in each nostril. An entrance and exit for water to pass through. Water borne scents flow through the nostrils and are analyzed by numerous scent receptors. These receptors are triggered by different sized molecules of chemicals, pheromones, and hormones. Chemicals are used to communicate danger (fear of predators); pheromones (courtship and mating); and amino acid chemicals that affect feeding. Fishing scents are used to both attract as well as to mask objectionable scents and an important part of the successful angler's arsenal.

Impacts of Dissolved Oxygen on Salmon Migration

Although water temperature is most often associated as to whether salmon migrate to their natal grounds to spawn when in actuality dissolved oxygen content of the water is more of a factor. Minimal dissolved oxygen is one of the limiting factors for salmon. In general, salmon possess highly specialized gas exchange systems that allow maximum utilization of available oxygen.

Specifically, salmon require a sufficient oxygen gradient, between their bodies and surrounding waters to allow dissolved oxygen gas to exchange through diffusion across their gills and into their blood. Further, there must be sufficient available oxygen to fulfill minimum metabolic demands for maintenance of minimum bodily functions including spawning.

Freshwater at sea level has a saturation dissolved oxygen concentration of about 14.6 mg/liter at 32°F and 8.2 mg/liter at 77°F. Concentrations below 5 mg/liter adversely affects bodily functions and minimal survival of the fish, and sustained exposure below 2 mg/liter leads to eventual death.
Recommended oxygen levels for all spawning salmonids is a minimum of 80 percent saturation with temporary levels no lower than 5 mg/liter. While maximum sustained swimming speeds of adult coho were adversely affected when dissolved oxygen was reduced below saturation at temperatures from 50°F to 70°F. Dissolved oxygen distribution in reservoirs may vary substantially from river systems due to differing hydraulic regimes.

Another mechanism of water may increase or decrease dissolved oxygen is through the transfer between the air-water surfaces. Typically the transfer is from the atmosphere pressure into the water (re-aeration) because dissolved oxygen in most natural waters is below saturation. However, under super saturated conditions there is a net transfer of oxygen from the water body to the atmosphere. Usually, dissolved oxygen levels in excess of 7.0 mg/liter are desired to maintain all aquatic ecosystem general health.

Theoretically, a critical oxygen level for each fish species exists; however limited data is available. Salmon can resist or tolerate short-term oxygen reductions. It has been determined that certain salmonid species may acclimatize to reduced dissolved oxygen levels, as observed in trout species, if declines are not abrupt. Behaviorally, fish may avoid low dissolved oxygen conditions by physically moving out of an area. Under low oxygen levels apart from water temperature, salmon may forestall migration. Finally, low oxygen levels can also increase toxicity of contaminants to anadromous fish In general, including ammonia, zinc, lead, and copper.

Excessive oxygen levels appear to have no deleterious impact on fish. Concentration levels of 250 to 300 percent of saturation are not lethal. This condition should not be confused with gas bubble disease, the result of local gas super saturation (typically nitrogen) caused by air entrainment, heating of water, and air vented into power turbines.

Rolling Shad & Anchovies for Landlocked Kings— by Motherlodelakes.com

The veteran angles that target Landlocked King Salmon while rolling shad and anchovies on the beautiful lakes in California know exactly what it takes to be successful while using this awesome fishing technique. On the other side of the coin there are numerous anglers that have no idea how to roll shad or anchovies, therefore; they're missing out on a great way to catch Landlocked Kings. I'm hoping this article helps out the new anglers who want to learn more about rolling shad and anchovies for landlocked King Salmon on their favorite lake. Whether you've decided to target the awesome King Salmon fishery at Don Pedro, **Lake Shasta**, Lake Berryessa, or the many other California Lakes with a population of Landlocked Kings, technique is very critical and the proper equipment is a must!

Since I love to fish for Landlocked Kings with ultra light equipment, my favorite rod is a one piece; 7' ultra light Shimano Talora TLA – 70ul with 8 pound Trilene line on an Abu Garcia 4600 C3 reel. When the Kings are in less than 70 feet of water, I'll use a size 1, Pro Troll #2100 Clear Roto Chip Bait Holder. When the fish are deeper than 70 feet, I like to use the same set up but instead of the clear Roto Chip Bait Holder, I prefer the #2114 Glow Green or the #2312 Glow White.

Picking the right bag of bait is very important. Make sure the bags of bait you choose are completely sealed. Look over the size of the bait, I like to find a bag of anchovies that have anchovies in the 4-5 inch range. As for shad, I like to find bags of shad that hold 3-4 inch shad. You can use them right out of the bag, or you can brine them overnight. If you brine your bait, it will last much longer on your hooks.

