



Department of Defense Legacy Resource Management Program

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Invasive Wild Pigs Best Practices and Decision Support Tools

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Wild Pig Decision Tool Instruction Sheet

When dealing with wild pigs, choosing the right eradication technique can be extremely complex due to the nature of a variety of domains that the decision may span. This decision tool was designed to assist those who must make decisions on how to handle wild pigs. It should be noted that this tool was not designed simply to tell a decision maker what to do, but rather to inform the decision maker about the tradeoffs that are being made when they do make a decision.

Preliminary Considerations

Before using this tool, it is necessary to consider who has a stake in the decision. Who will be affected by the countermeasure used? Who is making the decision? What kinds of things does this person or group of people value? This is important to do because there may be aspects of the decision that are not built into the model. In order to appropriately use this model, it is essential that the user understand what the model accounts for and what the model does not account for.

Using the Tool

This decision model is based on Multi-Criteria Decision Making, which enables a decision maker to input their values, and based on quantitative reasoning, utilities are assigned to each of the alternatives that are considered. The decision criteria and sub-criteria are diagramed in Figure A1, while definitions of the criteria and sub-criteria can be found in Tables A1 and A2 of the Appendix. When you open the Excel-based spreadsheet model, you will see three (3) key areas: a Criteria Comparison Table, a Sub-Criteria Comparison Table, and an Efficacy Table. These tables and how to use them are explained below in the order in which they should be used.

The Criteria Comparison Table allows the user to evaluate the criteria against each other on a Likert scale from 1-6. In general, 1 means a lower concern for that criteria and 6 means a stronger concern. The user should change these ratings to adapt the model to their specific concerns. When rating these criteria it is important to understand two things. First, these ratings are compared against each other (i.e. giving a 5 rating to Financial Cost and a 3 rating to Social Considerations means that the user is more concerned with the monetary cost than they are about public scrutiny). Second, these are ratings, not rankings, so two criterion can be equal (i.e. Financial Cost and Environmental Considerations are both a 5 means we care equally about them).

The Sub-Criteria Comparison Table enables the user to engage in more detailed ratings by breaking two of the criteria (Feasibility and Environmental) down into constituent parts. By engaging in higher resolution sub-criteria, the tool is able to better interpret the user's true values. These sub-criteria are rated on a 1-6 Likert scale the same way the criteria were, however it is important to only rate the sub-criteria against each other within their own criteria categories. This means that *one should not rank Feasibility sub-criteria against Environmental sub-criteria*. The Feasibility criteria is divided into three sub-criteria: Land Traversal,

Efficacy, and Training Needed. The Environmental criteria is divided into Non-target Species Impact and Environmental Impact. Again, definitions for these sub-criteria can be found in Table A2 of the Appendix. It should be noted that because the Financial criteria is not broken down into sub-criteria, the model assumes only total cost is considered. In this sense, the model is unable to consider long-term vs short-term financial values. Similarly, Social values are all grouped together, thus the model is unable to account for specific values of how (for example) different groups may view the different countermeasures that are being assessed.

Lastly, the Efficacy Table simply asks the user about the density of pigs they are dealing with, as well as the type of land. Pig density has been broadly defined as Low, Medium, High where Low refers to <1 pig per hectare, Medium refers to 1-3 pigs per hectare, and High refers to >3 pigs per hectare. The land is split up into Open Land, Mixed, and Forested Land where Open Land refers to areas that are mostly plains, Mixed refers to a relatively even mix of forested areas and plains, and Forested Land refers to forested areas. After choosing your pig density and land cover, double check to make sure that you have added ratings for all of the criteria and sub-criteria, and then you are ready to view the model output (by clicking the button).

Results

On the “Results” tab you will see two visuals that describe the results of the model (example results are shown below in Figure 1). You will see a standard bar chart (“Utility Scores by Countermeasures”) that shows how much utility was scored by potential countermeasure. It should be noted that these values are normalized such that the best option will always have a utility score of 1, while the other countermeasures are shown as a percentage of that countermeasure. The 100% stacked column chart, labeled “Criteria Contributions by Countermeasure” supplements the overall utility scores by showing where each countermeasure is gaining its utility. This is extremely beneficial to the user, as now they not only know which countermeasure is overall most effective, but why they are “better” than the others. In the notional example below, trapping is the best solution. The inherent question the tool user will ask is “why is this the best?” By looking at the stacked bar chart, we see that trapping has relatively high efficacy and low total cost compared to the other countermeasures.

