# 3. Key recommendations

This report provides significant detail with respect to the terms of reference, observations and many granular (technical) responses. To ensure our highest-level, structural recommendations are forefront, we have summarised the synthesised recommendations (full details provided in Section 6: Discussion) that we consider the most urgent and important. These are also prioritised with suggested implementation actions in Section 8: Recommendations and implementation plan. The key recommendations are a summary of (rather than a substitute for) the more detailed recommendations elsewhere in the report.

For many of the technical operations and decision-making processes, up-to-date or complete documentation was not readily available. This is challenging for reviewers but, more importantly, creates as an over-reliance on institutional knowledge and introduces the risk of 'process-drift'. We strongly recommend updating the SRO breeding manual 'program documentation' annually to provide a process map and rationale for all current operations. This should be provided to reviewers at the earliest opportunity in any future review processes.

## 3.1 Family production 'version 2.0'

The ability to produce 50 families per year for the last 10 years is a significant achievement, especially for such a challenging species. However, high attrition rates, and the suboptimal genetic gain that results from being forced to make selection and mating compromises, mean that the rate of genetic gain and production efficiency have significant scope for improvement. The inability to generate sufficient broodstock to ensure every family is eligible for commercial deployment is a serious consequence of the current hatchery production challenges.

### Key recommendations

1. Invest in additional research to improve broodstock conditioning protocols in collaboration with the industry hatcheries that will also benefit from these improvements. While this research will be challenging, there are significant advantages for both family and commercial production if successful.
2. Scope, evaluate and implement opportunities to utilise next-generation family production methods. There are several low-risk collaboration options that could be used to evaluate the suitability of next-generation hatchery methods for SRO.

## 3.2 Reinvigorated traits and breeding objectives

The current goal of '70% QX survival and 30% faster growth with no loss of condition' has outlived its usefulness. There are perceptions that '70% QX survival' lacks commercial relevance, is overly simplistic and fails to account for the complex combinations of (multiple) challenges that SRO may experience.

There is almost universal interest in the concept of resilience as a breeding objective. Trade-offs between selecting for survival, growth and condition (especially within-family) are not always considered, nor are genetic correlation estimates (which quantify these trade-offs) readily available. There is scope for a more dynamic, interactive and ongoing discussion between the NSW DPIRD, aquaculture research groups, the core breeding program and industry stakeholders to ensure traits and breeding objectives are appropriate, relevant and adaptive.

### Key recommendations

3. Leverage the SRO Breeding Program Technical Committee (SROBPTC) and the SRO Breeding Program Advisory Group (SROBPAG) to annually review high-level program progress, confirm selection indices are appropriate, identify directions for research that will underpin the future success of the SRO Breeding Program and update the SRO breeding manual.
4. Establish stronger connections with existing and future research programs that are aligned with the SRO Breeding Program.
5. Empower industry to play a greater role in guiding the technical direction of the SRO Breeding Program through co-developed technical publications, breeding workshops and extension.

## 3.3 Shifting the workload and expanding field trials

There is ongoing tension between the call for additional family evaluation trials and the lack of resources for trial maintenance and assessment. We believe NSW DPIRD staff are doing too much of the on-farm work that could be done better and more appropriately by industry (with formal recognition of the in-kind value of this assistance). This increased engagement would also give industry a clearer picture of breeding outcomes.

### Key recommendations

6. Transition to a split-role model where oysters are handed to industry for field trials and subsequent assessment (with NSW DPIRD oversight). NSW DPIRD should provide upskilling, and breeding program context and extension to ensure trials have the level of robustness needed for generating accurate data.
7. Evaluate new trial designs that could enable more responsive trial assessment and the incorporation of new technologies (e.g. genomics).

