

Re-watering the River Garry: how much water ^{and sediment} does a river need and can we keep everyone happy?

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&
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River Garry Technical Working Group:

Scottish Environment Protection Agency (SEPA)

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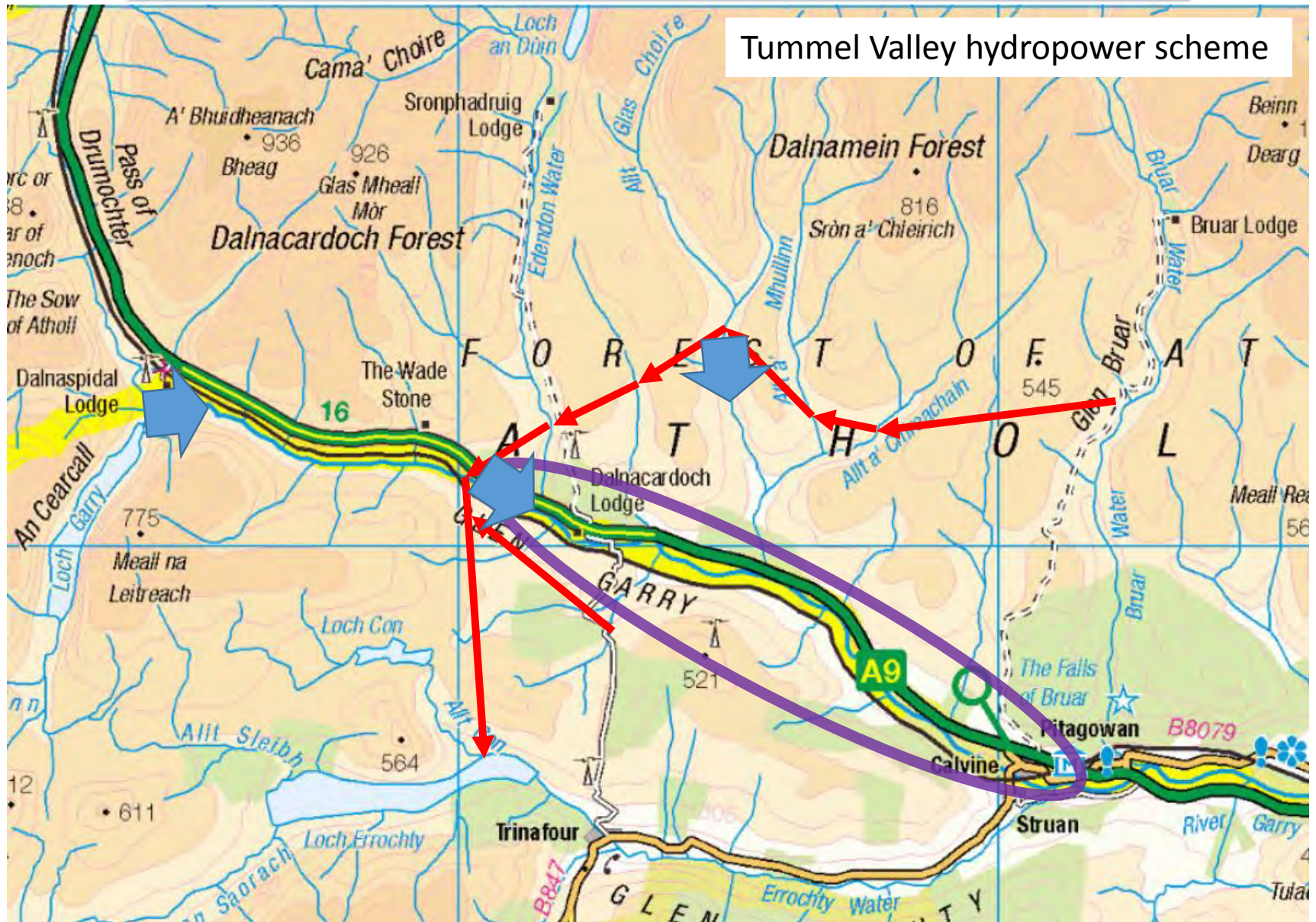
Tay District Salmon Fisheries Board (TDSFB)

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River Garry, Perthshire





River Garry intake (1950s – 2017)



DRIVERS

Water Framework Directive

- River Basin Management Plan Objective – Good Ecological Potential (GEP)



Renewable energy generation (Net Zero Carbon)

- Cap on loss of renewables generation
- £££

➤ Prioritisation of 'dry' waterbodies – ecological benefit vs loss of generation

River Garry:

- 13km impacted reach; good salmon habitat
- High visibility
- 'Valuable' water – 3 power stations

