Listing and monetary valuation methods

of ecosystem services associated with diadromous species

6th July, 2022

LOCAL AND GLOBAL INITIATIVES:

HOW SCIENCE SUPPORTS MANAGEMENT ACTIONS ON DIADROMOUS FISH

Listing ES based on Literature Review (LR)

The initial research question was: What are the benefits that people receive from diadromous species populations?

SEARCH PROTOCOL WAS IMPLEMENTED

✓ For **peer reviewed** journal articles the tools 'Web of Science' and 'Scopus' were used

✓ To identify **relevant book chapters and grey literature** the 'Google Books' search engine and the 'Open Grey' search engine was used.

✓ **Inclusion criteria was applied**:
i) studies are required to be published from 1990 onwards
ii) studies are required to report on diadromous fish species
iii) results from any comparable temperate habitats to the European Atlantic Area can be included

✓ **Evidence extraction**:
Extraction of information under the headings:

- ES Category
- Type of paper
- Relevance of location
- Level of ES assessment
- Methodology for ES quantification
- Valuation methodology
- Intervention
- Result

✓ **Assessment of relevance and robustness of the evidence**

Section	CICES 5.1 Division/group/class	Anadromous								Catadromous		
		Salmon	Brown / sea trout	Sturgeon	Smelt	Allis Shad	Twaite Shad	Sea Lamprey	River Lamprey	Eel	Flounder	Mullet
Provisioning	**Biomass** (wild animals and their outputs)	3	3	3	3	3	3	3	3	3	3	3
Regulation and Maintenance	Transformation of biochemical or physical inputs to ecosystems – **Bio-remediation by micro-organisms, algae, plants, and animals**	3	1									
	Regulation of physical, chemical, biological conditions – **regulation of the chemical composition of freshwaters by living processes**	3	3	3	3	3	3	1	1	1	1	1
	Regulation of physical, chemical, biological conditions – **nutrient cycling (marine to terrestrial)**	3	3	3	3	3	3	3	3	3	3	3
	Decomposition and fixing processes and their effect on soil quality	3	3	3	3	3	3			1		
	Maintaining nursery populations and habitats (including gene pool protection)	3	3	3	3	3	3	3	3			
Cultural	Physical and experiential interactions with natural environment - **Physical use of land/seascapes in different environmental settings**	3	3	3	3	3	3	3	3	3	3	3
	Intellectual and representative interactions with natural environment – Characteristics of living systems that enable **scientific investigation or the creation of traditional ecological knowledge**	3	2	2	2	2	2	2	2	2	2	2
	Intellectual and representative interactions with natural environment – Characteristics of living systems that enable **education and training**	1	1	1	1	1	1	1	1	1	1	1
	Intellectual and representative interactions with natural environment – Characteristics of living systems that are resonant in terms of **culture or heritage**	3	3	3		3	3	3	3	3		
	Intellectual and representative interactions with natural environment – Characteristics of living systems that enable **aesthetic experiences**	2	2							1		
	Intellectual and representative interactions with natural environment – Elements of living systems that have **symbolic meaning**	1										
	Intellectual and representative interactions with natural environment – Elements of living systems that have **sacred or religious meaning**	1										
	Intellectual and representative interactions with natural environment – Characteristics or features of living systems that have an **existence value**	2	2	1	1	1	1	1	1	1	1	1
	Intellectual and representative interactions with natural environment – Characteristics or features of living systems that have an option or **bequest value**	2	2	1	1	1	1	1	1	1	1	1
Other Supporting services	**Primary production**	3	3	3	3	3	3		3	3	3	3
	Biological diversity	3	3	3	3	3	3	3	3	3	3	3
Other Regulating services	**Biological control**							2	2			
	Larval /Gamete supply	1	1	1	1	1	1	1	1	1	1	1

Scale of ecosystem service supplied relative to other features		Confidence in evidence	
#	Significant contribution	3	AA relevant - Peer reviewed literature
#	Moderate contribution	2	Grey literature or evidence from outside AA sites
#	Low contribution	1	Expert opinion
#	No or negligible ecosystem service provision		Not assessed
	Not assessed		

Matrix approach. Potts et al., 2014; Saunders et al., 2015; Burden et al., 2017

Which ES from LR?

