

Position Paper:

Protection and Management of Riparian Ecosystems: Activities and Views of the U.S. Fish and Wildlife Service¹

Allan Hirsch² and Charles A. Segelquist³

Abstract.--Riparian ecosystems are vital to the continued well-being of many of the Nation's fish and wildlife resources. However, land use changes and water resource development activities are jeopardizing these valuable environments. Current activities of the Fish and Wildlife Service providing for the protection of riparian resources are described, and several initiatives are outlined to strengthen riparian ecosystem protection and management programs.

Riparian ecosystems support some of the most productive and diverse wildlife populations in the United States. They also play an important, if not essential, role in maintaining wildlife populations in adjacent uplands and in supplying energy and nutrients to riverine, lacustrine, and estuarine systems. These important riparian resources are being lost and degraded at an alarming rate throughout the country as a result of developmental activities. Inasmuch as riparian ecosystems play a critical role in maintaining fish and wildlife productivity and diversity, more vigorous efforts are needed to protect and manage these valuable resources.

IMPORTANCE OF RIPARIAN ECOSYSTEMS TO FISH AND WILDLIFE

There is no single definition of riparian ecosystem endorsed by all ecologists, but there is general agreement that these systems have certain common features. Riparian ecosystems are characterized by stream or riverside plant communities with more hydric or mesic growth habits than adjacent upland communities. They range from only a few feet in width along small western streams to several miles across along major southeastern rivers. Riparian plant communities are dependent upon high water tables or overbank flooding to meet their moisture requirements. They usually depend on overbank flooding for the deposition of substrates and nutrients necessary for regeneration, establishment, and maintenance.

The linear configuration of the riparian system, its proximity to the aquatic system, and the physical and chemical interchanges between the riparian and aquatic systems provide an astonishing number and variety of habitats that are occupied by a multitude of organisms from all trophic levels. This results in complex food webs that support some of the most productive and diverse wildlife populations of any ecosystem type.

Certain species of wildlife are restricted entirely to the riparian zone for all their life requirements, but many more are dependent on the riparian system for some critical element of their life cycle such as

¹Paper presented at the National Symposium on Strategies for Protection and Management of Floodplain Wetlands and other Riparian Ecosystems, Callaway Gardens, Georgia, December 11-13, 1978.

²Chief, Office of Biological Services, U.S. Fish and Wildlife Service, Washington, DC.

³Wildlife Ecologist, Eastern Energy and Land Use Team, U.S. Fish and Wildlife Service, Harpers Ferry, West Virginia.

food, cover, or breeding habitat. Numerous other species also make extensive use of these areas even though they are not dependent upon them.

As the riparian system interfaces with the aquatic system, it has many functional attributes that strongly influence the latter system. To a large extent, the riparian system regulates the productivity of the aquatic system by supplying organic detritus to the stream. Streamside vegetation also serves to filter sediments and other pollutants prohibiting them from entering the stream. The shading effect of riparian vegetation has a strong influence on water temperature. Roots and fallen trees provide critical habitat features for numerous species of aquatic organisms.

The ecological influence of the riparian system is not limited to the immediately adjacent aquatic system. Comprehensive research on the relationship between woodland stream productivity and adjacent forested ecosystems reveals that much of the energy and hydrocarbons in aquatic food webs originates in the forest system. Nutrients and detritus derived from riparian forests are also picked up by the flooding river and transported to the coastal estuaries where they serve a major role in maintaining productivity.

Historically, riparian ecosystems have been studied much more intensively in the arid regions of the West than in the East, and we know more about western systems. Western birds have an especially strong affinity for the vertically stratified habitat provided by riparian woodlands. Over 50 percent of all species of birds along the Verde River in Arizona depend exclusively on riparian woodlands for breeding. Many ungulates in the mountainous regions of the West winter in lowland riparian areas. Beaver depend heavily on riparian woodlands for food and construction material for lodges and dams. Although data have not been adequately summarized for all vertebrates, it is widely recognized that many other western species are dependent upon the unique set of characteristics provided by the land-water interface of the riparian ecosystem.

