RISK IDENTIFICATION AND RISK ASSESSMENT

by

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ADDRESS TO ENVIRONMENTAL RISK MANAGEMENT AUTHORITY CONFERENCE, CHRISTRCHURCH

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ENVIRONMENTAL RISK MANAGEMENT AUTHORITY

NGĀ KAIWHAKATŪPATO WHAKARARU TAIAO

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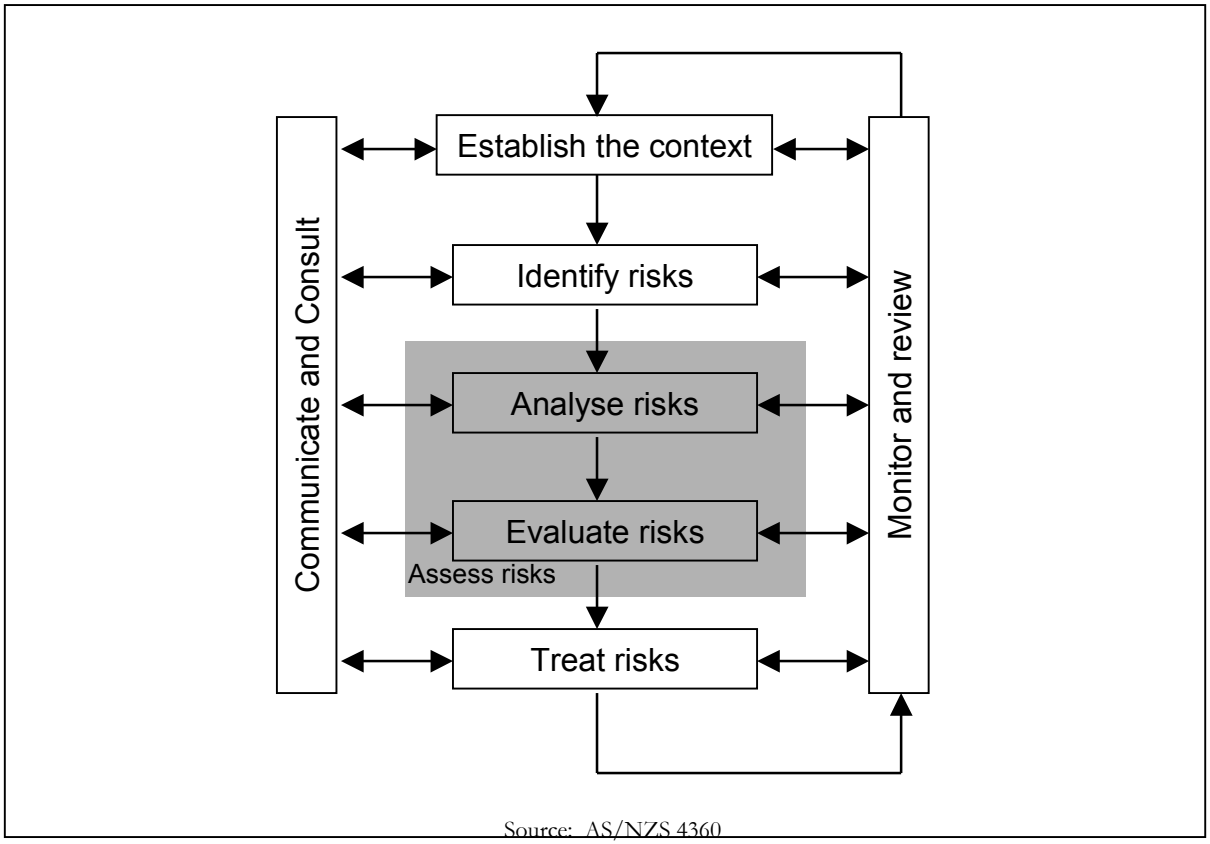
1. OVERVIEW OF THE HSNO RISK MANAGEMENT PROCESS

RISK MANAGEMENT OVERVIEW



KEY TERMS:

Risk identification
The process of determining what can happen, when and how.

Risk analysis
A systematic use of available information to determine how often specified events may occur and the magnitude of their consequences.

Risk evaluation
The process used to determine risk management priorities by comparing the level of risk against predetermined standards, target risk levels or other criteria.

Risk assessment
The overall process of risk analysis and risk evaluation.

Risk treatment
Selection and implementation of appropriate options for dealing with risk.

