



Australian Government

Australian Fisheries Management Authority



Guidelines

Assessing Residual Risk In Commonwealth Managed Fisheries



Introduction

While wide reaching in its approach, the primary purpose of the Ecological Risk Assessment and Management (ERA/ERM) process is to:

- i) use a stepped (hierarchical) approach to assess the risks to the marine ecosystem of fishing and fishing-related activities in Commonwealth managed fisheries;
- ii) assess the mitigating effects of fisheries management arrangements on the risks identified;
- iii) after consideration of ii), provide an assessment of the residual risk from fishing for all high risk species; and
- iv) focus the attention of ERM activities on management responses that will minimise the effects of fishing on high risk species – for example, modifying existing management arrangements, developing and implementing new responses, and/or by gathering more data.

The ERA Process

ERAs assess the impact, both direct and indirect, a fishery's activities may have on all aspects of the marine ecosystem. Impacts posed by a fishery are assessed against five ecological components – target species; byproduct and bycatch species; Threatened, Endangered and Protected (TEP) species; habitats; and (ecological) communities¹. The assessments categorise species, habitats and communities into high, medium or low risk on the basis of their susceptibility to fishing activities and their ability to recover from fishing impacts.

ERAs proceed through a scoping stage and three progressive levels of analysis:

- Level 1 Scale Intensity Consequence Analysis (SICA) - qualitative;
- Level 2 Productivity Susceptibility Analysis (PSA) - semi-quantitative;
- Level 3 Stock Assessment - fully quantitative.

This hierarchical approach is a cost and time efficient way of screening activities and identifying key ecological priorities for fisheries management.

At **Level 1**, the potential impacts of fishing and fishing-related activities on units (species, habitat or community) within the five key ecological components are assessed. Key external impacts on the fishery, such as non-Commonwealth fishing activities, are also assessed. Minimal allowance for risk mitigation is made for the effect of specific management arrangements (e.g. MARPOL² requirements).

At **Level 2**, high and medium risk units from Level 1 are more comprehensively screened using a semi-quantitative approach. The approach takes into account some existing management responses that directly affect the susceptibility of a unit to fishing activities (e.g. mesh size). For units assessed at medium or high risk, assessment may progress to Level 3.

¹ Communities are currently only assessed at Level 1 due to limitations in the methodology development.

² International Convention for the Prevention of Pollution from Ships

Level 3 analysis is a fully quantitative assessment and for a specific species is similar to a standard stock assessment. Quantitative stock assessments constituting the equivalent of a Level 3 risk analysis currently exist for many species and these will be taken into account when assessing residual risk.

The Residual Risk Process

ERAs for all major Commonwealth managed fisheries have now been completed to Level 2. Completing assessments to this level is seen as an appropriate compromise between certainty in the assessment and the level of resources and time required. However, due to the semi-quantitative nature of a Level 2 assessment there were a number of limitations. In particular, certain management arrangements which mitigate the risks posed by a fishery as well as additional information concerning levels of direct mortality were not entirely taken into account in the assessments.

In response, AFMA in collaboration with CSIRO have developed a process, known as residual risk, which will effectively bridge the gap between the raw ERA results and the real 'on the water' risks posed by Commonwealth managed fisheries. The residual risk process will consider additional information, particularly the mitigating effects of management arrangements that were not explicitly included in the ERAs or introduced after the ERA process commenced. Priority for this process is currently focused on those species attributed a high risk rating (those likely to be most at risk from fishing activities).

Once completed, ERAs and the residual risk assessments will determine priorities and allow fisheries managers to make informed and consistent decisions about the future management of Commonwealth fisheries.

Application of the Residual Risk Guidelines

Residual risk guidelines have been developed to assist in making accurate judgments consistently across all fisheries. Experts have been consulted during the development of the guidelines to ensure a consistent, repeatable and transparent assessment process is applied. At the moment, the guidelines are only designed to apply to high risk target, byproduct, bycatch and TEP species, due to limitations in Level 2 methodology development for assessing habitats and communities.

There are nine residual risk guidelines, as detailed in Attachment 1.

The guidelines are not seen as a definitive guide on the determination of residual risk and it is expected that in a small number of cases, the guidelines may not apply. Care must also be taken when applying the guidelines to ensure residual risk results are appropriate in a practical sense.

