SPOT-F User Guide

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

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Table of Contents

WILDLIFE COMPUTERS

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 configure and deploy a SPOT tag:

- A Wildlife Computers Data Portal Account
- A Windows® computer with Tag Agent and our USB driver installed
- A Wildlife Computers communications cable
- A magnet

Visit wildlifecomputers.com to download the required software (Tag Agent and the USB communications cable driver) and setup an account. At the end of this document, there is a list of key terms and concepts for reference. We recommend new users review this list.

About the SPOT-F

The Wildlife Computers SPOT-F tag includes an Argos transmitter, Fastloc-GPS receiver, temperature sensor, and wet/dry sensors.

SPOT-F tags take a rapid 'snapshot' of the GPS satellites in the sky above. The satellite identities and pseudo-ranges are stored on board the tag and relayed back to the researcher via Argos on a later surfacing event.

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 SPOT-F

Wildlife Computers offers SPOT-F tags in many different shapes to suit a variety of applications. While the shapes may differ, all SPOT-F tags have several elements in common (Figure 1).
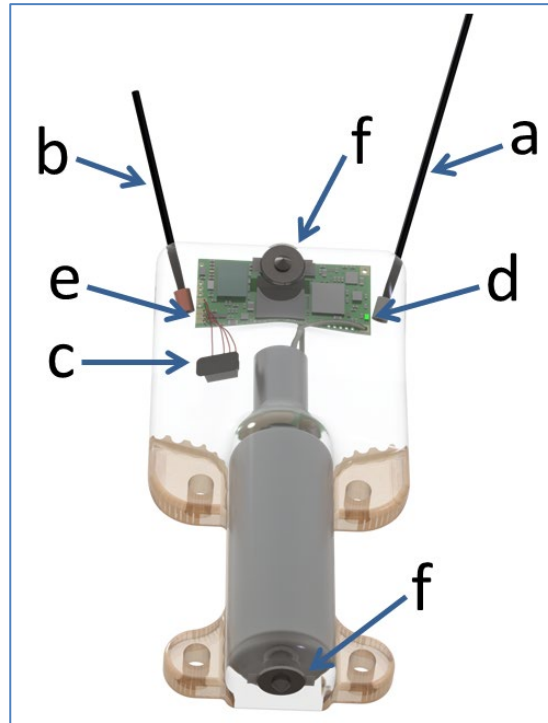

Figure 1—a typical SPOT-F tag showing the Argos antenna (a), Fastloc® GPS antenna (b), communications port with plug (c), indicator light (d), magnetic switch (e), and wet/dry sensor (f)

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 anti-fouling 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.

WILDLIFE COMPUTERS

Tag States

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

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

Start—when in Start mode, a SPOT-F is running and will transmit to Argos. When first deployed, the LED will blink every second. This "heartbeat" blink provides visual confirmation that a tag has switched from Auto-Start to Start and is meant to prevent deployment of deactivated tags. Additionally, the LED will blink brightly whenever the SPOT-F 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 SPOT-F 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).
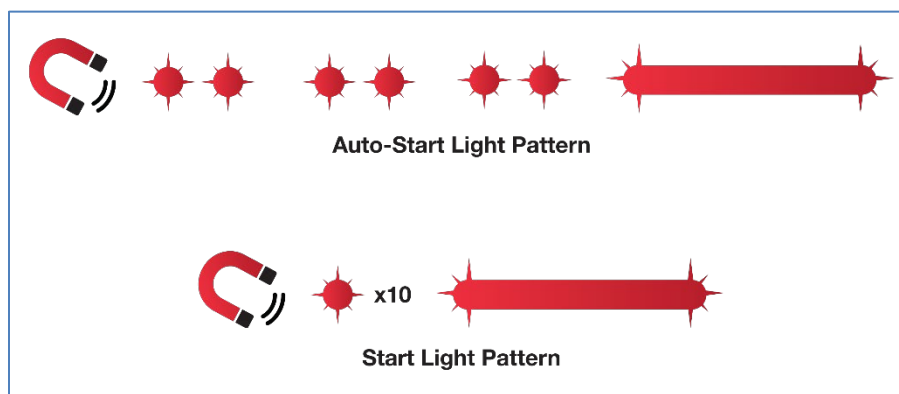