KEY ROLES IN THE HSNO RISK MANAGEMENT PROCESS

	Applicant	ERMA New Zealand	Authority
Risk Identification	Primary responsibility	Evaluation and review	Evaluation and review
Risk Analysis	Primary responsibility	Evaluation and review	Evaluation and review
Risk Evaluation	-	Evaluate and advise	Primary responsibility
Risk Treatment	-	Evaluate and advise	Primary responsibility

2. RISK IDENTIFICATION

ERMA NEW ZEALAND'S APPROACH TO RISK IDENTIFICATION

Two pronged:

1. Review the applicant's risk identification process.

2. Conduct our own risk identification.

AUDIT OF THE APPLICANT'S RISK IDENTIFICATION PROCESS

- Look for evidence that the applicant has gone about the task of risk identification in a systematic and methodologically robust way.
- (arguably) the most important component.

COMMON WAYS TO IDENTIFY RISKS

- Local or overseas experience
- Brainstorming
- Analogy to known cases
- History, failure analysis
- Consultation, interview/focus group discussion (stakeholder consultation)
- Checklists
- Scenario analysis, fault trees, event trees
- Experiments and tests of product performance
- Flow charting, systems analysis, systems engineering techniques
- Database of incidents
- Etc.

Source: Risk identification methods (from Environmental Risk Management Authority Technical Guide: "Identifying Risks")

ERMA NEW ZEALAND RISK IDENTIFICATION

Commonly employed techniques:

- Brainstorming
- Analogy to known cases
- Local or overseas experience

Note, this (at best) is only a supplement to the applicant's risk identification

EXAMPLE: THRIPOBIUS SEMILUTEUS

- Wasp approximately 0.6mm long
- Introduced for biological control of greenhouse thrips (*Heliothrips haemorrhoidalis*)
- Greenhouse thrips is a major pest of commercial citrus and avocado orchards and causes damage to 40 other ornamental plants.

RISK IDENTIFICATION: THE APPLICANT

- No statement about the approach used by the applicant to identify risks
- However; can infer risks identified through:
  - deductions made from available literature;
  - own research on phenology and ecology of potential native hosts.

RISK IDENTIFICATION: ERMA NEW ZEALAND

ERMA New Zealand has conducted its own identification of effects related to the release of *T.semiluteus,* through brainstorming at project team meetings, and by reviewing expert advice sought by ERMA New Zealand