Scent is a very important factor while rolling shad or anchovies. There are many scents available on the market; I prefer to use Pro Cure scents. My personal favorites are Threadfin Shad, Shrimp/Krill, and Anchovy Super Gel while trolling for Landlocked Kings. Add a generous amount of scent to your bait and be sure to use it on the harness also. This will help hide any unnatural scents that may cause the fish to turn away.

Downriggers make fishing for Landlocked Kings much easier. There are many different brands and models on the market; I use the Cannon Mag 10 Downriggers. These downriggers offer a 250-fee-per-minute retrieval rate, which is the fastest in the industry, 20-lb weight capacity, Positive Ion Control that creates a fish-attracting electrical field around your boat, a three-digit counter and a heavy-duty telescopic boom that extends from 24" to 53". I like to use 8-10 lb pancake with flashers attached to them.

A fish finder is also a very important tool when it comes to locating schools of fish or bait balls. I like the Lowrance 102c and the Lowrance X510c. the color graphs allow anglers to identify certain species of fish by looking at their air bladders in the images.

While fishing for Landlocked Kings, depths can be as shallow as the top 30 feet of water and as deep as 140+ feet. On the California lakes, the average depth seems to be anywhere from 60 – 120 feet.

Trolling speeds can vary from day to day. 1 – 1 ½ miles per hour seems to be the best trolling speeds when targeting Kings. Experiment with speeds, when you catch a fish, take a note on the speed, this can be very important for the remainder of the day.

When targeting Kings at any of the California lakes, I like to start fishing in areas that I've caught fish in before. I'll rig one rod with shad and drop it down between 40 – 50 feet. On the second rod, I'll use an anchovy and drop it down to 60 – 70 feet. If I haven't had a bite within 15 minutes, I'll lower the rods down 10 -20 feet deeper than the starting depths. Keeping an eye on the fish finder, if I see fish on the screen, I'll adjust my baits to the depths accordingly.

Once I hook a fish, I take note on the depth and what bait was used and I'll make sure to get that rod back in the water as soon as possible at the same depth with the same bait and I'll make another trip over the area that produced. A marine radio can also be very helpful while trolling on your favorite lake; many anglers like to broadcast their success to other anglers over the radio, and if you ever have trouble on the water, a marine radio can get you the help you need.

Confidence is the key when targeting any species of fish. In order to build confidence, you need to try different approaches and techniques. Once you find out what's working on your favorite body of water, make notes so you can remember what was working during previous trips, the notes you take may help you out when things get tough out there.

Remember, there are five sensing mechanisms used by all fish to find and catch their prey:

- Sight – fish see their prey and attack it.
- Smell – Most fish have a highly refined sense of smell. The smell of blood or baitfish gets the attention of a lot of species.
- Sound – Sound travels much better in water than it does in air. Fish can hear sound from a long distance away.
- Vibration – Fish have a lateral line along their bodies that can detect vibrations in the water. Many species use this to detect vibrations from baitfish or other fish as they wiggle their tails to swim.
- Electrical sensitivity – Fish can detect the tiny nerve pulses of other fish. Many species use this to zero in on struggling baitfish or other prey.

Note: Rooster Tails February guest speaker was Cal Kellogg, Editor of Fish Sniffer Magazine, provides the following YouTube video on Rolling Shad or Anchovies for Landlocked Salmon or **BIG** trout. Be sure to wait-through the lead-in about Fish Sniffer Magazine… Have your sound up and watch this informative video: **http://www.youtube.com/watch?v=trB2i4Rit1o**

Jigging for River Salmon

The river salmon season open on the Central Valley major Rivers in July. Most anglers will be trolling or back-bouncing traditional salmon plugs such as the Flat Fish or Kwik Fish with a sardine or herring wrap. Others will be trolling various spinners such as Silvertrons or Blue Fox. Pulling plugs or running spinners fishing for salmon is to elicit a strike by taunting the fish into attacking a menacing object.

Many anglers are skittish about a fishing technique called jigging because they are concerned that they may snag a nice fish which, by law, must be released. Jigging is a finesse fishing method of getting a mouth-hookup and requires some basic techniques to avoid foul-hooking the fish. The key to successful jigging is to illicit a strike by causing the jig to mimic a 'fluttering-fall' of an injured bait fish. Spawning salmon do not feed when they enter fresh water, but when jigging is done properly they are still 'programmed' to strike at crippled forage. The salmon angler that masters a proper jig presentation capitalizes on salmon ocean feeding habits with greater results then other fishing methods.