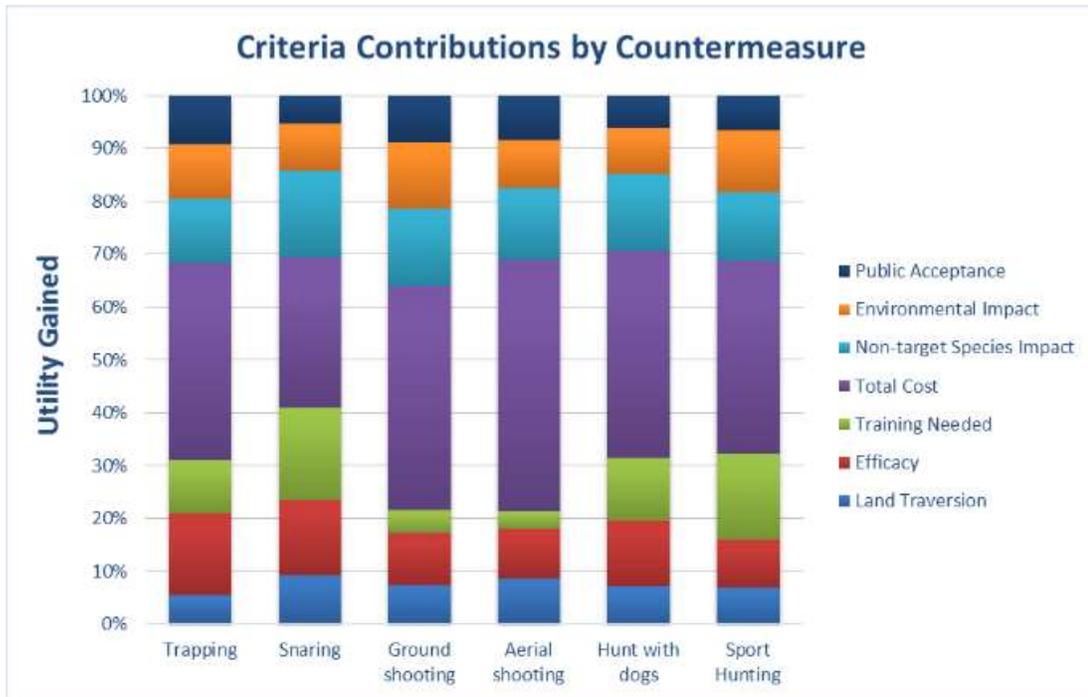
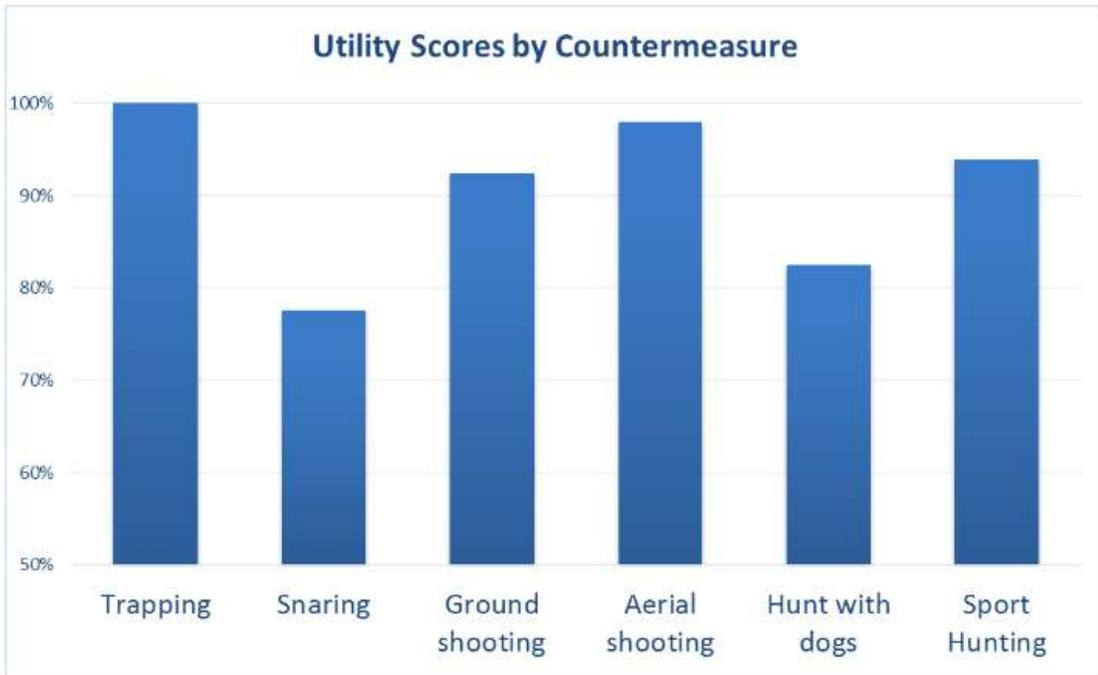


Figure 1: Example Results

Appendix

Table A1: Criteria Definitions

Criteria	Explanation
Feasibility	1: it does not matter how difficult implementing the countermeasure is
	6: it is extremely important that implementing the countermeasure is easy
Financial	1: cost does not matter at all
	6: cost is extremely important
Environmental	1: impact on the environment is not important at all
	6: impact on the environment is extremely important
Social	1: social acceptance does not matter
	6: socially acceptance is extremely important

