

Watershed Restoration Plan for the White Oak River Basin



2001



EXECUTIVE SUMMARY

This document, prepared by the North Carolina Wetlands Restoration Program (NCWRP), presents a description of Targeted Local Watersheds within the White Oak River Basin. It is the first update since the original Basinwide Wetlands and Riparian Restoration Plan for the White Oak River Basin was released in 1998. This plan provides more detailed descriptions of the areas of interest, the Targeted Local Watersheds, than the preceding document. NCWRP targets local watersheds based on their need and opportunity for stream, wetland and riparian buffer restoration. The NCWRP Watershed Restoration Plans are developed for each of the 17 major river basins in the State, and they are intended as companion documents to the N.C. Division of Water Quality's Basinwide Water Quality Plans -- both of these documents are updated on a 5-year planning cycle for each of the river basins in North Carolina.

The watershed approach infers that water quality improvements are likely to have more pronounced and longer lasting effects if assessments and restoration efforts are focused on the local watershed level as opposed to discrete and isolated stream segments or wetland areas within the basin. The NCWRP hopes that other agencies, groups and local governments will use the information in this document when identifying and locating water quality improvement projects. By coordinating project implementation in watersheds with significant restoration need, organizations with similar goals can generate a greater positive ecological impact on North Carolina's aquatic resources.

This document is complemented by the *Guide to NCWRP's Watershed Restoration Planning Strategy (Version 1)*, which provides general information pertaining to program goals and plan methodology [available at the NCWRP website: <http://h2o.enr.state.nc.us/wrp/>]. Information relating to White Oak River Basin restoration goals and basin-specific resource assessments are contained within this Watershed Restoration Plan. In general, this document provides an overview of the White Oak River Basin and component Subbasins within which Targeted Local Watersheds have been selected. Then each Targeted Local Watershed is described and reasons for its selection are given.

Section 2 provides an overview of the basin and includes a map of the White Oak River Basin with county boundaries and major municipalities. Section 2 also contains habitat information, permitted wetlands losses and Division of Water Quality Use Support Ratings.

Section 3 outlines basin-specific restoration goals and provides a brief discussion of the Targeted Local Watershed selection process. Figure 3.1 shows the White Oak River Basin with the 12 Targeted Local Watersheds highlighted. This section also provides information regarding the stakeholder process that was a valuable part of the development of this plan, as public input was solicited and weighed heavily in the selection of Targeted Local Watersheds.

The Targeted Local Watersheds are described in Section 4. Maps of each Targeted Local Watershed follow the text describing the watersheds within a given Subbasin. *[Not all Subbasins will necessarily contain Targeted Local Watersheds.]* NCWRP selected these watersheds based on their need for water quality and habitat improvement, and on the merit of potential stream, riparian buffer, and wetlands restoration opportunities in that watershed.

Section 5 contains contact information for several water quality programs and initiatives taking place within the White Oak River Basin, organized by federal, state, and local programs.

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SECTION 1: INTRODUCTION

Purpose and Background of the NC Wetlands Restoration Program

Recognizing the value of wetlands and riparian areas for maintaining water quality, storing floodwaters, providing fish and wildlife habitat, and performing other valuable functions, the North Carolina General Assembly established the North Carolina Wetlands Restoration Program (NCWRP) in 1996. The purpose of the NCWRP is to restore, enhance, preserve and create wetlands, stream and riparian buffer areas throughout North Carolina's seventeen major river basins (G.S. 143-214.9). The goals of the program are:

- To protect and improve water quality by restoring wetland and stream functions and values lost through historic, current and future permitted impacts.
- To achieve a net increase in wetlands acres, functions, and values in all of North Carolina's major river basins.
- To promote a comprehensive approach for protecting natural resources.
- To provide a consistent approach to addressing wetland and stream mitigation requirements associated with wetland regulations, and to increase the ecological effectiveness of mitigation projects.

Purpose of Watershed Restoration Plans

To accomplish the goals described above, the NCWRP develops Watershed Restoration Plans to focus planning and implementation of restoration activities within each of the 17 major river basins. These plans provide information on areas in the state that the NCWRP has determined are a priority for restoration efforts. The NCWRP uses the Watershed Restoration Plans to target degraded wetland and riparian areas which, if restored, could contribute significantly to the goal of protecting and enhancing local watershed functions.

The purpose of this document is to communicate to interested parties and individuals specific areas in the White Oak River Basin where the NCWRP will consider implementing restoration projects. This document also provides justification for those choices. It is intended to complement two other NC Division of Water Quality (DWQ) documents: 1) the White Oak River Basinwide Water Quality Plan (2001), and 2) the Guide to the NCWRP's Watershed Restoration Planning Strategy (Version 1).

One purpose for communicating the specific watersheds where the NCWRP intends to focus its projects is to encourage other groups and organizations to consider implementing projects in these areas also. The NCWRP believes that multiple restoration projects concentrated within a local watershed will result in greater benefits to water quality and other important watershed functions.

Application of Geographic Information Systems (GIS)

In order to target areas of focus, the NCWRP relies heavily on geographic data. With a variety of habitat and water quality data available digitally, NCWRP staff can view a variety of information about river basins, subbasins and local watersheds to evaluate watersheds for

restoration need and opportunity. The data used by NCWRP for this analysis include the following: water quality data (use support ratings and surface water quality classifications); resource information (location of streams, wetlands, important aquatic habitats, state and national forests or wilderness areas, and significant natural heritage sites); and basic location references (such as municipalities, roads and county boundaries). In river basins which encompass coastal counties, the GIS data evaluation also includes a consideration of mapped areas identified by the NC Division of Coastal Management [DCM] as containing potential wetland restoration sites.

As a component of the Watershed Restoration Plans, the NCWRP develops GIS-based maps to communicate NCWRP priority areas for restoration projects. Each restoration plan includes maps of the river basin, component subbasins, and Targeted Local Watersheds. To reduce printing costs, most of these maps are black and white. However, color maps are provided through the NCWRP web site [<http://h2o.enr.state.nc.us/wrp/>] for anyone interested in referencing more thorough and detailed geographic information on NCWRP targeted watersheds.

To evaluate watershed conditions, the NCWRP assesses multiple data and information sources describing the location and condition of natural resources. The information described in Sections 2 through 4 was compiled from a number of existing sources including DWQ's Basinwide Water Quality Plans, DWQ's Basinwide Assessment Reports, the Natural Heritage Program's Rare Plant and Animal Lists, information and recommendations received from local resource professionals and other interested parties in the basin, and the GIS data coverages noted above. A more detailed discussion of the types of information evaluated by the NCWRP is included in Section 2 of the Guide to NCWRP's Watershed Restoration Planning Strategy.