In the Prairie States, fringes of riparian woodland along the major rivers and their smaller tributaries provide the major, and frequently the only, source of woodland cover in these predominantly grassland or agricultural regions. In the colder latitudes riparian areas are critical sources of winter cover for non-migratory species. Pheasant populations in some northern prairie regions are closely correlated with the

availability of riparian cover. The extension of eastern species into the West is determined in large part by these fingers of riparian woodland extending along rivers and streams. Riparian zones also provide migratory or dispersion pathways for many species of wildlife. The north-south riparian zone of the James River in South Dakota is used as a migration corridor by over 160 species of waterfowl, shorebirds, songbirds, and raptors. The wild turkey is especially dependent on bottomland forests for communal roosts.

Riparian ecosystems are no less important to wildlife in the East. At least 300 species of migratory and resident birds utilize the Atchafalaya River floodplain at some time during the year. Large numbers of waterfowl use flooded bottoms for wintering areas, most from floodplain timber frequently providing the bulk of their winter diet. In Louisiana over 90 percent of the white-tailed deer are found in bottomlands even though this type makes up only 50 percent of the potential deer range in the State. The largest trophy bucks are also found in these fertile bottomland forests. There are vast numbers of reptiles and amphibians in bottomland ecosystems and many of the furbearers make frequent use of these riparian zones.

LOSSES OF RIPARIAN HABITAT

Although riparian ecosystems are still extremely important fish and wildlife habitat, exploitation and development of these systems have had serious impacts on fish and wildlife resources. Riparian zones were frequently the first areas settled by European immigrants. Rivers and fertile river valleys provided the abundance of fish, game, and other easily harvestable natural resources needed by settlers until they could bring lands into production. Rivers provided the only means of transporting large quantities of supplies and goods. Water power was harnessed to grind grain, saw wood, and accomplish other needed functions. The same fertile, alluvial soils that provided such excellent wildlife habitat also provided excellent farm lands after they were cleared of their dense forest stands, and water from the river was often used to irrigate croplands during times of drought. The major difficulty experienced from living next to the river was the frequent flooding of farms and villages; however, early settlers were willing to accept and adjust to these occasional and somewhat predictable inconveniences in order to capitalize on the many assets that derived from their location.

As development continued, people began looking for ways to enhance riverine transportation; maintain or increase water supplies for agricultural, industrial, and urban uses; and protect crops, homes, and industries from flooding. Various combinations of draining, diking, diverting, leveeing, damming, and channeling were used to accomplish these goals, but with increasing protection came additional clearing and converting of natural riparian environment to other uses.

Initially, the impacts of man's alteration activities may have actually increased the production of wildlife resources along rivers and streams by increasing habitat diversity and total production. Those species of wildlife not adapted to the often extensive climax riparian woodlands benefited from the diversity created by patchwork clearing, and agricultural crops provided a preferred food for many species of wildlife. Thus, increased abundance and diversity of wildlife was often associated with early developmental activities. However, the cumulative impact of continuous development, land use changes, overgrazing, inundation, stream channel alteration, water diversion, and other modifications of the hydrologic regime, has resulted in adverse effects on fish and wildlife habitats. Where habitat changes have been especially severe, certain species of plants and animals have become increasingly scarce, threatened, or even endangered. Of the 236 species of plants and animals on the Department of the Interior's list of threatened or endangered species, 69 are directly or indirectly dependent upon riparian ecosystems. Twelve riparian habitat areas have been designated as critical habitats.

Losses of riparian forest lands and associated wildlife have been most dramatic in the West and Midwest because of the relative scarcity of these types and the tremendous demand man has placed on the water and land resources of these regions. Along the Sacramento River in California, croplands cover over 66 percent of the terrace lands that once supported riparian forests. Conversion has been close to 100 percent beyond the flood control levee. On the Colorado River, cottonwood communities have declined from an estimated 5,000 acres to only about 500 acres as a result of changing hydrologic regimes resulting from upstream impoundments. There are still some 2,800 acres of willow-cottonwood stands along the river, but most are invaded by salt cedar, an exotic introduction of much lower value to wildlife. Overgrazing in the riparian zone of western rangelands is an extremely serious problem as attested by the "Forum - Grazing

and Riparian/Stream Ecosystems" conducted by Trout Unlimited just last month in Denver, Colorado.

