

**NON-GAME WILDLIFE RESEARCH
IN MEGALOPOLIS:
THE FOREST SERVICE PROGRAM**

**by Jack Ward Thomas
and Richard M. DeGraaf**



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6816 MARKET STREET, UPPER DARBY, PA. 19082
WARREN T. DOOLITTLE, DIRECTOR

The Authors

JACK WARD THOMAS is Principal Research Wildlife Biologist and Project Leader for the Northeastern Forest Experiment Station's multidisciplinary environmental forestry research project at the University of Massachusetts, Amherst. He received his B.S. degree from Texas A&M University in 1957, an M.S. degree from West Virginia University in 1969—both in wildlife science—and is now a Ph.D. candidate in forestry (resource planning) at the University of Massachusetts. He has authored or co-authored approximately 65 articles in the general field of wildlife biology.

RICHARD M. DE GRAAF is Assistant Research Wildlife Biologist at the Northeastern Station's Amherst research unit. He received his B.S. degree from Rutgers University in 1965, an M.S. degree from the University of Massachusetts in 1971, and is now a Ph.D. candidate at that institution, all in wildlife biology. He has authored or co-authored six articles on general wildlife biology.

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Abstract

The management of city habitats for wildlife production for enjoyment in forms other than hunting will require extensive coordinated research to provide guidance for such efforts. A generalized framework for such research is suggested and thirteen research studies particularly suited to the Forest Service research unit at Amherst, Mass., are outlined.

THE PROFESSIONS of wildlife management and forestry have traditionally been concerned with land management in rural areas for producing game and timber. The growth of megalopolis and the concentration of our citizenry in cities have brought these professions face-to-face with a challenge. If these professions are to improve the environments of most Americans, they must become active where the action is—in and around the cities.

This problem analysis is a guide to the wildlife-research efforts of the USDA Forest Service as it seeks to aid in the management of today's human environment. In the words of Gifford Pinchot, we hope we are "breaking new ground."

THE PROBLEM

We are told that by the year 2000 some 75 percent of the nation's population will live and work in cities (*Crissey 1971*). The primary habitat or living space of those citizens will be the neighborhoods where they live and

the areas where they work and play (*Zivnushka 1971*).

At a time when the average person is more and more isolated from the natural world, there seems to be an increasing public longing for experience with wildlife. This can be seen in the increased TV, magazine, and newspaper concern with wildlife and wild places. Yet, even these vicarious contacts seem to be in the form of fantasy visits to areas of the world remote from man's cities.

When we return from those armchair contacts with wild things and survey our everyday habitat we mourn or—even worse—accept the loss of these contacts as a penalty of life in the cities. But, if we are perceptive enough, we might say along with George Bernard Shaw . . . "You see things as they are; and you ask 'Why?' But I dream things that never were: and I ask 'Why not?'"

Why not revitalize our everyday living space so that we can purposefully and deliberately share it with plants and animals? They provide the interaction with nature that can yield a wealth of pleasure along with the constant lesson that man's actions now determine

the present and future suitability of Space-ship Earth for wildlife, for man—indeed for life itself.

Should there be an effort to provide wildlife, literally and figuratively, in man's backyard? There are a number of reasons for saying "yes" (*Shomon 1970, Sinton 1971, Stainbrook 1968*). Wildlife can provide a direct means for understanding the underlying ecological principles expressed by Commoner (1971): "Everything is connected to everything else . . . There is no such thing as a free lunch." The animals and the vegetation that supports them are a source of pleasure—to see, to hear, to smell.

But perhaps the best reason of all is that many people seem to want wildlife in the cities because it somehow makes their lives more complete and enjoyable.

Our goal is to develop the needed knowledge about: just if and how wildlife is important in the metropolitan areas; how wildlife habitat can be manipulated to produce or attract desirable wildlife; what wildlife species are the most desirable. We want to develop management plans for various potential wildlife habitats, and to determine how wildlife and their habitats might be best used to give city dwellers a feel for and knowledge of how the natural world works.

