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DRAFT GUIDELINES FOR MARINE RANCHING IN SOUTH AFRICA

Department of Environmental Affairs and Tourism

2006



environment & tourism

Department:
Environmental Affairs and Tourism
REPUBLIC OF SOUTH AFRICA

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DRAFT GUIDELINES FOR MARINE RANCHING IN SOUTH AFRICA

PREAMBLE

For the purpose of this document, Marine Aquaculture is defined as ***the farming of marine aquatic organisms including fish, molluscs, crustaceans and plants in controlled or selected 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.***

Marine ranching and stock enhancement are considered to be forms of aquaculture. Fundamentally ranching differs from other forms of aquaculture in that the organisms are released into the sea and then left to themselves “in the wild” until they are ready to be harvested or caught.

A new aquaculture policy is currently being drafted. In preparation for the implementation of the aquaculture policy, a legal review process is being undertaken, to analyse all legislation that impacts on aquaculture in order to address gaps and overlaps. The outcome of the process would determine whether it is necessary to develop new legislation to deal with aquaculture or whether existing legislation should be amended.

In terms of the aquaculture policy, sector specific guidelines are to be developed for various types of aquaculture activities. This marine ranching policy is being developed as part of that process, and provides guidelines for submitting proposals to undertake marine ranching and stock enhancement, assessment of proposals and management and regulation of the sector. The purpose of the document is to communicate the guidelines to all interested and affected stakeholders in the public sector (all spheres of government), private sector (industry, consultants, tertiary institutions, environmental interest groups, consumers and the general public).

INTRODUCTION

In a situation where environmental degradation and poor fisheries management have caused several of the world's fisheries to decline or even collapse, global production from well-managed fisheries is stagnant and demand for fishery products globally expanding, stocking (releasing into the sea) of early life-history stages of fish is one management option that is being used to sustain continued production from marine and coastal areas.

Between 1984 and 1997, 64 FAO¹ member countries reported on marine and coastal stocking of approximately 180 different species. Although many believe that stocking will become an increasingly important management tool in the future, it is fraught with controversy and Governments as well as development agencies are becoming more critical of this practice. The controversy is largely associated with:

- User group conflicts (*i.a.* “conventional” fishing activity).
- The potentially harmful ecological and environmental impacts of populations of introduced and transferred species on populations of native species and their natural environment.
- The potential genetic impact of introduced and transferred species by the mixing of farmed and wild stocks as well as of the release of genetically modified organisms.
- The possibility of inadvertent coincidental movement of harmful organisms associated with the target (host) species. Mass transfer of large number of animals and plants has inevitably led to the simultaneous introduction of pathogenic or parasitic agents causing damage to the development and growth of the new fishery resources and to native fisheries.

This inherent risk of unpredictable harmful effects that stocking could bring about, in combination with adherence to the principle of precautionary approach, is accepted by some as sufficient reason to resist any practices of stocking altogether. Others are adopting a more flexible position, to the effect of accepting that circumstances do exist where stocking would be acceptable, provided it takes place in accordance with appropriate standards and protocols. This draft document is developed on the hypothesis that policy on marine ranching in SA will be based on the latter position, whereby applications for specific marine ranching projects must be evaluated on merit on a case by case basis.

1 DEFINITIONS AND SCENARIOS OF STOCK ENHANCEMENT AND MARINE RANCHING

Bannister (1991)² defines marine ranching (reseeding) as the release of aquaculture products into a sea area with exclusive access confined to a limited number of harvesters. This was re-affirmed by Howell (1998, cited in Borg 2004) as: “Identifiable stock released with the intention of being harvested by the releasing agency.” Given the high investment involved in aquaculture, ranching only makes economic sense if exclusive harvest rights are allocated to those making the investment.

Bannister (1991) defined enhancement as the releasing of stock for the public good without the intention of directly benefiting an exclusive user group. Generally this would

¹ United Nations Food and Agriculture Organisation

² Cited in Borg 2004

imply some form of government assistance. Fisheries based on the release of hatchery reared animals into the wild for capture fisheries enhancement is referred to as “culture-based fisheries”.