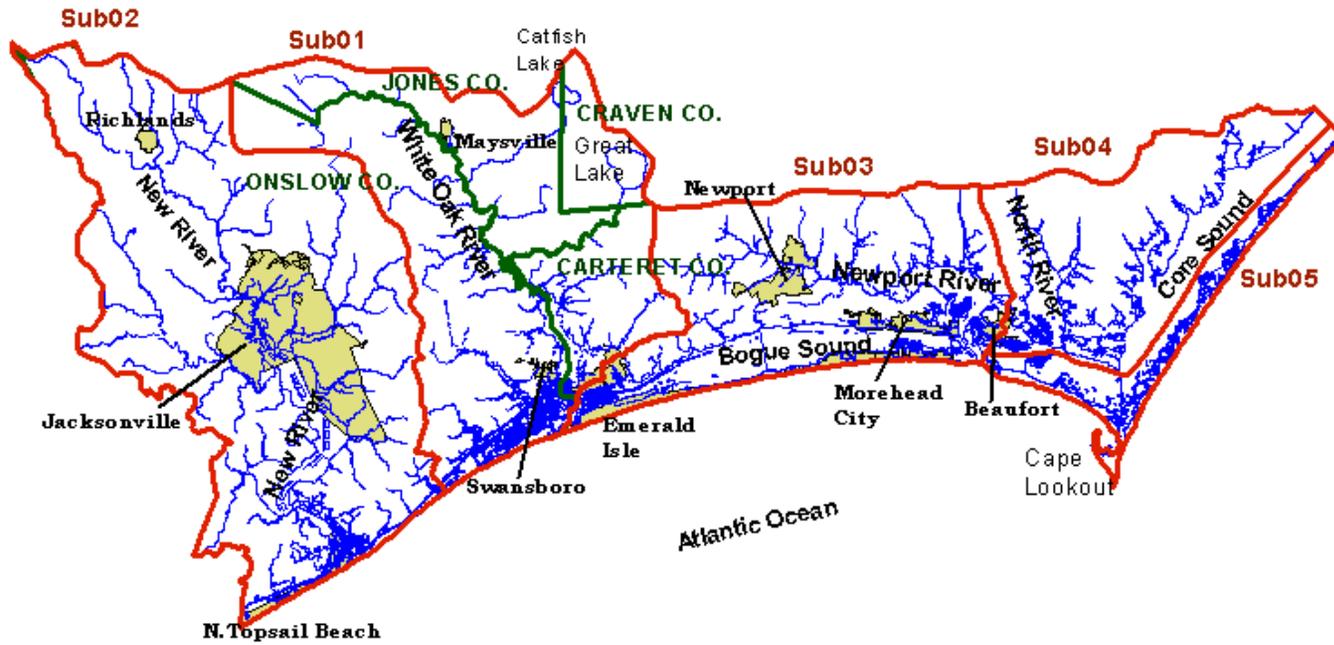
SECTION 2: OVERVIEW OF THE WHITE OAK RIVER BASIN

The White Oak River Basin covers much of Onslow and Carteret Counties as well as small portions of Craven and Jones Counties. The basin encompasses a 1,264-square mile watershed area which includes the drainages of four separate river systems: the New River and its tributaries in the southwestern section; the White Oak River and its tributaries; the Newport River and its tributaries; and the North River in the eastern section. The basin also includes Bogue and Core Sounds. Large portions of the basin are publicly owned areas such as the Croatan National Forest adjacent to the White Oak River, Hoffman State Forest, and Camp Lejeune Military Reservation on the New River.

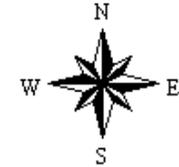
The 1990 population for the White Oak basin was approximately 150,000, with over 75% of this total residing in Onslow County. Jacksonville [in Subbasin 02] is by far the most populous and fastest growing of the 16 municipalities located in the basin, with a current population of over 66,000. Other municipalities in the White Oak basin -- with populations between 3,000 and 8,000 -- are Beaufort, Emerald Isle, Morehead City, and Newport. The 1990 population density in the basin was 141 persons per square mile, exclusive of Subbasin 05 which is sparsely populated National Seashore lands. The most densely populated areas of the Basin are Jacksonville and Camp Lejeune on the New River, and Morehead City and Beaufort on Bogue Sound and the Newport River]. The basin is expected to see a 26% increase in population from 1998 to 2015 [DWQ, 2001].

The NC Division of Water Quality [DWQ] subdivides each of the 17 major river basins in the state into component subbasins, which are designated with 6-digit codes. The White Oak River Basin consists of 5 such subbasins, designated 03-05-01 [Subbasin 01] to 03-05-05 [Subbasin 05]. The basin includes 417 miles of streams, over 130,000 acres of estuarine waters [including over 60,000 acres of Outstanding Resource Waters in Bogue and Core Sounds], and 91 miles of Atlantic Coastline [DWQ, 2001].

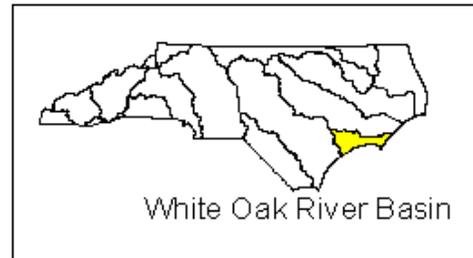
Figure 2.1 presents a general map of the White Oak River Basin with major rivers, municipalities, county boundaries, and subbasin boundaries depicted.



**Figure 2.1
White Oak River
Basin --
Counties,
Municipalities &
Major Hydrography**



- Subbasin Boundaries
- County Boundaries
- Major Hydrography
- Municipal Boundaries



This map was produced on 8/21/01 by the North Carolina Division of Water Quality Wetlands Restoration Program. Data was provided by the North Carolina Center for Geographic Information and Analysis.

The map is based on:
 Projection: Stateplane
 Zone: 4901
 Datum: NAD83
 Spheroid: GRS1980
 Units: Meters

Sensitive Species and Habitat Information

Wetland Communities

The White Oak River Basin is within the Outer Coastal Plain physiographic province of the state. The basin contains numerous estuarine wetland communities, including Salt Marsh, Brackish Marsh and Estuarine Fringe Loblolly Pine Forest. The basin also contains high-quality examples of Tidal Freshwater Marsh and Pine Savanna wetland types.

