

# Mobilizing Essential Salmon Ocean Ecology Variables

**Hakai**  
*Science on the Coastal Margin*



Brett Johnson, Krystal Bachen, Tim van der Stap, Brian Hunt

# HAKAI INSTITUTE OVERVIEW

## What is Hakai?

- Hakai is part of the Tula Foundation: self-financed; Eric Peterson. Conduct long-term science at remote locations on the coastal margin in the Public Interest

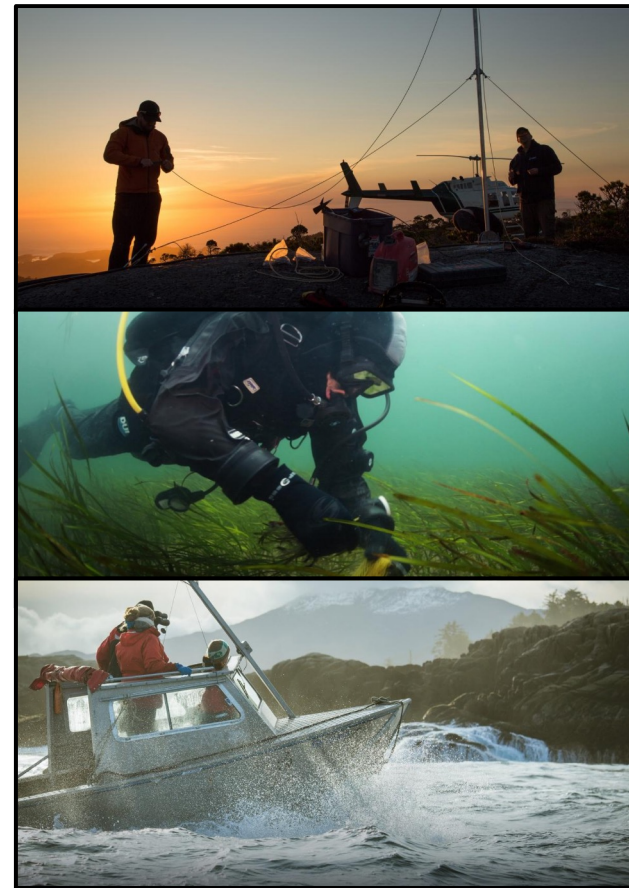
## What are we doing?

- Collaboration with a wide network of partners, applying new technology, developing information systems, stable funding to glue together projects

## Relevant Projects:

- Canadian Integrated Ocean Observing System
- International Year of the Salmon Ocean Observing System
- Juvenile Salmon Program

## Data Mobilization in the Public Interest



Data Mobilization: The process of making data available for appropriate reuse

FAIR Data<sup>1</sup>: Findable, Accessible, Interoperable, and Reusable

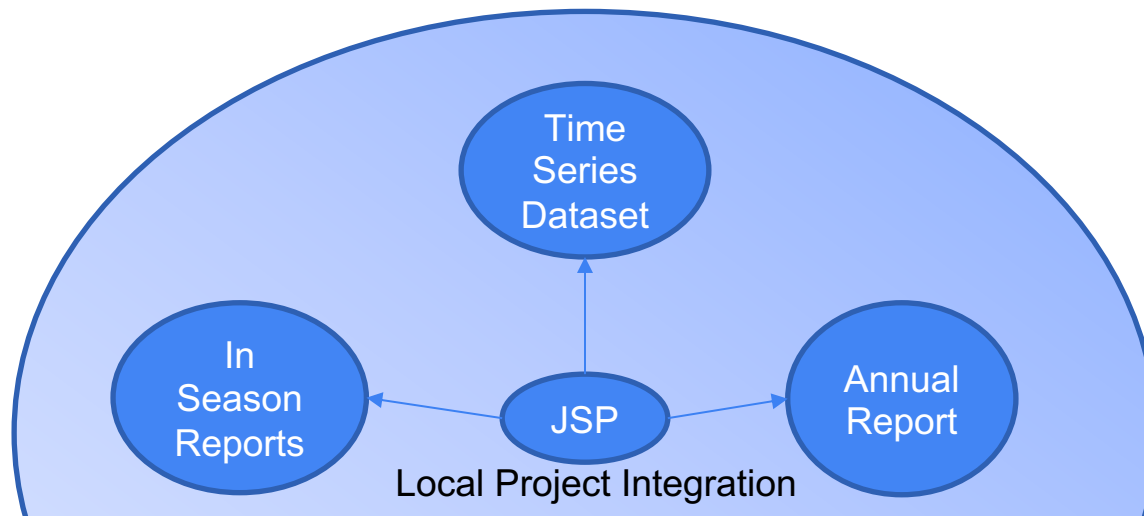
Mobilize FAIR Data:

- 1) Treat data and analyses like software to enable reproducibility
- 2) Publish standardized, well documented data
- 3) Re-use data, offer co-authorship and cite data

# HAKAI INSTITUTE JUVENILE SALMON PROGRAM



# LOCAL DATA INTEGRATION



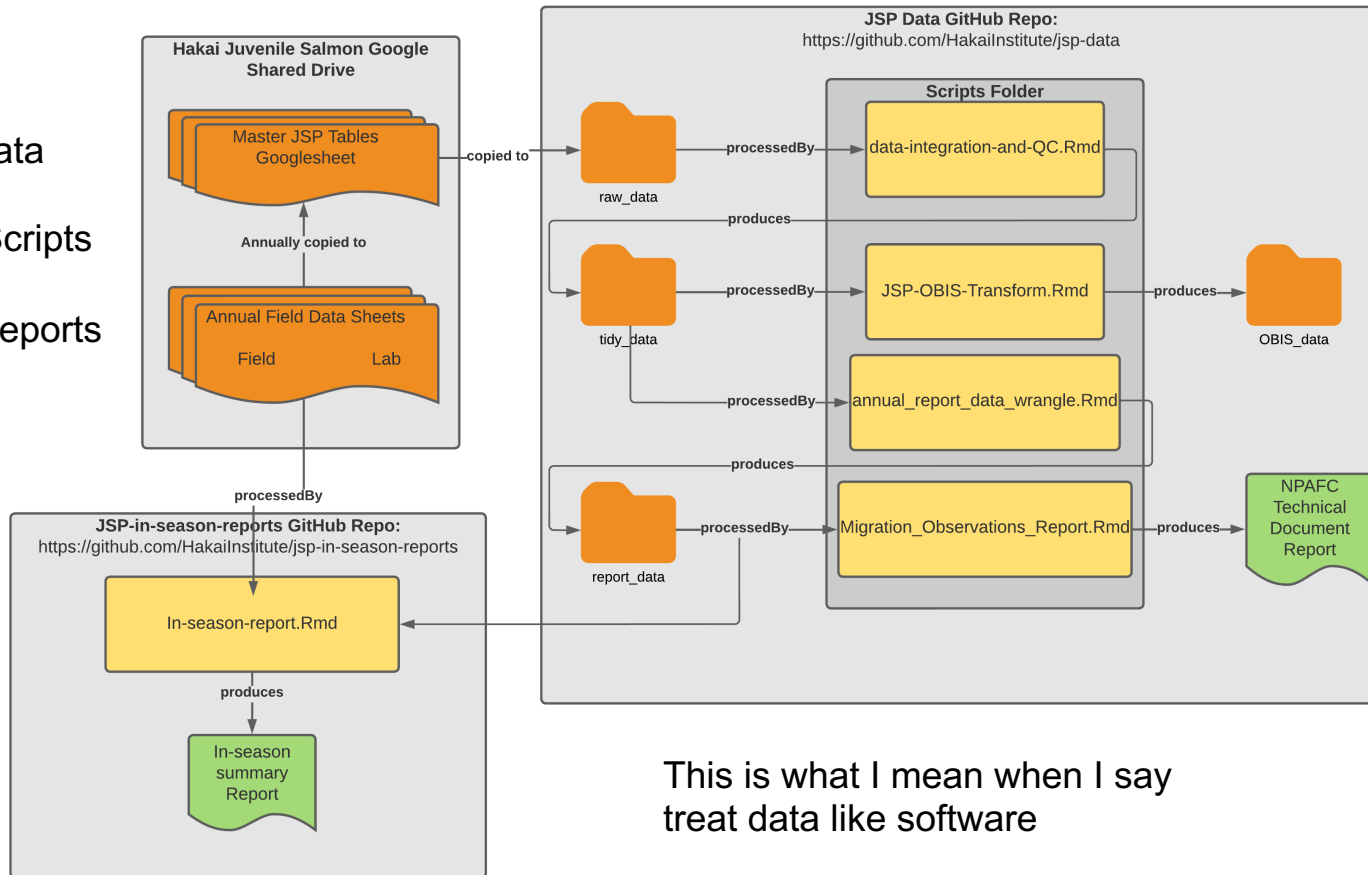


# REPRODUCIBLE DATA ASSEMBLY PIPELINE

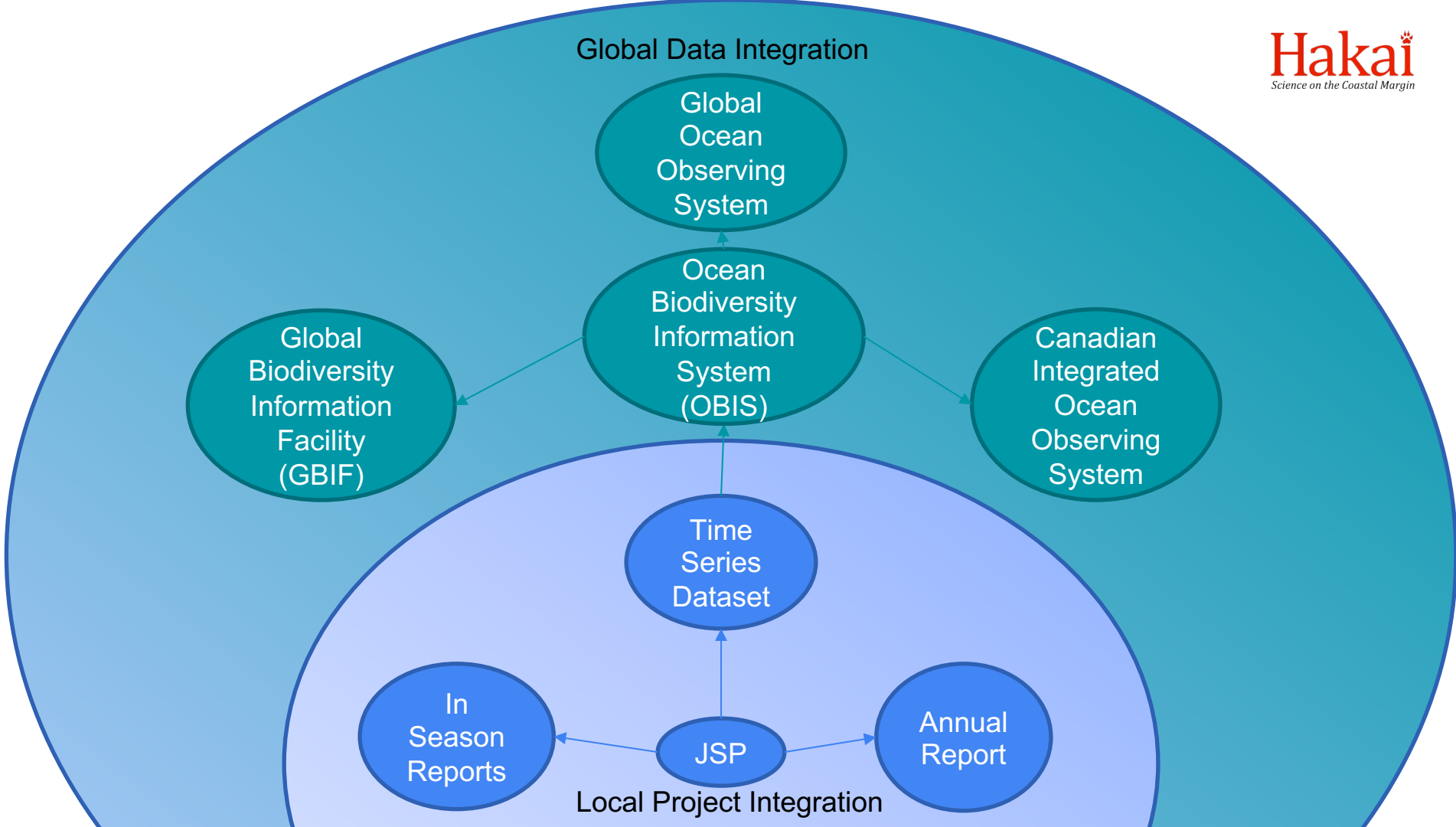
Orange is Data

Yellow are Scripts

Green are Reports



This is what I mean when I say  
treat data like software



# OBIS AND GBIF



**OBIS** OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM

OBIS is a global open-access data and information clearing-house on marine biodiversity for science, conservation and sustainable development