Just to be sure you are legally jigging, it is important for you to check DF&W regulations, but for this article, here are some guidelines:

- Using a treble hook on any lure weighting more than one-once is illegal when fishing on the Sacramento River North of Highway 50.
- No person shall use a single hook with a gap of greater than one-inch or any multiple-hook with a gap greater than ¾ inch.
- It is unlawful to use any hook which is directly or indirectly attached closer than 18 inches to any weight exceeding ½ ounce.
- It is unlawful to use any multiple hooks or more than one single hook on non-buoyant lures exceeding one once.
- It is unlawful to use any weight directly attached below a hook.
- It is also unlawful to use any tackle in an attempt to deliberately snag any fish, including radical ripping of the rod and lure.
- Bottom line is that if the hook or hooks are designed to snag a salmon… it is illegal

Common jig-spoons are Gibbs Minnows, Hopkins spoons, Crippled Herring jigs, and even large Kastmasters. Most of these jigs come with treble hooks which should be switched-out to a barbed Siwash single 2/0 to 4/0 hook. Jig colors are a matter of choice, however on cloudy days, deep or muddy water use dark colors. On bright sunny days or clear shallow water, use bright colors including silver or white. Some jiggers will put a slight bend to the body of the jig to increase the 'flutter' as it sinks.

Basic jigging technique involves continually vertically raising the jig and allowing it to slowly settle (flutter) towards the river bottom. Remember, it is important to keep the rise and fall of the jig vertical and not allow it to swing-back on an angle. The boat can be anchored over a river-seam/ridge to wait for traveling fish, or from a 'dead drift' boat on slow moving deep water.

Start by touching the tip of the fishing rod to the surface of the water slowing releasing line until the jig settles on the bottom. Retrieve some line with a couple of turns of the reel, than repeatedly raise the rod tip about two feet and then lower it again keeping the jig as close to the bottom as possible. It is

important to minimize slack in the line as the jig descends which is necessary to detect a 'tick' or interruption of the fall. Salmon will strike as the jig falls, if the jig 'stalls' on the way down, set the hook!

Electrical Sensitivity of Salmon by Pro-Troll Products

Research into the behavior of fish in the presence of electricity started over one hundred years ago. Scientists and biologists have long been fascinated by the ability of some fish to use electricity and magnetism to navigate and find prey. Even though a lot has been learned, in many ways the field is still in its infancy. It is known that all fish have some reaction to electric stimulus in the water; but exactly how fishermen should take advantage of this, remains a mystery with most species. Let's start with a summary of what is known.

Fish use electricity in varying ways.

As early as 1917 scientific studies had revealed that a number of animals, including fish, demonstrated responses to the presence of tiny electric fields in their environment. Some of the earliest work was done on catfish which turned out to be very electrically sensitive. Scientists, PARKER and VAN HEUSEN, tested blindfolded catfish in an aquarium. When glass or inert rods were inserted into the tank, there were no reactions. However, when metal rods were inserted, there were immediate reactions. With some metals, the catfish would swim to the rods and with other metals they would swim away. The reactions came from galvanic reactions between the metals and the water. Later the same scientists created the same reactions with induced electricity instead of the rods.

By the 1950's hundreds of fish were classified and ranked by their degree of response to an anode (electrical) reaction. It was learned that many fish have the capability to sense the electrical impulses given off by other fish and some can even sense the tiny voltage gradients created by ocean currents and river water movements in the presence of the earth's magnetic field. All fish have a reaction to an electrical field but it differs. Some fish are attracted to the field, some are frightened by it and attempt to hide and a third group appears to be immobilized by it. Interestingly, however, all of these groups react towards the positive charge and away from the negative. Even fish that are frightened and attempt to hide will move in the direction of the positive anode.

In 1982 a study by Mr. L. A. Balayev of the Moscow All-Union Research Institute for Sea Fisheries concluded in part:

- Fish are divided into three groups: those with an anode reaction, those without and those in the intermediate group.
- Irrespective of the presence or absence of anode reaction, all species of fish distinguish the anode (+) from the cathode (-) and prefer the anode.
- The anode reaction occurs in two stages: (1) distinction by the fish of the polarity of the current, (2) movement towards the anode or absence of movement depending on the ecological stereotype of behavior of the fish.
- The presence of an anode reaction is characteristic of active and agile species. Fish that are not very active respond to the action of the (electric) current by hiding.

