WORKSHOP NOTES
1ST INTERNATIONAL WORKSHOP ON WEED RISK ASSESSMENT
ADELAIDE 16-18TH FEBRUARY 1999

SESSION 3 - DISTRIBUTION

BUTCHERS PAPER - LARGE GROUP SESSION

Models - what appealed?

- uses real data (?) c.f. analysed data
- pretty maps
- the model that isn't Apple Mac based
- computer familiarity
- access
- grid format rather than point distribution
- CLIMATE is free
- speed of result
- don’t need to be an expert on the plant itself to do a CLIMATE match

GROUP 2
Jean Turner

- What are we interested in knowing, and including in our prediction models/methods (apart from climate info)
- Where (niche) plant occurs, its density, links to soil type, land use
- Key limiting factors of the plant's distribution
- Absence data, not just presence data
- Which plant communities does it occur in as a weed?
- "Everything" (we know realistically we can't use a large number of features / attributes)
- Knowledge of native range doesn't enable prediction of distribution as a weed
- Marginal areas, as well as likely and actual
- The reasons why a species is absent (from a location / environment) in its native range is really a big black box!

ISSUES RE: PREDICTION

- Do we need a measure of quality and reliability of the predicted distribution maps?
- ie. how much time put in to generating the maps
- level of thoroughness, index of effort, confidence in results
- criteria for peer review of models needed

- Climate distribution is just <u>one</u> part of the story.

- Criteria for peer review of models needed.

- What do we actually put in to the model?
- Geographic distribution – lines on maps, or dots (actual points of occurrence)
  – latitude / longitude, altitude

- Quality/accuracy of mapping information available for species outside their range – taxonomic problems can confuse/compound this.

- What do users want?
- Patterns only? (exclude or allow in – is this alone enough to fight off pressure to be able to bring a plant in?)
- Biological information? - give more confidence in decisions (why it will grow, min. temp, max. temp, chill required etc)

- What is the end use of the distribution information?
- quarantine vs risk/containment issues?
- sometimes pattern of discussion is enough (but often it is not)
- If containment, pattern information is not enough.

- How does <u>potential</u> range influence quarantine decision ?

– is it just YES/NO depending on ability to grow OR is it % coverage that influences decision
– eg. if only 5-10% distribution likely in a country then may let in, vs. 80% distribution then definitely exclude?

- Plants are brought in (or sought to be brought in) because they do / will grow here!

- Ratios of potential distribution: present distribution for plants already here

➔ useful for control programs if you have containment methods available.

- Information on rate of spread important and for many plants we don't know what the maximum potential distribution is compared with current distribution.

- can't necessarily use overseas information on rate of spread to predict rate of spread in new country.

- Discounting in economic analyses ➔ impact on decisions, if discount over eg. 30 years ➔ value of control now may not look worthwhile.

- For early intervention (to justify it) almost need to throw out economic impact considerations (discounting effect highlighted above if you are in the early stages of invasion)
  ➔Use analogy with known other species (scare tactics)

- Pattern matching processes (Bob asked out of interest)

- Level of detail/rigour required by people? (variances / probabilities)

- would people use these if built into the system?
  ⇒ probably need it at some stage in the decision process

SESSION 3
GROUP 6
VICKI LINTON

1. **Weakness in current system**

- Ratio correct : incorrect in predictions
- Incomplete knowledge, (poor) data quality
- Can be used for prioritising ?
- Scale
- More distribution date = better model
- Application for biocontrol
- Helps identify risk
- Predict plants not yet weeds
- It's not just climate that's important

2. **Can we have a risk assessment without predicting distribution?**

- Can do it without computer model
- Go to someone with knowledge about weed
- Model makes you think about other / all characteristics
- Useful for barrier protection and policy
- For prioritising
- Needs to be accountable, transparent
- IS IT RELIABLE?