The basin is noted for its extensive pocosin wetlands (Natural Heritage Program, 1998), including many thousands of acres in Croatan National Forest and Hoffman State Forest, including the Catfish Lake and Great Lake Wilderness areas. Pocosins are typically located along interstream divides and are marked by dense thickets of shrubs and vines, and by thick peaty soils. In some areas of the White Oak basin they occur as bay forests [or "tall pocosins"] dominated by pond pine. Pocosins constitute important wildlife habitat for species such as black bear, bobcat, pine warbler, gray fox, deer, and a variety of snakes and amphibians (NC DEHNR, 1996).

Wetland and Riparian Area Species Information

The White Oak River Basin contains many rare animal and plant species that are dependent on wetlands or open water for their existence. In Onslow and Carteret Counties, which comprise the bulk of the White Oak basin, there are a total of 26 federally or state-listed endangered or threatened species [plant and animal] that have documented sightings within the past 20 years. Listed animal species include the Manatee, Eastern Woodrat, American Alligator, Loggerhead, Green Turtle, Bald Eagle, Peregrine Falcon, Red-cockaded Woodpecker, and Piping Plover (Natural Heritage Program, 2001). The White Oak River Basin has more than 60 rare plant species, many of which grow in the wet soils of Savannas and Pocosins and are indirectly affected by water quality and quantity (Natural Heritage Program, 1998). Listed plant species in the basin that are associated with aquatic and/or wetland habitats include the Seabeach Amaranth, Rough-leaf Loosestrife, Carolina Goldenrod, Dwarf Bladderwort, Cooley's Meadowrue, and Golden Sedge (Natural Heritage Program, 2001).

In addition to federally or state-listed endangered and threatened species, 13 state-designated "Special Concern" species -- which have legal protection status in North Carolina -- have been documented in Onslow and Carteret Counties in the past 20 years. These include the following: Bachman's Sparrow; Black Skimmer; Little Blue Heron; Snowy Egret; Carolina Diamondback Terrapin; Mimic Glass Lizard; Carolina Gopher Frog; and the Venus Flytrap (Natural Heritage Program, 2001). Many of these Special Concern species are at least partially dependent upon aquatic, riparian, or wetland habitats for their existence. A detailed listing of the state's rare animal and plant species can be found in the "Natural Heritage Program List of Rare Animal Species of North Carolina" or the "Natural Heritage Program List of the Rare Plant Species of North Carolina", which are published every two years. More information about rare, threatened, and endangered species in the White Oak River Basin, and their preferred habitat or plant community types, can be found at the N.C. Natural Heritage Program's web site [<http://ils.unc.edu/parkproject/nhp/index.html>].

Over 80 fish species have been identified in the White Oak River Basin, including a variety with recreational and commercial importance. Many anadromous species which support

recreational and commercial interests rely on access to upstream portions of the White Oak River and tributaries for spawning during the spring (Wildlife Resources Commission, 1998).

Permitted Wetland and Stream Losses

The Division of Water Quality regulates activities involving streams and wetlands to ensure that construction projects cause minimal damage to these resources and that unavoidable impacts are addressed through mitigation projects. One important role of the NCWRP is to provide compensation for permitted impacts to wetlands and streams that fall below the regulatory threshold of less than one acre for wetlands and less than 150 feet for streams. The NCWRP uses the permitting database maintained by the Wetlands/401 Certification Unit of the Division of Water Quality to evaluate where the permitted impacts to wetlands and streams across the river basin are the greatest and where NCWRP projects are needed to offset unmitigated impacts.

Tables 2.1, 2.2, and 2.3 below present a summary of permitted wetland and stream impacts in the White Oak River Basin for 1995 to 2001, broken down by subbasins. Permitted **wetland impacts** total 447 acres over this time period, with projects in Subbasin 02 accounting for 54% of this total. Permitted *but unmitigated* [less than 1 acre] impacts to wetlands total 52 acres over the same time period, with Subbasins 01, 02, and 03 accounting for over 90% of these smaller, but cumulatively important permitted impacts. Unmitigated [less than 1 acre] wetland impacts in the Basin cumulatively represent 12% of the total permitted impacts to wetlands in the Basin. **Stream impacts** from 1997 to 2001 total nearly 6,500 linear feet, with 98% occurring in Subbasin 02. Unmitigated stream impacts [for projects less than 150 linear feet] over this time period amount to only 120 feet of this total [all in Subbasin 02].

These numbers suggest that the greatest development, road-building, and general land-clearing activities in the White Oak basin have occurred in the westernmost portions of the basin, including new subdivisions and encroaching urbanization in and around Jacksonville, Richlands, Swansboro, Newport, and Morehead City. This is where the greatest loss of aquatic habitat and water quality impacts would be predicted to occur, although relatively undeveloped headwater reaches of the New [subbasin 02], White Oak [subbasin 01], and Newport Rivers [subbasin 03] also show evidence of stream and riparian habitat degradation from land-clearing activities [agriculture and logging] according to the draft 2001 DWQ Basinwide Water Quality Plan for the White Oak (and recent field visits to some of these headwater areas).

Table 2.1 Permitted Total Wetland Impacts (acres) in the White Oak River Basin, by DWQ Subbasin from 1995-2000.

DWQ Subbasins (Counties in Subbasin)	1995	1996	1997	1998	1999	2000	2001 [as of 7/01]	Subbasin Total
Subbasin 01 [Onslow, Jones, Carteret, Craven]	35.2	10.9	1.31	45.2	1.16	0.99	0	94.8
Subbasin 02 [Onslow]	86.5	88.6	43.6	13	7.2	3.9	0.28	243.1
Subbasin 03 [Carteret]	6.96	8.95	30.4	2.8	38	4.92	5.16	97.1
Subbasin 04 [Carteret]	1	3.64	5.3	0.72	0.01	0.48	0.47	11.6
Subbasin 05 [Carteret]	0	0	0	0.05	0	0	0	0.05
TOTAL ACRES	129.7	112.1	80.6	61.8	46.4	10.3	5.91	446.7

Table 2.2 Permitted Unmitigated Wetland Impacts (acres) in the White Oak River Basin, by DWQ Subbasin from 1995-2000: Projects less than 1 acre.

