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Connecting the Dots in Marine Biodiversity Using Ontology-based Knowledge Graphs

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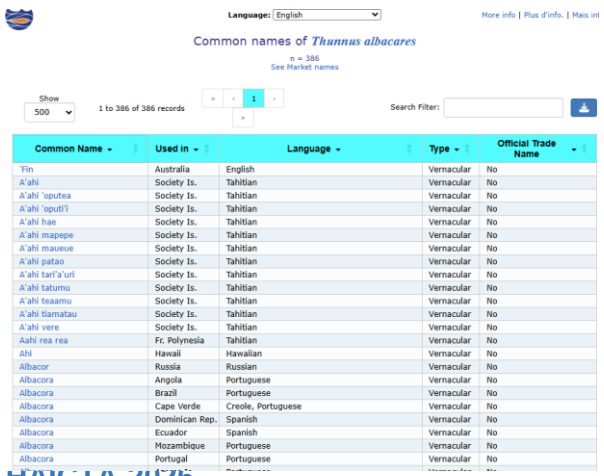


Outline

Why SemantyFish	3	2’
FAIR-by-design workflow	4	2’
Evolution support	5-7	2’
SemantyFish in Practice	8-10	3’
Conclusions & Next steps	11	1’

Why SemantyFish?





- ✓ Widely used, expert-curated biodiversity resource
- ✓ Rich information on taxonomy, ecology, traits, distribution
- ✓ Continuously updated

however…

- × Primarily designed for **human-oriented access**
- × **hard to integrate** with other resources (e.g. GBIF, OBIS, GRSF)
- × cross-table/cross-domain queries require **complex** joins
- × **not suitable** for machine-driven integration and reuse

SemantyFish adds an interoperable semantic layer on top of FishBase → making FishBase easier to integrate and reuse

