SPLASH User Guide

This user guide will give you all the essential information needed for interacting with, configuring, and deploying a Wildlife Computers SPLASH tag.

WILDLIFE COMPUTERS

v.202506

Table of Contents

Before you Begin

The information contained in this guide is designed to help you get the most from your deployment. In the guide, you will see the yellow icon highlighting information where special attention should be paid.

The list below shows what is required to interact with a SPLASH tag:

- A Windows® computer with Tag Agent and our USB driver installed
- A Wildlife Computers Portal Account
- A Wildlife Computers Communications Cable
- A magnet

Visit wildlifecomputers.com to create a Portal account and download the required software. At the end of this document there is a list of key concepts to reference. We recommend new users review this list.

Wildlife Computers carries SPLASH and SPLASH10 tags. Our new SPLASH tags are built with the latest technology and work with Tag Agent to configure the tags for the Wildlife Computers Data Portal. Our legacy SPLASH10 tags work with Mk10Host program.

How do I know I have a "SPLASH" tag versus a "SPLASH10" tag model?

Serial number

- SPLASH tags usually have the letter "U" in the serial number. For example, 18U0635.
- SPLASH10 tags have the letter "A" in its serial number. For example, 18A0635.

Tag Agent Host view

- When SPLASH tags interact with Tag Agent, Tag Sensor data will appear on the main screen.
- While SPLASH10 tags can interact with Tag Agent, no Tag Sensor data will appear on the main screen and the Tag Type is identified as "Mk10." ***If you see this image, X out of Tag Agent since the Disconnect tab does not work and open MK10Host. Refer to the SPLASH10 User Guide.***

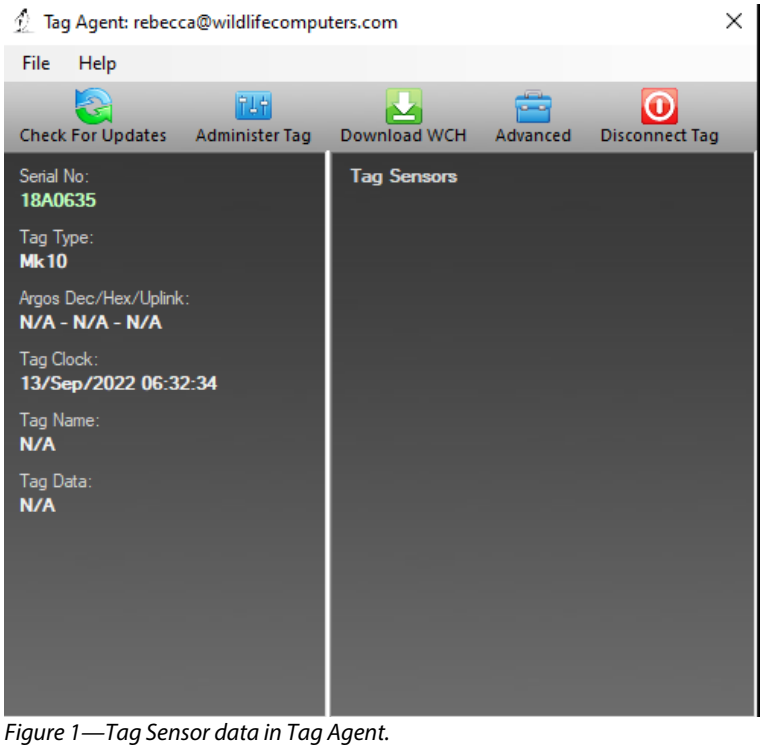


Figure 1—Tag Sensor data in Tag Agent.

About SPLASH Tags

The Wildlife Computers SPLASH tag includes an Argos transmitter, Fastloc-GPS receiver, pressure sensor, temperature sensor, and wet/dry sensors. Sensor data is stored permanently on the tag and can be recovered after a deployment.

The Argos transmitter is used to communicate with the Argos satellite system. The transmissions are used to determine the tags position and transmit data. Consecutive transmissions received in a single satellite pass are used to calculate the location of the tag and its host animal. See http://www.argos-system.org for more information on Doppler locations.

SPLASH tags have an on-board clock that keeps track of when a transmission should be made. When it is time to make a transmission, the SPLASH monitors its wet/dry sensors. As soon as the sensors indicate a dry condition, transmission is initiated.

SPLASH tags can take a rapid 'snapshot' of the GPS satellites in the sky above. The satellite data are stored on the tag and relayed back to the researcher via Argos on a later surfacing event. Snapshots can be processed in the Wildlife Computers Data Portal to create a location. Location accuracies from 20-75 meters are achievable, varying as a function of the number of GPS satellites used in the location calculation.

Anatomy of a Tag

Wildlife Computers can provide SPLASH tags in many different shapes to suit a variety of applications. While the shapes may differ, many elements are common among SPLASH tags (Figure 1).

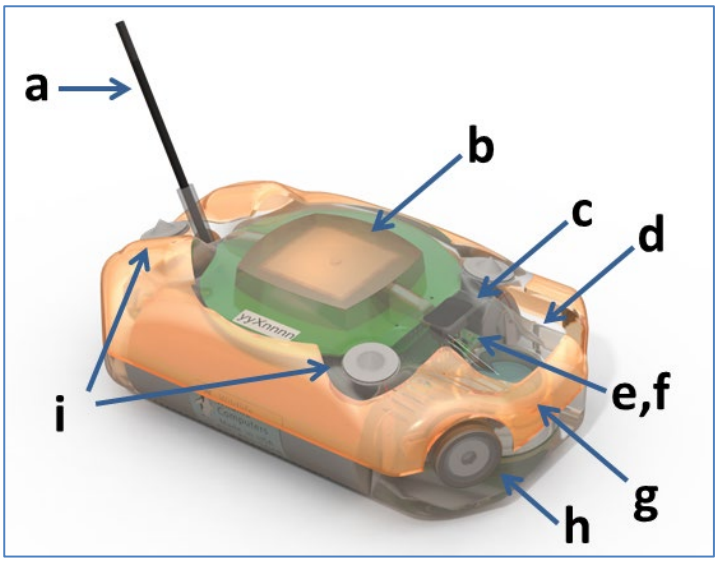


Figure 2—A typical SPLASH tag showing the Argos antenna (a), Fastloc® GPS antenna (b), communications port with plug (c), thermistor (d), indicator light (e), magnetic switch (f), pressure sensor (g), battery isolator (h), and wet/dry sensor (i).

Note: the magnetic switch is not visible. It is located near the base of the communication port. Swiping a magnet across the communication port will activate the switch.

The wet/dry sensor is composed of two or more metal discs on the surface of the tag. ***Do not cover any of the metal discs*** *with anything including antifouling substances and/or attachment adhesives (e.g., epoxy). Sea water contact is essential for normal function of the tag.*

The communications port is where the Wildlife Computers Communications Cable connects to the tag. Prior to a deployment, this port should be sealed with the plug provided. Smear a small amount of the silicone grease supplied onto the sides and bottom of the plug, align the plug and pins, and carefully push the plug into the port. If it does not align easily with the pins, rotate it 180° and try again. The plug prevents corrosion of the pins during the deployment; however, the plug is not required for the tag to function normally.

Tag States

SPLASH tags have three states—Auto-Start, Start and Stop.

Auto-Start—when in Auto-Start mode, the SPLASH tag will automatically deploy when submerged in seawater.

Start—when in Start mode, a SPLASH will collect sensor data and transmit them to Argos. When first deployed, the LED will blink every second. This "heartbeat" blink provides visual confirmation that a tag is running and is meant to prevent deployment of deactivated tags. Additionally, the LED will blink brightly whenever the SPLASH transmits to the satellite. The duration of both the heartbeat blinks and transmission blinks is user-programmable (see Miscellaneous Settings section). For some applications, it may be best to disable the blinks as they can draw unwanted attention to the tagged animal.

Stop—Stop mode is used for storing and shipping tags. In Stop mode, the tag will remain unresponsive until the tag is communicated with via Tag Agent. If storing tags, keep them in a cold place such as a refrigerator or freezer. See Tag Storage and Battery Maintenance.

Display a Tag's State Using a Magnet

Passing a magnet near the communications port will cause the tag to reveal its current state using the LED.

- Two blinks and a pause repeated three times means the tag is in Auto-Start mode.
- Ten rapid blinks indicate the tag is Started.
- No blinks indicate the tag is Stopped.

Change a Tag's State Using a Magnet

A timed magnet swipe can be used to change the state of a SPLASH between Auto-Start and Start modes.

First, swipe the magnet and wait for the tag to indicate its current state. At the end of the blinking pattern, the indicator light will remain on for several seconds. If the magnet is swiped a second time during the extended light-on stretch, the state will toggle. The second swipe needs to happen in the window when the light is on (Figure 2).

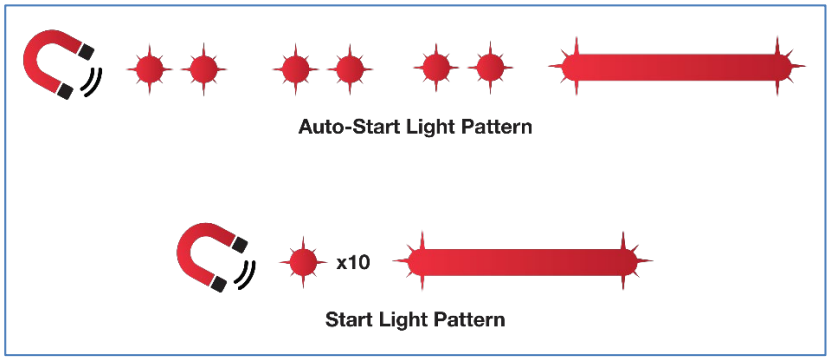


Figure 3—sample of the indicating light pattern showing how to switch from Auto-Start to Start.

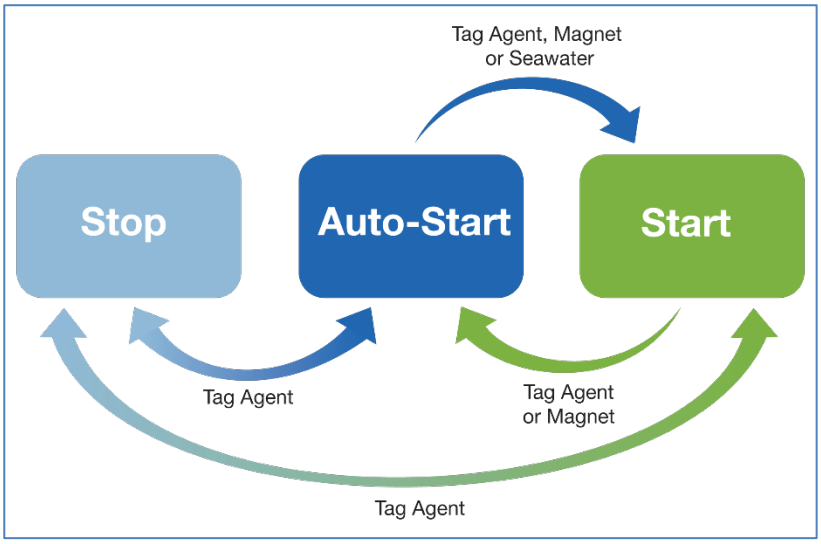


Figure 4—Methods for changing a SPLASH state. Tag Agent can be used to put a SPLASH in any state.

Interacting with a Tag

Tag Agent

Tag Agent is used to communicate with SPLASH tags. A local copy of Tag Agent must be downloaded the first time you use it. Once installed, updates to the tag's settings are done directly through the local copy on your machine. More information on using Tag Agent can be found in the Wildlife Computers Data Portal & Tag Agent User Guide.

The USB driver must be installed and a Wildlife Computers Data Portal account must be created prior to opening and using Tag Agent.

Each time Tag Agent is launched, you will be greeted by a welcome screen (Figure 4). Along the bottom the Tag Status, USB Status and Cloud Status are displayed.

Figure 5—Tag Agent welcome screen.

