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Key Stressors to Wild Atlantic Salmon in Spain

Navarra

1. Climate Change

- Impacts on survival, spawning timing, and juvenile development.
- Observed effects: warmer summers, spawning delay, mortality.
- Highest uncertainty; difficult to mitigate.

2. Physical Barriers

- Affect both upstream and downstream migration.
- Downstream passage (smolts and kelts) still unsolved.
- High mortality from turbines and canals.

3. Habitat Degradation

- Reduced habitat from dams and riparian vegetation loss.
- Increases in water temperature and oxygen depletion.
- Mortality of up to 50% in dry seasons.

Gipuzkoa

1. Habitat Degradation

- All basins affected by dams, urbanization, and loss of riparian cover.
- Alters temperature, oxygen, and water quality.
- Most significant and widespread stressor.

2. Climate Change

- Observed delays in spawning and high summer mortality.
- Affects all life stages, with growing unpredictability.
- Global stressor with local impacts.

3. Physical Barriers

- Many river stretches remain inaccessible.
- Downstream mortality from is unresolved.
- Migration severely disrupted.

Cantabria

1. Climate Change

- Affects all basins; increasing water temperature threatens survival.
- Global stressor; unpredictable effects.
- No planned mitigation measures

2. Physical Barriers

- Present in almost all river basins.
- Block access to optimal spawning habitats.
- High impact on recruitment
- Measures planned to improve river connectivity

3. Pollution

- All salmon populations are vulnerable to episodic contamination.
- Mostly from untreated wastewater and agriculture.
- Impact is localized but frequent.
- Ongoing investments in sanitation infrastructure

Asturias

1. Predators

• In all basins: Utter (*Lutra*) and Cormorán grande (*Phalacrocórax carbo)*
• In the estuary: sea bass (*Dicentrarchus labrax*)/dolphins: difficult to calculate
• Possibility of further negative impacts: high

2. Climate Change

• Affects in Eo and Esva rivers
• It affects basins located in places of lower altitude
•Evolution medium term not known.
• Possibility of further negative impacts is high. Restocking are carried out as a compensatory measure.

3. Physical Barriers

• Two river affected Nalón and Navia
•Moderate, Large dams affecting the upper areas of the Nalón-Narcea River and the entire Navia

Galicia

1. Climate Change

- Major stressor, no access to thermal refuges
- Insufficient cover to mitigate solar radiation
- May be some synergy with other stressors, such as pollution.

2. Predators

- Cormorants (winter juvenile migrants from Northern Europe)
- Abundant in the lower reaches of rivers

3. Physical Barriers

- Large hydropower dams are a major stressor
- Responsible for the poor state of most populations or even their loss.
- Migration severely disrupted.

Challenges & Conclusions

Challenges:

- fish passage solutions/ barrier removal.
- Increasing, unpredictable effects of climate change.
- Limited short-term recovery potential of degraded habitats.
- Urban pressure complicates large-scale habitat recovery.
- Water flow regulation limited by long-term concessions.

Conclusions:

- Priority: implement safe downstream fish migration solutions.
- Integrate climate adaptation into management plans
- Strengthen legislative protection with ecological restoration efforts.
- Improve river habitat quality and connectivity.
- Focus on river connectivity restoration as a tangible, local solution.
- Continue investing in wastewater treatment and pollution monitoring

THANK YOU FOR YOUR TIME