

Biotactic

FISHERIES RESEARCH & MONITORING



**FISH MONITORING SYSTEMS • AI DATA ANALYSIS • POST-PROJECT & REAL-TIME PROCESSING
FISHWAYS • FISH FENCES • CULVERTS • OPEN WATER • FRESHWATER • MARINE
FISH COUNTS • FISH PASSAGE ASSESSMENT • MOVEMENT RATES**

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Both BRAVO G3 and M2 Permanent and Mobile Fish Monitoring Systems can be upgraded to Fish Monitoring and Counting Systems with the addition of Biotactic Inc.'s BRAVO AI data analysis service – BRAIN. The BRAIN (Biotactic Research Artificial Intelligence Network) is our propriety machine learning artificial intelligence program that has been meticulously developed since 2013 and has been tested in a variety of environments and conditions for a variety of species. Coupled with human-based support the BRAIN is able to provide accurate assessments of fish counts, passage and migration behaviour.

BRAIN processing of collected data can be set up to be performed automatically (G3 system, ftp file transfer) or manually (G3 or M2 system, external hard drive file transfer). Automatic processing provides near-real time data which is updated daily and posted to a dedicated public or private BRAVO network webpage. Manual processing is performed post-project and can provide additional information from collected data with data turn-around dependent on the amount of recorded video and level of analysis.

Automatic BRAIN AI Data Analysis Service

System requirements	G3 Fish Monitoring System, internet link with bandwidth > 5Mbps
Video requirements	Recorded in 30fps in .mp4 file format
Standard BRAIN output	CSV file. Columns- video name, date, time, X direction (positive values rightwards movement, negative values leftwards movement), Y direction (positive values upwards movement, negative values downwards movement), statement of passage (True or False). Seperate rows for each detected fish. Provided monthly
Data posted to webpage	Monthly fish count table updated daily. Columns- date, total number of fish observed, net passage, peak time and peak pass rate. Interactive fish count graph updated monthly. Plots total number of fish observed or net passage by month. See Figure 1
Notes	<p>Please contact Biotactic prior to study initiation. Technicians will provide assistance to ensure that camera installation, orientation and video capture and transfer settings are optimized for video analysis</p> <p>The BRAIN can not distinguish species or individual fish. Fish present across multiple recordings or moving in and out of frame within a recording will be counted as seperate individuals</p> <p>Level of analysis can be customized to meet project requirements. Contact Biotactic to discuss available options</p>

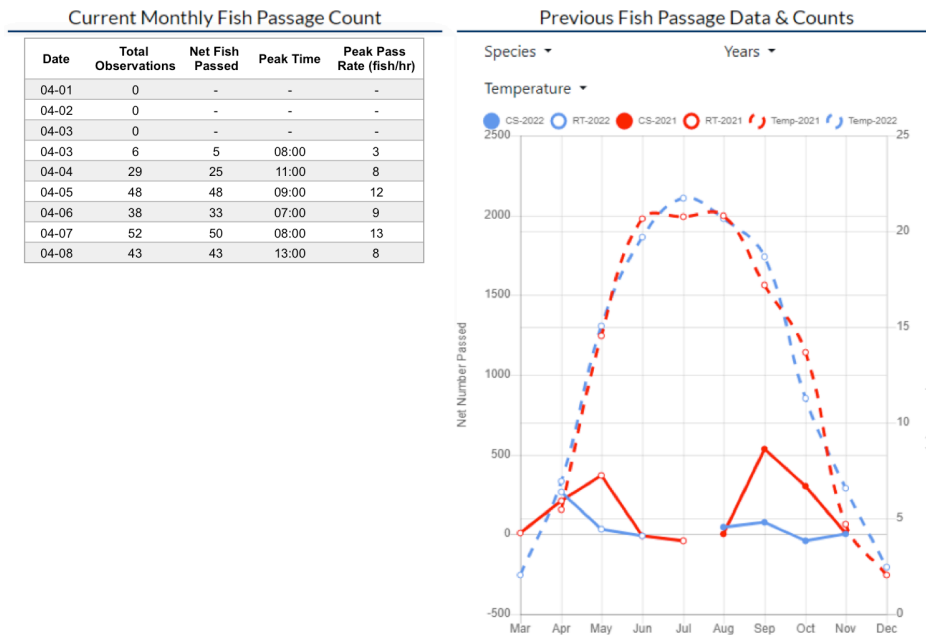


Figure 1. Example monthly fish passage count table updated daily and interactive fish count graph updated monthly which can be posted to a dedicated public or private BRAVO network webpage.

Manual BRAIN AI Data Analysis Service

System requirements	M2 or G3 Fish Monitoring System
Video requirements	Recorded in 30fps. Files in .mp4 format (can be converted post-capture)
Standard BRAIN output	CSV file. Columns- video name, date, time, X direction (positive values rightwards movement, negative values leftwards movement), Y direction (positive values upwards movement, negative values downwards movement), statement of passage (True or False). Seperate rows for each detected fish
Additional optional variables	Species identification, fish length estimates, adult/juvenile classification, notes on fish condition and behaviour (see Figure 2)
Notes	<p>Please contact Biotactic prior to study initiation. Technicians will provide assistance to ensure that camera installation, orientation and video capture settings are optimized for later video analysis</p> <p>The BRAIN can not distinguish individual fish and fish present across multiple recordings or moving in and out of frame within a recording will be counted as seperate individuals. Files created by the BRAIN (see Figure 2) can be quickly reviewed by Biotactic senior fish biologists and data can be filtered to eliminate replicated individuals (additional service)</p>



Figure 2. Screenshots from example peek files. During processing short 5-15 second peek video files are created for each fish detected by the BRAIN and show the detected movement tracked by a bounding box. These short clips can be quickly reviewed by Biotactic senior fish biologists within a propriety BRAIN confirmation QA/QC program. Within this program the BRAIN produced CSV file can be automatically amended to include additional optional variables and/or filtered to eliminate replicated individuals.