- **Overall, the evidence of ES provided by different salmon species and trout (Salmo trutta) was far greater than for any other species**

- **highly supported by the literature (50 of 92 papers). Focus: salmon and/or sea trout. Provision of cultural services, especially recreational angling**

- **Second most research attention (31 papers of 92 reviewed). Provisioning services**

- **Third, well supported (23 papers of 92) - Regulating services by diadromous species, in particular those relating to the transfer of nutrients from marine to river and terrestrial systems**

ES listing – Group statement through stakeholder engagement

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Which ES from LEK?

CULTURAL ES

- LR - **Recreational angling** focused on salmon fishing and trout fishing – greatest body

- **Intellectual and representative interactions with natural environment**
  - **scientific investigation** or the creation of **traditional ecological knowledge**,
  - **cultural and natural heritage**
  - **Gastronomy and emotional brotherhood.** Especially eel and lamprey (in Spanish, Portuguese and French sites and eel in Spanish (Basque) and Portuguese sites
  - In Spanish, Portuguese and French sites a strong link exists between these diadromous species and **local identify and culture, traditions, art and folklore**

PROVISIONING ES

- LR - **As well as fisheries for salmon, sea trout, eel and sturgeon identified in the literature**

- Fisheries for allis and twaite shad were identified in Portuguese and French sites

- Fisheries for sea lamprey were identified to be present in Spanish, Portuguese and French river systems

- Thin lipped grey mullet fisheries were identified in French, Portuguese and UK sites

- European flounder fisheries were identified in Spanish, Portuguese and French sites

REGULATING ES

- **Transport of marine derived nutrients to rivers and streams** (and riparian vegetation) relating to : Regulation of physical, chemical, biological conditions – and decomposition and fixing processes and their effect on soil quality receive the most research attention

- **Diadromous species roles as watershed engineers** through altering sediment composition during spawning, e.g. movement of gravel when constructing redds

- The food source created for other fish species, mammals

- Lamprey species were also related to biological control on host species

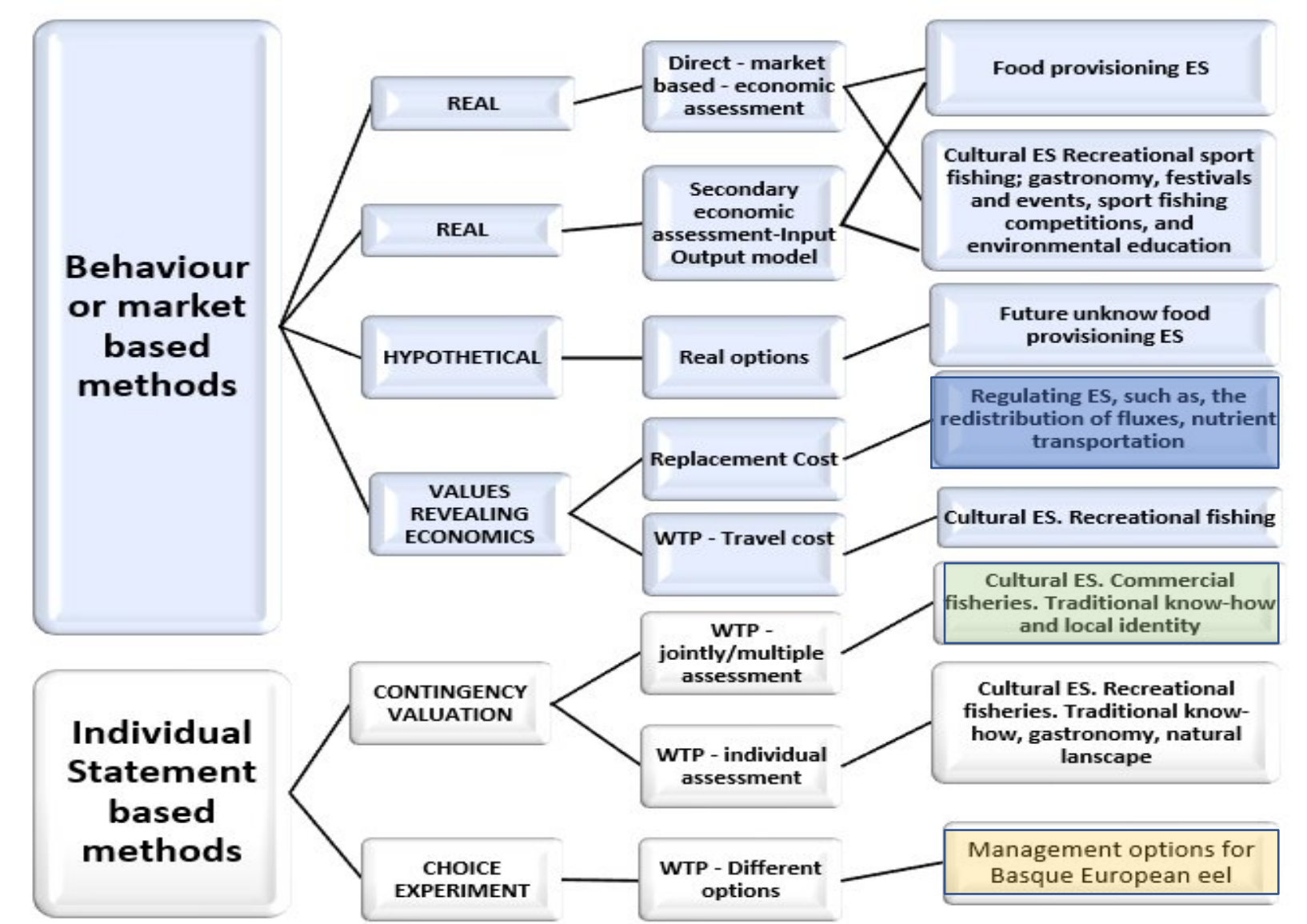
Why and Which assess valuation?

