

Schedule 1

**GENERAL GUIDELINES FOR MARINE RANCHING
AND STOCK ENHANCEMENT
IN SOUTH AFRICA**

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1 INTRODUCTION

Environmental degradation and poor fisheries management have caused several of the world's fisheries to decline or even collapse. At the same time the demand for fishery products globally is expanding. In order to meet the shortfall, stock enhancement and ranching have been used in other countries to sustain continued production from the marine environment. In light of the collapse of a number of fisheries in South Africa, and the concomitant negative socio-economic effects for coastal fishing communities, stock enhancement and ranching should be considered as a fishery management tool to restore and/or enhance fishery production. The emerging of the South African aquaculture industry, which is capable of mass producing seed, potentially provides the necessary technology and capacity to undertake the release of stock into the sea.

The Food and Agriculture Organisation's (FAO) guidelines on "Putting into practice the ecosystem approach to fisheries" views stock enhancement or ranching as a last resort and "should only be considered when other forms of management are incapable of restoring populations to acceptable levels. It should be coupled with effective control of fishing capacity and other appropriate management measures.

The FAO guidelines are a tool to be used only if:-

- 1) Natural recruitment has dropped to such a level that the natural population cannot sustain itself, and/or the population is unlikely to rebuild to historical levels of productivity if left alone. The implication is that reseedling is a short-term intervention to rebuild a stock to a self-sustaining level of production.
- 2) There is a social need to establish a new fishery based on the introduction or transfer of a species, for example, abalone ranching on the West coast beyond the range of *Haliotis midae*. This option will only be considered if an ecological risk assessment shows that the ecological risks are acceptable.

It is recognised that:-

- 1) The "precautionary principle" applies to stock enhancement and ranching activities and hence other resource management tools (e.g. size limits, maintaining a minimum spawner biomass, biological reference points) to ensure sustainable fishery production will be prescribed where applicable.

- 2) As an emerging activity in South Africa, ranching and stock enhancement initiatives have a significant opportunity to learn from mistakes made in other countries and avoid serious biodiversity impacts that have occurred elsewhere.
- 3) The genetics of the broodstock and released seed need to be managed so that genetic profile of the wild stock is not significantly changed.
- 4) Biosecurity measures will be developed to minimise the risk of disease transmission, or introduction of associated organisms, between the hatchery and wild stock.

1.1 Definitions

The following are applicable in terms of implementation of these Guidelines:

Harvesting:

Systematic catching of ranched animals. The removal of animals in terms of sampling, inspections and mortalities does not fall under the term harvesting.

Marine aquaculture:

The farming of marine aquatic organisms including fish, molluscs, crustaceans and plants in controlled or selected marine aquatic environments, with some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated (Nash, 1995).

Marine ranching:

Bannister (1991)¹ defines marine ranching (reseedling) as "Identifiable stock released with the intention of being harvested by the releasing agency."

Restocking:

The release of cultured juveniles into wild population(s) to restore severely depleted spawning biomass to a level where it can once again provide regular, substantial yields. This may also involve re-establishing a commercial species where it is locally extinct due to over fishing, or release of juveniles reared in "conservation hatcheries" to help restore endangered or threatened species (Bell et. al., 2008).

¹ Cited in Borg 2004

Site (Concession area):

A geographically set area defined in the permit where a Holder has the exclusive right to seed and harvest the ranched species.

Stock enhancement:

Bannister (1991) defines enhancement as "The releasing of stock for the public good without the intention of directly benefiting an exclusive user group". Generally this would imply some form of government assistance.

The deliberate or accidental release of a species into a marine environment outside its "current" distribution range is referred to as an introduction (introduced species = alien, non-indigenous etc.). The movement of individuals of a species or populations from one location to another within its current range is called a transfer. (Precautions to be taken when these activities are undertaken are contained in international codes such as the ICES Code of Practice on the Introductions and Transfers of Marine Organisms).

The terms "indigenous" and "alien" are used according to the definitions provided in the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), as follows:

"indigenous species" means a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced into the Republic as a result of human activity.

"alien species" means-

- (a) a species that is not an indigenous species; or*
- (b) an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.*

"invasive species" means any species whose establishment and spread outside of its natural distribution range-

- (a) threaten ecosystems, habitats or other species or have demonstrable potential to threaten ecosystems, habitats or other species, and*

(b) may result in economic or environmental harm or harm to human health.

