Benthic sPAT User Guide

This user guide will give you all the essential information needed for interacting with, and deploying a Wildlife Computers Benthic Survivorship PAT.

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About the Benthic Survivorship PAT (Benthic sPAT)

The Benthic sPAT (also known as a PAT tag or PSAT) is a pop-up archival transmitting tag specifically optimized for short-term survivorship studies on benthic species. Benthic species can remain stationary for days, making it difficult to deduce mortality from our typical data sets—depth, temperature, and light. The Benthic sPAT adds tilt to help measure activity (or inactivity) in order to help determine mortality. The Benthic sPAT monitors the status of the tagged animal for up to 96 days. Examples of species ideal to deploy the Benthic sPAT on include halibut, sole, flounder, turbot, and rays.

Figure 1— Benthic sPAT tag rigged with a stainless-steel heat shrink-covered tether and a Titanium anchor.

The Benthic sPAT is designed to be attached to an animal by a tether. The corrodible burn pin releases the tag from the tether on a pre-programmed interval or date, or when the Benthic sPAT determines it is no longer attached to an animal. Data transmission occurs when the tag floats on the ocean surface after it releases from the tether. These transmitted data will allow you to infer the status of the animal at the time of release.

For each UTC Day, one orientation message is generated that contains two-hour summary periods with the following information:

- Time upright.
- Number of times the tag was knocked down.
- Wet/Dry summary.

In addition, you will get the Argos generated pop-up location.

The Benthic sPAT will transmit for approximately 5-10 days until the tag battery expires. Upon linking your Benthic sPAT Argos Account credentials to the Wildlife Computers Data Portal, tag data will show up in your portal account in near-real time as the data are received.

Before you Begin

The list below shows what is required to communicate with the Benthic sPAT:

- A Wildlife Computers online portal account.
- A Windows computer with Tag Agent Software and USB driver installed.
- A Wildlife Computers USB communications cable.
- A magnet.

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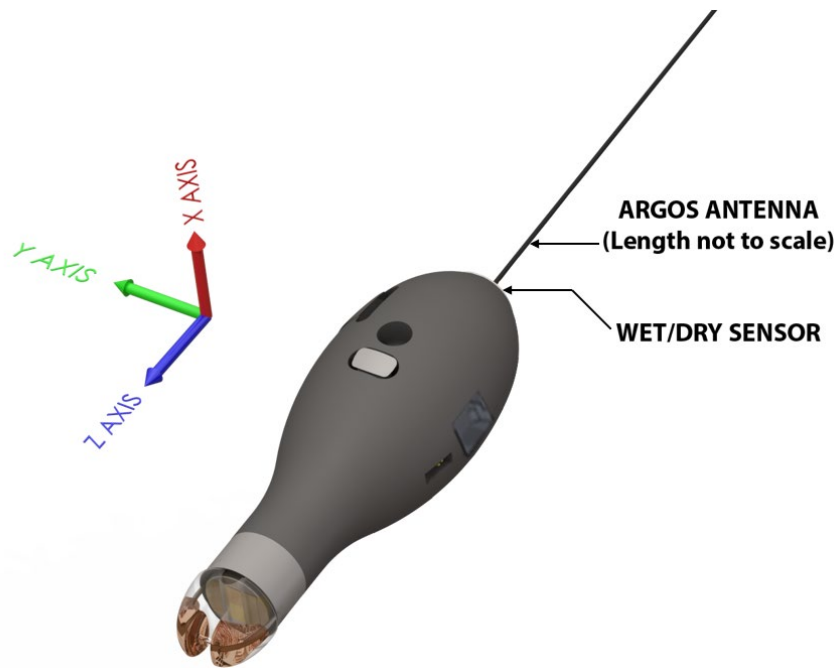
Anatomy of the Benthic sPAT

Figure 2 –Benthic sPAT 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 provided plug. To do this, smear a small amount of the supplied silicone grease onto the sides and bottom of the plug. Align the plug and pins, then carefully push the plug into the port.

- If the plug does not align easily with the pins, rotate it 180° and try again.
- The plug prevents corrosion of the pins during the deployment. The plug is not required for the tag to function normally.

Note that the Wet/Dry sensor, ground plate, and electronic release pin should never be covered.

Covering the Wet/Dry sensor, ground plate, and electronic release pin interferes with the tag's functionality. *This includes anti-fouling coatings, brightly colored paints for recovery purposes, and attachment adhesives (e.g. epoxy).*

Types of Data Received from Benthic sPAT

Orientation Message

For each UTC Day, one orientation message is generated that contains two-hour summary periods with the following information:

1. Time upright
2. Number of times the tag was knocked down
3. Wet/Dry summary

Tag Release

The Benthic sPAT is user-programmable for the users desired deployment duration (up to 96 days). On the user specified time interval or scheduled date, the tag will begin the release sequence, unless a conditional release occurs prior to reaching the intended duration.

Conditional Release

The Benthic sPAT uses We/Dry sensor measurements to make reasonable assumptions about the state of the deployment. The Benthic sPAT will initiate release if the tag Wet/Dry sensors determine the tag is floating at the surface.

Release reasons as reported in the tag's status messages:

1. **Interval**—the tag ran to the configured end of the deployment and the animal survived.
2. **Pin Broke**—the tag sensed the release pin was broken, and the tag found itself floating on the surface for an extended period. Some external force pulled on the tether and broke the pin.
3. **Floater**—the tag was dry for the majority of specified conditional release interval. For some reason (mortality or attachment failure) the tag has come off the animal and is floating at the surface.

Pinger

The pinger function is designed to aid in tag recovery. In addition to the Argos transmissions (sent every 60 seconds), the Benthic sPAT sends out low power "pings" after release while at the surface. The Benthic sPAT will ping at a one second interval for the duration of the Argos transmission period (approximately three days after release). During the Argos transmission period, tags can be located with an appropriate receiver and directional antenna. When the transmission period ends, the pinger function will cease.