Connecting a Tag to Your PC

To communicate with a SPLASH tag, open Tag Agent and use the USB communication cable to plug the tag into your PC. ***Make sure to align the pins properly.*** Once plugged in, swipe a magnet near the tag's communication port to establish a connection. The LED will turn on and the Tag Agent home screen will appear with tag information on the left and sensor readings on the right (Figure 5).

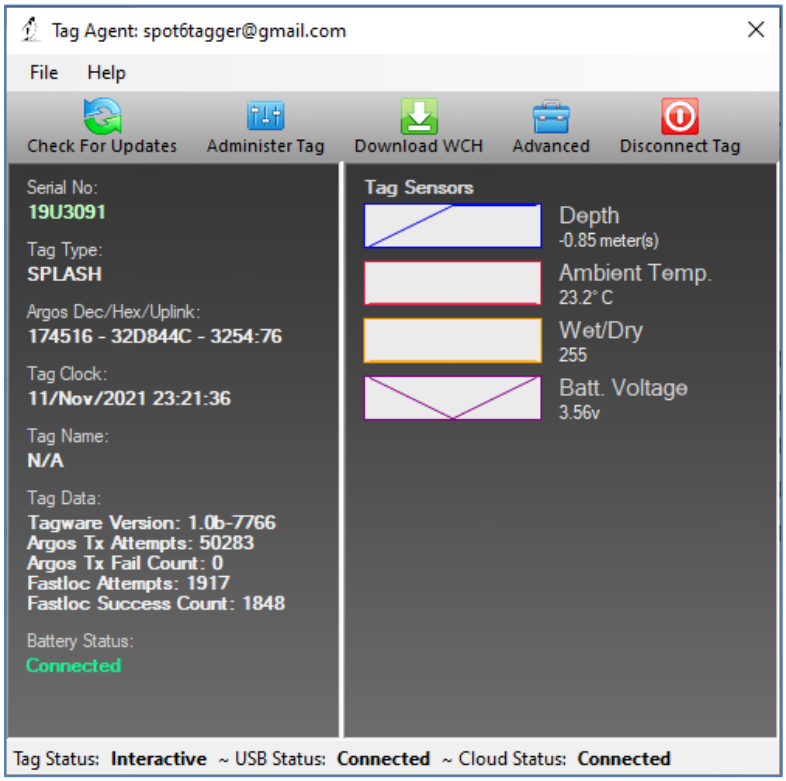


Figure 6—Tag Agent home screen.

If this is the first time you are communicating with a tag, a pop-up box will ask if you would like to become the tag administrator. Selecting 'yes' will allow you to select and publish tag settings.

Some models of SPLASH tags include a battery isolator screw. The Tag Agent will display whether the screw is placed or not. The screw must be placed prior to any deployment. See the Battery Isolator Screw section for more details.

Configuring Tag Settings

Use the Administer Tag button in the upper menu of Tag Agent to configure tag settings.

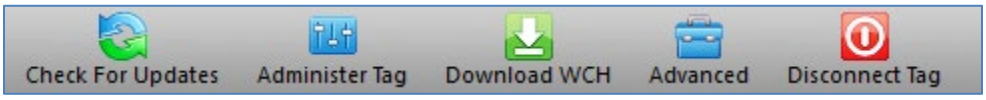


Figure 7—Tag Agent menu bar. Select Administer Tag to edit tag settings.

A new window will open revealing three categories—Tag Information, Data Product Settings, and Transmission Settings.

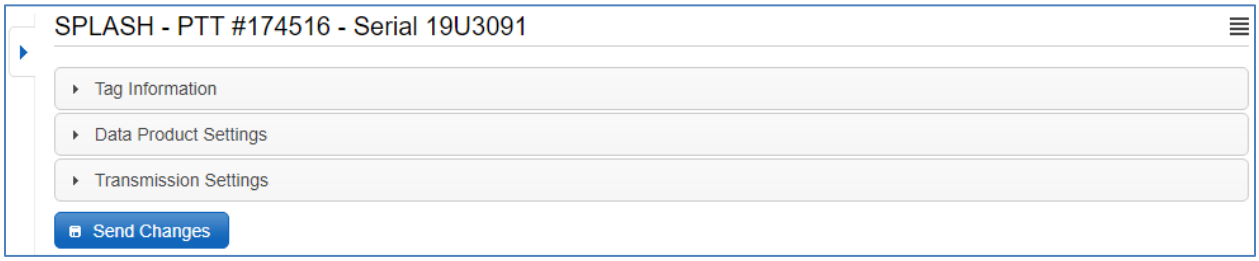


Figure 8—Collapsed version of SPLASH tag programming categories.

Tag Information

Tag Details

This tab includes information on tag administrators and Tagware version. A friendly name can be assigned to the tag if desired. This can make it easier to search and filter for the tag within the portal.

Argos Settings

The PTT decimal and hexadecimal numbers as well as the Argos uplink ID are listed here. PTT numbers are a manufacturer's setting. Contact Wildlife Computers if a change is needed.

Wet/Dry Sensor Settings

The wet/dry sensor for all applications should be set to Auto-Adjust. This allows the tag to correctly determine whether wet or dry as water conductivity changes. The initial threshold value for differentiating wet or dry can be set here as well. Deployments in water of lower conductivity or salinity than typical sea water may require different settings. Contact Wildlife Computers to assess your deployment and tag settings.

Miscellaneous Setting

SPLASH tags include an LED that blinks for a set amount of time after deployment starts. The blinks are a way to visually confirm a tag has switched from Auto-Start to Start mode. Consider disabling the blinks if the flashing LED may compromise your animal.

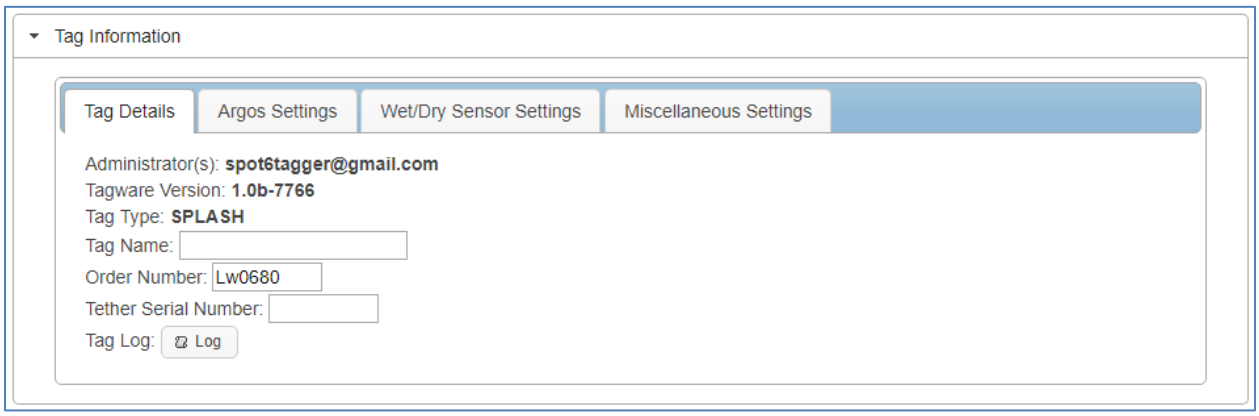


Figure 9—Expanded view of Tag Information and the Tag Details tab.

Data Product Settings

In addition to providing Argos locations, the SPLASH tag can optionally transmit:

- Temperature profiles
- Empirical cumulative distributions of depth
- Dive counts
- Percent Dry Timeline
- Time Series of Depth and Temperature

Details for these data products can be found in the Data product specifications section.

Data messages require more power to transmit than Argos location-only uplinks. The more data product messages created, the greater the impact on battery life.

Summary Period Data

Summary data is data collected and processed over a pre-defined period. Summary periods break up the 24-hour day into different durations of 1, 2, 3, 4, 6, 8, 12 or 24 hours. Typically, the summary periods are synchronized with UTC midnight; however, the tag can offset the summary period to match local time if desired by delaying the start time of the summary period.

Choosing a one-hour summary period will cause 24 times more data to be generated than choosing a 24-hour summary period.

Temperature Profile

If Temperature Profiles are enabled, then temperature and depth will be collected on dive ascents at 1 Hz. Temperature profiles are only created on qualifying dives, and when enabled in the transmission schedule (see below). If a dive descends 10% deeper than any previous dive in the current summary period, then all previous data are cleared, and new temperature-depth data are collected for the remainder of the current dive.

The temperature is saved at the depths specified in the World Ocean Database 2013 (WOD13) or World Ocean Atlas 1994 (WOA94). See the section Temperature profile depths for a list of the reported depths. Because WOD13 includes more depth levels, WOD13 will generate more messages than WOA94. The set of depth levels can be manually selected or set to automatic selection.

If automatic selection is enabled, the tag will select levels to minimize message generation as a priority. When equal messages would be generated, then the tag will opt for WOD13. For example, if the maximum depth of the profile was 75 meters, using WOA94 and WOD13 will both generate 1 message. In that case the tag will select WOD13 levels.

Rapid ascents can cause a depth to be missed; however, the tag will collect temperature data from nearby depths and this deviation is noted with the offset from the expected depth. When the instrument reaches the surface and reads dry, data collection is stopped and a Fastloc GPS snapshot is taken.

At the end of a summary period, one temperature profile from a single ascent will be created. The resulting message includes a one-minute resolution timestamp for the profile and the duration of the ascent that produced the profile. This later value provides a quantitative measure of the profile quality, where profiles of shorter durations can be assumed to have less horizontal movement. The Fastloc snapshot associated with the deepest profile is also queued for transmission.

Empirical Cumulative Distribution (ECD)

Time-at-depth data is summarized using empirical cumulative distributions. ECD data is collected at 1 Hz and message generation is controlled in the transmission schedule (see below). Each ECD data product has several components: a shallow ECD, a deep ECD, percent-time dry, and qualifying-dive count.

Two distinct ECDs will be collected for every summary period while the tag is wet—one for the shallow portion of the water column and one for the deep portion of the water column. The boundary between shallow and deep are configurable. The boundary is the inclusive of the upper bound for the shallow depths. For example, if the shallow threshold is set to 30 meters, all depths between 0.0 meters - 30.1 meters are counted in the "Shallow ECD" and all depths 30.1 meters – max. depth are counted in the "Deep ECD." The Shallow ECD reports the 33rd, 66th, and 100th percentiles. The Deep ECD reports the 20th, 40th, 60th, 80th, and 100th percentiles.

Shallow depths are broken into terciles (thirds), deep depths are broken into quintiles (fifths). For example, if the boundary is 20 meters and the 60th deep quintile is 150 meters, then 60 percent of the

time spent deep was between 20 and 150 meters. By splitting the water column this way, use of the water column can be adjusted for a surface bias, such as for air-breathers.

Table 1—Cumulative distribution values in the ECD for deep and shallow depths.

Shallow Terciles	Deep Quintiles
0th (minimum depth)	0th (boundary)
33rd	20th
66th	40th
100th (boundary)	60th
	80th
	100th (maximum depth)

Each ECD will also contain a count of qualifying dives that met the configured dive definition (with a max count of 127) and a percentage of time spent dry, shallow, or deep. Note that using the percent times and the summary period duration, the data can be combined into a single ECD. Contact Wildlife Computers for details.