THE GEOGRAPHICAL AREA OF CONCERN

We are concerned with wildlife research needed to enhance human environments in and around the Nation's cities, particularly in the megalopolitan areas of the Northeast.

Megalopolis consists of a series of metropolitan centers from Boston, Massachusetts, to Washington, D. C., surrounded by rural areas that supply resource services such as water, food, and recreation. This service area (5 percent of the Nation's land) extends from Canada to North Carolina, between the Appalachians and the Atlantic, and contains 26 percent of the Nation's population (*Gottman 1961*).

Pronounced changes in land use from rural to urban uses are occurring within this area, and a shift of 8,755,000 acres to urban land

use is expected in the period 1960-2020. Population has increased from 34.4 million in 1940 to 50 million in 1970 and is expected to reach 55.6 million by 1980, 69.5 million by 2,000, and 86.2 million by 2020 (*USDA 1970*).

Marked changes in the distribution of various land uses is expected in the North Atlantic Region in the period 1963-2020: decreases in cropland (15.2 to 6.0 percent) and pasture (6.3 to 2.6 percent); and increases in forest land (57.4 to 64.4 percent) and urbanized areas (6.0 to 14.3 percent) (*USDA 1970*).

These ongoing land changes are seen as a trend toward a visual image of trees and houses (*Zube et al. 1971*).

THE ROLE OF NATURAL RESOURCE MANAGEMENT PROFESSIONS IN URBAN AREAS

The Wildlife Biologist's Role in Urban Areas

The purpose of wildlife management is to satisfy human needs and desires. We subscribe to Eggeling's (1971) philosophy, that man does not conserve wildlife for altruistic reasons but for the pleasure that he derives from it.

Some 75 percent of all Americans will live in cities by 2000 (*Crissey 1971*). Obviously, if wildlife managers want to have an impact on the environment of the majority, that is where they must be active (*Clawson 1968a and Foster 1971*).

As some states move toward total urbanization (*Grossman 1965 and Clawson 1968b*), their wildlife agencies must evolve into a new socially useful role or decline in stature and vigor.

The Bureau of Sports Fisheries and Wildlife has begun to define its role in urban-oriented society. Its director (*Gottschalk 1968*) stated: "If our Bureau were to focus, as we have in the past, on the wide open spaces and neglect the people in the city, I believe it would find itself in a very questionable orientation with society."

Some states, notably New York (*Miller et al. 1971*) and California (*Leach 1969*) have

initiated planning toward broadening their programs to include urban areas and non-game wildlife. Wildlife and other environmental management in the city may be the only chance to give people any understanding of nature (*Cain 1968*).

MacMullan (*1968*) put it this way: "I am convinced that not only can wildlife continue to have meaning for the denizen of megalopolis, it must be a part of his basic ecological understanding."

A FRAMEWORK FOR NEW RESEARCH

We conceive the problem components to be human preferences, habitat, and wildlife-human interaction. This analysis is limited to management of wildlife for aesthetic enhancement of megalopolis. We did not consider control or human-wildlife conflict resolution, which is receiving adequate attention elsewhere (*McCabe et al. 1970*).

There appear to be two not mutually exclusive ways of selecting species for management consideration. The biologists can select the species, manage for them, and try to convince the public that this is what is wanted and needed. Or the public can select the species for attention.

It is one thing to be convinced that wildlife management for the enhancement of man's environment is desirable and quite another to find funds for such programs. We must know if and how much the public is willing to pay, both for management by individual property owners and for government (local, state, or federal) efforts to influence wildlife habitat.

The habitat requirements of any species must be known before more than rudimentary management can be done. Such studies should be made according to the priorities determined by the investigations on human preference.

Areas available for management should be evaluated and categorized according to their potential as habitat for wildlife. Habitat-management techniques must be developed, tested, and evaluated. The evaluation should include cost/benefit analysis, even though the benefits may be intangible.

The important sites where human-wildlife interactions occur should be identified. Such results can be used in conjunction with the results of studies on human preference, determination of habitat requirements and sites available to provide management at the appropriate places, and times to provide maximum human benefit.