2. **Issues And Limitations To Be Addressed To Advance Distribution**
   - Value of system increases if species is invasive elsewhere (okay for some species)
   - Global databases evolving. This groups' responsibility to progress?
   - "Index Holmiensis" provides references to published maps on distributions of all plants
   - CABI digital catalogue of global distributions being developed
   - Identify naturalised/native versus planted
   - Forecast other changes that may affect potential distribution eg landuse, irrigation, climate change
   - Recognise potential distribution can't be used in isolation as a decision-making tool
   - Approved standards for use and interpretation

- validate
- need a drivers licence
- ecologists ➔ not recognising wider social/political needs
   - Validate
   - Which model is best for certain circumstances
   - How measure distribution (dots on maps, density etc)

2. **Facilitators comments**

- No policy voice in group - concentrated on science needs
- protective of driving force (eg ecologists only)
- information sharing a key, global database

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GROUP 5
Mark Williams

Discussed where the focus should be:

- separate out factors that are used to predict potential distribution from rate of spread (biological attributes)

STRENGTHS – in the systems discussed in the morning

- Climate suitability can be used with some confidence at quarantine level to give a Yes/No answer
- Can readily use :"precautionary principle" when considering potential distribution
- Systems have multiple uses:
  - quarantine
  - can be used on a regional and / or national scale
  - can be used as prioritisation tool
- Can be used for assessment of climate suitability for new crops
- Can be used for early detection of "sleepers"
- System can provide some transparency and confidence

WEAKNESSES

- Difficult to use when plants have wide distribution in native range ➔ more complex analysis required
- Interpretation of models more difficult for widely distributed weeds
- Expert analysis needed ➔ may lead to bias
- Different models:
  - weaknesses need to be identified in some models for some situations
- Taxonomic confusion
- Lack of good distribution maps

OPPORTUNITIES

- Need for worldwide database
- Need for public awareness education

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Rebecca Lang

- The models are another tool to add to ecological and local knowledge
- local knowledge is important and we need to use all the information and skills available to crack the problem

- access to data is needed to feed into the programs
- questions people ask about in terms of potential declaration are:

1. Will it grow?
2. Where will it grow?

- this is the level of knowledge and understanding many people are working at
- one of the driving factors for work on distribution is will it impact on agriculture and the politician

- national database on weeds
- desirable/costs?
- benefits/costs?

- huge gaps in information about where weeds occur
- sometimes poor levels of taxonomy are involved

- need to get more focus of resources/funding on the next levels of information about the biology and ecology of the species that may enable them to occupy their potential range
- could 'indicator' species be used to help predictions of potential or likely distribution?
- how do we bring intuitive information to bear?

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Mary Reiger

Issues

1. Is climate the only factor which determines distribution?
- is a better measure the interactions between species?

1. Is the problem a matter of scale?
- that is climate may not be a great predictor in uniform climates like Europe but in Australia or Mexico where the climate is more diverse, climate is a better predictor

1. There is limited time to make decisions about species
- to use climate to match distribution of a species, time is needed to gather information
- models can be used as a checking system in this case
- use the model (which takes time) to verify or justify the decision you have made

1. There is a need to collect more accurate species distribution information
- at the moment there is limited information for some species on their native range and this can be an impediment to a climate matching approach

1. Does native range necessarily predict invasive range?
- invasive range may not be limited by climate but rather predators, competition, etc.

1. Issue surrounding provenance that is the source of the invading species
- is it from one single location which is genetically divers or homogenous?
- where has the taxonomic unit come from?
- this is an important issue, but a lot of the time the information is hard to come by

1. Are other factors important in distribution - like soil type, soil waterholding capacity etc.

2. Need to test our predictions - verification of the models
- there has been some done, but more is needed and it needs to be published

Why are we predicting distribution?

- it is part of the decision-making process to allow plants into the country
- or, help us decide how to respond once a plant is already here
- it's also a way to validate reasoning behind restricting entry of a species

- how should distribution be weighted in our decision making process?

