To The Mercury, Rob Inglis Journalist
1 September 2021

1. I write in response to the comments by Messrs. Todd Walsh and Julian Amos in the Mercury of last weekend, which misrepresent the nature of salmonid hatchery impacts in Tasmanian rivers.

2. I agree with Mr Walsh that many of Tasmania's rivers are strongly affected by changes in sediment, flow and water quality due to landuse; and that mining and its legacy continues to have severe impacts. This is clearly evident in the data underpinning the Tasmanian Conservation of Freshwater Ecosystem Values database. However, his statements on the level of impact from salmon hatcheries indicate a lack of experience and knowledge of both the industry and stream ecology, and of the tools necessary to properly assess river health.

3. Mr Walsh quotes results from a technique called AUSRIVAS, based on macroinvertebrates (river insects and other organisms). There are significant issues when applying it. I know this, since I developed and nationally coordinated the AUSRIVAS system as the nation's first standardised protocol designed for scoping the state of river health at regional scales. I have conducted thousands of AUSRIVAS assessments in Tasmania and interstate. On its own, this system is not suitable for evaluating impacts from industrial or hatchery discharges. AUSRIVAS is a crude tool, measuring only one aspect of the river ecosystem. It merely compares a site's list of invertebrate families with one derived from a benchmark set of 'reference sites' – many of which have been compromised by landuse.

4. Using AUSRIVAS alone is like taking one's temperature to diagnose a complex disease – misdiagnosis is a frequent consequence. In response to this weakness, I developed the Stream Life component of the Tasmanian River Condition Index (TRCI) in 2008 - a protocol whose metrics are used by DPIPWE, by the EPA in license conditions for monitoring hatcheries, and in the Aquaculture Stewardship Council's accreditation process for Tasmanian salmon hatcheries. TRCI contains ten measures of stream life - including the diversity, abundance and nature of the invertebrate community, as well as the biomass and extent of river bottom algae.

5. Hatchery effluent is characterized by high levels of nutrients (nitrogen and phosphorus), waste organic material and other potential toxicants. Current management of flow-through hatchery discharges cannot remove more than the organic waste component, doing little to change the soluble nitrogen and phosphorus loads. Tasmanian rivers, which are highly sensitive to these nutrients, therefore serve the industry as secondary effluent treatment systems. Prolific growth of algae is generally a direct result, with effects on habitat, oxygen and visual amenity; as well as changes in the numbers and composition of the invertebrate community – little of which is detected by AUSRIVAS. The full suite of TRCI metrics correctly identifies the level and nature of the impact of hatchery discharges on a river.

6. Mr Walsh claims that he has worked for HAC since 2017. This is curious. From 2008 to 2019 I worked as an independent advisor/consultant to HAC, conducting routine monitoring, between 2 and 12 times a year, of algae, fish and invertebrates in the Russel and Little Denison rivers. I conducted in-depth assessments of the nutrient, algal and invertebrate condition of these rivers while seeking a solution to the problem of excessive algal growth. An inescapable conclusion was that hatchery effluent is the primary cause of downstream algal enrichment in these highly sensitive rivers. This monitoring continues. Mr Walsh has had no involvement in such work, nor in the formal evaluation of impacts or management at any other major Tasmanian hatchery.

7. In work my team conducted at eight hatchery sites in the Derwent, Florentine, Russel, Little Denison, Tyenna, Brid and Macquarie Rivers over more than 20 years, it is evident that the riverine impacts of hatchery discharges can be substantial and extensive. They are different from those of mines and other landuses, but depending on the context are equally as intense. Over the years, the

Tasmanian and local governments have reduced or removed the impacts of town sewage discharges on our rivers. Hatchery effluent is broadly similar in nature, and improvements in performance are essential.

8. In the case of the Derwent River catchment, there is also the problem of nutrient enrichment of large hydroelectric storages. Hatcheries discharge substantial quantities of nutrients into these normally clean waters and nutrient-poor lakes which provide drinking water for greater Hobart and trout fishing. I conducted a review of water quality monitoring in these lakes, and found no long-term, coordinated or systematic monitoring of algal levels (other than occasional sampling for blue-green algal alerts). There is no government oversight, regulation or formal standard used to manage green algal levels to ensure that these lakes stay in a healthy state.

9. Mr Walsh states that sites downstream of salmon hatcheries are "*typically healthy*". This is both uninformed and misleading. He states that hatcheries are "*absolutely hammered by the EPA to have their discharge water as good as the intake*". This is false. EPA license conditions for discharges impose a set of water quality parameters, whose makeup and thresholds are significantly different to intake waters. He appears not to have read the numerous reports to the salmon industry provided by my team or others on the downstream effects of hatchery effluents. Nor does he understand that the AUSRIVAS protocol clearly states that an 'X band' rating is an alert for nutrient enrichment.

10. Several statements made by Mr Julian Amos are also either untrue or deliberately disingenuous:
    a. He claims that flow-through hatcheries "*take out all the solids before the water is returned to the river*". Untrue. Fine particulates are released from all Tasmanian flow-through hatcheries, especially in those without effective drum-filter systems.
    b. "*algal blooms are not the result of hatchery activities*". Untrue. Like death and taxes, some algal blooms are inevitable and natural - but the evidence shows that enhanced algal growth downstream of many Tasmanian hatcheries is directly related to the release of dissolved or particulate nutrients from their discharges.
    c. "*some of the hatcheries use recycled water*" – Disingenuous. How many? How much recycled water? Land based re-recirculation systems are one method to reduce hatchery and fishfarm environmental impacts. Government protocols to effectively manage the effects of the nutrient-enriched wastes they produce are also inadequate or absent.
    d. "*Other hatcheries go through wetlands in order to remove the nutrients and the solids*". Disingenuous. How many? Is there evidence that these wetlands are both specifically designed and effective, or do they merely act like settling ponds with inadequate change in effluent water quality?
    e. The salmon industry is "*being unfairly targeted for things that are happening that are totally beyond our control*." Disingenuous. Excessive nutrient enrichment from discharges falls firmly within the industry's control, and should be the subject of due diligence and targeted investment.

11. I am left wondering at the basis and motivation for these comments, and at the industry's silent acceptance of testimony at such a level of expertise. This is a time for openness, integrity and honesty, in the spirit of properly managing the industry and our rivers with sound information and intelligent analysis. We need effective policy and regulation based on a clear and socially accepted vision for our environment and a sustainable industry. Not ill-informed speculation or dismissive assertions.

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40 years' experience in freshwater environmental management, as an applied ecologist and ecotoxicologist, at local, state, national and international levels, including:
- Sampling of thousands of river sites across Tasmania since the 1980s;
- 20 years as science advisor to the Murray Darling Basin Commission and Authority;

- 10 years as Science Coordinator for the National River Health Program and the Sustainable Rivers Audit;
- Australian representative to the USEPA on nutrient water quality guidelines;
- Oceania technical representative to the Ramsar wetland Convention;
- Technical advisor to the European Union's Water Framework Directive;
- Science evaluator for the EU's Europa Horizon2020 program.

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