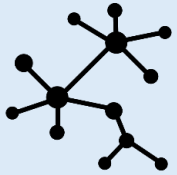
A FAIR-by-design workflow

1 FishBase



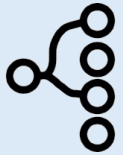
Relational database

2 Semantic Model



MarineTLO + extensions

3 Schema Mappings

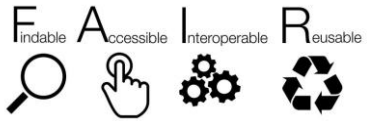


X3ML mapping specifications

4 **SemantyFish** Knowledge Graph



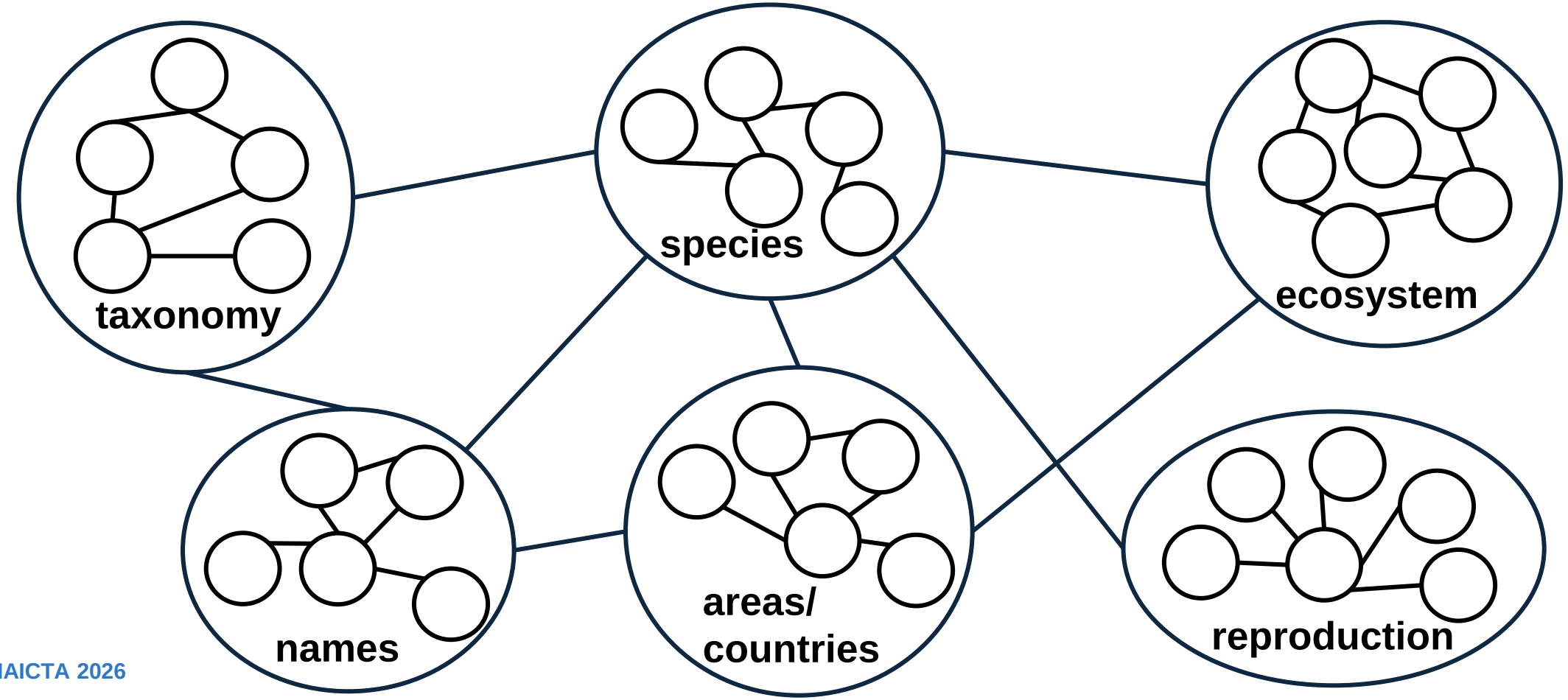
FishBase evolves → Knowledge Graph can be reconstructed



