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Waters of LIFE Advisor Training

Module 2: Introduction to Water Quality

May 2025

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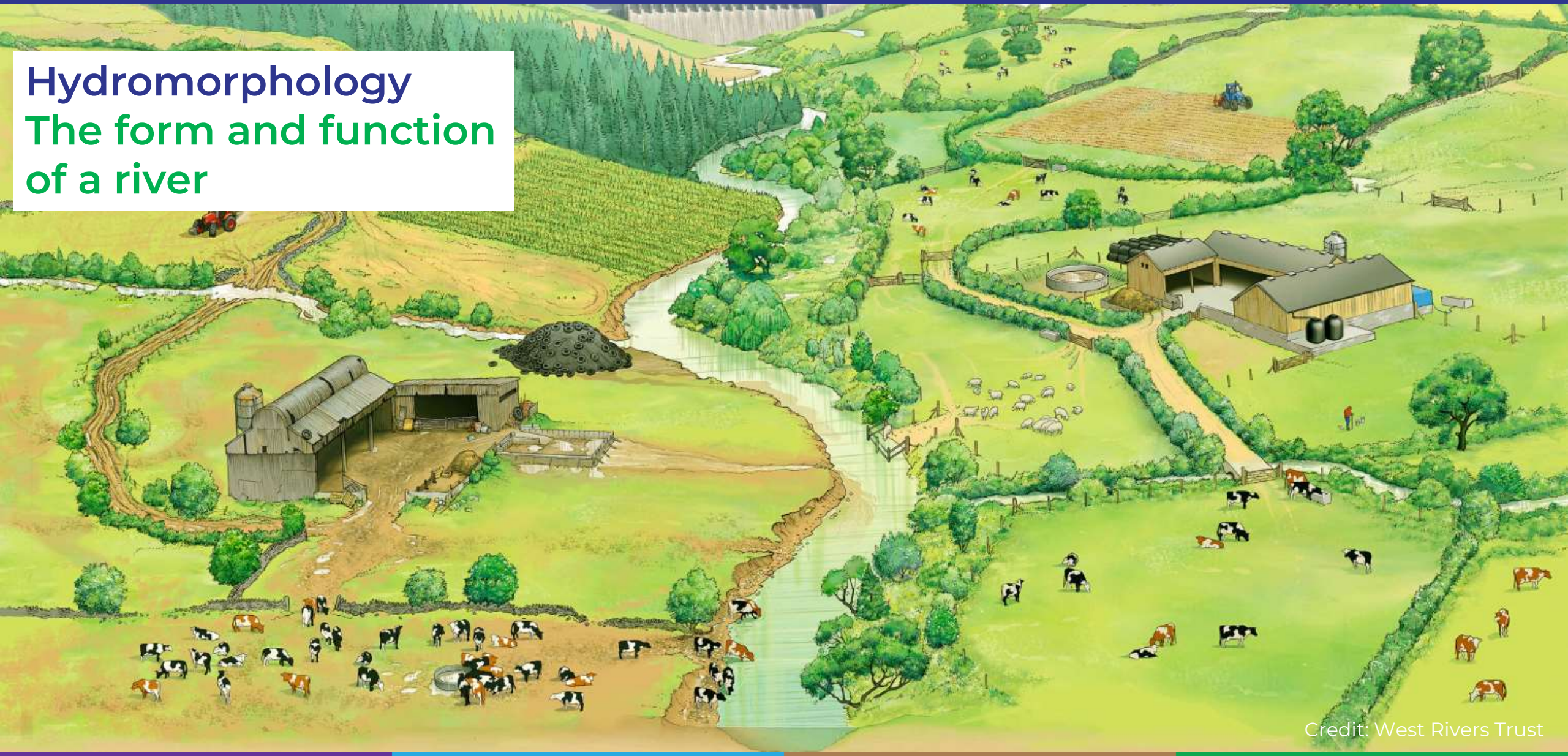
Hydromorphology
The form and function of a river



Credit: West Rivers Trust

WHAT IS A HEALTHY RIVER? THE FACTORS

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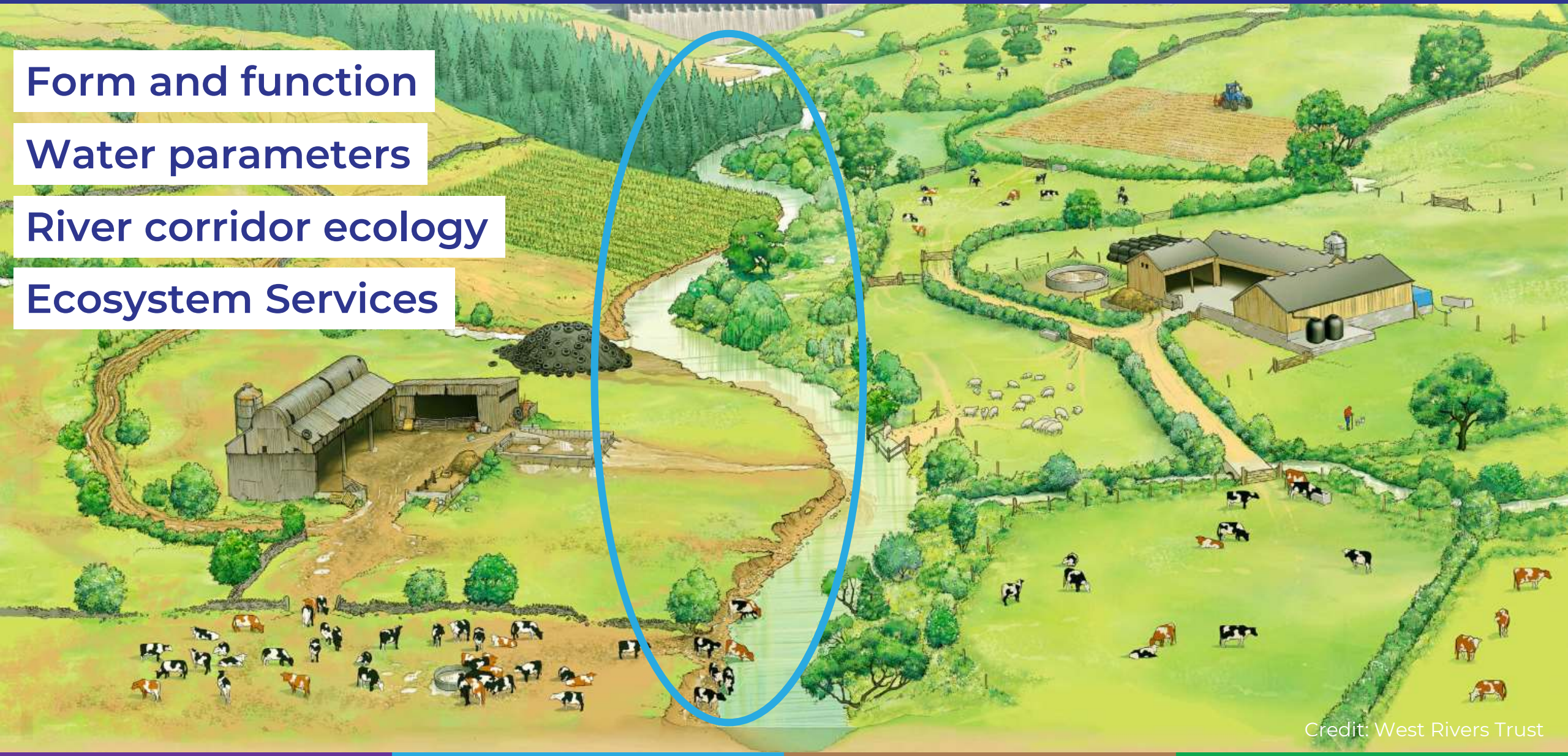

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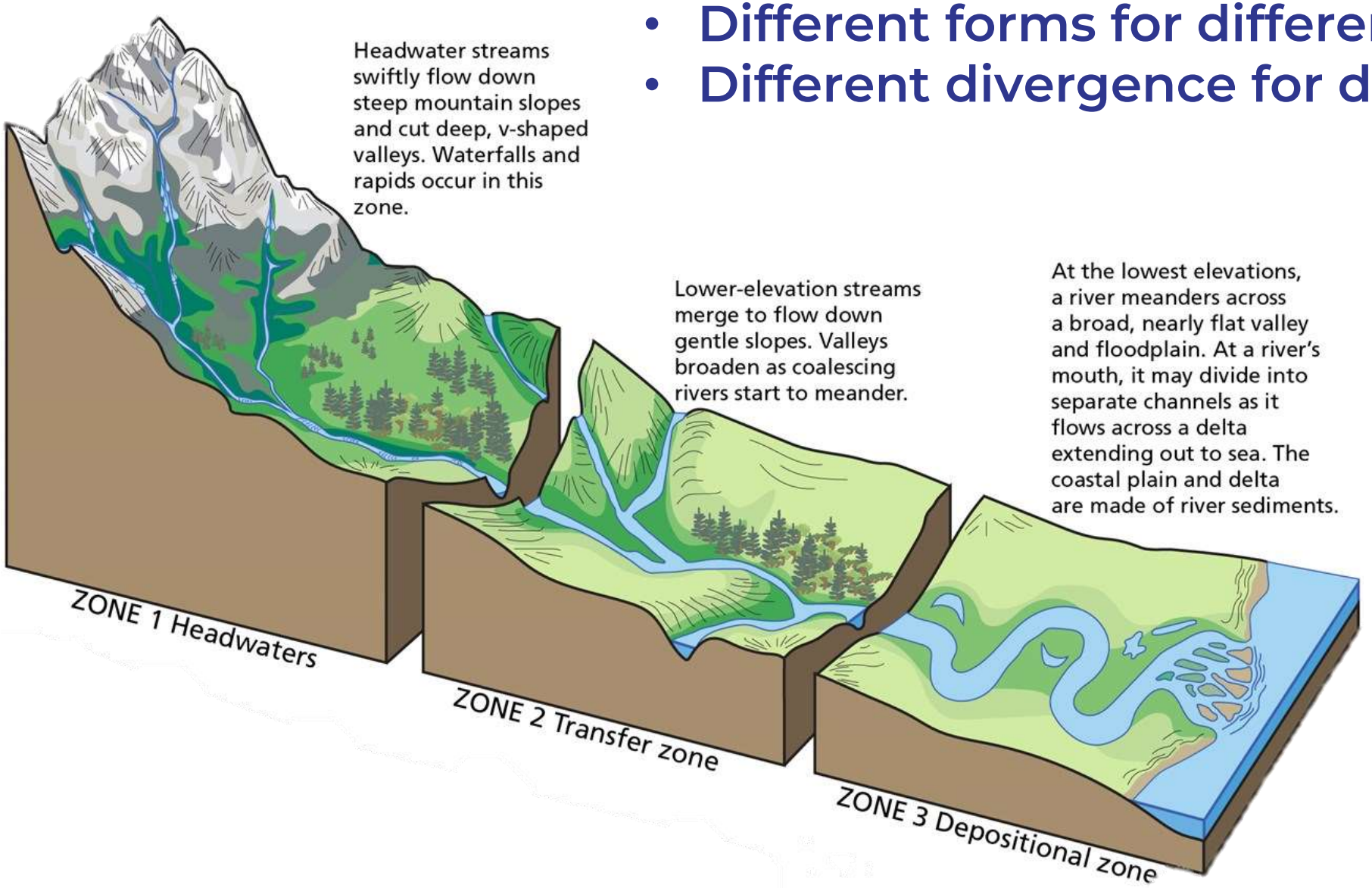
- Different forms for different landscapes
- Different divergence for different landscapes



