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# UTILIZING A COMPUTERIZED FISH AND WILDLIFE INFORMATION SYSTEM TO SOLVE ANIMAL DAMAGE CONTROL PROBLEMS

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# UTILIZING A COMPUTERIZED FISH AND WILDLIFE INFORMATION SYSTEM TO SOLVE ANIMAL DAMAGE CONTROL PROBLEMS

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## INTRODUCTION

Animal damage control professionals are faced with the monumental task of absorbing an enormous amount of literature about animal species. For example, one person cannot become an expert on all facets of dozens of species, much less the 1000 or more fish, reptiles, amphibians, mammals, and birds that fall under the wildlifer's jurisdiction. An important new aid to the wildlife damage control specialist is the computerized fish and wildife information system (CFWIS). A CFWIS is a tool for systematically compiling and managing information about animal species which reside in a state. Cushwa and Kopf (1984) summarized the development of state CFWISs from the 1970's through 1984. At present 11 states are implementing a CFWIS using a variety of hardware and software. Categories of information in CFWISs generally follow the "Procedures" system (Mason et al. 1979). Currently,

Virginia, Colorado, Missouri and Pennsylvania have working Procedures-type CFWISs. Illinois, Kentucky, Tennessee, and Wyoming are in the implementation stage, and decisions are pending in many other states.

As more states implement a CFWIS, new applications of the systems are being identified and evaluated. The objectives of this paper are to demonstrate the use of a CFWIS to animal damage control professionals and to solicit ways to increase the usefulness of these systems to animal damage control programs.

A CFWIS as implemented in Virginia contains 190 categories of information on each of 978 species. It can be used in the following general types of animal damage control problems:

1. Species list within a geographic area, i.e. county, habitat, type or watershed.

2. Direct management of a problem species or its habitat.

3. Indirect management or biological control

   a. competitor, predator, parasite, or disease

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b. habitat of competitor, predator, parasite, or disease

Other types of information in a CFWIS that may be of use to animal damage control professionals include legal status of the animals in question, beneficial and adverse management practices, life history, environmental associations, and information on the effects control efforts will likely have on non-target species.

APPLICATIONS

The following hypothetical animal damage control problem has been addressed using the CFWIS of the Virginia Commission of Game and Inland Fisheries. Virginia's system is not expressly designed for animal damage problems, but information required in animal damage control is generally the same biology, ecology, and habitat information required by any other aspect of the complex operations within wildlife management. Consequently, animal damage problems can be addressed by the Virginia system.

Problem -
A rice farmer in Chesapeake County, Virginia has lodged a complaint about grackles in his rice fields. The farmer wants to know the best way to reduce the damage.

1. Access the system and find what species of animals are potentially associated with rice fields (search for species associated with shallow inland non-forested wetlands in Chesapeake County)?

-Result: 47 SPECIES (see Appendix A)

These 47 species comprise the animal community that the manager must be aware of. One of the most useful aspects of a CFWIS to the animal damage control professional is its ability to identify non-target species that may be affected by various management actions. This first list is a starting point for the rest of the analysis.

2. What is the status of these (47) species?

4 Unclassified
5 Sensitive
12 Pest/Crops
8 Nongame-Protected
23 Game [consumptive]
2 Furbearer
39 Federal migratory
3 Commercial
2 Biological indicator

The manager now has a list of the animal species that may ultimately be affected by management actions in the rice fields. None of the 47 animals associated with these habitat types are classified as federally threatened or endangered species, but five species are classified as sensitive and should be given special consideration when a final management plan is prepared. Forty-two federal migratory species are potentially associated with this habitat type. These animals are protected by federal law, and special care should be taken concerning them as well.

3. Of these 47 species in Chesapeake County, which species are known to eat rice?

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-Result: 16 SPECIES (see Appendix B)

These 16 species are known to eat rice. They may be dependent on rice as a food source, or they may be causing additional damage to the rice fields, or both.

The species doing the damage has already been identified as the common grackle. Since this is the target species, any information the manager could obtain about this species would be helpful.

4. What environmental, ecological, or life history information is available for the common grackle?

LIFESTAGE= General;

22 environmental associations (with plants, wetlands, point habitat types, etc...)

Comments on Environmental Associations -

Breeding, nesting, roosting, and foraging information.

MANAGEMENT= Beneficial;

   9 beneficial management practices

   4 adverse management practices

   Comments on Management Practices -

   Includes comments on land conversion and other man-made disturbances.

Life History -

Includes origin, physical description, reproduction, be-havior, and aquatic/terrestrial associations.