## 3.4 Fixing deployment

The greatest risk to the program is probably the failure to reliably deploy the best available stock and *have that stock* demonstrate the breeding program's value proposition. Problems include not having enough good quality family broodstock available for all families and not establishing a coordinated supply chain through hatcheries to the farmer. Moreover, there is a lack of traceability of spat genetic

merit through to the farm (which could demonstrate the linkage between good genetics and good performance). The success of the breeding program depends on the NSW DPIRD, the hatcheries and the farmers all working together; however, this is currently limited by a perceived lack of trust. The move to holding broodstock in Wallis Lake, while forced by natural events, is a step in the right direction.

### Key recommendations

8. Recognise that collaboration and cooperation are required for the program's success. A strong partnership based on trust and a recognition of shared goals is essential.
9. Implement the recommended improvements to family production processes to ensure that all families are of sufficient number to be eligible (if selected) for commercial spat production. Industry should confirm the target number of broodstock per family needed for reliable commercial hatchery production, which may require the ability to strip spawn.
10. Complete the transition to full industry management of broodstock using the appropriate cost-sharing or recovery model (e.g. recognition of in-kind, direct cost recovery). This should include providing redundant repositories to mitigate biosecurity and environmental risks.
11. Implement a system for making genetic merit (e.g. estimated breeding values [EBVs]) accessible and transparent through production from hatchery to farm (see Appendix 4 for a working example: GF Plus™ system in New Zealand radiata pine breeding). This will enable clear demonstration of the breeding program value proposition.
12. Provide upskilling, extension and resources to ensure the entire supply chain (i.e. hatcheries, nurseries, farmers) understands the principles of deploying genetically improved stock, interpreting EBVs, trait trade-offs, the impact of culling and within-family selection, etc.

## 3.5 Governance partnership

Leadership and governance were repeatedly raised as systemic issues underpinning many of the other concerns raised. We saw a history of governance instability, a myriad of ephemeral committees, ineffective decision-making, a lack of trust, a high degree of fragmentation and a lack of connectivity. There is a perception that NSW DPIRD is responsible for everything and therefore gets blamed for everything. The levy appears as more of a cost-recovery 'big stick' rather than an enabler for program success and additionality. There was a sense that people fear another SOCo.

Partnership and leadership are needed across the program ecosystem, including at the governance, operational and technical levels. Sound partnerships will ensure that responsibility and accountability are distributed fairly, decisions align with the program's best interests, solutions are co-developed, benefits from the program's successes are shared by all involved and the program has a sustainable funding model. Industry should therefore be responsible for all on-farm aspects of the program, freeing up resources for researchers to answer the difficult questions. This will empower industry stakeholders to take an active role in learning how the program works and ensuring its success. Leadership entails good decision-making and overseeing best practice through regular self-review. Seeking independent advice, fine-tuning processes and challenging internal assumptions are also important. An emphasise should be placed on *what's good for the program is good for everyone*.

## Key recommendations

13. Urgently establish a formal partnership between industry and the NSW DPIRD, beginning with a memorandum of understanding and partnership principles to build common ground. The NSW Farmers' Association was suggested as a potential partner to represent industry (but this is not necessarily the only or best option). The new partnership should be responsible for leading operational decision-making, particularly decisions relating to connectivity along the breeding program supply chain (e.g. NSW DPIRD, hatcheries, nurseries, farmers). There is scope for an 'independent' manager to provide oversight and coordination across the wider program.
14. Use this partnership to facilitate and implement the other review recommendations, such as shifting the trial and broodstock workload to industry. The partnership should seek, leverage or reallocate funding to implement relevant research-based recommendations. A sound and enduring partnership will give government the confidence to invest in the program as a generator of regional economic growth and as ready-response insurance against future challenges.
15. Ensure that the SROBPTC is delegated a more active role in overseeing and reviewing the operation of the nucleus breeding program, including family production, assessment, genetic analysis, and new research or tool development (e.g. genomic selection) opportunities.
16. Formalise overarching intellectual property (IP) principles, including ownership of existing material versus material originating from any new partnership. A spat certification process may help provide confidence that only legitimate users have access to spat from the breeding program (and / or have paid a levy to access this resource).