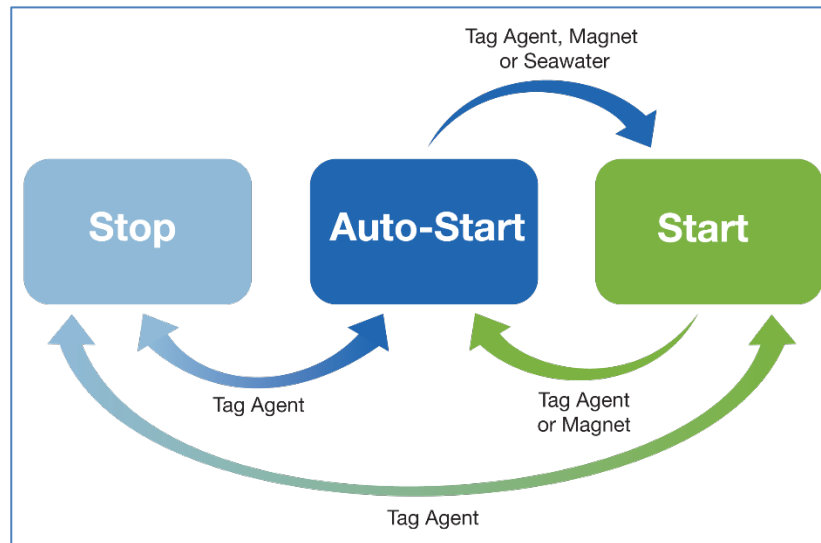*Figure 2—sample of the indicating light pattern.*

Figure 3—methods for changing a SPOT-F state. Tag Agent can be used to put a SPOT-F in any state.

Interacting with a Tag

Tag Agent

Tag Agent is used to communicate with SPOT-F tags. A local copy of Tag Agent must be downloaded the first time you use it. Once installed, all updates to the tag's software 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'll be greeted by a welcome screen (Figure 4). Along the bottom the Tag Status, USB Status and Cloud Status are displayed.
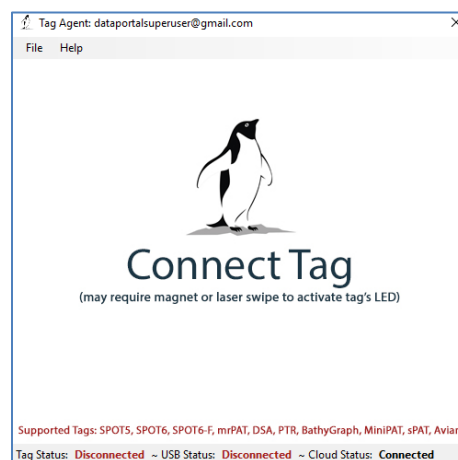

Figure 4—Tag Agent welcome screen.

Connecting a Tag to Your PC

To communicate with a SPOT-F 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 Tag Agent home screen will appear with tag information on the left and sensor readings on the right (Figure 5).
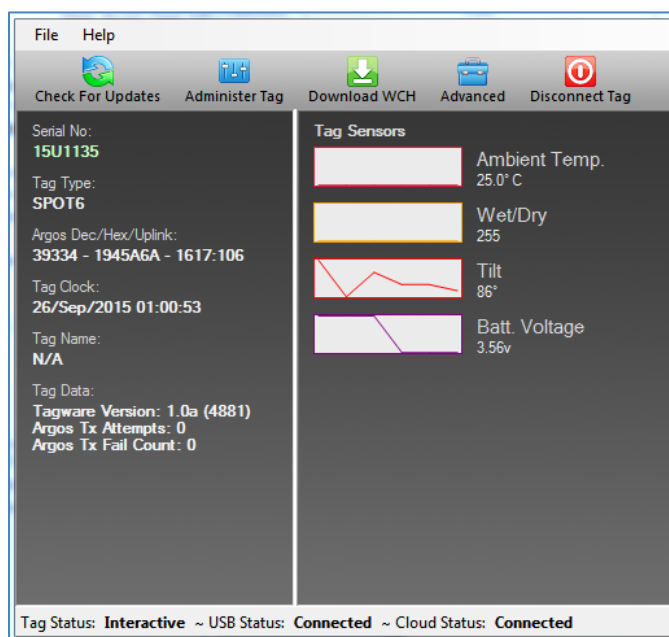

Figure 5—Tag Agent home screen.

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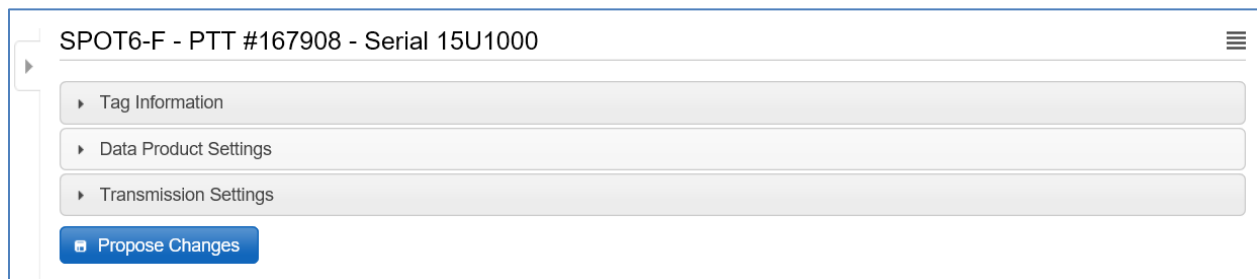
Configuring Tag Settings

