

REVIEW OF TASMANIAN AND INTERNATIONAL REGULATORY REQUIREMENTS FOR SALMONID AQUACULTURE (DRAFT), EPA, Feb 2020

Scientific review and recommendations by Christine Coughanowr

The EPA's review of international practices provides a comparative perspective on regulatory practices in Tasmania, New Zealand, Norway, Scotland, Ireland, Canada and Chile. This is a good opportunity to consider which practices seem to be most effective and how might these be incorporated into the EPA's new Salmon Standard, which is currently under development. However, the scope of the review is relatively narrow, and appears to be primarily focussed on compliance monitoring of lease sites, with some additional discussion of baseline monitoring and management responses to non-compliances. Furthermore, the review does not include any conclusions or recommendations. In particular, what specific regulatory practices could be adopted to improve Tasmania's current system?

A much broader approach is needed that addresses planning, site selection, regulation, compliance and reporting. This should include the full range of activities and resources required to produce salmon, including smolt production, freshwater use and wellboat operations. In addition, the management of biofouling, biosecurity, use of therapeutics, fish escapes and management of mass mortalities are also notably absent from this comparative review. While I recognise that all of these issues are not the responsibility of the EPA, there is still merit in systematic review and better integration to support both environmental protection and long-term sustainability of the industry.

Comments specific to this document

Based on this review, it appears that the vast majority of overseas monitoring and management is based on benthic impacts, with far less emphasis on dissolved nutrients and very little on broader ecosystem impacts, including sensitive habitats/species and cumulative impacts. Modelling, with exception of DEPOMOD (benthic footprint) is also relatively rare.

By comparison, Tasmania does indeed appear to be a leader in broad-scale monitoring and modelling. However, as our understanding improves and the industry expands, these methods also need to be updated to better measure and predict impacts. In particular, the modelling and monitoring design that underpin the Channel/Huon BEMP have not been substantively updated in over a decade, and the initial model for Macquarie Harbour was poorly designed/validated, with disastrous consequences (note: this model was developed by an external consultant with a poor understanding of the system; which raises additional concerns about the process by which it was assessed and awarded.) Finally, a number of the older marine farming areas/leases have not been modelled or monitored in a comprehensive way.

The structure of the EPA review document is somewhat difficult to follow, as there is considerable detail and variation between different countries, states and regulatory iterations. It would be useful to consider and review how the different regulatory systems address both preemptive aspects (e.g. baseline surveys, carrying capacity modelling, delineation of Acceptable Zone of Effects) as well as compliance monitoring and response. A comparative table(s) would be very useful in this regard.

That said, the review indicates that there are a number of areas in which Tasmania's current regulations should be improved. In particular:

- Most countries set a Maximum Allowable Biomass for regions and individual leases, and Tasmania should also take this approach. This should be initially based on rigorous modelling of carrying capacity that takes into account sensitive areas and habitats, and fine-tuned following performance monitoring.

- Compliance monitoring needs to be done at times of peak production (and/or at times of maximum biological impact) and in areas most likely to be impacted. Until this is done, the EPA really cannot make meaningful statements about compliance.
- Tasmania's current regulations are heavily focussed on visual benthic criteria both within the lease area and at a 35m compliance limit from the lease boundary. The rationale for this 35m compliance limit requires further review and justification, as does the definition of what constitutes a 'significant' impact. Regional and site-specific differences need to be considered in defining an Acceptable Zone of Effect (AZE). Impacts beyond the AZE should also include non-benthic criteria, particularly nuisance macro-algae. Other methods/indicators could also be useful, such as settlement plates or stable isotopes.
- A number of the other standard license conditions (p 12) lack criteria, and rely on terms such as 'significant', 'to the satisfaction of the Director', and 'take all reasonable steps'. These need to be defined.
- A one-size-fits all monitoring design is too simplistic. Monitoring intensity should be scaled with biomass and the sensitivity of system. Tasmania should consider a tiered monitoring system, as well as a 5-yearly repeat of more extensive initial baseline surveys (similar to New Zealand).
- Site-specific modelling (e.g. DEPOMOD) is needed to establish the benthic footprint at each lease. This should then be used as a basis for an optimised benthic monitoring design. Monitoring transects aligned with current direction/speed also seem like a sensible approach.
- Requirements around fallowing times are vague, and clearer criteria are needed as to what constitutes 'recovery'.
- While there has been some good work done on regional monitoring & impacts (e.g. BEMPs, recent Macquarie Harbour studies), this needs to be tightened up to better reflect potential lease & farm specific impacts. In particular, the majority of BEMPs do not include water quality monitoring in sheltered areas (where nutrient impacts may be most pronounced) or biological monitoring of vulnerable habitats (e.g. reefs, seagrasses). Furthermore, the growth of nuisance filamentous algae is not currently included in biogeochemical models, and has only just been included in the Storm Bay monitoring design, but is not routinely monitored in other regions. While some work has been done on impacts on reef and intertidal communities, this is not always directly related to the dissolved nutrient footprint of nearby leases.
- Tiered management responses based on monitoring results should be clearly stated, including clear criteria and what follow-up actions will be required (e.g. more intensive monitoring, move pens, reduce feed input, early harvest, extended fallow, reduce MAB, fines & penalties, close lease). At present, this seems to be done in an ad hoc manner.
- Further discussion is needed as to what constitutes a comprehensive and adequate baseline survey. Over what period should these be done, and how often should they be repeated to assess impacts after leases have been occupied?