Credit: West Rivers Trust

HYDROMORPHOLOGY – THE FORM AND FUNCTION OF A RIVER

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Zone 1 Headwaters

Avonmore

Zone 2 Transfer Zone

Awbeg Sub-Catchment

Zone 3 Depositional Zone

Islands Sub-Catchment

HYDROMORPHOLOGY – THE FORM AND FUNCTION OF A RIVER

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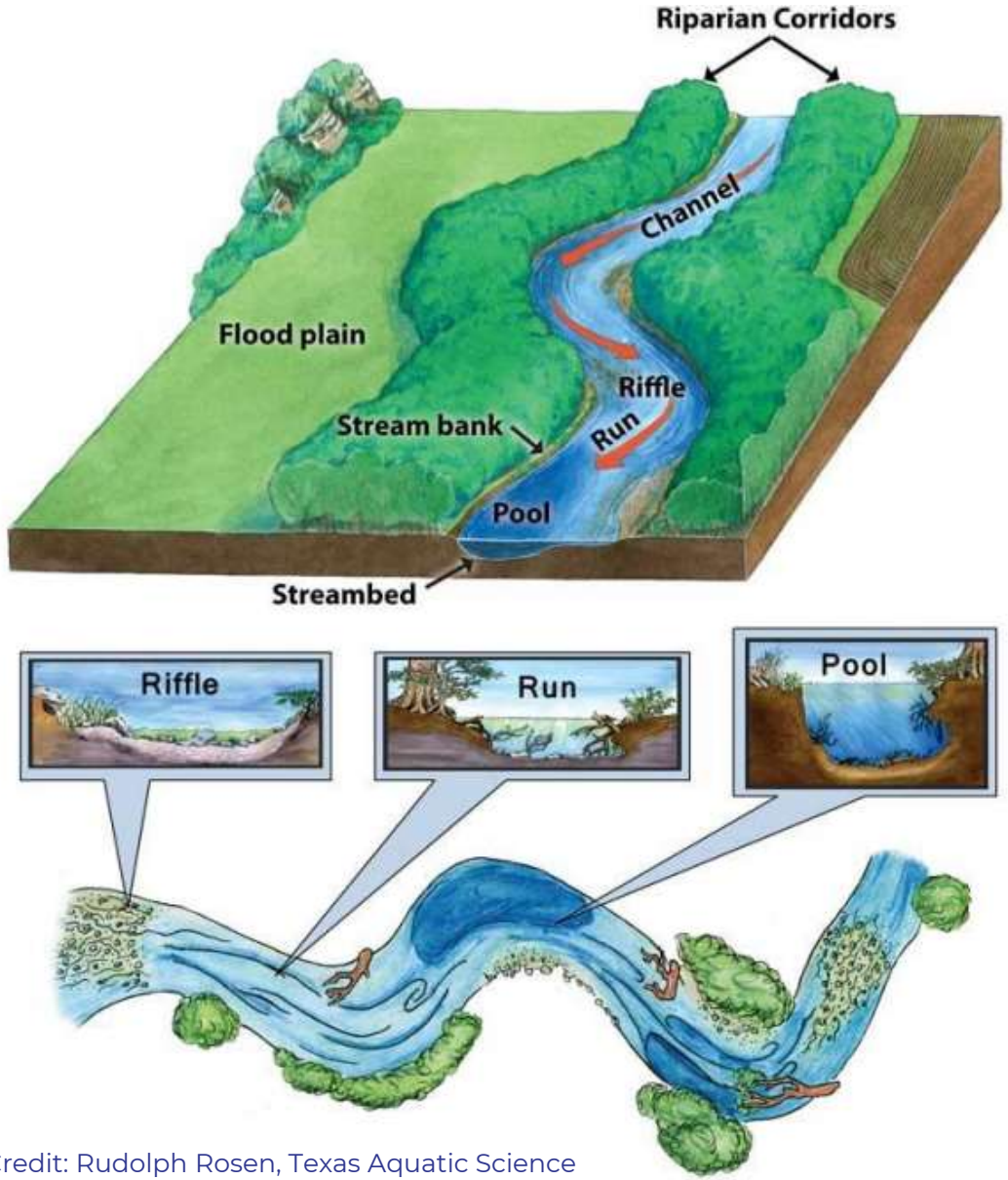
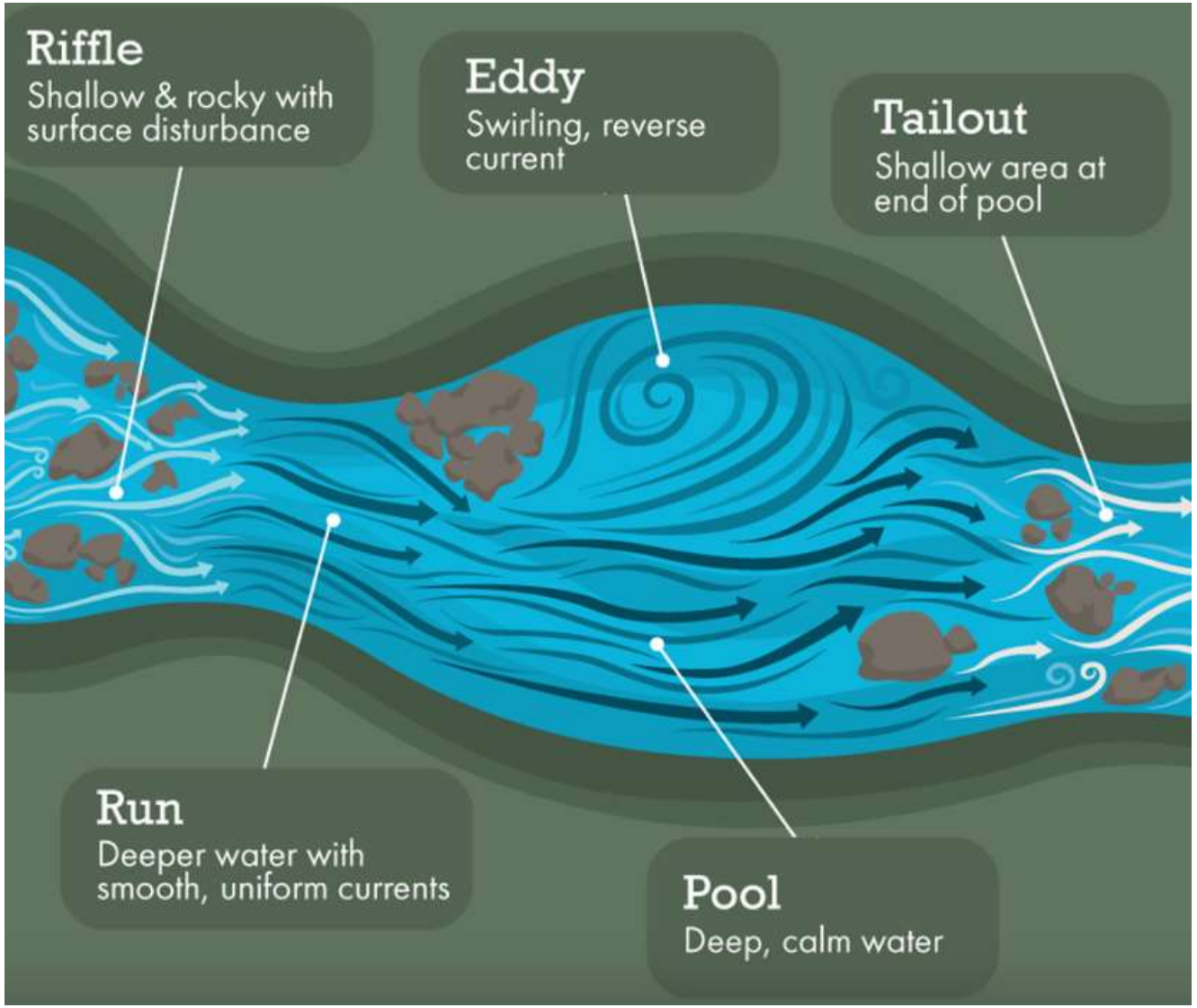