ERMA New Zealand E&R Report, p.15

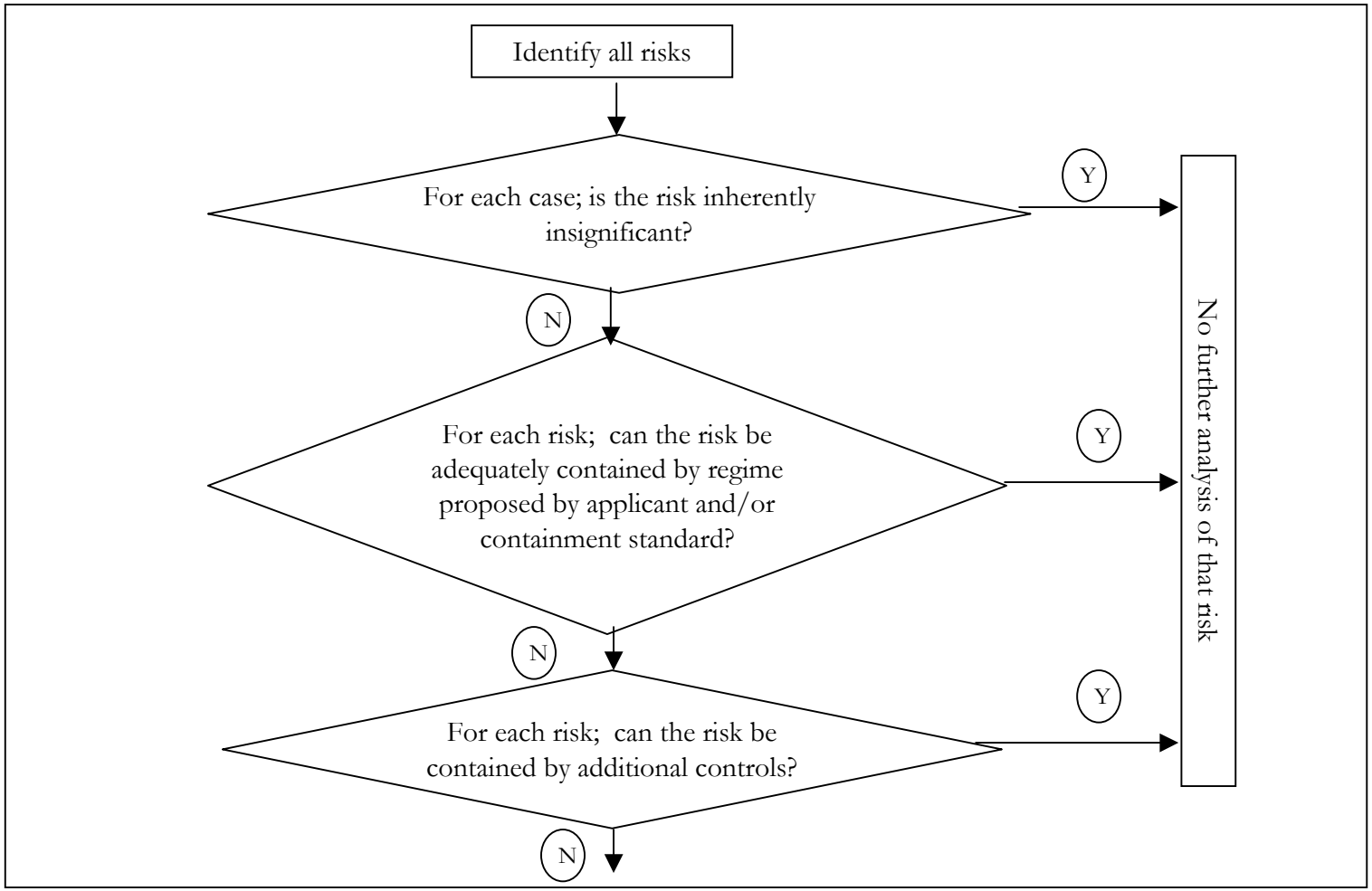
RISKS IDENTIFIED

- Host range/host preference shift
- Parasitoid incorrectly identified
- Reduced risks to pesticide applicators
- Adverse effects on the relationship of Māori culture and traditions with native flora
- …….. + 24 others

GROUPING OF EFFECTS

- Environmental (eg, host range/host preference shift)
- Health (eg, reduction in pesticide use)
- Cultural (eg, relationship with native flora)
- Economic (eg, enhancement of New Zealand's clean green image)

FROM RISK IDENTIFICATION TO RISK ASSESSMENT



Source: Environmental Risk Management Authority protocol 2(2): Decision Paths

3. RISK ASSESSMENT

RISK ASSESSMENT

- The overall process of analysing and evaluating risks using a systematic methodology.
- Risk assessments may be qualitative or quantitative.
- This section will present an illustrated example of each.

RISK ASSESSMENT
THE IDEAL PRESCRIPTION

- For each identified risk estimate **likelihood** of occurrence and **magnitude** of effect.
- Likelihood and magnitude of effect are combined as the characterisation of risk.
- Ideally expressed as probability curve.

THE IMPACT OF RISK MANAGEMENT ON RISK ASSESSMENT

- Assess the initial risk.
- Consider controls/risk management options.
- Assess residual risk.

QUALITATIVE ASSESSMENTS

- Use word scales or descriptions.
- Can be based on:
  - opinion polls;
  - sampling of expert opinion;
  - professional judgement.

USE QUALITATIVE ASSESSMENTS

- Where full numerical data are inadequate.
- Where the level of risk does not justify the time and resources needed to do a numerical analysis.
- For initial screening prior to a more detailed analysis (to prioritise).

SAMPLE SCALE FOR LIKELIHOOD

Descriptor	Description
Very unlikely	Not impossible, but only occurring in exceptional circumstances.
Unlikely	Could occur, but is not expected to occur under normal conditions.
Likely	Will probably occur at some time.
Very likely (almost certain)	Is expected to occur.

SAMPLE SCALE FOR MAGNITUDE OF EFFECT

- Minimal
- Minor
- Moderate
- Major
- Massive

WHAT DO THESE MEAN?

- Minimal - Insignificant (repairable or reversible) environmental impact, no observable cultural effects, other effects slight (reversible) or very small.
- Minor - Reversible environmental impact, limited adverse cultural effects (affecting small area or localized community), other effects small and limited in scope.