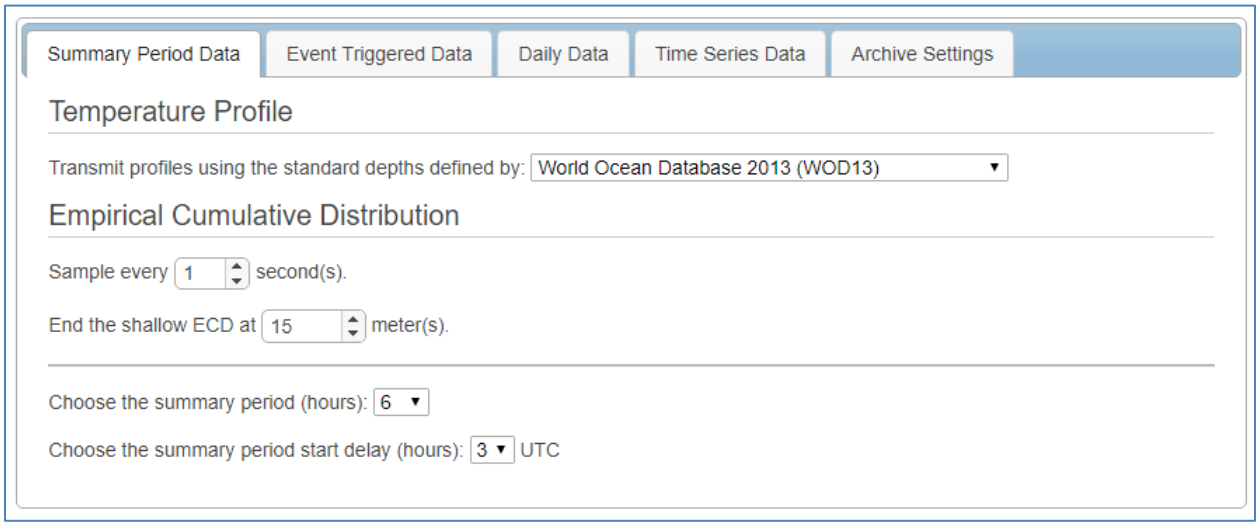


Figure 10—Summary Period Data tab showing WOD13 depth levels for the temperature profiles, ECDs with shallow depths defined as less than 15 meters, and six-hour summary periods and a three-hour start delay.

Event Triggered Data

Some data collection is triggered from animal behavior and requires detection criteria for the specific behavior.

Dive Analysis

SPLASH tags can detect and count dives. The dive count is included with ECD data. Dives will also trigger generation of temperature profiles. Like PDTs and ECDs, dive data is collected at 1 Hz.

The start and end of a dive can be defined either as a depth or with the wet/dry sensor. We recommend using a depth rather than the wet/dry sensor. This is because the tag may be at the surface but still wet, such as when a tag is deployed on the back of a seal, where the animal's head is out of the water but the back remains wet. Furthermore, the depth and wet/dry sensors are sampled once per second. So, when looking for a dry reading, it is possible that a brief dry period can be missed and thus artificially increasing the dive duration.

Dives can be limited by duration and depth. Only dives that exceed a defined duration, a defined depth, or both a depth and duration will be counted. This might be used to limit the dive count to a particular type of foraging dive.

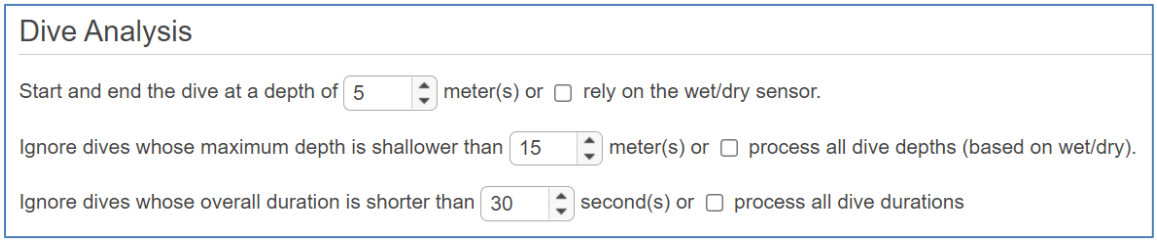


Figure 11—Dive definition under Event Triggered Data tab.

Daily Data

Percent-Dry Timelines

This timeline reports the amount of time the tag is dry. The amount of time is reported as a percentage of each hour in the day.

Percent-Dry Timelines cannot be controlled with the transmissions schedule. If enabled, they will be generated for the entire deployment. Data is collected for dry-timelines every 3 seconds.

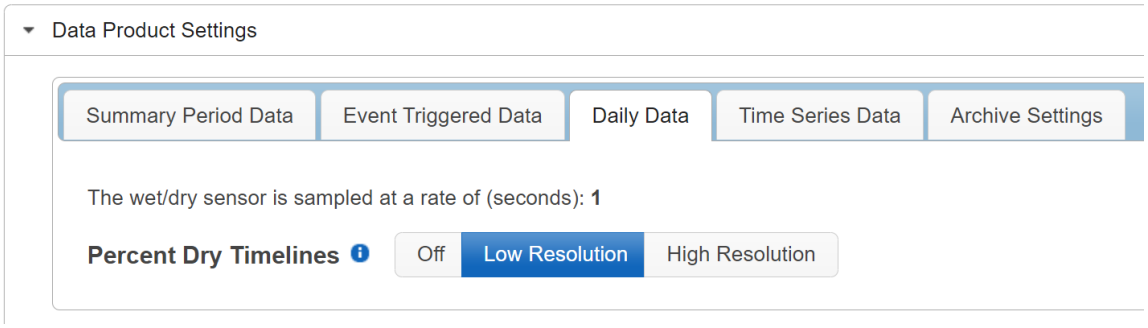


Figure 12—Low-resolution percent-dry timeline enabled.

Choosing the Low-Resolution option will cause the tag to report to the nearest 10%. The High-Resolution option reports to the nearest 1%. The Low-Resolution timeline will also indicate when the tag was wet for the entire hour and when the tag was completely dry for the entire hour (Table 2).

Table 2—low-resolution decoded output.

% Reported	Time dry
0	0% (no dry readings)
3	0% < dry < 5%
10	5% ≤ dry < 15%
20	15% ≤ dry < 25%
…	…
80	75% ≤ dry < 85%
90	85% ≤ dry < 95%
98	95% ≤ dry < 100%
100	100% (every sample was dry)

Time Series Data

Time series messages can be generated using one of five sample intervals (75, 150, 300, 450, 600 seconds). This determines the number of Argos messages generated per day. The time series sample interval is entirely independent of, and unrelated to, the archive sample rate. 48 summarized samples, covering one message period, will fit into one Argos message (Table 3).

Table 3—Argos messages created per day and the corresponding message sample period for the five time series sample intervals.

Sample interval (seconds)	Argos messages per day		Message period (hours)
	Depth	Depth and temperature	
75	24	48	1
150	12	24	2
300	6	12	4
450	4	8	6
600	3	6	8

Selecting a short (75-second) time series sampling interval will rapidly generate many messages. This may be appropriate for a short deployment. However, if too many messages are generated, they may not all be received. The result will be random gaps of time during the deployment for which there is no time series data. Selecting a longer sampling interval will improve the odds that there will be no gaps; however, the temporal resolution of each datum will be reduced. Different study objectives will warrant different trade-offs between coverage and temporal resolution. Each depth and temperature time series message contains:

- The time series data sampled at the specified interval.
- The minimum and maximum values encountered during the period covered by the time series message period as measured at the *faster, archive* sampling rate.

Time series collection is controlled in the transmission schedule (see below).

The absolute Min/Max values and point sample values may not match as the absolute values are determined from all archived data collected during the message period. This can give insight to the amount of aliasing that has occurred when generating the time series message.

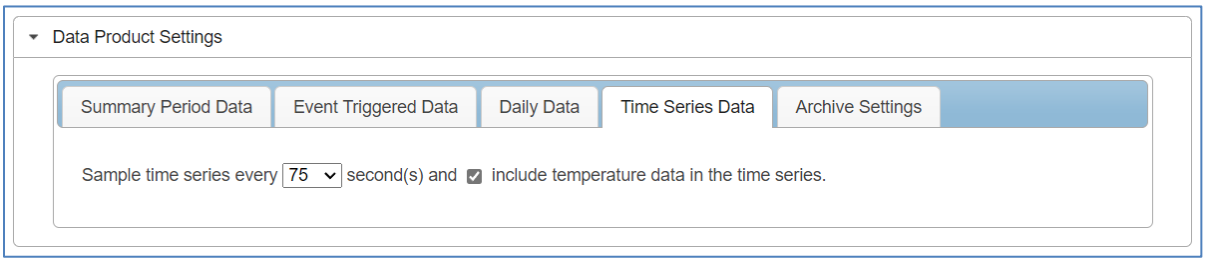


Figure 13—Depth and temperature time series setup for collection every 75 sec.

Archive Settings

The archive sample interval is the rate at which sensor data is collected for permanent storage on the tag. The interval is fixed at 1 second.

Transmission Settings

Argos uplinks serve two purposes—generation of Argos Doppler locations and data transmission. ***Fastloc® snapshots are sent as data messages.***

Argos Location Uplinks—SPLASH tags send short, three-byte messages for the purpose of generating Argos Doppler locations.

The generation of Argos Doppler locations requires 3 or more uplinks to be received by one satellite in a narrow window of time (<15 minutes). The location uplink scheduler is used to set the location transmit limit. The scheduler is highly flexible. See At-Sea Mode vs. Haul-Out Mode section for more information.

SPLASH deployments typically target the collection of Fastloc for locations and send a limited number of Argos Location Uplinks.

Data Messages—a separate schedule is used to transmit data messages. Data messages include: Fastloc® snapshots, ECDs and Percent-Dry Timelines. Each unique data message is transmitted multiple times (the default is 10 times). Resent messages are separated in time by at least 40 minutes to maximize the odds of reception. Data messages are only combined with Argos Doppler location messages when timing coincides.

In summary, SPLASH tags transmit two types of messages—short, Doppler location messages which transmit at a user determined uplink schedule and longer, data-filled messages which transmit according to a preset agenda. Data messages are independent of the location transmit count. A tag programmed to

send 100-location transmissions per day and generate 12-data messages could attempt 220 uplinks (assuming each data message is sent 10 times). This is important to keep in mind for power budgeting.

Fastloc®

Typically, Fastloc® GPS is used to generate location data and Argos uplinks are used to transmit the snapshots.

When set conditions are met, a sub-second "snapshot" of the GPS constellation is taken. Following the snapshot, the Fast-GPS module processes the snapshot to determine the identity and range of the GPS satellites that were present. The processing takes 12 seconds and continues after the animal has submerged.

A Fast-GPS acquisition is considered successful if 4 or more satellites are identified in the Fast-GPS snapshot. If 4 or more satellites are identified, the details are saved to be sent via Argos on a later surfacing event.

When 3 or fewer satellites are identified, no data are stored. After a failed snapshot, the SPLASH will attempt one retry at the next available opportunity.

Fast-GPS snapshots are stored in permanent memory for download if the tag is recovered. Up to 4096 successful snapshots can be stored.

Transmission Modes

Contact Wildlife Computers to discuss the battery capacity of your tag, your target deployment length and how frequently locations are required.

At-Sea Mode Versus Haul-Out Mode

Independent transmission regimes can be set for when an animal is At-Sea versus Haul-Out.

The Haul-Out mode entry and exit conditions are user defined. When haul out is achieved the tag switches to its slower transmission rate (usually 90 seconds).

If tagging an animal that never hauls out, set Haul-Out mode to DISABLED to ensure transmissions always occur at the faster transmission rate.

Transmission Patterns

Both transmission modes have a schedule that can have one or more patterns.

Patterns can start on a specific calendar date or after a fixed number of days. This allows the tag to modify its behavior to accommodate changing requirements during the deployment. When an interval is used, the number of days is timed from the deployment start for the At-Sea Schedule. For the Haulout Schedule, the interval is timed from the start of haulout rather than the start of the deployment.

Figure 14—Example of a deployment with 3 transmission patterns.

Transmission Steps

Each pattern is made up of sequential steps and a loop. The pattern will run to the last step, then revert to the step designated by the loop and repeat. This can be any step in the pattern. The loop allows steps in a schedule to be used only once or for all the steps to be repeated.

The spiral arrow icon under the Actions column can be used to create loops.