Credit: Rudolph Rosen, Texas Aquatic Science



Credit: Fix.com

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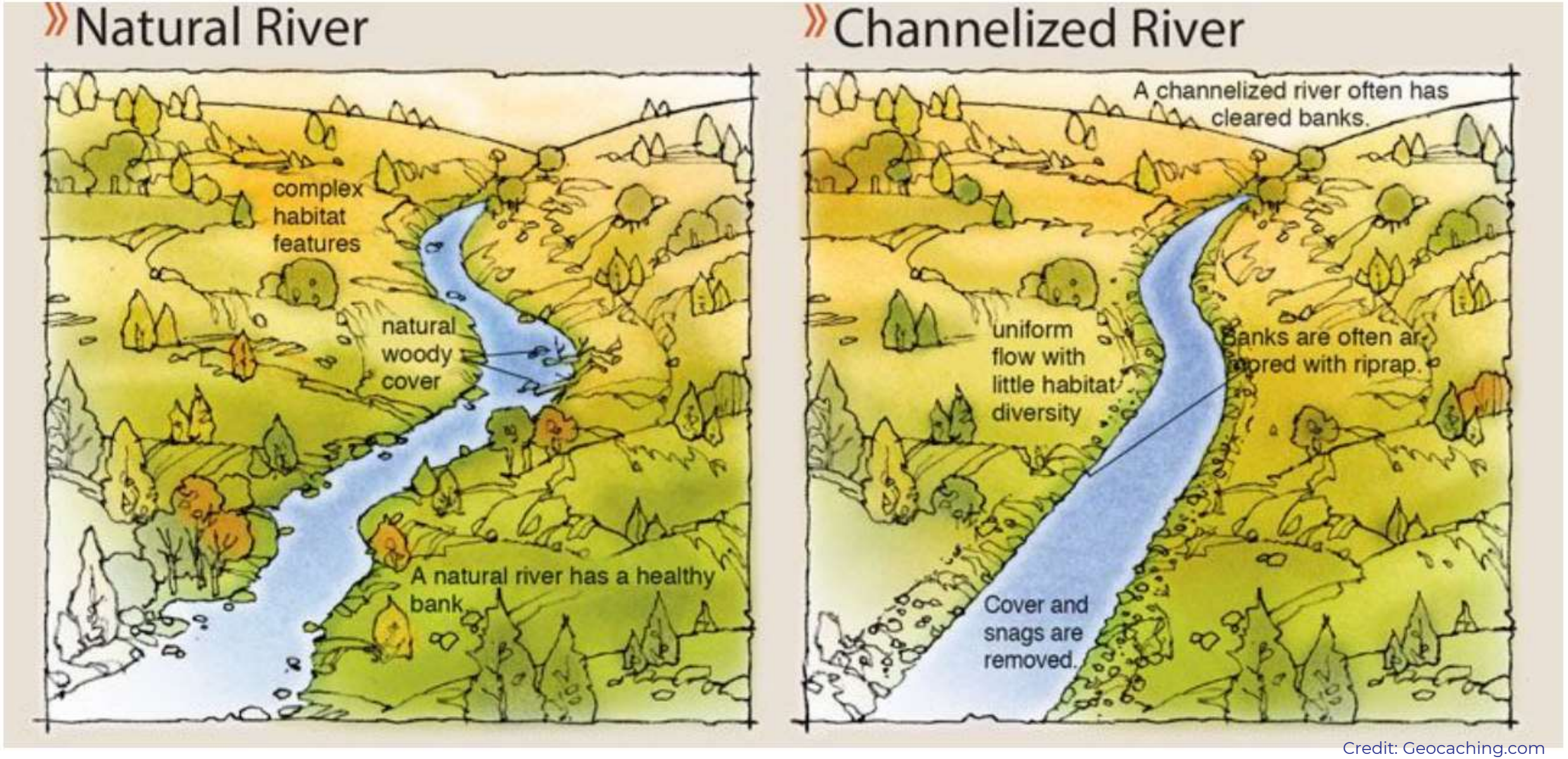

Credit: Geocaching.com

NATURAL FORM OF A RIVER: CHANNELISATION

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Credit: Geocaching.com

NATURAL FORM OF A RIVER: BARRIERS TO MOVEMENT

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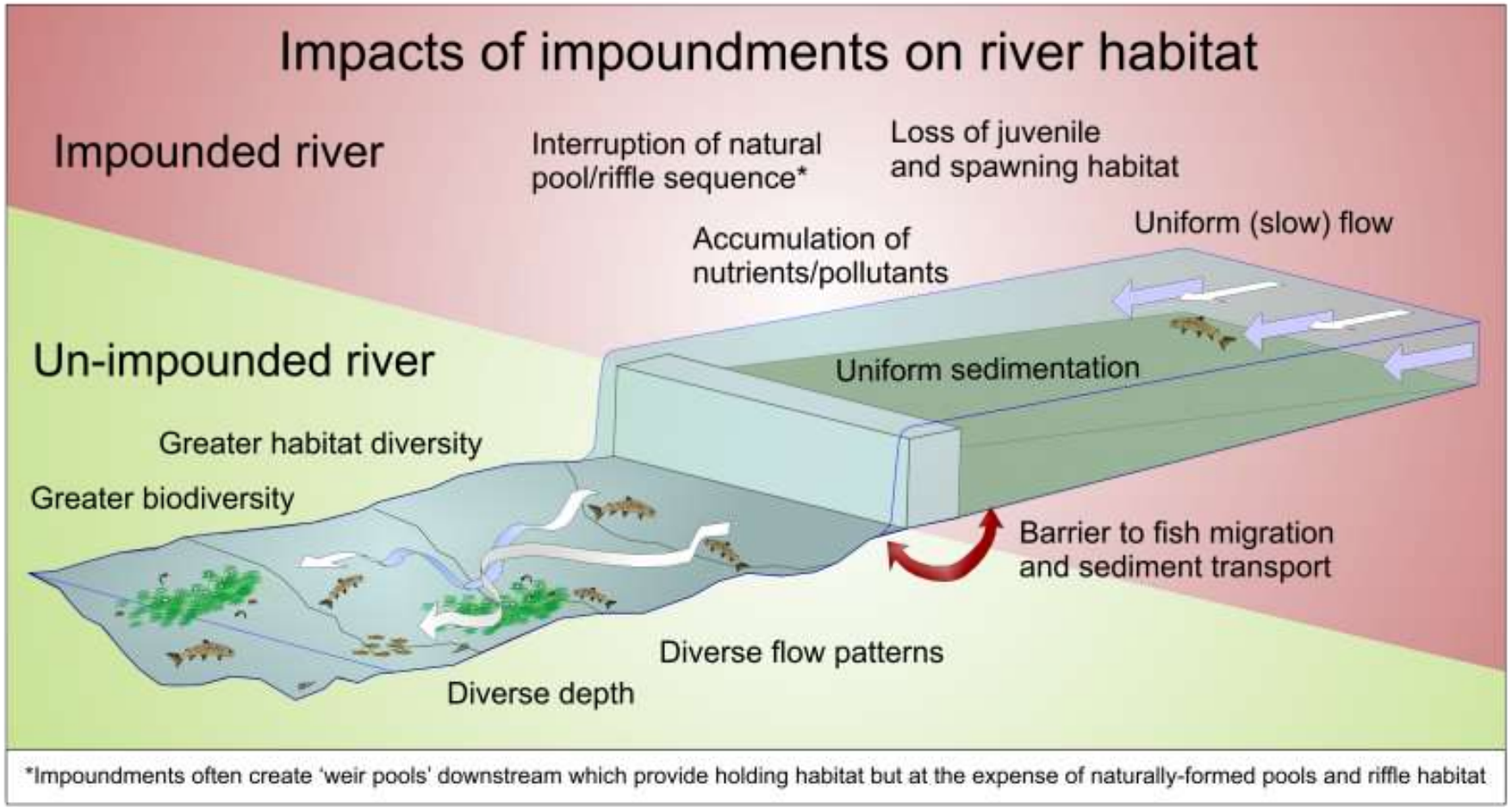

Credit: Wild Trout Trust

NATURAL FORM OF A RIVER: FLOOD PLAIN CONNECTIVITY

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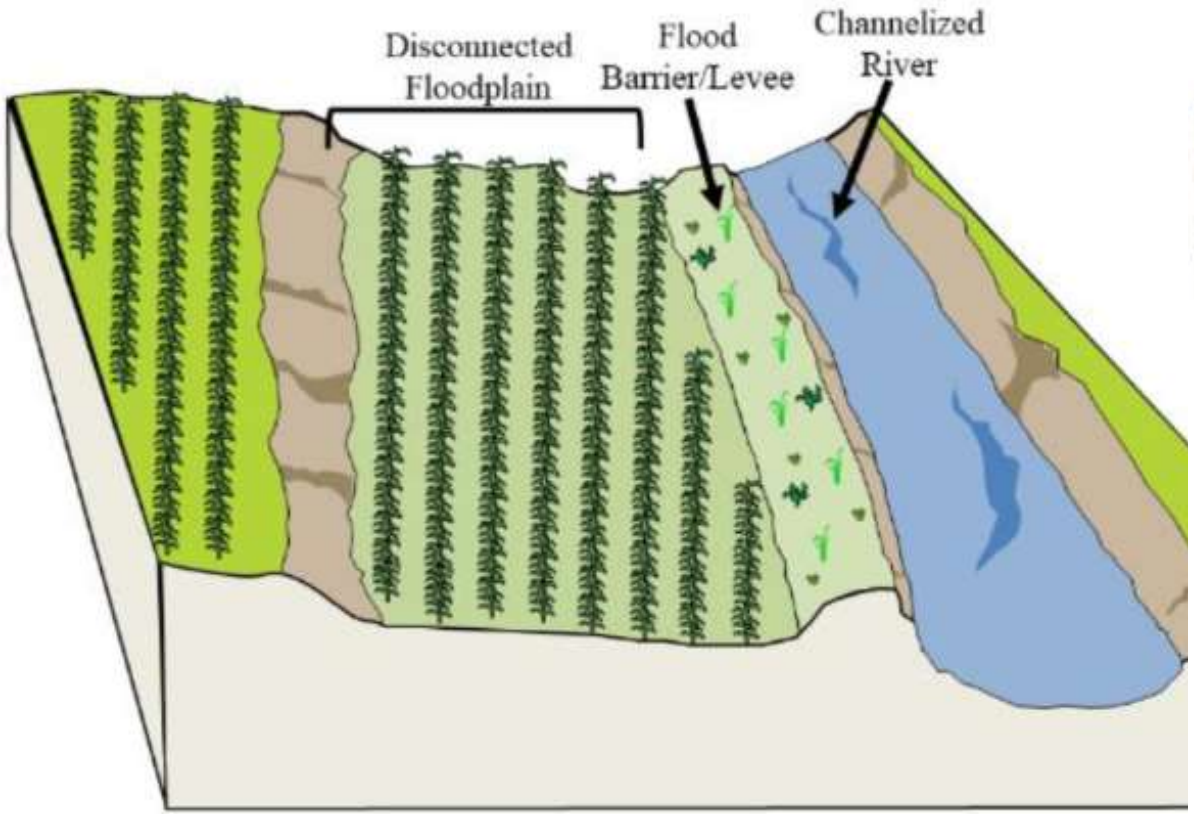