Findable, **A**ccessible, **I**nteroperable, **R**eusable FishBase data

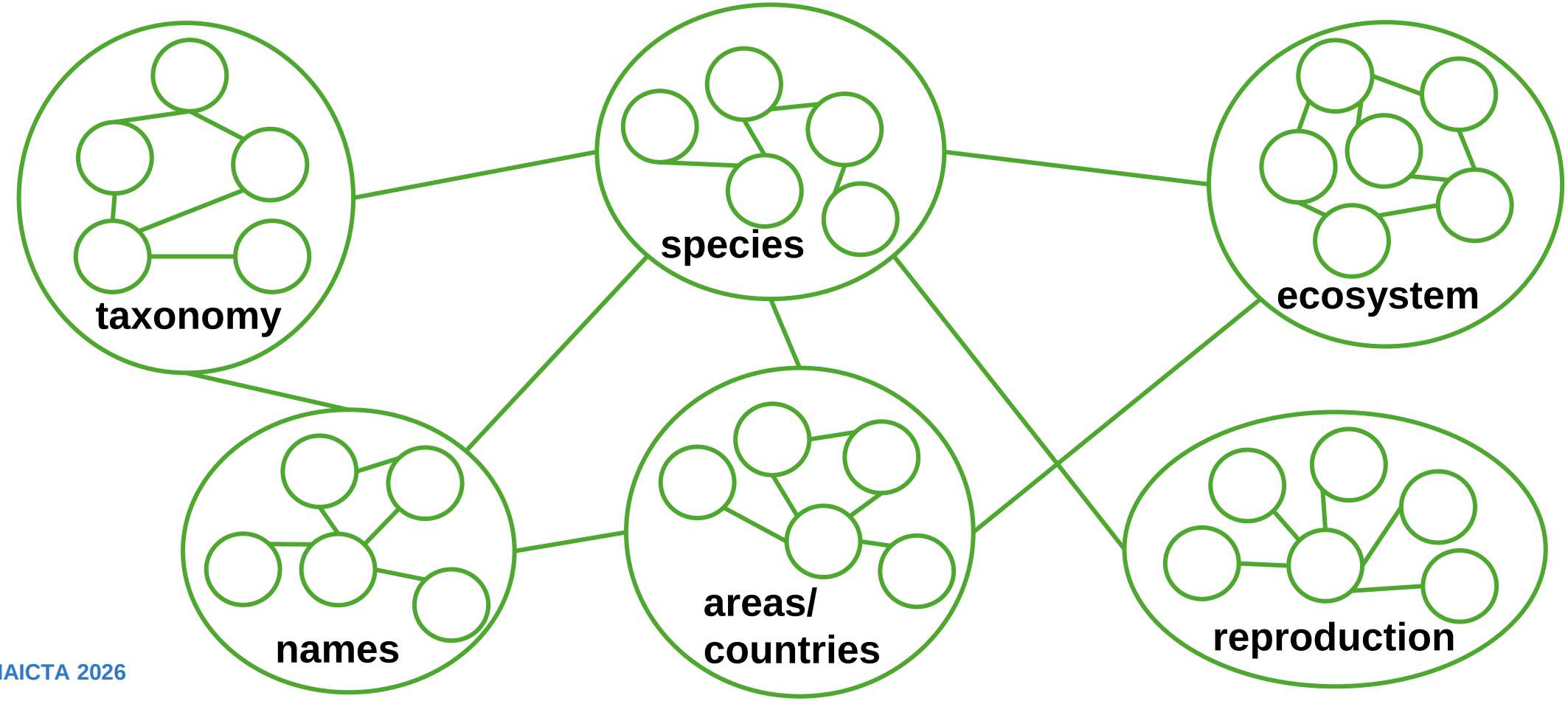
Keeping SemantyFish up to date

- Organized as **interconnected named graphs**



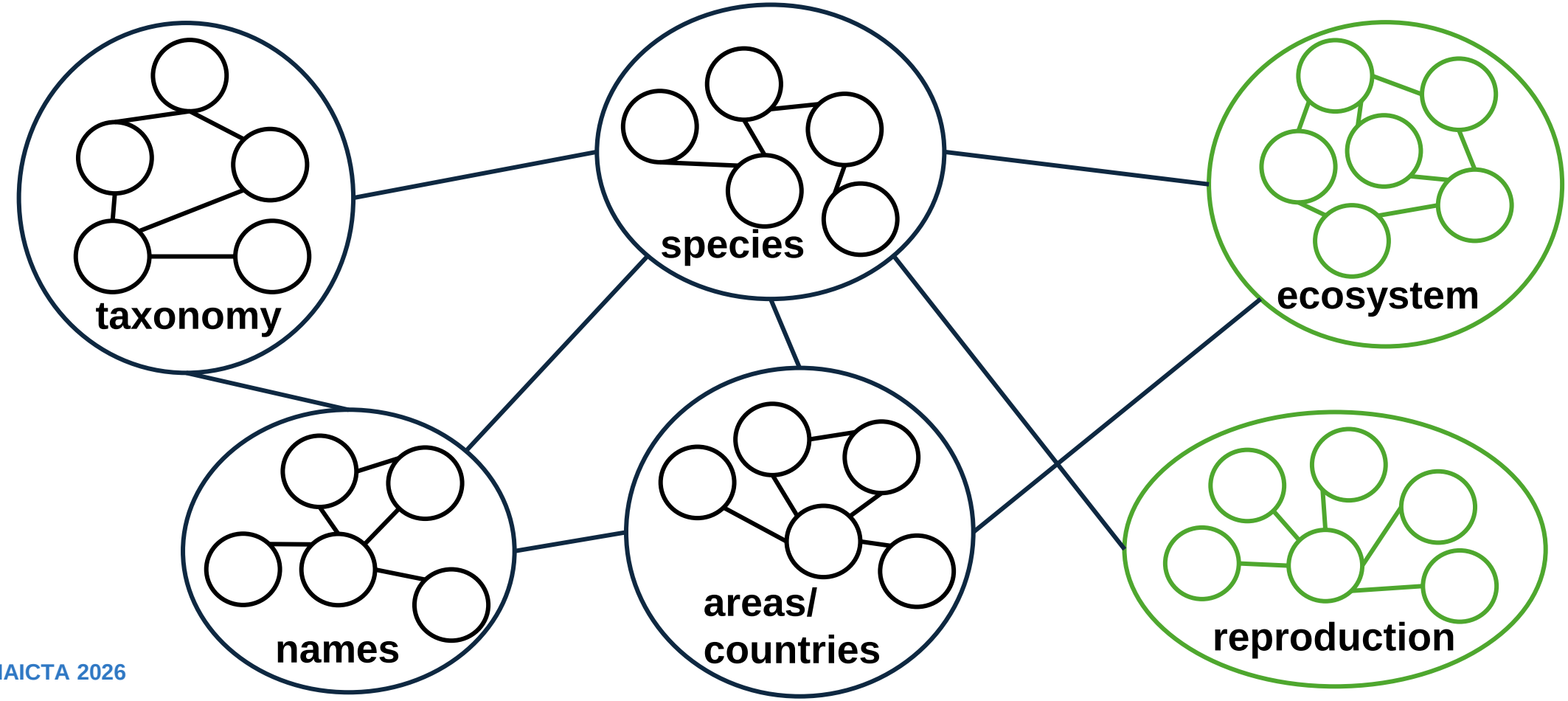
Keeping SemantyFish up to date – full reconstruction