Bottomland hardwoods in Missouri have declined by 96 percent. Along the lower Missouri River, at least 180,000 acres that were once part of a wide riverine floodplain have become valuable croplands as a result of constriction of the river by channelization and bank stabilization activities and changed hydrologic regimes resulting from upstream impoundment for flood control and navigation purposes. Lake Oahe alone on the upper Missouri in South Dakota has inundated 300,000 acres of land, including all riparian areas along a 200 mile reach of the river. Conversion of bottomland hardwoods to agricultural crops have exceeded 95 percent in some Mississippi delta counties in Arkansas.

Quantification of riparian ecosystem alteration has not been accomplished on a systematic basis throughout the United States, but it is probably reasonable to assume that from 70 to 90 percent of all natural riparian areas have been subjected to extensive alteration. Furthermore, alteration is continuing at a steady pace. Overgrazing and water diversions in the West, stream channel alteration in the Prairie States, urban and industrial expansion in the East, and drainage and forest land conversion in the South; all these activities and more are eating away at the few still relatively undisturbed riparian ecosystems. Nowhere is this more dramatically illustrated than in the delta hardwoods of Mississippi where bottomland woodlands were reduced by 60 percent from 1970 to 1976.

CURRENT ACTIVITIES OF THE FISH AND WILDLIFE SERVICE

Protection of riparian systems has high priority in the programs of the Fish and Wildlife Service. The Service's role in riparian protection involves three main lines of activity: land acquisition; participation in the environmental planning and regulatory process; and conduct of research, studies, and inventories. Fish and Wildlife Service involvement in riparian protection originally stemmed from the agency's responsibilities for protection and management of migratory birds, particularly waterfowl. However, as both public environmental awareness and the Service's own responsibilities have broadened, its programs have reflected concern for the full range of environmental values inherent in protecting riparian ecosystems.

Land Acquisition

The Fish and Wildlife Service has about 35 million acres in National Wildlife Refuges and Waterfowl Production Areas which it acquired under one or more of the following authorities: The Migratory Bird Conservation Act of 1929; the Migratory Bird Hunting and Conservation Stamp Act of 1937; the Wetland Loan Act of 1961; the Land and Water Conservation Fund Act; as mitigation for Federal water development projects; and other legislative provisions. Many additional thousands of acres also have been acquired by the States through the Federal Aid in Wildlife Restoration Program. Lands acquired by the Service through the Migratory Bird funds are for waterfowl breeding, migration, and wintering areas. The Land and Water Conservation Fund has been used to acquire unique ecosystems such as those supporting endangered or threatened species or having other important natural resource values.

While most of the lands currently within the National Wildlife Refuge System are not riparian ecosystems, many refuges do contain sizable quantities of riparian lands. Examples are the White River Refuge in Arkansas, the Santa Ana Refuge on the Rio Grande in Texas, the Havasu Refuge on the Colorado River in Arizona, the Columbia White-Tailed Deer Refuge on the Columbia River in Washington, and the Upper Mississippi River Wildlife Refuge. All of these are largely riparian areas that benefit many species of fish and wildlife.

Current and planned acquisitions with Migratory Bird and Land and Water Conservation Funds will include many riparian lands. As part of an accelerated waterfowl acquisition program currently underway within the Fish and Wildlife Service, major Migratory Bird Fund acquisition efforts are being initiated in key waterfowl wintering areas; a 21,000 acre tract on the upper Ouchita River in Louisiana has just recently been purchased. The Service is also currently in the process of identifying unique ecosystems for each State. Initial identification should be completed by the end of the year. From these assessments, national priorities will be established to guide the Service in its Land and Water Conservation Fund acquisitions. Many of the areas being identified by this process are riparian ecosystems, especially those in the Southeast and the Southwest. Land is presently being acquired for the Minnesota Valley Wildlife Refuge and plans are underway to acquire lands along the lower Suwannee River in Florida with Land and Water Conservation Funds.

In perhaps the most ambitious effort ever proposed by the Fish and Wildlife Service to protect valuable riparian lands threatened by development, the agency has recently advanced a proposal to acquire 443,000 acres of the lower Atchafalaya River floodplain for the purpose of flood control, fish and wildlife conservation, and public recreation. This proposal advocates the purchase of the floodplain by the Federal Government as part of a multiple purpose plan to protect existing environmental values while providing a floodway for passage of excess floodwaters from the Mississippi and Red River drainages.