- ✓ **Valuation is the application of methods** and approaches to recognize values of nature

- ✓ **Which values?** It is a challenge to provide a valuation given the huge amount of disciplinary silos (economics, ecology, non-economy human-environmental interactions,...)

  - ✓ **The origin of valuation of nature in economics can be traced back to 1947 and Hotelling – travel costs**
  - ✓ **No methods** existed and the effects were **usually ignored (Pearce, 2002)**
  - ✓ **Later**, the idea that **the value of environmental benefits** can be derived from **markets - "revealed preference methods"**
  - ✓ **Given the lack of markets it was necessary to elicit those values using questionnaires – stated preference methods**

Which methods for which ES?



This research considers a high variety of methods depending on the particular ES from market based to non market based (Individual statement)

Replacement costs – nutrient transportation

GR3D: A tool to quantify nutrient fluxes

Routine implementation

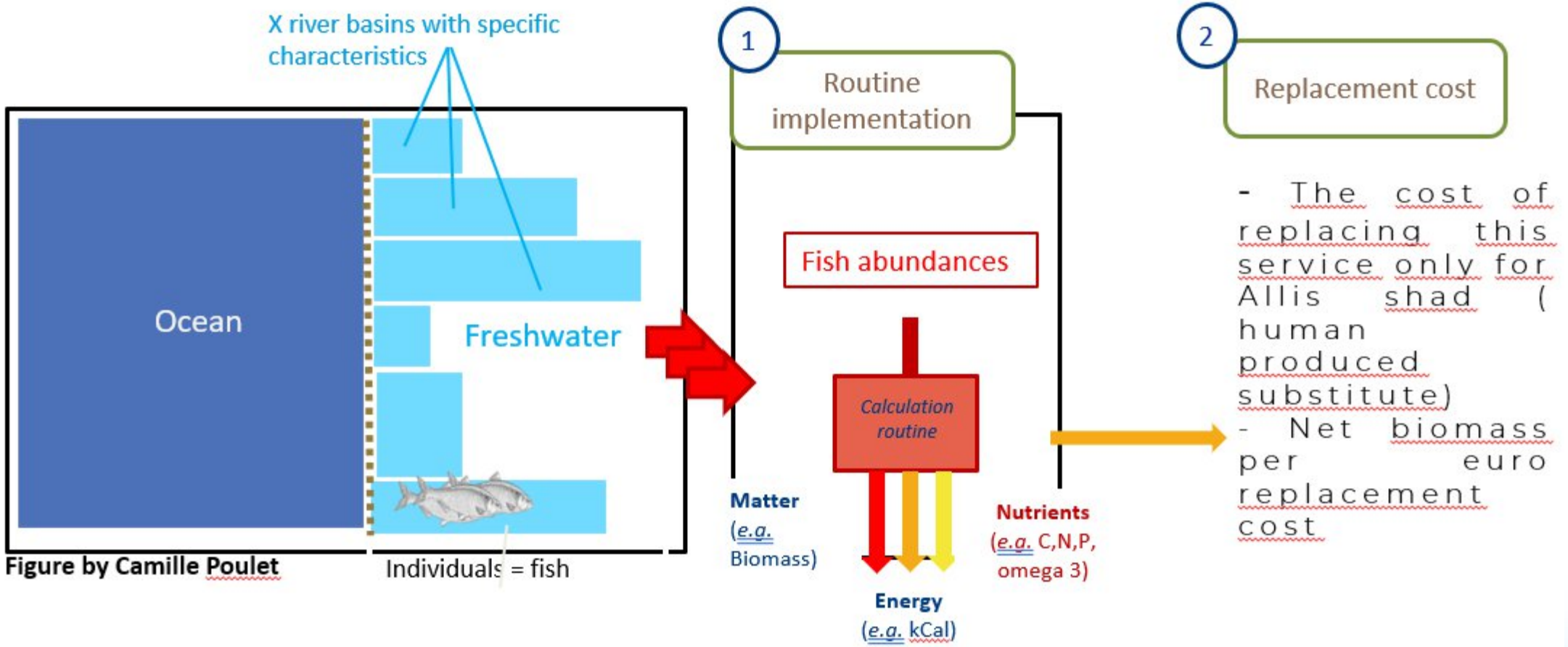
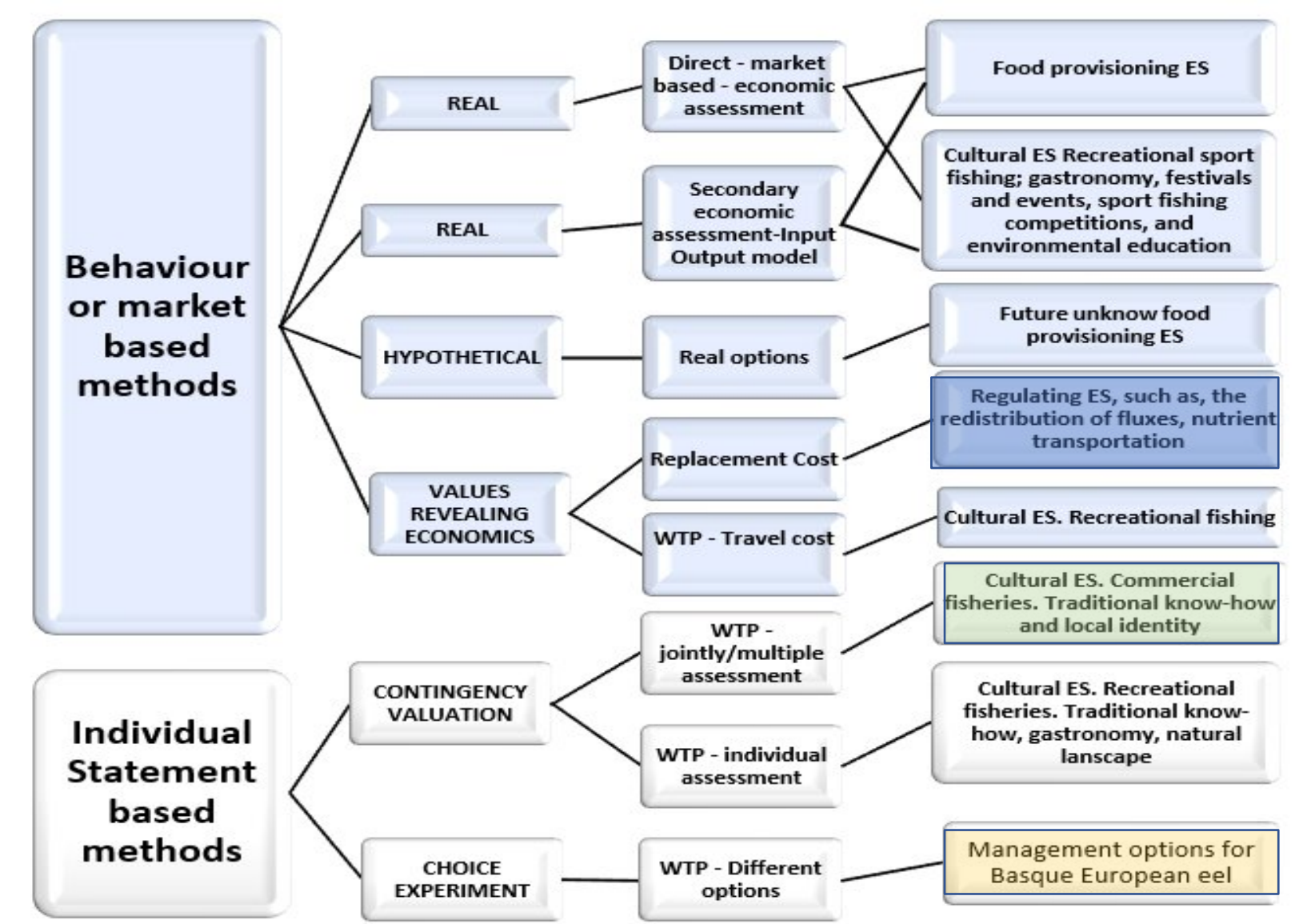


