TOPIC 3. ECONOMIC RESEARCH NEEDS

There have always been attempts to place dollar values on wildlife, with only partial justification. Some wildlife values, such as the value of the meat, can be legitimately given dollar values, and others, such as the value of a view with elk or moose or sheep foraging on a hillside cannot be represented by any economic unit of measurement. All too often, the value of the elk grazing is not determined directly, but the question is turned around and values assigned to a replacement, such as an oil well, and the question asked "Is an elk worth more than $XXX which this oil well will yield over the next several years?"

One of the most urgent needs for research in the realm of natural resource economics is in the area of question-formulation. "How to lie with statistics" has a counterpart in the formulation of questions. The question at the end of the paragraph above is not a legitimate one.

The wildlife professional should know what questions are legitimate so answers are formulated which direct attention to the issues and not to the questions themselves. The question of legitimacy is answered in different ways by different people. Thus there are elements of psychology involved too, and it is important to know the backgrounds and reasons for the asking of particular questions.

This TOPIC includes discussions of two areas of research needs in economic analyses; cost-benefit ratios (UNIT 3.1) and dimensionless values (UNIT 3.2). Since they are such distinctly different measures, it is important that both are understood so the appropriate measures are applied in the appropriate places. The business community knows about the first of these only. The wildlife biologist must know about both in order to keep economic analyses in perspective.

UNIT 3.1: COST-BENEFIT RATIOS

Cost-benefit ratios seem to simple and straight-forward. Simply divide the costs by the benefits, and compare to the value before treatment. If the benefits derived exceed the costs and the benefits from the present situation, then proceed with the development. If not, reconsider, redo the cost-benefit analyses, and see if there isn't some way to demonstrate the ultimate value of the proposed treatment (or development). Right? WRONG.

Economists are hesitant to predict the value of the dollar or the price of gold very far in advance. Yet the wildlife values which are being given a price effectively bear that price for years and generations to come. The passenger pigeon wasn't worth much on the market when it was abundant. Now, its value is very high--infinite, perhaps--since it is extinct. No amount of money can bring it back.

It is so important to take a forward look when evaluating the application of cost-benefit ratios to wildlife. Decisions simply should not be made on the current value of meat, or hunting expenditures, or film for photographing, or any other current expense associated with the animals. How much do we know about such projections, however? All too often we give up trying to count animals present, much less make predictions of their numbers and value in the future. Isn't it time that we give up our fatalistic attitudes toward some of these specifics and begin looking at overall patterns and generalizations, especially those which can be represented numerically to provide some estimate of their status in the future?

Consider the exponential population predictions in PART VI, CHAPTER 20. That quick method can be used to predict numbers for as many years in advance as you wish to recognize reasonable estimates of natality and mortality rates. Since it is highly unlikely that deer will ever have litters of 5, 6, 7 . . . fawns, isn't it reasonable to use realistic values currently available to estimate numbers of animals in years to come when a particular area of their habitat is being considered for "development?" Rather than let the developer take the initiative and come up with a cost-benefit analyses that must be refuted by the wildlifer, let the wildlifer come up with a cost-benefit analyses for the developer to consider.

Increased research on the part of wildlife biologists into not only ecological functions and syntheses but also economic analyses may help put the wildlife biologist in a postion of initiative rather than defense.

The Wildlife Society has taken an important step toward economic literacy by requiring coursework in resource economics in order to grant certification to individuals. It will likely take a generation for that to perfuse into the field, and the first persons will come with coursework taught by economists who have little knowledge of natural resources and ecosystem functions, but in time perhaps the two fields will be mastered by individuals who can then teach both aspects of the problem.

One staggering aspect of the need for research into economics is the rapid increase in costs and, hence, values while the value of the dollar declines. Values assigned in one year are outmoded by the next year. Research is needed into processes rather than absolute values, searching for processes that can be employed as new conditions and circumstances arise rather than simply determining numbers that can be used. Businesses, companies, investment firms . . . all are willing to use any value they might find for wildlife that gives some element of security by its mere existence, and they, not familiar with ecological processes, will think that such a value is in fact an adequate represenation of the truth.

The process approach has much more long-term usefulness than the accumulation of facts. Research into processes should be high priority for persons with educations in both economics and ecology. Such areas should be represented by persons with degrees in both fields, enabling such persons to be not only conversant but also knowledgable enough to make or contribute significantly to decision-making.

REFERENCES, UNIT 3.1

COST-BENEFIT RATIOS

SERIALS

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

odvi

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

odhe

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

ceel

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

alal

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

rata

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

anam

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

bibi

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

ovca

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

ovda

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

obmo

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

oram

UNIT 3.2. DIMENSIONLESS VALUES

Research into dimensionless values seems to be a paradox to the scientific mind, because research is conducted by making measurements. Dimensionless values cannot be measured, however, so we are faced with the impossible. Dimensionless values are important, so ways must be found to represent them and include them in decision-making.