DWQ Subbasins (Counties in Subbasin)	1995	1996	1997	1998	1999	2000	2001 [as of 7/01]	Subbasin Total
Subbasin 01 [Onslow, Jones, Carteret, Craven]	1.09	9.39	1.31	1.25	1.16	0.99	0	15.19
Subbasin 02 [Onslow]	4.77	0.87	10.24	0.71	1.29	2.24	0.28	20.4
Subbasin 03 [Carteret]	2.05	3.54	2.97	1.77	0.35	1.99	0.66	13.33
Subbasin 04 [Carteret]	1	0.32	0.25	0.72	0.01	0.48	0.47	3.25
Subbasin 05 [Carteret]	0	0	0	0.05	0	0	0	0.05
TOTAL ACRES	8.91	14.12	14.77	4.5	2.81	5.7	1.41	52.22

Table 2.3 Permitted Total Stream Impacts (linear feet) in the White Oak River Basin by DWQ Subbasin from 1997-2000.

DWQ Subbasins (Counties in Subbasin)	1997	1998	1999	2000	2001 [as of 7/01]	Subbasin Totals
Subbasin 01 [Onslow, Jones, Carteret, Craven]	0	0	0	0	0	0
Subbasin 02 [Onslow]	0	910	2149	3250	0	6309
Subbasin 03 [Carteret]	0	0	0	160	0	160
Subbasin 04 [Carteret]	0	0	0	0	0	0
Subbasin 05 [Carteret]	0	0	0	0	0	0
TOTAL LINEAR FEET	0	910	2149	3410	0	6469

Division of Water Quality Use Support Ratings

Waters are classified according to their best intended uses. Use support categories that are applied to stream and estuarine waters of the White Oak basin include: aquatic life & secondary recreation; fish consumption; primary recreation; and shellfish harvesting. [As there are no surface waters in this basin utilized as public water supplies, the WS classification for water supply watersheds does not apply within this river basin.] Determining how well a water body supports its designated uses is an important method of interpreting water quality data and assessing a given stream or river's overall aquatic health and use impairment. The NCWRP uses the use support assessments as criteria in determining restoration need within a local watershed. *A water body that is designated as "partially supporting" or "not supporting" its designated uses indicates that water quality impairment and/or habitat degradation has occurred; therefore, wetland and/or stream restoration initiatives within that local watershed could be beneficial to water quality. If nonpoint source pollution issues are indicated as factors contributing to local water quality impairment, the NCWRP may consider it as a water body in need of restoration.*

Waters lacking sufficient biological assessment or chemical water quality monitoring data and/or having inconclusive data [e.g., swamp waters naturally low in dissolved oxygen content and pH values] are assigned a "Not Rated" [NR] rating. A more detailed discussion of the Division of Water Quality's Surface Water Classifications and the Use Support Rating System can be found in Sections 3.2 through 3.5 of the Basinwide Water Quality Plan for the White Oak River [DWQ, 2001], which can be downloaded from the Division of Water Quality website at <http://h2o.enr.state.nc.us/basinwide/index.html> or is available from the Division of Water Quality at (919) 733-5083 ext. 354.

Current use support ratings for the White Oak Basin are summarized here for each of the four applicable use support categories:

Aquatic Life & Secondary Recreation (applies to all waters): no impaired streams or estuarine waters in this use support category during this planning cycle; 17% of stream miles [72 miles] fully supporting; 83% of stream miles [345 miles] not rated; 91% of estuarine waters [119,437 acres] fully supporting; 9% of estuarine waters [11,779 acres] not rated.

Fish Consumption (applies to all waters): due to a statewide advisory limiting consumption of bowfin [due to elevated mercury concentrations], all waters are considered partially supporting for this use support category; however, only 31 stream miles in the basin are considered monitored for this category [actual fish tissue analyses], which represents less than 8% of the total freshwater stream miles in the basin.

Primary Recreation (applies to class B, SB and SA waters): no impaired streams, estuarine waters, or coastal miles in this use support category [36 stream miles; 118,132 estuarine acres; 91 coastal miles]; 100% of applicable stream miles are not rated; 80% of estuarine acres are fully supporting [20% not rated]; 100% of coastal miles are fully supporting.

Shellfish Harvesting (applies to class SA waters): of the approximately 118,000 acres total of estuarine waters classified for shellfish harvesting in the basin, 76% are fully supporting and 24% [approximately 28,000 acres] are impaired -- 16% partially supporting; 8% not supporting.

Color maps depicting current use support ratings in individual subbasins of the White Oak River Basin are presented in Section 4. These maps focus on the use support ratings for shellfishing waters [class SA] and aquatic life/secondary recreation [class C] streams, essentially depicting worst-case use support impairment within streams and estuarine waters of the basin. In the White Oak Basin most of the impairment is in the Shellfish Harvesting use support category.

Table 2.4 below summarizes the impaired estuarine waters [class SA - Shellfish Harvesting] in the White Oak River Basin for each of the five subbasins. Also noted are "other issue" waters identified by the Division of Water Quality in the 2001 White Oak River Basinwide Water Quality Plan. These "other issue" waters, despite being not rated or rated fully supporting for aquatic life & secondary recreation [AL/SR], show evidence of nutrient loading and habitat degradation from new subdivisions, road building, wetlands ditching/drainage, and poor post-hurricane de-snagging operations [DWQ, 2001]. The term *habitat degradation* refers to a notable decline in the quality of instream and riparian habitat due to sedimentation, bank erosion, streambed scour, lack of riparian vegetation, loss of pools or riffles, and loss of woody habitat [DWQ, 2001].

Table 2.4 Impaired Waters in the White Oak River Basin (DWQ, 2001).