Figure by Camille Poulet

Which methods for which ES?



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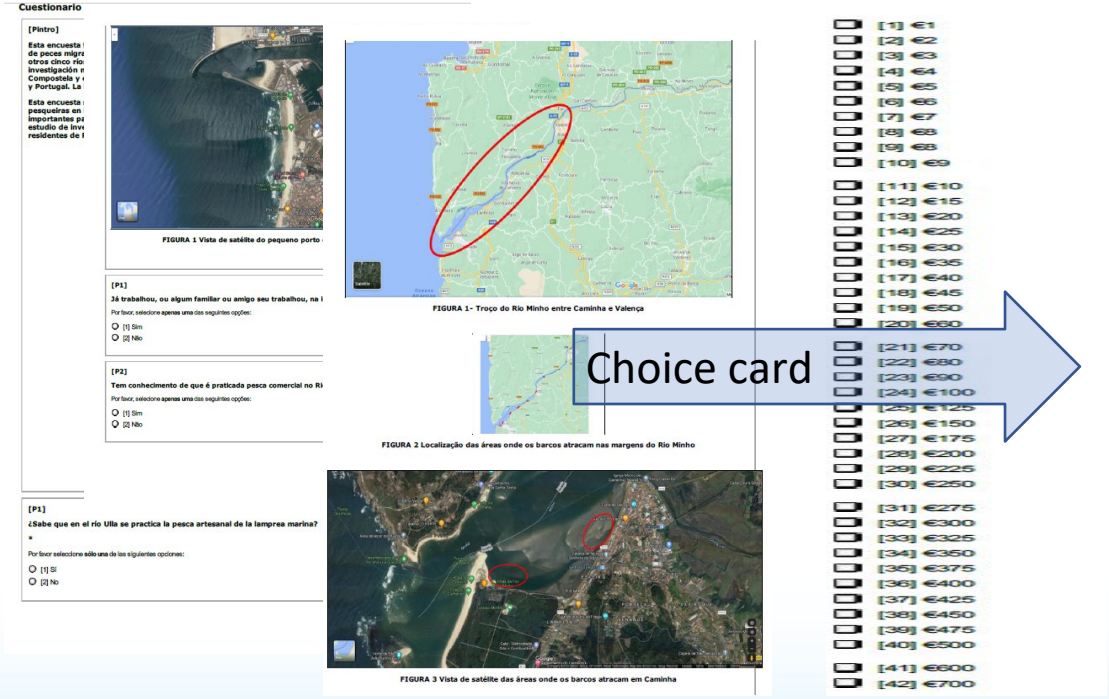
Contingent valuation – cultural ES