Most of the literature we reviewed indicated that interaction between man and wildlife (excluding pests) is desirable. We should know: (1) why it is important; (2) how this importance is acquired; and (3) what there is in the man-animal-habitat matrix that can be managed to enhance the experience for man.

The techniques for increasing or enhancing these interactions should be devised and tested. This interaction is the pay-off for aesthetic wildlife management, in much the same way as the opportunity to harvest game is for traditional wildlife management.

GENERALIZED RESEARCH TOPICS

The general topics we believe important for research attention follow. The list is general in the sense that we make no suggestions as to who or how the research should be conducted. Specific studies appropriate to the Forest Service efforts are discussed later.

Human Preferences for Wildlife Species

1. Studies of the preferences of city residents for various species, numbers, and location of wildlife would be valuable in guiding research and management. These studies should include stratifications of the human population sample to include variables such as cultural background, income, residence, ability to travel, education, and geographical area of concern.
2. Techniques and potential sources of funding for management and research should be investigated. Existing and potential constituency groups for such programs should be identified, quantified, and qualified.

3. Investigations should be made into existing law, customs, and governmental organization from local to state to federal level, to determine where authority and responsibility lie for management and research.

Wildlife Habitat

4. Techniques for determination of the habitat requirements of various species selected for management must be adapted or designed and tested for urban environments. These techniques may borrow liberally from procedures developed for use in the more traditional rural settings. However, considerable imagination will be necessary to account for habitat diversity and the effect of high human density and attendant technology.
5. Habitat requirements for selected species must be determined as prerequisites to management. Such determinations should include public health implications of this management. These studies should consider the inter-relationships of habitat requirements; that is, given management for a particular species, what other species will be expected and how?
6. Plant materials suitable to meet the habitat requirements of various wildlife species must be evaluated. Much information exists on domestic and native plant material, but not in a form useful to wildlife managers, landscape architects, garden centers, and gardeners. These evaluations should cover food, nesting, and cover provisions. Particularly promising is the evaluation of wild plants for use in suburban or park areas. Such studies should emphasize aesthetic values, wildlife values, and techniques for transplanting or propagation.
7. Management techniques should be tested for effectiveness. Such information should be stratified by area size and use (city lot to large park), requirements for pre-existing large trees, time delay from instigation of management to results, and cost-effectiveness.

8. Available areas for management should be identified, cataloged, and rated in terms of area, importance, ownership or control, availability (spatial and temporal), and limitations on management activities. Such studies would be utilized in combination with the preference studies to direct priority research and management-technique development toward appropriate sites.

Human-Wildlife Interaction

9. Sites where interaction now occurs should be cataloged and ranked in terms of quantity and quality. To pinpoint sites for intensive research and management, such information would be utilized in conjunction with information on areas available for management, species preferences, and habitat requirements.
10. The interactions should be evaluated in terms of contributions to the welfare of man. These values, once identified and weighed, might be emphasized in management.
11. Techniques for increasing interaction should be developed. These techniques might include bringing the wildlife and the people to the same place at appropriate times. Tastefulness and subtlety, and knowledge of the wildlife and people, will be required to create satisfactory encounters. Quality and quantity of the species, wildlife and human, and the site itself will be involved.
12. Techniques and materials should be developed for the use of appropriate areas as wildlife education areas. The studies should include habitat and wildlife-management procedures and development of lesson plans and educational materials to guide teachers and students.

Research Cooperation with Other Disciplines

Solutions to these research problems will require contributions from scientists of other disciplines for optimal results. Table 1 shows

the suggested collaboration among the disciplines, the appropriate locale, and a priority for each area of research .

SPECIFIC STUDIES

The following studies are planned (some are now being conducted) by, or through, the Environmental Forestry Research Unit of the USDA Forest Service at Amherst, Massachusetts. These are specific responses to the generalized research areas. These studies do not fill all the research needs. Much additional research by other researchers and agencies will be required.

These studies were planned for a 5-year time frame. Table 2 shows the priorities among studies and scheduled starting dates. The studies are categorized according to the problem components stated above.