Interacting with a Tag

Tag Agent Software is used to communicate with the Benthic sPAT. Tag Agent and the USB Driver can be downloaded from our website: wildlifecomputers.com .

Plug the USB communications cable into the computer and connect to a tag carefully observing the orientation of the connector pins to the communications port on the tag. The Tag Agent connection screen will display with Tag Status as Interactive in the lower left (Figure 3) when a proper USB and tag connection is made. If tag status remains Disconnected, swipe the magnet supplied near the communication port on the tag to view the tag in interactive mode.

Figure 3—Tag Agent software connection screen.

If the tag is new or was previously programmed by another user, a pop-up box will appear asking if you wish to take ownership of the tag. By accepting ownership, you will become a "Tag Administrator" and have the authority to select and save new tag settings to your tag.

If tag settings have been updated through Tag Portal, a pop-up box will appear upon opening Tag Agent advising that changes were made, and the tag's settings need to be updated.

When the tag is connected to Tag Agent, the home screen will appear (Figure 4). The sensor values displayed on the home screen are continuously updated from the tag.
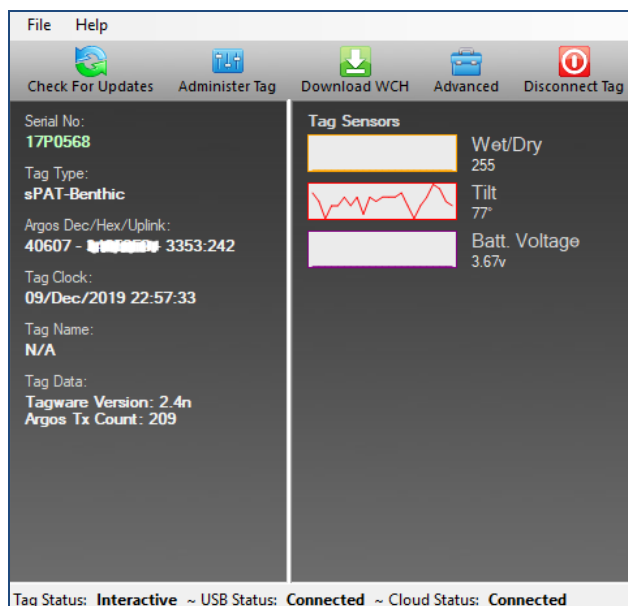
Figure 4—Tag Agent home screen with sensor values displayed.

In the grey menu at the top of the home screen;

- *Administer Tag* button allows you to modify the settings of the connected tag.
- *Download WCH* button shows a summary of data on the tag and gives you the option to download the archive and set-up info onto your local machine.
- *Advanced* button allows you to test the tag and gather tag information.
- *Disconnect Tag* button allow you to choose which state or mode to disconnect the tag.

Configuring the Benthic sPAT With Tag Agent

To configure the Benthic sPAT within Tag Agent, select the "Administer Tag" button in the upper grey menu on the screen.
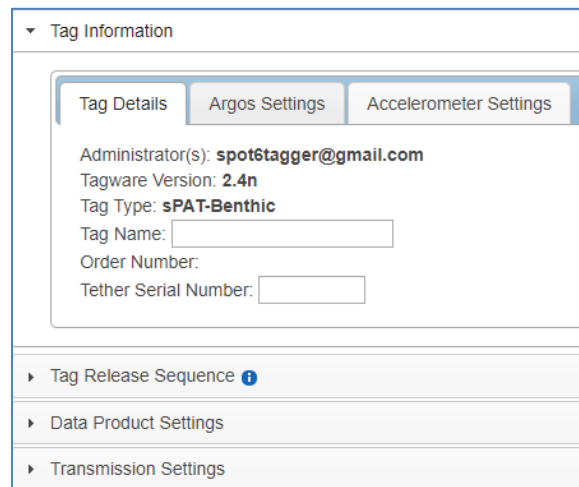

Figure 5—Tag Agent menu bar. Select "Administer Tag" to edit tag release settings.

A new window will open to reveal four sections —Tag Information, Tag Release Sequence, Data Product Settings, and Transmission Settings.

Tag Information

Tag information includes individual tag details & Argos settings (Figure 6). Tag administrators, tagware version, and tag type are displayed on the Tag Details tab. Tag Name is an optional field designed to make a tag easier to find in the Tag Portal when applying the filter feature. The Argos Settings tab displays the tag PTT ID details.

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For more information on these terms, reference the [Glossary of Terms](#) section at the end of this document.

Figure 6—Expanded view of Tag Details tab.

Tag Release Sequence

Tag release sequence settings define when the tag will activate its release mechanism. Either an interval release or scheduled date release can be set. The release will begin at 20:00 UTC after the number of days specified, or on the chosen date (Figure 7).

The tag automatically sets its archival sample interval based on the deployment length specified in this tab.

Conditional Release

The Benthic sPAT uses Wet/Dry sensor measurements to make reasonable assumptions about the state of the deployment. Depending on your study design and the behavior of your study animal, you can program the tag to release and transmit earlier than the interval or scheduled date release, so long as certain conditions are met.

Auto-Detect Tag Detachment

This parameter automatically initiates release if the tag detects itself floating at the surface.

- Select how long the tag must be at the surface before a release will occur. The pin burn will occur after the specified time has elapsed, not at 20:00 UTC like the scheduled release.

Figure 7—Tag release settings.

The release settings shown in Figure 7 will result in the following:
- The tag will release 60 days after deployment.
- The tag will release if it is floating at the surface for 48 hours.

⚠️ ***Note: Auto-Detect Mortality (a feature for MiniPAT and sPAT tags) is not available on the Benthic sPAT because there is no depth sensor.***

Data Product Settings

Orientation Data Product

These settings define the Orientation Data Product. To enable the Orientation data product, the Tag Release Sequence must be set for a deployment of 96 days or less.