The estimated purchase price of this area is \$85 million. However, the fish, wildlife, and recreational resource values of the lower Atchafalaya floodway alone are estimated to be approximately \$97 million annually. At least 300 species of birds, numerous mammals, 65 species of reptiles and amphibians, and 90 species of fish, crawfish, crabs, and shrimp occupy the floodway. When continuing values for flood protection, pollution abatement, and other natural resource functions are included, maintenance of this riparian system becomes even more important. Unless the floodway is protected and managed to sustain these resources, the Atchafalaya floodplain will be cleared and converted to agricultural crops, as have millions of acres of other Delta hardwoods.

Participation in Environmental Planning and Regulation

Even under the most favorable prospects, only a small portion of the riparian areas meriting protection will be subject to direct Federal acquisition. The majority of these areas will depend upon other means of protection from development or degradation. Thus, participation in the environmental planning and regulatory process is another important component of the Service's role in wetlands preservation.

Fish and Wildlife Coordination Act Activities

The principal authority for the Service's program in environmental planning and regulation is the Fish and Wildlife Coordination Act. Through the authority of the Act, the Service evaluates the impact of federally funded, permitted, or licensed water resource development projects and recommends measures for the mitigation and/or enhancement of fish and wildlife resources in conjunction with the development project. In response to this legislative mandate, the Service has become deeply involved in

consulting on and reviewing water and related land resource development proposals, both those which are federally financed and authorized by the Congress and those which are private and require issuance of a Federal permit or license.

These projects run the gamut from large water resource development projects constructed by the Bureau of Reclamation and Corps of Engineers to private construction of small structures such as docks and piers in navigable waters under Federal permits. Water resource projects proposed by public or private agencies which require Federal permits or licenses under the Coordination Act include construction activities in navigable waters; construction of hydroelectric power projects; fossil and nuclear-fueled power plants involving water diversion or transmission lines; discharge of pollutants; and discharge of dredged or fill material into wetlands. These actions are regulated by the U.S. Army Corps of Engineers, the U.S. Coast Guard, the Federal Energy Regulatory Commission, the Environmental Protection Agency, the Nuclear Regulatory Commission, and others. Many of these activities are prime causes of loss or modification of riparian systems, and it is through its implementation of the Coordination Act provisions that the Service has worked to prevent this.

It is important to remember that regardless of the action being taken, whether it be by Federal, other public, or private entity, and regardless of which agency ultimately issues the license or permit, the Service can only advise of the consequences to fish and wildlife and recommend measures to prevent damage, or when appropriate, to improve fish and wildlife resources. The Service has no enforcing power, except in those few cases where the proposed actions would take place on Service-administered lands. Its role under the Coordination Act is an advisory one. In the case of Federal projects proposed by the Corps of Engineers or the Bureau of Reclamation, the Service's advice, in the form of a Coordination Act Report, must be made a part of the request for project authorization and transmitted to Congress. Where permits are involved, the Service's comments are made part of the documentation reviewed by the decisionmaking official.

However, we have developed a strong, positive working relationship with various construction and regulatory agencies. Particularly since the advent of the National Environmental Policy Act, we believe that the Service's recommendations have carried increasing weight and that this advice has

been instrumental in saving thousands of acres of wetlands and riparian areas from destruction. For example, recently concluded joint SCS-FWS channelization guidelines should do much to facilitate Fish and Wildlife Service input into future small watershed projects.

These guidelines suggest methods for protecting stream and riparian ecosystem resources in small watershed management activities. Channel modification and destruction of streamside vegetation will normally be considered only as a last resort under the guidelines.

In addition to providing national policy direction, which has helped assure that the Service's views concerning Federal activities would receive greater consideration, NEPA has added an additional dimension to the Service's advisory activities. The Act covers a wide array of development projects, beyond the water projects traditionally reviewed by the Service. By participating in Department of the Interior's review and comment on impact statements, the Service is able to work with numerous other Federal agencies to advise them on ecological values and environmental protection needs.

The President's recent Executive Orders on Protection of Wetlands and Floodplain Management provide additional policy guidance to Federal agencies, which should further strengthen the importance of the Service's recommendations. These Executive Orders specifically direct Federal agencies to avoid, to the extent possible, long and short term adverse impacts associated with the destruction, occupancy, or modification of wetlands and floodplains by direct or indirect developmental activities wherever there is a practicable alternative.