To estimate the economic value of the **cultural services attached to commercial fisheries** a **contingent valuation** exercise was implemented (Alberini and Kahn, 2006)

Respondents were asked about their willingness to pay (WTP) for preserving the existence of certain commercial fisheries



WTP from the choice card:

$$A_i\ LOW < WTP_i < A_i\ UP$$

$$\Pr(A_i\ LOW < WTP_i < A_i\ UP) = F(A_i\ UP) - F(A_i\ LOW)$$

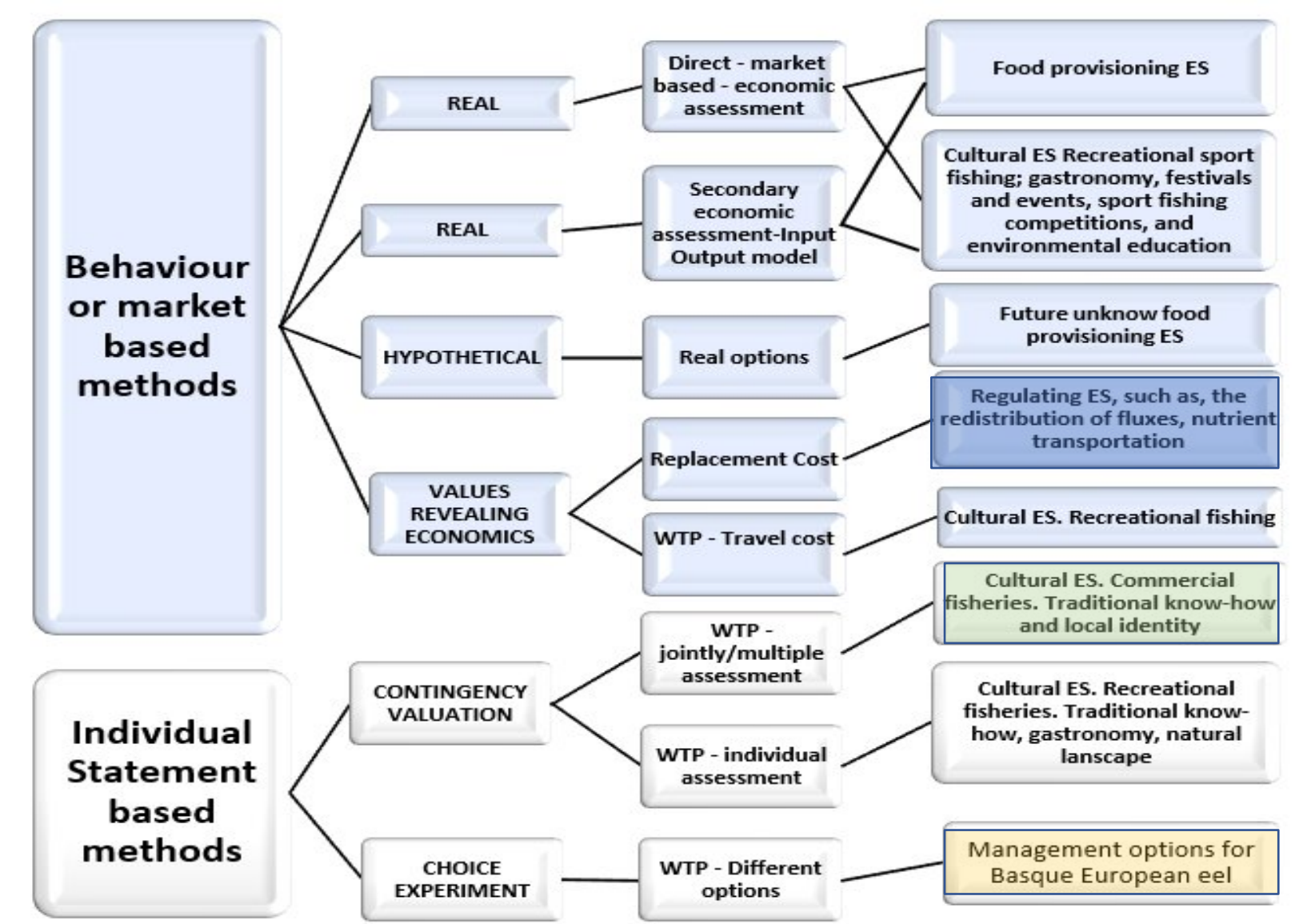
F: cumulative distribution function for WTPi.