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

Figure 6—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 7—collapsed version of SPOT-F tag programming categories.
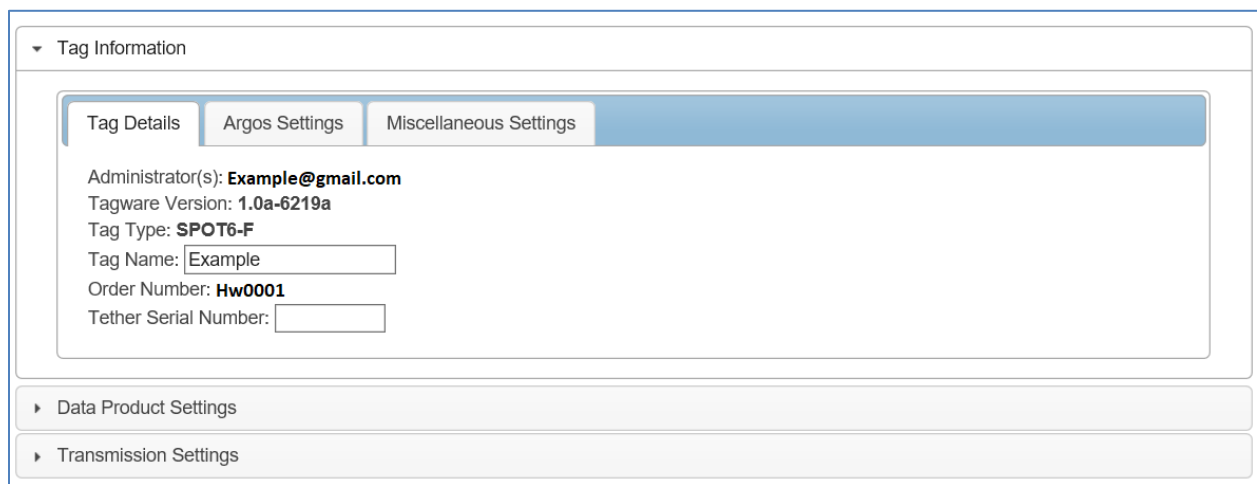
Tag Information

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.

Miscellaneous Setting

SPOT-F 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 your animal may be compromised by the flashing LED.

Figure 8—expanded view of Tag Details tab.

Data Product Settings

In addition to providing Argos locations, the SPOT-F tag can optionally transmit Time-at-Temperature histograms, Percent Dry Timeline and Fastloc data messages.

⚠️ ***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

Time-at-Temperature Histograms (TAT)

The Time-at-Temperature histogram reports the amount of time that an animal spent within each temperature bin. The amount of time is reported as a percentage of the histogram summary period.

Select the high temperature limit for each bin. Next choose the summary period. The summary period can range from one hour to 24 hours but the chosen period must divide the day evenly. The summary period begins immediately after midnight UTC by default and runs to the end of the UTC day. Selecting a six-hour summary period will cause the tag to generate four histograms. One from 00:00 hrs. to 06:00 hrs.; one from 06:00 hrs. to 12:00 hrs.; one from 12:00 hrs. to 18:00 hrs.; and one from 18:00 hrs. to 24:00 hrs. This pattern repeats on the next UTC day.

To measure behavior associated with local time, you can delay the start of each summary period by setting a summary period offset. Choosing an offset of three hours will shift the example summary periods as follows: 03:00 hrs. to 09:00 hrs; 09:00 hrs. to 15:00 hrs.; 15:00 hrs. to 21:00 hrs.; and 21:00 hrs. to 03:00 hrs.

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

Be aware that the temperature sensor is buried in the tag and has a response time of approximately 30 minutes.

Figure 9—example of Time-at-Temperate histogram with six-hour summary periods and a three-hour start delay.

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. Choosing the Low-Resolution option will cause the tag to report to the nearest 10%. 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. The High-Resolution option reports to the nearest 1%.

Figure 10—low resolution percent dry timeline enabled.

The percentages are as follows:

% reported in DAP spreadsheet	Amount of time during hour
0	0% (no readings were dry)
3	0% < dry < 5%
10	5% <= dry < 15%
20	15% <= dry < 25%
30	25% <= dry < 35%
40	35% <= dry < 45%
50	45% <= dry < 55%
60	55% <= dry < 65%
70	65% <= dry < 75%
80	75% <= dry < 85%
90	85% <= dry < 95%
98	95% <= dry < 100%
100	100% (every sample was dry)

Figure 11—percentages in Percent-Dry Timeline

Transmission Settings

Data Uplinks

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

Argos Location Uplinks—SPOT-F 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.