Credit: American Rivers

NATURAL FORM OF A RIVER: WATER TABLES

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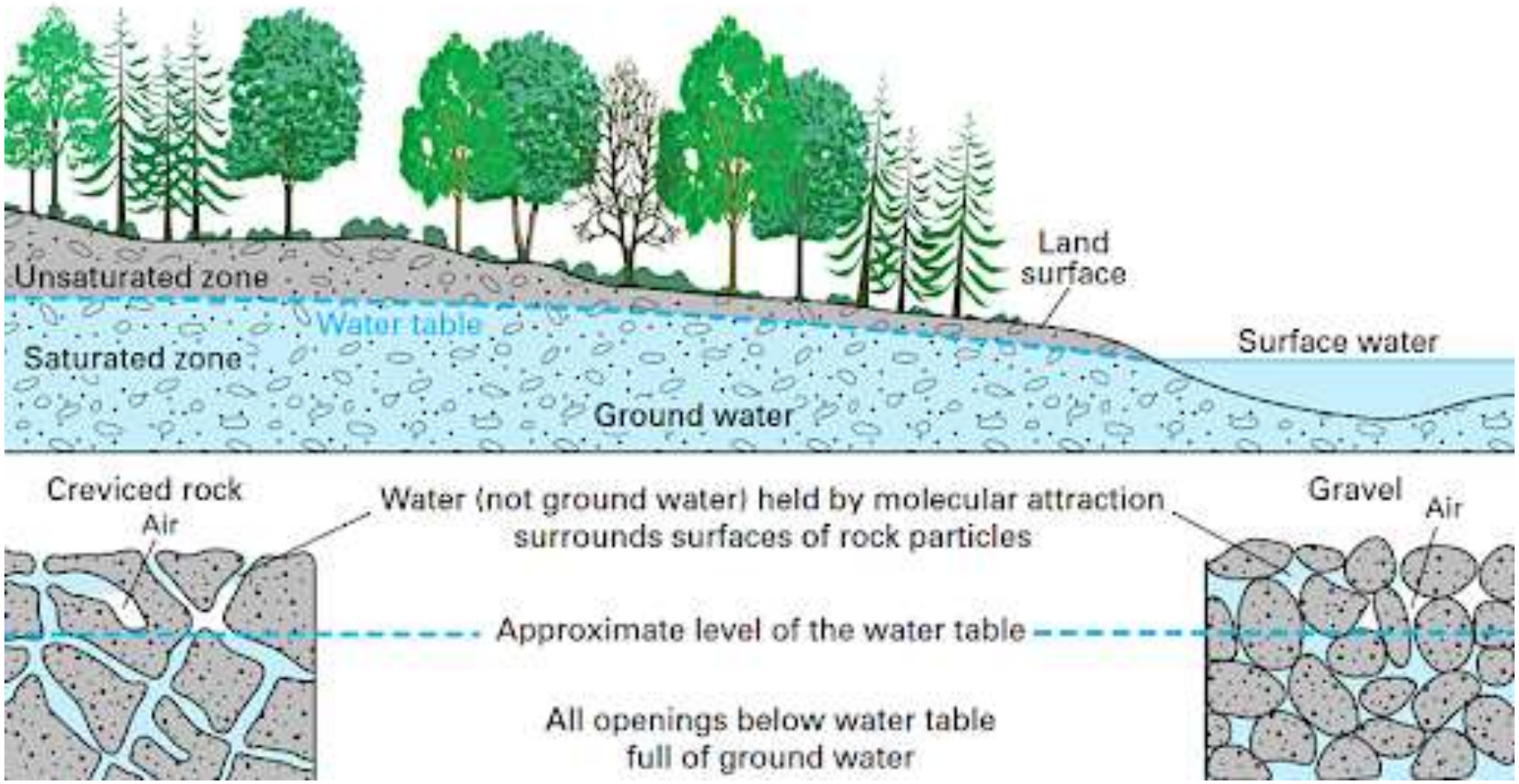

Credit: United States Geological Survey

Credit: Donal Daly

NATURAL FORM OF A RIVER: WATER TABLES

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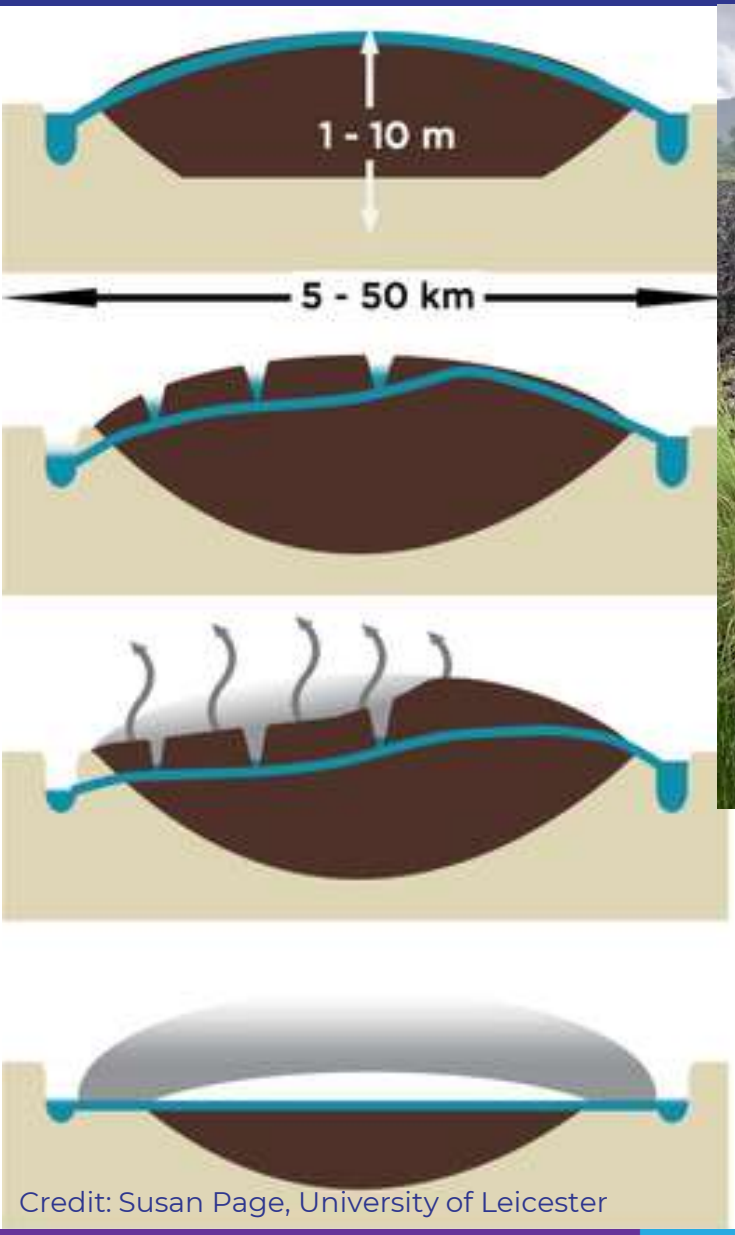

Credit: Susan Page, University of Leicester

Credit: Pearl Mussel Project

Credit: Donal Daly

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What do we mean when we refer to a polluted water body?

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What do we mean when we refer to a polluted water body?

EPA have their own definition of EQS for High Status and Good Status Rivers (to be discussed later).

But really…

It’s the correct water chemistry parameters for that river in its natural form without human pressures present.

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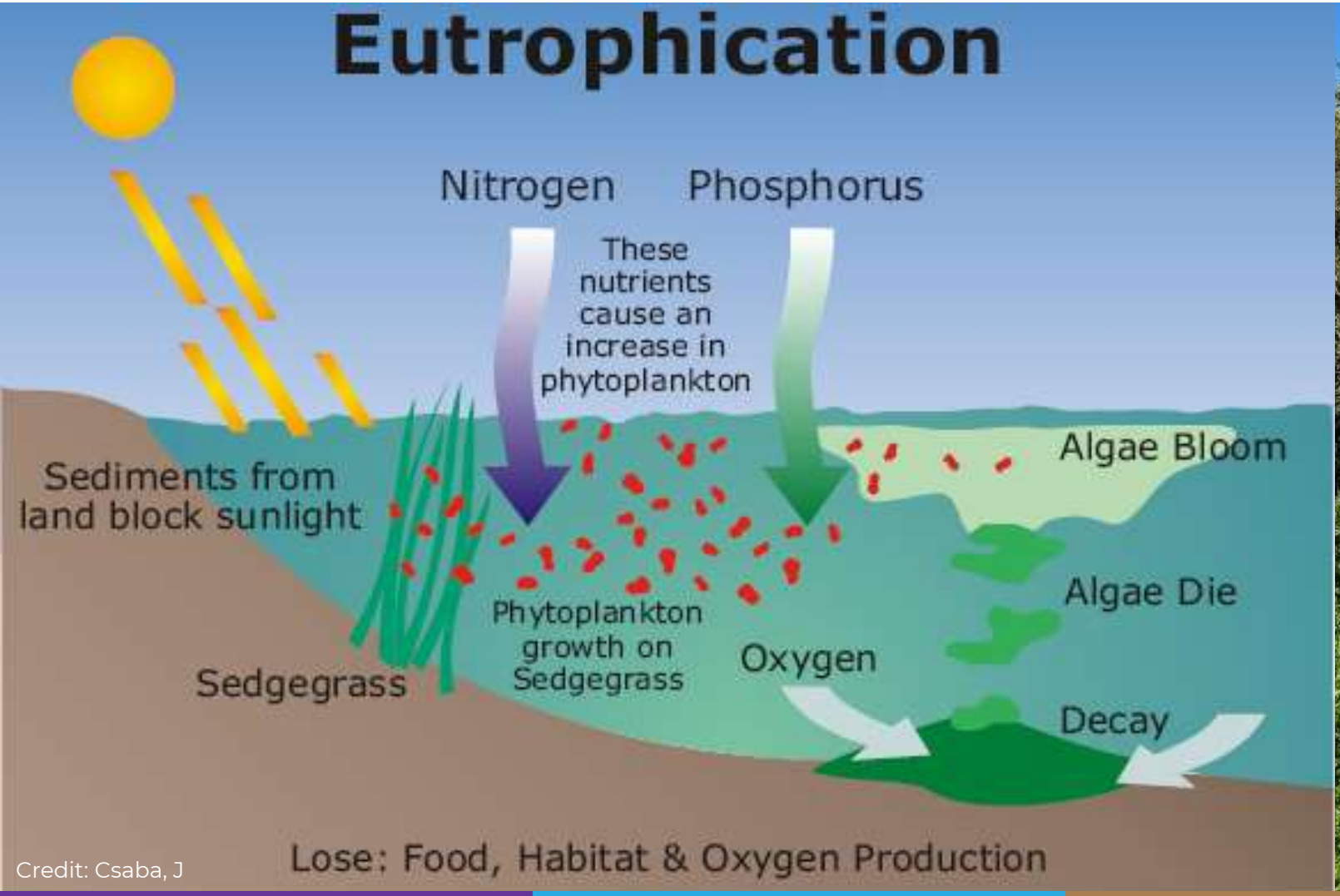
What do we mean when we refer to a polluted water body?