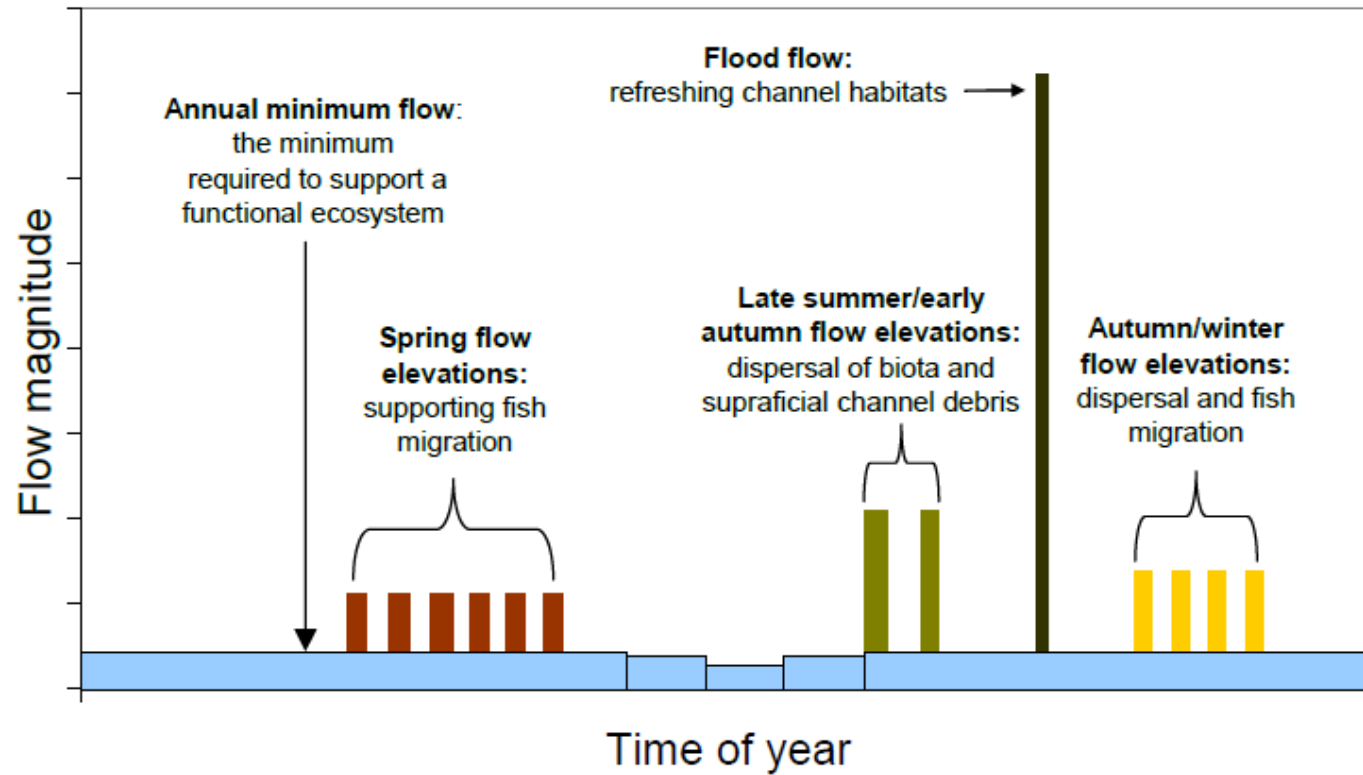
➤ Achieve GEP whilst minimising loss of generation

Ecological outcomes for GEP (UKTAG)

1. Continuously wetted area... reasonable sized and healthy populations of plants and animals
2. Flow depths and velocities... to facilitate fish migration, spawning, egg and juvenile growth... juvenile populations better than poor status.
3. Active channel... maintain a sediment grade mix... not compromise river habitats e.g. clogging of redds with fine sediment...
4. ...channel not encroached upon by riparian vegetation... a balance of species... avoiding dominance by species that thrive under stable flow conditions.

How much water?

UK Technical Advisory Group (UKTAG) guidelines for flows for GEP

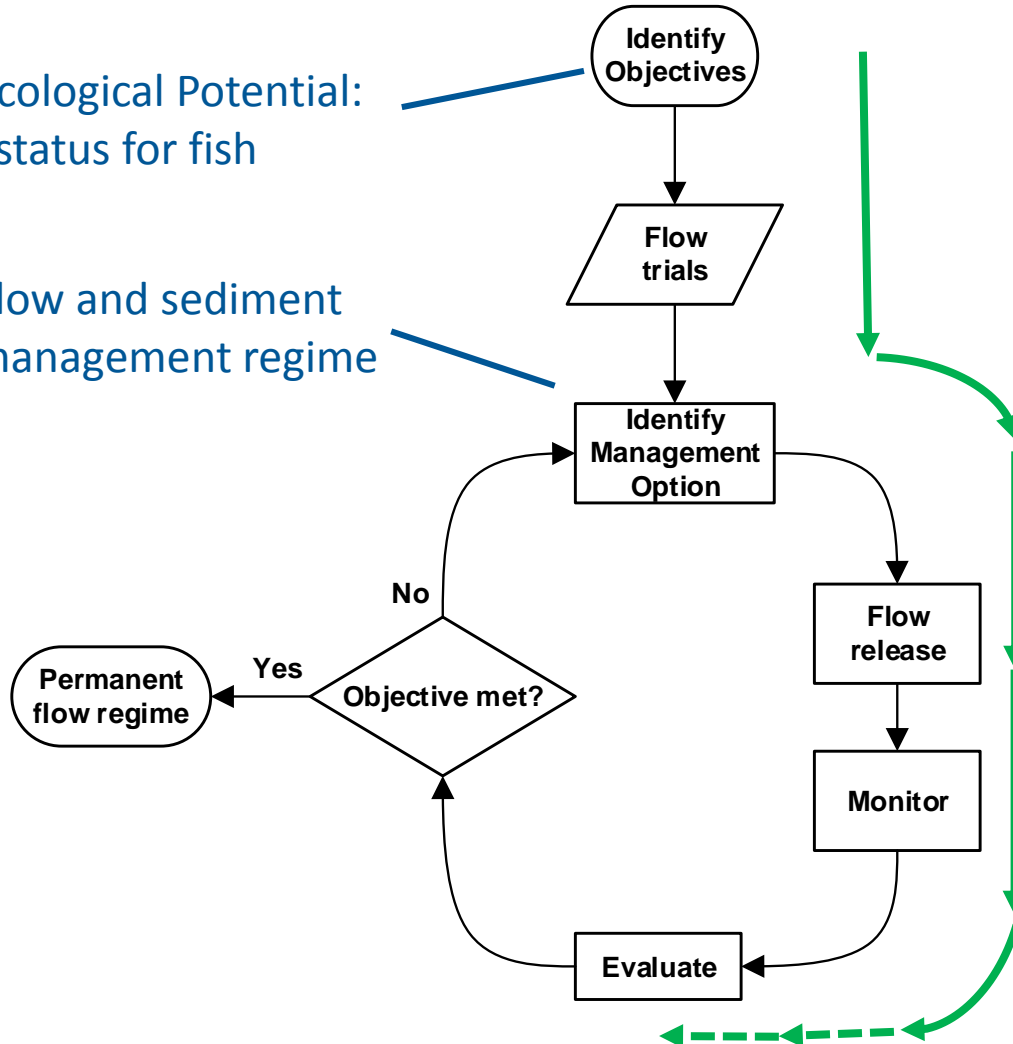


Schematic representation of a mitigation flow regime based on the recommended flow building blocks