Knockdown

The knockdown detector identifies changes in tag orientation. Select the threshold that qualifies a change in acceleration as a knockdown event. To calculate the change in angle from the vertical (θ) that will result in a knockdown, $\theta = \cos^{-1}(1-'k')$, where 'k' is the knockdown value. Keep in mind that a change in acceleration does not equate to the same change in tilt over the full range of motion. For example, a tag tilting from 0 degrees to 30 degrees or 60 degrees to 68 degrees will both result in a change in acceleration of 0.13g.

Upright

To determine the amount of time a tag spends upright versus tilted, a threshold definition of upright is needed. A measurement of acceleration on the x-axis of the tag that is considered upright. This assumes the tag has no other accelerations acting on it. When the sensor reads -1g on the z-axis, the tag is perfectly upright. To calculate the tilt angle (θ), $\theta = \cos^{-1}(u)$, where 'u' is the upright value.

The default settings for Knockdown are 0.5g and Upright -0.5g. This could vary depending on the behavior of the animal you are tagging. Contact Wildlife Computers if you need assistance.

Once settings have been chosen, use the blue Send Changes button (or Propose Changes button if working in Tag Portal) to load settings into tag. Tag Agent will confirm receipt of settings via dialog box. The Check for Updates tab on the top left menu bar of Tag Agent home screen can be used at any time to see if settings updates are available.

Transmission Settings

Displayed in this tab is the 60 second Argos transmission interval the tag will attempt post-release. This value is unchangeable to the user.
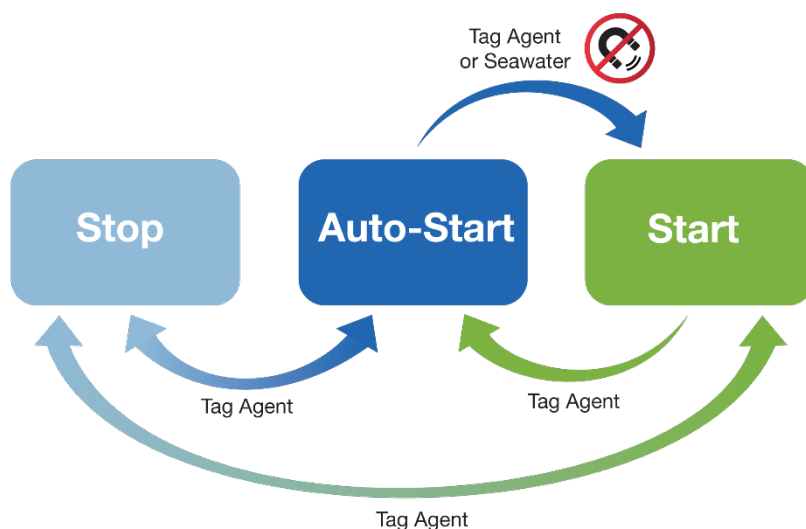
Disconnect from the Benthic sPAT

Tag States: Start, Auto-Start, and Stop

Use the "Disconnect Tag" button on the top right menu bar (Figure 5) to disconnect from a tag. **Do not simply unplug the USB communications cable.**

The Benthic sPAT has three states: Auto-Start, Start, and Stop. Wildlife Computers ships Benthic sPATs in Auto-Start.

1. *Auto-Start mode* allows the tag to Start or activate by sea water submersion.
2. *Start mode* activates the tag. In Start mode, data collection is running and the tag begins monitoring for its set release condition.
3. *Stop mode* is the equivalent of shutdown and is used for storage of tags for periods longer than a month. In this mode the tag will remain unresponsive unless connected to Tag Agent.

Prior to a deployment the communications 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 easily align with the pins, rotate the plug 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.

⚠️ ***Tags in Stop mode need to be connected to Tag Agent through the USB cable to awaken the tag.***

LED Blink Patterns

Within Tag Agent, the "Disconnect Tag" button on the top right menu bar can be used to put a tag in any state. Wildlife Computers ships the Benthic sPAT in Auto-Start mode.

At any time, users can verify the tag state by making a single pass of a magnet near the communications port. When the LED gradually transitions from bright to dim, this is confirmation that the tag is in Auto-Start mode.

Once disconnected in Auto-Start:

- If the tag gets wet for approximately 10 seconds, the tag will "deploy" – this is visible by the LED blinking ten times. The archive will erase, and the deployment will begin.
    - o Within the first hour of deployment you can reset the tag state and toggle the tag back into Auto-Start mode by swiping it with a magnet. If done successfully, you will see the LED come on and gradually transition from bright to dim.
    - o After one hour of a deployment, the reset switch is disabled, and a magnet no longer has the ability to toggle the tag state. If this happens, the tag must be connected to Tag Agent using a USB Cable and reset.
- If the tag gets wet, but not long enough to enter "deploy" mode as above, the LED will gradually transition from bright to dim to show the tag state remains in Auto-Start mode.

Auto-Start Light Pattern

Start Light Pattern

Clearing the Benthic sPAT Archive

The archive is cleared automatically when a new deployment is started. The LED will indicate that the tag is clearing the archive with many rapid blinks. Leave the tag connected until Tag Agent indicates that the archive is erased. This may take several minutes.

⚠️ ***Disconnecting the tag in Start or Auto-Start will erase the archive. If a tag is recovered, be sure to download the data prior to putting it back in Auto-Start or Start mode.***

Gathering Benthic sPAT Tag Information

Checking Sensor Readings & Transmission Test

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:

- Wet/dry—connecting a wire from the large rectangular ground plate strap above the communication port to the metal ring around the base of the antenna should change the value from over 200 to less than 20.
- Tilt – rotating the tag should change the value from 0 degrees (antenna straight up) to 180 degrees (antenna straight down).

