Pop-Up Major Lessons Learned   
from Gen 3.1

* **PAY ATTENTION TO TIME TO FIRST FIX**\*\*Main draw on power budget was searching for GPS fix (~60% of total power budget in worst case scenario)\*\* Software changed to search for a single GPS satellite instead of a full fix (requires only a few seconds vs. several minutes)\*\* …From “Major Lessons Learned from Gen 2”

LESSON LEARNED:

<https://www.lifewire.com/time-to-first-fix-ttff-1683313>

“If a GPS device is new, has been turned off for a long period of time, or has been transported for a long distance since it was last turned on, it will take longer to acquire these data sets and get a Time to First Fix. This is because the GPS data is outdated and needs to download up-to date information.”

For Gen 3 buoys deployed in 2018 (3800, 1240, 5210, 8220) the software was changed to search for a single fix, and the timeframe to find a fix before going back to sleep mode was set for 20 seconds. We found that floats 5210 and 8200 had errors sending back surface drifter GPS coordinates at the time of sampling because they struggled to acquire first fix… we still recovered Iridium coordinates (albeit less accurate than the onboard GPS), and the drifter function of the float is seen as accessory. All data was transmitted successfully. However, for Gen 3.1 and 3.2 the software was changed to look for a single satellite for 2 minutes, after which, if unsuccessful, the unit would return to its sleep mode.

* **STILL LOOKING FOR BEST MECHANICAL RELEASE SOLUTION** (Another!) new burn wire developed by DBV Technology : Release Block. New design houses circuit board controller and battery pack for burn wire inside the trawl float housing. A brass 7/16-20 bulkhead penetrator provides through-hull connection from battery pack and release board to the release wire.

LESSON LEARNED:

DBV tech was extremely difficult to work with, there was poor communication from Bud Vincent throughout the design and purchasing process. Originally he told me that the new design would result in a $250-$275 per unit cost, final price was $585 per unit (still a reduction from the self-contained cylinder, which cost $750 each). Furthermore, at sea the potting that bound to the penetrator on pop-up SN 211 or 215 separated. Would not recommend using DBV tech for partnerships in the future.

* **CIRCUIT BOARD QUIESCENCE, ADDED REGULATOR**

See EcoFOCI\_PopUp>Engineering>Electrical>Voltage Regulator Mod

Boards were short-circuiting regularly, Dirk Tagawa identified this regulator modification as a fix.

* **OVERBALLASTED, AND RELEASE DATE IN LATE OCTOBER IN BERING SEA RESULTING IN INCOMPLETE DATA TRANSFER**

THE DBV tech cable that reached from the float to the release block was too short, so we shortened the frame to accommodate it and reduced the righting moment arm. Data return was very spotty on these units, rough weather in the Bering Sea in late October and a heavier build with a shorter frame resulted in interrupted data streams. Salt water interrupts the Iridium data transmission, the floats sent lots of short “Hello” messages and ran their battery down trying to connect with satellite at the surface but not connecting for long enough to transmit data. These floats had just 2.5” of freeboard, compared with Gen 3 which had 3.5” of freeboard. Despite successful lake tests, data transmission was spotty in the field. One thing to note is that Iridium satellite data transmission can occur through small layers of freshwater, but not at all through salt water. Word of caution for future testing in lake for marine field equipment.

* **ISSUES WITH VACCUUM HOLDING AT THE SST THERMISTOR PROBE, CHANGED TAPERED THREAD TO SAE ORB**