1.2 Objectives of Ranching and Stock Enhancement

The primary objectives of ranching and stock enhancement are the following:

1. Restocking, which is undertaken to compensate for depletion or eradication of a species, to replenish an area where it used to occur but has since been eradicated (re-introduction), or to provide additional spawning stock to an area where the fishery has declined or collapsed (supplementation). Restocking may also be considered to further improve production in an already sustainable fishery.
2. Augmentation is undertaken to compensate for loss of or damage to the habitat through stock release. It recognises the effect of the modified habitat through the release of fish at a size or age when the habitat is no longer a limiting factor. Some habitats cannot support animals at an early stage of development but may support older animals.
3. Addition, when a new species is translocated into an area outside its natural range. The ongoing experiment with abalone on the West Coast is an example of this practice. The production and stocking of trout for recreational fishing is another well-known example.

The risk of unpredictable harmful effects that stocking could bring about is accepted by some as sufficient reason to resist the practice of stocking altogether. Others adopt a more flexible position that accepts that circumstances do exist where stocking would be acceptable, provided it takes place in accordance with appropriate standards and protocols. This document is developed on the basis that the policy on marine aquaculture in South Africa will be based on the latter position. The applications for specific marine ranching or stock enhancement projects would be evaluated on their merits.

1.3 Legislative and Policy Framework

The guidelines for stock enhancement and marine ranching are published in terms of the provisions and objectives of the Marine Living Resources Act, 1998 (Act No. 18 of 1988). Other relevant legislation and policies include:

- The Marine Living Resources Act: Policy for a Sustainable Marine Aquaculture Sector in South Africa (2007),

- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004),
- The FAO Code of Conduct for Responsible Fisheries, FAO: 1995.

The Department may develop regulations to implement these guidelines.

1.4 Vision

Economic opportunity for coastal communities through ranching operations, restoration or enhancement of fishery production by means of the release of cultured fish or shellfish.

1.5 Guiding Principles

In light of the novelty of the stock enhancement/ ranching resource management arrangements, the following guiding principles flowing from the above policies and legislation are applicable:

1.5.1 Equity

A core principle informing the development of stock enhancement and ranching is that of equity. Past inequalities combined with the decline of South African fisheries have compromised the viability of coastal livelihoods based on these resources creating hardship for coastal fishing communities. Coastal communities should thus be the primary beneficiaries of opportunities for the marine-based component of stock enhancement and ranching. The beneficiaries should be individuals from disadvantaged communities adjacent, or close to the location of proposed projects. At the same time it is recognized that the aquaculture component of stock enhancement and ranching is a capital and technology intensive enterprise, and that industry partners may require a fair return on their investment and risk.

1.5.2 Partnerships

Whilst prioritizing historically disadvantaged fishing and coastal communities, stock enhancement and ranching development should be fostered in partnership between these communities, government, aquaculture industry, research, and educational institutions and others involved in the supply chain.

1.5.3 Economics

Stock enhancement and ranching must be able to directly and indirectly contribute to basic food security as well as to the growth of the local and national economy through being competitive and sustainable whilst creating gainful employment and livelihood opportunities.

1.5.4 Seeding and Harvest Rights

Stock enhancement and ranching within the near shore will be undertaken based on the principles of designated and preferential user rights.

In terms of ranching, the Department will consider applications for seeding and the successful applicant will be authorized to seed and harvest within the designated sea area. Seeding will be undertaken only with a valid permit that will be issued with specific conditions. The harvesting of the resources will be done with a harvesting permit that will be issued once the stock assessment has been undertaken in areas where the species released occurs naturally. The Department will determine the minimum harvesting size and quantities in consultation with the right holder. Harvesting will only be undertaken once the seeded animals reach the legal size limit. In areas where a species does not occur naturally (e.g. Northern Cape in the case of abalone), there will be no size limits for harvesting but harvesting will only be undertaken with a harvesting permit. If the stock moves out of their designated ranching area the right holder has no right to retrieve it. The sea bed area in which sedentary stock are seeded will not be owned by the right holder, and the rights of other users of the area (e.g. recreational, vessels, fishing) will still be valid, unless they are restricted by the Minister in terms of the Marine Living Resources Act.