SPOT-F deployments typically target the collection of Fastloc data 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, Time-at-Temperature histograms 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, SPOT-F 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 SPOT-F will attempt one retry at the next available opportunity.

Transmission Modes

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 repetition 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 repetition 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.
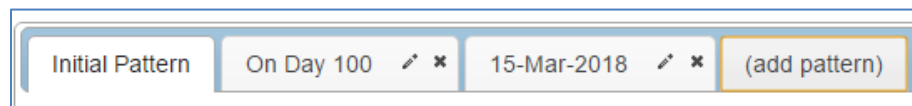
Figure 12—example of a deployment with 3 transmission patterns.

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 all the steps to be repeated.

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

Figure 13—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. Step 2 loops repeatedly until 10-January-2018, when the next pattern begins.

Figure 14—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.

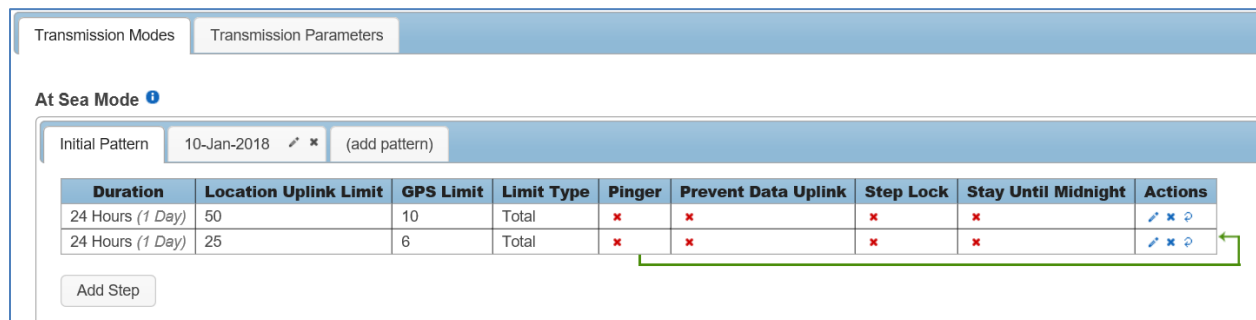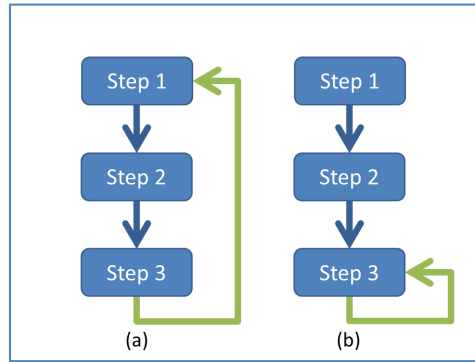| Duration	Location Uplink Limit	GPS Limit	Limit Type	Pinger	Prevent Data Uplink	Step Lock	Stay Until Midnight	Actions
24 Hours *(1 Day)*	25	10	Total	✘	✘	✘	✘	✏ ✘ ↻

Figure 15—The pencil icon can be used to configure step details.

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 and animal must be at 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+)
e. When the transmit limit is too conservative it can be difficult to achieve these conditions.

Most SPOT-F deployments target the collection of Fastloc data. 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.

Pinger Enabled

The pinger is used for radio tracking recovery. When enabled, a SPOT-F tag sends out low-power pings every two seconds while at the surface. With an appropriate receiver and directional antenna, the tag can be located. Excess power draw from the pinger is negligible.

Prevent Data Uplink

Data message transmissions can be disabled. When all transmissions are disabled, 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 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.

Figure 16—example of a step lasting one day with a total location transmission limit of 50 and Fastloc-GPS limit of 6.

