

# Return on Investment Analysis

## ROI Analysis for the DCS System

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## Introduction

The Data Collection Station hardware (“Data-Entry Boards”) and software (Android and Web Applications) were created with the single purpose of decreasing the costs and time associated with gathering and using Field and Animal Data. Field and Animal Data requires specific features and hardware support in order to realize such cost-savings.

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## The Components of DCS

Big Fin Scientific's DCS system is composed of specialized hardware called EDEBs (Electronic Data-Entry Boards) and software which runs on waterproof, rugged Android devices. The components can be used independently but provide maximum cost savings when used together.

### The Hardware

The Big Fin Scientific EDEBs provide a portable, lightweight platform for accurate measurements (better than a millimeter accuracy), with a 10-hr+ battery life and an IP67 waterproof enclosure. The built-in Bluetooth radio connects the EDEB to our DCSTLinkStream Android application, providing the temperature-compensated measurements and user-assignable shortcut keys across the length of the board. This, combined with the audio-over-Bluetooth-headset feedback from DCSTLinkStream, allows for true Heads-Down operation without requiring direct manipulation of the tablet. This is important for typical Field data collection operations which involve taking data with wet or soiled hands, often gloved.

### The Software

The DCS software ecosystem includes two offerings:

**DCSTLinkStream** - An Android application which runs on a variety of Android tablets, DCSTLinkStream is a user-adaptable application which links to almost all peripherals with a digital output. Examples include: EDEBs, weight scales, PIT tag readers, water quality testers and label printers. Data-fields in the application are customized by the user, obviating the need for custom software design and support costs.

**DCSUnity** - A Web application which automatically pulls all DCSTLinkStream data into a web account and provides organization, sharing and analysis tools. Data can be shared across an Organization on a user-by-user permissions basis. In the near future, analyses and reports can be generated from an Individual or Organization's data and published directly from DCSUnity. Analyses and Reports can be used as templates, such that periodic reports of the same format can be generated with new data at the push of a few buttons.

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## Cost-Savings Anecdotes

Since it is difficult to present ROI calculations which are broadly applicable, it may be useful to present anecdotal reaction to the use of the DCS system in a variety of settings, such that parallels might be drawn to your own Organization's efforts. ROI analyses follow this section.

### Customer Trial Reaction

Shad Mahlum at Uni research institute in Norway says this:

*"I started using DCS and the Big Fin Scientific fish-boards for a trial, while some other folks used the older programmable handheld PIT-readers. We were PIT-tagging and taking length-measurements and weights of salmon. The other folks didn't bother with the weights because it was too laborious. Out of the 1500 fish we processed that day, I processed half with the DCS system, taking weight of every 10th fish, while the other two accomplished the remaining half, not taking weights.*

*I took more that twice the amount of data in the same time as our old method. And that doesn't reflect the corrections on the back-end due to the error-prone handheld PIT-reader. Next time, we'll reduce manpower from 3 to 2 and still come out ahead."*

See Shad's work here: <http://uni.no/en/uni-environment/lfi/> and here: <http://uni.no/en/uni-environment/lfi/atlantic-wild-salmon-in-vosso-1/>

### Customer Efficiency Analysis

"Big Fin Scientific – Data Collection Efficiency

Kyle Martin- Troutlodge / Hendrix Genetics

Efficiency:

Over hand written data:

More than 100% efficiency improvement. Working with thousands of fish on a weekly basis, hand scribing PIT tags, length, weight, sex and other data would make the job virtually impossible within a reasonable period.

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### DCS:

Using the DCS we are able to bypass any hand scribing. For most data collections, we have been able to customize the board to allow one touch entry for specific data points (deformity, sex etc). This allows full operation without handling the tablet, or doing manual entry into the tablet.

Time needed for data capture on 100 fish varies based on size, however once the equipment is set up and running we can do 100 fish in 20-25 minutes. This includes collection of PIT code, length, weight, sex, deformity and any other information.

### Accuracy:

One big advantage is the data accuracy, particularly over hand scribing. Automatic entry into a spreadsheet from the collection equipment (scale, data board, tag reader) eliminates any human error in data entry. Hand scribing provides 2 opportunities for error- upon scribing, and re-entry into the computer. This system eliminates both. Adjusting settings on the equipment (scale in particular) helps to reduce faulty info sent directly to the DCS tablet.

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### Comments



*“Hi Guys, This is the new equipment that we have recently started using for our data collections. Overall, very happy with how it's working out. Just wanted to pass it on in case there is interest for using it in other locations. This was purchased through Biomark and developed by Big Fin Scientific (<http://www.bigfinscientific.com/>)” - Kyle Martin, Trout Lodge, ID, USA*



*“The electronic BigFin fish-board is a simple and robust solution to quickly and accurately measure the species we are studying in our surveys. The implementation of the solution BigFin is an undeniable quality win for our observations.” - Vincent Badts, IFREMER, France*



*"I've been using the 10MF1 fish board for the past year and couldn't be happier with its ease of use. It drastically cuts down the data collection time and I never have to worry about transcription errors. I would definitely recommend this product to those tasked with measuring large volumes of fish."* - John Wiley, Western Pacific Regional Fishery Management Council



*"Big Fin's technology is very innovative, efficient, and effective at collecting all types of fisheries data. Their customer service has been beyond commendable, as they are always available to answer questions, troubleshoot devices, as well as collaboratively develop new ideas. I would highly recommend this to any agency or company looking for a cost effective and efficient way to collect fisheries information."* - Adam Kenyon, Virginia Marine Resources Commission

## **Return on Investment**

Due to the widely varied situations of each organizations, in terms of data collected, number of days spent in the Field and how the data is transferred to a PC or database, general ROI conclusions are difficult to determine.

