Welcome to...

Effective strategies across ocean data lifecycles

Enhancing ocean data management & mobilization

W6: FUTURE/TCODE Topic Workshop

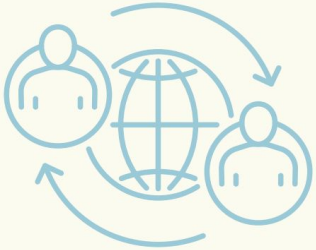
9 Nov 2025

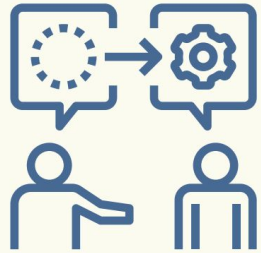
Guidelines

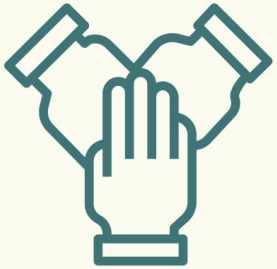
Please…

- speak clearly, slowly
- use simple, plain language
- introduce yourself before you speak
- speak into the microphone
- Repeat the Qs
- be patient with technology
- listen actively and respectfully
- avoid side conversations – these can be hard to follow

Zoom link: https://bit.ly/pices-2025-w6







Welcome
& Workshop framing

Introductions: *Facilitators & co-conveners*

Erin Satterthwaite, USA

Steve Diggs, USA

Julia Schmid, Canada

Kathryn Berry, Canada

Seung-tae Yoon, Korea

Wan Fangfang, China

Talen Rimmer, Canada

Jeanette Gann, USA

Noriko Shoji, USA

Introductions: *Participants*

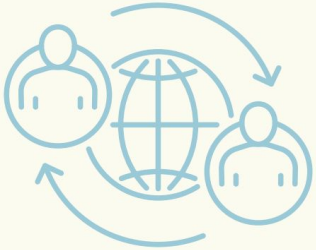
Please make sure you signed in & join us on Slido

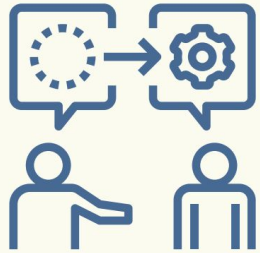
What types of data do you interact with most?

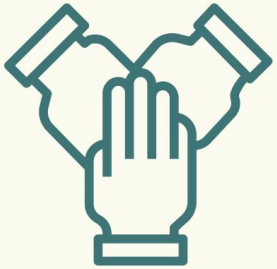
What country are you from?

What parameters do you interact with most?

