ANIMAL-BORNE VIDEO & ACOUSTIC LOGGER

LoggLaw CAM

Underwater video logger / animal-borne camera

A logger that records underwater behaviour in video and sound from the animal's own point of view. Depth, temperature, acceleration and geomagnetism are recorded on the same time base, and everything is read out once the animal is recovered. Two bodies, with hydrophone, sensor and battery-extension options added as the study requires.

From footage recorded by a LoggLaw CAM carried by a sea turtle: an encounter with another individual (Full HD 1920 × 1080, 30 fps). One frame, reproduced whole: neither cropped nor retouched.

> Every underwater image in this catalog is a frame **recorded by a LoggLaw CAM in the field**. None of it is stock photography. What you see is what stays on the card once you recover the animal.

01 Overview

One deployment, start to finish

A LoggLaw CAM deployment ends when you recover the animal and read the records out. Nothing is transmitted, so the only data you get is from the animals you get back. Settle how recovery will work before you settle the configuration.

One deployment, step by step

From setup to readout

How long it records depends on configuration and settings (see 05)

Set up
Connect over USB-C and write the recording schedule and sensor intervals

→

Attach
Fix the logger with a mount built for that attachment surface

→

Record
Video, underwater sound and sensor values on one time base

→

Recover
Recapture the animal and remove the logger. Nothing is sent by radio

→

Read out
Video and sensor values both read out over the USB-C port under the cap

Applications

- Foraging behaviour: what is taken, and how
- The habitat and seafloor an animal passes through
- Encounters with conspecifics and other species
- Vocalizations set against behaviour (hydrophone configuration)
- Depth and acceleration traces matched to the footage
- Checking attachment methods and the effect of the device

Fit

Where LoggLaw CAM fits

- You need to see the behaviour. Sensor traces alone leave the event ambiguous
- You expect to recapture the animal
- A few hours covers what you are after, or depth and acceleration can select the moment → **triggered recording**
- You want underwater sound on the same time base as the video → **hydrophone**

Where another instrument fits better

- You need weeks or months of behaviour, and sensors alone will do → **LoggLaw C series**
- You are watching one place rather than following one animal → **LoggLaw NAD-W**
- Recovery is unlikely. CAM sends nothing by radio, so a logger not recovered leaves no data

※ The battery, not memory, sets the length of the video. Cards up to 1 TB are supported, so capacity never runs out first; the design question is which part of the deployment the recording time is spent on (see 05).

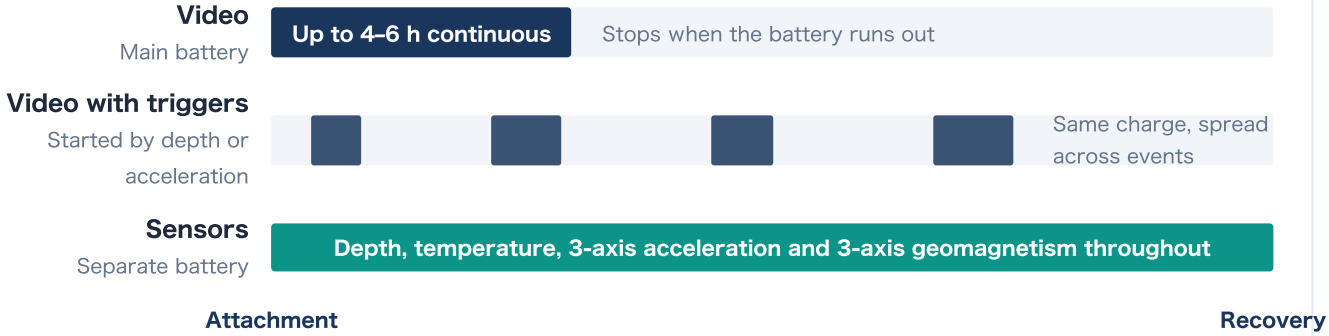
02 What the video and sensors cover

Video stops first, sensors carry on

LoggLaw CAM transmits nothing. A survey is complete only when you recover the animal and read the records out. Video and sensors record for different lengths of time, so establish that span before planning attachment and recovery.