In terms of stock enhancement, once a fish is released from a hatchery into the sea, it is no longer the property of the releasing agent or last owner. It becomes part of a wild stock, subject to use rights allocated by Government.

2. RISK FACTORS TO CONSIDER WHEN PROPOSING TO UNDERTAKE RANCHING AND STOCK ENHANCEMENT

It is important to determine the level of biological risk (risk to other species and to the environment) before considering ranching or stock enhancement. It is clear that there is no such thing as 'no risk' in such activities. Therefore, it is necessary to determine "an

acceptable level of risk". Based on (Borg 2004) for inland fisheries, the following levels of risk were identified:

1. The lowest level of risk is the introduction of naturally occurring species into areas within their range but where they are no longer found.
2. A higher level of risk is the introduction of stock within its range where it is already found, to restore abundance to levels of productivity of naturally occurring stock.
3. The next level of risk is when a species whose reproductive biology is well understood is introduced into an area outside its natural range where it is known that successful reproduction cannot occur.
4. An even higher level of risk is the translocation of an indigenous species outside of its natural range, where neither its reproductive biology is known nor conditions for successful reproduction are known to exist.
5. The highest level of risk is the introduction of alien species that have the potential to be invasive in that particular environment.

The Department of Agriculture, Forestry and Fisheries (the Department) will only consider proposals for enhancement and ranching that fall within the first four levels of risk.

Other risks include the following:

- User group conflicts (e.g. with "conventional" fishing and recreational activities, etc.).
- The potentially harmful ecological and environmental impacts by related activities, populations of introduced and transferred species on populations of indigenous species and their natural environment.
- The potential genetic impact of introduced and transferred species by the interbreeding of farmed and wild stocks as well as of the release of genetically modified organisms.
- The possibility of inadvertent transfer of harmful organisms associated with the target (host) species. Mass transfer of large numbers of animals and plants has led to the simultaneous introduction of pathogenic or parasitic agents causing damage to indigenous fisheries.

3. ASSESSMENT OF PROPOSALS TO UNDERTAKE MARINE RANCHING

Where ranching and/or stock enhancement is considered desirable and feasible, a rigorous process must be undertaken to assess proposals. Proposals to undertake an introduction

must be reviewed by a panel of experts. Such a review will determine the risk as well as precautions that need to be taken to prevent introductions of non-target species.

Proposals must provide information on the aspects listed below as a minimum.

3.1 Description of proposed activity

Proposals must contain a full description of the proposed activity with details of species to be introduced and associated biological parameters, e.g. origin or source of stock (i.e. hatchery-reared or wild stock), growth, reproduction, survival rates, resource status, etc. In the case of hatchery-reared stock, the animals must be obtained from a marine aquaculture establishment approved by the Department. In the case of wild stock, details of collection sites, stock status, collection equipment and methods should be provided. Proposals must describe the proposed area and site(s) for the release of stock, as well as release equipment and methods, e.g. timing and size/age at release. Detailed maps and diagrams should be provided. Proposals must also provide details of the proposed harvesting of the released stock, e.g. timing, size/age and methods.

3.2 Objectives and performance targets

Proposals must provide clearly defined objectives and associated performance targets to be monitored within the framework of other activities in the area. The targets must therefore be realistic and measurable.

3.3 Economic feasibility

Ranching proposals must provide information on the economic feasibility of the proposed activity, such as cost benefit analysis. Positive economical benefits need to be balanced against negative ecological effects. These economic benefits must include a demonstration that there will be increased productivity and production in the area. Possible revenue generation opportunities must be identified whether local or international. The applicant must demonstrate that the project will be profitable and sustainable. Details of facilities, infrastructure and employment opportunities that will be created in the process, must also be provided.

3.4 Involvement of Historically Disadvantaged Communities

Proposals are required to involve and benefit historically disadvantaged communities in the area of the proposed stock enhancement or ranching activity, and will be evaluated on the extent of the social and economic benefit they generate. The creation of economic opportunities for previously disadvantaged individuals in other components of the value chain (e.g. hatchery operations, processing, other related services) must be outlined in the proposal.