Taxa Search OBIS

Icon	Value	Description
Location pin	106,752,113	PRESENCE RECORDS
Thermometer	183,323,125	MEASUREMENTS AND FACTS
Database icon	4,645	DATASETS
Checkmark	164,395	ACCEPTED SPECIES



**GBIF** Global Biodiversity Information Facility

Icon	Value	Description
Occurrence records icon	2,210,084,681	Occurrence records
Datasets icon	75,453	Datasets
Publishing institutions icon	1,880	Publishing institutions
Peer-reviewed papers icon	7,559	Peer-reviewed papers using data

## Common Standards:

- Ecological Metadata Language
- Darwin Core Data Model

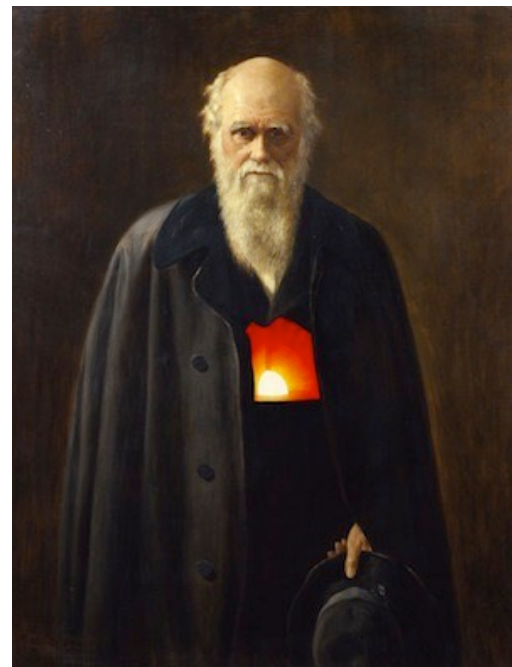


Darwin Core: A body of standards for biodiversity informatics.

It provides stable terms and vocabularies for sharing biodiversity data.

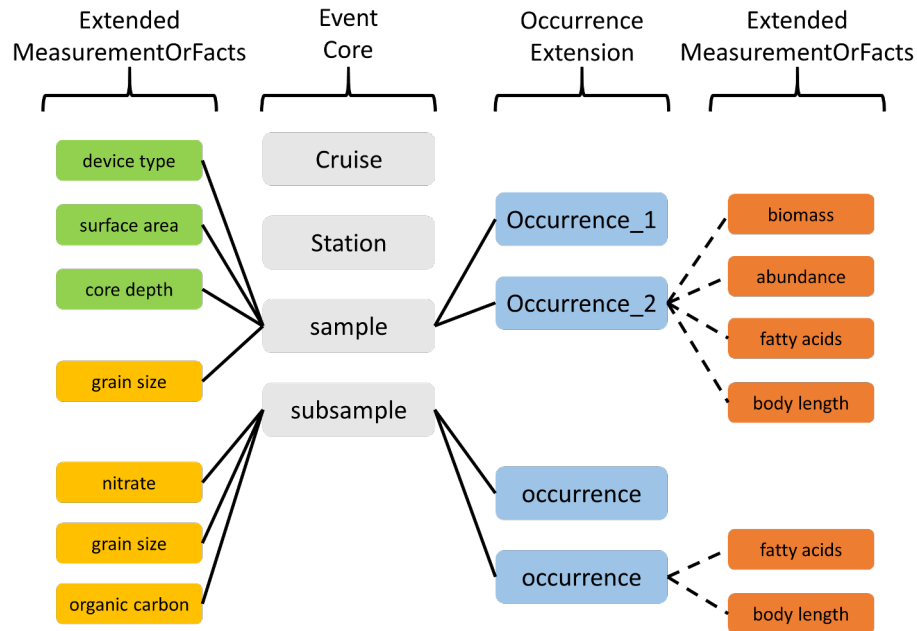
Terms (attributes, variables, column names):

- Taxonomy and identification of occurrences
- Locations
- Events
- Sampling
- Measurements and Facts



# DARWIN CORE ENV DATA FORMAT

- Three tables only
  - Event Table
  - Occurrence Table
  - Measurements or Facts Table
- `Events` lead to `Occurrences` which have `Measurements or Facts`
- Intuitively represents how ecologists work