Adaptive Management Approach

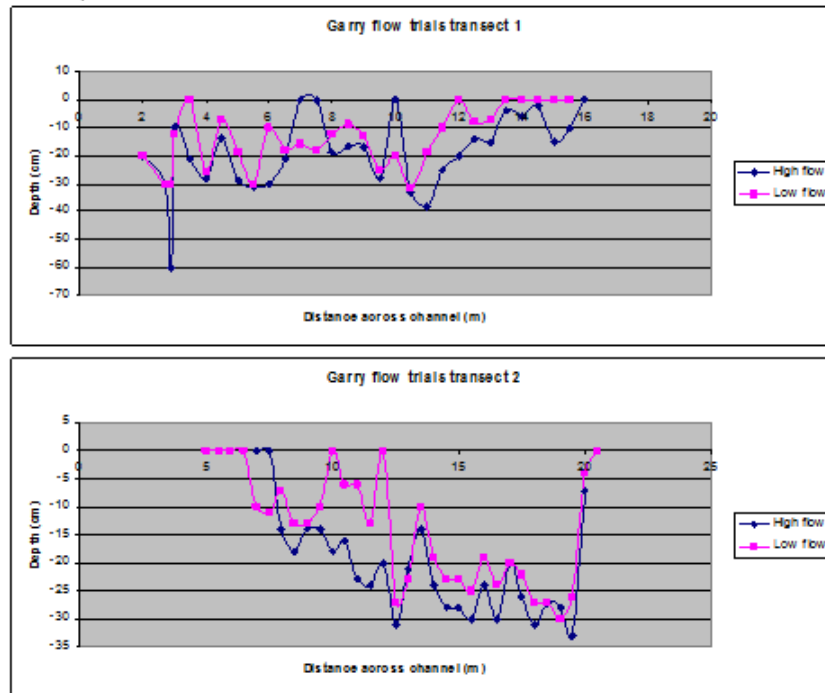
Good Ecological Potential:
> poor status for fish

Flow and sediment
management regime



Flow trials to confirm minimum flow

Figure 2. Cross sectional profiles for the 8 transects. The distance across the channel (in m) is shown on the horizontal axis, while the depth at each 50cm across the transect is shown in the vertical axis in cm. Transect profiles at each of the flow releases are shown.



Downstream



Upstream



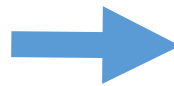
Modifying the intake structure



The tap is turned on!



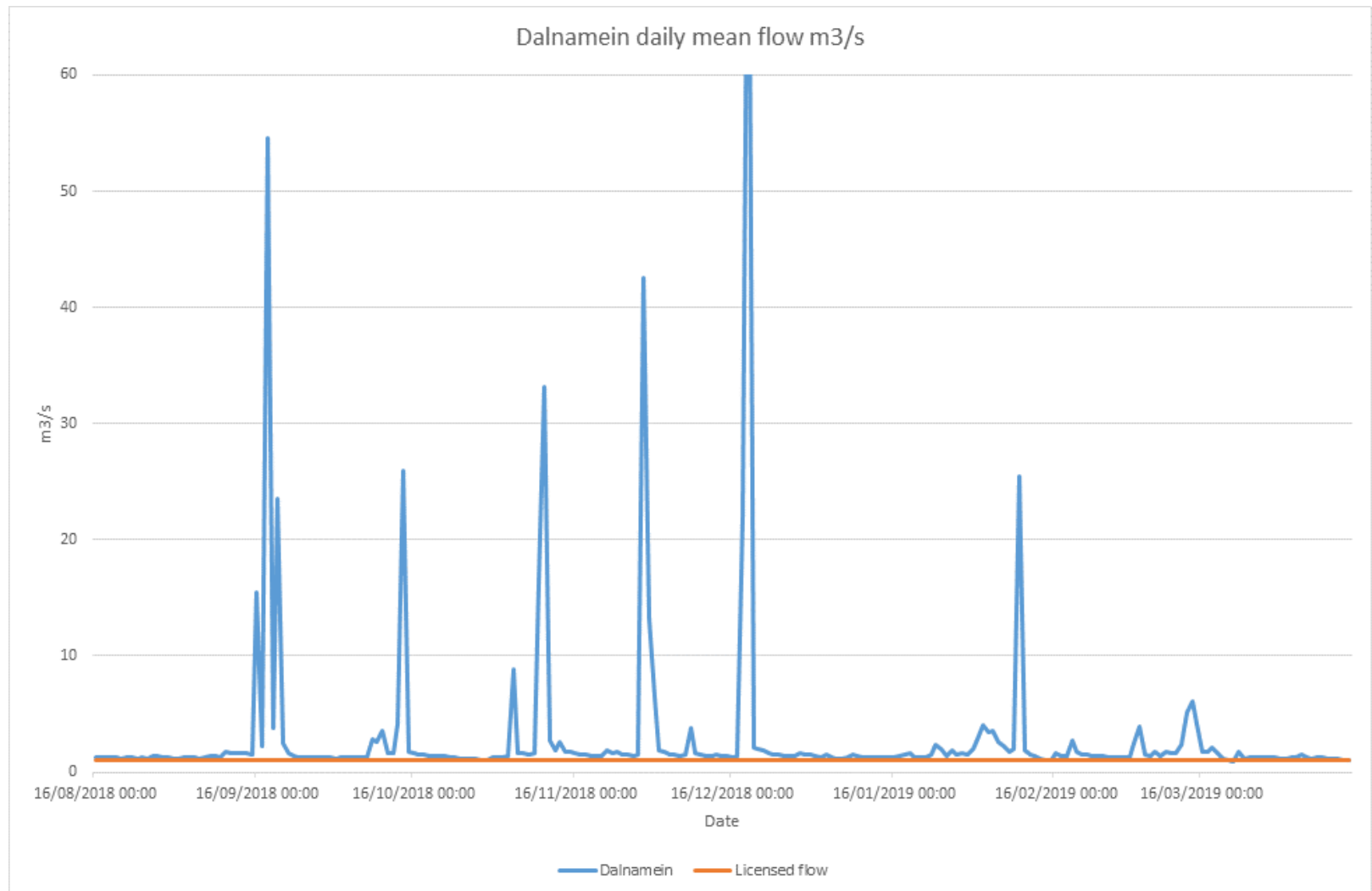
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Monitoring programme