Join at slido.com #3755206

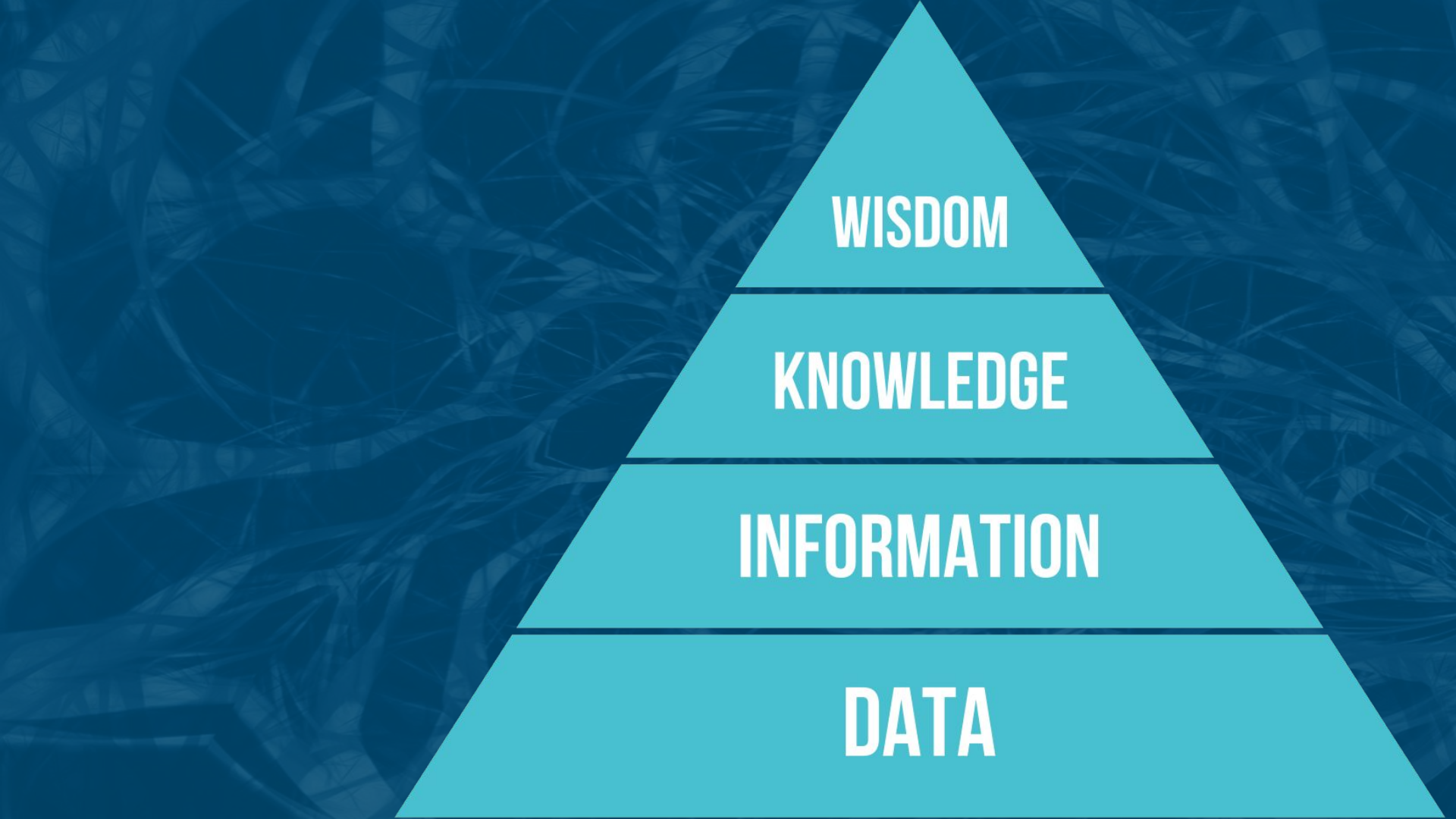




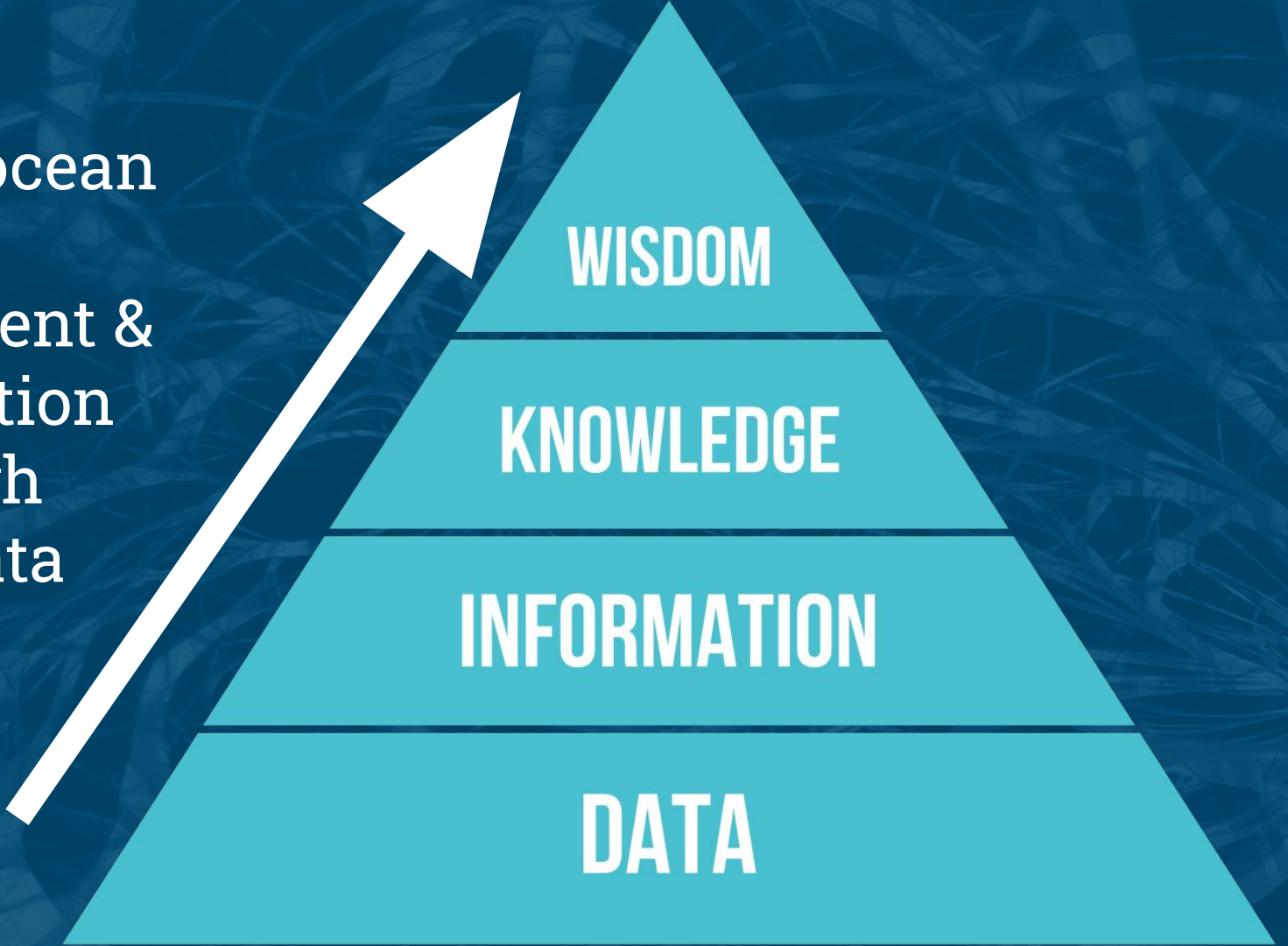


Data is not *information*,
information is not *knowledge*,
knowledge is not *understanding*,
understanding is not *wisdom*