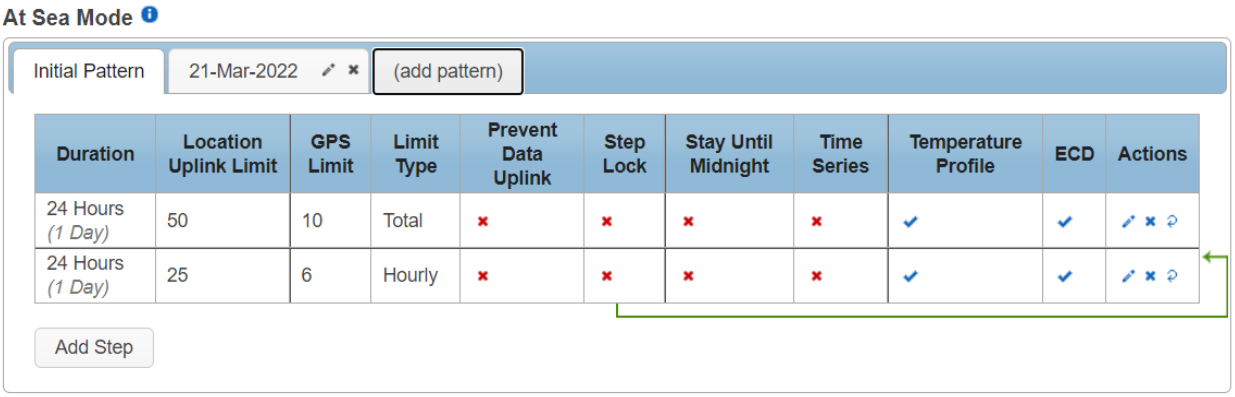


Figure 15—Transmission schedule example with an initial pattern made up of two steps. Step one lasts for 24 hours with 50 location transmissions allowed and 10 Fastloc GPS acquisitions. Step two lasts 24 hours with 25 location uplinks allowed and 6 Fastloc acquisitions. Temperature Profiles and ECDs will be created and transmitted in both steps. Step 2 loops repeatedly until 21-March-2022, when the next pattern begins.

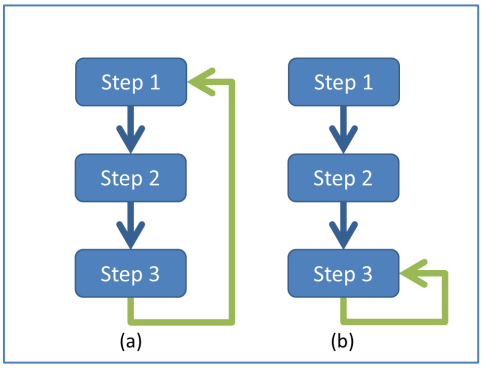


Figure 16—a pattern which repeats all steps (a), and a pattern which uses steps one and two once and then repeats the last step (b).

To configure steps within a pattern, select the pencil icon under the Actions column on the far right.

Duration	Location Uplink Limit	GPS Limit	Limit Type	Prevent Data Uplink	Step Lock	Stay Until Midnight	Time Series	Temperature Profile	ECD	Actions
24 Hours *(1 Day)*	50	10	Total	✖	✖	✖	✖	✔	✔	✎ ✖ ↻

Figure 17—The pencil icon can be used to configure step details. The 'x' will delete the step and the spiral arrow will connect a loop to the step.

Select the Duration of the Step

The step duration can range from one hour to multiple years. A maximum of 254 transmissions per step are allowed. If more than 254 transmissions are required, reduce the duration of the step.

The Location Uplink Limit is the maximum number of transmissions for the duration of that step. It is not a daily transmission limit unless the duration is set to 24 hours.

Location Uplink Limit

Select the number of transmissions dedicated to achieving Argos Doppler Locations. Keep in mind that Argos locations require a combination of events:

a. A satellite must be overhead (near the equator satellites are overhead roughly 20% of the time)
b. The tag must be at above the surface
c. The tag must be allowed to transmit (the uplink limit must not have been met, and no mask must be on)
d. Multiple uplinks must be received during a single satellite pass (ideally 3+)

When the transmit limit is too conservative it can be difficult to achieve these conditions

Most SPLASH deployments target the collection of Fastloc data to determine location. Therefore, consider allocating a limited number of messages for Argos Doppler locations. Consult Wildlife Computers for tag setup advice.

Fastloc-GPS Limit

Select the number of Fastloc-GPS acquisitions desired. Snapshot attempts are spread evenly throughout the duration of the step. In a step with unlimited snapshots, acquisitions will occur as fast as possible with a minimum interval of 2 minutes.

Make Limits Hourly

Hourly limits can be used to spread Argos transmissions evenly throughout a step. By default, when a step begins, Doppler location uplinks occur as fast as possible (at the set Argos repetition rate and when a dry environment is detected). Once the uplink limit is achieved, Argos location transmissions are suspended until the next step begins.

Data messages are independent of Argos location uplinks. Data messages are each sent 10 times, spaced out in time by at least 40 minutes for the best odds of reception.

Prevent Data Uplink

Data message transmissions can be disabled. Data collected in steps where transmission is prevented will be queued up and ready to send when data transmissions resume. When all transmissions are disabled (zero location transmissions and this feature enabled), the tag no longer monitors for a dry environment which can have significant power savings.

Enabling Prevent Data Uplink in a step will disable the transmission of Fastloc and other data for that entire step.

Step Lock

Step lock overrules the At-Sea and Haul-Out mode definitions for the duration of the step.

Stay Until Midnight

Stay until midnight locks the current step settings until UTC midnight after the step was set to expire. It can be used to sync subsequent steps to UTC midnight.

Time Series, Temperature Profile, and ECD

These data products will be generated according to the step settings. Note that Percent-Dry Timelines cannot be controlled in the schedule.

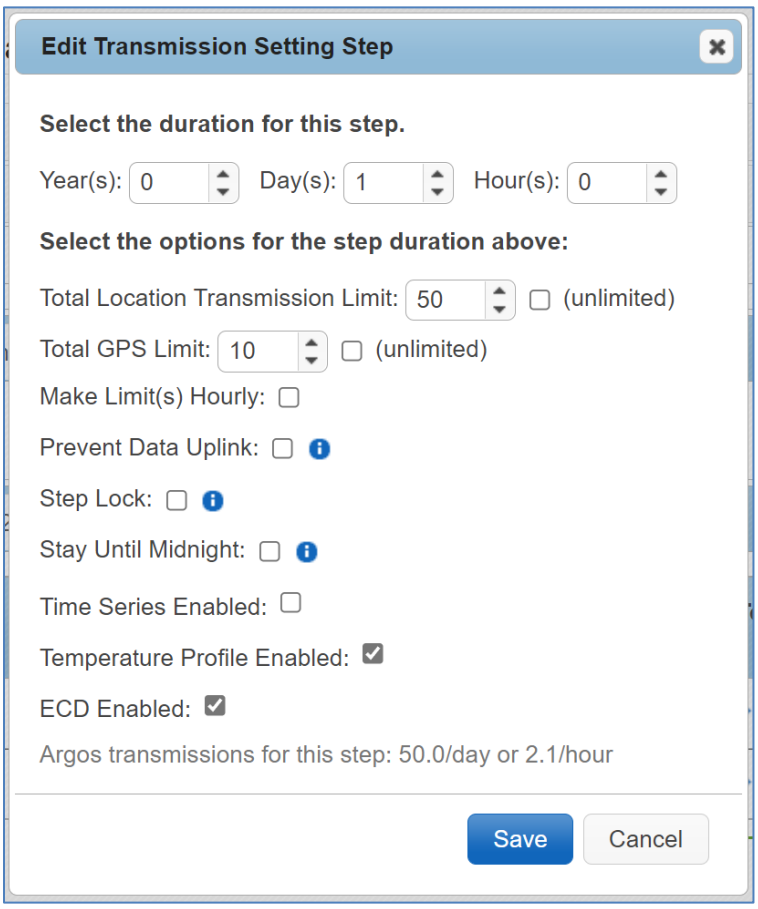


Figure 18—Example of a step lasting one day with a total location transmission limit of 50, Fastloc-GPS limit of 6, Temperature Profiles enabled, and ECDs enabled.

Transmission Parameters

Argos Uplink Mask

In each location, there are known, consistent gaps in Argos satellite coverage. The Mask feature can be used to save battery power by preventing a tag from transmitting during hours with few or no satellite passes.

Figure 19—Argos Uplink Mask with UTC hour 10 disabled.

By default, all transmitting hours are enabled (blue). Hours which you choose to disable will turn red and appear with an X.

The best and worst satellite coverage hours can be determined using the Argos Pass Prediction Program. See Argos Pass Prediction section for instructions on how to use the program.

If you expect your animal to move more than 500 km East or West, leave all hours enabled as satellite coverage will change drastically enough that masking is not advised. Alternatively, you may run satellite pass predictions for the expected new locations and determine if there are appropriate transmission hours for the animals' entire migration. The Uplink Mask does not impact data collection. The schedule only impacts when Argos transmissions are allowed.

Argos Uplink Settings

The minimum uplink interval (or repetition rate) is displayed for At-Sea and Haul-Out modes.

The typical rate for pinnipeds is 45 and 90 seconds, respectively. Turtles and sharks tend to have faster At-Sea rates (15-30 seconds) to increase the probability of multiple transmissions reaching the satellites.

The repetition rate is a manufacturer setting. Contact Wildlife Computers before deployment if you wish to change the interval.

Argos uplinks can be delayed by fractions of a second once the tag is ready to transmit and becomes dry. This is typically used for large cetaceans to make sure the tag is well clear of the water and not likely to be splashed or re-submerged during an uplink. ***Note: the dry readings are attempted at 0.25 second intervals.***

To maximize the probability of receiving data messages, it is recommended that each unique message be sent 10 times. Changing the number of times a message is present will impact what data is received.

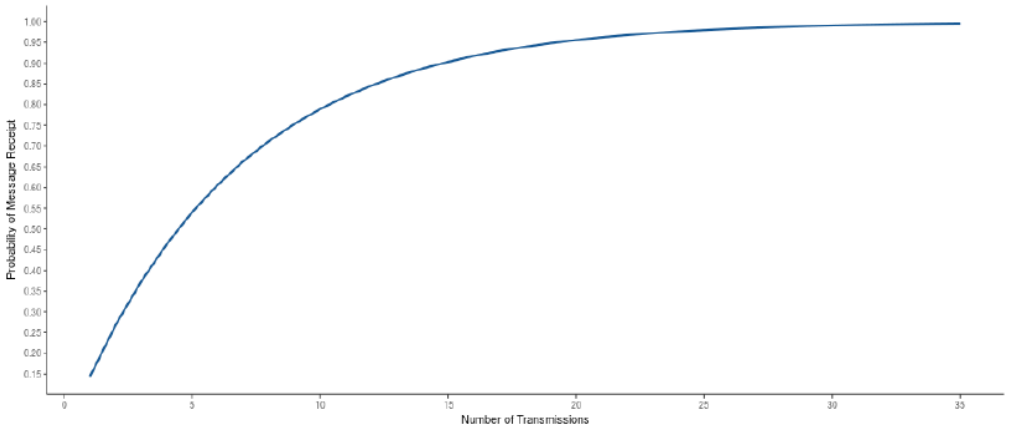


Figure 20—Graph showing the probability of successful data transmission with an increasing number of re-transmits for a specific location. A per message corruption rate of 10% is assumed.

Loading Settings into a Tag

Once settings have been chosen to use the blue Send Changes button to load settings into the tag. Tag Agent will confirm receipt of settings with a pop-up box.

Creating Templates

A template can be saved so the same settings may be applied to multiple tags. To save settings as a template, click the four horizontal lines in the shape of a square ≣ visible in the top right corner of the screen. You have the option of creating an online template or a local template file of the current settings selected. Local templates are used when no Internet connection is available.

Viewing Configuration History

You can review a tag's programing history using the arrow icon on the left-hand sidebar menu. Clicking the arrow exposes the tag history. Previous tag settings can be viewed by clicking on each date listed. The blue check mark indicates settings were applied. A date without a check mark indicates settings were proposed but not applied to a tag.