1. Human Preferences for Wildlife Species

a. Study Title: "Preferences of Suburban Residents Concerning Wildlife—A Pilot Study"

This effort will be an extensive pretesting of procedures, techniques, and questionnaires for determining city dwellers' (1) attitudes toward wildlife, (2) preferences among wildlife species, and (3) willingness to practice or pay for practice of wildlife management in the urban forest interface. This study, although it is a pilot for a larger study, should yield results on attitudes and preferences.

b. Study Title: "Preferences of Urban-Suburban Residents Concerning Wildlife"

This study will be the full-scale application of the approaches outlined under study 1a above and will be replicated among several large cities and suburbs of the northeastern United States. The results will be used to select non-game birds and mammals as subjects for research effort, and to determine the interest and base support for potential management effort.

2. Wildlife Habitat

a. Study Title: "Identification of Important Habitat Variables for Street-Side Occurrence of Selected Songbirds in a Small Town—A Pilot Study"

This effort will develop and test a multivariate approach to determining habitat requirements for songbirds. Important habitat variables will be identified and procedures streamlined for large-scale application of the technique, which should be usable for determining habitat requirements of most songbirds over a wide range of habitats. As a secondary result, computer programs will be developed for use in later replicated efforts. Resulting publications should provide descriptions of habitat requirements of 10 selected species in small New England towns. A study plan has been developed, and research is under way on the influence of an urban park on distribution of songbirds in adjacent neighborhoods, utilizing the techniques developed here.

b. Study Title: "Identification of Important Habitat Variables for Street-Side Occurrence of Selected Songbirds"

Utilizing the bird species preference ratings developed under studies 1a and 1b, habitat requirements will be developed for 10 species per year for 3 years in each of 3 separate cities. Techniques and computer programs developed under study 2a will be utilized. Contract research for one or two of the replications may be desirable.

c. Study Title: "Evaluation of Wild Shrubs for Possible Use in Habitat Management for Suburban Songbirds"

Demands for habitat management for songbirds in suburbs might be met this way; and information on appropriate shrubs, their characteristics, and techniques for establishment would be useful. The objectives include: (1) selection and evaluation of 10 wild shrubs and (2) development of knowledge for selection of appropriate species to suit site requirements.

Methods will include: (1) selection of candidate species from literature review, using

Table 1.—Research topics:

	Generalized research topics for wildlife research	Potential cooperating disciplines						
		Economics	Law	Psychology	Sociology	Government	Geography	Forestry-Arboriculture
1.	Preferences of urban residents for wildlife species	..	..	X	..	..	..	..
2.	Identification of funding and revenue sources & constituencies	X	..	..	..	X	..	..
3.	Assignment of research and management responsibilities	..	X	..	X	X	..	..
4.	Technique development for study of habitat requirements in cities	..	..	..	..	..	..	X
5.	Habitat requirements of wildlife species selected for management	..	..	..	..	..	..	X
6.	Evaluation and development of plant materials for use in wildlife management in urban situations	..	..	..	..	..	..	X
7.	Development and testing of wildlife habitat management techniques	X	..	..	..	..	..	..
8.	Identification, cataloging, & rating of areas available for wildlife management practices	..	X	..	X	..	X	X
9.	Cataloging & ranking of areas where significant human-wildlife interactions now occur	..	..	X	..	..	X	..
10.	Evaluation of the significance of human-wildlife interaction	..	..	X	X	..	..	..
11.	Development and testing of techniques for creating satisfactory human-wildlife interaction	X	..	X	X	..	..	..
12.	Development and testing of appropriate techniques to use wildlife in teaching	..	..	..	X	..	..	..

*Research topics are grouped into first, second, or third priority in reference to the logical sequence of a continuing research program.

summary and priorities

discipline					Major geographic focus			Priority*	
Landscape architecture	Horticulture	Planning	General ecology	Education	Urban	Fringe	Rural	Research sequence	Management needs
..	X	X	..	1	1
..	X	X	..	3	1
..	X	X	..	3	1
..	X	..	X	X	..	1	2
..	X	..	X	X	X	2	2
X	X	..	X	..	..	X	X	2	3
..	X	..	..	X	X	2	2
X	..	X	..	..	X	X	..	1	2
..	..	X	..	..	X	X	..	1	3
..	X	X	..	2	3
..	..	X	..	..	X	X	..	3	2
..	X	X	X	..	3	3

program and in reference to the satisfaction of existing management needs.