Science in the traditional sense may be the simplest of endeavors. Measurements with precision devices, calibrated in defined units of measurements, are very much simpler than the subjective evaluations necessary when dealing with matters of judgement, with dimensionless values. Scientists are generally uncomfortable with dimensionless values, preferring rather to have the security of defined units and statistical tests to make decisions. Is it possible that the most objective measurements might also yield the greatest sense of false security?

Perhaps scientists do not deserve the esteem in which they are sometimes held, and perhaps those of us that are scientists should look up more to the philosopher. Our most advanced degree is given the name "Doctor of Philosophy" which, literally interpreted, means "lover of wisdom." I like that definition. I would intensely dislike a definition such as "lover of facts," or "lover of numbers," or "lover of some other scientific term."

What are the research needs in dimensionless values? The objective approach discussed in the first six PARTS and most of this seventh PART provides a framework of natural laws within which decisions must be made. The tolerances within this framework are appropriate for subjective evaluations, for decisions that may be dependent on the will of the majority, or the recommended judgements of those who have the foresight to make decisions that will benefit future generations.

There are examples of previously-made decisions by persons with considerable foresight that have benefited the present generation. Consider the National Parks and the foresight of President Roosevelt, for example. The scenic values, not subject to evaluations in dollars, were preserved for future generations by foresighted individuals. Do we not agree that such decisions were good? Yet these decisions come under almost continuous attack by persons interested in short-term gains.

My personal philosophy is definitely a conservative one. I question how much responsibility we humans should be willing to accept with regard to the management of natural systems. I also question how much we should be willing to impact natural systems, especially the relicts that are still with us. Being conservative, I suggest that we should not extend ourselves too far. H. D. Thoreau said, in WALDEN:

> "Individuals, like nations, must have suitable broad and natural boundaries, even a considerable neutral ground, between them."

Assuming that posture, it is imperative then that we do not become too abundant, too demanding, too expectant, too optimistic . . ., but rather be content with what we have, limit our numbers by making appropriate preventive-type decisions rather than remedial ones, and look to the simpler things in life for fulfullment.

LOOK DOWNWARD: "If you are too busy to key out a violet, you are too busy" (Memo to A. N. Moen from A. N. Moen).

LOOK INWARD: "But it is a characteristic of wisdom not to do desparate things" (H. D. Thoreau in WALDEN).

LOOK UPWARD: "The heavens declare the glory of God; and the firmament firmament sheweth his handywork" (Psalms 19:1; King James Version).

CLOSING COMMENTS

The completion of the last CHAPTER in this 7-PART series on THE BIOLOGY AND MANAGEMENT OF WILD RUMINANTS results in a sense of relief which will last for a few days at most, in a sense of inadequacy that will stimulate me to improve the material, and in a sense of anticipation as I not only use the CHAPTERS and SERIALS as they are but analyze, synthesize, and write more. My enjoyment comes from writing, and my enjoyment will be most complete when I find that these written words have been useful to others, especially students, who are the wild ruminant biologists of the future.

Aaron N. Moen
March 21, 1982

GLOSSARY OF SERIAL CODENS - CHAPTER TWENTY-FIVE

Serials are identified by five-character, generally mnemonic codes called CODEN, listed in 1980 BIOSIS, LIST OF SERIALS (BioSciences Information Service, 2100 Arch Street, Philadelphia, PA 19103).

The headings for the lists of SERIALS are:

CODEN VO-NU BEPA ENPA ANIM KEY WORDS---------- AUTHORS---------- YEAR

The volume and issue numbers (VO-NU) are given after the CODEN entry, followed by beginning page (BEPA), ending page (ENPA), species discussed (ANIM)1, KEY WORDS from the title, AUTHORS [truncated if necessary, slash (/) indicates additional authors], and YEAR.

AMNAA American Midland Naturalist
ATRLA Acta Theriologica (Poland)

CAFGA California Fish and Game (US)

EXPEA Experientia (Switzerland)

IZYBA International Zoo Year Book

JWMAA Journal of Wildlife Management (US)

MILUB Milu

NAWTA North American Wildlife and Natural Resources Conference, Transactions of the (US)
NZJFA New Zealand Journal of Forestry

PCGFA Proceedings of the Southeastern Association of Game and Fish Commissioners (US)

tdbca Transactions of the Desert Bighorn Council

WLSBA Wildlife Society Bulletin

ZOLZA Zoologicheskii Zhurnal (USSR)

Wild ruminants are referred to in this CHAPTER by a 4-character abbreviation from the family, genus and genus-species. These are listed below under Abbreviation.

Scientific names of North American wild ruminants are those used in BIG GAME OF NORTH AMERICA, edited by J.C. Schmidt and D. L. Gilbert (1979: Stackpole Books, Harrisburg, PA 17105, 494 p.), and may be different from the scientific names given in the original literature.

The abbreviations used for North American wild ruminants are listed below.