The common grackle normally gathers in large communal flocks in the fall along with cowbirds, redwing blackbirds, and starlings. Because of this, direct control may be efficient, but non-target birds will also be affected. The data base does list "draining wetlands" as an adverse management practice for grackles. Consequently, draining and harvesting the fields before the birds congregate may be the best solution if agriculturally feasible. Avicides, wetting agents, and dispersal are not specifically mentioned in the management practices. The manager at this point must realize that there are no pesticides registered for use against blackbird damage in wetlands so the cultural methods of control may be the only management alternative aside from scare tactics (Dolbeer 1983).

5. Which of the 47 species would be affected adversely by pesticide application in this habitat type in Chesapeake County if an avicide does become available?

-Result: 27 SPECIES (see Appendix C)

This particular type of information may be helpful in heading off problems with non-target species in a case where pesticide applications are a viable solution to the problem.

6. What is the status of these species?

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2 Unclassified
4 Sensitive
1 Pest/Crops
6 Nongame-Protected
18 Game [consumptive]
23 Federal migratory
1 Commercial
2 Biological indicator

If for instance, the manager anticipated problems with a particular non-target species, information could be called up on that species for the purpose of planning mitigation or altering the management recommendations. The river otter was identified as a sensitive species and is used in this example:

7. What information is available specifically on the river otter?[4]

NAME = Otter, river;

Comments on occurrence = "Rare or disappeared from most parts of VA by early 1900's, reoccupied many areas east of Blue Ridge after 1940's, but remains nearly extirpated west of the Blue Ridge; headed for extirpation by excessive fur harvest, stream pollution *154*[5]";

Comments on status = Scarce where waters polluted, residues of pesticides, including Hg, DDT, and metabolites, mirex reported from tissues, highly susceptible to overharvest as travel extensively in restricted avenues of waterways *57*;

HARVEST;

ANNUAL.HARV = 1-10;

ANNUAL.HARV.FIP = Chesapeake;

LAND.USE = Forest land;

LAND.USE = Deciduous forest land;

LAND.USE = Evergreen forest land;

LAND.USE = Mixed forest land;

LAND.USE = Water;

LAND.USE = Streams and canals;

LAND.USE = Lakes;

LAND.USE = Reservoirs;

LAND.USE = Bays and estuaries;

LAND.USE = Wetland;

LAND.USE = Forested wetland;

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[4] The information on the river otter is formatted very similarly to the actual output of the CFWIS.

[5] The numbers in asterisks are reference numbers for the preceding line of information.

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LAND.USE = Nonforested
wetland;

Comments on food habits =
"9999S=not a significant preda-
tor of muskrat *154*; birds oc-
casionally, usually carrion;
boon to fishermen: prey prima-
rily on non-game fish -- espe-
cially slow moving fish, bottom
dwelling/'rough' fish,
secondarily on fish in
abundance/large schools
*154,57,133*; insects: mostly
large aquatic *154,57*; high
metabolic rate, efficient
digestive system *57*; crayfish
important in diet
*154,57,133*";

Comments on environmental asso-
ciations = "00020S=may travel
on ice in winter or swim long
distances under it *154,57*;
00040S=absent in waters altered
by acidic mine drainage *57*;
water quality in general: 'lit-
tle work done on identifying
range of water quality toler-
ated' *57*; 00060S=otter
habitat destruction from in-
creased siltation *57*;
00170S=need stretches of water
with flow swift enough to remain
open in winter *154*;
00300S=from marine environment
to high mountain lakes; more
abundant in food-rich coastal
areas/lower parts of streams,
rivers *57*; 00410S=drift
piles, logjams *57*;
00540S=among tree roots *154*;
00900S=occasionally use duck
blinds, abandoned boat houses
*57*";

MANAGEMENT = Beneficial;

   Regulating harvest of spe-
   cies being described;

   Maintaining wilderness en-
   vironment;

Developing/maintaining
stream bank vegetation;

Maintaining/protecting
riparian habitats;

Stocking captive-reared
wild-strain animals;

Restricting/regulating hu-
man use of habitats;

Maintaining
undisturbed/undeveloped
areas;

Maintaining unique or spe-
cial habitat features
[wetlands, caves, etc.];

Developing/maintaining wa-
ter holes, ponds, potholes,
etc.;

Maintaining dead/downed
woody materials;

Developing/maintaining sub-
merged brush, timber, de-
bris, etc.;

Maintaining large trees for
denning, nesting, or
roosting;

Developing/maintaining
suitable pH;

