# USER**MANUAL**
## FishCount
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**SUBSEA TECH**
**Marine and Underwater Technologies**

fishc🐟unt

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automatic fish tracking and counting

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Marine and Underwater Technologies

START DETECTION

# Summary

# Introduction

## Software overview

FishCount is an add-on for Blueprint Subsea ViewPoint software. It is designed to work with Blueprint Subsea Oculus M-Series and MD-Series multibeam sonars. FishCount is capable of automatic fish tracking and counting, using a 2D multibeam sonar. The suite consists in two software : FishCount Live and FishCount Player, which functions are detailed in this manual.

## Principle of operation

FishCount is a 2D sonar image treatment software based on the adaptation of motion detection algorithms.

It allows analyzing groups of moving pixels and discriminating the nature of the target. Thus it is able to differentiate a fish from potential background noises (surface noise, boat engine, waves,...). Each target (fish) is identified by a bounding box, and filtered by size according to the parameters defined by the user. An algorithm, based on the analysis of the size and behavior of each fish, determines whether the detected fish is a «new» fish or not.
Finally, a double virtual counting gate eliminates most of the false positive by tracking each fish going though the two gates, upstream or downstream. If a fish does not pass successively the two gates, it will not be counted.

## Requirements

PC running Microsoft Windows 7/8/10, with OpenGL 4.0 support or higher.
Blueprint Subsea Oculus sonar M-Series or MD-Series.

**FishCount is based on the Oculus ViewPoint software from Blueprint Subsea. We recommend to read the Oculus M-Series user manual before.**

**Oculus M-Series User Manual : https://www.blueprintsubsea.com/sys/download.php?Id=oculus_mseries_manual_en**

# 1. General information

## 1.1. Logs recording

FishCount Live (see *2. FishCount Live*) generates record logs during the campaign. Suchlogs  can be later analyzed in the FishCount Player (see *3. FishCount Player*) software.
These logs are filed in folders, with one folder per day, named «*LOG_MMDD*», where *MM* is the month, and *DD* is the day (i.e. «LOG_1225»).

Each folder contains the following files (for each entry, *YYYY* is the year, *MM* is the month and *DD* is the day) :

* **Oculus_YYYYMMDD_XXXXXX.oculus**
  The Oculus original file format, stores the images.
* **Size_Fishes_MMDD.txt**
  The «main» log file, as it keeps the important data such as time and date, size and position (see *1.2. Logs content*).
* **Count_Fishes_MMDD.txt**
  The log file that keeps the count for each size group (see *1.2. Logs content* and *2.3. Detection*).
* **List_Alarms_MMDD.txt**
  The list of all alarms (detections) recorder by FishCount Live in detection mode (see *2.3. Detection*).

## 1.2. Logs content

### Main log files (Size_Fishes_MMDD.txt)

As previously mentioned, these files are storing the important data of your campaign. Below is an example of the content of these files:

```
T:16/04-10:18::19-ID:10-size:31.5887_36.8534-pos:643_577
T:16/04-10:18::19-ID:11-size:24.4939_15.7012-pos:619_592
```

Each line can be interpreted as follow:

```
T:16/04-10:18::19-ID:11-size:24.4939_15.7012-pos:619_592
```

Date and time of the detection

Unique ID of the fish

Size of the bounding box

Position of the box, relative to the center of the scene

### Fishes daily counter (Count_Fishes_MMDD.txt)

For each day, a file summarize the counting, sorted by previously set size groups (see *2.3. Detection*).

```
N1_30:3;N2_50:0;N3_100:1;N4:0
```

N1_30 means that for the size group #1, 30 fishes have been counted.

# 2.    FishCount Live

## 2.1.   Description

FishCount Live is the software part that allows you to carry out campaigns. It allows to detect, track and count fish from live sonar images, or from previously recorded files (*.oculus* file format only). A parameter window allows to optimize the acquisition.

