

Fish Attraction Devices – Floating and Submersible LED Arrays

An LED Array is a visual Fish Attraction Device made up of Superbright Green, Blue and full spectrum White LED's. Fish eyes peak in the blue/green spectrum, these wavelengths also penetrate deeper than other colors, cool white full spectrum LED's are included to make for better human viewing of fish around the array. In a floating array or underwater light 100% of the light is available whereas an overhead light, depending upon ocean conditions, may be attenuated up to 90% due to the light reflecting off the surface. For photographic purposes the difference between an overhead light and an underwater light would be about two full aperture stops. In clear off-shore water blue/green light may penetrate to 100 meters, cloudy inshore waters will limit penetration. These pictures show first generation LED arrays, the LED is shown with voltage turned down to prevent photo wipeout. In actual use the LEDs are extremely bright, from a fish viewpoint it is virtual cloud of light.



Illuminated FAD's are used by fisherman to "make bait" and attract game fish, and by fishery scientists to attract and identify species within a given area, in this instance underwater cameras using, ambient, IR and/or full spectrum lighting would be positioned around, below or over the array recording fish species and activity, many new species of fish and other aquatic marine species have been discovered using these FAD's.

Fish are attracted to light in a roundabout way, it's all about the ocean food chain wherein the big fishes eat the little fishes and the little fishes eat the plankton that are nourished by the sun. At the bottom of the food chain, the starting point, are single-celled marine plants called Phytoplankton (algae, primary diatoms, dinoflagellates, coccolithophorids, etc., are collectively called phytoplankton). Phytoplankton float within the upper layers of the oceans, they use solar energy from the Sun (photons) to convert (photosynthesize) carbon dioxide and other nutrients derived from ocean bottom upwelling's into carbohydrates that in turn is the food used by marine creatures. Zooplankton such as macro-shrimp, copepods, jellyfish, etc. feed on Phytoplankton, smaller Zooplankton are eaten by larger Zooplankton which in turn are eaten by bait fish including small squid, anchovies, sardines, lantern fish, etc...

Photons are also produced by artificial light, on a dark night a light on the surface will activate plankton and start a food chain feeding frenzy with Zooplankton eating the Phytoplankton, small fish eating the Zooplankton and eventually larger bait fish joining the party eating whatever is smaller and available. Nature's most effective FAD is a feeding frenzy, this gathering of bait fish such as anchovies, sardines, mackerel and even small squid, their darting in and out of the light circle pouncing on smaller prey (often with sea birds joining in) sets up vibrations in the water that can be detected at a great distant by foraging predators. Simulated feeding frenzy vibrations can easily be created by directing a strong stream of aerated water into the ocean alongside the boat, this technique was effectively used by the old San Diego and San Pedro tuna fishing fleets to attract and hold the tuna to the boat for Jap-Pole harvesting (wherein up to three men with three poles attached to a single bare hook, with a bit of chum in the water, did the job.



Fish appear to be programmed to know that light may be a potential food source thus at night they will be attracted to a light source, this may be due to the fact that most predators and game fish feed 24/7, at night an abundant food source is the tiny but luminous lanternfish, thus any night light may translate into a grouping of lanternfish.

Large predators and game fish will typically "stand-off" from the brightly lit area foraging below and on the periphery of the light zone picking off the bait fish as they dart in and out of the bright illuminated feeding area. Observing these larger fish is accomplished by placing underwater or floating video cameras with (invisible) infrared lighting on the periphery. When fishing with floating or underwater lights cast your line into the dark surrounding waters and/or drop a line along side or close by the array to about 8 to 10 feet below the array. A bit of chum helps a lot.

During the spawning season California Market Squid (Logilo) are particularly attracted to underwater lights and floating light arrays offering easy harvesting. These inshore waters are usually cloudy obviously the more light the better but even a small light can be very effective depending upon the competition from lights in the immediate area.

Although blue/green (aqua) is the preferred wavelength for fish attraction that color, when viewed from a boat deck the water appears dark to the human eye thus the fish that are attracted are difficult to see. The present generations of super bright (Cool White, not Warm White) full spectrum LED's contain a large spectrum of purple-blue-green thus they not only attract fish but make for easy human viewing. Nothing is accomplished by using colored filters over a white light. Today full spectrum cool white is the easiest way to go. To check the full color spectrum of a white LED hold a CD disc near the LED, the CD will reflect the full spectrum much like a prism. The difference between a cool white and warm white will be noticeable.

The following FAD describes a floating LED array with a difference, it is essentially a poor man's "Holographic 3D projector", best results are obtained in water with poor visibility as it utilizes particles in the ocean water as a reflective "3D" projection screen. In this instance the target fish species would be Yellowtail or White Sea Bass usually off San Clemente Island or the backside of Catalina Island where inshore water conditions (visibility) are usually poor. White Sea Bass forage in these murky waters using their lateral line sensors to locate prey, usually market squid, and then vision for the final pounce.

The array consists of 8 10mm large super bright cool white LED's electronically wired as strobes, they are mounted in a circular pattern in a 10" watertight container, the jumbo 10 millimeter LED's protrude thru the bottom to take advantage of emitted side-lighting and sea water cooling. Not visible in the video clip, on the bottom in the center of the container surrounded by the LED strobes, is a 3 inch long by 3 inch wide reflective cylinder, the strobes flash in a consecutive counter-clockwise motion around the cylinder which

reflects the light flashes in a rotating 360 degree pattern. As the strobes flash around the center cylinder the cylinder blocks the back side light, the result is a flash on one side of the cylinder and a dark shadow on the reverse side; this gives the appearance of a dark object chasing the flash around the array. A fish below viewing the display would see what would appear to be an excited rotating "bait-ball" or maybe a shoal of agitated spawning market squid, both sought after food targets for most predator game fish. The circuit draws less than one watt making it practical to use self-contained batteries. This is an out-of-the water top side view, still working on an underwater video.



An excellent source for ready-made fishing lights at reasonable prices: <http://www.fishinglightsetc.com/>
We highly recommend their 12 volt super bright LED submersible full spectrum cool white lights.