- When FishBase evolves → **option A: full reconstruction**
  - Reconstruct the entire SemantyFish Knowledge Graph



Keeping SemantyFish up to date – partial reconstruction

- When FishBase evolves → **option B: partial reconstruction**
  - Reconstruct only the affected named graphs



SemantyFish at scale

37.4 million
RDF triples

7.7 million
distinct resources

36,175
species

386,456
common names

366 languages

36,363
ecosystems

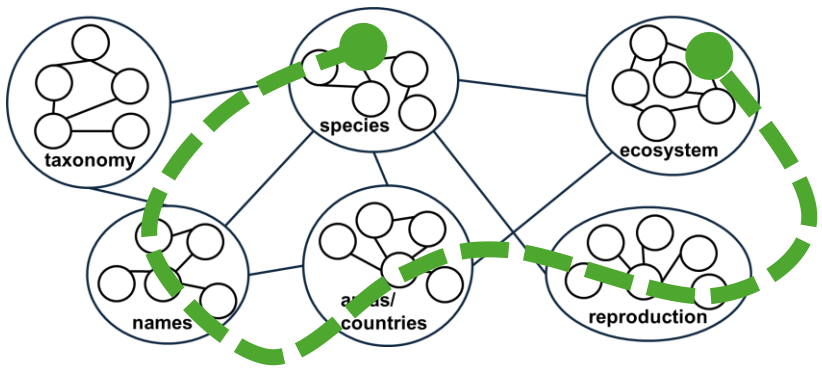
~ 22 minutes
transformation time

~ 3 minutes
Knowledge Graph construction time

Answering complex questions with SemantyFish

"Find the reproduction mode and Greek common name of commercially important marine species in the Mediterranean Sea that occur in brackish habitats deeper than 20 m."