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

Transmission Parameters

Argos Uplink Mask

In a given 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 17—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 or the pinger. 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 resent will greatly impact what data is received.
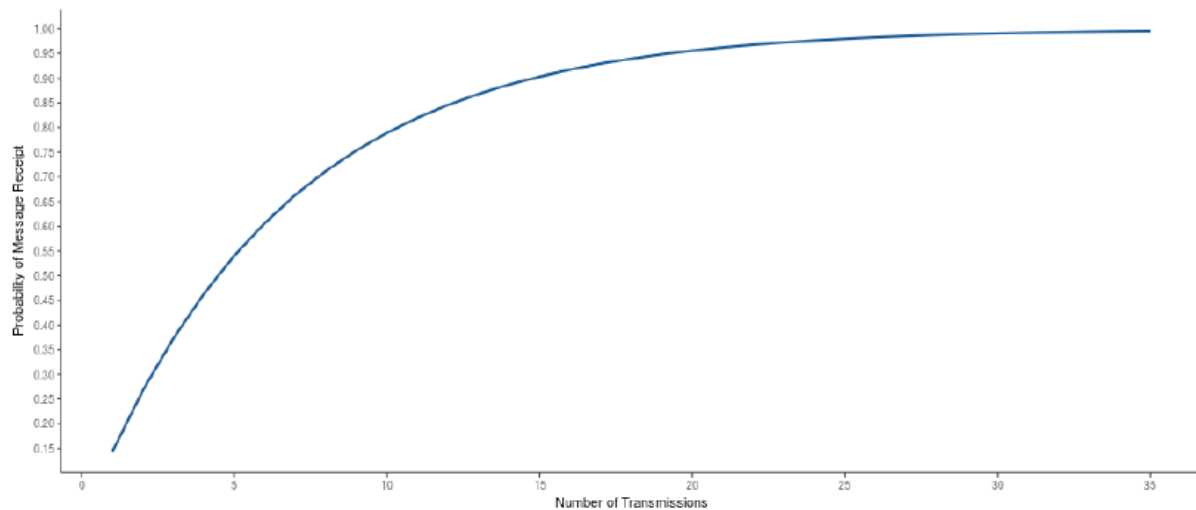

Figure 18—graph showing the probability of successful data transmission with an increasing number of re-transmits for a specific location. A per message corruption rate of 10% is assumed.

WILDLIFE COMPUTERS

Loading Settings into a Tag

Once settings have been chosen 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.
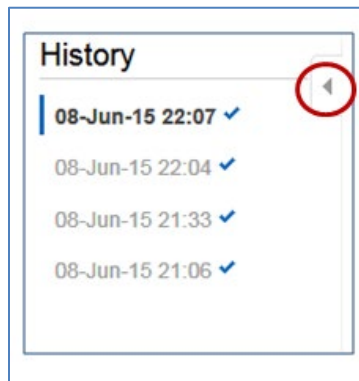
Figure 19—arrow icon exposes tag programing history.

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:

- Internal Temperature—this will change slowly as the entire tag changes temperature. Leaving a tag in a refrigerator for a while will change the value.
- Wet/Dry—connecting a wire between a ground and active wet/dry sensor disc should change the value from 255 to less than 20.

Test Transmission

Under the Advanced button on the top menu there's an option to Send Test Transmission. When selected, a pop-up box with transmission values will appear.
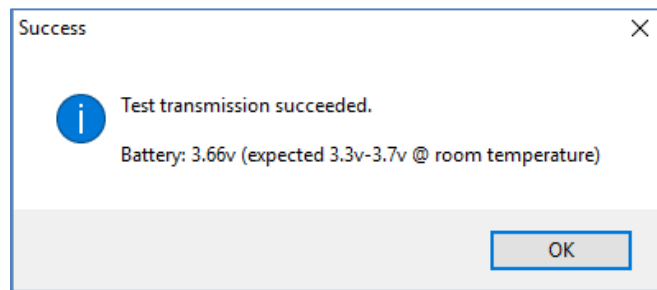
Figure 20—test transmission results.

The battery voltage value will be lower in the pop-up box than on the Tag Agent home screen because it is measured when the battery is driving a transmission.