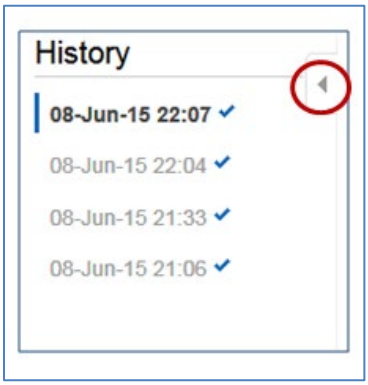


Figure 21—Arrow icon exposes tag programing history.

Check Sensor Readings

The sensor values displayed on the Tag Agent home screen are continuously updated from the tag. Sensor functionality can be validated by manipulating the sensors as follows:

- Depth—depth should read within 2 or 3 meters of zero.
- Ambient Temperature—responds quickly to warm air blown onto the thermistor located near the communications port.
- Wet/Dry—connecting a wire between certain combinations of the sensor discs should change the value from 255 to less than 20.
- Battery Voltage—voltage should be between 3.5 and 3.7 volts.

Perform Battery Tests

Prior to deploying your tags, check that the batteries are functioning optimally.

Sending Test Transmissions

Sending Test Transmissions gives a quick view of the current battery voltage and power output of the tag.

Tips to Optimize this Test

To optimize the Sending Test Transmissions Test, consider the following:

- **Antenna angle should point UP.** The angle of the antenna should mimic how the tag will orient while transmitting in the field. Never touch the antenna to anything.
- **Some SPLASH tags should be held ~15cm above the desk for this test.** Think of the desk as the surface of the water. You should hold the tag in a way that imitates the height of the instrument when the animal comes out of the water. For finmount applications, tags should be held higher (~15-30 cm above the desk). For backmount and towed tag applications, tags should lie flat or nearer to the desk (antenna up). See the photos below.

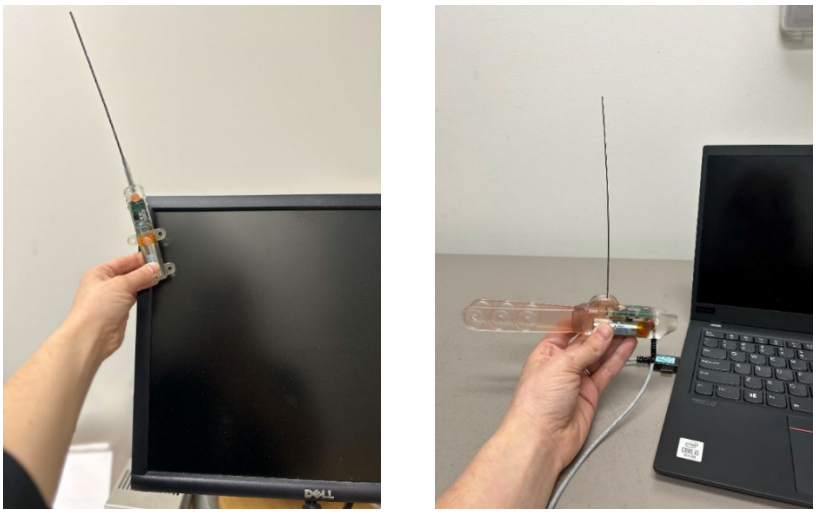


Figure 22—example of finmount orientation (left) and single-point finmount (right) for Test Transmission test.

Connect your USB cable to each SPLASH tag and log into Tag Agent. In the menu at the top, click the "Advanced" tab. Scroll down to "Send Test Transmission" and follow the prompts.

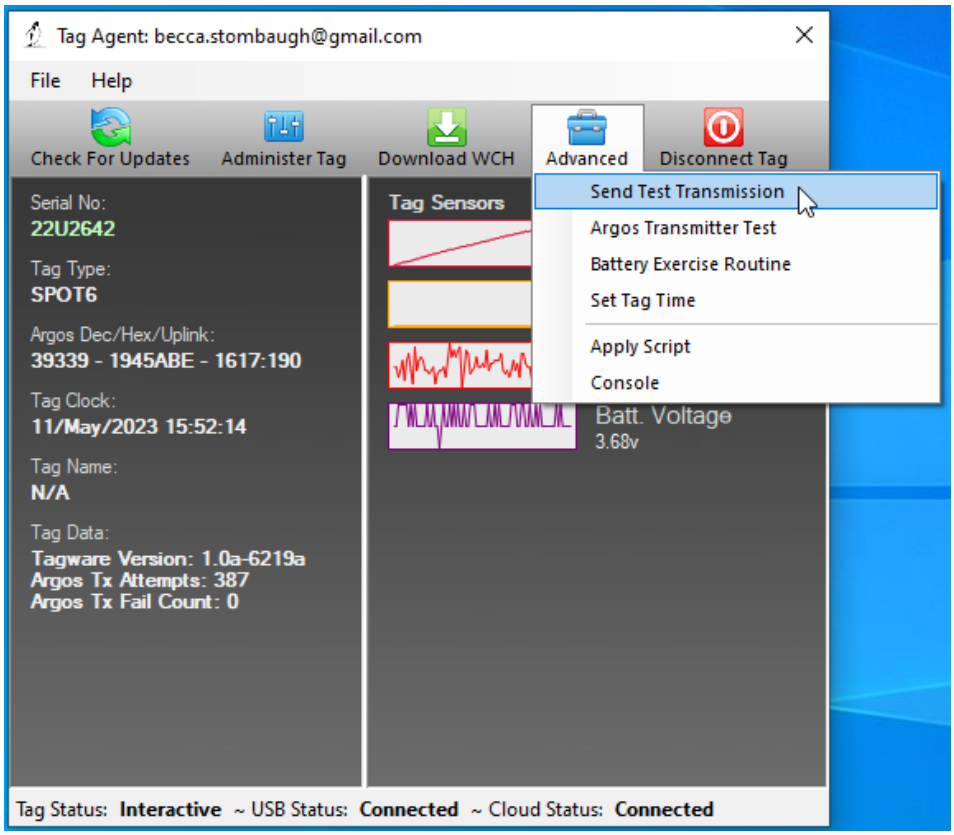


Figure 23—example of Send Test Transmission.

The test transmission voltage should read 3.3V or higher and the battery voltage displayed on the main sensor screen should be around 3.5V.

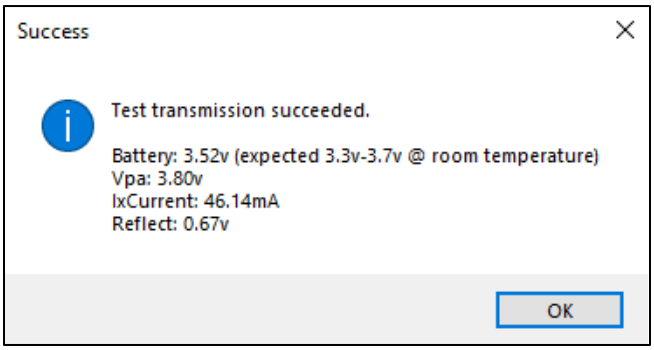


Figure 24—example of acceptable transmit battery voltage and acceptable transmit current.

If the output values of three consecutive test transmissions are all within the expected range(s), and all sensors on the main sensor screen are within the normal range, the tag is ready to continue storing, or it is ready to deploy.

- To continue storing; Disconnect the tag in "Stop" mode.
- To prepare for deployment (<1 month); Disconnect the tag in "Auto-Start" mode.

If you see a lower than acceptable voltage, it may be due to passivation forming during storage. We recommend taking additional steps to dislodge passivation by performing the Battery Exercise Routine in Tag Agent.

Battery Exercise Routine

You must be connected to the Internet to run the Battery Exercise Routine.

If a tag shows a low voltage reading after three consecutive low Test Transmission results, run the Battery Exercise Routine in Tag Agent. *Refer to the* Tips to Optimize Transmitting Tests.

To start the test, in the top menu, select the "Advanced" tab and click "Battery Exercise Routine."

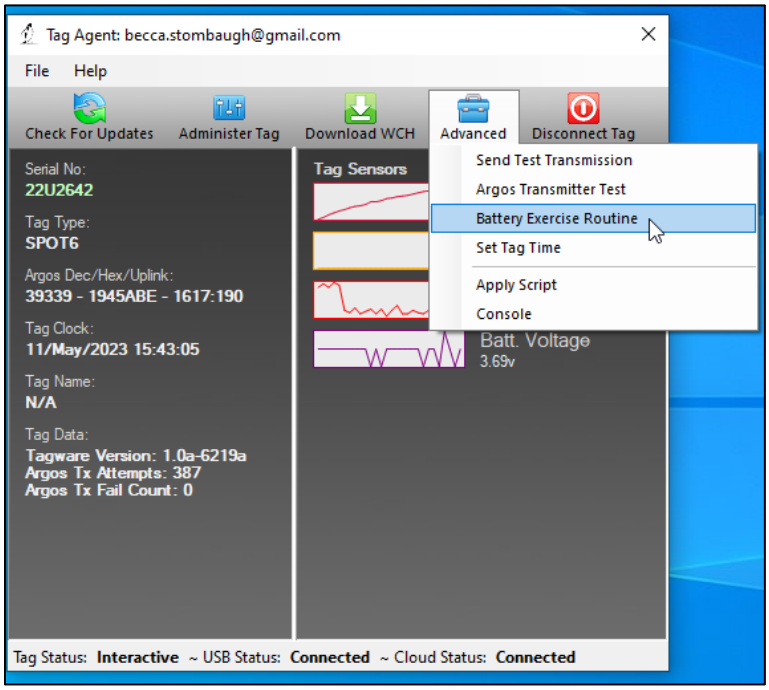


Figure 25—Battery Exercise Routine location in Tag Agent.

The following box will appear:

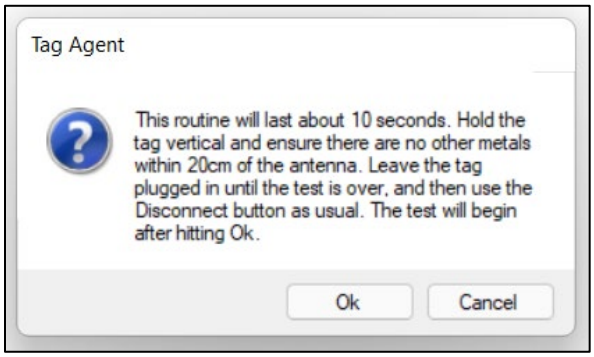


Figure 26—Battery Exercise Routine prompt.

- To run the test, click "OK" to exercise the battery. The test will perform ten transmissions very quickly.
- To exit test, click "Cancel."

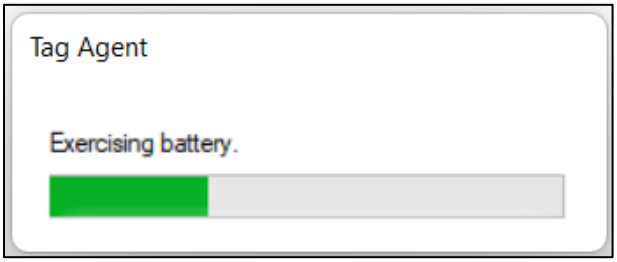


Figure 27—example view of ongoing Battery Exercise Routine test.

After the test's initial run, if the battery voltage is *below* the recommended threshold, Tag Agent will prompt you to run the test again. Click Ok.

- *You will see the prompt up to nine more times if the battery voltage continues to read below the recommended threshold.*

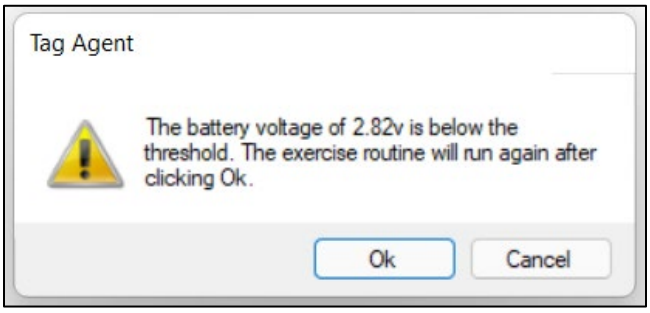


Figure 28—low voltage output. Prompt to rerun test.