~Clifford Stoll


WISDOM
KNOWLEDGE
INFORMATION
DATA

Enhance ocean data management & mobilization through metadata



This year's workshop builds on last years

Developing a shared data pipeline

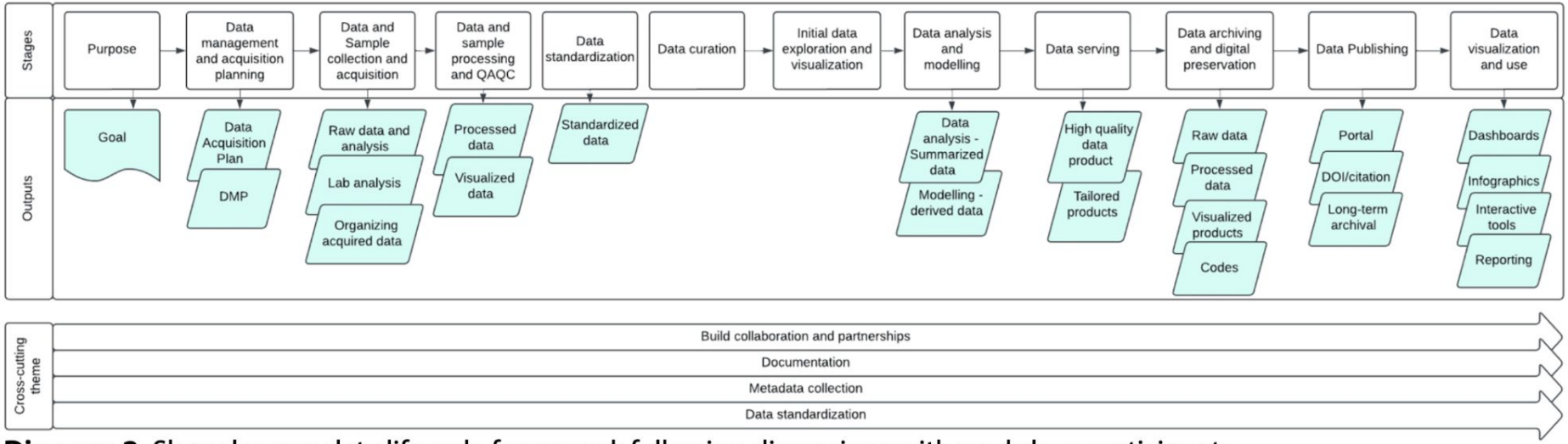


Diagram 2. Shared ocean data lifecycle framework following discussions with workshop participants.

https://meetings.pices.int/publications/pices-press/PICES-Press-2025-Vol33No1.pdf

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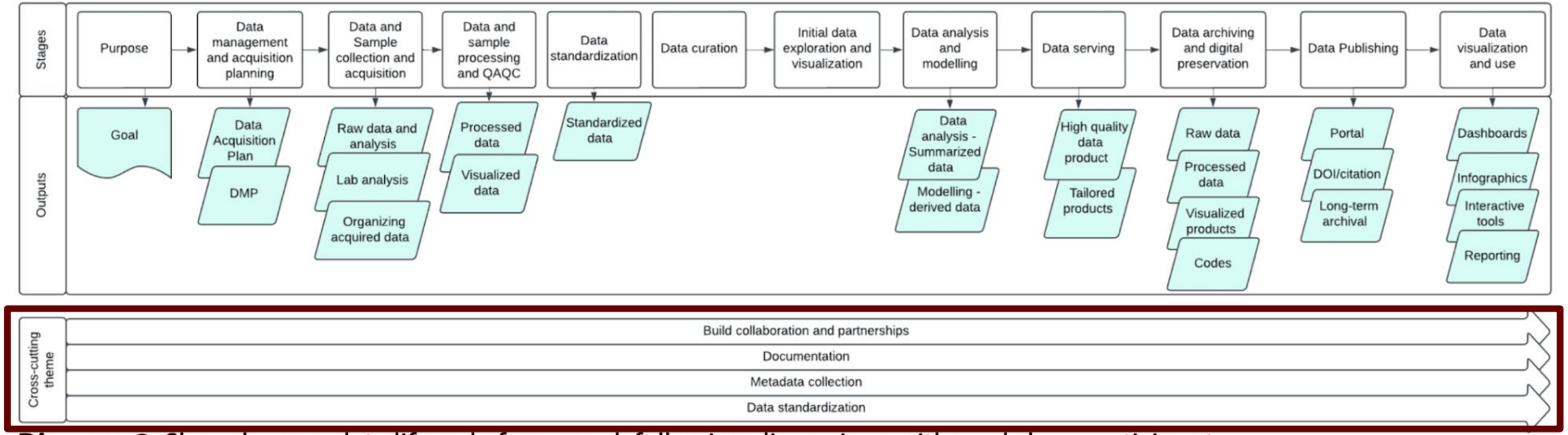


Diagram 2. Shared ocean data lifecycle framework following discussions with workshop participants.

https://meetings.pices.int/publications/pices-press/PICES-Press-2025-Vol33No1.pdf

Why focus on metadata?

We'll talk more on this later, too :)

Metadata is what makes data useful —
and able to be put together.

- **One of the first steps** in the data mobilization process
- **Can be one of the most difficult** parts of the data pipeline
- **Often forgotten**, yet foundational for discoverability and reuse
- **Increasingly critical** for high-quality, machine-readable data used in **AI and automation**
- Helps clarify **what data are being collected** and **why**

Workshop **Goals**

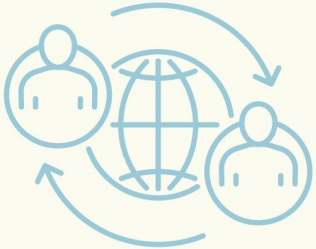
- Identify **actionable & implementable solutions** for **improving metadata creation, standardization, sharing, and reuse** to enable data mobilization

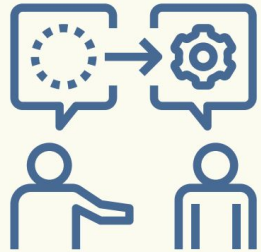
- Facilitate **cross-regional synthesis of environmental and fisheries data** to support large-scale research

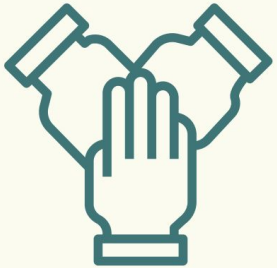
Agenda also on Whova!