Developing/maintaining
brackish marsh;

Developing/maintaining
saline marsh;

Developing/maintaining
freshwater marsh;

Developing/maintaining/protecting
wetlands;

Controlling sedimentation;

Controlling pollution
[thermal, chemical, phys-
ical];

Segregating and treating
toxic materials;

Excluding livestock from
banks and water;

MANAGEMENT = Adverse;

Applying herbicides;

Applying pesticides;

Applying insecticides;

Applying fertilizers;

Other management practices
[specified in comments];

Draining wetlands, marshes,
ponds, lakes;

Construction of naviga-
tional improvements [dams,
locks, etc.];

Constructing/maintaining
bulkheads, seawalls, and
dikes;

Dredging;

Underwater explosions;

Underwater mining;

Surface mining;

Clean farming;

MANAGEMENT = Existing;

Regulating harvest of spe-
cies being described;

Comments on Management Prac-
tices - "999(B)=much research
needed *154,57*; first
priority-review status east of
Blue Ridge; trapping season

should be earlier-when extends
to Feb. 28, overlaps birth,
mating seasons-wipe out 3 gen-
erations when capture mated fe-
male with litter in den; educate
fishermen, pond owners about
food habits, value of otter;
remove and relocate from fish
hatcheries, areas where un-
wanted, polluted waters *154*;
999(A)=industrial pollution,
intensive recreational develop-
ment, urban or agrarian devel-
opment, creation of surburban
residential areas
*132,45,90,57*";

The next step in the analysis
was to address the effects on
the food chain in the animal
community if grackles are re-
moved. This information can be
used to identify potential bi-
ological control methods and
also to identify which species
use grackles for a food base.

8. What species prey on grackles,
and what management practices
may be used to enhance the
predators' habitat?

-Result: 4 SPECIES

Hawk, red-shouldered;

MANAGEMENT= Beneficial;

Maintaining/protecting
riparian habitats;

Developing/maintaining/
protecting wetlands;

Other management practices
[specified in comments];

MANAGEMENT= Adverse;

Draining wetlands,
marshes, ponds, lakes;

Comments on Management Prac-
tices - 999 (B) = intense re-
search needs to be conducted to
determine reasons for popu-
lation declines, this sharp
drop cannot be attributed to
pesticide use since the major
part of their diet (rodents) are
relatively free of pesticide
contamination *693*;

Owl, common barn;

MANAGEMENT= Beneficial;

Restricting/regulating hu-
man use of habitats;

Restricting/regulating hu-
man disturbance of popu-
lations;

Maintaining unique or spe-
cial habitat features
[wetlands,

caves, etc.];

Creating/maintaining snags;

Providing artificial
nesting/spawning sites;

Maintaining overmature for-
ests;

MANAGEMENT= Adverse;

Applying pesticides;

Timber harvesting -
clearcutting;

Timber harvesting - se-
lection cuts;

Timber harvesting -
shelterwood cuts;

Timber harvesting - seed
tree cuts;

Clean farming;

Comments on Management Prac-
tices - "999(B)=need to iden-
tify habitat requirements for
nesting, roosting and feeding
and then inventory such
habitats in area being managed
*459*; pesticides and
rodenticides should be used
cautiously *459*; maintain spe-
cial habitats = cavities and
snags for nesting/roosting
*459*; provide artificial nest
sites where natural sites are
not available *459*;
999(A)=industrial pollution,
intensive agricultural prac-
tices *511, 528*";

Owl, short-eared;

MANAGEMENT= Beneficial;

Using flushing devices on
mowers;

Maintaining early stages of
ecological succession;

MANAGEMENT= Adverse;

Maintaining natural ecolog-
ical succession;

Other management practices
[specified in comments];

MANAGEMENT= Existing;

Other management practices
[specified in comments];

Comments on Management Prac-
tices - 999(A+E)=where owls are
a nuisance mowing and agricul-
tural practices should be mini-
mized to reduce number of prey
species *3831*;

One of the goals of a computer-
ized fish and wildlife system
is low user cost and speed. The
following is a breakdown of
search costs and the time re-

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quired to complete this analysis.

9. Cost summary.

Operator -
21 minutes * $7.30/hr = $2.19
   Computer costs = $6.06
     TOTAL = $8.25

DISCUSSION

The Virginia CFWIS is still very much in the development stage and there are some obvious holes in the data. For example, cowbirds and red-winged blackbirds never show up in the analysis, but they do appear in the life history of the common grackle. The animal damage control professional may be required to recognize and assimilate some types of information that are not included in the CFWIS. An example would be the application of pesticides; the system does not include detailed information on licensing and available control measures for the various pest species. Also, an on-site investigation should always be conducted by the wildlife professional to determine whether the species of concern are actually in the area.