Table 2.—Priorities among proposed studies and scheduled starting dates

Study No.	Name of study	Depends on completion of these studies for inception	Priority rating			Proposed beginning & ending dates
			1	2	3	
1a	Preferences of suburban residents concerning wildlife	..	X	..	..	Sept. 1973 Sept. 1974
1b	Preferences of urban-suburban residents concerning wildlife	1a	..	X	..	Jan. 1975 Jan. 1976
2a	Identification of important habitat variables for street-side occurrence of selected songbirds in a small town—a pilot study	..	X	..	..	May 1971 June 1973
2b	Identification of important habitat variables for street-side occurrence of selected songbirds in suburban areas of the northeastern United States	1a, 1b, 2a	..	X	..	May 1973 Sept. 1975
2c	Evaluation of wild shrubs for possible use in habitat management for suburban songbirds	..	..	..	X	May 1971 Oct. 1974
2d	Nest-site preferences of arboreal nesting songbirds in New England suburbs	2a	..	..	X	Aug. 1971 Sept. 1973
2e	Nest-site preferences of arboreal nesting songbirds in suburban areas of the northeastern United States	1a, 1b, 2a, 2b	..	..	X	Sept. 1973 —
2f	Bioassay of the value of wild shrubs developed for use in habitat management for suburban songbirds	2c	..	..	X	May 1973 Aug. 1975
2g	Evaluation of 20 years of change in the human environment in Massachusetts, 1955-1971	..	X	..	..	Jan. 1971
3a	Identification & preliminary evaluation of open space areas within or adjacent to cities that might provide wildlife habitat & human-wildlife interaction	2g	..	X	..	May 1971 Aug. 1974
3b	The evaluation & recommendations for management of cemeteries as open space areas providing wildlife habitat & human-wildlife interaction	..	..	..	X	Jan. 1972 June 1973
3c	Evaluation of techniques for increasing desirable human-wildlife contact in public & other heavily utilized areas	..	..	..	X	Sept. 1974 Aug. 1976
3d	Utilization of urban wildlife for educational purposes	3a, 3b	..	..	X	Sept. 1974 Sept. 1976

fruit production, range, attractiveness of growth form, and propagation probabilities as criteria; (2) propagation of shrubs; (3) out-plantings will be tested in natural and amended soils in Coastal Plain and Piedmont soils; (4) phenology of vital characters will be developed; (5) plants will be evaluated on aesthetic characteristics; and (6) recommendations on utilization of the shrubs will be derived. A study plan for this has been developed.

d. *Study Title: "Nest-Site Preferences of Arboreal Nesting Songbirds in New England Suburbs"*

Data collected under study 2a will be utilized. Nesting habitat is critical in any management plan, and such knowledge on preferred nest-sites in relation to available vegetation is lacking. The objectives are: (1) to identify suitable nest-sites, by bird species; (2) to develop a technique for determination of preferred nesting sites by occupied vertical nesting zones and the rating of plant species for this purpose.

Methods will include: (1) search for nests within vegetative study plots; (2) determine the occupied vertical nesting zone for each bird species; (3) examine location to determine randomness; and (4) assign index ratings to species as nest-sites. These techniques, once developed, can be utilized with the habitat-requirement determinations in study 2a. In that sense, this may also be considered a pilot study.

e. *Study Title: "Nest-Site Preferences of Arboreal Nesting Songbirds in Suburban Areas of the northeastern United States"*

This study will be conducted in conjunction with study 2b. The procedures, objectives, and anticipated results will be as described under study 2d. This is the application of the developed techniques to the problem. At least parts of this study will be cooperative aid or contract research.

f. *Study Title: "Bioassay of the Value of Wild Shrubs Developed for Use in Habitat Management for Suburban Songbirds"*