There are a number of conditions which underpin the residual risk guidelines and which should be understood before the guidelines are applied:

- All assessments and management measures used within the residual risk assessment must be implemented prior to the assessment with sufficient data to demonstrate the effect. Any planned or proposed measures can be referred to in the assessment but can not be used to revise the risk score.

- When applied, the guidelines generally result in changes to particular "attribute" scores for a particular species. Only after all of the guidelines have been applied to a particular species, should the overall risk category be re-calculated. This will ensure consistency, as well as facilitating the application of multiple guidelines;
- Unless there is clear and substantiated information to support applying an individual guideline, then the attribute and residual risk score should remain unchanged. All supporting information considered in applying these guidelines must be clearly documented and referenced where applicable. This is consistent with the precautionary approach applied in ERAs, with residual risk remaining high unless there is evidence to the contrary ensuring a transparent process is applied.

Guideline 1 - Risk rating due to missing/incorrect information

Due to the precautionary approach applied in ERAs, species that have missing productivity or susceptibility attribute data may be categorised as high risk. In addition to this, species attribute data may have been accurate at the time of the initial Level 2 assessment for a particular fishery, but since that time, additional or more precise information may be known from another fishery or trusted source.

Where missing, additional or more precise attribute data is known from another fishery or through a trusted source, then it may be incorporated. Only after all guidelines have been applied, may the overall risk category be re-calculated. All incorporated data must be provided to other fisheries where the species has been assessed, as well as the CSIRO database, to ensure changes are consistently applied. All incorporated data should be clearly labeled as such and the source documented and referenced.

Guideline 2 - Additional scientific assessment

It may be the case for a fishery that a rigorous scientific assessment has been performed in addition to the Level 2 assessment currently completed for all major fisheries. Additional assessments may include a Level 2.5 risk assessment, a rapid Level 3 risk assessment, or a population viability analysis. The results of an additional assessment may provide a more quantitative analysis than the results from the Level 2 assessment and are able to be considered by the guidelines.

If the results of the scientific assessment have been published, or are readily accessible, then the risk score from the additional assessment may be adopted. The adopted data should be clearly labeled as such and the source documented and referenced.

If a risk score is adopted from a more quantitative assessment but is still at high risk, consideration needs to be given to the methodology used before applying further residual risk guidelines. The additional assessment may have used a different methodology to that of the Level 2 assessment and as such the guidelines may not be applicable.

Guideline 3 - At risk due to missing attributes

Cryptic species (often bycatch) frequently have unknown information regarding their productivity or susceptibility attributes. Due to the precautionary nature of the ERA

process, this missing information will often result in these species being categorised as high risk. This guideline allows the “borrowing” of productivity (not susceptibility) attribute risk scores from closely related species. This “borrowing” is a temporary measure until sufficient productivity attribute data is collected for the species.

The key considerations for this guideline outline the importance of there being more than two closely related species with minimal variability from which attribute risk scores are “borrowed”. This minimal variability may also be used to assess at what level taxonomically species are considered to be closely related. It may be the case that there are species at different taxonomic levels (e.g. same family but different genus) but which display minimal variability.

All key considerations must apply before “borrowing” of an attribute risk score is permitted. In addition, if there is any variability between the attribute risk scores for the closely related species, then “borrowing” is not permitted. If a genus/family is labeled as “undifferentiated” in the Level 2 assessment, it should not be used to determine minimal variability, or be “borrowed”.

Justification and evidence to support the “borrowing” of attribute risk scores from closely related species is essential to maintain rigor and confidence in the “borrowing” process. The “borrowed” data should be clearly labeled as such and the source documented and referenced.

Guideline 4 - At risk with spatial assumptions

This guideline may be applied for species that are widely distributed outside of the area of the fishery. The Level 2 ERA methodology utilised a precautionary approach assuming species were only distributed within the jurisdictional boundary of the fishery when assessing its susceptibility. While for species that form discrete populations or stocks this approach is robust, the risk score for a number of species, including pelagic and migratory species, should be revised to incorporate this spatial information.

A number of key considerations must apply with clear justification and evidence provided before the decision rules can be used. For the guideline to apply, a significant proportion of a species population must occur outside the jurisdictional boundary used in Level 2 ERA assessments. This population must be continuous both inside and outside the fishery, and there must be no aggregation of the main population within the fishery at any time (e.g. seasonal, spawning, feeding). Finally, the impact from all fisheries (including the one being assessed) must be known to be at a minimal level.