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.
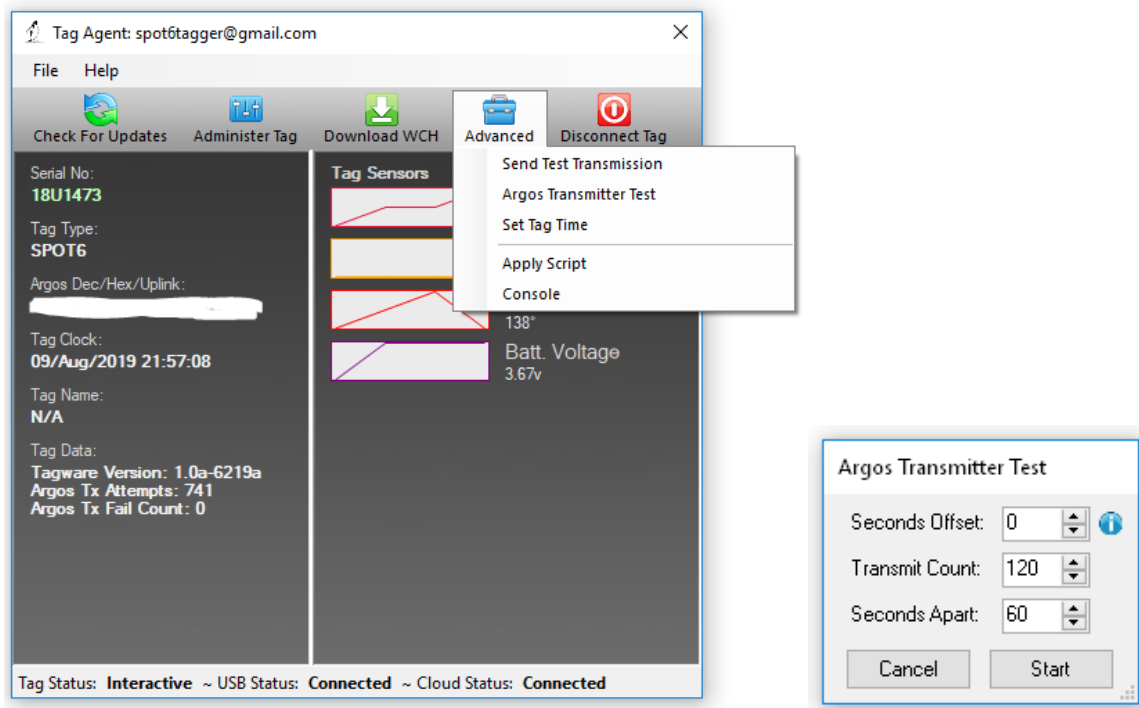
Figure 21—Argos transmitter test.

- 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 60 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 of the tags are setup 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, and you will need to 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 SPOT-F

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 in the near future, 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.

WILDLIFE C O M P U T E R S

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.

As long as 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, SPOT tags ship in "Auto-Start" mode for immediate deployment, unless otherwise specified.

SPOT-F Storage—Less Than One Month

Not much needs to be done as you will be deploying them soon. Store 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.

SPOT-F Storage—Longer Than One Month

If you are storing SPOT tags for longer than one month, place your tag in "Stop" mode using Tag Agent and exercise the batteries at least 3 months* prior to your deployment to confirm the battery voltage is 3.3-3.7V.

To change the Tag State from "Auto-Start," connect to each tag and log in to Tag Agent. In the menu at the top, you will see the "Disconnect Tag" tab. Scroll down to "Stop." 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.

If you receive a low voltage reading, it may be due to passivation. Turn the tag on and leave it outside for several hours. Then reconnect to Tag Agent to see if the transmission voltage level has increased.
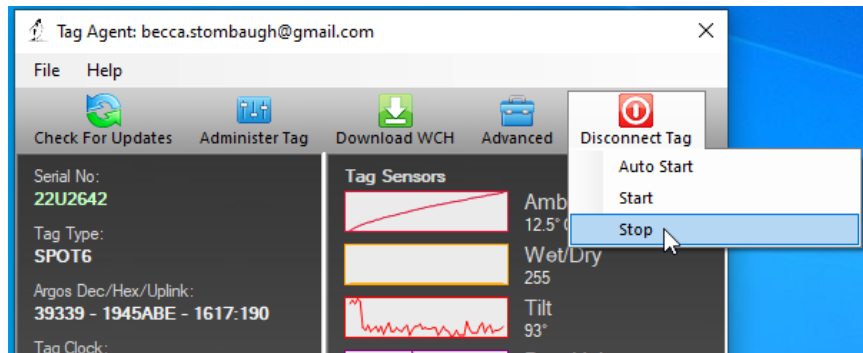

Figure 22—example of how to put tag in Stop Mode in Tag Agent.

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 SPOT-F. Numerous shapes are available with the same feature-set technology.

Attachment type	***
Sensors	Temperature, Wet/Dry, Fastloc
Temperature sensor range	-40° C to 60° C
Temperature sensor resolution	0.05° C
Dimensions (mm)	***
Weight (g)	***
Pressure rating (m)	***
Operating temperature rating	-20° C to 50° C
Optimal storage temperature range	0° C to 5° C

Conductivity operational limits	0.1 to 5 S/m
Memory	No archive memory
Maximum deployment length	***