CLASS: MAMMALIA

ORDER: ARTIODACTYLA	Abbreviation
FAMILY: CERVIDAE	cerv
GENUS: Odocoileus (deer)	od--
SPECIES: O. virginianus (white-tailed deer)	odvi
O. hemionus (mule deer)	odhe
GENUS: Cervus (Wapiti, elk)	ce--
SPECIES: C. elaphus	ceel
GENUS: Alces (moose)	
SPECIES: A. alces	alal
GENUS: Rangifer (caribou)	
SPECIES: R. tarandus	rata
FAMILY: ANTILOCAPRIDAE	
GENUS: Antilocapra	
SPECIES: A. americana (pronghorn)	anam
FAMILY: BOVIDAE	bovi
GENUS: Bison (bison)	bi--
SPECIES: B. bison	bibi
GENUS: Ovis (sheep)	ov--
SPECIES: O. canadensis (bighorn sheep)	ovca
O. dalli (Dall's sheep)	ovda
GENUS: Ovibos	
SPECIES: O. moschatus (muskox)	obmo
GENUS: Oreamnos	
SPECIES: O. americanus (mountain goat)	oram

The abbreviations used for European wild ruminants are listed below.

CLASS: MAMMALIA	
ORDER: ARTIODACTYLA	Abbreviation
FAMILY: CERVIDAE	cerv
GENUS: Capreolus (roe deer)	ca--
SPECIES: C. capreolus	caca
GENUS: Dama (fallow deer)	da--
SPECIES: D. dama	dada
GENUS: Cervus (Wapiti, elk)	ce--
SPECIES: C. elaphus (red deer)	ceel
GENUS: Alces (moose)	
SPECIES: A. alces	alal
GENUS: Rangifer (caribou)	
SPECIES: R. tarandus	rata
FAMILY: BOVIDAE	
GENUS: Bison (bison)	
SPECIES: B. bonasus	bibo
GENUS: Capra (ibex, wild goat)	cp--
SPECIES: C. aegargrus(Persian ibex)	cpae
C. siberica (Siberian ibex)	cpsi

OTHERS

Abbreviations for a few other species and groups of species may appear in the reference lists. These are listed below.

Axis axis (axis deer)	axax
Elaphurus davidianus (Pere David's deer)	elda
Cervus nippon (Sika deer)	ceni
Hydropotes inermis (Chinese water deer)	hyin
Muntiacus reevesi (Chinese muntjac)	mure
Moschus moschifer (Chinese musk deer)	momo
Ovis nivicola (snow sheep)	ovni
Ovis musimon (moufflon)	ovmu
Ovis linnaeus (Iranian sheep)	ovli
Rupicapra rupicapra (chamois)	ruru
big game	biga
domestic sheep	dosh
domestic cattle	doca
domestic goat	dogo
domestic ruminant	doru
herbivore	hrbv
mammals	mamm
three or more species of wild ruminants	many
ruminants	rumi
ungulates	ungu
vertebrates	vert
wildlife	wldl
wild ruminant	wiru

JULIAN DAY: MONTH AND DAY EQUIVALENTS*

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Day
1	001	032	060	091	121	152	182	213	244	274	305	335	1
2	002	033	061	092	122	153	183	214	245	275	306	336	2
3	003	034	062	093	123	154	184	215	246	276	307	337	3
4	004	035	063	094	124	155	185	216	247	277	308	338	4
5	005	036	064	095	125	156	186	217	248	278	309	339	5
6	006	037	065	096	126	157	187	218	249	279	310	340	6
7	007	038	066	097	127	158	188	219	250	280	311	341	7
8	008	039	067	098	128	159	189	220	251	281	312	342	8
9	009	040	068	099	129	160	190	221	252	282	313	343	9
10	010	041	069	100	130	161	191	222	253	283	314	344	10
11	011	042	070	101	131	162	192	223	254	284	315	345	11
12	012	043	071	102	132	163	193	224	255	285	316	346	12
13	013	044	072	103	133	164	194	225	256	286	317	347	13
14	014	045	073	104	134	165	195	226	257	287	318	348	14
15	015	046	074	105	135	166	196	227	258	288	319	349	15
16	016	047	075	106	136	167	197	228	259	289	320	350	16
17	017	048	076	107	137	168	198	229	260	290	321	351	17
18	018	049	077	108	138	169	199	230	261	291	322	352	18
19	019	050	078	109	139	170	200	231	262	292	323	353	19
20	020	051	079	110	140	171	201	232	263	293	324	354	20
21	021	052	080	111	141	172	202	233	264	294	325	355	21
22	022	053	081	112	142	173	203	234	265	295	326	356	22
23	023	054	082	113	143	174	204	235	266	296	327	357	23
24	024	055	083	114	144	175	205	236	267	297	328	358	24
25	025	056	084	115	145	176	206	237	268	298	329	359	25
26	026	057	085	116	146	177	207	238	269	299	330	360	26
27	027	058	086	117	147	178	208	239	270	300	331	361	27
28	028	059	087	118	148	179	209	240	271	301	332	362	28
29	029	[060]	088	119	149	180	210	241	272	302	333	363	29
30	030		089	120	150	181	211	242	273	303	334	364	30
31	031		090		151		212	243		304		365	31

* For leap year, February 29 = JDAY 60. Add 1 to all subsequent JDAYs.