How the time between attachment and recovery is spent

Schematic | actual durations vary with configuration and settings



※ Video and sensors run on separate batteries. Once the video battery is exhausted, depth, temperature, acceleration and geomagnetism keep recording. Video captures part of the behaviour; what came before and after it stays in the sensor record.

VGA 640 × 480, 30 fps
Carried by a whale shark. The 4–6 hours above is this setting.

Full HD 1920 × 1080, 30 fps
Carried by a sea turtle, as on the cover. More pixels, fewer hours.

Ambient light only
Carried by a king penguin, early in the descent.

Red LED lit (CAM basic)
Deeper in the same dive. Prey stays visible without daylight.

03 Choosing a configuration

Body & options

Start from one of two bodies, then add sensors, a hydrophone and battery extension as the study requires. Every option tells on weight and bulk, so the limit is what the target animal can carry.

CAM mini

When weight matters most: smaller animals

Dimensions	30 × 32 × 58 mm
Weight in air	98 g
Continuous recording	Up to 4 hours *1
Red LED	None

31 g lighter than basic, and smaller in width and height. Recording in low light depends on ambient light.

CAM basic

When recording time and low light matter most

Dimensions	38 × 38 × 58 mm
Weight in air	129 g
Continuous recording	Up to 6 hours *1
Red LED	Yes (660 nm)

The high-luminance red LED can switch on automatically according to ambient light. Its 660 nm wavelength limits the effect on the animal. Lighting it shortens recording time (see 05).

Option	What it records	What it changes
Sensors -S	Depth (pressure), temperature, 3-axis acceleration and 3-axis geomagnetism, on the same time base as the video.	Runs on its own battery, so recording continues after the video stops. Sampling settings: see 06
Hydrophone -A	Underwater sound at 96 kHz, 100 Hz–48 kHz, mono or stereo.	Driven by the same clock as the video, so sound and image stay aligned. Mounted outside the body on a lead
Battery extension -EX	Extends recording time itself. What is recorded does not change.	External, so overall size and weight increase. Plan it together with the attachment. Capacity built to order

The body with the waterproof cap removed.

An example with two hydrophones and a mount. Mounts are built for the attachment surface.

An example with battery extension and a hydrophone.

*1: Estimated for continuous recording at VGA, 30 fps. Higher resolutions and frame rates shorten it.

04 Attaching the logger

Attachment & recovery

Whether the logger can be carried depends on how much of the attachment surface it occupies. The outlines below are actual size. Print this page on A4 at 100% and hold it against the attachment surface to judge for yourself.

Outline dimensions (actual size)

True to life when printed on A4 at 100%

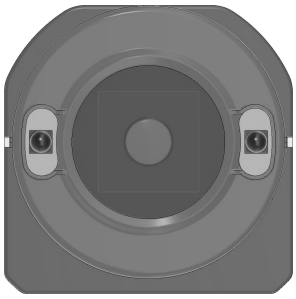
Side (waterproof cap fitted)

CAM mini
30 × 32 × 71 mm (body 58 mm + cap 13 mm)

CAM basic
38 × 38 × 71 mm (body 58 mm + cap 13 mm)

Front (lens side)

CAM mini
30 × 32 mm / 98 g



CAM basic
38 × 38 mm / 129 g

Each outline is the maximum envelope with the waterproof cap fitted, and excludes mounts, hydrophones and other options. Read the footprint on the attachment surface off the front view, and the length off the side view.
The waterproof cap fits the end opposite the lens. At ø23.6 mm and 13 mm long it is narrower than either body, so fitting it adds length only: the cross-section stays 30 × 32 mm on mini and 38 × 38 mm on basic. Under the cap sits the USB-C port used for setup and readout (see 07).

The operating envelope is **500 m** maximum depth and **-10 ° C to 40 ° C**. Nothing is transmitted by radio, so the logger suits studies where recovering the animal is realistic.

Decisions in the attachment design

- Whether a **mount** can be built for the attachment surface
- Whether **flotation** is needed, and if so how much and where
- **Recovery method**, built around recapture of the animal
- **Total weight** once options are added, and the margin left on the attachment surface

05 Designing the recording window

Bounded by the battery, not memory

Recording time is bounded by the battery, not by memory. The card holds up to 1 TB, so storage never runs out first. Which moments those hours are spent on is therefore the central setting.