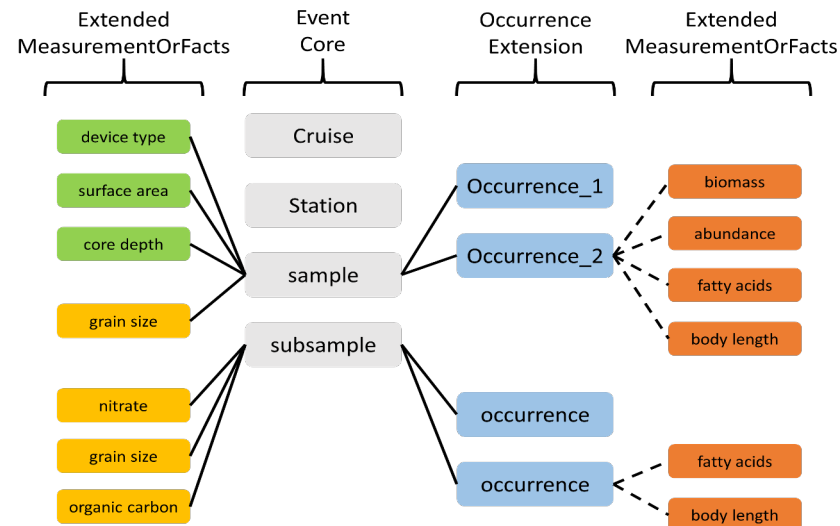


# EXTENDED MEASUREMENTS OR FACTS

occurrenceID	eventID	measurementType	measurementValue	measurementTypeID	measurementUnit	measurementUnitID	measurementValueID
hakai-jsp-U01	JE101N1	Length (fork length)	118	<a href="http://vocab.nerc.ac.uk/collection/P01/current/FL01XX01/">http://vocab.nerc.ac.uk/collection/P01/current/FL01XX01/</a>	mm	<a href="http://vocab.nerc.ac.uk/collection/S11/current/S1127/">http://vocab.nerc.ac.uk/collection/S11/current/S1127/</a>	NA
hakai-jsp-U01	JE101N1	Life stage	juvenile	<a href="http://vocab.nerc.ac.uk/collection/P01/current/LSTAGE01/">http://vocab.nerc.ac.uk/collection/P01/current/LSTAGE01/</a>	NA	NA	<a href="http://vocab.nerc.ac.uk/collection/S11/current/S1127/">http://vocab.nerc.ac.uk/collection/S11/current/S1127/</a>
hakai-jsp-U02	JE101N1	Length (fork length)	128	<a href="http://vocab.nerc.ac.uk/collection/P01/current/FL01XX01/">http://vocab.nerc.ac.uk/collection/P01/current/FL01XX01/</a>	mm	<a href="http://vocab.nerc.ac.uk/collection/S11/current/S1127/">http://vocab.nerc.ac.uk/collection/S11/current/S1127/</a>	NA
hakai-jsp-U02	JE101N1	Weight	22.2	<a href="http://vocab.nerc.ac.uk/collection/P01/current/SPWGXX01/">http://vocab.nerc.ac.uk/collection/P01/current/SPWGXX01/</a>	grams	<a href="http://vocab.nerc.ac.uk/collection/S11/current/S1127/">http://vocab.nerc.ac.uk/collection/S11/current/S1127/</a>	NA
hakai-jsp-U02	JE101N1	Life stage	juvenile	<a href="http://vocab.nerc.ac.uk/collection/P01/current/LSTAGE01/">http://vocab.nerc.ac.uk/collection/P01/current/LSTAGE01/</a>	NA	NA	<a href="http://vocab.nerc.ac.uk/collection/S11/current/S1127/">http://vocab.nerc.ac.uk/collection/S11/current/S1127/</a>
hakai-jsp-U11	JE101N1	Length (fork length)	132	<a href="http://vocab.nerc.ac.uk/collection/P01/current/FL01XX01/">http://vocab.nerc.ac.uk/collection/P01/current/FL01XX01/</a>	mm	<a href="http://vocab.nerc.ac.uk/collection/S11/current/S1127/">http://vocab.nerc.ac.uk/collection/S11/current/S1127/</a>	NA
hakai-jsp-U11	JE101N1	Life stage	juvenile	<a href="http://vocab.nerc.ac.uk/collection/P01/current/LSTAGE01/">http://vocab.nerc.ac.uk/collection/P01/current/LSTAGE01/</a>	NA	NA	<a href="http://vocab.nerc.ac.uk/collection/S11/current/S1127/">http://vocab.nerc.ac.uk/collection/S11/current/S1127/</a>
hakai-jsp-U12	JE101N1	Length (fork length)	143	<a href="http://vocab.nerc.ac.uk/collection/P01/current/FL01XX01/">http://vocab.nerc.ac.uk/collection/P01/current/FL01XX01/</a>	mm	<a href="http://vocab.nerc.ac.uk/collection/S11/current/S1127/">http://vocab.nerc.ac.uk/collection/S11/current/S1127/</a>	NA
hakai-jsp-U12	JE101N1	Life stage	juvenile	<a href="http://vocab.nerc.ac.uk/collection/P01/current/LSTAGE01/">http://vocab.nerc.ac.uk/collection/P01/current/LSTAGE01/</a>	NA	NA	<a href="http://vocab.nerc.ac.uk/collection/S11/current/S1127/">http://vocab.nerc.ac.uk/collection/S11/current/S1127/</a>