Subbasin	Listed Waters	Use Support Rating	Potential Sources of Impairment
03-05-01	- 6,631 acres total, including Bear Creek, Queens Creek & tribs., White Oak River & tribs., and the ICWW - upper White Oak River	NS and PS FS [AL/SR]	- fecal coliform bacteria in runoff from subdivisions, septic systems, forest clearing, agriculture, and wildlife - nutrient loading, channelization, habitat removal/degradation [nonpoint]
03-05-02	- 2,431 acres total, including Stones Bay and New River tribs., Fullards Crk, Rogers Bay, Chadwick Bay, Alligator Bay, Salliers Bay, Gillets Crk, Freemans Crk and the ICWW - upper New River	NS and PS PS [fish consumpt.]	- fecal coliform bacteria in runoff from subdivisions, septic systems, forest clearing, agriculture, and wildlife - nutrient loading, channelization, habitat removal/degradation [nonpoint]
03-05-03	- 7,463 acres total, including portions of Bogue Sound and tribs. [Spooner Crk, Broad Crk, Money Island Bay]; Newport River and adjacent bays & tribs. [Harlowe Crk, Core Crk, Crab Pt. Bay] - upper Newport River	NS and PS NR [AL/SR]	- fecal coliform bacteria in runoff from subdivisions, septic systems, urban areas, forest clearing, agriculture, and wildlife - nutrient loading, channelization, habitat removal/degradation [nonpoint]
03-05-04	- 11,535 acres total, including North River & adjacent bays, tribs. [Ward Crk, Goose Crk, The Straits, Newby Crk, Davis Bay]; Western bays, tribs., and adjacent areas of Core Sound [Jarrett Bay, Nelson Bay, Oyster Crk] - upper North River	NS and PS FS [AL/SR]	- fecal coliform bacteria in runoff from subdivisions, septic systems, urban areas, forest clearing, agriculture, and wildlife - nutrient loading, channelization, habitat removal/degradation [nonpoint]
03-05-05	- No impaired waters	N/A	- N/A

Section 303(d) of the federal Clean Water Act requires states to develop a list of waters not meeting water quality standards and to submit this list to the U.S. Environmental Protection

Agency biennially. Waters are placed on North Carolina's 303(d) List primarily due to a partially or not supporting use support rating. Addressing water quality impairment in waters that are on the state's 303(d) List is a priority for the state. The NCWRP considers the 303(d) List in selecting watersheds for restoration efforts. *Many of the waters listed in Table 2.4 above will be added to the state's 303(d) list of impaired waters in 2002 [DWQ, 2001].*

Local Water Resource Management Initiatives

The White Oak River Basin encompasses all or portions of four counties and 16 municipalities, all of which fall within the Region P Council of Governments planning jurisdiction. As the population in the White Oak River basin is projected to increase by 40,000 people over the next 15 years, with most of this growth occurring on the coast and around existing urban areas, there is an obvious need for environmental planning efforts at the local government level -- especially in the areas of land use planning, storm water management, and general water quality protection. A concise discussion of state and local planning considerations pertinent to the White Oak basin is presented in Section 4.3 of the 2001 Basinwide Water Quality Plan [DWQ, 2001].

Proactive planning efforts from county and municipal governments in the basin -- for instance, developing ordinances designed to limit impervious surfaces and preserve intact riparian buffer zones and wetlands -- are needed to ensure that new development is done in a manner that maintains water quality. The NC Coastal Area Management Act [CAMA] requires the development and periodic updating of local land use plans in the 20 coastal counties, including three of the four counties encompassed by the White Oak basin [Carteret, Craven, Onslow]. The NC Division of Coastal Management [DCM] provides oversight, review, and approval of the local land use planning process. A detailed review of the current status of local land use planning efforts in the White Oak basin is beyond the scope of this document. Further information on coastal land use planning under the CAMA rules is available through the DCM website at <http://dcm2.enr.state.nc.us/>.

The NCWRP will begin implementing in 2001 a Local Watershed Planning initiative in a cluster of local watersheds [NRCS 14-digit hydrologic units] within subbasin 02 of the White Oak River Basin. This process will entail the development of a comprehensive package of recommendations for water quality improvement within several local watersheds comprising the drainage area for the upper New River, extending upstream from Jacksonville to the Richlands area. Local watershed protection tools include stream and wetland restoration projects, land use controls, open space planning, and stormwater best management practices (BMPs). Coincidentally, Onslow County and several municipalities in the county, including Jacksonville, are presently considering the adoption of an "Intelligent Development" planning strategy to control urban sprawl and preserve open space and greenways more effectively [Hargett, personal communication, 2001]. *For further information on the NCWRP Local Watershed Planning initiative in the White Oak basin, see Section 4 of this plan ["Targeted Local Watersheds by Subbasin"], Subbasin 02.*

Jacksonville and Onslow County will fall under the EPA NPDES Phase II storm water permitting program, which requires the development of a strategy for implementing storm water Best Management Practices [BMPs] in six program areas. For additional information regarding the Phase II stormwater program requirements in North Carolina, go to <http://h2o.enr.state.nc.us/su/stormwater.html>.

Unified Watershed Assessment

In September of 1998 the NC Division of Water Quality and the USDA-Natural Resource Conservation Service evaluated all 8-digit cataloging units [CUs] in the state using the US Environmental Protection Agency's (EPA) Framework for the Unified Watershed Assessment to determine priority areas for water quality restoration. The assessment assigned one of four categories to each 8-digit CU in the state:

- Category I: Watersheds in Need of Restoration. These watersheds do not now meet, or face imminent threat of not meeting, clean water and other natural resource goals.
- Category II: Watersheds Meeting Goals, Including Those Needing Action to Sustain Water Quality. These watersheds meet clean water and other natural resource goals and standards and support healthy aquatic systems.
- Category III: Watersheds with Pristine or Sensitive Aquatic System Conditions on Lands Administered by Federal, State, and Tribal Governments.
- Category IV: Watersheds With Insufficient Data to Make an Assessment.

As shown in Figure 2.2, the Unified Watershed Assessment process identified two 8-digit CUs, together encompassing the entire White Oak River basin, as Category I priority areas for restoration: Cataloging Units 03020106 and 03030001. Unified Watershed Assessment Category I watersheds receive priority for EPA Section 319 Incremental Grant funds. The NCWRP is committed to working with other agencies and programs to leverage Section 319 resources in the Unified Watershed Assessment high-priority areas. In some cases, the NCWRP can provide matching funds for projects located in NCWRP Targeted Local Watersheds. Information on the NC 319 Grant Program is available online at <http://h2o.enr.state.nc.us/nps/bigpic.htm>.