Agenda

14:00 – 14:10 | Welcome & workshop introduction – 10 minutes
14:10 – 14:30 | Invited speaker (Dr. Toru Suzuki): Challenges & opportunities in data publishing & metadata – 20 minutes
14:30 – 14:45 | Overview on use case for our session: North Pacific Ecosystem Status Report (NPESR)/BECI – 15 minutes
14:45 – 15:10 | Intro to datasets – Group activity to search for metadata for zooplankton biomass/biovolume data – 25 minutes
15:10 – 15:30 | Compile Core Metadata Information (Step 1a) – 20 minutes
15:30 – 15:50 | Break – 20 minutes
15:50 – 16:20 | Choosing a Metadata standard (Step 1b) – 30 minutes
16:20 – 16:50 | Metadata generating tools (Step 2) – 30 minutes
16:50 – 17:10 | Publishable metadata (Step 3) – 20 minutes
17:10 – 17:30 | Next steps & workshop wrap-up – 20 minutes







Workshop outputs

- **List of minimum fields** for metadata (step 1a)
- **List of metadata standards used** for different data types across PICES countries (step 1b)
- **Inventory of available metadata generating tools** (step 2)
- **List of repositories** where researchers from PICES currently publish metadata/data (step 3)

What we mean by...

Data

- Can take many forms – observations, measurements (numbers), images, videos, acoustic files, text, and other forms of recorded information.

What we mean by...

Metadata

- “Data about data”
- Describes content, quality, and context of a dataset
- Helps data be found, understood, and reused
- Typically includes the what, where, when, who, how, why, and units

What we mean by...

Data Publishing

- Making data publicly available, accessible, and citable
- Shared through recognized repositories or platforms
- Includes metadata and documentation
- Ensures data can be discovered, understood, reused, and credited

Invited presentation by…

Dr. Toru Suzuki

Marine Information Research Center (MIRC)

Q & A with…

Dr. Toru Suzuki

Marine Information Research Center (MIRC)

Overview on use case for our session

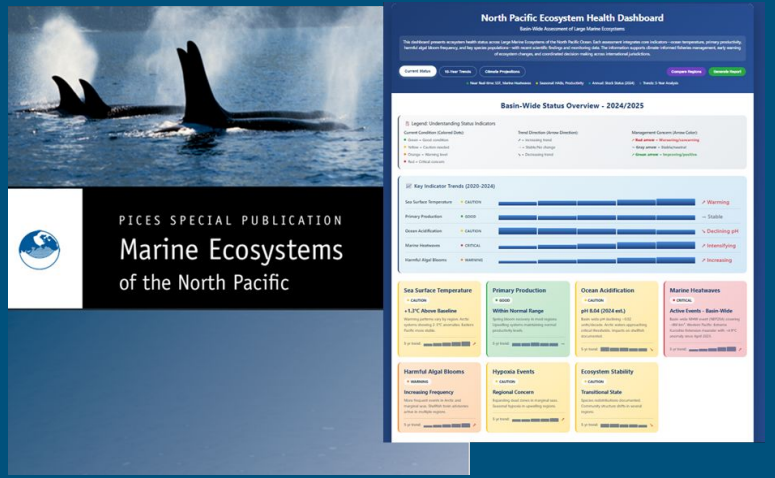
North Pacific Ecosystem Status Report (NPESR) / BECI

Introduction to NPESR & BECI

- North Pacific Ecosystem Status Report (NPESR): PICES' most comprehensive Pan-Pacific synthesis covering 14 ecoregions
- New NPESR Study Group being established (2025-2026) to develop different reporting processes for next iteration
- Basin-scale Events and Coastal Impacts (BECI) Knowledge Network: interactive platform to integrate information to support informed decision-making.
    - There is a strong focus on standardized assessments and cross-regional analyses

Both projects face critical barriers:

- Non-standardized metadata across regions and institutions
- Manual data synthesis processes that are time-intensive
- Difficult to compare information across jurisdictions



Challenges NPESR & BECI Authors Face

NPESR: Voluntary contributions from member countries with inconsistent reporting formats

- Variable data availability across 14 ecoregions
- Different parameter selection and analytical approaches
- Lengthy compilation process

BECI: Aims to be a "living synthesis" and needs to connect diverse data sources

- Multiple monitoring programs with different protocols
- Data stored in different repositories and formats
- Lack of common vocabulary for discovery

Both need: Comparable data, clear methods documentation, ability to assess fitness-for-purpose

Zooplankton Data as Our Use Case

Why zooplankton?

- Core biological indicator in NPESR and BECI (zooplankton biomass indices)
- Collected across all North Pacific regions
- Key link between ocean conditions and fisheries productivity

The metadata challenge with zooplankton:

- Different sampling methods (net types, mesh sizes, depth ranges)
- Variable taxonomic resolution (species vs. functional groups)
- Non-standardized units (biomass, abundance, biovolume)
- Seasonal sampling differences

Connection to community: W2 North Pacific Plankton Time Series Data Analyses and Synthesis

Led by Akash Sastri, Julie Keister, Kazuaki Tadokoro, Satoshi Kitajima. Facilitating regional inter-comparison of zooplankton time series with a goal to examine if similar patterns exist across PICES regions and climate events.
Without standardized metadata, these comparisons are difficult and time intensive

Intro to datasets

Group activity to search for metadata for zooplankton biomass/biovolume data

Intro to datasets

5 min – Individual Search

- Search for zooplankton metadata records in repositories from your country/region
- *What's the state of discoverable metadata in the North Pacific?* (What's findable?)

10 min – Small Group Discussion

- What did you find? Is discoverability *better or worse than expected?*

10 mins – Showcase examples & group discussion

- What patterns or gaps do we see across the North Pacific?
- How can we improve discoverability and usability?

Compile Core Metadata Information

(Step 1a)

Join us on Slido!

Join at slido.com #1417580

Step 1a (pt 2) - *5-7 mins*

1. Break into small groups
2. Discuss the following questions and share your knowledge! (5-7 mins)
3. Report back to main group (5 mins)

Step 1a (pt 2) - *5-7 mins*

Question 1:
What metadata fields do you **absolutely need** to reuse the data?

Question 2:
What metadata fields are **optional but make integration easier** (i.e. ‘nice to have’ fields)?

Discuss these in the context of your group. Are there similarities / differences across regions, fields, etc?