*** *indicates the specification is dependent upon the configuration model*

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. In order 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.
- Pinger—a UHF radio tracking beacon.
- 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 and 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.*
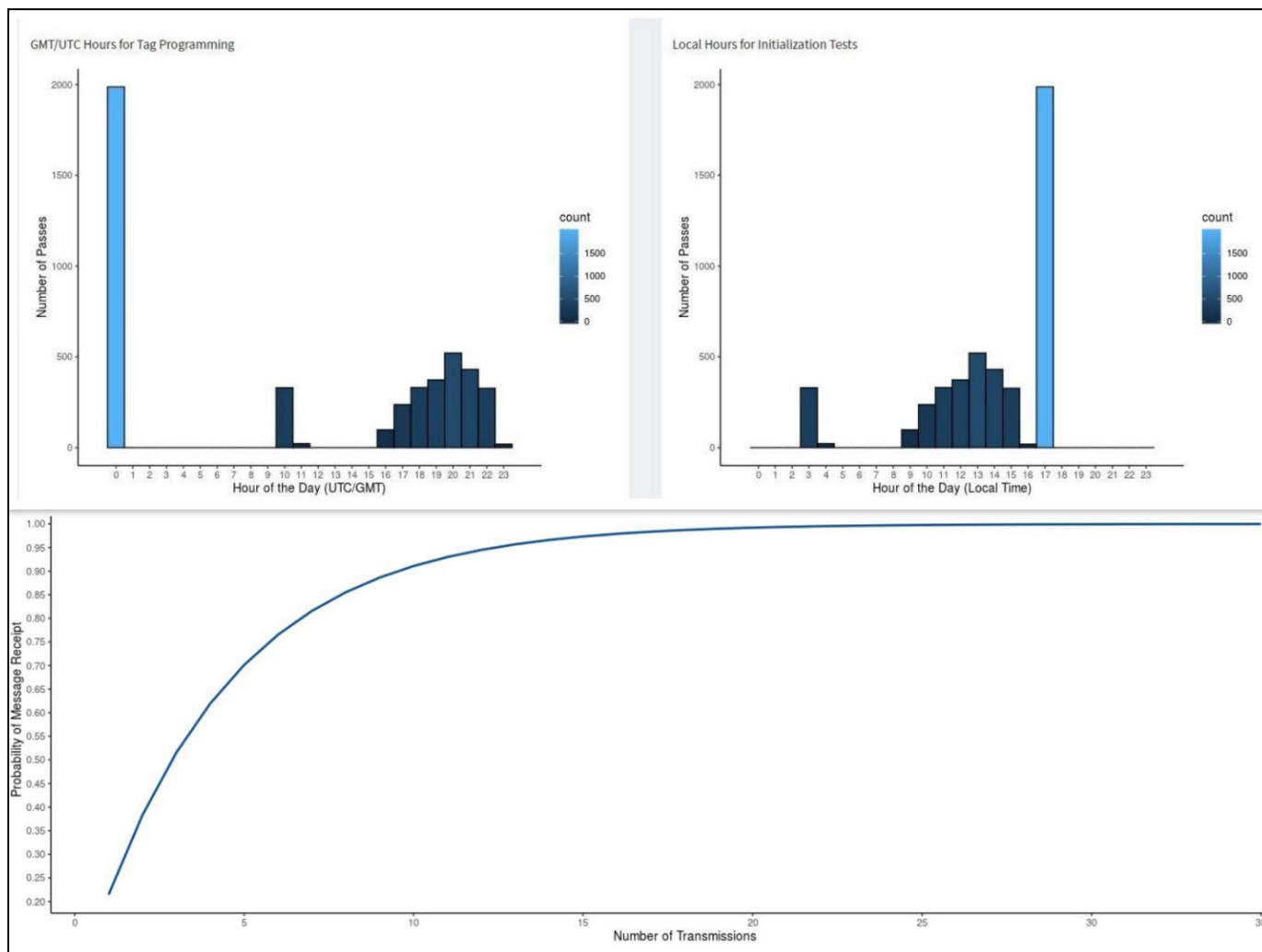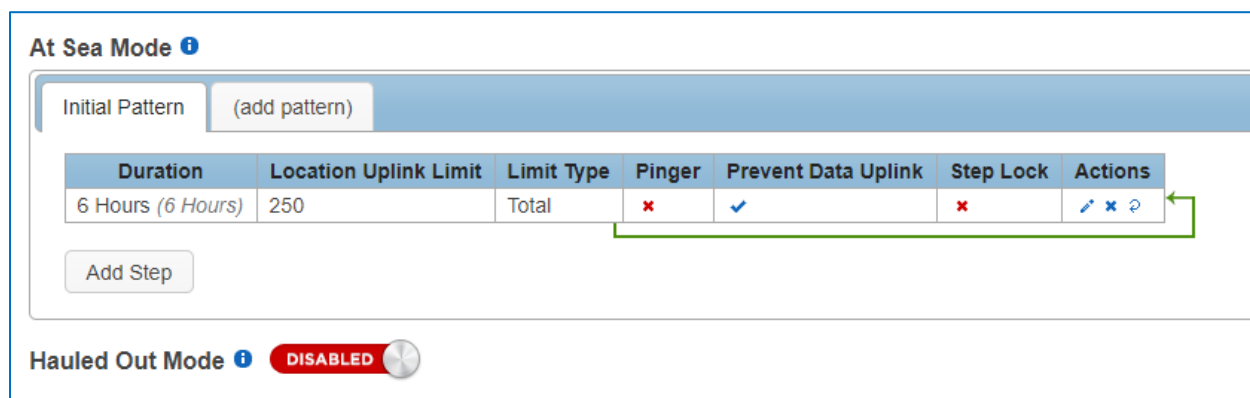
Figure 22—satellite coverage is best in UTC hours 2-4 and worst in hours 7-10 with no passes at all in hours 8 and 9.