If all key considerations apply, then the availability risk score may be revised to incorporate the proportion of the species outside the fishery. If the proportion of a population outside the fishery is substantial (e.g. greater than 80% - based on catch rates as a proxy), then the availability risk score may be reduced to 1. If the proportion of a population outside the fishery is in the majority (e.g. greater than 50% but less than 80% - based on catch rates as a proxy), then the availability risk score may be reduced to 2. The actual percentage of a population deemed to be substantial, or in majority, may vary depending on the fishery, or the species being assessed.

Justification and evidence to substantiate the spatial distribution of a species and impact of other fisheries must be provided. Any changes to availability risk scores should be clearly documented.

Guideline 5 - At risk in regards to level of interaction/capture with a zero or negligible level of susceptibility

Through the application of the Level 2 ERA methodology, if a species has a low productivity score (e.g. due to slow growth, low fecundity), it will be categorised as high or high-medium risk irrespective of its susceptibility risk score. If the level of interaction or capture for these species is zero or negligible, the likelihood of impact is in effect low and there is little a fishery can do with regards to introducing further management arrangements to reduce the risk. Therefore it is practical to include assessment of this level of interaction or capture as part of determining residual risk.

Under this guideline, observer data is used to confirm that a species has a zero or negligible, interaction or catch rate. Observer coverage must be at an adequate level to be able to accurately determine catch rates. There are 5 aspects of observer coverage which must be considered when determining adequacy:

- average observer coverage per year
- timeliness of the observer coverage
- number of years observed
- observer spatial coverage within the fishery
- level of species identification by observers

As observers only record what they see caught, cryptic mortality must also be considered when evaluating if there has been zero or negligible, interaction or capture. Where a zero or negligible, interaction or capture catch rate for a species is evidenced by adequate observer data, and it is considered that there is a negligible level of cryptic mortality, the susceptibility risk score or overall risk category may be revised as follows:

- Low susceptibility, zero interaction/capture – reduce overall risk category to low
- Low susceptibility, low interaction/capture – reduce overall risk category to medium
- Medium/high susceptibility, zero interaction/capture - reduce susceptibility risk score to 1
- Medium/high susceptibility, low interaction/capture – reduce susceptibility risk score to 2 (if already below 2, then reduce to 1.5)

Justification and evidence to prove the adequacy of observer coverage in a fishery is essential and must be provided to maintain rigor and confidence in the residual risk process. Any changes to risk scores or categories should also be clearly documented.

Guideline 6 - Effort and catch management arrangements for target and byproduct species

Effort and catch management arrangements for target and byproduct species are not taken into account by the Level 2 ERA methodology. This guideline allows effort and catch limits (e.g. Total Allowable Effort (TAE), Total Allowable Catch (TAC), trigger limits) to be considered through the residual risk process. This guideline does not apply for TEP species.

There are a number of key considerations when applying this guideline which must apply and be clearly evidenced before the decision rules can be used. Catch or effort limits must be set according to the outcomes of a scientific assessment (e.g. harvest strategy, stock assessment). There must also be confidence that there is a high level of compliance with the effort or catch limits in the fishery. If revising a risk score based on trigger limits for a species, it must be documented that the limit actually triggers a management action to reduce the impact on the species.

If a catch or effort limit has been determined through a scientific assessment, and there is confidence of a high level of compliance in the fishery, then the overall risk category for a species may be reduced to medium.

In some rare cases, “limited entry” arrangements may directly restrict fishing pressure to a precautionary level. If this arrangement reduces the proportion of a species caught to minor levels relative to a species productivity, and there is clear evidence to support this, then the susceptibility risk score for a species may be reduced to medium. The decision rule regarding limited entry may only be used in rare and exceptional cases. Any changes to risk scores or categories should be clearly documented.

Guideline 7 - Management arrangements to mitigate against the level of bycatch

Only certain management arrangements which mitigate against the level of bycatch were incorporated into the Level 2 ERA assessments including gear limits that affect the size of animals that are captured (i.e. selectivity), and handling practices that may affect the survival of species after capture (i.e. post capture mortality). Management arrangements introduced since ERAs were completed (i.e. mid 2005) will not be represented in the current Level 2 results. This guideline assesses management arrangements that fall into this category.

TEP species remain a management priority in fisheries, however if there is a Threat Abatement Plan (TAP) in place, this may reduce the risk posed by a fishery for that species. If a TAP is in place for a TEP species, and there is confidence of a high level of compliance with the measures prescribed, then the encounterability risk score for that species may be reduced to 1.