The manager must rely on common sense and his own experience to interpret the results of a CFWIS analysis. The system is not designed to make decisions. It is designed to provide pertinent information in a timely manner. A good analogy would be a complete university and agency library combined in a small box on the managers desk that can instantly access any reference in the library given some environmental or taxonomic criteria. A weak point of the system is that it requires experienced managers to interpret results. The strong point of the system is its ability to provide the manager with an expanded and technically docu-

mented information base to make better informed decisions.

CONCLUSION

A computerized fish and wildlife information system is a powerful tool that can enable the wildlife professional to quickly and cheaply obtain large amounts of pertinent fish and wildlife data for a number of different applications. Although specific information on animal damage control problems is not currently included in the Virginia CFWIS, a state may decide to include things like information on certain pesticides or unusual damage control techniques. The systems have the capability to absorb and manipulate information on those subjects as easily as life history or environmental associations .

The rice example is the sort of problem that animal damage control professionals face each day. In addition to calling up information on current conditions in the management area, the user can ask "what if" type questions concerning potential habitat changes, management practices, and effects on non-target species. Information found by a search of the CFWIS is in a condensed format, but still requires a professional to assimilate and organize it into a workable management plan; consequently specific management recommendations are not included in this work.

Perhaps the most powerful aspect of a CFWIS is its ability to grow and become more useful over time. The Virginia CFWIS that was used for the previous examples, is still under development. New information is constantly being entered and old information updated as research results become available. In 5-10 years, with continuing additions and improvement, this CFWIS will be

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a major source of fish and wildlife information, and we predict it will be indispensable to the wildlife professional in the 21st century.

## LITERATURE CITED

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Mason, W.T., Jr., C.T. Cushwa, L.J. Salaski, and D.N. Gladwin. 1979. A procedure for describing instructions for PA USDI FWS/OBS 79/19 Wash. D.C. 21 pp. + 19 appendices.

APPENDIX A - List of species found in Chesapeake County Virginia that are potentially associated with rice fields.

Anhinga;
Bittern, least;
Bullfrog;
Canvasback;
Crow, American;
Dove, mourning;
Dowitcher, long-billed;
Duck, American black;

Duck, ring-necked;
Egret, great;
Frog, little grass;
Gadwall;
Goose, Canada;
Goose, greater snow;
Goose, lesser snow;
Grackle, common;
Heron, tricolored;
Ibis, glossy;
Ibis, white;
Knot, red;
Mallard;
Merganser, common;
Merganser, hooded;
Mouse, cotton;
Muskrat, large-toothed;
Otter, river;
Owl, short-eared;
Pheasant, ring-necked;
Pintail, northern;
Rail, king;
Rail, Virginia;
Rat, marsh rice;
Redhead;
Sanderling;
Sandpiper, least;
Sandpiper, spotted;
Sandpiper, western;
Scaup, lesser;
Shoveler, northern;
Skimmer, black;
Snipe, common;
Teal, blue-winged;
Teal, green-winged;
Tern, common;
Weasel, long-tailed;
Wigeon, American;
Willet, eastern;

APPENDIX B - List of species out of the 47 identified in the animal community that are known to eat rice.

Bullfrog;[6]
Crow, American;

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[6]   References for the bullfrog's food habits are available upon request.

Dove, mourning;
Duck, ring-necked;
Goose, greater snow;
Goose, lesser snow;
Grackle, common;
Mallard;
Muskrat, large-toothed;
Pheasant, ring-necked;
Pintail, northern;
Rail, king;
Redhead;
Scaup, lesser;
Teal, green-winged;
Willet, eastern;

APPENDIX C - List of species out of the 47 identified in the animal community that would be adversely affected by avicide application.

Anhinga;
Bullfrog;
Canvasback;

Crow, American;
Duck, American black;
Duck, ring-necked;
Gadwall;
Goose, Canada;
Ibis, glossy;
Ibis, white;
Merganser, common;
Merganser, hooded;
Otter, river;
Pheasant, ring-necked;
Pintail, northern;
Rail, king;
Rail, Virginia;
Rat, marsh rice;
Redhead;
Sandpiper, least;
Sandpiper, spotted;
Scaup, lesser;
Shoveler, northern;
Snipe, common;
Teal, blue-winged;
Teal, green-winged;
Wigeon, American;