WTP was estimated using the log-likelihood function:

$$\mathrm{Ln(L)} = \sum_{i=1}^{n} ln\left[F(A_i\ UP) - F(A_i\ LOW)\right]$$

n: number of individuals in the sample, respondents

Which methods for which ES?



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Choice experiment – cultural ES

- ☐ [1] €1
- ☐ [2] €2
- ☐ [3] €3
- ☐ [4] €4
- ☐ [5] €5
- ☐ [6] €6
- ☐ [7] €7
- ☐ [8] €8
- ☐ [9] €8
- ☐ [10] €9
- ☐ [11] €10
- ☐ [12] €15
- ☐ [13] €20
- ☐ [14] €25
- ☐ [15] €30
- ☐ [16] €35
- ☐ [17] €40
- ☐ [18] €45
- ☐ [19] €50
- ☐ [20] €60
- ☐ [21] €70
- ☐ [22] €80
- ☐ [23] €90
- ☐ [24] €100
- ☐ [25] €125
- ☐ [26] €150
- ☐ [27] €175
- ☐ [28] €200
- ☐ [29] €225
- ☐ [30] €250
- ☐ [31] €275
- ☐ [32] €300
- ☐ [39] €325
- ☐ [34] €350
- ☐ [35] €375
- ☐ [36] €400
- ☐ [37] €425
- ☐ [38] €450
- ☐ [39] €475
- ☐ [40] €500
- ☐ [41] €600
- ☐ [42] €700

PROPUESTA DE CUESTIONARIO SOBRE LA ACTIVIDAD PESQUERA DE LA ANGULA UTILIZANDO UN EXPERIMENTO DE ELECCIÓN DISCRETA

BLOQUE 1

PROYECTO DIADES

Esta encuesta forma parte de un estudio de investigación científica sobre el valor económico del patrimonio cultural de las pesquerías recreativas de angula en los ríos de Gipuzkoa. El estudio forma parte de un proyecto de investigación más amplio, DiadES (www.diades.eu) financiado por el programa Interreg Espacio Atlántico de la UE.