If the battery voltage is still below the threshold after ten runs of the test, contact your Technical Sales Consultant (tags@wildlifecomputers.com).

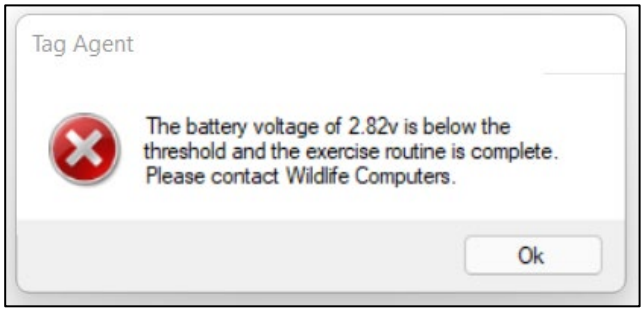


Figure 29—low voltage output. Contact Wildlife Computers.

If the battery voltage is *above* the threshold during any part of the Battery Exercise Routine, Tag Agent will display the following message:

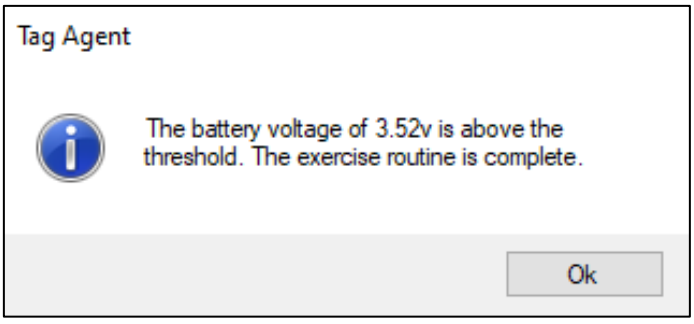


Figure 30—acceptable voltage output prompt.

When you see the battery voltage is above the threshold prompt, the tag is ready for either storage or deployment.

- To continue storing; Disconnect the tag in “Stop” mode.
- To prepare for deployment (<1 month); Disconnect the tag in “Auto-Start” mode.

The outcome of each test will save to the TagLog for each tag within the Tag Portal. Depending on which test you perform (Test Transmission or Battery Exercise Routine), the name of the test will appear in the column.

05-May-2023 22:40:38	teddy@wildlifecomputers.com	Test Transmission (2.2.44.0)	~txs 05/05/2023 22:40:38 PTTHEX [redacted] PTTDEC [redacted] Test ~txd 127 153 139 041 120 001 085 028 063 095 039 000 000 088 103 015 ~txd 016 017 018 019 020 021 022 023 024 025 026 027 028 029 030 ~txe Battery:3.48 Vpa:3.83 IxCurrent:103.27 Reflect:0.23 Vpll:2.76 TxVco:1.58 TxLock:1 TxCnt:383 Accel:1.04:tilt:85 PWR Tx:78 Png:00 MOD L:1C M:3F H:5F PLL:50 mS UT>
05-May-2023 22:40:40	teddy@wildlifecomputers.com	Test Transmission (2.2.44.0)	~txs 05/05/2023 22:40:40 PTTHEX [redacted] PTTDEC [redacted] Test ~txd 128 153 140 041 120 001 085 028 063 095 039 000 000 022 237 ~txe Battery:3.49 Vpa:3.81 IxCurrent:103.52 Reflect:0.23 Vpll:2.76 TxVco:1.58 TxLock:1 TxCnt:384 Accel:1.06:tilt:85 PWR Tx:78 Png:00 MOD L:1C M:3F H:5F PLL:50 mS UT>
05-May-2023 22:40:42	teddy@wildlifecomputers.com	Test Transmission (2.2.44.0)	~txs 05/05/2023 22:40:42 PTTHEX [redacted] PTTDEC [redacted] Test ~txd 129 153 140 042 120 001 085 028 063 095 040 000 000 212 096 015 ~txd 016 ~txe Battery:3.49 Vpa:3.82 IxCurrent:103.76 Reflect:0.23 Vpll:2.75 TxVco:1.57 TxLock:1 TxCnt:385 Accel:1.06:tilt:85 PWR Tx:78 Png:00 MOD L:1C M:3F H:5F PLL:50 mS UT>
05-May-2023 22:40:59	teddy@wildlifecomputers.com	Disconnected (2.2.44.0)	Tag Disconnected in 'Auto Start' mode.
05-May-2023 22:40:59	teddy@wildlifecomputers.com	Control Closed (2.2.44.0)	
05-May-2023 22:46:06	teddy@wildlifecomputers.com	Control Closed (2.2.44.0)	

Figure 31—Tag Portal’s TagLog view of Test Transmission test results.

Argos Transmitter Test

The Argos Transmitter test allows for a full system test to confirm that the tag is successfully sending messages to the Argos satellites. Click on the Advanced Tab then Argos Transmitter Test.

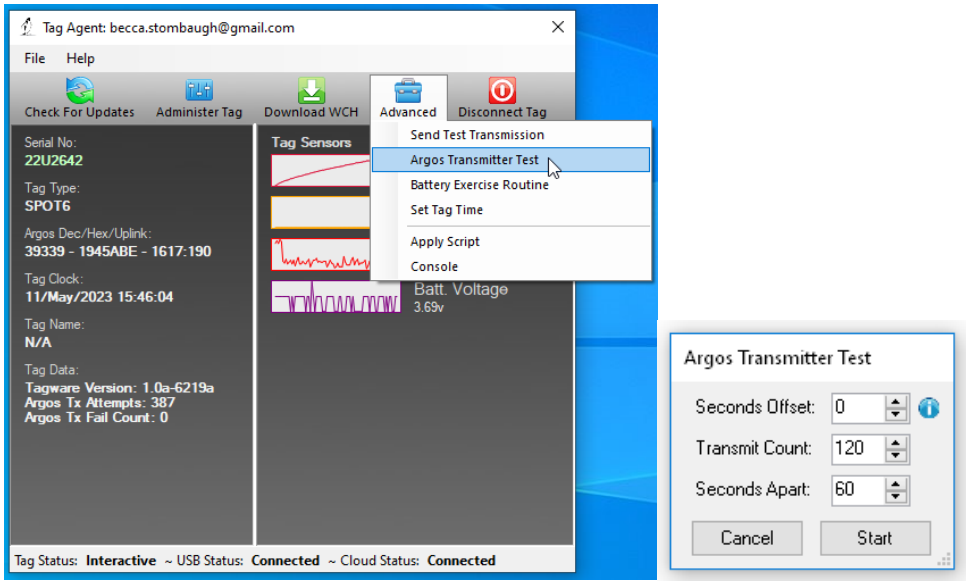


Figure 32—Argos Transmitter Test.

- Seconds Offset: If you will be testing multiple tags at one time, you can use this parameter to offset transmissions so the tags will not transmit at the same time.
- Transmit Count: How many times you want the tag to transmit. 120 transmissions at a sixty second interval will provide a 2-hour test, which is usually enough to coincide with a couple of satellite passes. Check the satellite passes in your area prior to beginning the test.
- Seconds Apart: The time between each transmission. 60 seconds is standard.

When all the tags are set up and deployed, take them outside where they have a full view of the sky.

Upon completion of the Argos Transmitter Test, the tag will be in STOP mode. You must communicate with it again prior to deploying it. When the test is complete, verify that the LED light is not on. If the LED light is on, you MUST communicate with the tag using Tag Agent and manually place the tag in Auto-Start or Stop mode.

Disconnect from SPLASH

Use the Disconnect tab on the upper right of the Tag Agent home screen menu to select the tag state before unplugging. If you are planning to deploy soon, select Auto-Start. The tag will then auto deploy upon submersion in saltwater.

Always disconnect the tag using the Disconnect button. Unplugging without setting the tag state could leave the tag in a state that will rapidly deplete the battery.

Using Tag Portal to Select Settings Remotely

Tag Portal is the cloud-based service offered by Wildlife Computers for remotely selecting tag settings. Configuring can be done without connecting to your tag. This enables project coordinators to review and select settings for their associates and programming to be done while tags are in transit before

arrival. More information on using Tag Portal can be found in the Wildlife Computers Data Portal & Tag Agent User Guide.

When logged into your portal account, a list of the tags for which you have administration rights can be viewed under the My Tags tab. To select settings, click on the serial number of the tag you wish to configure or use the pencil icon.

This will open a new window with setting selections. The same programming options are available whether settings are configured via Tag Portal or from within Tag Agent.

Once settings have been selected in Tag Portal, click the blue Propose Changes link. This will save the settings into the Cloud. The next time the tag communicates with Tag Agent (no matter who plugs in the tag), a notification will appear stating that new settings are awaiting upload.

Multiple set-ups can be published resulting in a queue of configurations awaiting upload. In this case, a dialog box will reveal a list of the configurations, when they were selected, and which administrator chose the settings.

Tag Portal maintains a historical record of tag settings each time changes are uploaded into a tag. The record is instantly updated so long as an Internet connection is available.

If tags are programed offline using Tag Agent, the next time an Internet connection is established and Tag Agent software is open, the record automatically updates.

Offline Mode

Before programming can be done offline, Tag Agent must be downloaded and opened with valid credentials entered while connected to the Internet. Credentials are your Wildlife Computers Data Portal login username and password.

If the software has been opened once and credentials entered, programming offline is possible. To program settings, select Administer Tag from Tag Agent's top navigation bar, configure the tag, and click Send Changes. A dialog box will confirm when settings are loaded into the tag.

The next time an Internet connection is established, and Tag Agent software is open, the historical record will be updated in Tag Portal.

Online templates are not accessible when working offline. To program a group of tags with the same settings when working without an Internet connection, you need to create a local template. A file of the selected tag settings will be saved onto your local machine. Local templates can be created and applied in the Template Manager. Expose the Template Manager with the icon in the upper right corner of the screen.

The Internet connection status is displayed at the bottom of the Tag Agent home screen.

Tag Storage and Battery Maintenance

Proper tag storage is important to minimize passivation and keep the batteries charged. When stored correctly, the amount of battery life lost per year is only 1-2 percent. Battery passivation may cause low voltage readings, and in extreme cases, may compromise the battery. For this reason, batteries must be stored and then exercised.

As a standard, SPLASH tags ship in "Auto-Start" mode for immediate deployment, unless otherwise specified.

SPLASH Storage—Less Than One Month

Not much needs to be done as you will be deploying them soon. Keep the tags in "Auto-Start" mode. The optimal storage temperature range is 0° to 5° C. Tags must not be stored at temperatures warmer than 5° C or colder than -20° C. Remember to read the pre- and post-deployment checklists to optimize your deployment.

SPLASH Storage—Longer Than One Month

If you are storing SPLASH tags for longer than one month, place your tag in "Stop" mode using Tag Agent. If your deployment date is more than one month away, place the tags in "Stop" mode before storing. Refer to the Special Considerations for Longer-term Storage section of this User Guide for battery maintenance while in storage.

To put tags in "Stop" mode, open Tag Agent. In the top menu, click the "Disconnect Tag" tab. Scroll down to "Stop" and follow the prompts. The optimal storage temperature range is 0° to 5° C. For long-term storage, tags must not be stored at temperatures warmer than 5° C or colder than -20° C. Remember to read the pre- and post-deployment checklists to optimize your deployment.