UWA Categories For 8-Digit Hydrologic Units in North Carolina

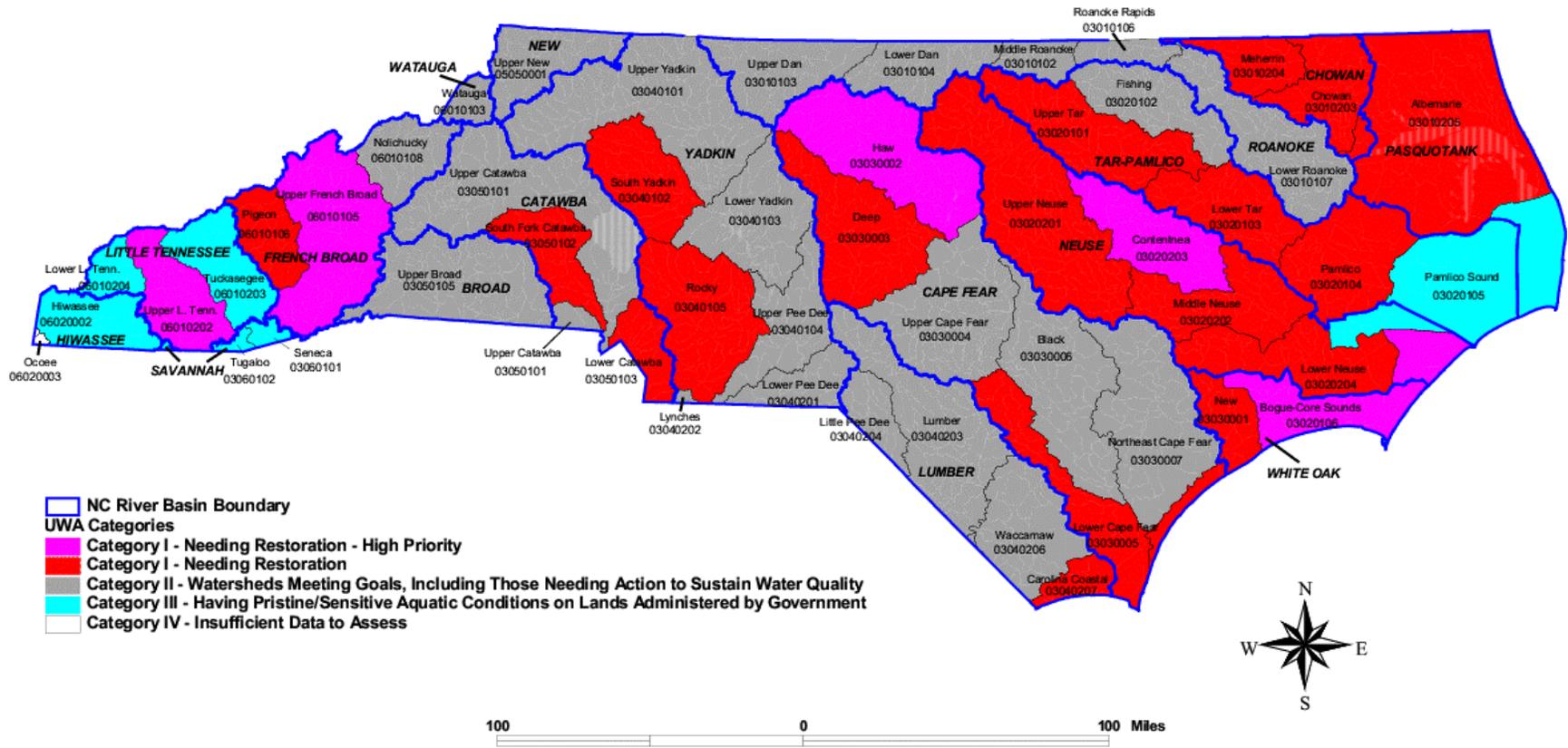
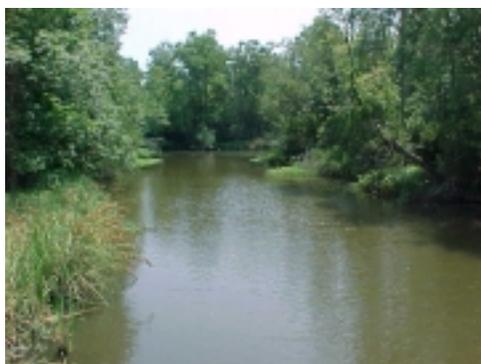


Figure 2.2 Unified Watershed Assessment Categories for 8-Digit Hydrologic Units in North Carolina.

SECTION 3: RESTORATION GOALS FOR THE WHITE OAK RIVER BASIN

Based on an assessment of existing watershed characteristics and resource information, the NCWRP has developed three broad restoration goals for the White Oak River Basin. Each goal reflects the NCWRP's watershed restoration strategy to focus restoration projects within local watersheds in order to address water quality impacts from nonpoint source pollution. The goals also reflect the NCWRP's focus on restoring wetland and riparian area values such as maintaining and enhancing water quality, increasing storage of floodwaters, and improving fish and wildlife habitat. The general restoration goals for the White Oak River Basin are listed below, including specific objectives for reaching those goals.

1. Protect and improve water quality throughout the Basin by reducing sediment and nutrient inputs into streams and rivers.



- Implement stream restoration projects that reduce instream sources of sediment pollution by stabilizing streambanks and restoring channel meanders, especially in headwater tributaries and upper portions of rivers.

- Restore riparian vegetation and wetlands to trap sediment pollution and remove nutrients from surface runoff.

- Work with local land trusts and landowners to protect in perpetuity high-quality watersheds through restoration and preservation of critical riparian and wetland tracts.

- Support the education/outreach efforts of local Cooperative Extension Service and Soil & Water District staff, especially in the areas of agricultural, residential and urban stormwater BMPs.

2. Protect shellfish harvesting waters and reduce the number & frequency of Division of Environmental Health (DEH) closures of designated shellfish growing areas.



- Support local studies of the sources of fecal coliform bacteria and the development of strategies for reducing fecal coliform inputs into local waters-- including urban stormwater BMPs.

- Implement stream, wetland and riparian buffer restoration projects within watersheds that drain directly into class SA waters [e.g., tidal creeks].

- Support local public education/outreach efforts to increase public awareness of the sources and controls of pathogens in local streams, rivers, bays and sounds.

3. Support efforts to restore local watersheds in the White Oak River Basin.



- Develop a Local Watershed Plan for upper New River watersheds [see Section 4] to address future compensatory mitigation needs and local stakeholder priorities.

- Cooperate with local resource agencies to help obtain federal and state grant monies for watershed restoration efforts.

- Complete and maintain existing NCWRP stream, shoreline, and wetland restoration projects in the basin, including those in the Jacksonville area.