Step 1a (pt 2) - *5-7 mins*

Use the following metadata sets as conversation starters if you have trouble starting:

KODC (Korea Ocean Data Center) –
Korean version– https://www.nifs.go.kr/kodc/index.kodc
English version – https://www.nifs.go.kr/kodc/eng/index.kodc

CAL COFI ZoopData Page:
https://calcofi.org/data/marine-ecosystem-data/zooplankton/

ERDDAP site:
https://oceanview.pfeg.noaa.gov/erddap/tabledap/erdCalCOFIzoovol.htm

Break

Choosing a Metadata standard

(Step 1b)

Choosing a Metadata standard
Goal & output

Goal

- Identify metadata standards for different data types and audiences

Output

- List of metadata standards used for data types across different PICES countries

Data type	Canada	USA	People's Republic of China	Japan	Republic of Korea	Russian Federation
Ecological data						
Biological records						
Oceanographic Surveys						
…						

Choosing a Metadata standard
Activity

- Share what metadata standards are in use across countries/domains (e.g., EML for ecological data, Darwin Core for biological records, or ISO 19115 for oceanographic surveys.)
- Posters for each data type + 1 blank for anything we missed on the wall
- Please write a metadata standard & country per sticky note (one per sticky note)

Please come back in 10-15 minutes

Choosing a Metadata standard
Group discussion

- Is anything *missing*?
- What *similarities* in metadata standards exist across domains or countries?
- What *differences* in metadata standards exist across domains or countries?
- *Other observations*?

Metadata generating tools

(Step 2)

Metadata generating tools

Repository Interfaces: Data + Metadata

OBIS
OCEAN BIODIVERSITY INFORMATION SYSTEM

ERDDAP
Easier access to scientific data

GeoNetwork
opensource

zenodo

Template / Manual Editors:

QSphere

CatMDEdit
OpenSource Project

Metadata brokers / Harvesters:

ODIS

GEO
GROUP ON EARTH OBSERVATIONS

AI-Assisted Metadata Tools:

DataCite
Metadata Schema

OpenAI

Metadata generating tools

Environmental Research Division's Data Access Program

USER INPUT:
- Dataset files (NetCDF, CSV)
- Global attributes (title, summary, contact, variable descriptions)
- datasets.xml config

AUTOMATION: Moderate
- Autogenerates data access forms
- Multiple download formats
- Standardizes variables names/units
- Metadata exported in **CF Conventions** and **ISO 19115 XML** export possible

OUTPUT:
- Data and metadata served via REST API and OpeNDAP
- Downloadable in multiple formats (e.g., .csv, .json, .nc)

Metadata generating tools

Barriers/Limitations

Repository Interfaces:
- Technical setup
- Rigid standards
- Metadata quality depends on users

Template / Manual Editors:
- Time-consuming
- Inconsistent or incomplete records
- Limited scalability

Metadata brokers / Harvesters:
- Depend on source quality
- Interoperability issues

AI-Assisted Metadata Tools:
- Accuracy, validation, and domain knowledge gaps

Automation helps — but only when metadata quality, standards alignment, and validation are in place.

Metadata generating tools

Group discussion:

Questions 1:
Have you used metadata generating tools?

Question 2:
If so, what?

Question 3:
If you could automate one aspect of your metadata creation, what would it be?

Join us on Slido!

oin at slido.com #9348423

Publishable metadata

(Step 3)

Publishable metadata

Two options:

1. Publish metadata and data together in same repository

2. Publish metadata separately and link to data elsewhere

Publishable metadata

Group discussion:

Questions 1:
Where do you currently publish metadata?
(Datatype, repo name, country)

Question 2:
Can other researchers or data portals easily find your datasets?

Data type	Canada	USA	People's Republic of China	Japan	Republic of Korea	Russian Federation
Ecological data						
Biological records						
Oceanographic Surveys						
…						