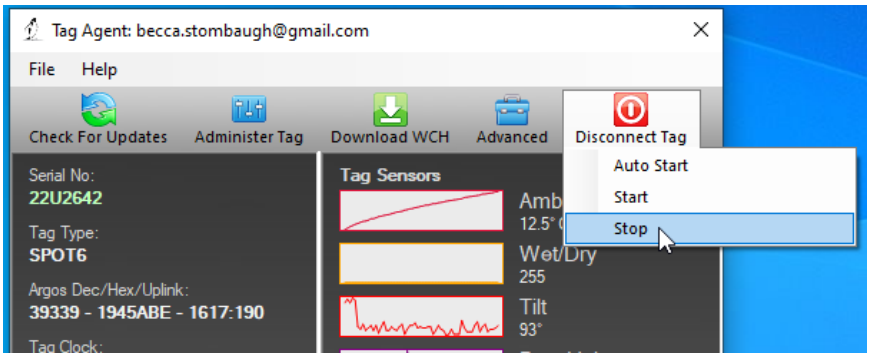


Figure 33—example of how to put tag in Stop Mode in Tag Agent.

Ideally, every few months we suggest exercising the tag's batteries by sending several test transmissions. This can be done in Tag Agent. Select Advanced and then Send Test Transmission. The transmission voltage should read approximately 3.3v and the battery voltage level displayed on the main sensor screen should be around 3.5v. It may take several transmissions for the tag voltage to build up after storage.

If you receive a low voltage reading, it may be due to passivation. Turn the tag on and leave it outside for several hours according to the Argos Transmitter Test instructions. When the unattended Argos test concludes, reconnect to Tag Agent to and perform three more Test Transmissions to see if the transmission voltage level has increased.

Technical Specifications

Below are the specifications of the SPLASH. Numerous shapes are available with the same feature-set technology.

Attachment Type, Dimensions, Weight, and Deployment Length	Varies by tag model
Sensors	Depth, Temperature, Wet/Dry, Fastloc
Depth Sensor Range	0 to 2000m (dBar)
Depth Sensor Resolution	0.061m (dBar)
Depth Sensor Accuracy	1% of reading (typical), 1.25% FS (maximum)
Temperature Sensor Range	-40° C to 60° C
Temperature Sensor Resolution	0.02°C
Temperature Sensor Accuracy	0.1°C
Pressure Rating (m)	2000m
Operating Temperature Rating (° C)	-20° C to 50° C
Optimal Storage Temperature Range (° C)	0° C to 5° C
Conductivity Operational Limits	0.1 to 5 S/m
Memory	2 GB
Transmitter Frequency	401.678 MHz
Transmitter Power	0.5W / 3 dBi peak antenna gain

TEMPERATURE PROFILE	
Depths (source)	67 (WOD13) or 26 (WOA94)
Depth accuracy	1% of reading (typical), 1.25% FS (maximum)
Depth resolution	0.5m
Depth range	0 to 2000 m
Depth units	meters of seawater (dBar)
Temperature accuracy	0.1° C
Temperature resolution	0.05° C
Temperature range	-3.8° C to 47.15° C
Temperature units	Celsius
Sample interval	1s
Maximum messages per profile	Up to 4 (WOD13) or 2 (WOA94)
Summary periods	1, 2, 3, 4, 6, 8, 12, or 24h
UTC offset?	Yes
CRC check?	Yes

TIME SERIES	
Depth accuracy	1% of reading (typical), 1.25% FS (maximum)
Depth resolution	Varies, proportional to range observed
Depth range	0 to 2000 m
Depth units	meters of seawater (dBar)
Temperature accuracy	0.1° C
Temperature resolution	Varies, proportional to range observed
Temperature range	-2° C to 48° C
Temperature units	Celsius
Sample interval	75, 150, 300, 450, or 600s
Argos messages per day per sensor	24, 12, 6, 4, or 3
CRC check?	Yes

EMPRICAL CUMMULATIVE DISTRIBUTION FOR DEPTH	
Dive count resolution	1 Dive
Dive count range	0 to 127
Depth resolution	1 – 8 m, varies with maximum depth
Depth accuracy	1% of reading (typical), 1.25% FS (maximum)
Depth range	0 to 2000 m
Depth units	meters of seawater (dBar)
Sample interval	1s
Percent time spent dry resolution	0.1% of summary period
Minimum depth resolution	1 m
Shallow percentiles	33, 66, and 100%
Percent-time spent shallow resolution	0.1% of summary period
Deep percentiles	20, 40, 60, 80, and 100%
Percent-time spent deep resolution	0.1% of summary period

Summary periods	1, 2, 3, 4, 6, 8, 12, or 24h
Argos messages per summary period	0.5
UTC offset?	Yes
CRC check?	Yes
PERCENT DRY TIMELINES	
Wet/dry sample interval	3s
Units	Percent time dry
Low resolution	10%, with special 0% and 100% values
High resolution	1%
Summary period	1h
Argos messages per day - low resolution	0.5
Argos messages per day - high resolution	1
FASTLOC® GPS	
Location accuracy	<75 m (typical)
Minimum Interval	1 min
Time accuracy	2 sec (with Argos clock corrections)
Time resolution	1 sec
Argos messages per Fastloc®	1
ARCHIVE	
Sample interval	1s
Depth accuracy	1% of reading (typical), 1.25% FS (maximum)
Depth resolution	0.061 m
Depth range	0 to 2000 m
Depth units	meters of seawater (dBar)
Temperature accuracy	0.1° C
Temperature resolution	0.05° C
Temperature units	Celsius
Wet/Dry accuracy	N/A
Wet/Dry resolution	1
Wet/Dry range	0 to 255
Wet/Dry units	Relative conductivity
Dry	Reports tag state based on Wet/Dry
Battery	Reports battery voltage
Fastloc® Snapshots	Up to 4096

Temperature Profile Depths

Temperature profiles on SPLASH tags report temperatures at fixed depths taken from the World Ocean Database 2013 specification and the World Ocean Almanac 1994 specification.

*Table 4—WOD13 depths used for temperature profiles. Up to 67 levels are used. Depths which cause another Argos message to be created are in **bold** with the total quantity of messages indicated in parentheses **()**.*

WOD13 Standard Depths For 2000 Meters and Above				
0(1)	70	300	800	1500
5	75	325	850	1550
10	80	350	900	1600
15	***85(2)***	375	950	1650
20	90	400	1000	1700
25	95	425	1050	1750
30	100	***450(3)***	1100	1800
35	125	475	1150	1850
40	150	500	1200	1900
45	175	550	***1250(4)***	1950
50	200	600	1300	2000
55	225	650	1350	
60	250	700	1400	
65	275	750	1450	

*Table 5—WOA14 depths used for temperature profiles. Up to 26 levels are used. Depths which cause another Argos message to be created are in **bold** with the total quantity of messages indicated in parentheses **()**.*

WOA94 Standard Depths For 2000 Meters and Above				
0(1)	100	400	1000	1750
10	125	500	1100	2000
20	150	600	1200	
30	200	700	1300	
50	250	800	1400	
75	300	***900(2)***	1500	

Additional Information

Glossary of Terms

- Administrator—someone who has the authority to publish tag settings.
- Argos ID—uniquely identifies a transmitter for the Argos system. The ID consists of a decimal number and a hexadecimal (base 16) number.
- Argos Location—a location generated by the Argos system from uplinks received during a satellite pass. Get more information about how the Argos system works here: http://www.argos-system.org/web/en/391-faq-general-questions.php
- Argos Uplink—a radio transmission intended for the Argos satellite system.
- At-Sea and Haul-Out—tag states controlled by wet/dry readings.
- Daily Data—generated from sensors over a fixed 24-hour period.
- Data Message—created by the tag to transmit data through the Argos system. Each data message is transmitted as payload in an Argos uplink. To increase the likelihood of its reception by the Argos system, each message is sent a fixed number of times.
- Data Products—the various types of data available from Wildlife Computer tags.
- Deployment—the period when a tag is associated with an animal and actively collecting and sending telemetry data.
- Location Uplink—a transmission intended to generate an Argos location. These uplinks can also carry a data message payload. Multiple uplinks are required to generate an Argos location.
- Start/Auto-Start/Stop—tag states. When started, will generate locations and/or collect sensor data. Auto-Start will allow the tag to Start using a magnet or when reading wet. Stop causes the tag to do nothing until reconnected to Tag Agent.
- Summary Period Data—generated from sensors during a defined number of hours.
- Tag Agent Software—the program used to change tag states, select tag settings, and connect a tag to the Wildlife Computers Tag Portal.
- Tagware—the software running on a tag.
- Wildlife Computers Communication Cable—the Wildlife Computers communication cable required by Tag Agent.
- Tag Portal—the cloud-based service offered by Wildlife Computers for remote tag setup. A historic record of tag settings and templates is maintained within the Tag Portal.
- Wet and Dry—the state of the tag as determined by the wet/dry sensor which measures conductivity

Argos Satellite Pass Prediction

CLS offers a satellite pass prediction program to help forecast satellite coverage at a given location. Additionally, Wildlife Computers offers a tool to graph the results and display the best hours for tags to transmit data for up to six months. The Wildlife Computers tool will display satellite pass histograms in both UTC/GMT for tag programming, and in local time for tag initialization and testing.

The following instructions outline the two-step process:

To determine when satellites will be in view, log onto the CLS website at http://www.argos-system.org and select "DATA ACCESS." Log in with your Argos username and password. Ensure that the time settings next to the login username are set to UTC. If not, then change them using the settings icon.

To run a simulation, select “Satellite Pass Prediction” on the right side of the dashboard.

- To run a simulation, select “Satellite Pass Prediction” on the right side of the dashboard.
- Set your simulation period—select today’s date as the “Start Date.” Then select “End Date.” Use the calendar box on the right-hand side to select an end date that is six months out from today’s date (the calendar will be grayed-out after six months). A shorter period can be selected for initialization testing or shorter deployments.
- Select satellites—ensure all satellites are selected.
- Enter location—select “Latitude/Longitude/Altitude.” Input your deployment location coordinates. The location will display on the world map on the right-hand side. Altitude must also be set to “0” for marine applications.
- Click “Simulate”—the results spreadsheet will now appear.
- Click “Export”—select to save as a .CSV file and to save it in an easy-to-access location on your computer.
- Exit the Argos website.

Plotting the Results

- Use a web browser to navigate to the following link: http://bit.ly/argospassprediction. Adjust the UTC/GMT slider to the UTC/GMT offset of your current location, including possible daylight-saving time.

- Upload the Argos file—browse and import the pass prediction file saved from Argos. The program will display the pass prediction data for the next six months which will assist in selecting the best hours to activate the tag.

Tags must always be set and programmed in UTC/GMT time. The “Local Time” histogram is only used for identifying the best hours for tag initialization and testing.