Mitigation measures to reduce bycatch will affect specific susceptibility attributes of a species. Different susceptibility attributes will be affected depending on the type of mitigation measure (e.g. Turtle Exclusion Devices (TEDs) reduce post capture mortality). When considering bycatch mitigation measures, it is important to consider the possible negative impacts to other species of the measure.

Before using bycatch mitigation measures to revise risk, it is necessary to consider whether the measure was introduced post mid-2005, and which susceptibility attribute is affected by the measure. Once determined, the relevant susceptibility attribute risk score may be reduced according to the reduction in catch of the species, with the resulting attribute risk score rounded up to the nearest whole number, in line with the ERA precautionary approach.

Catch limits for bycatch species may also be introduced in a fishery. If these limits have been through a scientific assessment, and there is confidence of a high level of compliance in the fishery, then the overall risk category may be reduced to medium.

Justification and evidence to support application of this guideline must be provided to maintain rigor and confidence in the residual risk process. Any changes to attribute risk scores or risk categories should also be clearly documented.

Guideline 8 - Limits on associated species through other management arrangements

Management arrangements specifically targeting one species (primary species) may provide a benefit to other species (associated species) if there is a high degree of association between the two. Management arrangements considered under this guideline must not have already been incorporated in the Level 2 ERA assessment. Aspects which need to be considered when identifying if species are highly associated are:

- Is the associated species marketable in its own right?
- Is the associated species able to be targeted?
- Is the associated species caught only when the primary species is caught, as well as not caught when the primary species is not caught?

Apart from there being a defined high association between species, the productivity and susceptibility risk scores of the associated species (the species being assessed) must be equal to or less than the initial (prior to a residual risk assessment) productivity and susceptibility risk scores of the primary species (the species not being assessed). If all key considerations apply, any reductions in attribute risk scores or the overall risk category for the primary species, as a result of the mitigating effects of a management arrangement, may be adopted by the highly associated species.

Justification and evidence to establish that there is a high association between species must be provided. Any changes to attribute risk scores or overall risk categories should also be labeled and clearly documented.

Guideline 9 - Management arrangements relating to seasonal, spatial and depth closures

Seasonal, spatial and depth closures are introduced to restrict a species' catch in a certain proportion of the fishing area, depth or fishing season. Spatial management (availability) and depth limits (encounterability) may have been considered in Level 2 ERA assessments if they were introduced into a fishery before 2005. All seasonal, spatial and depth closures introduced post mid-2005 will not have been considered and may be assessed under this guideline.

Certain aspects of a closure need to be considered when determining its effectiveness to mitigate against the impact a fishery may have on a species. A closure must take into account the seasons/areas/depths of highest vulnerability of a species. In addition, the closure must also allow for a successful breeding or spawning population to continue the recruitment of a species. If a closure has not been considered through a Level 2 ERA assessment, and the above conditions apply, the two options for revising residual risk are:

- If a closure prevents all catch or interaction with a species, then the relevant susceptibility attribute risk score may be reduced to 1.

- If a closure substantially restricts the catch or interaction with a species, then the relevant susceptibility attribute score may be reduced by the same percentage as the reduction in catch (rounded up to the nearest whole number).

Depth closures may affect the encounterability score of a species (depth distribution relative to fishing gear), as well as the availability score of a species (spatial distribution of that depth). If this is the case for a species, then both susceptibility attribute risk scores may be revised appropriately. Justification and evidence to support application of this guideline must be provided and any changes to attribute risk scores should be clearly documented.