ON THE OTHER HAND …

- Major - Irreversible environmental effects but no species loss, adverse cultural effects widespread but remedial action available, other effects large.
- Massive - Extensive irreversible environmental effects, including species loss, adverse health effects, severe adverse cultural effects over whole country with no possible remedial action, other effects very large and widespread.

QUALITATIVE LEVEL OF RISK

Likelihood	Scale of Magnitude of Effect				
	Minimal	**Minor**	**Moderate**	**Major**	**Massive**
Very unlikely	insignificant	insignificant	low	medium	medium
Unlikely	insignificant	low	low	medium	high
Likely	low	low	medium	medium	high
Very likely (almost certain)	medium	medium	medium	high	high

Modified from AS/NZS 4360: 1999

EXAMPLE #1

- Risk that parasitoid *Thripobius semiluteus* may cause adverse effects on native thrips.
- *T. semiluteus* is a biological control agent for exotic greenhouse thrips *Heliothrips haemorrhoidalis* on citrus and avocado.

IS THERE A HAZARD?

- *T. semiluteus* shown only to parasitise thrips of the Panchaetothripinae sub-family.
- The only known native member of this sub-family is *Sigmothrips aotearoana*.
- Host specificity laboratory testing show 6-8% of *S. aotearoana* parasitised by *T. semiluteus*.

FURTHER ….

- Overseas laboratory testing had shown low levels of parasitism of *Hercinothrips binctus* by *T. semiluteus* which was not observed in the field when the parasite was released into an environment where *H. binctus* was also present.
- Uncertainty as to whether this conclusion can be extrapolated to *S. aotearoana*.

CONCLUSION ON HAZARD

- Parasitism of the native thrips *S. aotearoana* was **likely**, i.e., would probably occur at some time.

IS THIS HAZARD **LIKELY** TO OCCUR?

- *S. aotearoana* inhabits native plants throughout NZ whereas *H. haemorrhoidalis* mainly inhabits exotic citrus and avocado plants in northern parts of NZ.
- Larval stages of *S. aotearoana*, necessary to maintain *T. semiluteus* are not available all year round as are those of *H. haemorrhoidalis*.
- If the target species and the native species co-exist, attack of the native thrips may be sustained. However, the likelihood that there is habitat overlap occurring is small.

CONCLUSION ON **MAGNITUDE** OF THE EFFECT

- Given the:
  - separation of habitat and
  - ecology of the pest and the native thrips,

  the magnitude of the effect, if it did occur, would be **minimal**.

QUALITATIVE LEVEL OF RISK

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RISK ASSESSMENT

- Risk is assessed as being **low**.

- We were also of the view that while the information was fairly robust, some residual uncertainty remained. This is the case in most assessments of this type.

EXAMPLE #2

- Risk to aquatic organisms from the use of the organophosphate, Diazinon, in boom spray applications.
- Risk is assessed by calculating a toxicity-exposure ratio (TER) which compares predicted environmental concentration (PEC) from a particular scenario with the toxicity to aquatic organisms.

MEASURES OF RISK

TER	Risk
TER>10	Low risk
1<TER>10	Moderate risk
TER<1	High risk

EPPO/CoE (1993)

CALCULATION OF TERS

- Scenario: "label" spray rates, boom at least 1 m from water body 300 mm deep.

Organism	TER
Fish (*O. mykiss*)	5.4
Scud (*G. faciatus*)	0.012
Algae (*S. capricorautum*)	60

CONSIDER THE APPLICATION OF RISK MANAGEMENT OPTIONS

- Change the buffer zone distance to 5 m from the water body the residual risk is:

Organism	TER
Fish (*O. mykiss*)	45
Scud (*G. faciatus*)	1.1
Algae (*S. capricorautum*)	500

RISK ASSESSMENT

- By applying a control of a spray restriction or buffer zone of 5 m next to surface waters would manage the risk to an acceptable level
  - assuming that a moderate risk to scud is acceptable. This is where "approach to risk" is important as if only low risks are acceptable then the restriction zone would need to be 8 m.

4. CONCLUDING COMMENTS

CONCLUDING COMMENTS

- Identification and assessment of risks:
  - only parts of the overall evaluation and review of applications at the heart of the consideration. All the other aspects of the decision-making process rely on these two aspects.
- Expert judgement is a core feature of the process:
  - need to closely describe the basis for each conclusion.