

# Integrating Early-successional Wildlife and Habitats into North Carolina's 21st Century Landscape

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*Abstract:* Small game populations, including northern bobwhite, have shown precipitous declines in North Carolina. To address these declines and trends in habitat loss, the North Carolina Wildlife Resources Commission implemented the Cooperative Upland habitat Restoration and Enhancement (CURE) program in August 2000. The CURE program has 6 objectives related directly to habitat enhancement. This is a cooperative, multi-phase project, the success of which depends upon collaboration with numerous private landowners and other agencies and organizations. The CURE program has been designed to minimize expense to landowners while maximizing habitat quality and quantity in specific geographical areas. As we enter the 21st Century, the CURE program is the Commission's attempt to address declines in small game.

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In North Carolina, and most of the Southeast, the suite of wildlife species commonly referred to as small game includes northern bobwhite (*Colinus virginianus* hereafter quail), rabbits (*Sylvilagus* spp.), squirrels (*Sciurus* spp.) and ruffed grouse (*Bonasa umbellus*). In North Carolina, the most precipitous declines in small game have been in quail populations. Based on the current status of quail populations in North Carolina, and because specific causes of changes in small game populations and management required to maintain high and stable populations varies by species, the North Carolina Wildlife Resources Commission (hereafter Commission) is currently focusing small game research and management efforts on bobwhite quail. However, this approach does not obviate the need to subsequently address other species such as grouse. While in the review of small game management issues and current Commission programs we address specific issues and management related to quail, we also address issues and approaches of a more general nature (e.g., revision

of technical guidance and incentive programs) to improve management of all wildlife, including small game species, and habitats upon which they depend.

## **Quail Management Issues**

### **Population Status**

Historically, quail were an established component of the longleaf pine (*Pinus palustris*) ecosystem that dominated the southeastern Coastal Plain and rarely occurred in other physiographic regions (Lawson 1709). However, early pioneer settlements and subsequent expansion of agriculture created ideal quail habitat throughout the Southeast (Judd 1905) and quail populations generally expanded and remained high through this period of early agricultural development (Mahan 1995).

As early as the 1930s, however, declines in quail populations were documented throughout the species' range (Stoddard 1931). Quail also have exhibited long-term declines in most of the 28 states originally supporting significant populations (Goodrum 1949, Peterjohn and Sauer 1993). Overall, bobwhite quail have declined more than 60% since 1966 (McKenzie and Riley 1995). McKenzie and Riley (1995) suggested that at the current rate of decline, quail populations will be unhuntable in 10 years and could vanish in 15 years. Based on data from annual Breeding Bird Surveys (BBS), quail populations in North Carolina declined by 3.6% per year from the mid-1960s through 1980 and by 6.2% per year from 1982–1991 (Peterjohn and Sauer 1993).

Numerous theories have been proposed and investigated to explain declines in quail populations. Declines are believed to be primarily associated with deteriorating quantity and quality of habitat resulting from increased human population growth and associated changes in land-use patterns, impacts of herbicides and pesticides on quail habitats and food availability, cleaner and more mechanized farming practices, increasing size and monotypic nature of farming operations, collapse of the tenant farming system, and national trend toward a serviced-based economy, intensified timber production, restricted use of prescribed fire, and declines in quail food availability (Droege and Sauer 1990, Brennan 1991, Church and Taylor 1992, Church et al. 1993, McKenzie and Riley 1995, Guthery 1997). The role of mammalian and avian predation on quail has been investigated, but cause/effect relationships between predation and declines in quail populations have yet to be demonstrated. These, and possibly other, interrelated factors impact quail populations locally. We believe, however, that the major factor responsible for the decline of quail populations throughout the species' range is declines in habitat quality and availability across the landscape.

### **Changes in Habitat Quantity and Quality**

*Agricultural Habitats.*—In 1931, >3.1 million people lived in North Carolina. By 1997, the population increased to >7.4 million (U.S. Census Bur. 1997). Many in the state's now burgeoning population live on former farmland. From 1950 to 1992,

the number of North Carolina farms decreased from approximately 201,000 to 51,854. Similarly, total area in farmland decreased from >8.4 million ha in 1950 to approximately 3.5 million ha in 1992. North Carolina has been losing an estimated 2,000 farms per year, decreasing in number 72.4% from 1959 to 1992. While number of farms and total area in farmland has decreased, the average size of farms in North Carolina increased from 32.7 ha in 1959 to 67.7 ha by 1992 (U.S. Dep. Commerce 1992).