Tasmania's stated goal of world's best practice is certainly laudable, and indeed the scientific basis to achieve this is well-advanced in a number of ways. However, achievement of this goal will require both pre-emptive as well as reactive planning, regulation, monitoring and response. This needs to be coupled with clear and transparent communication and reporting, and must apply to both new operations as well as existing licenses.

The following key elements should be included:

1. Site selection (e.g. map habitats/sensitive species; bathymetry & currents; sed character)
2. Modelling (DEPOMOD and dispersion/biogeochemical)
3. Establish monitoring zones and sites, with inclusion of sensitive regions/habitats/species
4. Set monitoring parameters, timing & frequency
5. Establish clear management criteria, responses and penalties
6. Require regular, timely and transparent reporting
7. Implement regular reviews and improvements

Further comments and recommendations are provided below.

- Start with a broad assessment of regional and site suitability. This should start with mapping of key habitats and species, as well as bathymetry, currents, and sediment/seafloor characteristics. It is essential that other socio-economic aspects be included here as well. The recently published *Pilot Marine Spatial Assessment Tool* (Ross et al, 2020) provides an example of how this could be done.
- Complete detailed baseline survey(s) in selected areas, including bathymetry, hydrodynamics, water and sediment quality, condition/extent of key habitats (e.g. seagrasses and reefs), presence of protected species, marine pests, etc. This baseline survey should be repeated periodically to assess any changes, as is done in New Zealand (e.g. 5-yearly)
- Develop & implement models to determine carrying capacity/biomass limits and to inform monitoring design. These should include DEPOMOD, dispersion and biogeochemical/nutrient response models. Ideally these would predict both benthic and nutrient enrichment footprints, as well as impacts from both individual and cumulative operations.
- Set region- and farm-specific limits on biomass, feed and/or TPDNO.
- Establish monitoring zones and sites. Nutrient-sensitive regions, habitats and species should be specifically included, such as poorly flushed embayments, seagrass beds and rocky reefs. Monitoring transects and AZEs should be aligned with current directions. Tiered monitoring design is recommended, with more intensive monitoring required for larger operations and for those located in more nutrient-sensitive waterways
- Monitoring should focus on the maximum biomass period, sensitive periods as well as post-fallow/pre-stocking periods.
- The currently allowable 1m distance between the bottom of cage and seabed should be reviewed, particularly in areas with poor circulation. More clarity is also needed around fallowing regimes
- Indicators should include benthic enrichment, nutrient enrichment (both phytoplankton and nuisance macroalgae), water quality and biological/ecosystem health.
- Set clear criteria/triggers for what constitutes 'significant' impact, both within the lease area and beyond.
- Link exceedences to clear and timely management responses, and meaningful penalties.
- Review and update models and monitoring programs on a regular basis.
- Provide regular, timely and transparent reporting, including biomass levels and/or nutrient loads associated with specific regions and leases. 'Commercial in confidence' is not an acceptable reason to withhold information when pollutants are discharged to public waterways, and is not standard practice elsewhere. An example of this is the monthly reporting by the Scottish EPA, which can be accessed here: http://aquaculture.scotland.gov.uk/data/fish_farms_monthly_biomass_and_treatment_reports.aspx

I hope this feedback is useful and can be incorporated within the new Salmon Standard.