## 2.2.   General interface
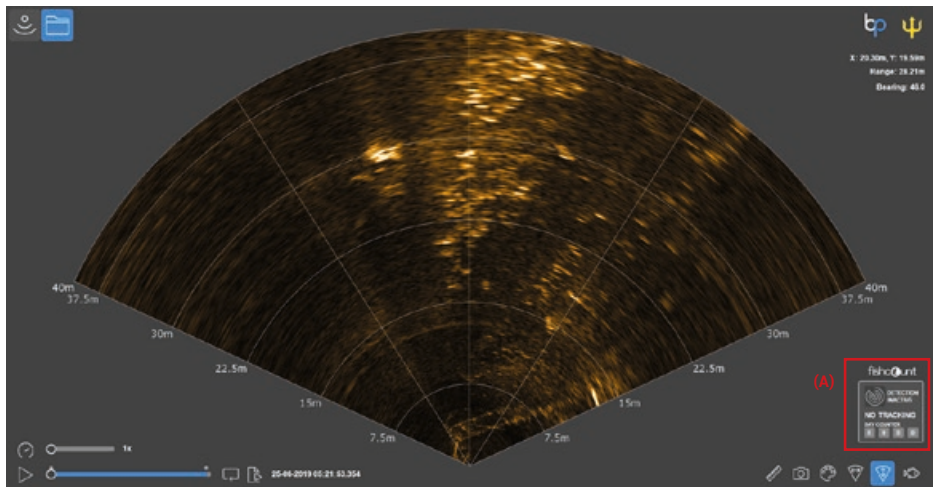


| (A) | **Status area**<br>This area in the main interface provides information such as:<br>• Detection: ACTIVE/INACTIVE<br>• Tracking state: No Tracking/Tracking<br>• Fish count for the day, sorted by size, as defined in the Detection window (see *2.3. Detection*) |
| --- | --- |

**Detection window**
All the main features for the detection, including activation, range settings and log files options.
For more details, see *2.3. Detection*

*The software can be used as the standard Blueprint Subsea Oculus Viewpoint software, without FishCount functions. Those standard features are detailed in the Blueprint Subsea Oculus M-Series user manual. See Introduction for the download link.*

## 2.3.  Detection

The detection mode can be activated anytime, once the sonar is connected and switched on or when playing a previously recorded file (.*oculus* file format only). When detection is active, the software will target and track all moving objects.  FishCount is able to differentiate moving targets such as fishes from surrounding noise (surface noise, boat engines, etc.). As a main feature, the software will also record all information in log files, which parameters can be set here.
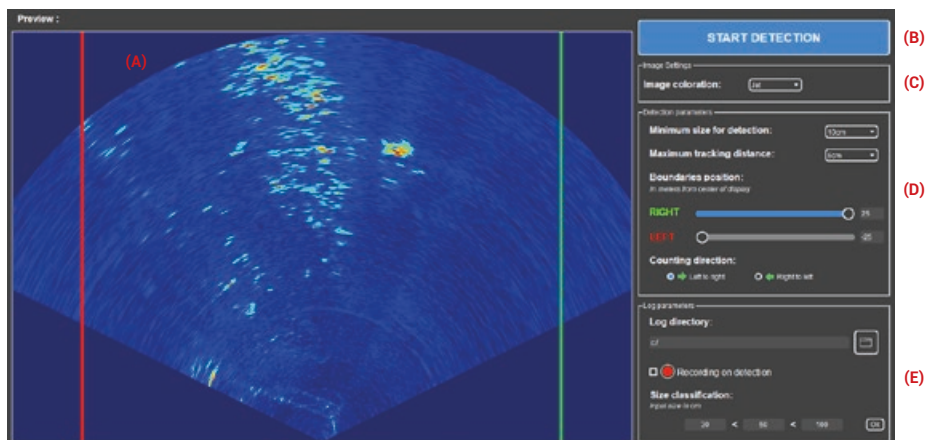


**(A)** **Detection processing area**
This area is a display of the raw sonar data. Each moving target is identified by a bounding box.

**(B)** **Detection activation**

**(C)** **Image settings**
You can pick a color scheme for the processing area (A).

**(D)**

**Detection parameters**
You can define the minimum size of the targets and the maximum tracking distance (see paragraph below). Boundaries can be set, to create a precise area to scan. Those are defined by green and red line, displayed in the pro-cessing area (A). The user can also define the counting direction.