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.
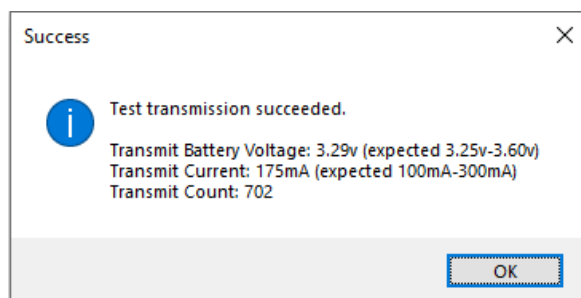

Figure 8—Test transmission results.

The Transmit 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.

The Transmit Current will vary depending on the presence of conductive objects near the tag. It has been optimized for a tag that is floating in seawater.

Transmit Count is the number of transmissions the tag has made since it was manufactured.

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. Pop-up tags do not need to be initialized. After completing the test, **the tag will be in STOP mode, and you will need to communicate with it again prior to deployment.** Click on the Advanced Tab then Argos Transmitter Test.
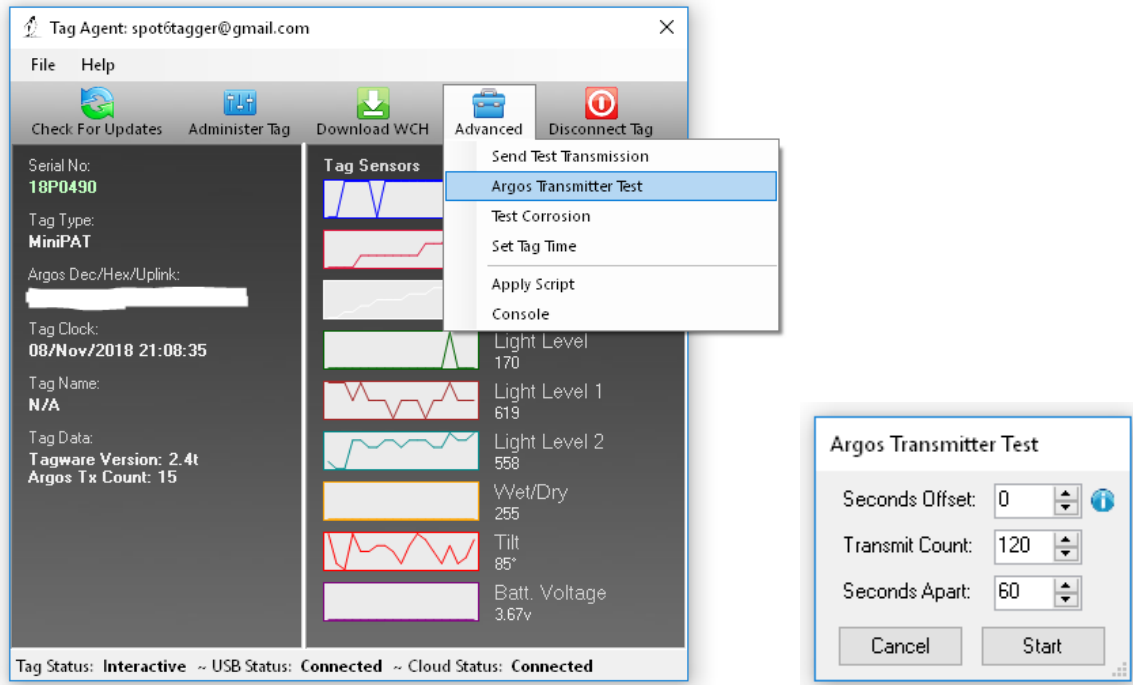

Figure 9—Argos transmitter test.

- 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.

When all the tags are set up and deployed, take them outside where they have a full view of the sky. For the best results, float the Benthic sPATs in a bucket of saltwater.
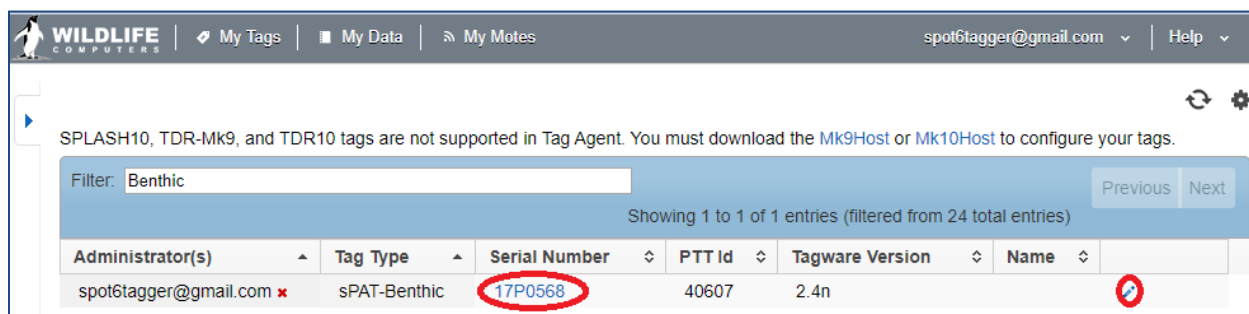
⚠️ *Upon completion of the Argos Transmitter Test, the tag will be in STOP mode, and you will need to communicate with it again prior to deploying it. When the test is complete, verify that the LED light is not on. If the LED light is on, you MUST communicate with the tag using Tag Agent and manually place the tag in Auto-Start or Stop mode.*

Configuring Benthic sPAT Remotely and Offline Using Tag Portal and Tag Agent

Using Tag Portal to Remotely Change Tag Settings

Tag Portal is the cloud-based service offered by Wildlife Computers to remotely select and make changes to your tag settings via the cloud. In Tag Portal, tag configuration can be done without physically connecting to tag. This enables project coordinators to review and select settings for their associates while tags are in transit before arrival.

When logged into your Portal account, a list of the tags you can administer can be viewed under the My Tags tab. To view the current tag settings, click on the serial number of the tag you wish to configure or use the pencil icon (on the far right of the row).

Figure 10—List of tags within Tag Portal. To program select the serial number or pencil icon.