Caddy & Defeo (2003) expand Bannisters’ definition of stock enhancement as any intervention that improves the productivity of a resource and renders the resource more sustainable, and does not exclude a role of individuals, companies, cooperatives or coastal communities in this activity where the legislative framework so allows. This definition includes natural restocking (regeneration) as a passive process that depends on standard fisheries management protocols such as fishery input controls (restrictions on number of licenses, gear, seasons, areas etc.), output controls (e.g. quotas, bag limits, size limits), marine protected areas (MPAs) etc. Where such an option exists, for instance in a poorly performing fishery, the first approach should be to look at traditional management tools to ascertain whether these can address the problem(s). If they cannot alleviate the problems being experienced in an underperforming fishery, managers have two further options (either of which would probably be supplemented by traditional fishery management tools):

- I. Restore/modify the habitat such that the natural populations increase without further assistance (rehabilitation, mitigation). Some examples are:
 - a. Removal of physical barriers to fish stocks
 - b. Removal of pollution sources
 - c. Restoration of wetlands
 - d. Artificial reefs
- II. Enhance the natural populations by releasing hatchery reared stock or broodstock/juveniles collected/captured from areas of recurrently successful recruitment.

The primary motivations for enhancement can be ascribed to three main categories:

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 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. For instance, if it has been shown that there will be no detrimental effect on the ecological balance, then redistribution of natural stock or release of hatchery stock into less productive areas may improve on the overall performance of the fishery.
2. Augmentation, which is undertaken to compensate for loss of or damage to the habitat. It acknowledges the effect of the modified habitat through the release of fish at a sufficient size when the habitat is no longer a limiting factor.
3. Addition when a new species is translocated into an area outside its natural range. The ongoing experiment with releasing of abalone on the West Coast is an example of this strategy. The production and stocking of trout for recreational fishing which has historically occurred in many countries is another well-known example.

The deliberate (or accidental) release of a species into a marine environment outside its present distribution range is referred to as an introduction (introduced species = alien,

exotic, non-indigenous etc.). The movement of individuals of a species or populations from one location to another within its present range is called a transfer. (Precautions to be observed when these activities are undertaken are covered in international codes such as the ICES Code of Practice on the Introductions and Transfers of Marine Organisms).

The available management options and their motivation can be illustrated in matrix format as follows:

Purpose of intervention	OPTIONAL RANCHING INTERVENTIONS/STRATEGIES				
	Habitat modification (4)	Releasing of living marine organisms			
		Hatchery reared stock		Wild caught stock	
		Indigenous	Alien	Indigenous	Alien
Restocking (1)	A1	B1	NA	C1	NA
Augmentation (2)	NA	B2	NA	C2	NA
Addition (3)	A3	NA	B3	NA	C3

The terms “indigenous” and “alien” are used according to the definitions provided in the Biodiversity Act, no 10 – 2004, as follows:

“alien species” means-

- a) a species that is not an indigenous species; or
- b) an indigenous species trans-located or intended to be trans-located 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;

“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 in the Republic as a result of human activity.

Key to the strategies listed in the table above

Restocking may (in theory) be undertaken by either

- A1 = Habitat modification; or
- B1 = The releasing of hatchery reared indigenous stock; or
- C1 = The releasing of wild caught indigenous stock; or
- Any combination of A1 and/or B1 and/or C1

Augmentation may (in theory) be undertaken by either

- B2 = The releasing of hatchery-reared indigenous stock; or
- C2 = The releasing of wild caught indigenous stock; or
- A combination of B2 and C2

Addition may (in theory) be undertaken by either

- B3 = The releasing of hatchery-reared alien stock; or
- C3 = The releasing of wild caught alien stock; or
- Any combination of B3 and/or C3 supplemented by habitat modification (A3)

In summary, in its broader sense, stock enhancement includes measures such as conventional fisheries management tools, habitat restoration/modification, and release of juvenile or adult specimens to specific areas. This guidance document will focus on the release of stock into the wild, ref. scenarios B1, B2, B3, C1 and C3 above. The distinction between “enhancement” and “ranching” categories of release merely reflect ownership issues.

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

Stock enhancement and ranching should only be considered in poorly performing fisheries where stocks fail to recover after applying traditional fishery management tools and, only in extreme instances for the development of a new fishery, e.g. to enhance economic development or social (poverty) up-liftment.

It is important to determine the level of biological risk (risk to other species and to the environment) before considering stock enhancement or ranching. It is fairly clear that there is no such thing as ‘no risk’ in stock enhancement. Therefore a decision is needed to determine ‘what is an acceptable level of risk? The following levels of risk are offered when enhancing stocks:

1. The lowest risk is enhancing stock within its range and where it is already found, to restore abundance to levels of productivity of naturally occurring stock.
2. The next level is the introduction of naturally occurring species into areas within their range but where they are no longer found.
3. The next level is a species outside its natural range, whose reproductive biology is well understood and conditions for successful reproduction cannot be met.
4. The next greatest risk is translocation outside an indigenous species’ natural range, where its reproductive biology is not known or conditions for successful reproduction exist in the environment into which the species has been introduced.
5. The highest level of risk is a trans-boundary translocation of non-indigenous species.