Better analytical methods can also contribute to more effective consideration of habitat protection needs in project formulation. To quantify changes in fish and wildlife habitat values resulting from water resource development projects, the Fish and Wildlife Service in concerted efforts with State Game and Fish agencies, private conservation groups and other Federal agencies has developed, and is continuing to refine, Habitat Evaluation Procedures. These procedures combine habitat quality and quantity values into an index that provides decisionmakers with a method of assessing existing habitat conditions, evaluating the consequences of alternative sites and plans, and determining compensation requirements. Development of these procedures to date has focused primarily on assessing habitat values in riparian areas that will be impacted by

water resource development activities. Thus, these procedures provide an important analytical tool for dealing with riparian issues.

Another technique being developed by the Fish and Wildlife Service in cooperation with other Federal and State agencies to assess impacts of stream alteration activities on fish and wildlife is an incremental methodology for physical instream habitat evaluation. This methodology allows quantification of potential habitat available for various species of fish at different streamflow regimes with different channel configurations and slopes. Through some modifications presently being considered, the incremental methodology may be useful for quantifying effects of stream alteration activities on riparian as well as instream habitats.

Environmental Planning

Recognizing that the best way to minimize environmental impacts is through input early in the planning process, rather than after a project has been formulated, the Service has sought to increase its planning involvement in various ways. Two of these, which are particularly germane to riparian protection, will be mentioned here.

The first of these is coastal zone management. Increasingly, the Service has been assisting States in the development of their programs under the Coastal Zone Management Act by providing guidance which will preserve important fish and wildlife habitats such as those in coastal floodplains. We are also participating in the Federal review and approval process for State coastal zone management programs.

The second involves Fish and Wildlife Service participation in water quality planning through Section 208 activities of the Clean Waters Act. The development and implementation of "Best Management Practices" to control non-point sources of pollution will have a strong positive influence on riparian resources along smaller streams and tributaries in agricultural areas. Best Management Practices incorporate those soil and water conservation measures that help to keep water where it falls, restrict soil erosion, and keep sediment and chemical pollutants out of the stream. Research indicates that natural streamside vegetation can reduce sediment transport from the uplands to the stream, that nearstream vegetation will moderate water quality problems associated with temperature, and that allowing streams to maintain a natural

morphology will reduce bank erosion and suspended sediment concentrations by dissipating stream energy. Best Management Practices that incorporate the maintenance of riparian vegetation and natural stream morphology will not only reduce soil erosion and improve water quality, but will preserve and enhance fish and wildlife resources.

Endangered Species Act of 1973

The Endangered Species Act of 1973 has special importance to the planning processes of all Federal agencies. All Federal agencies are required by the Act to consult with the Fish and Wildlife Service when their activities or programs may affect endangered or threatened species or their critical habitats. Critical habitats are determined by the Service after consultation with the affected States. Once this critical habitat has been delineated, all agencies must insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of threatened or endangered species or result in the destruction or modification of this habitat. At this time there have been 34 final determinations of critical habitats, 12 of which involve riparian ecosystems. The only two plant species for which critical habitats have been designated are both located in unique riparian sand dune areas in the Sacramento-San Joaquin floodplain.

Research, Studies, and Inventories

As discussions at this Symposium have highlighted, a central aspect of any national effort must be development of information necessary for riparian protection and management. Information concerning the relative values, sensitivities and importance of various riparian areas will become even more crucial as developmental threats and pressures increase in future years. The Fish and Wildlife Service has been heavily involved in development of such information and expertise.

National Wetland Inventory

The National Wetland Inventory of the Fish and Wildlife Service is inventorying, mapping, and determining status and trends of those portions of riparian ecosystems classified as wetlands. However, some riparian areas, such as the transition zones along western streams or some areas of bottomland hardwoods in the East, have not been classified as wetlands and will not be included in the Wetland Inventory data base.

Research and Field Investigations

Research is being sponsored or conducted on many issues relating to management of riparian systems. Of particular interest to the topic of this Symposium is a program of research on the impacts of stream channelization and other alterations on stream ecosystems.