However, we have gathered some actual cost-savings data we can use to assess ROI for some situations, which are described below.

### **Scenario 1 - Light Workload**

Description of work: Tagging and measuring trout at a trout farm.

Qty of animals processed: 250

Equipment purchased: DCS Fish-Board, DCSLinkStream subscription and D10 tablet (waterproof, ruggedized), HPR Plus PIT-tag reader.

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Synopsis: On a solo operation, Armando PIT-tagged and measured 250 fish in 4 hours, which he feels would have been impossible to do without the DCS board and software. He felt that without it, he would have required another person to handle the fish and do the tagging while another recorded data on a clipboard. Thus, he feels a tagging job which would normally require two people was reduced to 1.

We can conservatively estimate that a half person-day is saved for this effort, ignoring travel requirements. In addition, we can estimate that transposing data from paper to PC for qty 250 fish, then having someone double-check it, might take another half person-day. If an organization does this type of work twice a month, two person-days are saved per month.

Using a figure of \$40/hr for labor, we're saving approx \$650/mo or ~\$8K/yr.

The cost of the system is:

DCS Fish-Board: ~\$7K

DCS LinkStream Subscription: \$30/mo

D10 Android tablet: ~\$2K

HPR+ Reader: \$3K

Total: \$12K + \$30/mo

Thus, we can estimate the Break-Even horizon for this scenario to be 18-20 months, with an approximate savings of \$8K/yr thereafter. If we consider travel costs, the savings are higher.

## **Scenario 2 - Medium WorkLoad**

Description of work: Tagging, measuring and weighing Salmon.

Qty of animals processed: 1500

Equipment purchased: DCS Fish-Board, DCSTLinkStream subscription and D10 tablet (waterproof, ruggedized), HPR Plus PIT-tag reader.

Synopsis: In a 3 person team, Shad and two others processed 1500 salmon. While Shad used the DCS system, the other two used pencil and paper and mechanical board. Shad took weights

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of every 10th fish, while the other two did not take weights. Shad processed 750 fish, while the other two processed 375 apiece.

Shad estimates that, if the teammates using traditional methods had taken weights, the time required for the traditional work would have increased 50%. Thus, adjusting for the weight-taking requirement, the team is able to process ~3X the number of fish vs using DCS vs the traditional method.

Shad feels that this time savings will allow him to decrease the team size for any particular survey site from 3 to 2, saving a man-day per survey.

It is unknown to us how many surveys the team will do per month, so we'll relate the ROI in terms of surveys instead of time:

Cost of the system: ~12.4K

Savings per survey: ~\$1300

# of Surveys to Break-Even: 10

### **Scenario 3 - High Workload**

Description of work: Tagging, measuring and weighing Salmon smolts.

Qty of animals processed: 70,000 (over a season)

Equipment purchased: DCS Fish-Board, DCSTLinkStream subscription and D10 tablet (waterproof, ruggedized), HPR Plus PIT-tag reader

Synopsis: Using methods previous to the DCS, a team of 8-10 would collect data on 3000-4000 fish per day. Using the DCS system, a team of 5 did the same work on 4000-5000 per day. Shad estimates 420 person-hours saved over the course of the season (Feb - June).

In a high workload scenario such as this, the DCS system is paying for itself and providing large cost-savings right away.

Cost of the system: ~\$12.4K

Savings per season: ~\$16K

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Extrapolating Shad's person-hours savings for continual operations, we arrive at a theoretical maximum savings of approximately 1000 person-hours or \$40K per year, not counting data transposing labor.



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## Conclusion

Though Return on Investment analysis models are difficult to fit to a wide variety of processes and workloads, the general conclusion from our experience to-date is that with moderate use the systems will pay for themselves within the first year of ownership and provide north of \$10K in savings per year thereafter.

For organizations with fixed labor costs, the efficiency gains translate to a decreased percentage of data-related labor vs grant-writing or other, revenue-generating activity. In addition, by eliminating the errors inherent to transposition of paper data to PC, the DCS systems provide a higher quality data deliverable with lower overhead.

As we've seen in the above scenarios, break-even horizons depend on the number of fields collected for any one animal, travel requirements, labor rates and data management requirements. As a general rule, for those organizations processing 250-500 fish per month or more, a single DCS system provides a break-even horizon of between 3 and 20 months, depending on fish volume. ROI post break-even is estimated to start at \$8k/yr/system for a lower-volume operation. An ROI of \$16K is estimated for a high volume, single season operations, with those outfits processing continuously at high volume saving more per system with a theoretical maximum of \$40K/yr/system. The higher-volume ROI examples do not reflect so-called "soft benefits", which include efficiencies related to flexibility of the system, ease of sharing study formats across multiple users and opportunity-cost avoided inherent to the time required to transpose data from paper and fix transposing errors.

## Join the Conversation

Big Fin Scientific is devoted to decreasing costs for scientific assessments of animal populations and ecosystems in general.

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