Selecting the serial number opens a new window with setting selections. The same programming options are available whether settings are configured via Tag Portal or from within Tag Agent.

When you are satisfied with your selected settings in Tag Portal, click the blue Propose Changes button. This will save the settings in the cloud.

- The next time that tag communicates with Tag Agent (regardless of who physically connects to the tag), a dialog box will appear notifying 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 published, when they were selected, and which administrator chose the settings.

Tag Portal maintains a historic 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.

Using Tag Agent in Offline Mode

Before you can program offline, you must download Tag Agent software and communicate with a tag while connected to the Internet. You can simulate offline mode by disabling your Internet connection.

What you need before you begin:
- A Windows-based computer with Tag Agent software and USB driver installed. Download both at http://www.WildlifeComputers.com.
- A Wildlife Computers Portal account. Create your free Portal account at https://my.wildlifecomputers.com.
- A USB communications cable.
- A Magnet.
- One of every tag type (i.e., SPOT, SPOT-F, MiniPAT) you are taking in the field.

Connect to each tag type while you have Internet connection:
1. Open Tag Agent and use the USB cable to connect a tag to your computer.
2. Swipe a magnet near the communication port to establish connection. The tag LED will turn on and the Tag Agent home screen will appear.
3. Use the "Administer Tag" button to familiarize yourself with the tag setting options.
4. Use the "Disconnect Tag" button to select the tag state before unplugging.

⚠️ ***If you are headed into the field with multiple tag types (i.e., SPOT, SPOT-F, MiniPAT, etc.) be sure to communicate with one of each tag model while you have an Internet connection.***

So long as you have taken the above steps, working offline is identical to working online. The difference is that the Internet status will display *Disconnected* in the lower left corner of Tag Agent connection screen.
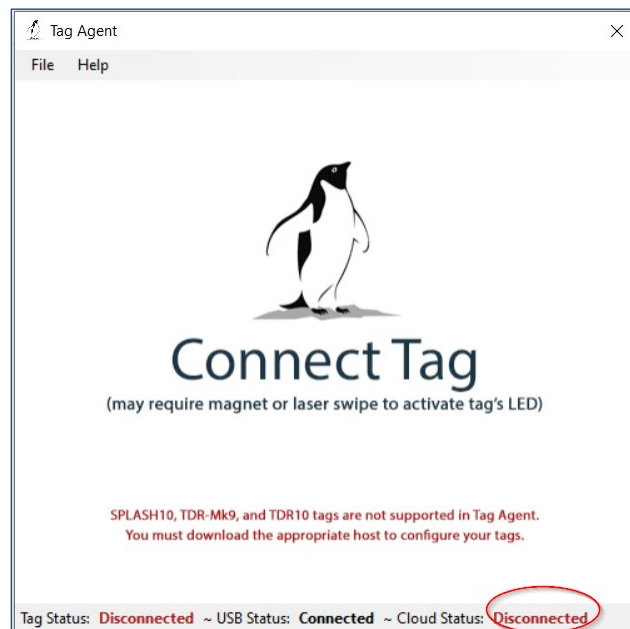

Figure 11—Internet status.

⚠️ ***If the Internet connection is unreliable, it is best to disable the connection entirely. A partial connection can prohibit settings from loading properly.***

To Program Tags Offline

- Open Tag Agent and use the USB communications cable to plug a tag into your computer.
- Swipe a magnet near the communication port to establish a connection.
- If the tag's internal clock needs adjusting, select "Yes" to the pop-up box that appears, as well as the Date/Time Picker (Figure 11 —sometimes the Picker hides in the upper left corner of the screen).
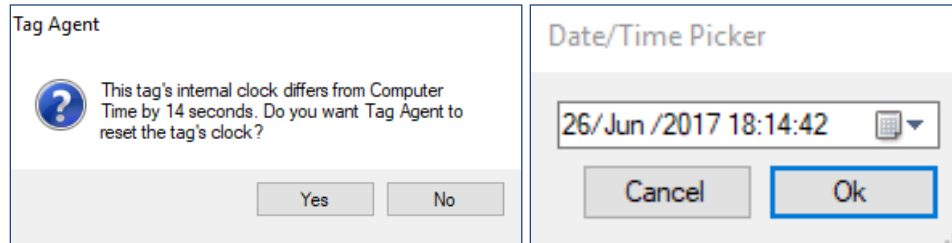

Figure 12—Pop-up boxes for Date/Time Picker.

- Click the "Administer Tag" button and make the required changes to the tag settings.
- Click "Send Changes" to push settings into the tag. A pop-up box will confirm the new settings were applied. Click "Ok."
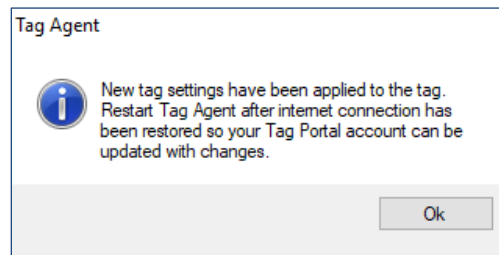

Figure 13—Pop-up confirming new settings.

- Use the "Disconnect Tag" button to select the tag state before unplugging.
- Restart Tag Agent when the Internet connection is restored so a record of the selected tag settings will be saved.

Creating Local Templates

You can program a group of tags with the same settings using a local template. Click the "Administer Tag" button and use the Template Manager ≡ icon in the upper right corner of the screen to create and apply templates.

⚠️ ***The Send Changes button must be selected after a template is applied to push settings into a tag.***

Benthic sPAT Recovery Instructions

If the Benthic sPAT is recovered after deployment, it is possible that contamination of the communications port may cause some communication difficulties. The following instructions, in addition to describing how to recover the data, explain likely problems that might occur during the recovery and how to fix them. Even if all attempts to communicate with the Benthic sPAT fails, your deployment data are probably still in memory, and can be retrieved by Wildlife Computers.