**(E)**

**Log parameters**
FishCount Live create log files during recording. You can chose the log directory. The checkbox option enables recording of small videos of each detection.  Finally, you can set 3 size limits, in order to classify detected targets by size groups.

## Detection settings

When it comes to detect a particular fish species, the detection parameters have to be set accordingly. The software allow fixing a minimum size to avoid targets that are smaller than desired. It also allows defining a maximum tracking distance. It corres-ponds to the distance achieved by a target between two frames, an can be interpreted as a sensitivity parameter. The default value is 5 centimers and should be changed only if you are sure of what you are doing.

# 3.    FishCount Player

## 3.1.    Description

FishCount Player allows playing back any recorded campaign, and reviewing every sequence during which fishes were detected, thanks to a playlist of alarms. Another tool allows to review quickly the main statistics of the campaign.

*Open file*
To open a file, you must pick an .oculus file inside its log directory (LOG_MMDD, where MM is the month and DD is the day).

## 3.2.    General interface
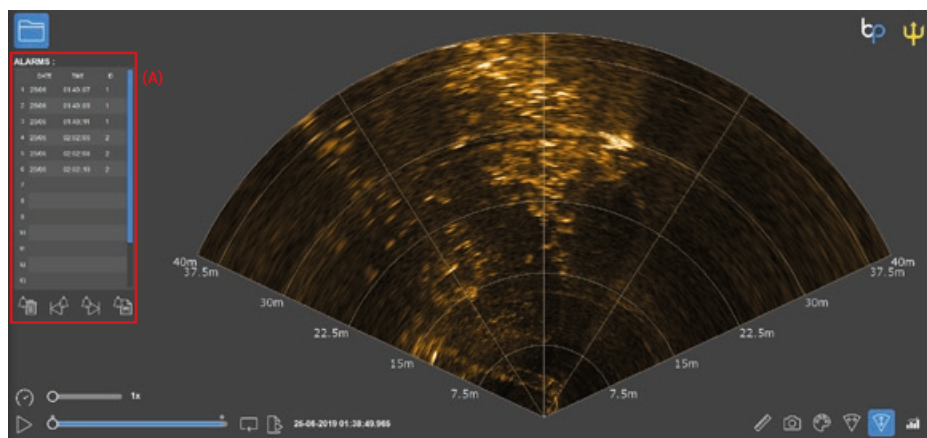


**(A)**   **Alarms playlist**
Every detection is recorded in a log file. This playlist allows to navigate through all recorded alarms. It opens the file where the detection has be made and jump to its position. If the line is white, it means the alarm is part of the opened file. If not, the line is blue.

**Statistics window**
This window sums up all the statistics from the log file, with graphs and counters.
For more details, see *3.3. Statistics window*

## 3.3. Statistics window

This window summarize all the relevant information contained in the log files. Although the log files can be processed in any spreadsheet application like Microsoft Excel, FishCount also provides an integrated interpreter.
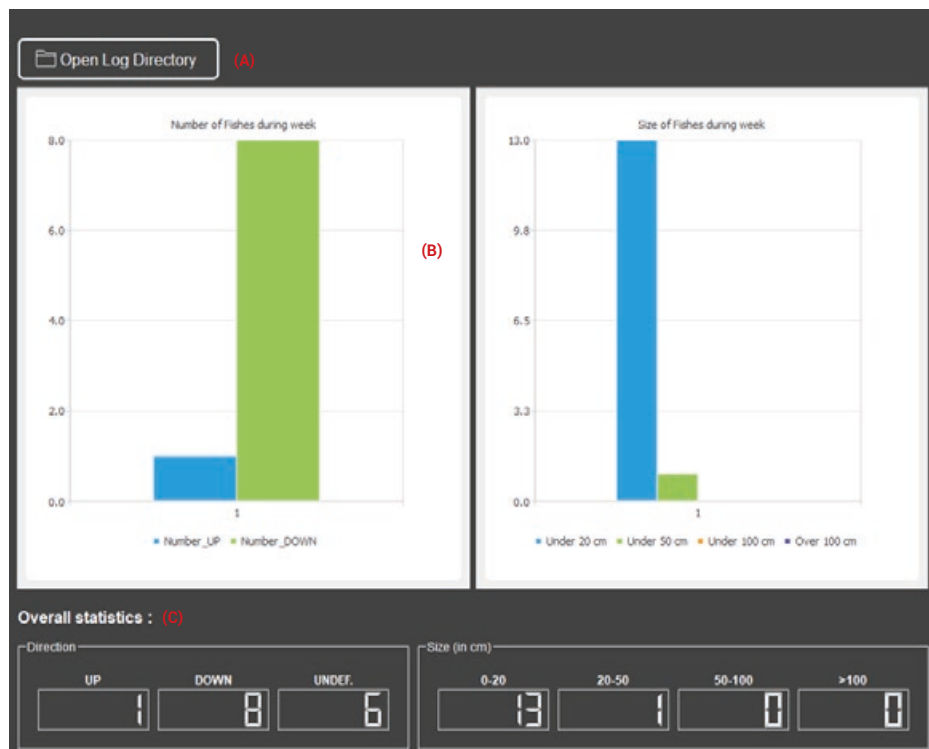