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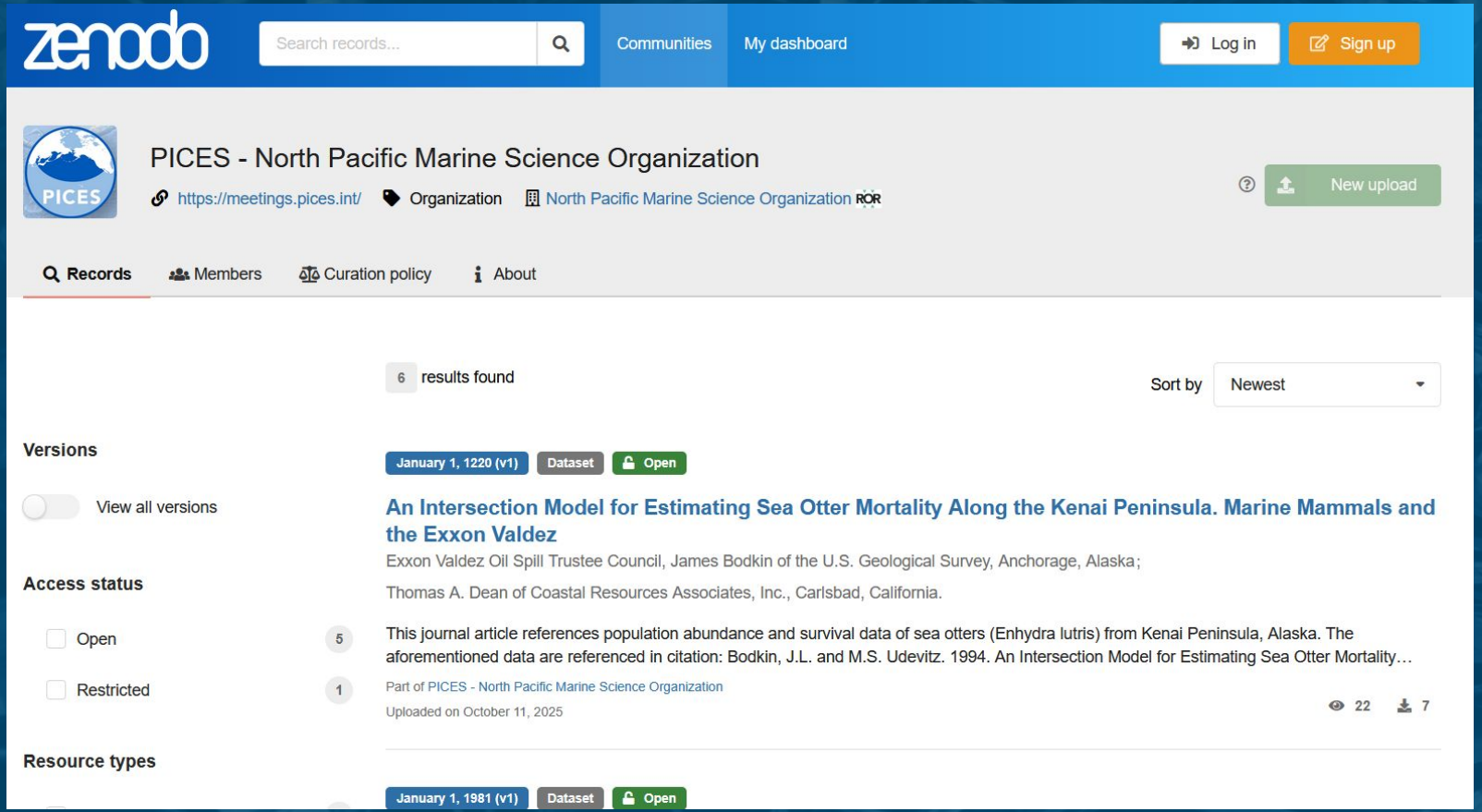
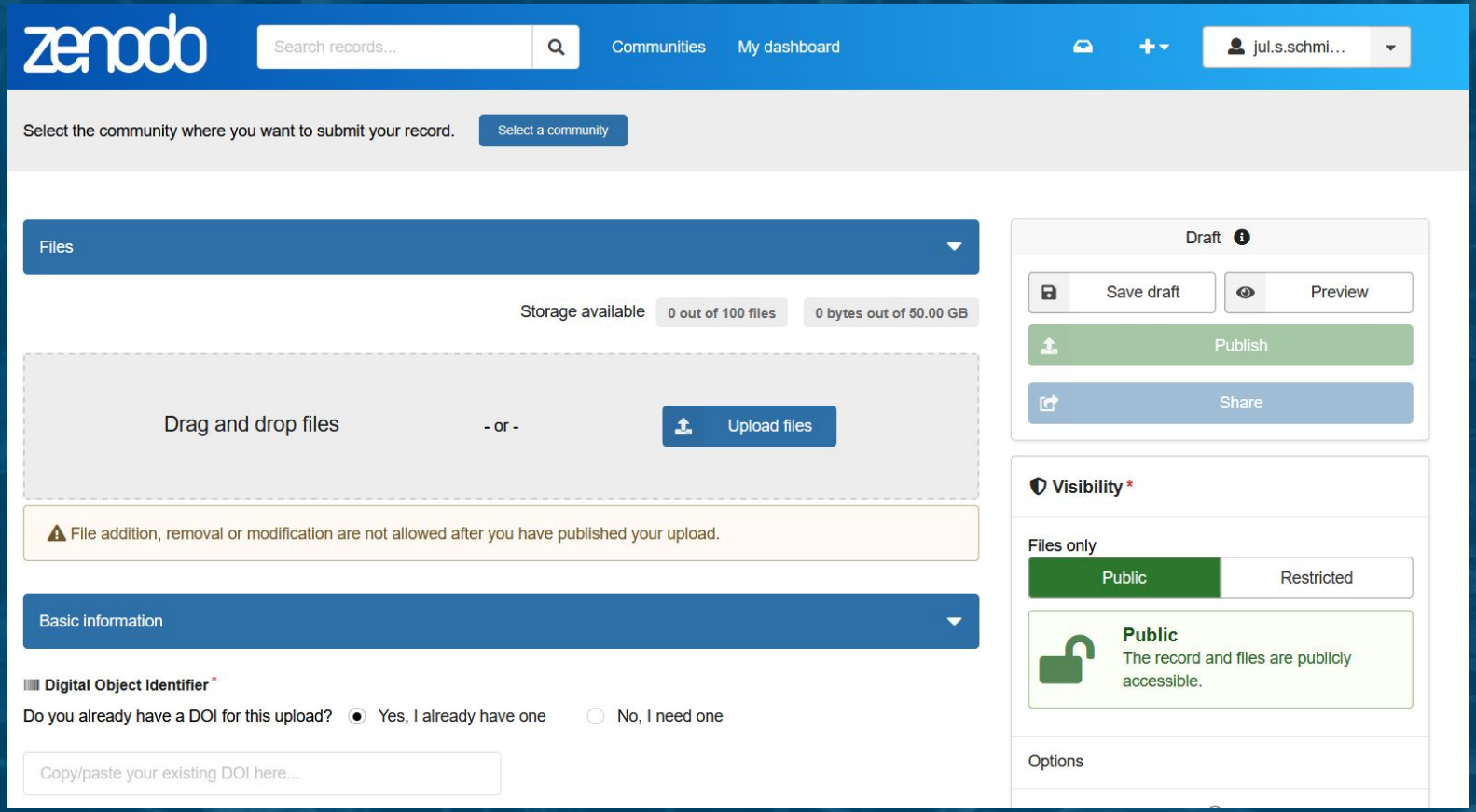
Publishable metadata - Zenodo