Attachment 1: Residual Risk Guidelines Summary Table

Residual Risk Guidelines - Summary Table			
<p>When applying these residual risk guidelines, please note that:</p> <ul style="list-style-type: none"> - all assessments and management measures used within the residual risk assessment must be implemented prior to the assessment with data to demonstrate the effect. Any planned measures can be referred to in the assessment but can not be used to revise the risk score. - only after all of the guidelines have been applied to a particular species, should the overall risk category be re-calculated; - unless there is clear and substantiated information to support applying an individual guideline, then the attribute and residual risk score should remain unchanged; - all supporting information considered in applying these guidelines must be clearly documented and referenced where applicable (note: any additional data or changes must also feed back into the CSIRO ERA database); and - when applied, these guidelines generally result in changes to particular "attribute" scores for a particular species. 			
Guideline Number	Key Considerations	Decision Rules	Examples
Guideline 1. Risk rating due to missing/incorrect information	1. Are susceptibility and/or productivity attribute data for a species missing or incorrect from this fishery assessment but known through a trusted source or another fishery?	<p>a. If missing or more precise information is known, attribute data may be incorporated where appropriate and the new attribute risk score calculated once all guidelines are applied.</p> <p>Where information is updated or included, it must be provided to other fisheries where the species is also found to ensure the changes are consistently applied.</p> <p>Once attribute data has been incorporated or amended, the source of the data or evidence should be clearly documented and the incorporated/amended data clearly labeled.</p>	<p>A species occurs across two fisheries. Productivity attribute data for the species is included in one fisheries' assessment but not the other. Data from one fishery may be incorporated into the other and the new attribute risk score calculated.</p> <p>Further information is available on the maximum age and age at maturity of the king dory. This more up to date data is included and a new attribute risk score calculated. The source of the data is clearly documented and the amended data clearly labeled.</p>
Guideline 2. Additional scientific assessment	<p>1. Has the species undergone an additional rigorous scientific assessment (e.g. level 2.5 risk assessment, rapid Level 3 risk assessment, population viability analysis. This excludes stock assessments which are to be considered under Guidelines 6 and 7) that calculates the species level of risk from the fishery?</p> <p>2. Has this scientific assessment been published or are the results available?</p>	<p>a. If an additional scientific assessment for a species has been published, then the risk score from the additional assessment may be adopted.</p> <p>If the risk score of a species remains high after the additional assessment, the methodology of this assessment needs to be considered before applying other guidelines.</p> <p>The source of the adopted risk score should be clearly documented and adopted data clearly labeled.</p>	<p>A fishery has undergone a Level 2.5 assessment for bycatch species. This assessment's outcomes have been released and the risk scores from this assessment are adopted by the fishery. The source of the adopted risk score should be clearly documented and adopted data clearly labeled.</p>
Guideline 3. At risk due to missing attributes	<p>1. Does a species have 3 or more missing productivity attributes?</p> <p>2. Are there 2 or more closely related species within a fishery that have those productivity attributes known?</p> <p>3. Are these species at the closest available taxonomic level?</p> <p>4. Is there minimal variability between the productivity</p>	<p>Only if yes to all key considerations, then "borrowing" of closely related species attribute(s) risk score is permitted.</p> <p>a. Where the closely related species all have the same calculated risk score for the particular productivity attribute, borrow the risk score (1,2,3) for that attribute.</p>	<p>A cuttlefish has 7 missing productivity attributes. There are 3 other closely related species of the same genus within the fishery which have 2 of these attributes known. There is no variation between the closely related species' productivity attribute risk scores for each attribute (i.e. all 1), therefore borrowing of the attribute risk scores is permitted.</p> <p>If the closest related species' have variable attribute</p>