Credit: Csaba, J

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What do we mean when we refer to a polluted water body?

Credit: Inland Fisheries Ireland

Credit: BBC

Credit: Pry House Farm

RIVERSIDE HABITATS

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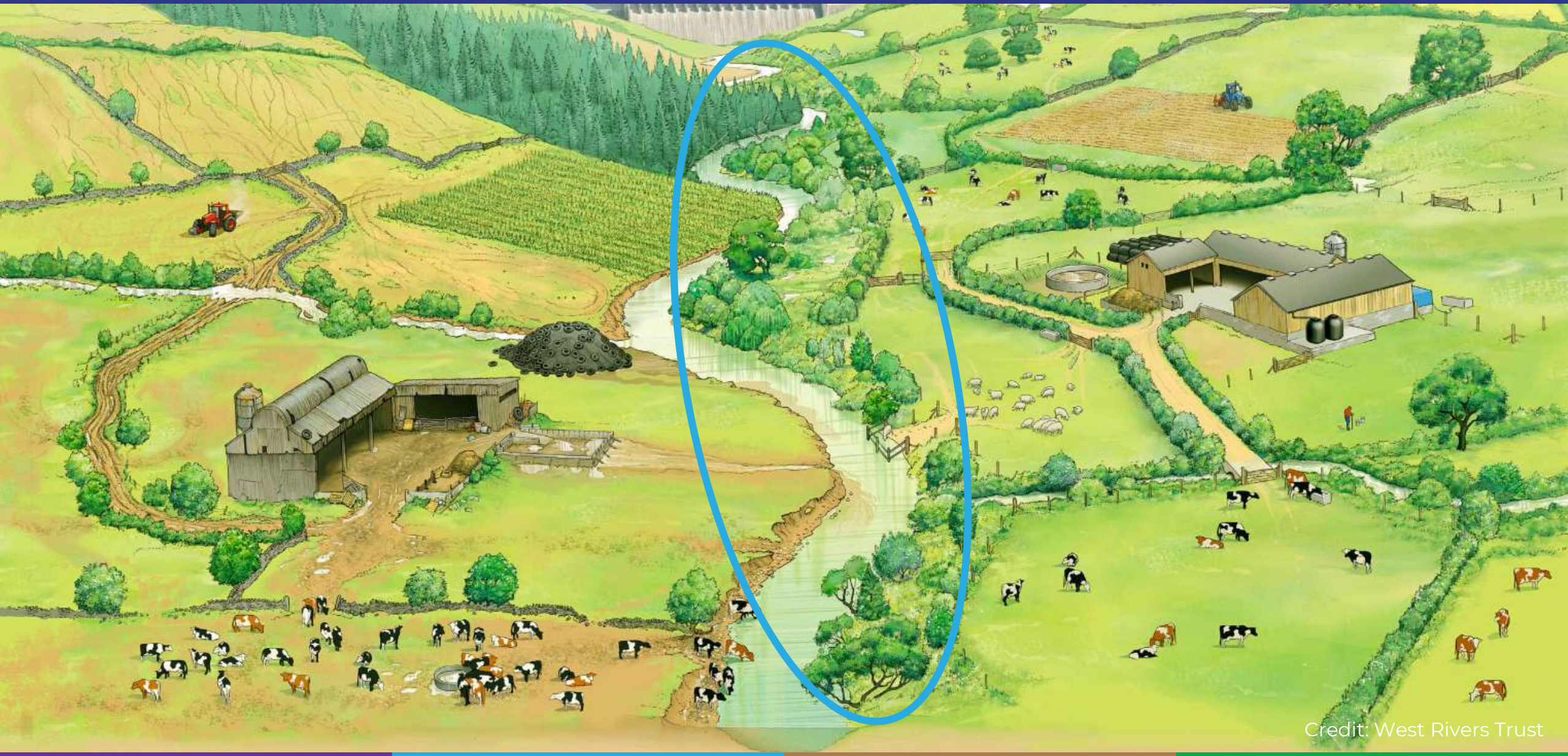

Credit: West Rivers Trust

RIVERSIDE HABITATS

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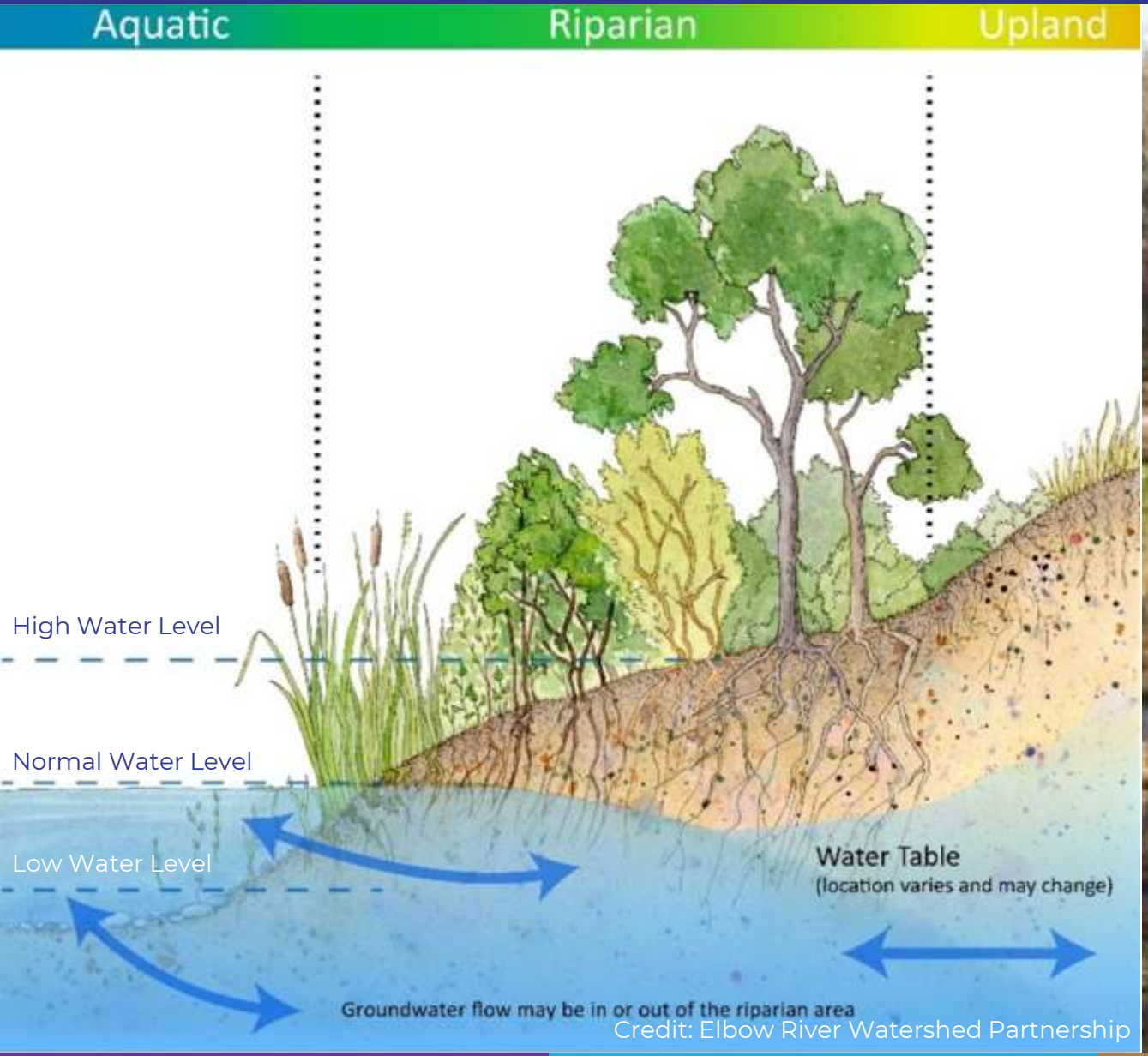