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Preparation for Post-deployment Communication

When you recover your Benthic sPAT and before you attempt to connect the tag to the USB communications cable there are several steps to perform. As a precaution, it is advised to have the following on hand:

- Compressed air in a can.
- Electronic contact cleaner, if available.

1. Thoroughly dry the Benthic sPAT with a paper towel.
2. Remove the rubber communications port protection plug.
3. Blow out any water in the communication port. Make sure the port is clean and dry. Compressed air in a can works well for this. ***Note: Communicating with a Benthic sPAT which has saltwater in the communications port will cause the pins to corrode very fast!***
4. Count the number of pins in the communications port. If there are fewer than four pins, one or more have corroded or broken off. Stop there and send the Benthic sPAT to Wildlife Computers, and we will download your data.
5. Examine the pins in the communications port. If they are rusty or corroded, send the Benthic sPAT back to Wildlife Computers for downloading.
6. If all four pins are clean and golden in color, you can continue to attempt tag communication.
7. You may wish to spray some contact cleaner into the communications port as a precaution.

If you establish a communication connection with the tag, you are now ready to download your data with Tag Agent.

Download your Data

Use the "Download WCH" button on the Tag Agent top menu bar to download Benthic SPAT archival data (Figure 11). You will be prompted to save the .wch file to your computer. The file can then be uploaded into the Data Portal for decoding, analysis, and storage.
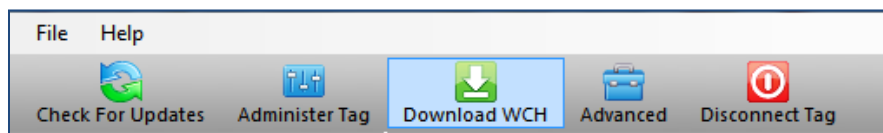

Figure 14—Tag Agent menu bar. Select "Download WCH" to download archived data.

The archive will contain the following data:

- Z-axis acceleration (g)
- Wet/Dry
- Upright (Aux channel)

Disconnect the tag in Stop mode after downloading the data.

Tag Storage and Battery Maintenance

Proper tag storage and battery maintenance are important to minimize passivation, maintain optimal battery voltage, and prepare the tags for deployment.

As a standard, Benthic sPAT tags ship in "Auto-Start" mode for immediate deployment, unless otherwise specified. When stored correctly, tags may experience battery life loss of one to two percent for every year of non-use.

Benthic sPAT Storage—Less Than One Month

If your deployment date will be less than one month, simply 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.
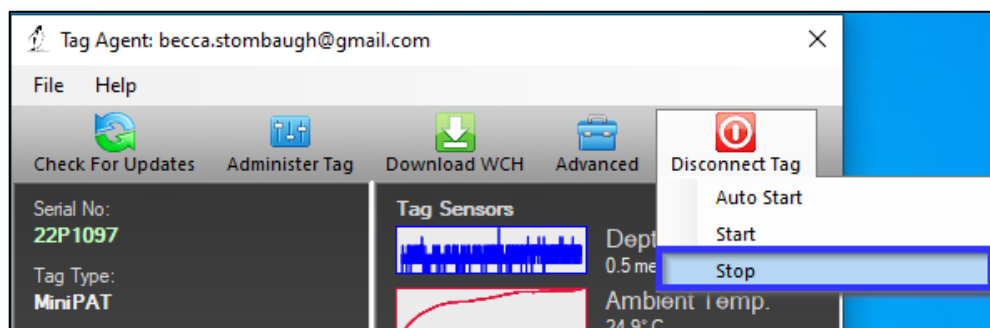
Benthic sPAT Storage—Longer Than One Month

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 15—Example of how to put tag in Stop mode in Tag Agent.

Special Considerations for Longer-term Storage

Benthic sPAT tags can be stored longer than a month, but particular care must be taken to avoid battery passivation. Battery passivation may cause low voltage readings and in extreme cases may compromise the battery. For this reason, batteries must be exercised.

Exercising Tags with Tagware Version 2.5b and Greater

If your tags are running tagware version 2.5b (or greater), ***connect to each tag at least three months prior to deployment*** and send Test Transmissions in Tag Agent to confirm the Transmit Voltage is 3.25V or higher.

Confirm your tag's tagware version on the main Tag Agent screen.

Figure 16—Location of Tagware version on Tag Agent main screen.

⚠️ ***If your tags have a tagware version that precedes 2.5b (for example, 2.4z), return these tags for a free tagware upgrade. Please contact your Technical Sales Consultant (tags@wildlifecomputers.com) to coordinate the return.***

Exercising Tags with Tagware Versions Prior to 2.5b

If your tags have a tagware version that precedes 2.5b (e.g., 2.4z), **connect to each tag monthly** and exercise the batteries by sending Test Transmissions in Tag Agent.

Sending Test Transmissions
Tips to Optimize Sending Test Transmissions

To optimize this 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 lay the tag flat or have the tag antenna touch anything.**

Pop-up tags transmit when they reach the water's surface. While floating, the ground pad remains under water. For this reason, a good angle and height orientation for the Sending Test Transmissions is shown below.

Figure 17—Optimal orientation of pop-up tag for Test Transmission.

Connect to each Benthic sPAT 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 18—Example of Send Test Transmission.