About 15 research projects are nearing completion or have recently been completed. These studies were conducted by various Fishery and Wildlife Cooperative Research Units and through contracts with universities and private consultants. Results of some of these projects have been presented at this Symposium. Studies in this program include investigation of the fish and wildlife values of national riparian ecosystems; impacts of stream alteration activities on land use changes, habitat values, and fish and wildlife populations in riparian areas; development of remote sensing techniques to monitor changes in riparian areas; dynamics of bottomland hardwood growth patterns under changing hydrologic conditions and assessments of the effects of altered stream flows on fish and wildlife in riparian ecosystems.

In addition to research studies, conducted for the purpose of increasing general understanding of riparian systems, numerous field investigations are being conducted by the Fish and Wildlife Service, often in concert with other Federal agencies, to assess the impacts of specific development projects. Field studies include investigations of riparian habitat changes on the Platte River where instream diversions are resulting in encroachment of riparian vegetation on sandbar habitats used by thousands of ducks and geese, sandhill cranes, and the endangered whooping crane as a staging area during migration. Other studies include rates and causes of riparian habitat losses on the Mississippi River as related to water resource development activities, effects of fluctuating water levels on riparian vegetation on the Columbia River, and estimates of fish and wildlife values of Atchafalaya floodplain habitats. While these and other studies are being conducted to determine site-specific solutions, usually directly in support of the Service's efforts to protect these areas under the Fish and Wildlife Coordination or Endangered Species Acts, they are also contributing greatly to our overall understanding of riparian systems.

For example, a special effort has been initiated in the Service's Southwestern Region to facilitate consideration of fish

and wildlife needs in the riparian area. A five-member Riparian Habitat Team has been formed to develop and test strategies and techniques for the protection and enhancement of riparian ecosystems. The Team has a broad background in terrestrial and aquatic ecosystems with extensive experience in Federal water project planning. The Team is currently in the process of identifying and inventorying valuable riparian resources; developing alternative strategies to supplement traditional Fish and Wildlife Service efforts to protect riparian habitats; and supporting, through contracts, efforts to develop methods for reestablishing riparian vegetation.

PROGRAMS NEEDED TO PROTECT RIPARIAN ECOSYSTEMS

Although there are no legislative authorities specifically addressing riparian ecosystems as such, there are mechanisms for achieving reasonable levels of protection through existing floodplain, wetland, coastal zone, water quality, soil and water conservation, endangered species, wild and scenic river, and other environmental legislation. Despite this protection and the multitude of State and Federal programs developed in response to these legislative mandates, natural riparian ecosystems continue to be destroyed and degraded. Among the reasons for this continuing environmental degradation are economic pressures and programs that encourage conflicting uses, lack of public awareness of the important values associated with the maintenance of healthy riparian ecosystems, and failure of governmental agencies to fully implement environmental regulations and guidelines.

It is clear that if we are to reduce future losses and protect the increasingly precious remaining riparian systems, a concerted effort must be mounted. In our judgment, that effort should include the following measures:

1. First, we must strengthen our research, surveys, and inventories to build a better information base on riparian systems and their management. This includes:
 - a. Better documentation of the multiple values of riparian ecosystems, including the contribution these systems make to flood control, pollution abatement, erosion control, streambank stabilization, waste treatment, ground water recharge, fish and wildlife productivity, recreation, and aesthetics.