| (A) | **Open log directory**<br>**Warning:** you have to select the directory (LOG_MMDD) and not a file. |
|---|---|
| (B) | **Charts**<br>Two plot charts represent the two main information which are the number of fishes during the week (and the direction, upstream or downstream, they were moving) and the sizes of theses fishes. |
| (C) | **Counters**<br>Same information as in the charts, but numeral. |

# 4.   Operation

## 4.1.   Oculus sonar

This section will only summarize the basics for the sonar operation. For further information, we recommend to read the Chapter 3 (Using the Sonar) from the Oculus User Manual.

### Multibeam sonar basics

A multibeam sonar emits sound waves in a fan shape. The distance of an object is determined by the amount of time it takes for the sound wave to return to the sonar head.

The sonar has specific vertical and horizontal apertures. All the area covered by the sonar can be considered as «illuminated», like a torch in a darkened environment. Knowing this, any object targeted by the sonar generates a shadow, best known as «acoustic shadow».

Most of multibeam sonars (including Oculus sonars) have a wide horizontal aperture (>120°) and a shorter vertical aperture (<20°). This means that the sonar has to be orientated in the same plan as the monitored area.

### Sonar orientation

When using the FishCount software, the Oculus sonar has to be in a fixed position. This can be achieved for example by mounting the sonar on a pole fixed on a quay, or on a tripod laying on the seabed.

When the seabed needs to be seen, a good way to orient the sonar is to use the 10% rule: a sonar placed at an altitude of 10% of the operating range, with a 15° down angle, can achieve a 70% seabed coverage.
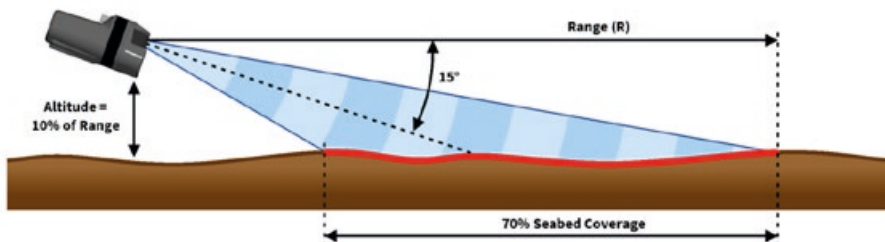


*Illustration courtesy of Blueprint Subsea ©*

For general purpose, we recommend that the sonar is tilted down according to the vertical aperture and placed at least at 2 meters below the water surface, as the latter is a source of acoustic noise.

# 5.    Support

**Subsea Tech can provide support for both Oculus Sonar and FishCount software. You can contact us via:**

- **Email: <u>st.sales@subsea-tech.com</u>**

- **Phone: +33 (0)4 91 51 76 71** (Monday-Thursday from 8:30AM to 5:30PM and Friday from 9:00AM to 12:00PM)

# 6.    License

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**All the terms of the End User License Agreement are listed in the software package and can be read during the setup or anytime in the «LICENSE» file, located in the installation directory.**

# Notes