3.5 Access and Resource sharing issues

Proposals must address distribution of benefits and how other users in the area will be affected by the proposed initiative. Also to be addressed is the right of access to the area and the need for large areas of water to be allocated for these activities. All these issues must be addressed prior to embarking on a stock enhancement or ranching initiative.

In order to encourage investment in ranching, which is capital intensive, exclusive ranching rights would be given as an incentive. The decision to grant exclusive ranching rights would have to be balanced with the interests of the broader public and other user groups.

3.6 Environmental Issues

Proposals should provide an analysis of potential impacts at the introduction site, including potential ecological, genetic and disease impacts and consequences of its spread. The applicant is therefore required to undertake an Environmental Assessment (EA) in respect of ranching or stock enhancement under the National Environmental Management Amendment Act, 2004 (Act No. 8 of 2004) and regulations. The assessment will be evaluated and authorized by the Department. The EA should be undertaken by an appropriately qualified person/organization ("independent"). An environmental monitoring and management plan that will provide details of management practices and mitigation measures should also be developed. With regards to the above (environmental assessment and management plan), the following environmental issues should be addressed:

3.6.1 Carrying capacity

A primary consideration is habitat suitability, i.e. existence of critical habitat characteristics for the life history stage under consideration. Environmental carrying capacity must be determined before deciding on the appropriate number of individuals to be released into an area. The density of animals occurring in pristine natural populations of the animal in question can be an indicator in this regard.

3.6.2 Trophic/ Ecological

There are many examples where introduced stock have replaced or dominated indigenous populations due to competition, differing predator responses, or introduction of a predator (food-web modifications or 'trophic cascades'). Due consideration must be given to behavioural aspects of the species to be introduced and potential effects on natural ecosystem functioning at the site of the intended release. Predator control must be considered and addressed.

3.6.3 Genetic

Genetic issues are a major concern even when the released species is indigenous. Biodiversity can be lost through breeding between hatchery and wild stock resulting in a different set of survival traits of the hybrids. Proposals must comply with the following directives:

- All hatchery stock to be released into the marine environment should originate from broodstock obtained from the same area or an interconnecting system (same genetic zone).
- Large numbers (in excess of 100) of randomly collected animals for broodstock should be used to produce juveniles for release purposes. This will help prevent loss of genetic diversity through inbreeding and genetic drift.
- No selection process to improve the broodstock must occur in the case of transfers. Some selection process may be allowed for

introductions/re-introduction to an area to optimize fitness and improve survival.

3.6.4 Diseases

All stock releases, whether of an introduced or transferred species, carry the danger of accidental introduction of disease causing agents and/or non-target species including pathogens, parasites and pest organisms to an area, with potentially highly detrimental effects on the ecosystem. It is important that careful quarantine procedures are implemented such as described in the ICES Code of Practice on the Introductions and Transfers of Marine Organisms 2004 (ICES 2004). In addition, the World Organisation for Animal Health (OIE) Code of Practice must be used in translocating animals in South Africa to assist with the identification and containment of existing (listed) and potentially new diseases. Stock to be released must be tested for diseases and pests. Testing and certification of disease- or pest-free status must be performed by government veterinarians or other competent persons/ institutes whose tests will be certified according to government requirements.

Proposals should include a thorough review of non-target species that could accompany the introduction or transfer. The following important issues must be addressed:

- Known pathogens and parasites of the species.
- Susceptibility of species in the area of enhancement to diseases and parasites found to affect the introduced species in its current range.
- The likelihood that the introduced species will act as an intermediate host for unwanted species.
- Precautions undertaken to ensure no unnecessary biota accompany the shipment.
- A disease monitoring programme for introduced or transferred stocks.
- Contingency plan in the event of a significant disease agent being detected in the area of enhancement.

The introduced or transferred organisms used as broodstock for the production of seed should be kept in a quarantine facility. The quarantine facility serves to prevent escape of non-target species and provide assurance of freedom from diseases prior to release. The animals must be declared disease and parasite free before being introduced. The operational plan for the facility should address at a minimum the following:

- Treatment of all effluents and wastes to destroy all disease agents and other non-target species. All disinfectants should be neutralized before being released into the surrounding medium.
- Isolation of the introduced broodstock from progeny, disease agents, birds and other animals, unauthorized entry etc.
- Regular inspections for reportable diseases and pathogens.
- Detailed record keeping - mortalities, effluent/influent treatments, veterinary reports etc.
- The quarantine period required to allow detection of all non-target species (including non-pathogenic parasites and diseases).