- Hydrology
- Morphology
- Fish habitat
- Fish populations
- Invertebrates
- Ecological indicators of severe flow pressure

Hydrology – flow gauging



Morphology

Coarsening



2019

Fining



2019



Restoring a salmon population

Struan Weir



Waterfalls



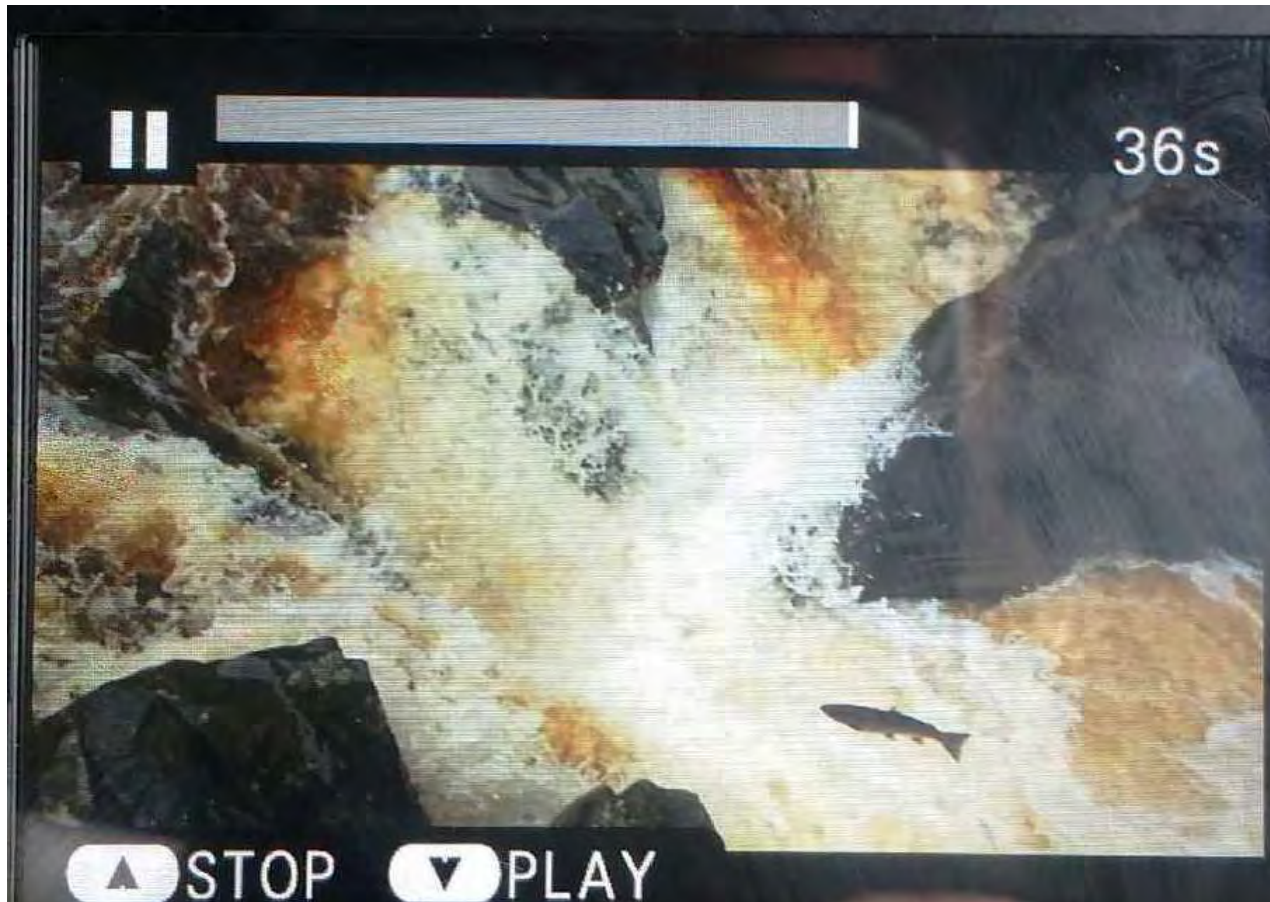
Flow for juveniles



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We need to prove that fish get over falls (or don't!) and spawn successfully



Assessment methods

- Electrofishing juveniles
- Redd counting
- Observations of adults – filming, snorkelling

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What if salmon can't get over the falls and there are no fish to start with?