Credit: Elbow River Watershed Partnership

Credit: Gloucestershire Wildlife Trust

RIVERS AS ECOSYSTEMS

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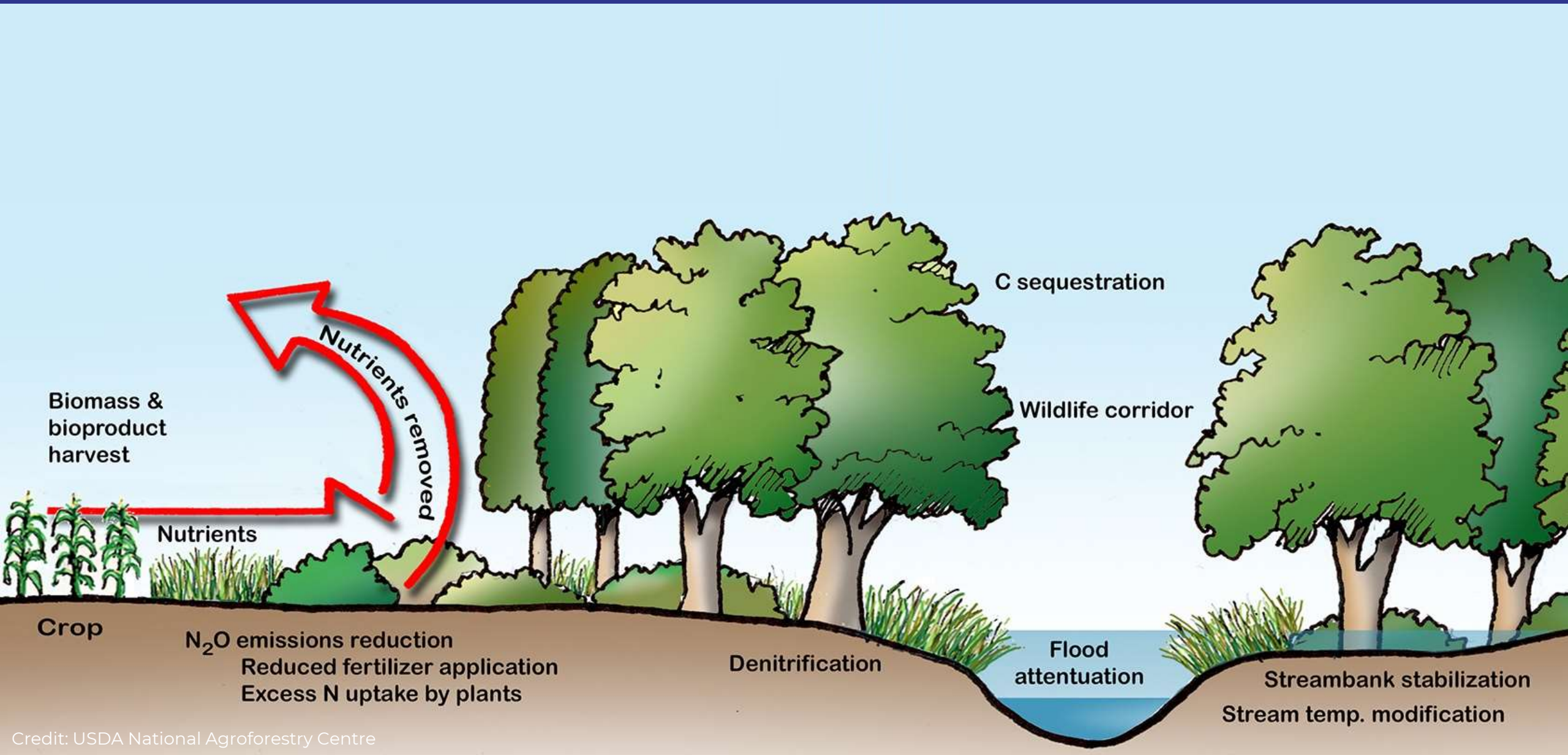

Credit: USDA National Agroforestry Centre

Woodland Riparian Zone

ECOSYSTEM SERVICES

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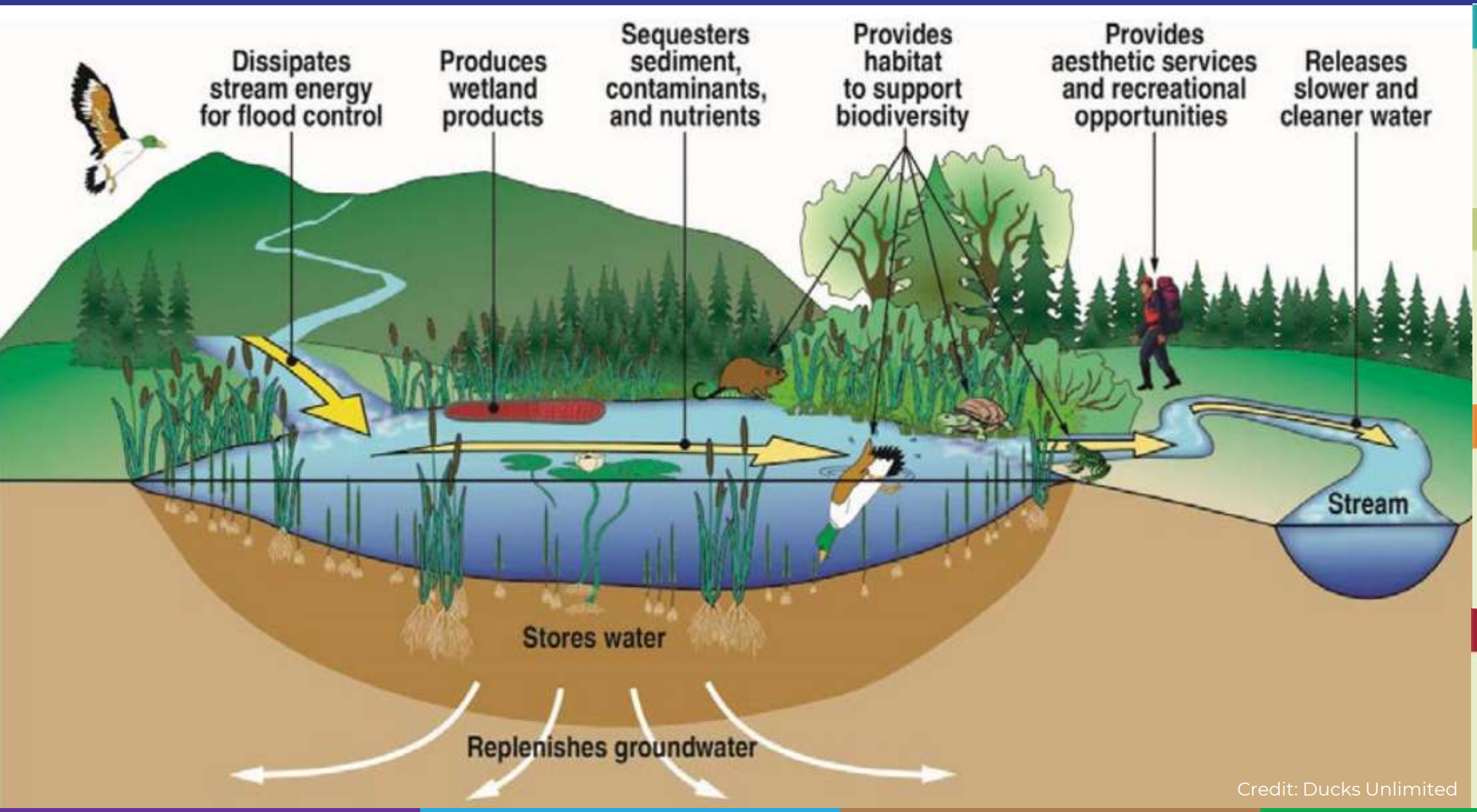

Credit: Ducks Unlimited

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Identify the ‘good’ features in the scale model

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WFD and River Basin Management Plans

Rialtas na hÉireann
Government of Ireland

Water quality has to be protected and restored where necessary to reach these environmental objectives.

Minimum objective of good.

No deterioration

River Basin Management Plan prepared every six years

Sets out necessary measures to protect and restore water quality in Ireland.

Conducted by EPA with support from Local Authorities, IFI and other state agencies.

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

- 2,899 waterbodies
- 60% of the total number of water bodies

2,429 Rivers

224 Lakes, 80 Estuaries, 45 Coastal waters, 16 Canals, 121 Groundwater bodies

Classification:

HIGH	GOOD	MODERATE	POOR	BAD

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Sampled vs modelled:

Monitored sites are actually visited for:

- Water chemistry parameters,
- HyMo assessments
- Biological indices

Modelled sites are based off predictive desktop studies.

Frequency:

Physiochemical:

- 4 times per year for operational
- 12 times for surveillance.

Biological: Every 3 years

SAMPLE POINTS

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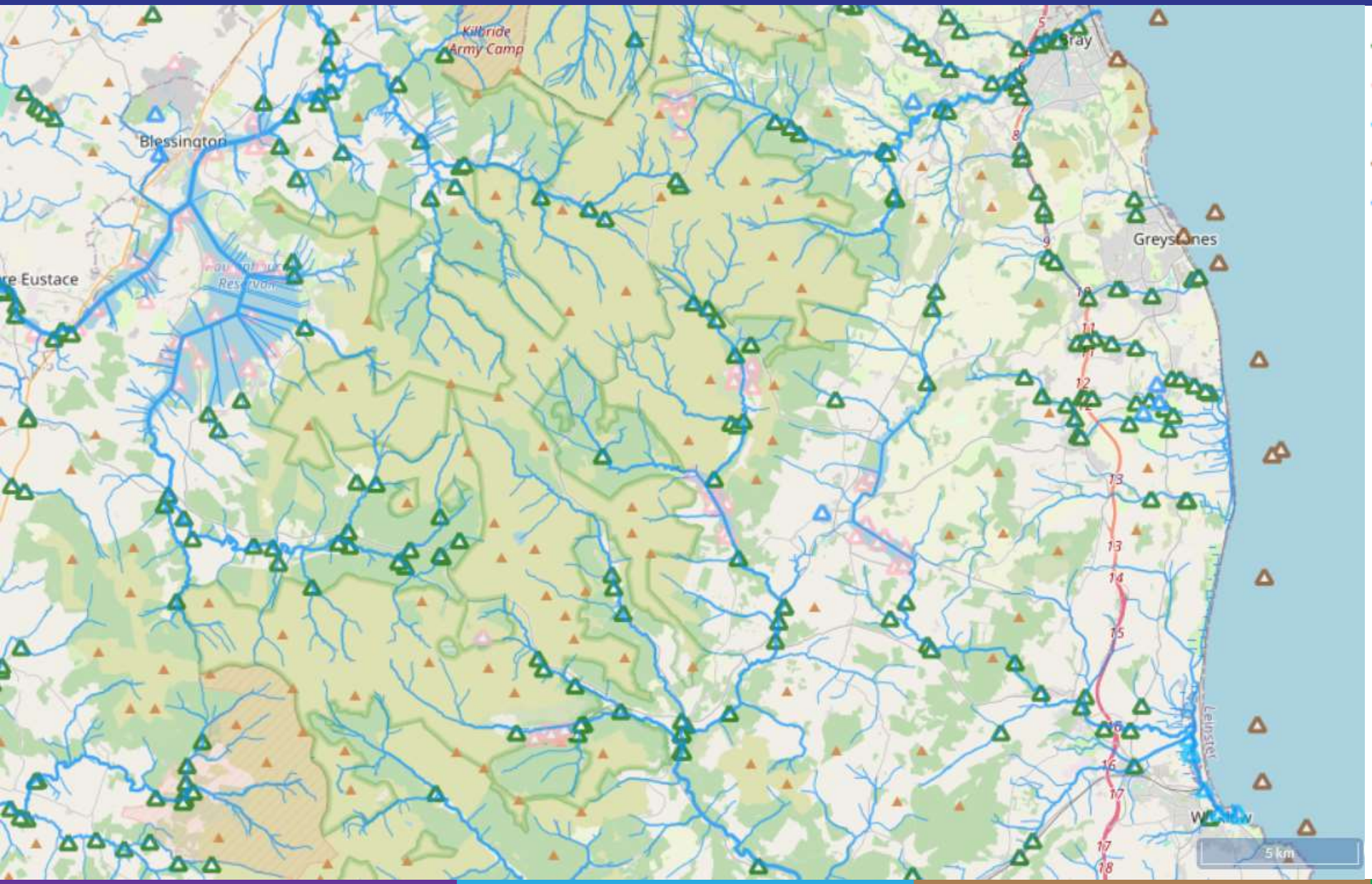