From 1958 to 1977, cropland acreage in North Carolina decreased 19.3% from approximately 3 million to 2.4 million ha. During the same period, pastureland area increased by 30% from approximately 0.6 million to 0.8 million ha, urban land increased 130% from 0.3 to >0.7 million ha, and forestland acreage decreased 8.4%. These changes have been most dramatic in the Piedmont region (U.S. Dep. Agric. 1978). From 1982–1992, North Carolina ranked third among all states in amount of rural acreage converted to urban uses, with total conversion of 0.3 million ha. From 1992–1997, North Carolina ranked fifth among all states in the amount of rural acreage converted to urban uses, with total conversion of 0.28 million ha (U.S. Dep. Agric. 1997).

North Carolina Department of Agriculture Statistics for the period 1949–1998 indicate significant changes in the types of agricultural habitats across the landscape. In 1949, 183,586 ha of lespedeza hay, 54,529 ha of soybean/cowpea hay, 41,424 ha of small grain hay, and 90,771 ha of “other” hay were harvested. By 1965, hay production had decreased to 35,359 ha of lespedeza hay, 30,466 ha of soybean/cowpea hay, 17,741 ha of small grain hay, and 88,545 ha of other hay. Coastal Bermuda hay came into production in 1969 with 7,516 ha harvested. By 1998, hay harvests were reported as 9,842 ha of alfalfa and 202,756 ha of other hay (N.C. Dep. Agric. 1998). Of the other hay category, most was fescue hay which over time has replaced orchard grass/clover hay previously comprising most of the other hay category. Potential impacts of the long-term loss in annual availability of >0.28 million ha of soybean/cowpea, small grain, and lespedeza hay habitats on bobwhite quail populations are significant.

Since 1949, the area in idle farmland (i.e., areas where no crops were harvested or that were not grazed) in North Carolina has shown an overall decreasing trend from >0.67 million ha to approximately 0.16 million ha in 2000. Idle acres of farmland and quail harvest (used here as an index to population level) are significantly correlated ( $P < 0.05$ ). As the number of idle acres has fluctuated—generally decreased—quail populations have followed a similar patten (Commission, unpubl. data).

These daunting agricultural statistics clearly demonstrate that changes in our farm landscapes have resulted in loss and reduced quality of millions of hectares of valuable quail habitats that one occurred on agricultural lands across North Carolina.

*Forested Habitats.*—Relative to quail populations and habitats, changes on forested lands are less severe than those that have occurred on agricultural lands. Since 1952, there have been no major changes in forest ownership or type that would significantly impact quail (Alig et al. 1990). Industrial timber companies own ap-

proximately 14% of timberlands in North Carolina with the remaining 86% in non-industrial, private, state, and federal ownership (Brown 1993). From 1974 to 1984, >0.1 million ha of timberland in the Northern Coastal Plain were diverted to other uses. Since 1984, the area of timberland in this region has stabilized at approximately 1.5 million ha (Thompson 1990). In the Southern Coastal Plain from 1974 to 1984, 46,456 ha of timberland were diverted to other uses, with 50% of this acreage being cleared for urban development; since 1984 losses in this region have been less than 1% (Johnson 1990). In the Mountain Region, timberland acreage has remained nearly static since 1974, with <1% decreases from 1984–1990 (Johnson 1991). In the Piedmont from 1974 to 1984, 71,653 ha of timberlands were diverted to other uses, including urban development and agriculture (Brown 1991).

Although ownership and forest type have changed little, some important changes in availability and quality of forested habitats have occurred. Habitat quality and availability are equally important. Prior to passage of the 1985 Farm Bill, most abandoned agriculture fields and harvested forests naturally seeded to pines. Since 1985 and partially as a result of Farm Bill programs, many abandoned agricultural fields on private land and most areas from which timber was harvested in the southeastern United States have been mechanically planted (Brown 1993), primarily for timber production. Naturally seeded pine habitats provide fair to good early succession quail habitat for a period of up to 10–20 years, depending on inherent site fertility. Pine plantations usually reach canopy closure in 3 to 5 years. Industrial timber production has moved to more intense silvicultural techniques and shorter pine rotations. Consequently, there are more frequent disturbances to the forest and soil and more frequent cutting and re-planting; all of which could benefit quail. However, quail production on tracts intended for commercial timber production requires specifically directed quail management. Such activities are often not included in site management plans that focus on timber production. Additionally, the significant reduction in incidence and extent of wild fires and use of prescribed burning over the past 20 years have negatively impacted quail management. Overall, the availability and quality of forested habitats for quail has decreased significantly across North Carolina.