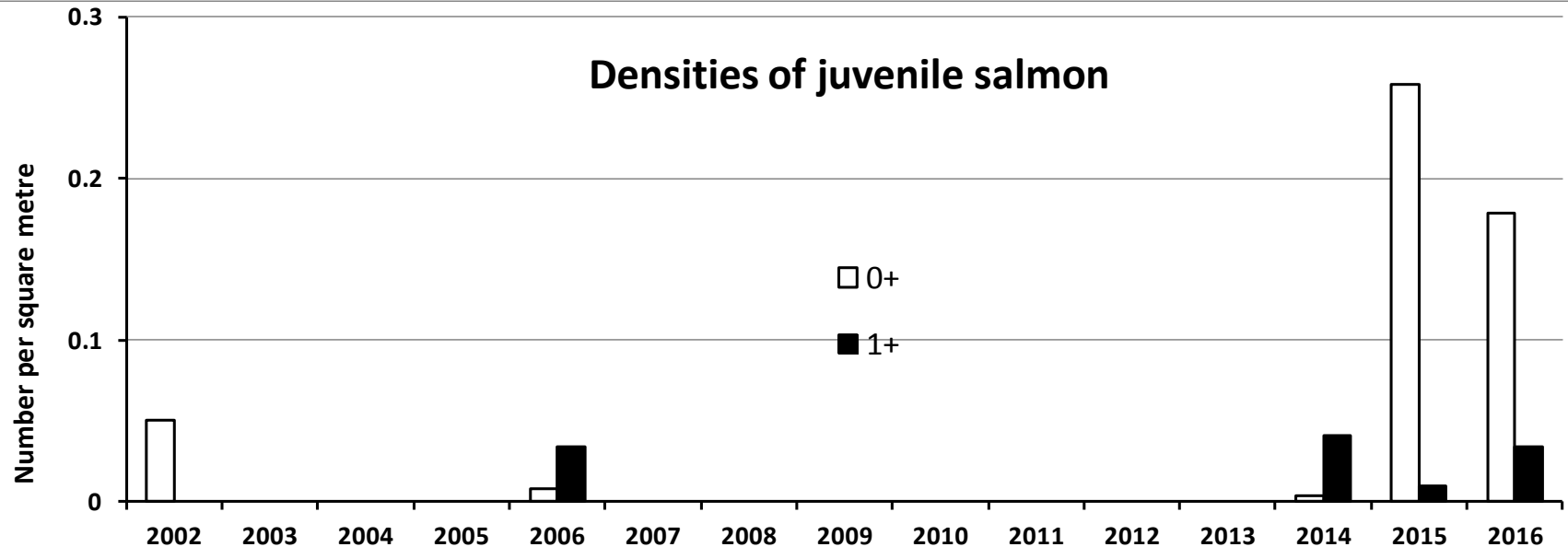
How would you know the falls are a problem?

We stocked salmon to ensure there would be fish returning

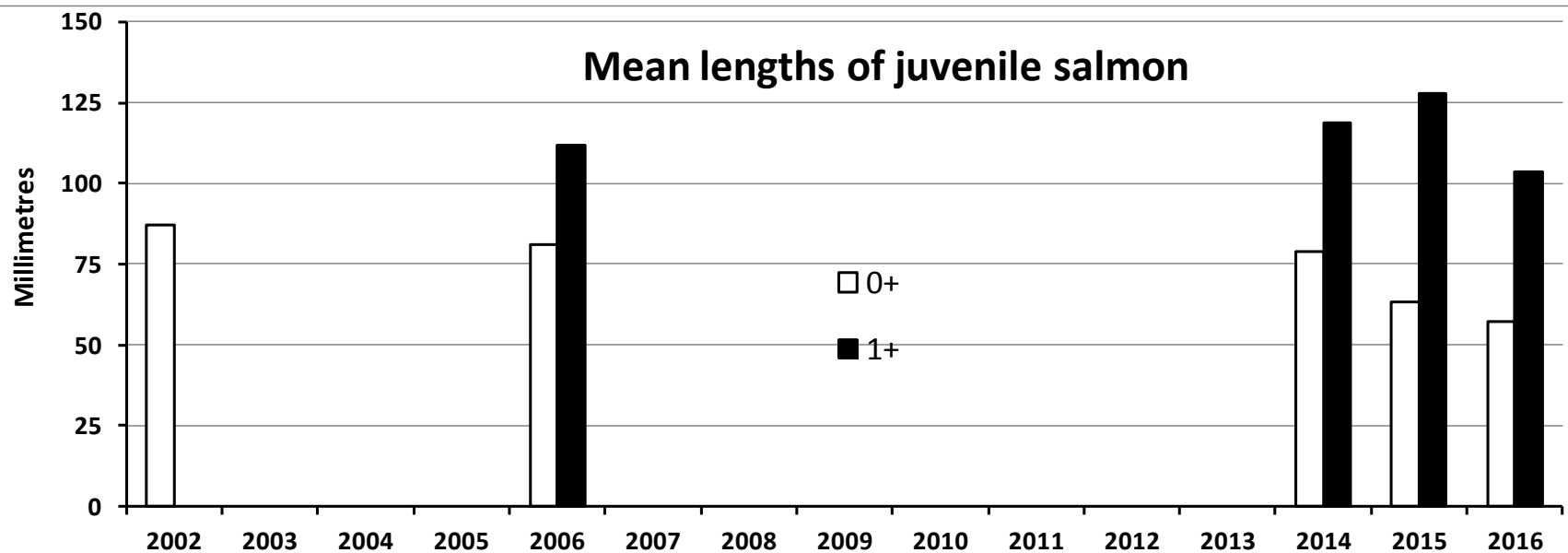
We stocked the Garry for some years in anticipation of flow restoration