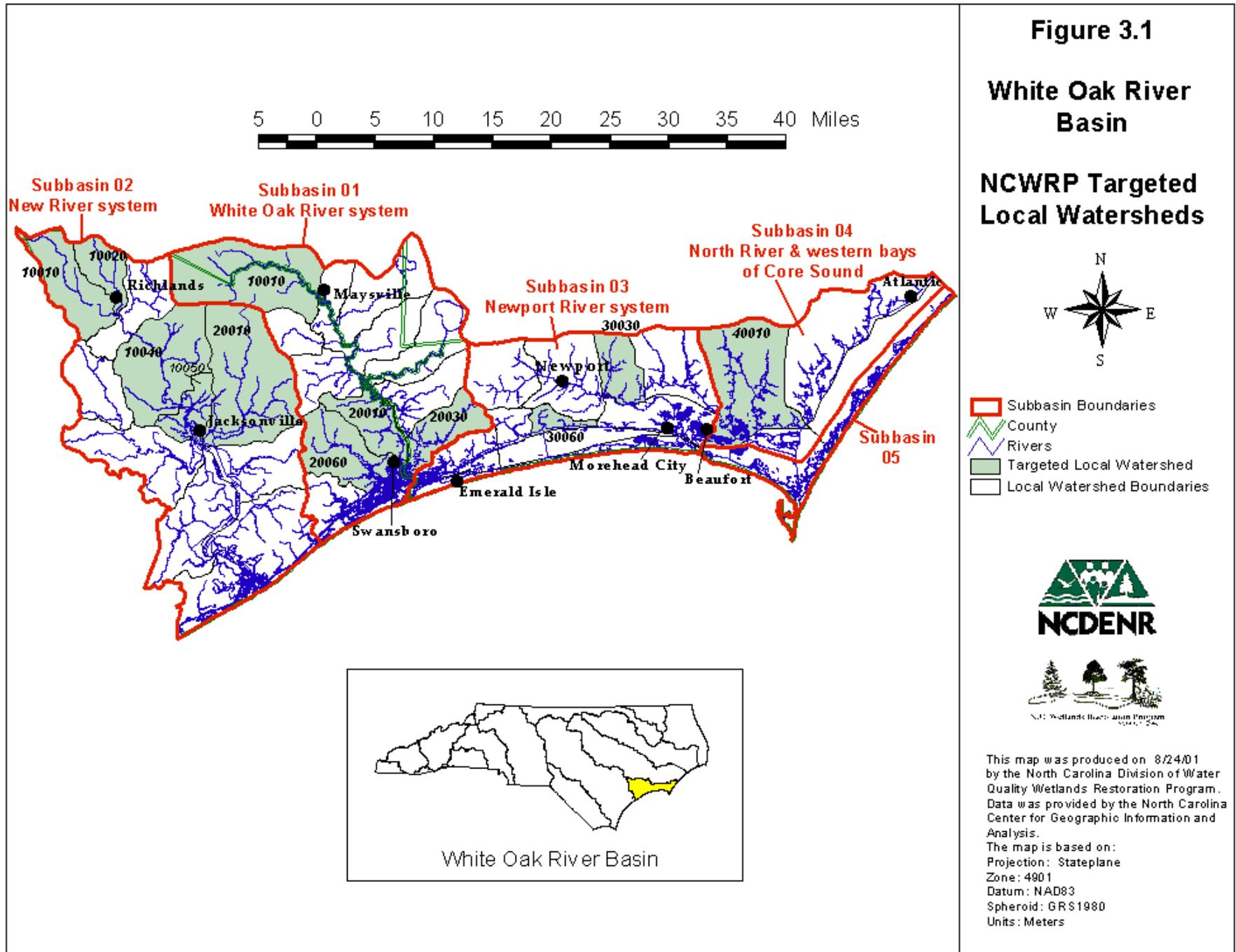
Targeted Local Watersheds

In order to meet the identified restoration goals, the NCWRP has selected 12 Targeted Local Watersheds in the White Oak River Basin. Figure 3.1 presents a map of the Basin with Targeted Local Watersheds highlighted. These geographic priorities have been selected based on need and opportunity for restoration. The decision-making process used to make these selections is described in detail in the Guide to the NCWRP's Watershed Restoration Planning Strategy (Version 1). The purpose for selecting Targeted Local Watersheds is to concentrate projects geographically. In doing so, projects are more likely to result in water quality protection, flood control benefits, and habitat improvement through the cumulative effect of multiple projects within smaller-scale drainage systems.

Public Input into the Targeted Local Watershed Selection Process

To solicit input on proposed local watershed selections, NCWRP held a three-hour meeting at the Carteret-Craven Electric Cooperative [CCEC] facility near Morehead City on June 21, 2001. Representatives from federal, state and local government agencies, environmental and resource protection groups and organizations, and other interested parties from throughout the White Oak River Basin were invited to participate and were notified of the meeting during the outreach process of developing this report. The purpose of the meeting was to involve citizens and resource professionals in updating the Watershed Restoration Plan for the White Oak River Basin. This meeting included an overview of the NCWRP watershed planning approach and an opportunity for participants to brainstorm on restoration needs and opportunities within the NCWRP Subbasins and proposed Targeted Local Watersheds. Water quality problems and habitat degradation "hot spots" were identified by meeting participants.

As a follow-up to the resource professionals meeting, a letter was sent on July 19, 2001 detailing draft final Targeted Local Watershed selections. At this point, much effort had gone into analyzing available data and soliciting input from the public. Response to the draft Targeted Local Watershed picks weighed heavily in the final selection of the 12 targeted watersheds. Also, a field trip to explore possible candidate sites for stream, riparian buffer, and wetlands restoration projects in the Basin was conducted on August 9, 2001, led by staff of the Onslow County Cooperative Extension Service [CES] and Soil & Water Conservation District.



SECTION 4: TARGETED LOCAL WATERSHEDS IN THE WHITE OAK RIVER BASIN BY SUBBASIN

This section summarizes the status of water quality and aquatic habitat conditions within the Targeted Local Watersheds selected within four of the five subbasins in the White Oak River Basin. [No Targeted Local Watersheds have been selected within Subbasin 5 because no significant aquatic habitat degradation or water quality impairment has been documented within streams or estuarine waters of this subbasin (DWQ, 2001)]. This section also includes information about potential causes of resource degradation within these areas from the Division of Water Quality [DWQ] Basinwide Water Quality Plans, and comments provided by resource professionals and other interested parties within the basin. Maps of each Subbasin with Targeted Local Watersheds in the White Oak River Basin are provided in their respective sections. [Note: the term "local watershed" denotes a small, defined drainage area within a larger subbasin. Specifically, the term "local watershed" or "Targeted Local Watershed" refers to the 14-digit hydrologic unit as defined by the Natural Resource Conservation Service (NRCS). The term "subbasin" is reserved solely to denote a subbasin of the larger White Oak River Basin, as defined by the DWQ.]