Guideline Number	Key Considerations	Decision Rules	Examples
	attributes of these closely related species?	<p>b. Where the closely related species have varying attribute risk scores, the risk score can not be borrowed.</p> <p>If there is an 'undifferentiated' genus or family listed in the assessment as well as species of that genus or family, only use the species level attribute information when borrowing the data.</p> <p>In applying these decision rules, the assessor must be able to justify that the species are closely related.</p> <p>Once productivity attribute(s) risk score are "borrowed", they should be clearly labeled as "borrowed".</p>	risk scores (e.g. if any two of the 3 species above had attribute risk scores that were different), then borrowing is not permitted.
Guideline 4. At risk with spatial assumptions	<p>1. Is it known that a significant proportion of a species population(s) occurs primarily outside the fishery?</p> <p>2. Is it known that the population(s) is continuous inside and outside of the fishery?</p> <p>3. Is it known that the main part of the local or global population do not aggregate (seasonal, spawning, feeding etc) at times within the fishery?</p> <p>4. Is the level of impact on the population from all fisheries (including the one being assessed) known, and is this at a minimal level?</p>	<p>Only if 'yes' to all key considerations, will the modification of the residual risk score under this guideline be permitted.</p> <p>a. If the impact of all fisheries on the species is not known, or known to not be minimal, then the availability risk score can not be changed.</p> <p>b. If the impact on the species from all fisheries is known to be minimal, and a substantial proportion (e.g. greater than 80%) of the species population is located outside of the fishery being assessed (based on catch rates as a proxy), then the availability risk score may be reduced to 1.</p> <p>c. If the impact on the species from all fisheries is known to be minimal, and the majority (e.g. greater than 50%) of the species population is located outside of the fishery being assessed (based on catch rates as a proxy), then the availability risk score may be reduced to 2.</p> <p>d. If the majority of the species population is not located outside of the fishery, then the availability attribute risk scores cannot be reduced.</p> <p>In applying these decision rules, the assessor must be able to demonstrate that the impact from all fisheries on the species is minimal.</p>	<p>It is known that a significant proportion of the bight red fish population occurs primarily outside of the eastern trawl fishery. The impacts of all fisheries on this species are known to be relatively low (population thought to be not far below pre fishing status) and a much higher catch (442 t) is taken in another trawl fishery further west compared to the fishery being assessed (52 kg or <1%). As the impact on the species from all fisheries is known to be relatively minimal and most catches are further west, the availability risk score is reduced from 3 to 1.</p> <p>It is known that a significant proportion of the bronze whaler population occurs primarily outside of the fishery. The species has a primarily inshore distribution with the inshore boundary of the fishery providing protection from trawling. The impacts of all fisheries on this species are uncertain however it is known that much higher catches are taken in the inshore fisheries. As the impact on the species is uncertain, the availability risk score is not reduced.</p>
Guideline 5. At risk in regards to level of interaction/capture with a	1. Has there been an adequate level of observer coverage in the fishery?	Only if yes to key consideration (1), then the following decision rules can be considered.	The whale shark has never been recorded as caught in a fishery and there is a negligible likelihood of cryptic mortality (large species, unlikely to be

Guideline Number	Key Considerations	Decision Rules	Examples
zero or negligible level of susceptibility.	<p>Adequate coverage relates to 5 aspects:</p> <ul style="list-style-type: none"> - average observer coverage per year - how recent is the observer coverage - number of years observed - observer spatial coverage within fishery - level of species identification by observers <p>2. Does the species have low susceptibility (category), have zero or minimal interactions or captures occurred with this species, and is there a negligible likelihood of cryptic mortality?</p> <p>3. If the species does not have low susceptibility, have zero or minimal interactions or captures occurred with this species, and is there a negligible likelihood of cryptic mortality?</p>	<p>a. If (2) applies - a species has a low susceptibility risk score – and there has been zero interactions or captures with negligible likelihood of cryptic mortality, then the overall risk category may be reduced to low.</p> <p>b. If (2) applies - a species has a low susceptibility risk score – and there have been minimal interactions or captures with negligible likelihood of cryptic mortality, then the overall risk category may be reduced to medium.</p> <p>c. If (3) applies – a species does not have low susceptibility - and there has been zero interactions or captures with negligible likelihood of cryptic mortality, then the susceptibility risk score may be reduced to 1.</p> <p>d. If (3) applies – a species does not have low susceptibility - and there has been minimal interactions or captures with negligible likelihood of cryptic mortality, then the susceptibility risk score may be reduced to 2 (or if already below 2, reduced to 1.5).</p>	<p>captured by trawl nets). There is considered to be an adequate level of observer coverage (3 - 8% since 2000 with effective spatial and depth coverage). The species has low susceptibility and as such the overall risk category is reduced from medium to low.</p> <p>The stonelifter has never been recorded as caught and there is a negligible likelihood of cryptic mortality. There is considered to be an adequate level of observer coverage. The species does not have low susceptibility and as such the susceptibility risk score is reduced from 3 to 1.</p> <p>There have been minimal captures of the atlantic beardfish (6 kg). There is considered to be an adequate level of observer coverage. The species does not have low susceptibility and as such the susceptibility risk score is reduced from 3 to 2.</p> <p>The Australian angel shark has not been recorded as caught. The ornate angel shark, another high risk species however, has been recorded as caught and in large amounts. There is an issue with misidentification between the two species and taking a precautionary approach the risk scores of the Australian angel shark is not reduced.</p>
Guideline 6. Effort and catch management arrangements for target and byproduct species.	<p>1. Is there an effort or catch limit (e.g. TAC, TAE, trigger limit) for the species?</p> <p>2. Has this effort or catch limit been set according to the outcomes of a scientific assessment (e.g. harvest strategy) for that species?</p> <p>3. Is there confidence that there is a high level of compliance with the effort or catch limits in the fishery?</p> <p>4. If a trigger limit is in place, does it trigger a management action to reduce the impact on the species?</p> <p>5. Where there is no effort or catch limits, has limited entry been used to cap fishing pressure at precautionary levels so that relative to a species' productivity a minor proportion of the population, or its habitat is caught each year?</p>	<p>This guideline cannot be applied for TEP species.</p> <p>Only if yes to key considerations (1) to (4), then the following decision rules can be considered.</p> <p>a. If a scientific assessment (e.g. harvest strategy) has been used to determine an effort or catch limit (e.g. TAC, TAE) and there is confidence to be a high level of compliance, the overall risk category may be reduced to medium.</p> <p>b. If an effort or catch limit has been determined without the use of scientific assessment (or the assessment outcome is not used), or if an assessment has been used but the level of compliance with these arrangements is unknown or known to be low, the overall risk category remains unchanged.</p> <p>Only if yes to key consideration (5), then the following decision rule can be considered.</p> <p>c. In the rare case where the limited entry arrangements in a fishery restrict the potential catch of the species and there is clear evidence</p>	<p>A tiered set of catch limits for ling has been set using a harvest strategy (where data collection, analysis and assessment are triggered by different levels of catch). There is confidence in the level of compliance and effectiveness of the tiered catch limit. The overall risk category has been reduced from high to medium.</p> <p>A 7,500 t trigger catch limit on squid across three fisheries has been set through the use of largest historical catch, not a scientific assessment. As there is no scientific basis for the limit, the overall risk category remains unchanged.</p> <p>A stock assessment for eastern gemfish recommends a TAC of 0 kg. There is a global bycatch TAC of 121 t on this species to allow its take as byproduct (but not targeted). As this limit is not based on the stock assessment, the overall risk category remains unchanged.</p> <p>Limited entry requirements in a fishery will only be considered to affect the susceptibility score for a particular species, in the rare case where the number of actual and potential entrants is so low that a clear</p>