Species | Common names | Reproduction | Water areas | Ecosystems



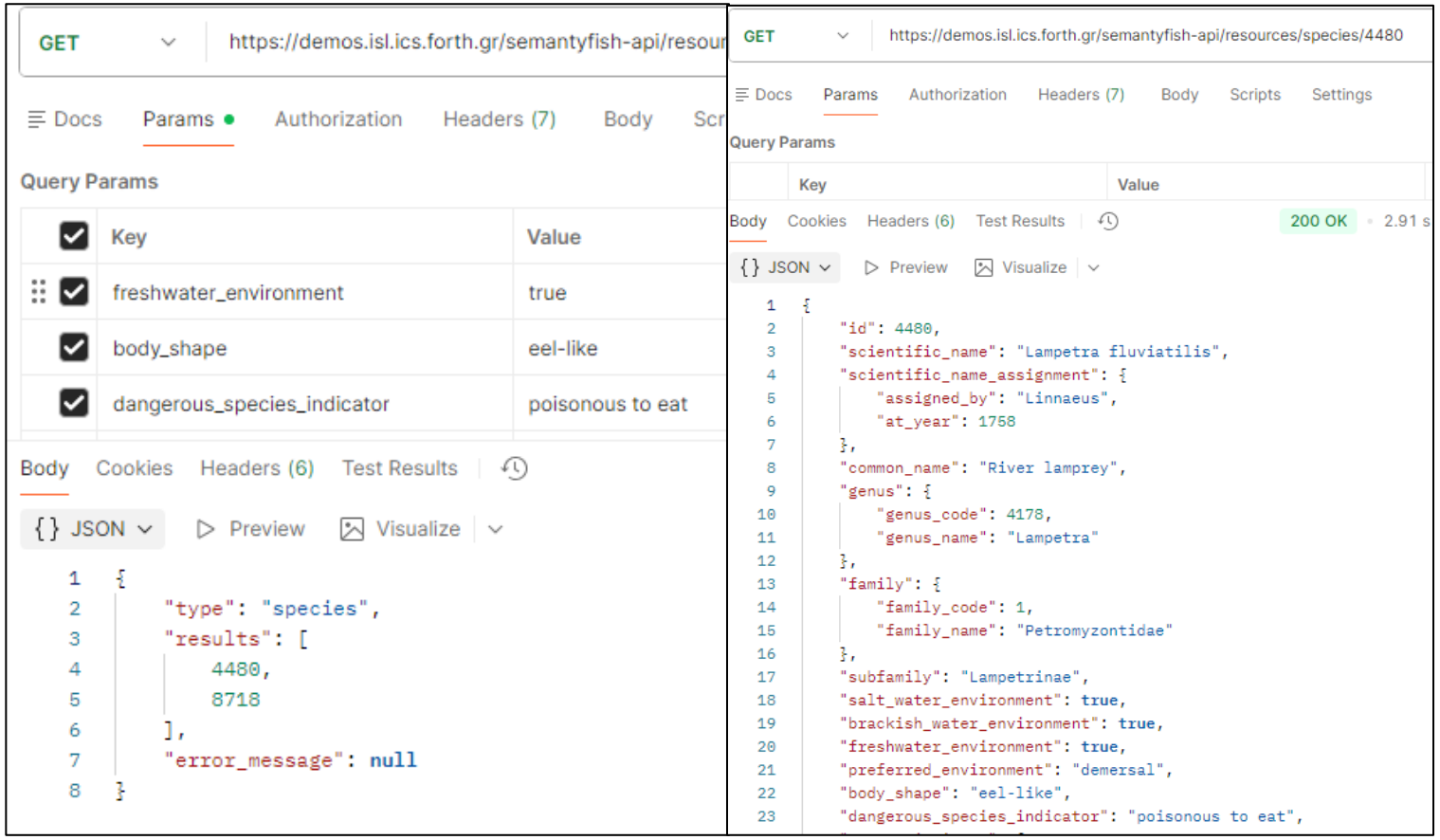
One semantic query

Scientific name	Greek common name	deepest waters	Reproduction details
Dicentrarchus labrax	Λαυράκι	100	dioecism
Belone belone	Ζαργάνα	22	dioecism
Acipenser huso	Μουρούνα	180	protogyny
Dasyatis pastinaca	Αγριόψαρο	200	dioecism

Open access through the SemantyFish API

Why the API matters?