In this study we assume that there will be usable results from study 2c, which is concerned with selection and testing of candidate species from the horticultural and botanical standpoint. The selected species will be evaluated as to fruit production, contribution to bird food supply in terms of volume and nutrient value, and birds attracted.

g. *Study Title: "Evaluation of 20 Years of Change in the Human Environment in Massachusetts, 1951-1971"*

The objectives are to determine or provide: (1) changes in forest use over a 20-year period; (2) predictions of future rates and patterns of change; (3) vegetative and land-use maps; (4) visual-aesthetic criteria for describing scenic quality; (5) data banks in computerized form on past, present, and future land use; and (6) patterns and mechanisms of urban growth and decay on forested land.

Data will be obtained and analyzed as follows: (1) acquire 1971 aerial photography; (2) interpret photos by an appropriately categorized system; (3) compile statistical summaries, by town and county; (4) make predictions of future change based on past change, population shift, highway construction, and other factors; and (5) interpret change as related to demographic, socioeconomic, and ecological factors. In addition to the direct results anticipated, other sub-studies may be instituted on the same base photography by the available interpreters. The study will provide base-line information on wildlife habitat—past, present, and future—that will be useful in planning efforts, particularly for the next study.

3. Human-Wildlife Interaction

a. **Study Title: "Identification and Preliminary Evaluation of Open Space Areas Within or Adjacent to Cities That Might Provide Wildlife Habitat and Human-Wildlife Interaction"**

From the aerial photography available from study 2g, open space areas that are available to the public but have not been traditionally managed for wildlife will be identified. Cemeteries and abandoned rights-of-way will be encountered (*Whyte 1968*). The sample will include several cities within Massachusetts. The techniques will include: (1) aerial photo interpretation; (2) ground verification; (3) categorization of open space encountered by type, availability, amount, and potential for the purposes mentioned; and (4) priority ranking of these areas as to potential and research priority (table 1).

b. **Study Title: "The Evaluation and Recommendations for Management of Cemeteries as Open Space Areas Providing Wildlife Habitat and Human-Wildlife Interaction"**

We assume that cemeteries will be selected as high-priority areas under the criteria of study 2h. The cemeteries will be categorized by vegetative composition, types of management, present rating as wildlife habitat, present use by people seeking wildlife-human interaction, and development of management recommendations for wildlife habitat and for increasing human-wildlife interaction. A study plan has been prepared for this research.

c. **Study Title: "Evaluation of Techniques for Increasing Desirable Human-Wildlife Contact in Public and Other Heavily Utilized Areas"**

This study will examine the effects of standard techniques such as scheduled feeding and use of nest boxes, for squirrels and birds in

selected public areas. The management will aim directly at increasing human-wildlife interaction, and indirectly at increasing wildlife populations. The study will determine the increase in interaction, evaluate wildlife response, evaluate human response, and develop cost/benefit ratios for increased interaction or increased wildlife, or both.

d. **Study Title: "Utilization of Urban Wildlife for Educational Purposes"**

This study will be aimed at development of management procedures for the areas identified under study 3a that would enhance their usefulness for demonstration or study areas for educational purposes. Also included will be development of a series of lesson plans and attendant educational materials (films, booklets, keys, etc.) for use by teachers and students. Cemeteries, studied under 3b, would be a potential area to use as a pilot.

CLOSING COMMENTS

We consider this analysis to be a starting point for our research and in no way feel that it represents the final word on such endeavors. Pilot studies may prove routes of inquiry unfruitful, new ideas may emerge as experience accumulates, and new directions may be taken. These efforts in wildlife research for increased human pleasure in our cities are only a part of the thrust in environmental forestry—a thrust that is necessary if we are to counteract the forces poignantly expressed by Wesley Le Faivre (*1969*):

"... How far, indeed the woods seem now.
How far indeed are they.
How distant are the sullen caves:
the brooks and foot-paths lay
beneath a cold and concrete cloak;
the ponds of yesterday . . .
polluted far beyond reclaim.
And children cannot play
in woods that are no longer there . . .
in woods too far away."

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