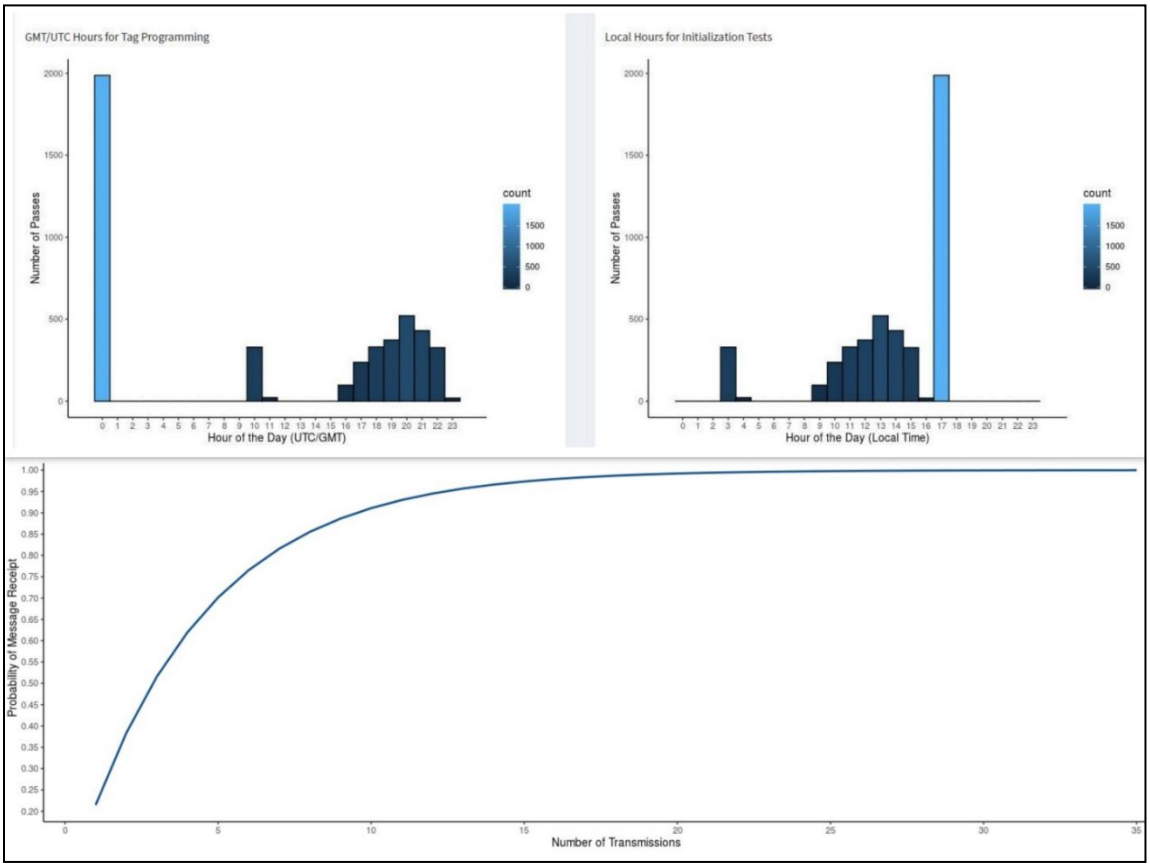


Figure 34—satellite coverage is best in UTC hours 2-4 and worst in hours 7-10 with no passes at all in hours 8 and 9.

Initializing Tags Prior to Deployment

Before deploying a SPLASH tag, it is recommended to conduct a trial mission. Activating tags prior to deployment has several benefits. It provides exposure to the software and data, it allows you to evaluate the performance of the tag, and, most importantly, it enables Argos to secure a quality location at your field site prior to the animal being released. This is significant because the Kalman filtering algorithm not only uses measurements from the current satellite pass but also from prior satellite passes to calculate positions from just one or two Argos messages.

Run the trial mission for four to six hours, leaving the tag outside with a clear view of the sky. It can be beneficial to run a pass prediction via the Argos website to ensure multiple satellite passes are scheduled during the mission window.

If the primary purpose of the trial is to hit the Argos satellites and generate locations, the recommended settings are one step with a 250-uplink limit and no data products enabled. If data product testing is desired, ensure the summary periods fit within your six-hour testing time.

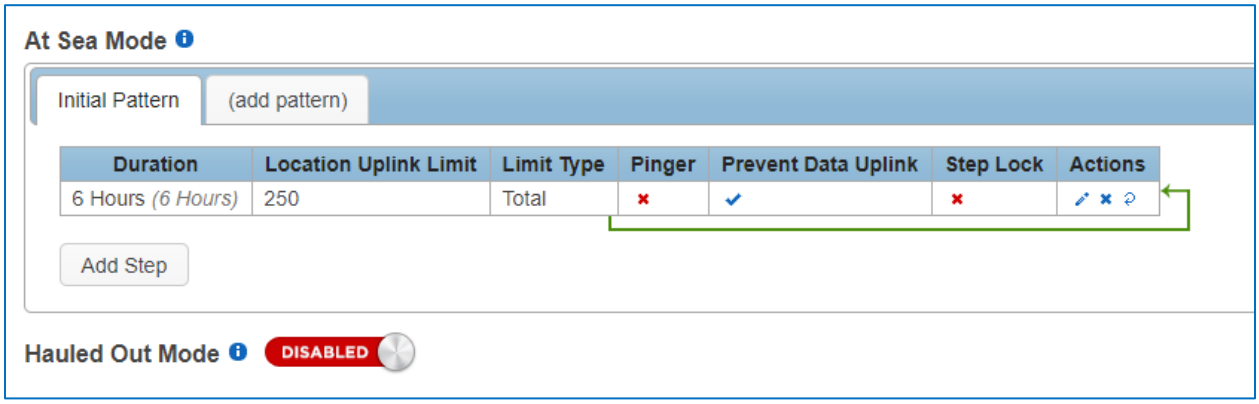


Figure 35—settings for priming Argos locations; a single six-hour step with a 250-uplink limit and no data uplinks.

When testing multiple tags, it is important to space out the transmissions so they do not interfere with one another. This is easily accomplished by using a magnet to activate tags ten seconds apart. Alternatively, it can be accomplished by starting tags using Tag Agent, placing tags in a bucket of salt water, and then pulling each tag out of the bucket, ten seconds apart. Wildlife Computers recommends only testing four to five tags at a time to avoid signal collisions. You could alternatively run an Argos Transmitter Test as described above.

After the trial, review your results in the data portal. Use Tag Agent to change the tag settings and switch the state to Auto-Start or Stop.

Battery Isolator Screw

Certain SPLASH tags with ample battery power (>2g lithium metal) include a battery isolator screw. The isolator keeps batteries disconnected during shipment. Once tags arrive at their destination, the screw must be inserted to connect the batteries.

Tag Agent displays the battery status on the lower left. For more detailed instructions, see our guide: Battery-Isolator-Screw-Instructions.pdf

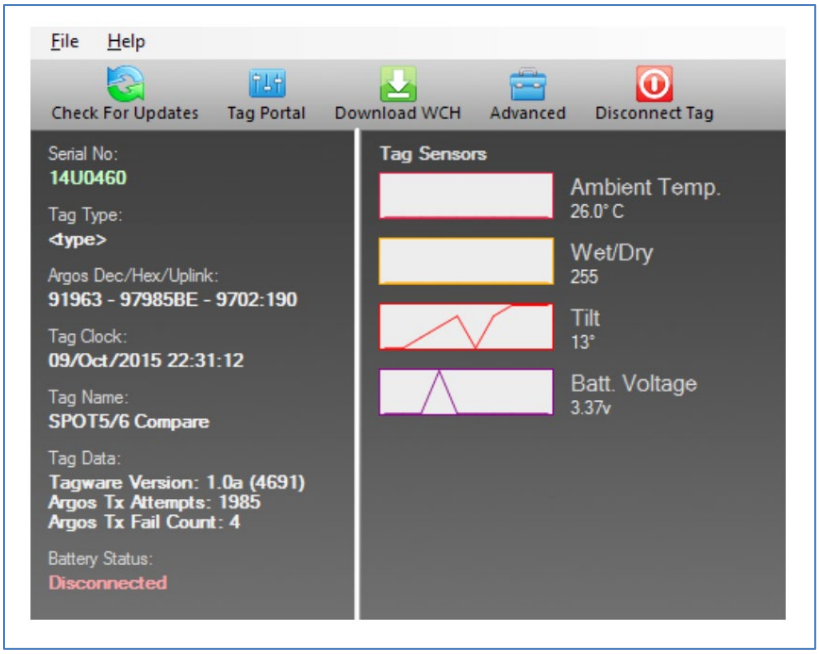


Figure 36—Tag Agent showing the Battery Status as disconnected

What is Antifouling Paint and Why You Should Apply It

Heavily fouled tags can be hugely detrimental to tagging studies as fouling growth over critical sensors impedes the tag's transmitting performance. Especially for deployments in tropical waters, it is imperative that tags be protected against marine growth.

Wildlife Computers leaves the decision to apply antifoul coating after manufacturing and before deployment entirely to the researcher's discretion. Excluding animals that regularly haul-out, ***we strongly recommend that tags be treated with some antifouling coating to ensure the best possible chance of a successful deployment as Wildlife Computers does not provide warranty against biofouling.***

Wildlife Computers endorses two antifouling coatings: Micron and Propspeed.

Micron is a range of copper-based antifouling paints, many with a biocide that repels barnacles. For optimal protection, it is critical to use International Paints' Interprotect primer in addition to the paint. Micron66* is a great choice for slow movers like sea turtles and whale sharks. Other Micron saltwater paint options are available and should work well. Proven choices are Micron 66, 77, 99, CSC, and Extra SPC. If Micron paint is unavailable in your area, find an alternative copper-based ablative antifouling paint with a suitable primer. Wildlife Computers does not currently apply Micron antifouling paint.

**Micron66 has been discontinued but can still be found in some stores. Wildlife Computers has been testing Micron CSC and Micron Extra SPC as a replacement. SPLASH and SPOT tags on species such as sea turtles*

should be painted with one coat of primer and three coats of any Micron paint.

Tags painted with Micron must only be handled with gloves as Micron contains copper and biocides. Store the tags in a Ziploc® bag as Micron gives off a strong odor. Store the tags in a cool place optimally between 0° C and 5° C.

Propspeed is a foul release silicon coating, not an antifoul, that impedes biofouling adhesion. Propspeed is non-toxic and widely available. Propspeed relies on movement for its effectiveness—the more water moves over its surface, the better it performs, as marine growth cannot get a grip to grow. Propspeed can last up to a year and is non-toxic according to the manufacturer.

Wildlife Computers offers an optional service to sand, mask, and paint tags with Propspeed antifouling and coat the wet/dry sensors with conductive polymer. Wildlife Computers offers Propspeed antifouling painting at a charge of $100 per tag prior to shipping.

For instructions on how to apply antifouling coatings, videos, and more:
https://wildlifecomputers.com/our-tags/extras/anti-fouling/

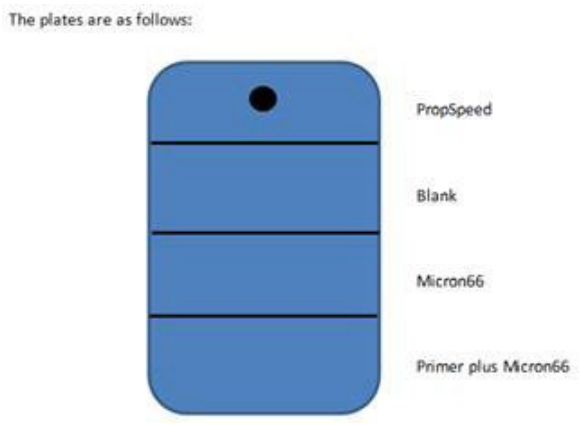
Antifouling Tests

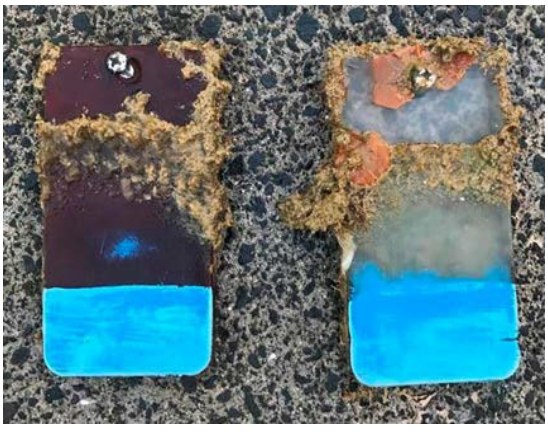
Wildlife Computers have been undertaking tests on antifouling paint in various parts of the world.

Below is an image of submerged polyurethane and epoxy test plates after two months on a wharf pile in New Zealand.

Propspeed is at the top and has done a reasonable job but has started to fail. Next is a placebo blank area with no protection that has fouled badly. The next strip down had Micron without a primer and the Micron has nearly worn away completely.

The Micron at the bottom has one coat of Interprotect primer and three coats of Micron—it is pristine. We recommend this set up for a successful project.





Contacting Wildlife Computers

U.S. and International

Members of the Wildlife Computers technical sales and support team are in Redmond, WA, USA, and Havelock North, New Zealand, allowing us to cover promptly a wide range of time zones.

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For Asian Clients

While we welcome your direct correspondence, we recommend that you contact our colleague, Yong Huang, for assistance. Mr. Huang understands the special purchase processes for your countries and will provide you with the best service for the best price. He also is fluent in Japanese, Chinese, and English.

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