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Greg Cock

ISSUES AND LIMITATIONS

- potential for bias in adoption of models by weed scientists (self fulfilling distributions)

➔ need for peer review at several levels - methodology, clients involvement

"CLIMATE" focus

- land systems inclusion
- changes the scale down
- could overlay at larger scale
- but time scale problems

- current overlays will have agricultural focus
- more work needed in environment area
- may need to use IBRA (Interim Biogeographic Regionalisation of Australia) units

- unsatisfactory prediction of aquatic weeds and riparian weeds

- need to overlay other data

- predicting trees vs. "herbage" plants
- potential distribution maps are only <u>one</u> piece of information in deciding what would be funded
- there is a need for other info
- need to include the next steps - animals, soil, landuse, water capacity, etc. etc

- eg. Noogoora burr potential distribution is the whole of Australia

- some models don't predict current distributions
- need models for supporting arguments
- need to be understandable

- weed distribution is the limitation, not other descriptors of the environment

Group Summaries

Jean

- what should be included in models
- where plant occurs, density, soil type, landuse ✓✓✓✓✓
- key limiting factors
- absence data / not just presence
- not just climate ✓✓✓
- Knowledge of native range doesn't enable prediction ✓
- Need measure of quality and reliability of map / need peer review / standards ✓✓✓✓
- Climate distribution is just one part ✓ – depends on scale and uniformity
- Okay for quarantine – YES/NO
- What do we put in models
- What do users want ➔ more confidence in decisions
- What is the end use
- Does potential range influence quarantine decision
- Need ratio of potential distribution: present distribution
- Information on rate of spread important – can't necessarily use overseas data
- Concern over discounting in economic analysis – handicaps early intervention

Mary

- Time to gather information is an issue
- Models are a good checking system ✓ – another tool and local knowledge
- Need for more accurate species distribution information
- Provenance differences an issue
- Need to test predictions (ratio of correct: incorrect)

Vicki

- Incomplete knowledge
- More distribution date = better model (lack of good map) ✓✓
- huge gaps in information
- Value of system increases if invasive elsewhere
- Global data base ✓✓– national data base
- Potential distribution can't be used in isolation

Mark

- Can use precautionary principle
- Can have multiple uses (even crops) (early detection of sleepers)
- Can provide transparency
- Difficult when plants have wide natural range
- Expert analysis – potential for bias
- Different models
- taxonomic confusion / poor levels of taxonomy
- Education/awareness needed

Bec

- Access to data important
- Will it grow

- Where will it grow
- What's the impact on agriculture and politicians
- Few people can interpret output
- Focus on resources for biology and ecology
- Could indicator species be used
- How do we bring intuitive information to bear

Greg

- Unsatisfactory prediction of aquatic and riparian weeds
- better understanding of appropriate scale
- Weed distribution data is the limitation, not the understanding of other descriptors of the environment

SUMMARY FOR INVASIVENESS (From Thursday lunch butchers paper)

- What data should be included in models?
- NOT JUST CLIMATE in models
- OK for yes/no in quarantine
- need to include other data
- soils, landuse
- absence as well as presence
- it's a matter of appropriate scale … need more understanding of appropriate scale

- need standards and peer review process for modelling and prediction
- need for a measure of quality/reliability

- what do end users want/need to account for
- for more confidence in decision making

- need more accurate information on distribution
- this more pressing than other environment descriptors

- concerns about poor levels of taxonomy - some confusion, provenances

- need to test predictions

- need a global/national database

- concerns over the potential for bias in predictions

- does potential range influence quarantine?

- need potential distribution / present distribution ratios

- information on the rate of spread is important
- often can't use overseas data

- concern over discounting in economic analyses handicapping early intervention

- time needed to gather information

- models are a good tool in conjunction with local knowledge

- education and awareness needed

- accessibility of data important

- concern that only a few people can interpret outputs

- need a focus on resources to gather biology and ecology information
- how do we bring intuitive data to bear?
- unsatisfactory prediction of aquatic and riparian weeds