The test transmission voltage should read 3.25V or higher and the battery voltage displayed on the main sensor screen should be around 3.5V. 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.
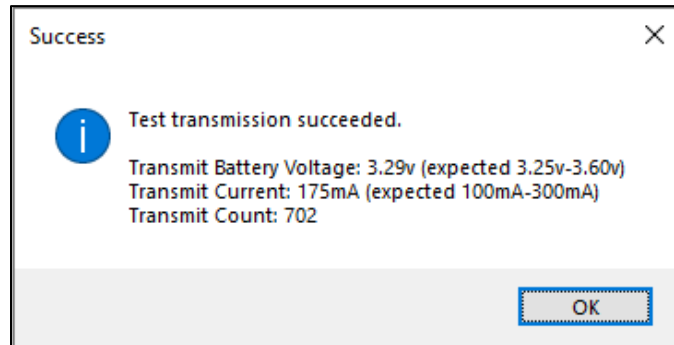

Figure 19—Example of acceptable transmit battery voltage and acceptable transmit current.
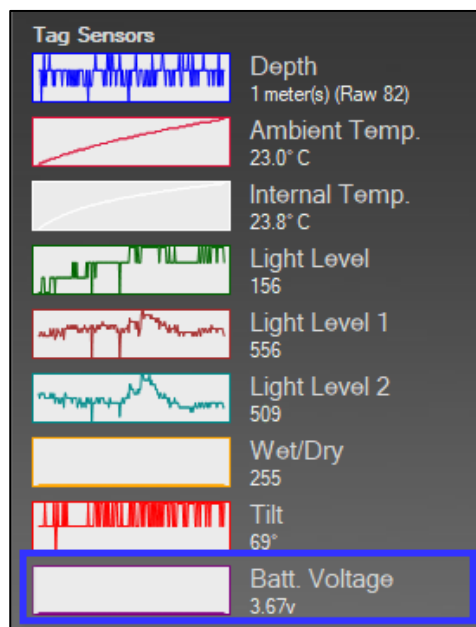

Figure 20—Example of acceptable battery voltage and normal readings for all sensors on the main screen of Tag Agent.
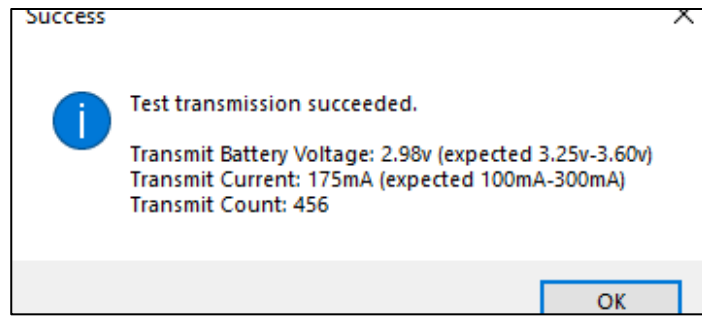
Figure 21— Example of low transmit battery voltage and acceptable transmit current.

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

If a tag shows a low voltage reading after sending a Test Transmission, run the Battery Exercise Routine in Tag Agent.

Tips to Optimize the Battery Exercise Routine

To optimize this test, consider the following:

- **Antenna angle should point UP, either held in your hand or supported in a non-metallic cup or drinking glass. It is ok if the tag touches the side of the cup.** The angle of the antenna should mimic how the tag will orient while transmitting in the field.
- **Never lay the tag flat or have the tag antenna touch anything.**

To start the test, under the Advanced tab, select "Battery Exercise Routine."
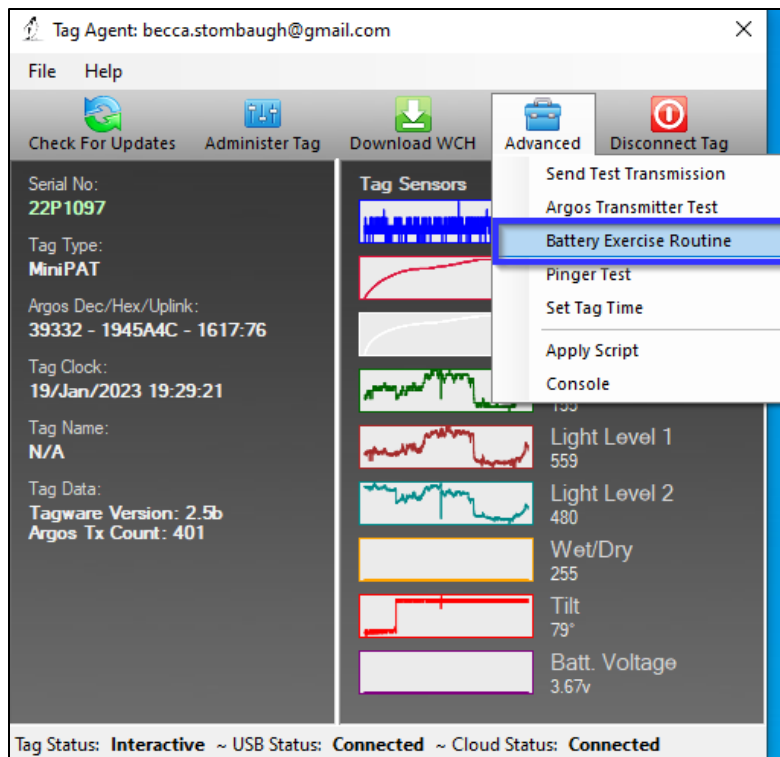
Figure 22— Battery Exercise Routine location in Tag Agent.
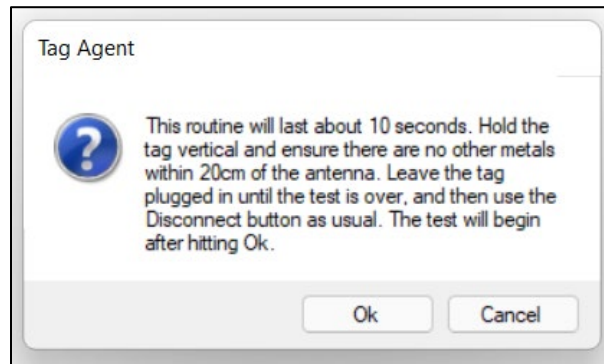
The following box will appear:

Figure 23— Battery Exercise Routine prompt.