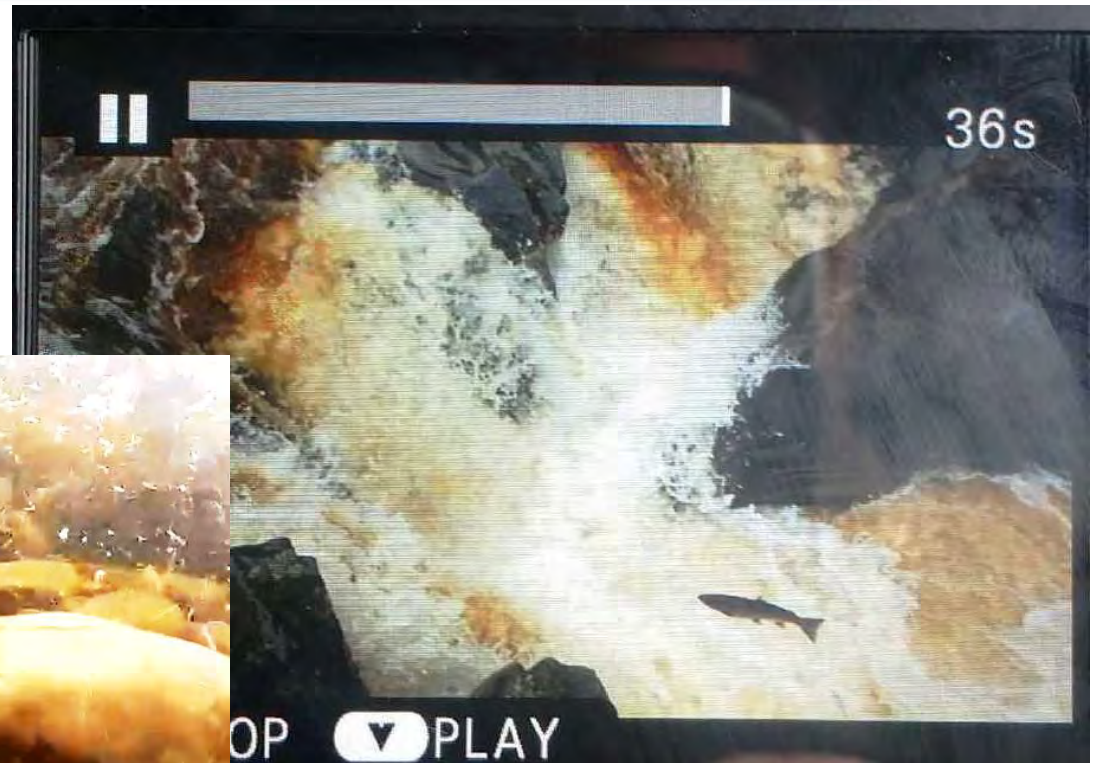
Densities of juvenile salmon



Mean lengths of juvenile salmon



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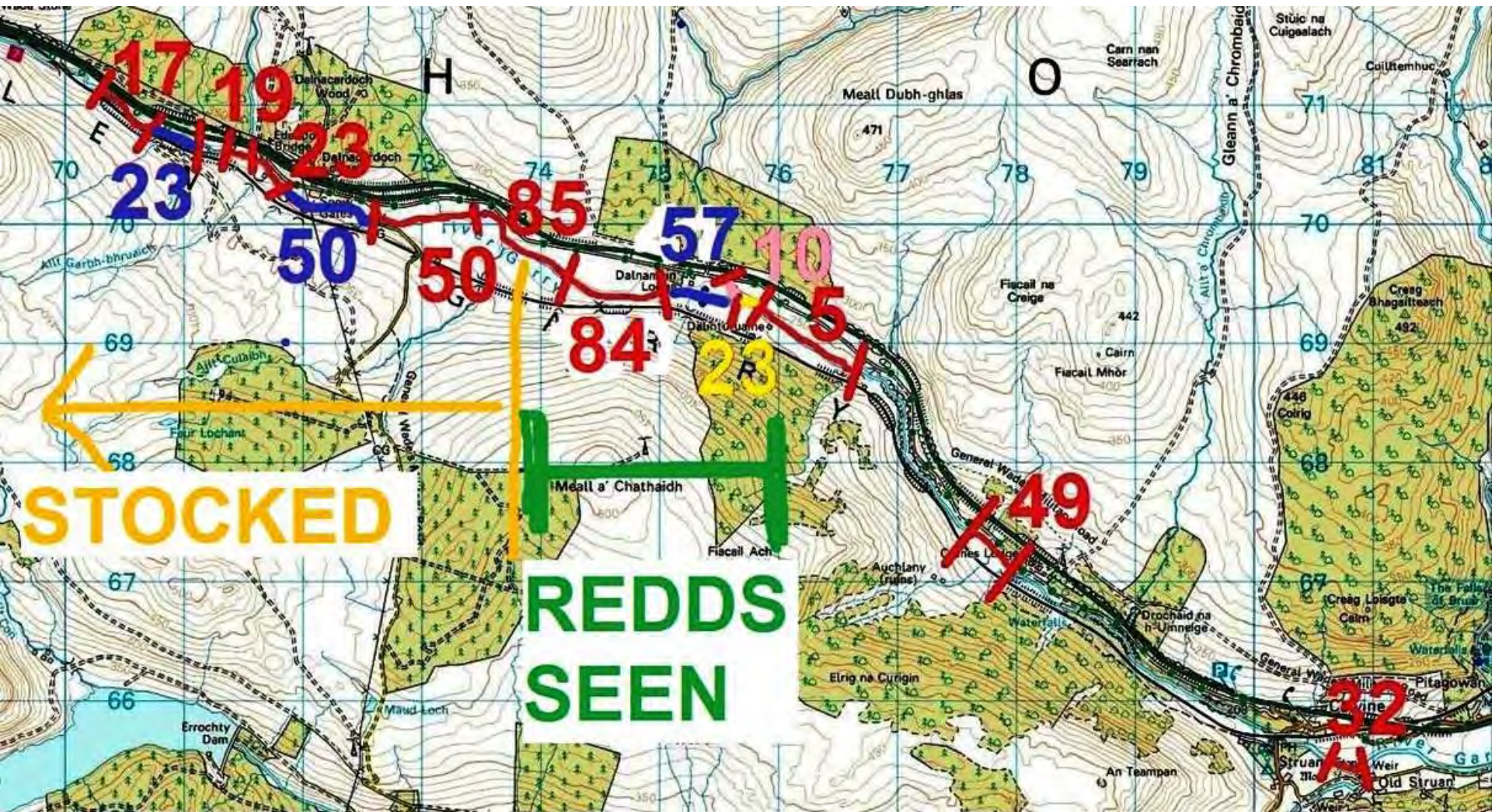


Dilemma!