- River Station
- Lake Station
- Transitional Station
- Coastal Station
- Groundwater Station

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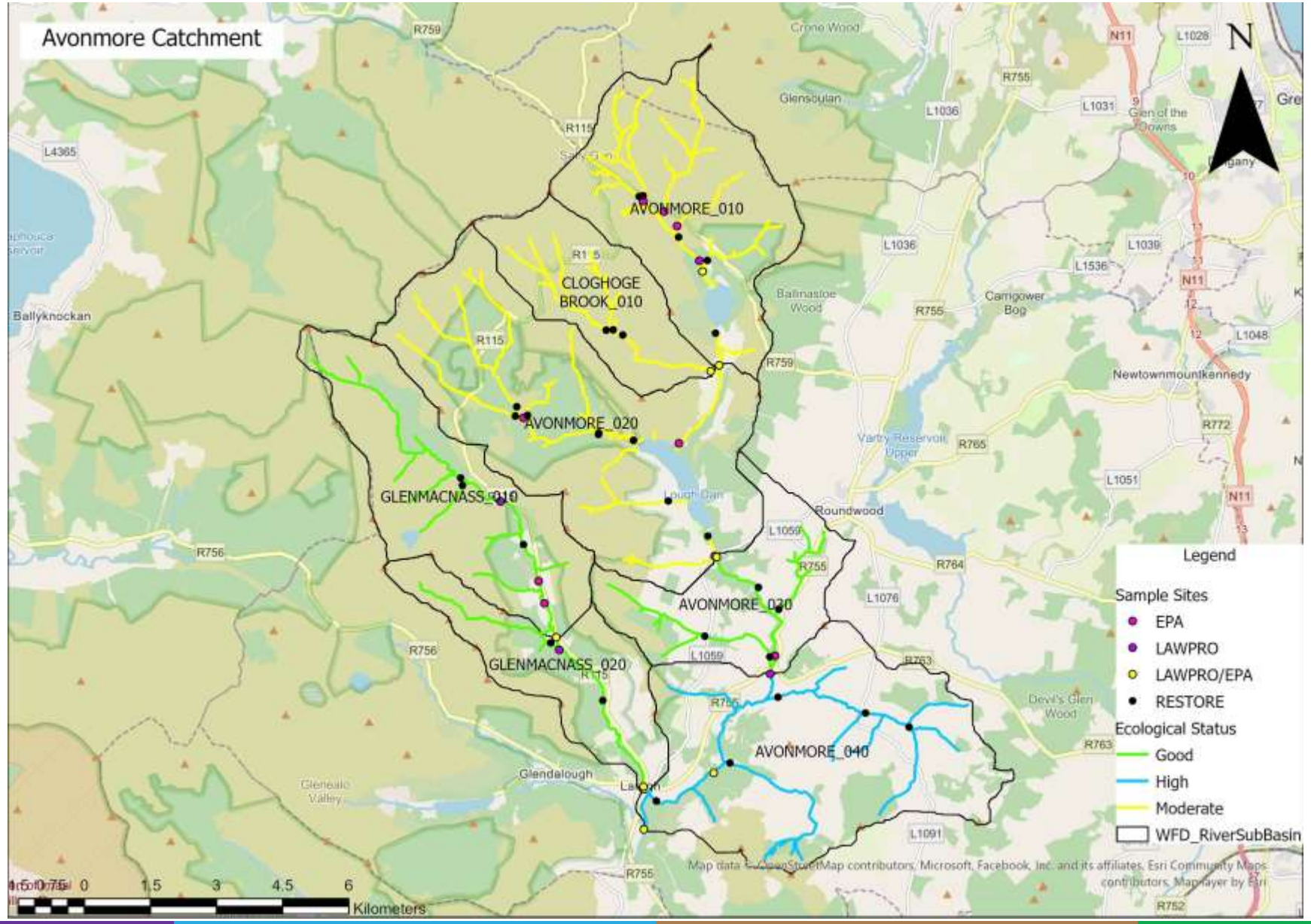
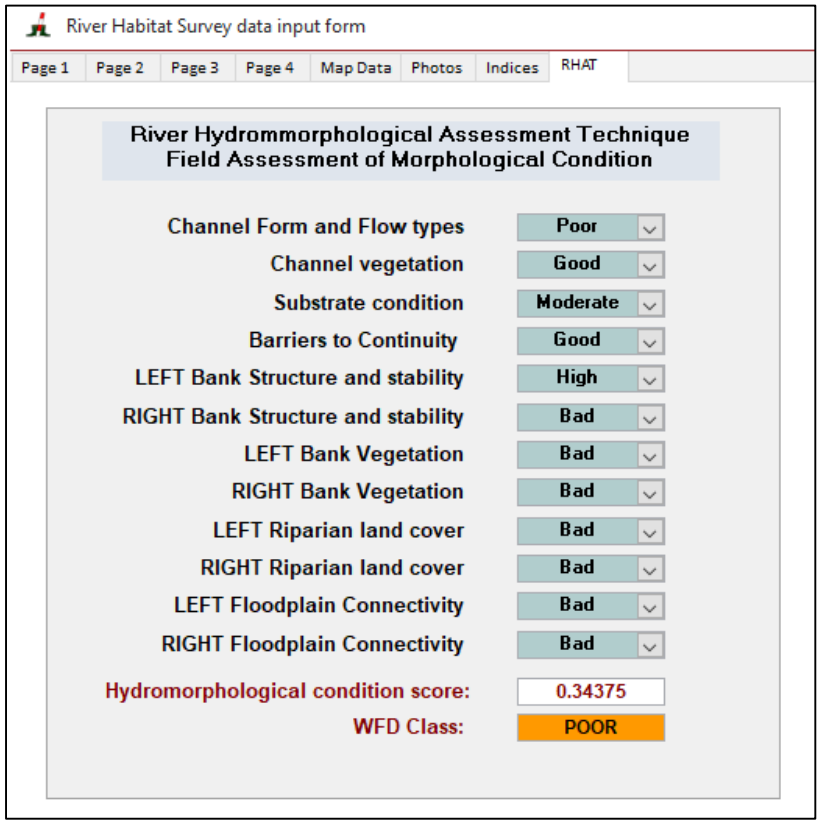
- Inland fisheries Ireland, UCD, EPA funded
- Monitoring programme for Waters of LIFE
- Multidisciplinary monitoring programme
- Detects change in high status objective river waterbodies
- Assess effectiveness of measures to protect and restore them
- Bespoke to pressures in each catchment

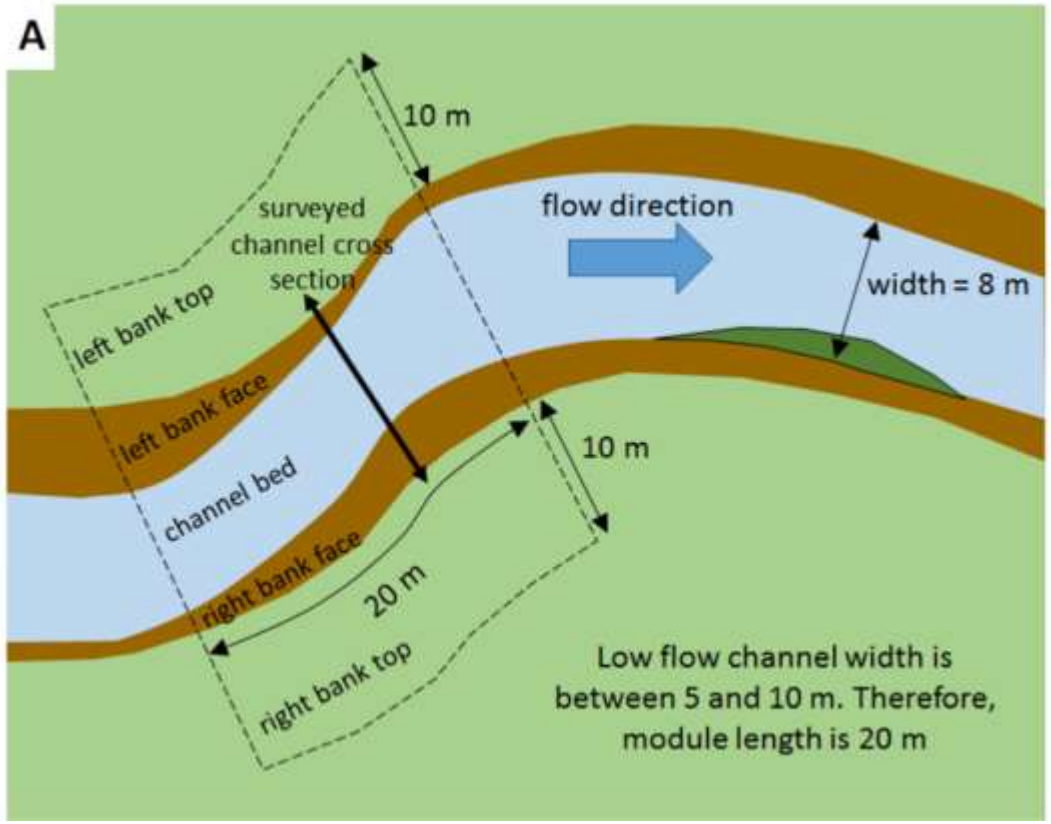

Avonmore Catchment
N
AVONMORE_010
CLOGHOGE BROOK_010
AVONMORE_020
GLENMACNASS_010
GLENMACNASS_020
AVONMORE_030
AVONMORE_040
Legend
Sample Sites
EPA
LAWPRO
LAWPRO/EPA
RESTORE
Ecological Status
Good
High
Moderate
WFD_RiverSubBasin
0 1.5 3 4.5 6
Kilometers

How do we assess hydromorphology?