Guideline Number	Key Considerations	Decision Rules	Examples
		to support this, the susceptibility risk score for that species can be reduced from high to medium.	limitation to potential catch of the species is obvious and can be documented.
Guideline 7. Management arrangements to mitigate against the level of bycatch.	<p>1. For TEP species, does the species have a TAP in place, and is there confidence that there is a high level of compliance with the TAP requirements?</p> <p>2. For bycatch species, are there bycatch mitigation measures that affect their susceptibility risk score?</p> <p>3. If there have been gear modifications or other bycatch mitigation measures, have these not been taken into consideration in the ERA process, and is there confidence that there is a high level of compliance and effectiveness of the use of these modifications or measures?</p> <p>4. What individual susceptibility attribute does each mitigation measure affect, and to what degree?</p> <p>5. Are there bycatch catch limits in place in the fishery for this species, have they been set using a scientific assessment (e.g. harvest strategy) and is there confidence that there is a high level of compliance with the catch limits?</p> <p>6. If there is a new bycatch mitigation measure, have you considered what, if any, negative impacts that mitigation measure is having on the mortality for other species?</p>	<p>Only if yes to key consideration (1), then the following decision rule can be considered.</p> <p>a. If a TEP species does have a TAP in place, there is confidence that compliance is high and can be documented, the encounterability risk score may be reduced to 1.</p> <p>Only if yes to key considerations (2) and (3), then the following decision rule can be considered.</p> <p>b. If bycatch mitigation measures affect the susceptibility of bycatch species, the relevant susceptibility attribute risk score (e.g. encounterability) may be reduced in proportion to the decrease in the fishery's mortality of the species. The resulting score is rounded up in all cases (e.g. 1.2 rounds up to 2) to ensure precaution.</p> <p>Only if yes to key consideration (5), then the following decision rules can be considered.</p> <p>c. If a scientific assessment (e.g. harvest strategy) has been used to determine bycatch limits and there is known to be a high level of compliance, then the overall risk category may be reduced to medium.</p> <p>d. If bycatch catch limits have been set without the use of scientific assessment (or the assessment outcome is not used), or if an assessment has been used but the level of compliance with these arrangements is unknown or known to be low, then the overall risk category remains unchanged.</p>	<p>A TEP species has a TAP in place and there it is known that the fishery is meeting the limits and requirements of the TAP, the selectivity risk score is reduced to 1.</p> <p>A TEP species has a TAP in place, however it is uncertain as to the level of compliance and effectiveness of the arrangements. In this case the selectivity risk score may not be reduced until such time as there is evidence to confirm the level of compliance and effectiveness of the measure.</p> <p>A ban on all wire trace in a longline fishery has resulted in a reduction in the amount of sharks being caught. The total fishing mortality for sharks has decreased by 43%. The selectivity attribute risk score has been reduced relative to this decrease from a 3 to a 2 (i.e. selectivity risk score of 3 and 43% decrease = $3 \times 0.57 = 1.71$ – round up to 2).</p>
Guideline 8. Limits on associated species through other management arrangements	<p>1. Is the species being assessed affected by species specific management measures for another species (primarily catch limits)?</p> <p>2. Is there a defined high association between the species being assessed and the other species (which is subject to these management measures)?</p> <p>3. Have these management measures not already been taken into account in the ERA assessment for this species?</p>	<p>Only If yes to all key considerations, once the guidelines have been applied to the primary species (the species not being assessed under this guideline), any reductions in the attribute or overall risk score for the primary species may be adopted for the highly associated species.</p> <p>Aspects to be considered and justified in determining a species to be highly associated include:</p> <ul style="list-style-type: none"> - Is the species marketable in its own right? 	<p>A TAC set via a harvest strategy is in place for the bight red fish. This catch limit also has the affect of limiting catch of the latchet. There is a defined high association between the two species as latchets are not marketable and are only caught in any volume when redfish are caught. The latchet's productivity and susceptibility risk scores are lower than the initial risk scores of the bight red fish. The guidelines have been applied to the bight red fish and the overall risk category has been reduced from high to medium</p>