Publishable metadata - Zenodo



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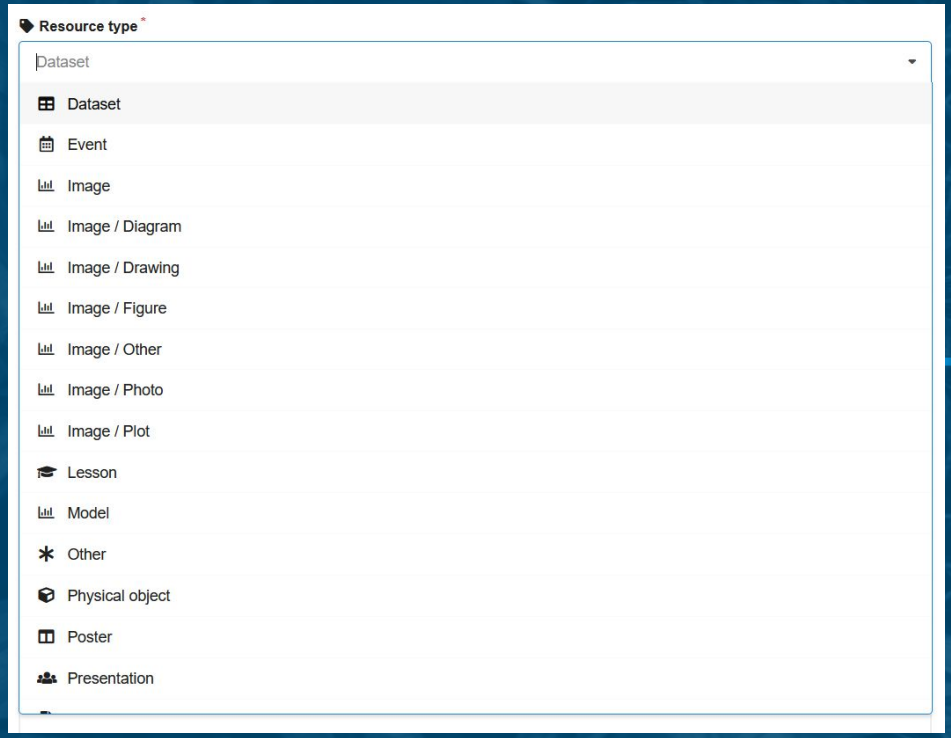


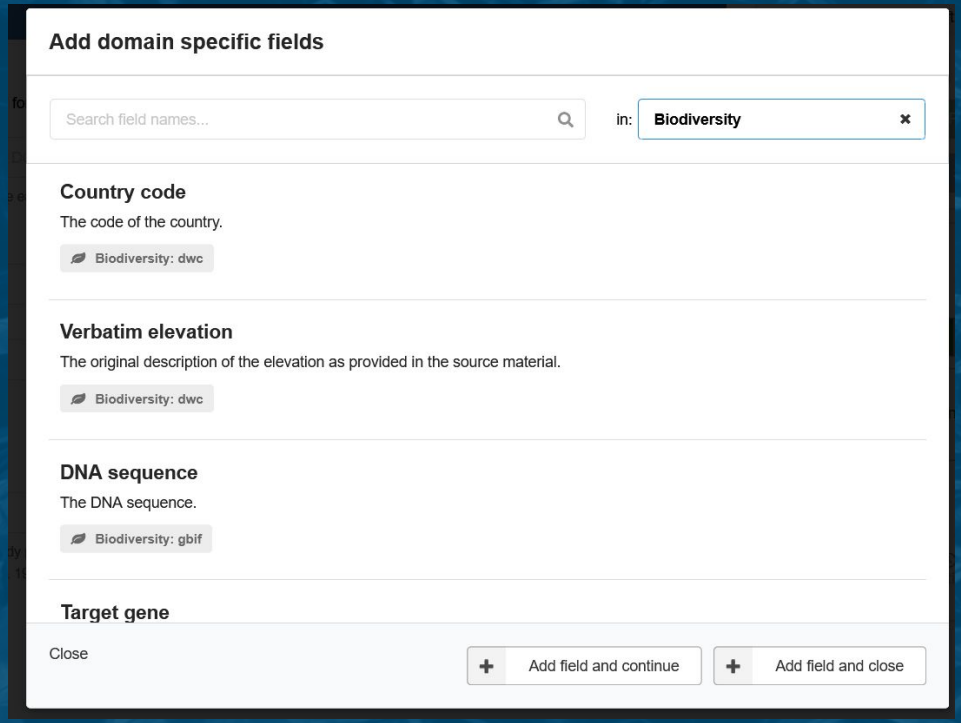
Mandatory:

- DOI
- Title
- Creators
- License
- Visibility

Optional

- Description
- Contributors
- Keywords and subjects
- Dates
- Funding
- Related works
- ...