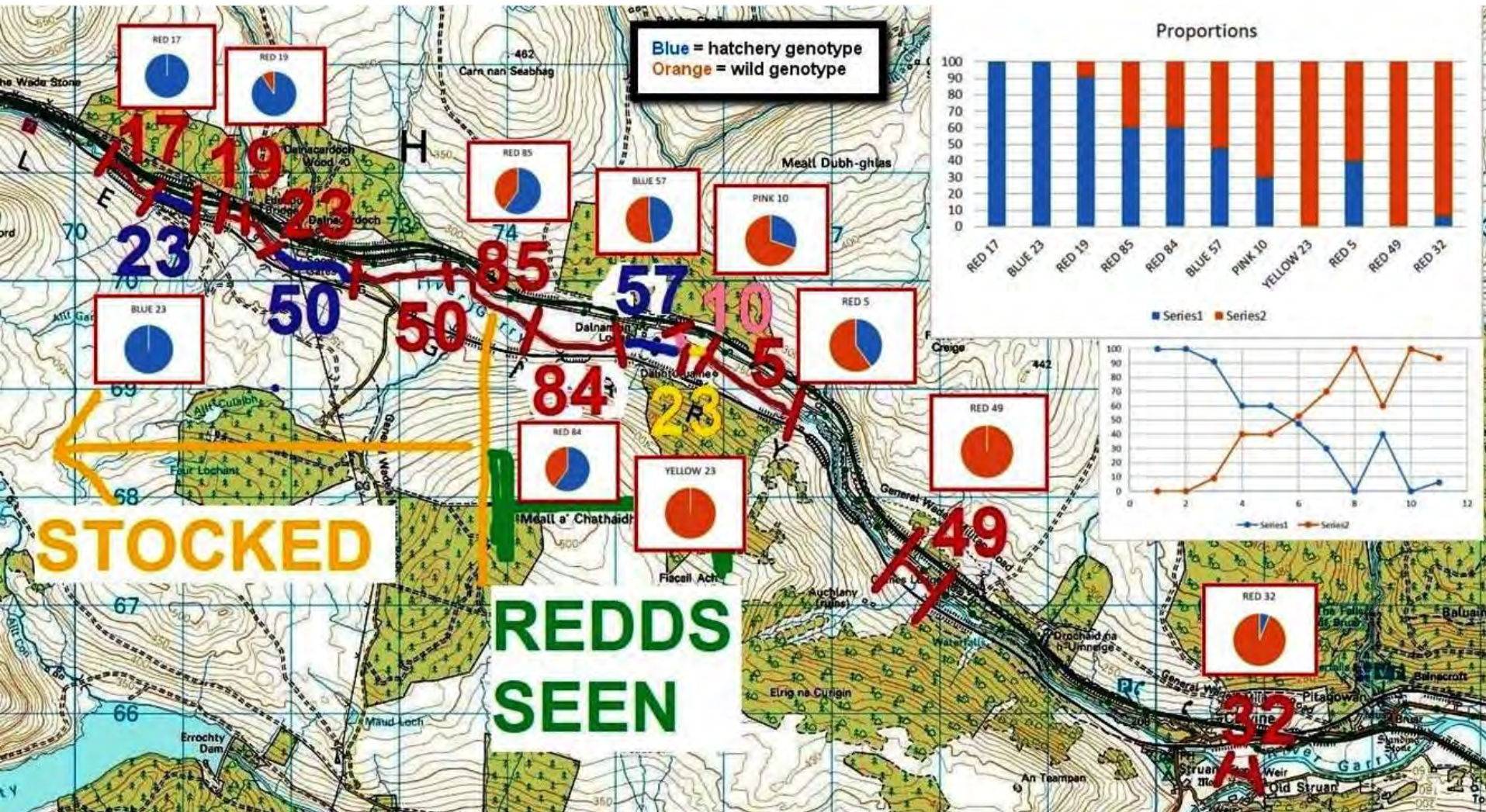
How can we demonstrate if
salmon are colonising
naturally if stocking
continues?