### Economics

*Incentives.*—There is a litany of economic incentive programs to promote soil, water, forest, or wildlife conservation in North Carolina. Most of these programs are funded or administered by the federal government, including the Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), Environmental Quality Incentive Program (EQIP), Forestry Incentive Program (FIP), Wetland Reserve Program (WRP), Wildlife Habitat Improvement Program (WHIP), and Stewardship Incentive Program (SIP). Programs funded or administered by state government include the North Carolina Agricultural Cost Share Program (NCACSP), North Carolina Wildlife Partners Program, North Carolina Wetlands Restoration Program, and Forestry Development Program. In general, all these programs provide cost shares to landowners who enroll, and directly or indirectly impact

wildlife habitat. The CRP, CREP, WRP, SIP, WHIP, and NCASCP provide avenues for landowners to directly improve and manage grassland and early successional herbaceous habitats. However, benefits of these programs for quail management have only been realized and used by few landowners. Impacts of these programs on quail management across North Carolina have been limited by administrative complications of individual programs, varying levels of annual funding, and the common priority of landowners to manage for other species or resources (e.g., timber).

*Disincentives.*—As currently structured, North Carolina tax codes serve as significant disincentives for managing wildlife habitat. Impacts of current tax structures on a landowner's ability to derive economic benefits from wildlife habitat management vary. However, impacts from statutes governing the North Carolina Use Value Assessment Program, sales taxes on agricultural equipment, and estate taxes are most significant. Laws regulating the Use Value Assessment Program include N.C.G.S. § 105-160A-49(f), § 105-277.2 through § 105-277.7, § 105-289(a)(5) and (6), § 105-296(j), and § 106A-37(f). Under the Use Value Assessment Program, owners of property in agricultural, horticultural, or forest production are taxed on the basis of the value of the property for that use (versus a higher assessment based on fair market value). To assist in determining present use value, the county tax assessor uses a manual of expected net income prepared by the Department of Revenue. The difference in the Use Value Assessment and Fair Market Value Assessment tax assessments for an individual property is carried forward as deferred taxes. These deferred taxes for the last 3 years of participation in the program, plus interest, become due if land fails to meet any condition or requirement for classification. Therefore, there is a significant incentive for landowners to maintain their properties in agricultural, horticultural, or forest production.

With the exception of property enrolled in the CRP, there is no property classification that includes acreage managed solely as wildlife habitat. Therefore, landowners that manage their property solely as wildlife habitat are assessed taxes based on fair market value. This provides a financial incentive for rural landowners to place and maintain as much property as possible in some form of economic production and provides a disincentive for landowners currently enrolled in the Use Value Assessment Program to establish or maintain wildlife habitat.

Therefore, for a landowner to convert property in agricultural, horticultural, or forest production to wildlife habitat, he/she must accept quadruple economic disincentives (Sawyer 2000). First, they must give up existing or potential income received from other uses. They must pay for establishment and management of the habitat (i.e., clearing, herbicide treatment, cultivation, seed, fertilizer, establishment of fire lines, planting, etc.). Annual tax payments are based on fair market value of the property. And, finally, the landowner must pay the rollback (deferred taxed for 3 years prior to conversion plus interest) on all converted acres. Sawyer (2000) referred to these collective disincentives as North Carolina's "quail tax."

### Big Game Boom/Small Game Bust

Populations of big game species, black bear (*Ursus americanus*), wild turkey (*Meleagris gallopavo*), and white-tailed deer (*Odocoileus virginianus*), declined in North Carolina in the early 1900s because of widespread habitat alteration and over-hunting. To reverse these trends, aggressive management programs such as the cooperative deer and turkey restoration and black bear sanctuary programs, were initiated. Additionally, landscape changes in habitats across North Carolina have generally favored big game species. Over-harvest of bears, turkeys, and deer is no longer a concern because of increased interest by sportsmen and landowners and regulation by the Commission (Cobb 1999). As a result of these efforts, big game populations in North Carolina are high and generally increasing.