- b. Identification of functional relationships of riparian systems relative to biological, chemical, and physical interaction of water, soils, plants, and animals. From the standpoint of fish and wildlife resources, it is particularly important that we obtain better information on the area, shape, and characteristics of riparian habitat necessary to support various species and populations, and the extent to which they can tolerate habitat disturbance.
 - c. Development of mitigation methods, such as improved techniques for reestablishing riparian plant communities in disturbed areas to enhance fish and wildlife values.
 - d. Identification of riparian ecosystems where particularly important fish and wildlife resource values still exist, as well as those where potential for the reestablishment of such values is high.
2. Next, we must provide information to the public, planners, and decisionmakers, to increase their awareness of riparian values. We need public recognition and support of these values equivalent to that which has developed for coastal ecosystems in recent years and has resulted in effective action to reduce coastal wetland loss. In the long run, unless the public comes to recognize and support the value of riparian ecosystems, many of these areas will continue to be lost.
3. Third, we need to work towards a more vigorous and effective mobilization of the various tools of environmental planning and regulation already available. We have been provided with many of the necessary mechanisms; now we must use them effectively. For example:
- a. The Clean Waters Act of 1977 provides major opportunities for protecting riparian systems, particularly through Sections 208 and 404 and through the implementation of Best Management Practice provisions relating to non-point sources of pollution. The Rural Clean Water Program being developed by the Department of Agriculture will have special significance to riparian problems on privately owned agricultural lands.
 - b. Effective compliance with President Carter's Executive Orders 11988 and 11990 on Floodplain Management and Protection of Wetlands issued last year will be a major step forward, with respect to Federal and federally supported projects. These orders specifically charge all Federal agencies to restore and preserve the natural and beneficial values served by floodplains and wetlands.
 - c. In June 1978, the President delivered to the Congress water policy initiatives designed to improve the efficiency in planning and management of Federal water resource programs, provide a new national emphasis on water conservation, provide more Federal-State cooperation in State water resource planning and, give more attention to environmental quality. Attention to these improvements will do much to resolve problems in riparian ecosystems. Five of the suggested initiatives have special significance to protection of riparian ecosystem values. These are:
 - a. Requiring the explicit formulation and consideration of a primarily nonstructural plan as one alternative whenever structural water projects or programs are planned.
 - b. Requiring that mitigation funds for fish and wildlife damages be provided concurrently and proportionally with construction funds.
 - c. Requiring that States and Federal agencies give special attention to protecting and managing groundwater and maintaining instream flows needed for fish and wildlife.
 - d. Requiring that the Departments of the Interior and Commerce promulgate regulations and other Federal agencies prepare formal procedures for implementing the Fish and Wildlife Coordination Act.
 - e. Requiring that the SCS give full consideration to the stream channelization guidelines in small watershed projects, insist that land

treatment measures be accelerated in conjunction with structural methods, and implement post-project monitoring to assure compliance with recommended land treatment measures.

4. Acquisition, or other special protection of especially valuable and highly threatened ecosystems will be required, including:

- a. Continued acquisition by the Fish and Wildlife Service as part of the National Wildlife Refuge System. For example, protection of important riparian areas in the arid Southwest and in southeastern bottomlands has high priority in the Service's acquisition program.
- b. Acquisition by State and private organizations, such as the Nature Conservancy and Audubon Society. In this regard, the National Heritage Program being developed by the Heritage Conservation and Recreation Service, and involving a coordinated network of State heritage programs, could be an especially valuable tool.
- c. Inclusion in the Wild and Scenic Rivers System. This is another important mechanism for protecting particularly valuable riparian habitats. Fortunately, the National Parks and Recreation Act of 1978 added 8 new rivers to the system, as well as including 17 new rivers to the study list as potential candidates.

5. In the final analysis, however, many riparian ecosystems are likely to remain in private hands where economic inducements to convert them into agricultural and other uses will be great. Existing environmental controls are generally not an effective mechanism for addressing changing land use patterns such as these. New strategies to discourage destruction of key riparian areas should be explored. These might include imaginative use of land use zoning mechanisms and various tax incentives to encourage protection.

One new approach is the Department of the Interior's Area of National Concern concept, which recognizes that there are large areas of valuable resources where the best solution to protection is to focus the combined resources and capabilities of local, State, and Federal governments and the private sector in developing a long-term comprehensive management plan for natural resource protection and enhancement. Two criteria are involved in the Area of National Concern approach:

- a. That the resource involved is of sufficient national concern to merit some Federal participation beyond that of the Land and Water Conservation Fund program; and
- b. That the resource, even though it has intrinsic national quality, should not be included in the traditional park, forest, or refuge systems due to excessive cost of purchasing the vast amount of land necessary to protect the values of the area, management considerations, or other factors.

The idea is to avoid Federal acquisition and to exploit existing local, State, and Federal protection tools and incentives wherever possible. This concept is first being applied in New Jersey's Pinelands and might well be applied to other systems in the future.

In outlining the above program of action, we have not limited ourselves to responsibilities of the Fish and wildlife Service. On the contrary, we recognize that our agency alone can only do a small part of the job. However, in working with the National Park Service and the many other agencies and organizations which co-sponsored this Symposium, we in the Fish and Wildlife Service were encouraged by the tremendous interest and support expressed for protection of riparian ecosystems.

Hopefully, the spirit of cooperation that has made this Symposium possible will carry over into the development of inter-agency strategies for addressing land and water resource needs that maintain, as far as possible, the functional integrity of riparian systems.