3.6.5. Social Impact

An assessment of the social impact of the project must be provided including:

- 1) The socio-economic benefits in terms of investment, jobs and income;
- 2) Identification of potential social conflicts arising from the enterprise and recommendations on how to mitigate/ manage them. The applicant should advertise and hold at least one public meeting regarding the proposed project in the local area. The advertisement should run for at least 1 month in the local news papers and public areas such as municipality offices. The issues raised in the public participation process should be addressed in the proposal to be submitted. All comments should be attached to the proposal.
- 3) The distribution of benefits (jobs, income) in terms beneficiaries.

3.7 Monitoring

The applicant should submit a proposed monitoring programme to be undertaken by an appropriately qualified person/organisation. A monitoring programme should be

implemented to evaluate the costs and benefits of the project. Success should be evaluated in terms of social, ecological and economic considerations. Both the pilot (see section 4) phase and subsequent commercial (see section 5) phases should be monitored.

Monitoring will also serve to verify that the project is meeting its performance targets. An initial (baseline) survey should be undertaken to determine the status of the stock prior to release of the animals that are being introduced. The stock should be assessed again prior to harvesting to determine appropriate harvest levels. The Department will review progress reports and results submitted by the permit holder and may undertake additional investigations or sampling where necessary. Resource surveys should be undertaken by the Department or an appropriately qualified independent person/organisation.

In the event of a "catastrophic event", the releasing agent will be liable. The releasing agent would need a contingency plan to be in place for such an eventuality. A catastrophic event may be a natural or accidental crisis that may lead to loss of stock, infrastructure or damage to the natural environment.

3.8 Enforcement

The applicant should assess the risks of illegal harvesting of the released stock and should identify the intended approach to prevent such illegal activities. The fact that reseeded stock may not always be identifiable from wild stock in some areas raises some important monitoring and enforcement issues related to access, quotas, size at harvest, etc. An enforcement risk assessment and plan should be provided by the applicant who will take primary responsibility for enforcement. Prior to implementation, the compliance enforcement plan should be finalised in consultation with the Department's enforcement division.

The applicant will be required to comply with regulations set out in the permit conditions to be issued by the Department. The Department will perform random inspections (spot checks) to ensure compliance with permit conditions.

4. ROLE OF GOVERNMENT IN ESTABLISHING STOCK ENHANCEMENT AND RANCHING PROJECTS

It is recognised that Government has a key role to play in facilitating the establishment of ranching projects and that includes:

- Grant ranching or stock enhancement authorisations.
- Undertake research on ranching.
- Monitor and assess ranching projects.
- Enforce compliance with permit conditions and relevant legislation.
- Investigate the provision of industrial incentives for investment in ranching.
- Identify and allocate ranching sites (concession areas).

5. PILOT PROJECTS

Once a proposal has been assessed and deemed feasible, a pilot scale operation should be carried out during which ecological interactions and risk assessment assumptions, and social and economic responses are monitored to determine viability. Scientific assessment should address survival of the released stock and main causes of mortality, impact on the gene pool, and other environmental impacts.

The pilot phase should be long enough to allow assessment of the enhancement techniques employed and critical ecological processes and effects, but short enough to keep the risk that may arise as low as possible. The duration of the pilot period will depend on the lifecycle of the species but should allow enough time for grow-out and harvest. If a pilot project is deemed to be unsuccessful, it is important that the reasons are ascertained. It should be appreciated that natural fluctuations in stock abundance can mask the success or failure of an enhancement project.

6. FULL COMMERCIAL RANCHING OR STOCK ENHANCEMENT

A successful pilot project may lead to a longer-term, commercial ranching or enhancement initiative. Notwithstanding the findings of the pilot project, there is a need for ongoing monitoring for success or failure during the lifetime of the project. Assessments should be based on not only the enhancements, but also other uses of the resources or area. Should

there be consensus that the pilot project be rolled out into a full scale operation, the applicant should apply for a long-term right that shall not exceed 20 years.

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