Commission staff are often asked why they simply cannot replicate previous big game management efforts (e.g., turkey restoration) toward small game management and, in so doing, see the same results. For a number of reasons, this approach likely would not result in increased or recovered small game populations.

Beginning in 1948 with the Cooperative Farm Game Habitat Development Project (Hazel and Hankla 1958), Commission biologists have initiated numerous projects designed to reverse declining trends in small game, including quail. While these efforts have resulted in some localized progress, they have not been successful in arresting population declines or restoring quail populations across North Carolina.

We believe that the previous inability to reverse statewide trends in small game is primarily due to objectives that have been inconsistent with the jurisdictional authority of the Commission. Efforts such as the deer and turkey restoration project, black bear sanctuary system, and big game harvest management have all been critical contributors to the current status of big game populations. These efforts have been achievable under the jurisdictional (i.e., regulatory) authority of the Commission, have been successful because significant statewide changes in land use patterns (as cited above) have favored these species, and have required relatively little direct habitat management by Commission biologists on private lands.

In general, however, quail, unlike big game, were historically an artifact of low-intensity agricultural ecosystems. Over-harvest is not a significant problem for quail and landscape-scale degradation of quail habitat (as cited above) continues. Habitat degradation has continued in large part because the Commission does not have statewide jurisdiction to regulate land use. The Commission simply does not have the ability to change factors most significantly impacting quail populations, namely increasing human population growth, urbanization, large-scale and monotypic agriculture, and land use conversions. However, the Commission could regulate quail harvest if needed, manage for quail and other small game on Game Lands, create or modify existing incentive programs, and provide increased technical assistance in a variety of forms to interested private landowners. Recommended management efforts focus on these approaches, especially as they pertain to management on private lands (Cobb 1999).

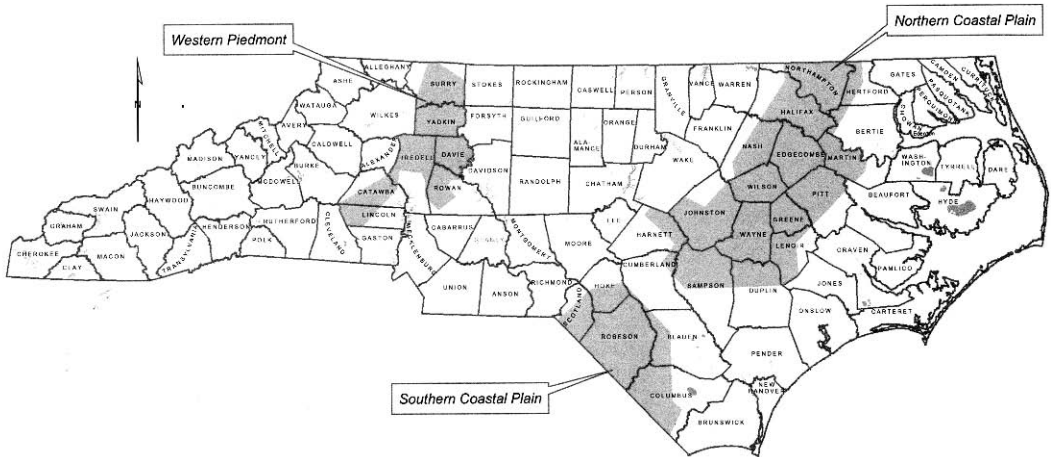
## Objectives

In August 2000, the Commission approved and funded a new small game management program. This program was named the Cooperative Upland habitat Restoration and Enhancement (CURE) program, with initial Commission funding of \$1 million. The Commission approved implementation of the CURE program with a complete program evaluation after 5 years and guaranteed funding of \$3.41 million for the 5-year pilot phase. Funding provided 8 new biologists assigned to the program, and the Division of Wildlife Management was reorganized to allow for increased emphasis on private lands wildlife management in general, and the CURE program specifically. The CURE program has 6 objectives related directly to habitat enhancement:

- 1.) Identify specific geographical areas (i.e., focal areas) in the state where potential to improve quail habitats and the populations on private lands are greatest, and concentrate resources and target programs into those geographical areas,
- 2.) Develop an outreach program to proactively promote small game management in the established focal areas,
- 3.) Develop a system of small game cooperatives to enable private landowners to effectively manage for quail and other small game,
- 4.) Evaluate and propose revisions to North Carolina tax codes,
- 5.) Inventory existing game lands to identify tracts on which active quail management can be expanded or implemented, and
- 6.) Establish Commission funding for small game management and habitat cost-share programs.