## Controlled Vocabulary Columns:

- measurementTypeID
- measurementUnitID
- measurementValueID



# CONTROLLED VOCABULARY SERVER

- OBIS Recommends the NERC Vocabulary Server hosted by the British Oceanographic Data Center.
- But depending on your data, you can use a number of different vocabulary server as long as the term is hosted at a stable URL
- Search for Fork Length. Wasn't available in 2019. We requested it be added. Easy process through GitHub Issues



Natural  
Environment  
Research Council



National Oceanography Centre  
British Oceanographic Data  
Centre BODC

## The NERC Vocabulary Server (NVS)

Service Status

[NVS Home](#) | [Vocabularies](#) | [Thesauri](#) | [Search NVS](#) | [SPARQL](#) | [Other Tools](#) | [About NVS](#)

### Search for a term in a vocabulary collection

Enter search string using % as wildcard if required. Example: chlorophyll%sediment.

Vocab II

Search

☒ Identifier ☒ Preferred label ☒ Alternative label ☐ Definition ☐ Exact match ☐ Case sensitive [toggle advanced options](#)

### Search for a term across vocabulary collections

Fork Length

Search

☒ Identifier ☒ fork length ☒ Alternative label ☒ Definition ☐ Exact match ☐ Case sensitive

### Search for vocabulary collections

Enter search string using % as wildcard if required. Example: parameter%vocabulary.

Search

☒ Identifier ☒ Title ☒ Short title ☒ Description ☒ Governance ☐ Exact match ☐ Case sensitive

### Explore mappings

Select a vocabulary

Show

## Concept

### Length (fork length)

**URI** <http://vocab.nerc.ac.uk/collection/S06/current/S0600261/>

**Within Vocab** [BODC parameter](#) [semantic model](#) [parameter entity names](#)

#### Alternative Labels

**Definition** A standard body length measurement used in fish biometric studies for fishes with forked tails and taken as the distance measured from the tip of the snout in a straight line to the posterior end of the shortest caudal rays in the center of the fork.