Resolution	Frame rate	CAM mini	CAM basic
VGA 640 × 480	30 fps	**4.1 hours**	**6.7 hours**
VGA 640 × 480	60 fps	2.8 hours	4.3 hours
HD 1280 × 720	30 / 60 fps	Not yet measured. Please ask us	
Full HD 1920 × 1080	30 fps	2.4 – 2.8 hours	4.4 hours

Measured in June 2023 on units fitted with sensors, one measurement per condition. Figures vary with water temperature, settings and battery condition. The “up to 4 hours / up to 6 hours” in the specifications is the VGA 30 fps result, rounded down. Lighting the red LED shortens it: on CAM basic at Full HD 30 fps, 4.4 hours became 2.4 hours.

01

Triggered recording

Depth or acceleration thresholds start and stop recording automatically, so the camera runs only during dives, or only when movement rises above a threshold.

Redistributes the same charge onto the moments you want

02

Schedule and duty cycle

Start and end times are set in the configuration software, and the camera can also run on a duty cycle that repeats on and off at a fixed interval.

Useful when the hours of interest are known in advance

03

Battery extension

An external battery extends recording time itself. Capacity is built to order.

64 hours of continuous recording confirmed at Full HD, 30 fps

※ The sensors (depth, temperature, acceleration, geomagnetism) run on a separate battery and keep recording after the video stops, which lets you cover the behaviour on either side of the footage.

Section 02 places records at VGA and at Full HD side by side.

06 Data recorded alongside the video

Synchronized sensors

Footage does not show how deep a moment occurred, or how much the animal was moving. The sensors and hydrophone record on the same time base as the video, so you can corroborate what it shows with numbers.

Hydrophone — 96 kHz

Underwater sound recorded on the same clock as the video. 100 Hz–48 kHz, mono or stereo. Vocalisations, feeding sounds and ambient noise can be matched to the image.

Depth (pressure) — 0.5 / 1 Hz

Range 0–600 m, accuracy ±1%, resolution better than 1 cm. Video segments can be laid over the dive profile.

3-axis acceleration — 4 / 8 / 16 / 32 / 64 Hz

Range ±8 g, sensitivity 4 mg/LSB. Captures stroke cycles and brief movements the camera misses, and can also trigger recording.

3-axis geomagnetism — 0.5 / 1 Hz

Range ±1200 µT. Combined with acceleration, it supports estimates of camera heading and body attitude.

Sensor specifications

Item	Depth	Temperature	Acceleration	Geomagnetism	Hydrophone
Range	0–600 m	-5 °C to 35 °C	±8 g	±1200 µT	100 Hz – 48 kHz
Accuracy	±1 %	±0.2 °C	—	—	—
Resolution / sensitivity	< 1 cm	< 0.05 °C	4 mg/LSB	—	—
Sampling	0.5 / 1 Hz	0.5 / 1 Hz	4 / 8 / 16 / 32 / 64 Hz	0.5 / 1 Hz	96 kHz
Input	—	—	—	—	Mono / stereo

Sensors are optional. The depth sensor measures to 600 m, while the housing is rated to 500 m maximum depth.

Read on one time base

Video, underwater sound and sensor values share one internal clock, so sound and image do not drift apart.

After recovery you read both out and match each moment of footage to depth, acceleration and sound (see 07): when a behaviour happened, at what depth, and amid how much movement.

From a record with a hydrophone

This video file carries 96 kHz mono underwater sound on the same time base

07 Setup and data delivery

What you configure, what you get back

Both configuration and readout are done from a PC over the USB-C port under the waterproof cap. Video is recorded to the SD card and sensor values to the body, and both read out through the same port.