## Implementation

The CURE program is being implemented as a cooperative, multiphase project on private lands, Commission-owned game lands, and lands owned by private corporations. Efforts to design the program were influenced by and benefited from input regarding quail management issues in the Southeast from numerous individuals and organizations. Burger (2002) provided a summary of these issues and current quail management programs in other southeastern states. In addition to the Commission, current CURE program cooperators include: 44 private landowners and farmers, Quail Unlimited (national, North Carolina Council, and Hunting Creek Chapter), the Natural Resources Conservation Service, National Fish and Wildlife Foundation, Wildlife Conservation and Restoration Program, North Carolina State University, North Carolina Department of Transportation, the North Carolina Wildlife Federation, and 1 private corporation. By the very nature of the program, additional cooperators are routinely recruited and number of tracts and landowners expands. The CURE program is being implemented in phases based on 3 general types of land management: private lands, state-owned game land, and industrial forestlands. Although this is the general approach, there is considerable overlap in some cases.



**Figure 1.** North Carolina Wildlife Resources Commission Cooperative Upland habitat Restoration and Enhancement (CURE) program focal areas, 2000–2005.

While the CURE program was designed and implemented prior to initiation of the North Bobwhite Conservation Initiative (NBCI; Dimmick et al. 2002), it is a substantial beginning to implementation of habitat restoration objectives in the NBCI in North Carolina.

The CURE program is based upon the tenet that statewide “restoration” of small game, including quail, populations in North Carolina is not feasible. Too many factors outside of the Commission’s purview negatively impact small game habitats. A primary element of the CURE program is the establishment of geographical areas (i.e., focal areas) where current quail population status, land-use patterns, and landowner interest is sufficient for Commission efforts to positively impact quail management. Hazel et al. (1955) referred to this approach as “the saturation idea.” Under this concept, Commission staff developed a landscape suitability model for quail from remotely-sensed satellite imagery to identify focal areas where the potential to enhance quail habitat and populations were greatest (Howell et al. 2002). One focal area was located in the western Piedmont and 2 focal areas were located in the Coastal Plain (Fig. 1).

When wildlife management objectives are counter to prevailing economic, social, and political perspectives about land use, our greatest challenge is education. As stated, one of the primary habitat issues for quail management is habitat quality and quantity. Good or expansive early successional habitats needed to support quail populations in North Carolina are not in vogue across most of the state. So success of the CURE program is dependent upon successful outreach educating the public on the



benefits of early successional habitats to a multitude of wildlife species and the various approaches to incorporate early successional habitat management into other land use practices. A wildlife extension biologist was hired to improve and expand education and outreach efforts to individuals and organizations involved directly in the CURE program and statewide regarding management of early successional habitats and associated wildlife of all species.

The core operational concept of the CURE program is the establishment of private land cooperatives. The Commission had previously attempted to impact small game habitats and populations by working with individual landowners on a case-by-case basis.

Using this approach, population objectives were not met. Aldo Leopold first expounded the cooperative approach in 1934 (Flader and Callicott 1991, Callicott and Freyfogle 1999). Somewhat different from Leopold's approach, the Commission's goal of the cooperative approach is to pull together singly or in aggregate landowners with areas of  $\geq 2,025$  ha to provide effective quail management units. The original objective for the private land cooperatives was to secure landowners sufficient to provide  $\geq 2,025$  contiguous ha of potential habitat. This objective has been met on all cooperatives. Commission-supported and other cost-share monies and technical assistance from Commission staff are utilized to implement quail management. Efforts focus on providing resources and assistance needed to make management successful while enfranchising the landowner to have certain management latitudes. As a key element of the program, a comprehensive and Commission-approved management plan is required.