Publishable metadata - Zenodo



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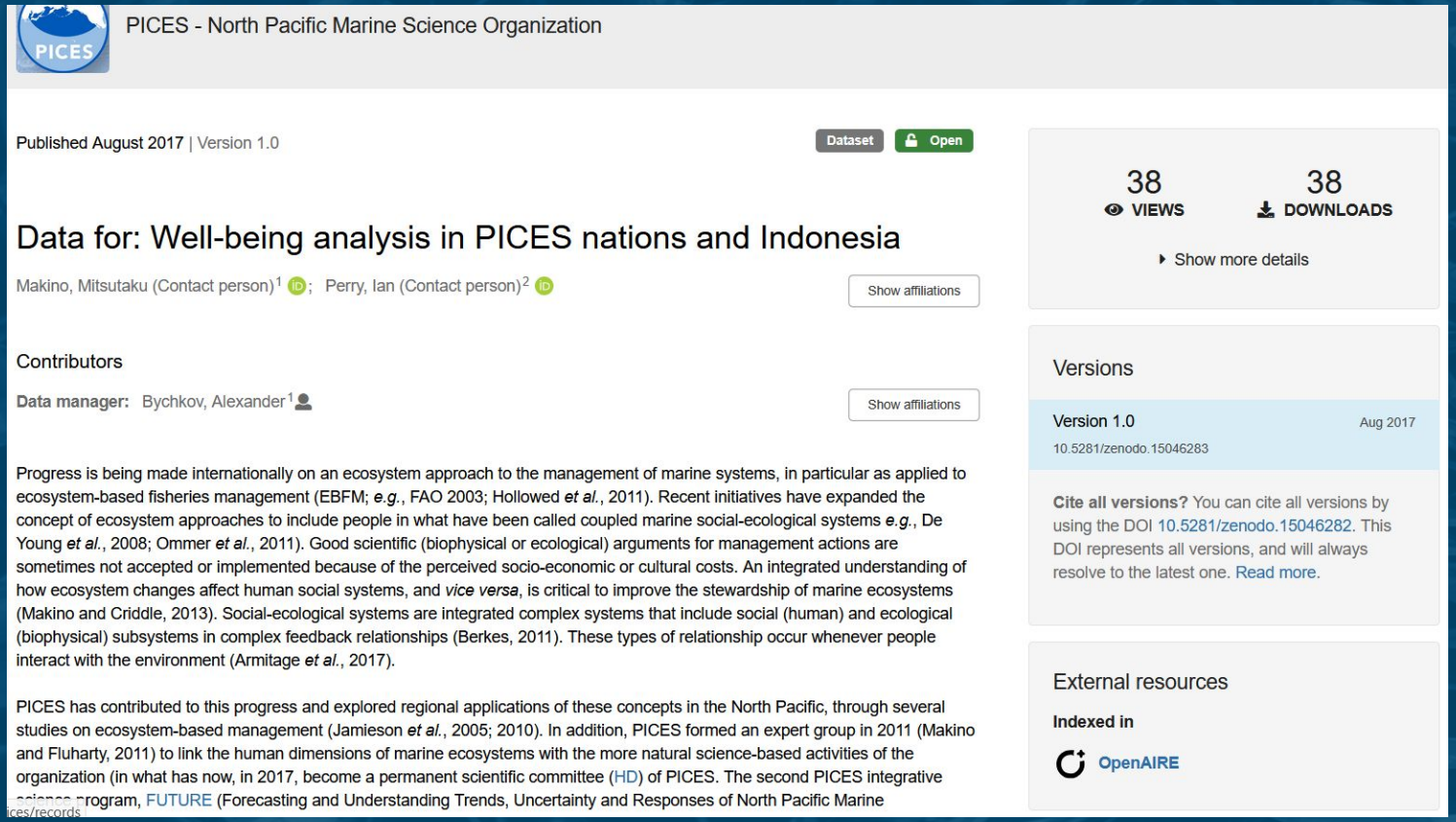

PICES - North Pacific Marine Science Organization

Published August 2017 | Version 1.0

Dataset Open

Data for: Well-being analysis in PICES nations and Indonesia

Makino, Mitsutaku (Contact person)[1]; Perry, Ian (Contact person)[2]

Show affiliations

Contributors

Data manager: Bychkov, Alexander[1]

Show affiliations

Progress is being made internationally on an ecosystem approach to the management of marine systems, in particular as applied to ecosystem-based fisheries management (EBFM; *e.g.*, FAO 2003; Hollowed *et al.*, 2011). Recent initiatives have expanded the concept of ecosystem approaches to include people in what have been called coupled marine social-ecological systems *e.g.*, De Young *et al.*, 2008; Ommer *et al.*, 2011). Good scientific (biophysical or ecological) arguments for management actions are sometimes not accepted or implemented because of the perceived socio-economic or cultural costs. An integrated understanding of how ecosystem changes affect human social systems, and *vice versa*, is critical to improve the stewardship of marine ecosystems (Makino and Criddle, 2013). Social-ecological systems are integrated complex systems that include social (human) and ecological (biophysical) subsystems in complex feedback relationships (Berkes, 2011). These types of relationship occur whenever people interact with the environment (Armitage *et al.*, 2017).

PICES has contributed to this progress and explored regional applications of these concepts in the North Pacific, through several studies on ecosystem-based management (Jamieson *et al.*, 2005; 2010). In addition, PICES formed an expert group in 2011 (Makino and Fluharty, 2011) to link the human dimensions of marine ecosystems with the more natural science-based activities of the organization (in what has now, in 2017, become a permanent scientific committee (HD) of PICES. The second PICES integrative science program, FUTURE (Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine

ices/records

38 VIEWS 38 DOWNLOADS

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Versions

Version 1.0 Aug 2017

10.5281/zenodo.15046283

Cite all versions? You can cite all versions by using the DOI 10.5281/zenodo.15046282. This DOI represents all versions, and will always resolve to the latest one. Read more.

External resources

Indexed in

OpenAIRE

Workshop wrap-up

Goal: Identify next steps and explore collaboration opportunities around metadata standardization and findability

Check in on main points that emerged during the workshop

- **List of minimum fields** for metadata (step 1a)
- **List of metadata standards used** for different data types across PICES countries (step 1b)
- **Inventory of available metadata generating tools** (step 2)
- **List of repositories** where researchers from PICES currently publish metadata/data (step 3)

Who will do it?

How much will it cost?

How long will it take?

Synthesis & closing thoughts?

- Open floor for other ideas that emerged during the workshop (e.g., insights, new directions, and collaborations)?
  - **Go around and share a word or phrase on what you are taking away from this workshop**

- Remaining gaps/challenges?
  - unresolved issues or open questions
  - Identify areas needing more input, resources, or coordination

Next steps

- We will plan to write PICES press article on findings.
  - Other ideas for outputs?
- Other outputs?
- Who wants to stay engaged, co-develop outputs, or pilot tools?
- Related or upcoming activities relevant to this work?

Thank you!

...for helping to build the foundation for more discoverable, interoperable ocean data in the North Pacific!