Guideline Number	Key Considerations	Decision Rules	Examples
	<p>4. Are the susceptibility and productivity risk scores of the species being assessed equal to or less than the initial (before the application of residual risk guidelines) susceptibility and productivity risk scores of the other highly associated species?</p>	<ul style="list-style-type: none"> - Is it targettable? - Is the species caught only when another species is caught, and not when the associated species isn't? 	<p>(under guideline 4). As a result the latched's overall risk category is also reduced from high to medium.</p>
<p>Guideline 9. Management arrangements relating to seasonal, spatial and depth closures.</p>	<ol style="list-style-type: none"> 1. Are there seasonal, spatial and/or depth closures that affect a species? 2. Do these closures take into account areas/depths/seasons of highest vulnerability? 3. Have these closures not already been taken into account in the ERA? 4. Does the closure prevent the catch/interaction with a species? 5. If (4) does not apply, does the closure substantially restrict the catch/interaction with a species? 	<p>Only if yes to key considerations (1) to (3), then the following decision rules can be considered.</p> <ol style="list-style-type: none"> a. If (4) applies - the closure prevents all interaction or capture of a species - reduce the relevant susceptibility risk score (availability, encounterability) to low. b. If (5) applies - the closure substantially restricts the catch or interaction with a species - the relevant susceptibility attribute risk score may be reduced in proportion to the decrease in the fishery's catch of the species. The resulting score is rounded up in all cases (e.g. 1.2 rounds up to 2) to ensure precaution. <p>For depth closures, the appropriate modification to the susceptibility attribute score can be made to both the availability and encounterability.</p>	<p>A depth closure incorporates the entire depth and spatial distribution of a species. There is a viable breeding population within this closure and this closure has not previously been considered in the ERA. The closure prevents the capture of the species and as such the encounterability risk score is reduced to 1.</p> <p>A spatial closure that incorporates a migratory path of a species has reduced the interaction with that species to zero. The availability risk score for this species is reduced to 1.</p> <p>A spatial closure incorporates areas of highest vulnerability and a viable breeding population of a species. This closure reduces the total catch of that species by 68%. The availability risk score (initially a 3) is reduced to 1 (i.e. availability risk score of 3 and 68% decrease = $3 \times 0.32 = 0.96$ – round up to 1).</p>

Attachment 2: Susceptibility Scores

Susceptibility indicator scores				Total susceptibility score
3	3	3	3	3.00
3	3	3	2	2.33
3	3	2	2	1.89
3	3	3	1	1.67
3	2	2	2	1.59
3	3	2	1	1.44
2	2	2	2	1.40
3	2	2	1	1.30
3	3	1	1	1.22
2	2	2	1	1.20
3	2	1	1	1.15
2	2	1	1	1.10
3	1	1	1	1.07
2	1	1	1	1.05
1	1	1	1	1.02