Revision of the North Carolina tax code to provide private landowners a long-term economic incentive to manage for wildlife habitats, including early successional habitats, would be one of the greatest wildlife management accomplishments at the state level as we enter the 21st Century. But, revision of tax codes is politically contentious at the county and state level and is viewed negatively by others who already are benefited from the current tax code (e.g. forestry, horticulture, and agricultural interests). A bill was introduced into the 2001 North Carolina legislative session to include wildlife habitat management as a qualifying activity in the North Carolina Use Value Assessment Program. That bill was revised and finally referred to a legislative study committee for further review and action. Because North Carolina is currently addressing a  $> \$1$  billion budget deficit, there is little likelihood of this measure receiving serious consideration in the 2002 Session. Commission staff will, however, continue to pursue this important conservation goal.

There are significant opportunities to enhance and expand early successional habitat and small game management on Commission-owned game lands. Plans for intensified small game management have prepared for the Sandhills, Suggs Mill Pond, Caswell, and South Mountain game lands. Thereby, Commission implemented small game management will further goals of the CURE program by providing at least 4 additional tracts whereon management of early successional habitats and associated wildlife is a priority. Although large-scale success of small game management efforts in North Carolina depends upon implementation on private lands, man-

agement on game lands has many benefits not realized elsewhere. Management implemented on game lands is under direct control of the Commission, can focus more intently on small game management, and have a more stable longevity. Unlike efforts on private lands, small game work on game lands is predominately forest management. Small game work on private lands is predominately management of agricultural fields and openings.

Another key element of the CURE program is new and innovative ways to fund habitat management on private lands. The Commission objective in establishing funding options was to develop multiple flexible approaches so that at least one would be applicable to almost any situation. In addition, we developed approaches that minimize the actual expense, either permanent or up-front expenses, to the landowner. Commission philosophy was that if the Commission could develop approaches to create opportunities to implement habitat management at little or no cost to the landowners, acceptance of the program would be significantly heightened.

CURE program grants are provided to landowners for practices in 4 broad categories: crop land rental, plantings, vegetation control, and fencing. Cropland rental may be for field borders or portions of fields, irrigated fields, pasture, one-time cropland conversion payments, or conservation tillage incentives. Grants for planting may include native warm season grasses (NWSG) in cropland or new ground, NWSG where sod must be killed (e.g., fescue pasture), or annual herbaceous plantings. Grants may be provided for vegetation control including chemical and/or mechanical control of woody vegetation, chemical and/or mechanical control of herbaceous vegetation, non-commercial woodland thinning, land clearing, shearing, drum chopping, disking, hand thinning, mowing, establishment of fire lines, prescribed burning, and/or establishment of forest openings. Fencing grants may be for 4-strand barbed wire, 3-strand electric wire, and/or gates. Rates for these practices vary between cooperative location and, as applicable, are based on soil types, current NRCS rates, and/or length of the cooperative agreement between the Commission and the private landowner. For example, land rental rates are based on soil type and are the current NRCS Conservation Reserve Program (CRP) rental rate \* 2 for annual rental or the NRCS CRP rental rate \* 2.25 for landowners who sign a 4-year contract.

In addition to Commission funding for habitat management practices, Commission staff works cooperatively with the NRCS to maximize benefits of programs provided by both agencies. The NRCS Wildlife Habitat Improvement Program (WHIP) is providing significant funding for many practices, especially in the Western Piedmont Focal Area. In addition, working with Quail Unlimited, the Commission has developed a program to provide up-front funding for the landowner portion of NRCS cost-share projects. Using this approach, cost to the landowner is minimized and habitat establishment is maximized.

To be truly successful restoring quail and associated wildlife and their habitats, the Commission and other cooperators must all do more than just address the biology of the species and its habitats. Commission efforts must develop inroads into land use planning processes, and develop and demonstrate the compatibility, and economic and social feasibility of early successional habitat management in the broad con-

text of our 21st Century landscape. Identifying and satisfying common biological, economic, and sociological objectives must become standard. Otherwise we will be relegated to artifacts of our 21st Century landscape . . . artifacts which typically do not include quail. These actions do not just fall into the realm of biologists, managers, and administrators. Everyone and every group sharing these objectives must contribute. As we enter the 21st Century, the CURE program is the Commission's effort to turn these goals into realities.

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