The Department will only consider proposals for enhancement and ranching that fall within the first three levels of risk.

3 ASSESSMENT OF PROPOSALS TO UNDERTAKE MARINE RANCHING

Where stock enhancement is considered a relevant and feasible option to assist with the sustainable management of a fishery or to create a new fishery, a rigorous process should be undertaken to allow thorough assessment of proposals, as well as monitoring, evaluation and review of projects.

Proposals to undertake an introduction should undergo a thorough review process by a panel of experts. Such review will critically analyze the precautions taken to prevent introductions of non-target species and the potential ecological impacts on the native ecosystem following an introduction, including possible disease outbreak.

Proposals must provide information on the issues listed below as a minimum:

3.1 Description of proposed activity

Proposals should contain a full description of the proposed activity, including duration of the pilot phase, details of the target species 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., where available. In the case of hatchery-reared stock, the animals should be obtained from a recognised and approved marine aquaculture establishment. In the case of wild caught stock, details of collection sites, stock status, collection equipment and methods should be provided. Proposals should describe proposed sites and area 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 should also provide details pertaining to the proposed harvesting of the released stock, e.g. timing, size/age and methods.

3.2 Objectives and performance targets

Proposals should provide clearly defined objectives and associated performance targets. These are necessary to allow for monitoring of success and they should be set within the framework of other activities in the area. The monitoring actions to be undertaken must be clearly elucidated in the context of performance targets. Targets should therefore be able to be measured and tested.

3.3 Economic feasibility

Proposals should provide information on the economic feasibility of the proposed activity, such as a cost benefit analysis and marketing strategy. Positive social benefits need to be balanced against negative ecological effects. Enhancing a stock may impact on other users of this stock or the area in which the stock occurs, or have downstream environmental impacts that have an associated social or economic impact (externalities). Details of facilities, infrastructure and employment opportunities that will be created in the process, should be provided.

3.4 Resource sharing issues

Proposals should address issues pertaining to distribution of benefits and how other users in the area will be impacted by the proposed initiative. Issues would need to be addressed on a case by case basis prior to embarking on enhancement/ranching initiatives, such as ownership of stock, access rights to the area and the need for large areas of water to be allocated for these activities. Closure of an area or fishery for reseeding has social, economic and political costs and user conflicts should be minimized.

There has to be some incentive for a proponent to invest in hatchery production and to reseed an area. The decision to issue “private ownership” would have to consider the interests of the broader public and other user groups.

Where the decision is made to close the area to all user groups, there is the need to differentiate between seeded and natural stock. Unless there are obvious morphological

differences between seeded and natural stock, all animals to be reseeded must be marked in some way, chemically or otherwise. Markings need not be visible to the naked eye, but for scientific and compliance reasons, reseeded individuals must be identifiable.

The issue of ownership of the next generation stock also needs to be addressed, especially in instances (i.e. in most cases) where the reseeded stock is able to breed with naturally occurring stock.

Proposals for public good and where benefits are shared amongst a wide group of stakeholders will be favoured.

3.5 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 impact assessment (EIA) in respect of stock enhancement or ranching under the National Environmental Management Amendment Act No. 8, 2004 and regulations. A Record of Decision (RoD) should be issued by the National Department of Environmental Affairs. The EIA should be undertaken by an appropriately qualified independent person/organization. An environmental management plan should also be developed that will provide details of mitigation measures. With regard to the above (impact assessment and management plan), the following environmental issues should be addressed:

3.5.1 Carrying capacity

A primary consideration is habitat suitability, i.e. existence of critical habitat characteristics for the life stage under consideration. Environmental carrying capacity should be considered when deciding on the appropriate number of individuals to be released into an area. Hydrodynamic factors need to be considered where the purpose of the stock enhancement is to provide a seed source for future settlement.

3.5.2 Trophic/Ecological

There are many examples where introduced stock have replaced or dominated native 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 target species and potential effects on natural ecosystem functioning at the site of the intended release. Predator control could be considered but would require detailed knowledge of the ecosystem functioning.