LoggLawSurfCam software

Platform	Windows, with Japanese and English interfaces
Connection	USB-C from a PC with the cap removed. Recording stops when the connection is detected
What you set	Recording start and stop schedule; duty cycle; depth and acceleration triggers; red-LED threshold; per-sensor recording interval; mono or stereo input
Readout	Downloads the sensor record from the body and converts it to CSV, either one file per sensor or a single combined file

What you have after recovery

Record	Format	Contents
Video	**QuickTime (.MOV) / H.264**	Recorded to the internal SD card and read out over USB-C. File names carry the start and end time, and recording is split at a set interval (e.g. 0001_2023-09-28-01h00m00~01h09m00.MOV)
Underwater sound	**Audio track inside the video file Linear PCM 16 bit, 96 kHz**	In a hydrophone configuration the sound sits in the same file as the video. There is no separate track to extract
Sensor values	**.blb (binary) from the body → converted to CSV**	One CSV of every sample and one of the event list. The header carries model, firmware, start and stop, serial number, per-sensor intervals and calibration values; below it, three-axis acceleration (g) with its resultant, three-axis geomagnetism (μT), pressure (hPa) and internal temperature (°C) in time order

Video and sensor values read out over the same USB-C port, and both carry the logger's own clock.

※ Pressure is written in hPa; converting it to depth is done in analysis. Video is bulky: Full HD at 30 fps runs about 6.5–7 GB per hour, and in 2023 testing 8 GB took roughly 18 minutes to read out (this varies with the PC).

File formats and columns were confirmed against recordings made in 2023–2024. Fields may differ with the firmware and LoggLawSurfCam version.

08 Specifications

CAM mini / CAM basic

Body

Item	CAM mini	CAM basic
Dimensions *1	30 × 32 × 58 mm	38 × 38 × 58 mm
Dimensions with waterproof cap	30 × 32 × 71 mm	38 × 38 × 71 mm
Weight in air	98 g	129 g
Water / pressure rating	500 m max depth	500 m max depth
Operating temperature	-10 °C to 40 °C	-10 °C to 40 °C
Clock accuracy	±108 s/yr	±108 s/yr

Video

Item	CAM mini	CAM basic
Resolution	VGA (640 × 480) | HD (1280 × 720) | Full HD (1920 × 1080)	VGA (640 × 480) | HD (1280 × 720) | Full HD (1920 × 1080)
Frame rate	VGA: 30 / 60 / 120 fps HD: 30 / 60 fps Full HD: 30 fps	VGA: 30 / 60 / 120 fps HD: 30 / 60 fps Full HD: 30 fps
Field of view	89° (in water) / 129° (in air)	89° (in water) / 129° (in air)
Red LED	None	High-luminance, 660 nm, automatic switching
Memory	SD card (up to 1 TB)	SD card (up to 1 TB)

Power and recording

Item	CAM mini	CAM basic
Battery	Rechargeable	Rechargeable
Continuous recording *2	Up to 4 hours	Up to 6 hours
Battery extension	Optional (64 hours measured at Full HD, 30 fps)	Optional (64 hours measured at Full HD, 30 fps)
Start / stop control	Schedule | duty cycle | depth or acceleration trigger	Schedule | duty cycle | depth or acceleration trigger
Sensor options	Hydrophone | depth (pressure) | temperature | 3-axis acceleration | 3-axis geomagnetism	Hydrophone | depth (pressure) | temperature | 3-axis acceleration | 3-axis geomagnetism
Sensor sampling	Hydrophone: 96 kHz Temp / depth / geomag: 0.5 / 1 Hz Acceleration: 4 / 8 / 16 / 32 / 64 Hz	Hydrophone: 96 kHz Temp / depth / geomag: 0.5 / 1 Hz Acceleration: 4 / 8 / 16 / 32 / 64 Hz
Sensor power	Battery separate from the video	Battery separate from the video
Setup & readout	LoggLawSurfCam (Windows), USB-C under cap	LoggLawSurfCam (Windows), USB-C under cap

*1: Adding options changes dimensions and weight.

*2: Estimated for continuous recording at VGA, 30 fps. Actual duration varies with conditions of use.

Specifications are subject to change without notice.

09 Contact

Biologging Solutions Inc.

Enquiries about LoggLaw CAM

Tell us the target species, the attachment surface and the behaviour you want to record, and we will propose the body and options, the recording window and the mount together. Please also ask about trial units before purchase.

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See also

For long-term records of depth, temperature, light level, acceleration and geomagnetism, see the **LoggLaw C Series** (C7 / C8 / C7XI / C7XIR). It suits studies that do not need video, or that run for months. A separate catalog is available.

From a LoggLaw CAM record
A frame read out after the animal was recovered