Comparison of three methods for determining antenna replacement criteria

Sandra L. Downing*[1], Earl F. Prentice[1], Sean Casey[2], and P. Carter Stein[3]

[1]NWFSC, NOAA-Fisheries

[2] Destron Technologies by Digital Angel

[3] Pacific States Marine Fisheries Commission

Although the orifice antennas containing moisture performed comparably to the antennas that did not contain moisture during 2002, their presence did force NMFS, Destron Technologies, PSMFC, and BPA to recognize that criteria needed to be developed to indicate when antennas would need to be replaced during the next dewatered period. Currently, we would only identify a nonfunctioning unit as one that would need a replacement, but we came up with three methods to use for monitoring the performance of antennas. These methods also help us identify interrogation units that needed to be investigated further in hopes they can be fixed/improved without having to replace them.

Relative weir count. Because there are usually uneven fish numbers for the weirs in the same ladder, to compare the performances, relative weir count values were calculated. The relative weir count values were based on using the highest weir count for each half month as the denominator. Weirs that consistently yielded values below 90% were identified.

Antenna tuning current values. In order to detect PIT tags, antennas are used to create electromagnetic fields. Normally, once an antenna is tuned, the value of the antenna tuning current is fairly stable. If the tuning current keeps dropping over the season in a stair-step pattern, this usually means that the antenna contains moisture. This situation is tolerable as long as one can still retune the transceiver and produce an electromagnetic field that is large enough to detect fish transiting the antennas. What we are trying to determine with this approach is how to predict the time it will take for an antenna to degrade from a normal functioning level to a low functioning level to a level when it becomes nonfunctional. Antennas were identified that had current values below 2.5 amps and that dropped > 0.5 amps over a year.

Reads per fish. Determining the number of reads per fish is certainly the most direct method for telling us how well a unit is reading fish; however it does vary with fish behavior and tune of the transceiver (the difference between a perfectly-tuned transceiver and a well-tuned unit can be 1-3 reads per fish). Earlier analyses have shown that if the median number of reads per fish is less than 5 reads per fish, then that antenna is missing fish. We identified these antennas by analyzing groups of 50-250 fish during each half-month period. The next step was to try to determine whether an interrogation unit was reading less than 5 reads per fish because there was a problem with the antenna or for some other reason *(e.g.*, it was detuned).