

Calculating Efficiency Scores

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Summary

The Application Evaluation and Ranking Tool Efficiency score takes values from the Conservation Practice Physical Effects (CPPE) matrix that shows the effect of a conservation practice on solving a resource concern(s) and cost information from the Practice Average Cost table.

The formula for the efficiency component is:
Sum of (each CPPE practice effect times its practice service life) divided by sum (all practice average costs identified as addressing resource concerns) times the cost efficiency multiplier

Procedure

- The first step is to identify each practice to be evaluated.
- For each practice, identify the Resource Concerns the practice will address.
- Identify the numeric effect for each concern for each practice from a +5 to -5.
- The Result should be a table similar to the CPPE Sample Table presented below:

	382 Fence	590 Nutrient Management	512 Pasture and Hay Planting	516 Pipeline	528 Prescribed Grazing
Domestic Animals- Inadequate Quantities and Quality of Feed and Forage	2	3	4	1	4
Domestic Animals-Inadequate Stock Water	0	0	0	5	0
Plant Condition- Forage Quality and Palatability	2	3	4	2	4
Plant Condition- Noxious and Invasive Plants	2	-1	4	1	3
Plant Condition-Productivity Health and Vigor.	3	3	4	2	5

- For each practice considered, it will be necessary to identify the Life Span of the practice. Lifespan is the period of time during which a conservation practice is to be maintained and used for the intended purpose and for which Federal financial assistance has been received. A pipeline technically could

last 50 years. The life of the pipeline would be 50 years but the lifespan could be only 15 years. Operators change, technology changes, etc, impact the utility of a practice or conservation system. The life span is also long enough to protect the financial interest of the federal government. Annual practices have a life span of one year. The life span of each practice is set in the Conservation Practice Standards (CPS) application.

- The next step is to input the average annual practice costs. For each practice the installation cost for the number of typical units will be established. The interest rate for the Water Resource projects will be used to amortize the installation cost. The operation and maintenance (O&M) cost is computed. The O &M plus the average annual installation cost is the average annual practice cost. In most states the state economist has the responsibility of developing the average annual cost table. All states are supported by the economist at the National Technical Centers.
- During the ranking process resource concerns are identified and the resulting practices to address those resource concerns are selected. The next table demonstrates a summary printout of the resource concerns identified and practices selected.

Domestic Animals- Inadequate Quantities and Quality of Feed and Forage	Pasture and Hay Planting
Domestic Animals-Inadequate Stock Water	Pipeline
Domestic Animals-Inadequate Stock Water	Fence
Plant Condition- Forage Quality and Palatability	Fence
Plant Condition- Forage Quality and Palatability	Nutrient Management
Plant Condition- Forage Quality and Palatability	Prescribed Grazing
Plant Condition-Productivity Health and Vigor.	Nutrient Management
Plant Condition-Productivity Health and Vigor.	Fence
Plant Condition-Productivity Health and Vigor.	Prescribed Grazing

- For each line the CPPE value is multiplied by the life span to produce Total CPPE values. The practice average cost is taken from the average cost table. The Total CPPE values column is summarized as well as the Average Annual cost column. If a practice has a zero or negative value for the CPPE these CPPE values are used to calculate the total CPPE values. The cost of a practice even if it is zero or negative is included. The cost of a practice is included only one time even though the practice may be selected multiple times to address different resource concerns.

RESOURCE CONCERN	Practice	CPPE VALUE	LIFE SPAN	TOTAL CPPE VALUES	PRACTICE AVERAGE ANNUAL COST
Domestic Animals- Inadequate Quantities and Quality of Feed and Forage	512	4	10	40	\$485
Domestic Animals-Inadequate Stock Water	516	5	20	100	\$737
Domestic Animals-Inadequate Stock Water	382	0	20	0	\$771
Plant Condition- Forage Quality and Palatability	382	2	20	40	
Plant Condition- Forage Quality and Palatability	590	3	1	3	\$158
Plant Condition- Forage Quality and Palatability	528	4	1	4	\$264
Plant Condition-Noxious and Invasive Plants..	590	-1	1	-1	
Plant Condition-Productivity Health and Vigor.	382	3	20	60	
Plant Condition-Productivity Health and Vigor.	528	5	1	5	
TOTAL				251	\$2,415

- The sum of the total CPPE value 251 is divided by the sum of the Total Average Annual Cost \$2,415 for an efficiency score of .1. Multipliers are used to adjust the weights of the four evaluation factors. In the example if a multiplier of one hundred were used $100 \times .1 = 10$ would be the score for efficiency.
- As states develop their questions for each category often the categories will have quite a variation in the potential points that can be scored. One category might have a thousand points while another category has ten. The multiplier provides a mechanism for balancing the different categories. The two most common methods are to either use the maximum points or typical points for each ranking tool category. In the following example we will use maximum points for each of the four categories of State, National, Local, and Efficiency. In the example, there are a total of 100 points.

RANKING TOOL CATEGORY	TOTAL RANKING POINTS
STATE	19.9
NATIONAL	40
LOCAL	40
EFFICIENCY	.1
TOTAL	100

- Enter the desired percentage for each category. In the example state and national are given 15% each, local concerns are given 60% and economic efficiency is given 10%.

RANKING TOOL CATEGORY	TOTAL RANKING POINTS	DESIRED PERCENTAGE
STATE	19.9	15%
NATIONAL	40	15%
LOCAL	40	60%
EFFICIENCY	.1	10%
TOTAL	100	100%

- The weighted average is computed by multiplying the desired percentage of the category times the Total of the ranking points. In the case where the total points are 100 the weighted average will be the same number as the desired percentage.

RANKING TOOL CATEGORY	TOTAL RANKING POINTS	DESIRED PERCENTAGE	WEIGHTED AVERAGE
STATE	19.9	15%	15
NATIONAL	40	15%	15
LOCAL	40	60%	60
EFFICIENCY	0.1	10%	10
TOTAL	100	100%	100

- The ranking multiplier is computed by dividing the weighted average by the total ranking points for that category.

For example, local concerns have a weighted average of 60. The total of the ranking points for Local is 40. The multiplier is 1.5

RANKING TOOL CATEGORY	TOTAL RANKING POINTS	DESIRED PERCENTAGE	WEIGHTED AVERAGE	RANKING MULTIPLIER
STATE	19.9	15%	15	0.75
NATIONAL	40	15%	15	0.38
LOCAL	40	60%	60	1.5
EFFICIENCY	0.1	10%	10	100
TOTAL	100	100%	100	1

The following table demonstrates ranking two alternatives.

RANKING TOOL CATEGORY	MULTIPLIERS	ALT # 1 SCORES	ALT #1 RANKED SCORE	ALT #2 SCORES	ALT #2 RANKED SCORE
STATE	.75	15	11.25	19.9	14.93
NATIONAL	.38	29	11.02	12	4.56
LOCAL	1.5	34	51	40	60
EFFICIENCY	100	.2	20	.05	5
TOTAL			93.27		84.49

The final table provides a more complex example with multiple points

RANKING TOOL CATEGORY	TOTAL RANKING POINTS	DESIRED %	WEIGHTED AVERAGE	RANKING MULTIPLIER
STATE	200	15%	96.02	.48
NATIONAL	40	15%	96.02	2.4
LOCAL	400	60%	384.06	.96
EFFICIENCY	.1	10%	64.01	640.1
TOTAL	640.1	100%	640.1	1