- No SPARQL expertise required
  - Search and browse SemantyFish resources
  - multiple search criteria
  - Machine-readable results (JSON)
  - Straightforward integration with services and tools
  - Links with WoRMS and GRSF



Access SemantyFish without knowing RDF or SPARQL

Conclusions and Next steps

Conclusions

- FAIR-aligned knowledge from FishBase
- Evolves with FishBase through full or partial reconstruction
- Support complex query answering and open API-based reuse

Next steps

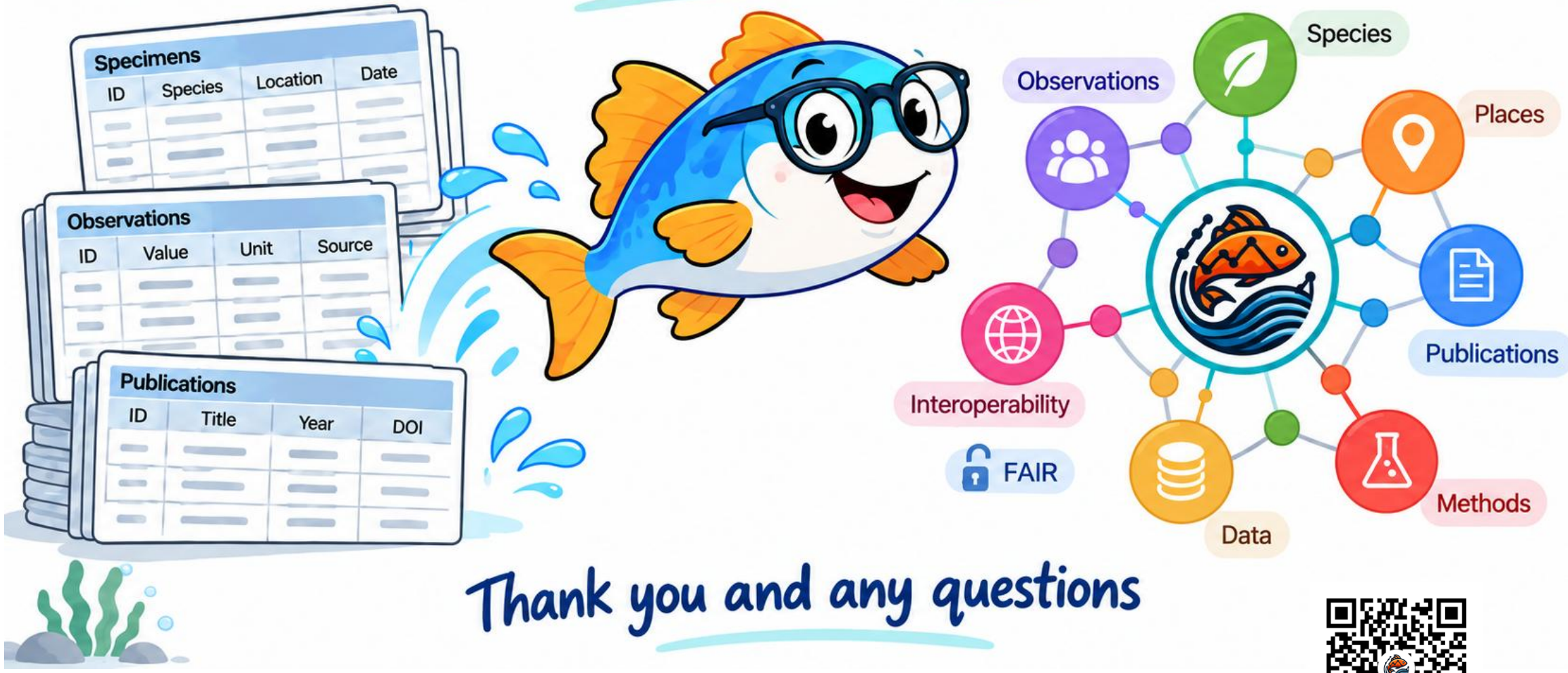
- Extend FishBase coverage and external links
- Evaluate semantic quality and enrichment

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I used to live in tables…
now I'm well connected.



Thank you and any questions

semantyfish.github.io