**Date** 2020-11-26T14:38:25

**Identifier** SDN:S06::S0600261

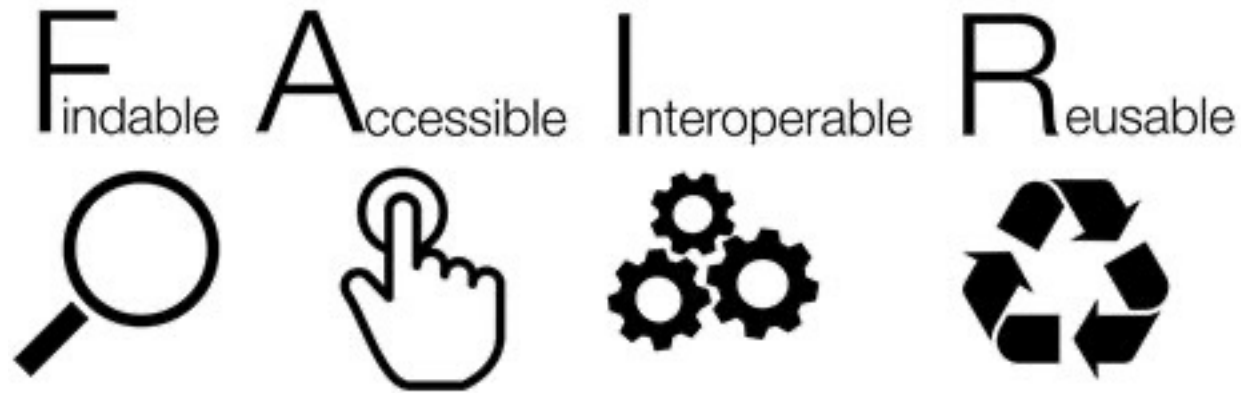
**Note** accepted

**Has Current Version** 1

**version** 1

**Narrower** [P01:FL01XX01](#) Length (fork length) of biological entity specified elsewhere

# FAIR DATA MOBILIZED IN PRACTICE







Q Hakai Institute Juvenile Salmon Program



▼ Last updated

▼ Download format

▼ Usage rights

▼ Topic

Free

Saved datasets

7 datasets found



**Hakai Institute Juvenile Salmon Program**

obis.org  
catalogue.cioospacific.ca  
+3more

zip

Updated May 18, 2021



**Hakai Institute Juvenile Salmon Program Time...**

catalogue.hakai.org

html

Updated Mar 15, 2022



**Data from: Juvenile salmon migration...**

catalogue.hakai.org

html, pdf

Updated Mar 15, 2022

## Hakai Institute Juvenile Salmon Program



Explore at obis.org

Explore at CIOOS - Pacific Catalogue

Explore at CIOOS/SIOOC

Explore at portal.obis.org

Explore at www.gbif.org

14 scholarly articles cite this dataset ([View in Google Scholar](#))

zip

Available download formats

Unique Identifier

<https://doi.org/10.21966/1.566666>

**Dataset updated**

May 18, 2021

**License**

[Attribution 4.0 \(CC BY 4.0\)](#)


License information was derived automatically

**Time period covered**

2015 - 2020

**Description**

The Hakai Institute Juvenile Salmon Program has been monitoring juvenile salmon migrations in the Discovery Islands and Johnstone Strait in British Columbia Canada, since 2015 to understand how ocean conditions experienced by juvenile salmon during their early marine migration impacts their growth, health and ultimately survival.





**Hakai**  
Science on the Coastal Margin

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**Hakai Institute Juvenile Salmon Program Time Series**

 Organization




**Hakai**  
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[OPEN DATA](#)

 Formats

RDF/XML

Turtle

Notation3

JSON-LD

JSON

Basic View

[Show Permalink](#)

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[Activity Stream](#)

## Hakai Institute Juvenile Salmon Program Time Series

The Hakai Institute Juvenile Salmon program is an ongoing initiative that was established in 2015 in partnership with the University of British Columbia, University of Toronto, Simon Fraser University and Salmon Coast Field Station. This program researches the early life history of juvenile salmon in coastal British Columbia. Primary research objectives are determining: 1) Migration timing rates and routes; 2) Migration habitat, including physical and chemical oceanographic conditions, and availability of plankton prey; 3) The impacts of prey phenology, quantity and quality on juvenile salmon growth and condition; 4) Species and stock-specific feeding biology and competitive interactions; 5) Pathogen and parasite infection dynamics; and 6) Mortality estimates.

The program targets Fraser River sockeye, and pink and chum salmon, but additionally provides information on coho, chinook, and herring through incidental capture. The field program operates between May and July during the peak of the juvenile sockeye outward migration. Purse seine and oceanographic sampling are conducted in the northern Strait of Georgia / Discovery Islands region (~ 220 km from the Fraser River mouth) and the Johnstone Strait / Queen Charlotte Strait region (~ 180 km from the northern Strait of Georgia. As such, this program informs early life history across two critical legs of the Fraser salmon northward migration.

Data packages are updated annually. Versioned datasets are available through the links below.


[<< read less](#)

### Access and Use

**Licence:** [Creative Commons Attribution 4.0](#)


**Limitations:** CC BY 4.0. Please collaborate with authors of this dataset if you plan to use it.

### Data and Resources



**Juvenile Salmon Data Archive Location**  
Hakai Juvenile Salmon Program Data Packages. These are updated annually.

[↗ Explore](#)