3.5.3 Genetic

Genetic issues are a major concern even when the released species is native. Biodiversity can be lost through breeding between hatchery and wild stock which may in turn confer a different set of survival traits on the hybrids. Proposals should take the following guidelines into consideration:

- 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 of randomly collected 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.

3.5.4 Disease management

All stock releases, whether of an introduced or transferred species, carry the danger of accidental introduction of diseases 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). Released stock must be tested for nominated diseases and pests prior to release. Testing and certification of disease- or pest-free status must be performed by government veterinarians or other authorized officials.

Proposals should include a thorough review of non-target species that could accompany the introduction or transfer. Some important issues to be covered:

- Known pathogens, parasites, epibionts and endobionts of the species (native range) or stock (donor location).
- Susceptibility of species in the area of enhancement to diseases and parasites found to affect the introduced species in its native 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.

If a decision is taken to proceed with an introduction, the health records of the donor location and surrounding area of the organisms to be introduced or transferred should be reviewed using internationally accepted protocols such as the Office International des Épizooties (OIE), prior to import.

The introduced or transferred organisms should be used to establish a broodstock for the production of progeny in a quarantine facility. The quarantine facility serves to prevent escape of non-target species and provide assurance of freedom from diseases etc. prior to release. Only progeny of the introduced species may be released into the wild - provided that no disease agents, parasites, or other non-target species are evident. The operational plan for the facility should address at a minimum:

- Treatment of all effluents and wastes (including mortalities) to destroy all disease agents and other non-target species. All disinfectants should be neutralized before release 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 epibionts or endobionts).

3.6 Monitoring

A scientifically robust monitoring programme should be implemented to evaluate success and determine the cost benefits of the project. Both the pilot release phase and subsequent commercial phases should be monitored. The applicant should submit a proposed monitoring programme to be undertaken by an appropriately qualified person/organisation.

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

The caution level may require acceptable results from further studies before the next stage of the introduction is pursued. A warning level requires a decision from the regulatory authorities as to whether the project can proceed or is to be discontinued. A mass mortality triggers the caution level leading to an investigation of possible environmental or disease/pest related causes. A warning level is put in place following the detection of a pathogen and serves to prevent any further introductions. If the disease agent or pest is shown to be native (i.e. not introduced), releases may continue, though obviously the viability of the project may be compromised.

User groups, beneficiaries and liabilities need to be identified in the event of an unforeseen “catastrophic event” (Section 28 of National Environmental Management Act guidelines should be followed). Liability would generally be the responsibility of the releasing agent and would need a contingency plan to be in place for adverse scenarios.

3.7 Compliance

A compliance risk assessment and plan should be provided. Prior to implementation, the compliance plan should be finalised in consultation with the Department’s compliance division. The proponent 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 raises some important monitoring and compliance issues related to access, quotas, size at harvest, etc. For effective monitoring and compliance, measures should be put in place to distinguish between the wild and introduced stock.

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

3.8 Co-management

Participation of user groups or fishers in the management of a stock release is seen as an effective means of minimizing conflict and improving the regulatory process. Allocation of co-ownership authority and responsibility fosters a long term, sustainable perspective on an enhanced fishery, improves surveillance of regulations, reduces enforcement costs and improves the quality and quantity information flow for scientific evaluation. Geographically restricted and well defined harvest areas are most suited for co-management practices. The Department encourages co-management of the country's marine and coastal resources. Applicants are therefore encouraged to provide information on co-management in their proposals to demonstrate commitment to this process.

4. PILOT OR LOCAL SCALE PROJECTS

Once a proposal is 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 small enough to minimize any negative effect. This trial period duration will depend on the lifecycle of the species but should obviously allow enough time for grow-out and harvest. If a pilot project is assessed as being unsuccessful it is important that the reasons are recognized. It should be appreciated that natural fluctuations in stock abundance can mask the success or failure of an enhancement project.

5. FULL COMMERCIAL RANCHING OR STOCK ENHANCEMENT

A successful pilot venture may lead to a longer-term, commercial enhancement or ranching initiative. Notwithstanding the findings of the pilot study, there is an ongoing need to monitor 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 study be rolled out into a full scale operation, the applicant should apply for a long-term right, that shall not exceed 15 years.

6. COST RECOVERY

Administrative costs will be covered by application and permit fees determined by the Department in consultation with National Treasury. The sale of harvests from pilot and commercial ventures should defray expenses incurred by the proponent.

Comments to be submitted to the Department by 31 January 2007

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