Some fish are unique in that they have special cells on their body surface that are electro receptors. These nerve cells have the specific capability of reading electric signals. Sharks, rays, sturgeon and catfish are some of the better known species of this type. Not only are they attracted by an anode reaction but they will use their electro receptors to find prey hidden or buried in the mud or sand. They can sense the electrical nerve discharges of their target.

Salmon do not have electro sensor cells like sharks but they have been found to be one of the species strongly attracted to an anode reaction. Research at the University of British Columbia demonstrated that salmon can distinguish the earth's magnetic field. When baby salmon in test tanks were subjected to magnetic fields imposed outside the tanks, the majority of the fish would orient themselves to one side of the tank. It is believed salmon use this sense in their migration patterns. Many years ago the U.S. Fish and Wildlife Service learned that they have to be very careful with galvanic reactions (electrolysis) around salmon hatcheries.

In many instances salmon must swim through culverts or other metal structures in their upstream migration. If the dissimilar metals are used such that a negative galvanic reaction is present, the salmon will refuse to enter the culvert or structure. The Fish and Wildlife service carefully neutralizes these structures to ensure salmon passage.

In 1979 Daniel Kenichi Nomura completed his master's thesis at the University of B.C. by running controlled voltage tests aboard boats of commercial salmon trollers. For King salmon, Nomura demonstrated that troll success was higher for the positive 0.5 volts condition and not significantly different for the positive 1.0 volts condition, with respect to the paired control conditions of zero volts? The same tests for sockeye salmon showed the best attraction voltage for this fish was 1.0 volts. Nomura also attempted to prove or disprove the theory that optimum voltage has a bearing on the size of salmon caught but his results were inconclusive.

Whenever a boat is in water, the different underwater metal parts interact with each other to form a weak battery. Electrical currents flow from one metal part to another depending on the type and placement of the metals involved as well as the mineral content of the water. Typical metals used on boats include aluminum, copper, steel, brass, stainless steel and zinc as sacrificial anodes. If a boat is set up properly all the corrosion is channeled so it dissipates harmlessly in the zinc sacrificial anodes. As it does so, it creates a positive field around the vessel which can be helpful in attracting fish.

The Pro-Troll Quick Boat Check Procedure

1. Use a voltmeter that has a DC scale that will read zero to one volt. If you already have the Cabela's Black Box you can use it as your voltmeter in the natural voltage mode.

2. With the boat in the water, lower a downrigger wire into the water 5 or 6'. It is best to do this away from docks where a number of boats are moored. Stray electrical currents from battery chargers or electrical systems can distort your readings. It is also best to have a vinyl-covered downrigger weight and an insulated end snap connecting your weight to the wire.

3. Turn off everything electrical on the boat. Turn off the master battery switches if you have them. Then connect the negative lead from your volt meter to the negative battery terminal, the engine or to some other grounded metal on the boat. Touch the positive lead to your downrigger wire near the spool or along the arm. You should get a natural voltage reading of between .7 volts and .8 volts. If the reading is significantly outside this range, you have a problem (see later roblem section).

4. One by one, turn on the boat's different electrical systems and watch the voltmeter. Start first with the battery switches. Next, turn on the bilge pump. Start the engine and then each of the other electrical devices. If your natural voltage reading changes by more than .05 volts from its starting point with any of these steps, you have an electrical leakage problem. These are quite common in battery switches and accessories like bilge pump connections where a slight amount of positive electricity can leak into the water in the bilge.

If your boat fails test 3 or 4, you are probably repelling fish rather than attracting them. You need to find the problem on the boat and clean it up.

Initial things to check if your readings are not normal

If your readings are low (below .500) most of the time the problem is either your zinc not making good contact with the water or your downrigger cables are not making good contact with the water. Boats that are kept on trailers out of the water, often get oxidation on the zinc and it will become covered with a white powder. This insulates the zinc from the water and causes a low voltage reading. The solution is to clean the zinc with a stainless steel brush.

Downrigger wires also get corrosion and don't make good contact with the water. The older the downrigger wire, the more likely it is covered with scum or corrosion. It will give you a low reading even with a good zinc. For testing purposes you can scrape or clean a section of the wire with steel wool. If the wire has broken strands it's probably time to replace it. Otherwise the best answer is to install a Black Box which will bring the voltage back where you want it. Different downriggers on the same boat will frequently show different natural voltage readings because the wire on one will be older or more corroded than the other. The Black Box will correct the voltage on up to six downriggers.