BLOQUE 2 – INTRO

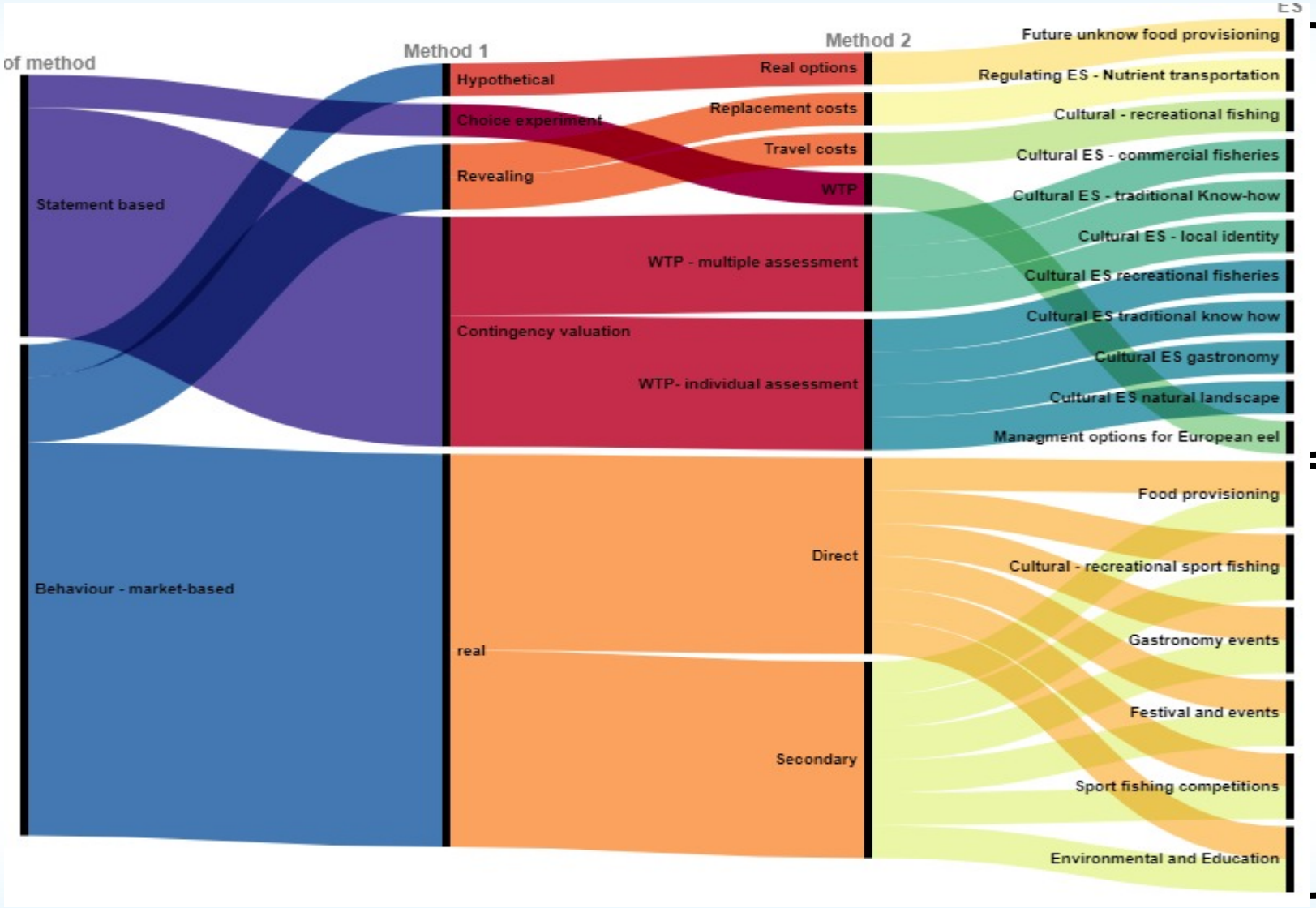
Euskadi es considerada la "cuna de la angula". La pesca de la angula es una actividad no profesional practicada desde hace muchos siglos si bien, **debido al estado de su biomasa sólo se permite el desarrollo de una pesquería recreativa**.

Una forma de garantizar la conservación, preservación y uso sostenible del patrimonio cultural y natural asociado a la actividad pesquera de angula sería la creación de un consorcio de entidades públicas y/o privadas sin ánimo de lucro que velen por el mismo. Este consorcio se financiaría gracias a una tasa pagada por la población vasca.

1. **¿Sabía que en los ríos de Gipuzkoa se practica pesca recreativa de angula?**
   - o Sí ☐
   - o No ☐
2. **¿Usted o alguno de sus familiares o amigos practica pesca recreativa de angula?**
   - o Sí ☐
   - o No ☐

CARD 1	PROGRAM A	PROGRAM B	NO PROGRAM
Fishing method	PROFESIONAL	NO PROFESIONAL	NO PROFESIONAL
Traditional vessels	El número de embarcaciones... SE MANTIENE	El número de embarcaciones... AUMENTA	El número de embarcaciones... DISMINUYE
Traditional fishing at land	El número de licencias... AUMENTA	El número de licencias... SE MANTIENE	El número de licencias... DISMINUYE
European Eel prices	SE BONIFICA	NO SE BONIFICA	NO SE BONIFICA
Cultural events	MASIFICADOS	NO MASIFICADOS	MASIFICADOS
European Eel conservation	PLANES EXISTENTES	ACCIONES ADICIONALES	PLANES EXISTENTES
Annual Tax per family (over 10 years)	72 €	144 €	0 €
CLICK YOUR PREFERRED OPTION→	☐	☐	☐

Which methods for which ES linked to SNA, SEEA?



SEEA, System of Environmental-Economic Accounting - Experimental Ecosystem Accounting

SNA, Standard National Accounting

Thanks for your attention!

Any further questions?

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or

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