Initializing Tags Prior to Deployment

Before deploying a SPOT-F 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, perhaps 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.

As long as 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 frame.

Figure 23—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 don't 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 SPOT-F 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
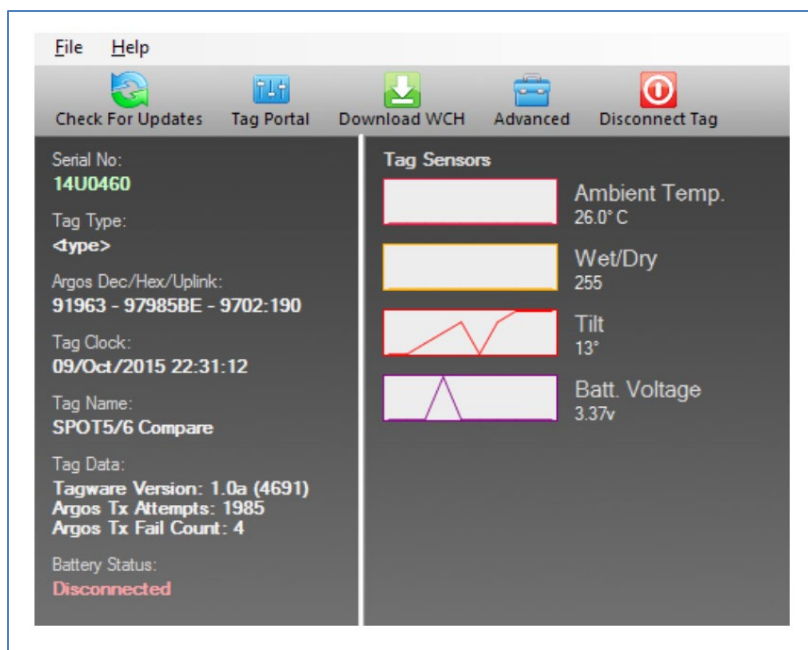

Figure 24—Tag Agent showing the Battery Status as disconnected

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. SPOT tags on species such as sea turtles should be

painted with one coat of primer and three coats of any Micron paint. Be sure to perform a buoyance test after the tether and antifouling paint are applied. When using SPOT versions of the [Wildlife Computers towed tags](#), Wildlife Computers recommends performing a float test once antifouling paint and tethers are applied.

⚠️ ***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 relatively 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/

⚠️ ***SPOT-F tag wet/dry sensors should never be covered or coated with anti-fouling paint. Seawater contact is essential to these sensors for correct operation. Use masking tape to protect the wet/dry sensors when painting.***

Resources

Peel Ply Instructions

Backmount SPOT-F tags are shipped with a sheet of heavy-duty white polyester peel ply. When the peel ply is removed, the tags have a contamination-free, bondable surface that requires no additional preparation.

Attachment instructions
- Immediately prior to attachment, peel off the peel ply fabric
- Apply epoxy to the tag bottom
- Attach tag to the animal

Recommendations
- If your application process includes sterilizing the tag, do so with the peel ply fabric in place
- Do not touch the exposed tag bottom surface with anything other than your epoxy
- Surfaces with peel ply should not be sanded

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Additional Advice

1. Once a SPOT-F is deployed, keep all magnets away from the reset position. Even though it takes two specifically timed swipes of the magnet to change modes, it is still a good idea to keep magnets away just in case.
2. Fine-grade sandpaper can be used to clean wet/dry sensors. Before deploying, ensure the wet/dry sensors are clean and free of any residual epoxy, tape residue or other contaminants. If the wet/dry sensors are covered, it will reduce the SPOT-F ability to determine wet and dry.
3. If traveling on a commercial carrier with your SPOT-F tags:
   - We recommend you place the tags in Stop mode so they are not transmitting.
   - We suggest carrying a copy of your invoice or our product literature identifying the tag as a scientific research instrument.
4. We highly recommend that a laptop with Tag Agent and USB driver installed and a Wildlife Computers USB communications cable are brought to the field location so that communication with the tag is possible onsite if necessary.

Contacting Wildlife Computers

U.S. and International

Members of the Wildlife Computers technical sales and support team are located 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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