Boat bonding could be a problem. Inspect the inside of the hull. If the boat is fiber glass or wood, there should be a copper bonding wire running along the bottom of the hull connecting all the underwater metal fittings together. For example, it should run from the engine or outdrive to the metal fuel tanks, metal water tanks, thru hulls, trim tabs and motor shaft and stuffing box. Be sure the bonding wire is not broken and that the connection to each fitting is clean and tight. The connections are easy to check with a volt/ohm meter. With the boat in the water, touch the positive lead from the volt meter to each fitting and the negative lead to the bonding wire. If the meter shows a reading of .010 volts or higher, clean the connection and recheck. If its below .010 volts, check the same connection with an ohm meter to insure continuity of less than one ohm. If the boat is out of the water on a trailer, you can use the ohm part of this test by itself.

If your outboard engine is an electric start, it is automatically grounded and nothing further needs to be done. If it is not an electric start it must be grounded (bonded) to the boat ground system. This can be done by running a wire from the metal on the motor to a ground point on the boat hull. If you are not sure the motor is grounded, you can use a volt/ohm meter to check. To test for bonding, connect the negative meter lead to the negative terminal of the battery and test for continuity to the boat hull or bonding strap as well as the outboard motor. If there is no continuity, install a bonding wire (#10) from the negative terminal to the hull and to the outboard.

Boat Electrical Field's Impact on Salmon Fishing by Dennis Reid

Dennis Reid has spent a large portion of his life fishing for salmon on the West Coast and has had phenomenal success hooking the prized fish.

As hard as it may be to believe, sharks can sense an electrical differential of one billionth of a volt. This is the equivalent of sensing the electrical current running between two flashlight batteries set on the ocean floor miles apart. Other fish, both fresh and saltwater, although not as exceptional in their abilities as sharks, have extraordinary powers to feel electricity in water. Salmon, for instance, can detect voltage changes of .025 of one volt. They will respond to the electricity emitted from a mooching setup attached to a downrigger from as much as 300 feet away.

All boats with metal parts radiate an electrical charge. Stern drive units, out board engines, trolling

motors, radar, marine radios, fish finders and any other metal on board including downrigger cables generate an electrical field. Even rusty screws react with water and generate an electrical impulse, particularly in salt water with its high concentration of conductive minerals. Electrons pass from the boat's metal into the water establishing an aura of electricity around the hull and all the way down to a downrigger ball. Even electronic gears not immediately in connect with water may radiate a charge even through fiber glass hulls.

As an example, Zinc anodes that are placed on boat motors and other metal boat parts to minimize electrolytic pitting demonstrates the existence of electron's action in water. Zinc is less noble than other metals, such as stainless steel, thus it donates electrons as the zinc gradually is eaten away. Zinc anodes need to be regularly cleaned and/or replaced at least once a year or more as they deteriorate for their purpose of controlling electrolysis.

What does this means to salmon fishing? A properly electrically balanced boat will do two things; it will resist electrolysis and give off a minute positive charge, less than .5 volt. On the other end, a charge electrolysis greater than .75 volts is too high and repeals salmon. The invisible ion cloud that surrounds your gear can actually attract salmon to your boat, if properly tuned-in, bringing them right to your tackle as well as other boats fishing in your immediate area.

This invisible bathing of even miniscule electricity can be extremely important to fishing for salmon. After changing engines on my boat two years ago, I noted drastically reduced catches, a situation I was not prepared to accept. A check with a voltmeter- negative clip attached to the engine and positive clip to the downrigger cable revealed a .829 volt boat electrical potential and hence indicated the source of my difficulties: I was actually blowing fish away from my boat. Commercial fishermen I have spoken with say they have spotted schools of salmon formed behind their gear when the correct voltage was dialed-in within the electronic sphere of their boat. When the voltage was changed outside of the optimum parameters the fish scooted away. Alter it was once again corrected to the proper voltage the fish came streaking back to their gear. Different species of bony and cartilaginous fish respond to differently, however the small variances in voltage. The recommended voltages for common sport species in fresh water are as follows:

Chinook salmon -	.60 volt	Rainbow trout -	.65
Coho salmon -	.65	Brown trout -	.65
Sockeye salmon -	.75	Cutthroat -	.65
Kokanee salmon -	.65	Black bass -	.75
Halibut -	.45	Sharks -	.40
Lake trout -	.65	Striped bass -	.65
Catfish -	.50	Sturgeon -	.50