Table A2: Sub-Criteria Definitions

	Sub-Criteria	Explanation
Feasibility	Land Traversal	1: it is not important that traversing the land (on foot or ATV) is easy
		6: it is extremely important that traversing the land (on foot or ATV) is easy
	Efficacy	1: it is not important that the technique is time-efficient
		6: it is very important that the technique is time efficient
	Training Needed	1: it is not important how much training is needed
		6: it is very important how many man-hours are spent on training
Environ-mental	Non-target Species Impact	1: there aren't any other animals that could be affected
		6: an abundance of other animals are present that could be affected
	Environmental Impact	1: impact on the environment is not important at all
		6: impact on environment is extremely important

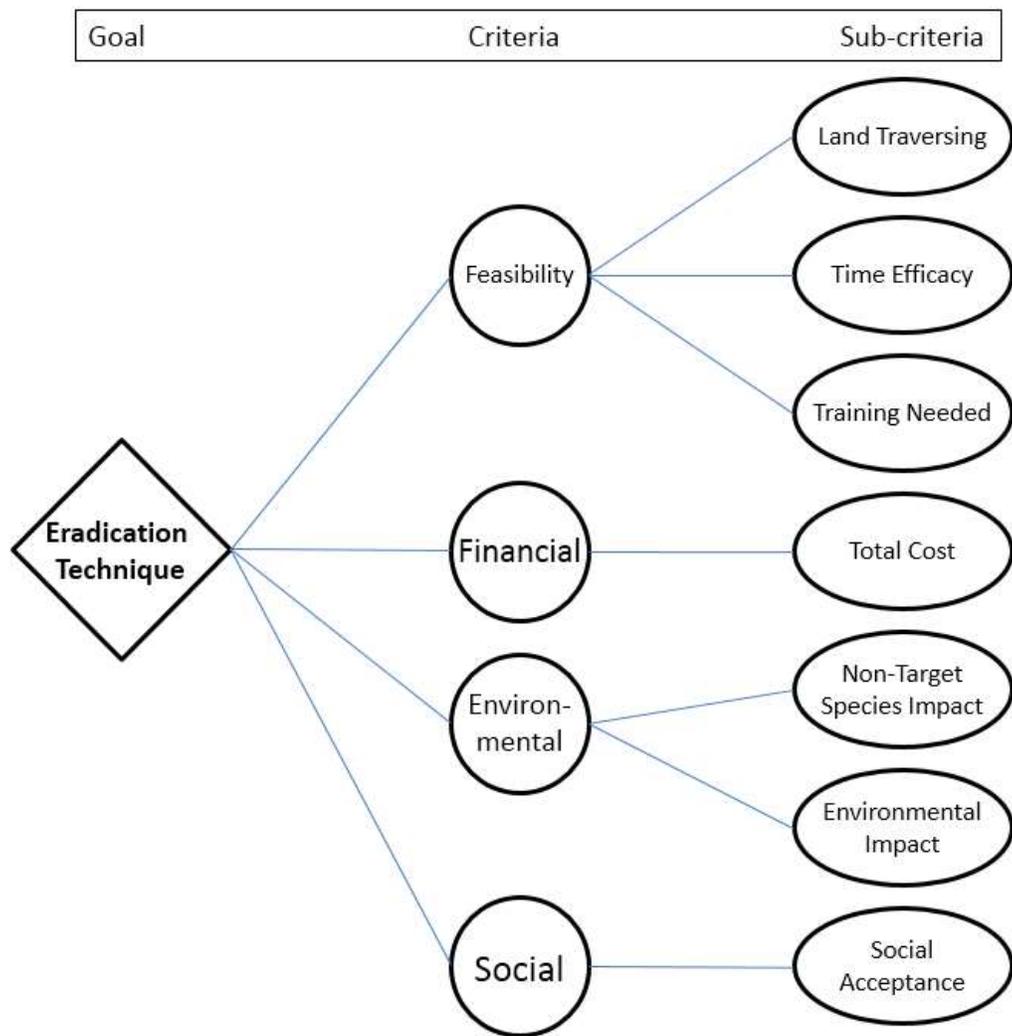


Figure A1: Hierarchy of criteria

Instructions: Rate how important the following criteria are to you, 1 being not important at all, 6 being extremely important. Then rate the sub-criteria against each other.

Remember: The criteria are ranked against each other (i.e. a 2 on "Funding Needed" and a 3 on "Timeliness" means you care more about how quickly the program runs than how much it costs) and **NOT** against the sub-criteria. Sub-criteria are ranked against each other within their criteria category. See instructions for a more thorough description if you are still confused.

Criteria	Rating	Normalized Score
Feasibility	5	0.45
Financial Cost	2	0.18
Environmental Considerations	3	0.27
Social Considerations	1	0.09

Sub-Criteria	Rating	Normalized Score
Land Traversal	3	0.30
Efficacy	5	0.50
Training Needed	2	0.20
Non-target Species Impact	1	0.50
Environmental Impact	1	0.50

Pig Density	<input type="radio"/> Low <input checked="" type="radio"/> Medium <input type="radio"/> High
Type of Land	<input type="radio"/> Open land <input checked="" type="radio"/> Mixed <input type="radio"/> Forested land

Figure 2: Screenshot from decision tool