RHAT Survey | Morph Survey | Desktop Assessment | River Restoration Plan



Credit: River Habitat Survey



Credit: Modular River Survey

HOW DO WE ASSESS WATER CHEMISTRY PARAMETERS?

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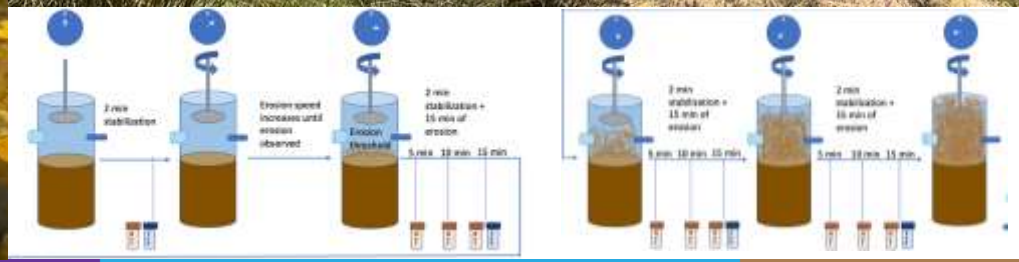
Location	Ammonia mg/l as N	Nitrate mg/l as N	Nitrite mg/l as N	Phosphorus (React) mg/l as P	TON mg/l as N
M-1	0.01	0.11	<0.005	<0.01	0.11
M-2	0.03	< 0.10	<0.005	<0.01	<0.10
M-3	0.02	< 0.10	<0.005	0.02	<0.10
M-4	0.02	< 0.10	<0.005	<0.01	<0.10
M-5	0.01	0.65	<0.005	0.01	0.65
M-6	0.02	0.56	<0.005	0.02	0.56
M-7	0.01	0.54	<0.005	<0.01	0.54
M-8	0.03	< 0.10	<0.005	0.02	<0.10
M-9	<0.01	0.12	<0.005	<0.01	0.12
M-10	<0.01	0.63	<0.005	<0.01	0.63
M-11	0.01	0.52	<0.005	<0.01	0.52



Credit: Dunia Rios-Yunes *et al* 2023

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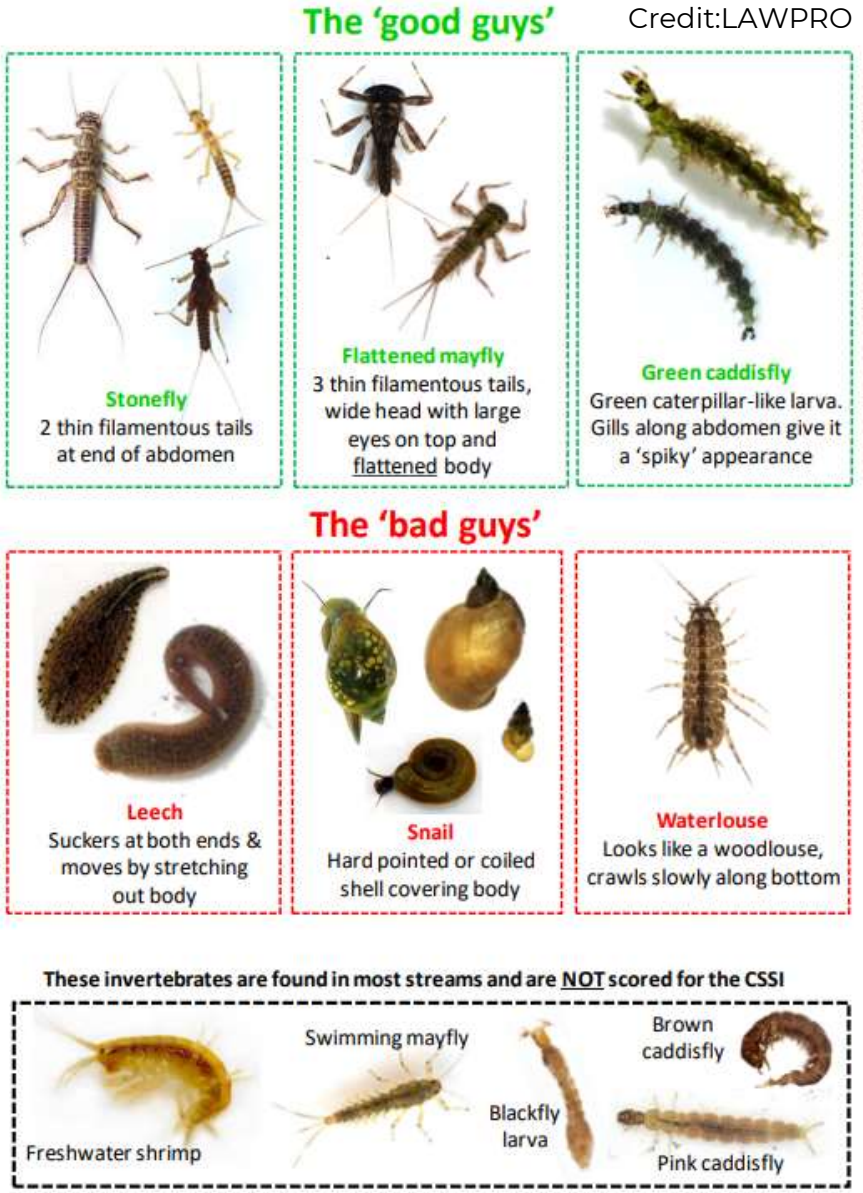
Macro-invertebrates:

Diversity and abundance tells a story.

Sampled using kick sampling techniques

Various stories can be told based on type of indicator presence: Acid indicators, sheep dip etc.

Tells a story longer than simple chemical parameters, life cycles take 1 – 2 years.

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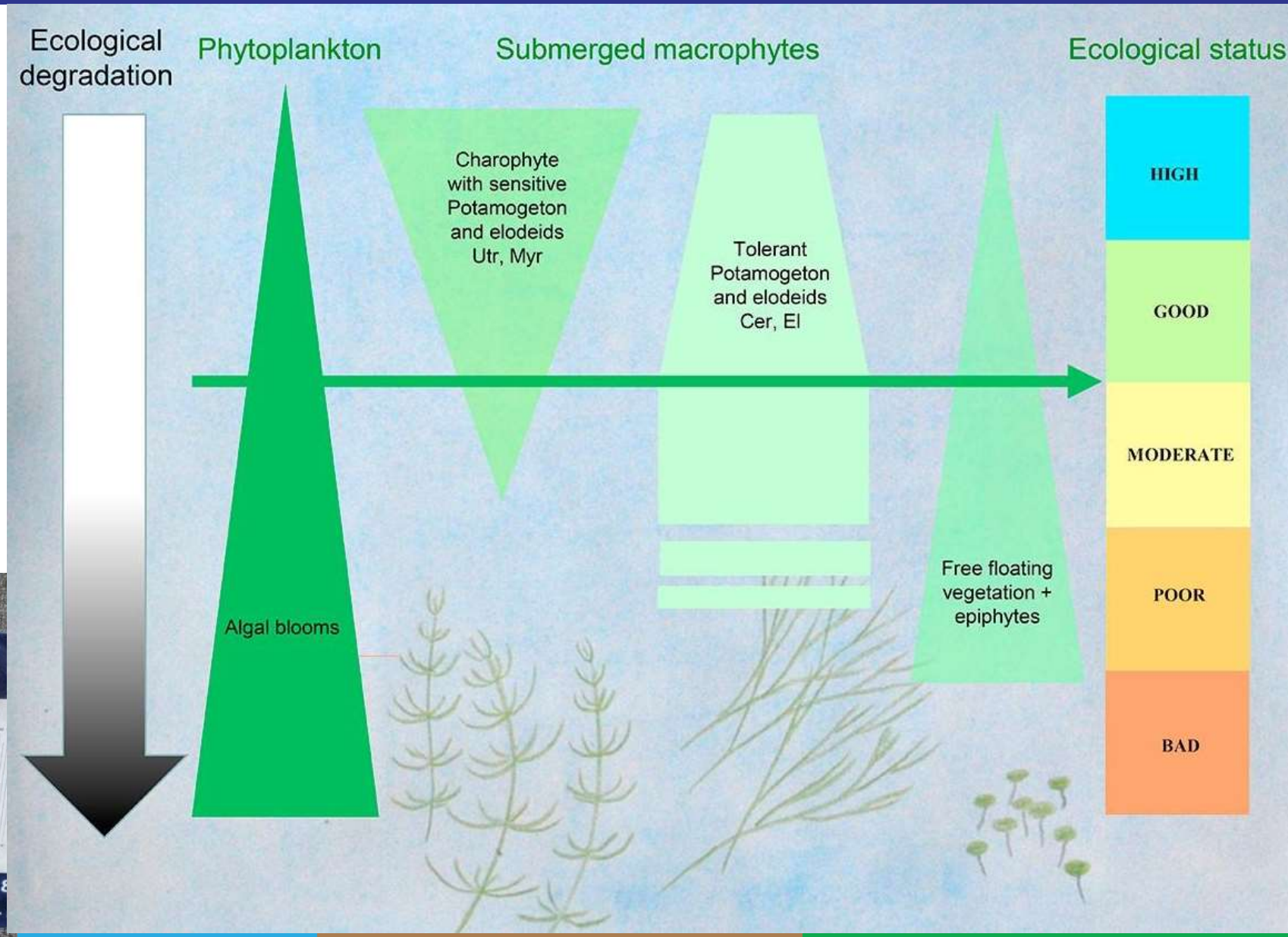
- Other biological indices include:
- Fish
- Phytoplankton
- Macrophytes (plants)
- Benthic Algae



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- Are as close to natural conditions as possible and must be retained as a reference to these conditions.
- Are the last reservoirs of sensitive species which are endemic to Irish Culture and Ecology.
- Provide the highest value in terms of ecosystem services

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1. Rivers have a natural form, functions and water parameters which must be protected or restored.

2. RESTORE project is responsible for monitoring, it is regular, locations picked based on measures implemented and not cross reported

3. High Status Objective rivers act as reference of undisturbed and a refuge for those species dependent on these conditions