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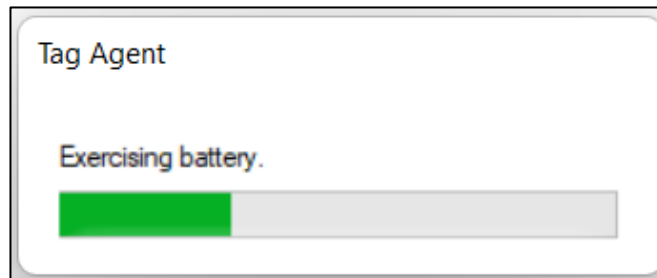- To exit test, click "Cancel."

Figure 24— 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.*
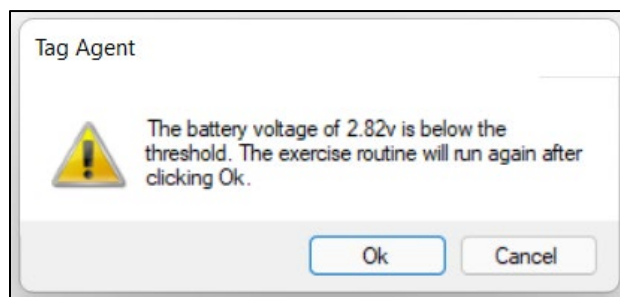

Figure 25— Low voltage output. Prompt to rerun test.

If the battery voltage is still below the threshold after ten runs of the test, contact your Technical Sales Consultant (tags@wildlifecomputers.com).
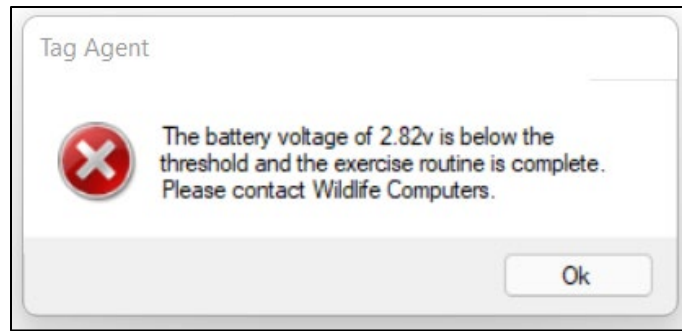
Figure 26— Low voltage output. Prompt to contact Wildlife Computers.

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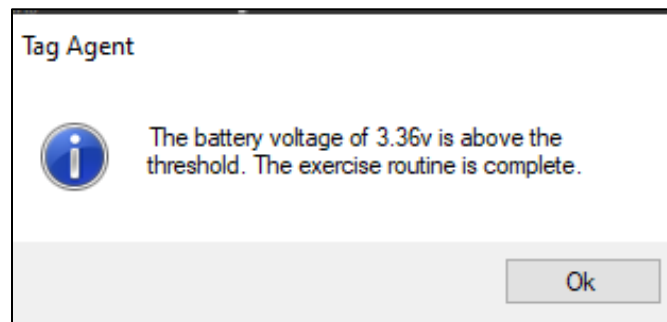

Figure 27— Acceptable voltage output prompt.

When you see this prompt, the tag is ready for storage or deployment.

The outcome of each test gets saved to the TagLog for each tag within the Tag Portal. Depending on which test is performed—Test Transmission or Battery Exercise Routine—the name of the test will appear in the column.

Figure 28— Tag Portal TagLog view of Test Transmission and Battery Exercise Routine test results.

In the above example, "169 BV" is a representation of the transmission voltage. **To convert to voltage, divide by 51. In this case 169 BV / 51 = 3.31 v**.

Technical Specifications

Dimensions	118 mm (length) X 38 mm (diameter)
Weight in Air	60 g
Pressure Rating	2000 m
Memory	64 MB
Operating Frequency	401.678 MHz
Maximum Deployment Length	Up to 96 days
Sensors	Wet/Dry, Acceleration
Accelerometer Range	± 2 g
Accelerometer Resolution	4 mg
Accelerometer Accuracy	± 0.15 g
Conductivity Operational Limits	0.1 to 5 S/m
Optimal Storage Temperature Range (°C)	0° C to 5° C
Communication	Via USB port using Wildlife Computers USB communications cable

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: www.argos-system.org.
- Argos uplink—a radio transmission intended for the Argos satellite system.
- 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.
- Pinger—a UHF radio tracking beacon.

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- Repetition Interval (repetition rate) —how often a tag will test for dry conditions and try to transmit. Set at 60 seconds for Benthic sPATs, this value is assigned by CLS (Argos) and set by Wildlife Computers.
- Start/Auto-Start/Stop—the different tag states. When in Start mode, the tag 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 version running on a tag.
- Tag Portal—the cloud-based service offered by Wildlife Computers for remote tag setup. A historic record of tag settings and templates are maintained within the Tag Portal.
- USB Communications Cable—the Wildlife Computers communication cable required by Tag Agent.
- Wet and Dry—the state of the tag as determined by the We/Dry sensor which measures conductivity.

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. Benthic sPAT pop-up tags will float with one coat of primer and two coats of Micron CSC. Micron Extra SPC is heavier, restricting the application on Benthic sPAT tags to one coat of primer and one coat of Micron Extra SPC paint. Once antifouling paints and tethers are applied, Wildlife Computers recommends performing a float test.

⚠️ ***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/
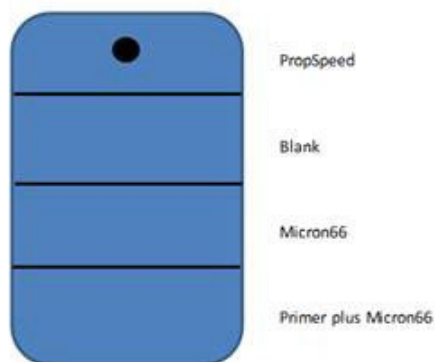
Antifouling Tests

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.

Mailing and Shipping

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Redmond, WA 98052 USA

Email

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Technical Support: support@wildlifecomputers.com

Phone

+1 (425) 881 3048

Website

WildlifeComputers.com

For Asian Clients

While we welcome your direct correspondence, we recommend that you contact our colleague, Mr. 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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