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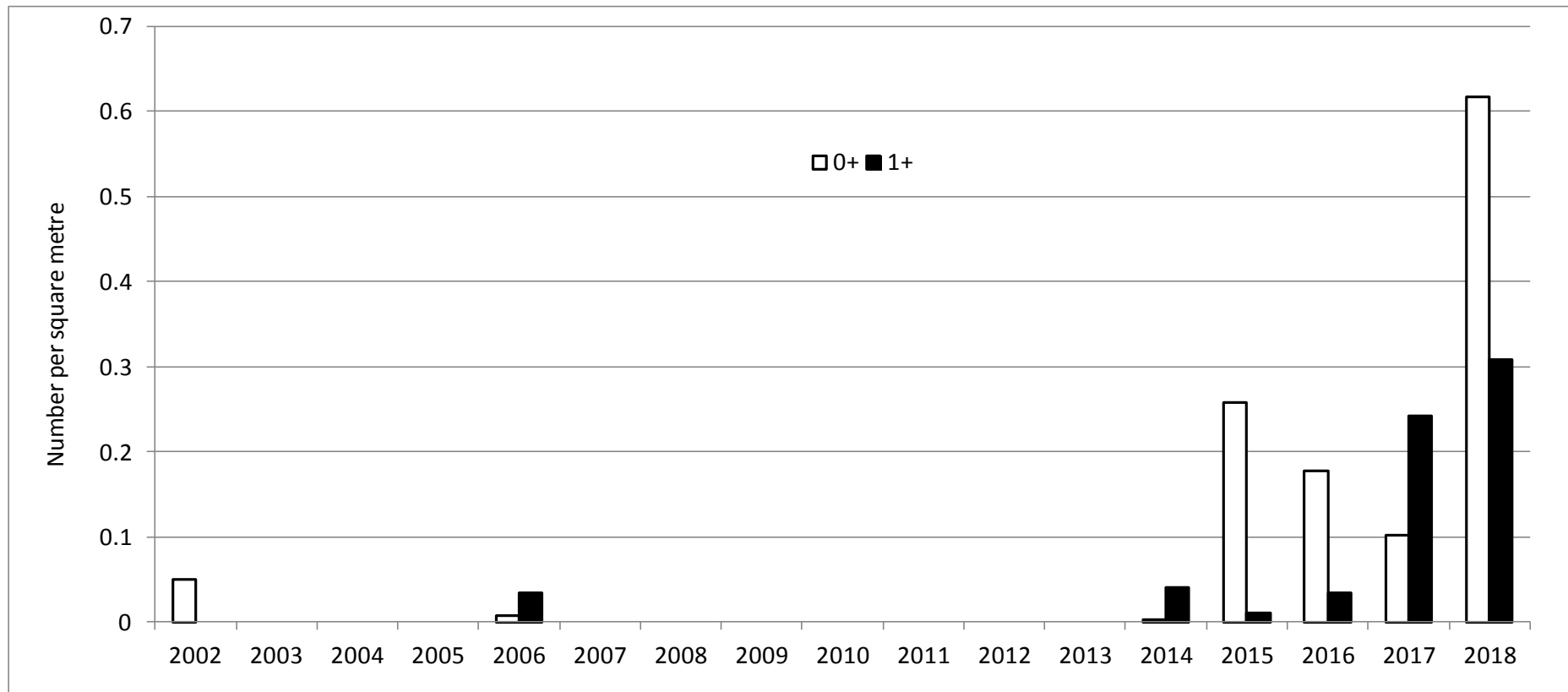




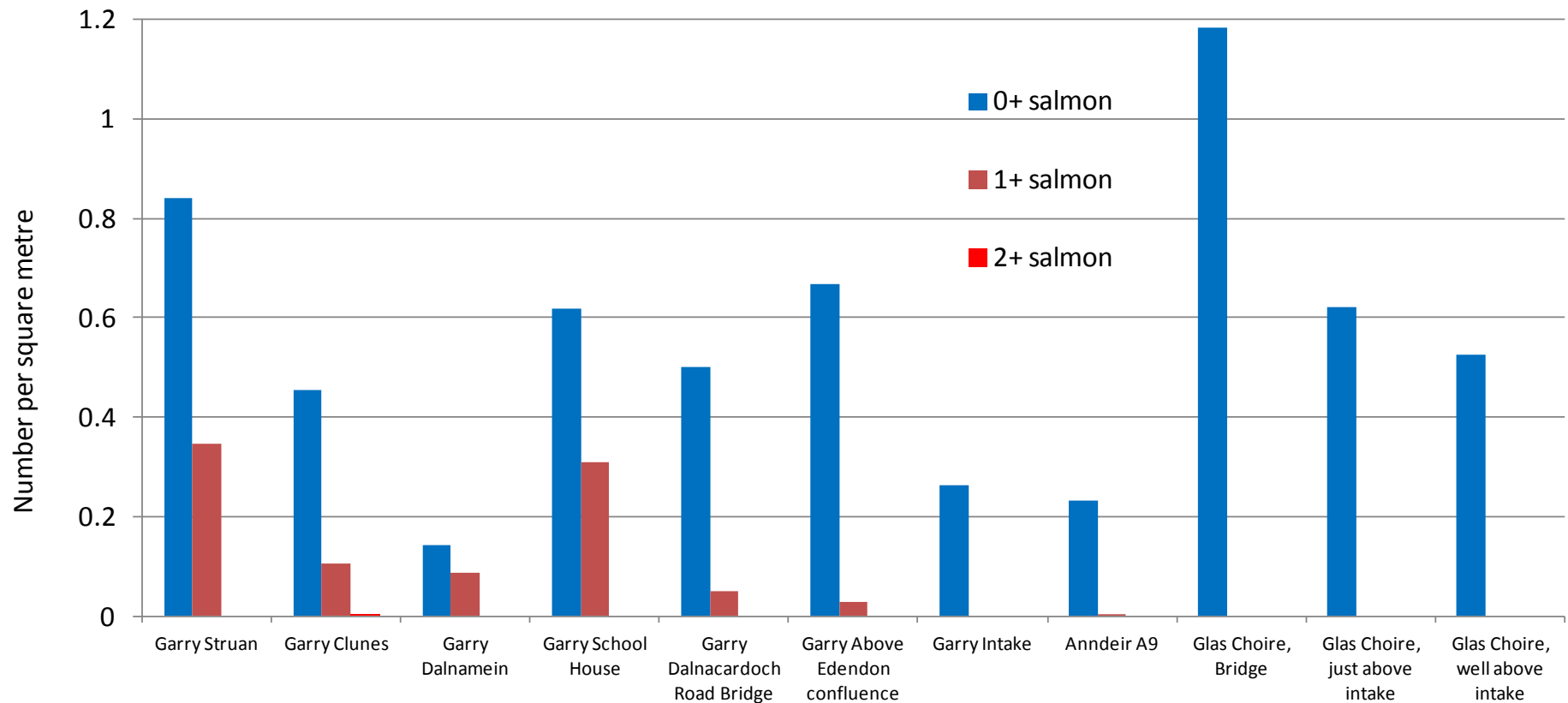
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Juvenile salmon densities, site above Dalnamein



Juvenile salmon densities, 2018





Have the objectives been met?

- GEP: wetted area..., flow depth and velocities..., active channel..., diversity of species... ✓
- GEP: Juvenile fish consistent with >poor status ✓?

+

- Collaborative working ✓
- Everyone happy? ✓