Fortunately, boat electrical problems can be addressed once they are identified. Downriggers and their metal cables can be modified by the use of vinyl-covered downrigger balls. Their electrical charge can also be reduced by isolating the ball from the system. Attach 1 ½ foot Dacron line between the downrigger ball and downrigger stainless steel cable. Then connect a small brass extender bar to the top of the Dacron for sockeye to the bottom for other species. Alternatively, another choice would be to install braided line on the downrigger instead of stainless downrigger cable. In my boat, I found that using monofilament line with weights and letting more line out behind the boat had a dramatic impact on success versus downriggers. I picked up fish on this setup in a ratio of four fish to one when compared with my downrigger, but it all depends on water depth and where the fish are holding.

The best method of producing a fish-attracting electrical charge is a product known as a Black Box. This bit of salmon-fishing wizardry ought to be on the Christmas list of every avid angler. It is hard to believe that a wire line dropped from the shore or through the ice can be wired to radiate that warm cloud fish find so attractive. They will migrate toward it and stay bathing much as we lounge in hot tubs. Sooner or later they will get hungry and presto, the lunch is on your line.

Black Boxes come with special sleeves. On the boat, these are attached to downrigger lines and the accurate voltage for a specific species is dialed in. The system is powerful enough to run up to six downriggers (which is far more than most boats can handle) and complex enough to deliver the correct voltage. A table of adjustments down to 200 feet comes with the unit. The notion of turning a dial to get the fish to swim on over to you may seem unbelievable while sitting at your computer screen. It will seem a lot more plausible when sitting in your boat getting skunked, particularly if you are a good fisherman who regularly brings home fish.

If you're interested in this recently investigated phenomena or have questions regarding boat electrical potential contact the manufacturers of the New Black Box at www.protroll.com/products/black-box.

Leadcore Line to Fish for River Salmon

Once the bastion of coldwater anglers who have used weighted line as a technique to reach deep-loving trout, kokanee, and landlocked salmon, leadcore line can be an effective tool to fish for shallower river water and the Delta for salmon. Leadcore allows the salmon angler to fish completely unencumbered by such extraneous bottom-snagging devices as lead-weights or divers to present sardine-wrapped hard-baits and spinners to the proper depth. Either anchored or trolling, leadline allows a more precise depth lure/bait control not achieved with other methods.

Leadcore is a thin, pliable, 'round core' of lead wire (or an environmentally lead-substitute) that is wrapped in an outer braided 'skin' of Dacron or nylon sheathing and rated as with other fishing line by pound test. Leadcore is commonly available in 12 and 18 pound test. The core of lead wire material itself provides no tensile strength with the sheath bearing the load strength performing much like regular braided line.

Leadcore is usually sold in spools of 100 yards and is color-coded in increments of 10 yards per color. For example, to pay-out 'four colors' is to let out 40 yards or 120 feet of line. Sink-rate varies due to trolling speed, moving water, water temperature and resulting density, lure weight, and leader length. Albeit a rough formula, 12 and 18 pound leadcore sinks at approximately five to seven feet per color with the later sinking faster.

Leadcore is best loaded onto an oversized level wind reel with a few feet of twenty pound monofilament backing to prevent it from spinning on the reel spool. When winding the leadcore onto the reel, keep the supply spool containing the leadcore up-right and in line with the reel being careful to prevent any kinks. Also, keep a steady pressure on the line as it is wound onto the reel. To tie the leadcore to monofilament backing or a leader, peel back 2 to 3 inches of the sheathing and pinch-off the lead. Using only the lead-free sheathing, use a blood knot to tie the leadcore to the backing and to ten feet of 20 pound monofilament leader.

Blood Knot

It is also recommended to tie a ball-bearing swivel to the end of the leader to prevent any twists to the leadcore. Leadcore rods tend to be on the short sturdier side. They should have a sensitive tip to read the bait action, but have enough strength and backbone to be able to handle the drag of the leadcore and the hookup of the fish.

New to the fishing line market is a product called Sufix 832 Advanced Leadcore and the first leadcore to combine both Dyneem and GORE high performance braided fiber sheath that sinks 30 percent deeper and is a whopping 70 percent stronger. Sufix 832 Advanced is infinitely more sensitive and available in 12 pound test with a .022 diameter and 18 pound test with a .027 diameter. It is accurately metered in ten foot colored sections and resistant to UV sunlight. Besides being thinner than ordinary leadcore lines, Sufix 832 Advanced has three times the abrasion resistance preventing wear down of the line.