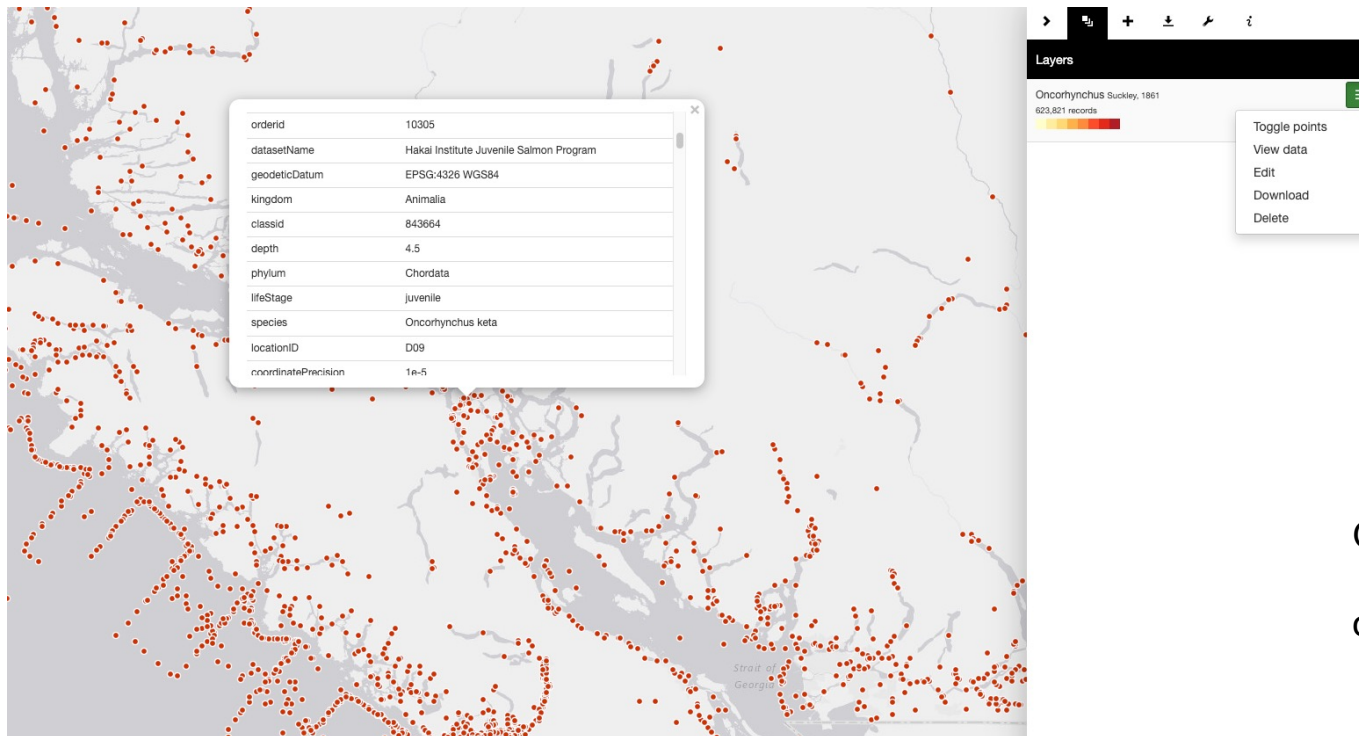


**Standardized OBIS (Ocean Biodiversity...**  
A subset of the Juvenile Salmon Program data are transformed to the Darwin...

[↗ Explore](#)

# FINDABLE, ACCESSIBLE, INTEROPERABLE

OBIS Mapper [mapper.obis.org](http://mapper.obis.org)



OBIS API

obisr R package

SAMPLING EVENT | REGISTERED AUGUST 21, 2020

## Hakai Institute Juvenile Salmon Program

Published by [Canadian node of the Ocean Biogeographic Information System \(OBIS Canada\)](#)

DATASET

PROJECT

METRICS

ACTIVITY

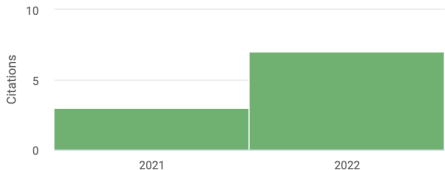
DOWNLOAD

HOME PAGE

311,595 OCCURRENCES

10 CITATIONS

### CITATIONS



10

citations

Read more about literature, how it's discovered and linked to GBIF-mediated data.

2,459 download events

Download report

311,595 OCCURRENCES FROM THIS DATASET

DOI 10.15468/dl.b2jhjj

Date: 20 August 2022

Format: Species list

Records: 1,791,245

Involved datasets: 35,516

Year

Between start of 1982 and end of 2020

RERUN QUERY SHOW

“Well that’s all great but I don’t have time for that.  
How am I supposed to do that?”

To enable this:

- Institutional and Policy Support, Enforcement and Incentivization
- Resource Allocation for Embedded Data Specialists and Research Software Development
- Culture Shift Towards Data Sharing, Citation, and Reuse. Data Creators Advantage.

# THANK YOU

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Comments/Questions:

[Brett.Johnson@hakai.org](mailto:Brett.Johnson@hakai.org)