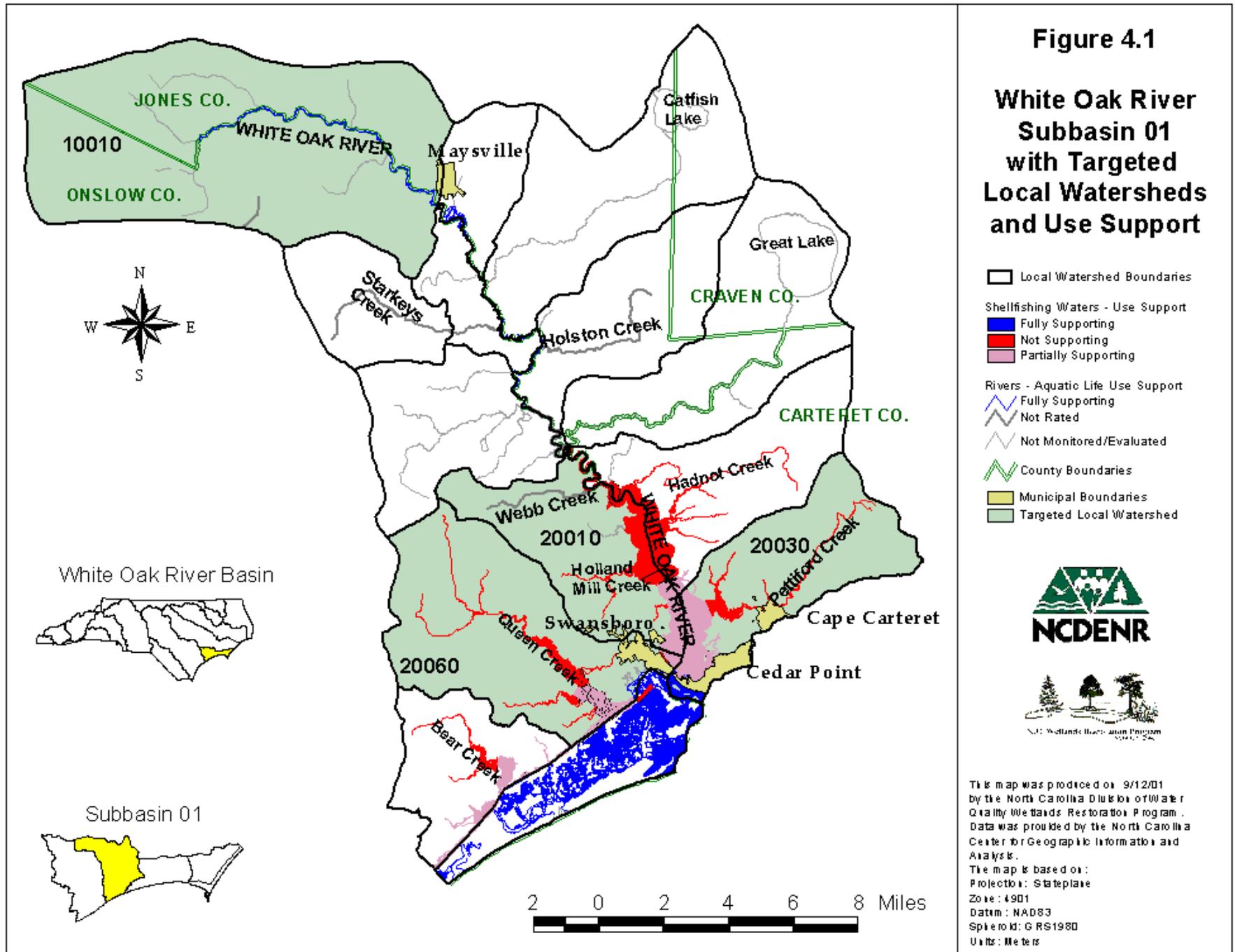
The NCWRP selected these Targeted Local Watersheds based on readily available resource information [e.g., GIS coverages] and on comments and recommendations received from local resource professionals, environmental organizations, citizens, and groups or agencies with planned or ongoing water quality projects in the local watersheds. The Targeted Local Watersheds are selected primarily on the basis of their *need* for water quality and habitat restoration, and on the basis of the *opportunity* to initiate collaborative water quality and habitat restoration projects within the local watersheds. [Readers interested in a more detailed explanation of the methodology used to target and prioritize local watersheds for restoration work are referred to the *Guide to the North Carolina Wetland Restoration Program's Watershed Restoration Strategy, version 1* (NCWRP, 2001)].

Subbasin 03-05-01	
<i>Area (square miles):</i>	351
<i>1990 Population Estimate:</i>	39,400
<i>Land Cover (%):</i>	
• Forest/Wetland	76
• Surface Water	8
• Urban	1
• Cultivated Crop	11
• Pasture/managed herbaceous	3
<i>Water Area</i>	
Stream Miles:	116
Estuarine Acres:	11,567
Coastal Miles:	8
Shellfish Harvest Acres:	11,239
• <u>Summary of Impaired Waters</u>	
- <i>Aq. Life & Secondary Recreation:</i>	no impaired stream miles
- <i>Shellfishing Harvesting [SA waters]:</i>	3,581 acres Partially Supporting 3,049 acres Not Supporting

Subbasin 03-05-01

Subbasin 01 contains the White Oak River and its tributaries in Onslow, Jones, Craven, and Carteret counties. Much of this subbasin consists of relatively undisturbed forest lands within the Croatan National Forest and Hoffman State Forest. The text box immediately to the left summarizes important basin statistics, including the miles and acres of impaired waters for the two key use support categories considered by NCWRP.

According to the Division of Water Quality Basinwide Water Quality Plan for the White Oak [DWQ, 2001], tributaries to the west of the White Oak River appear more impacted by agriculture and development than streams draining the pocosin wilderness areas and national forest lands to the east of the White Oak mainstem. Also, there are indications of nutrient loading, channelization, and habitat degradation in reaches of the upper White Oak River. Figure 4.1 presents the use support ratings for freshwater streams and estuarine shellfishing waters within this subbasin, as well as Targeted Local Watersheds.



Targeted Local Watersheds in Subbasin 01

See Table 4.1 for a concise summary of water quality and resource conditions in the four Targeted Local Watersheds selected within this Subbasin. See Figures 4.2 and 4.3 for maps depicting the major features in each of the four Targeted Local Watersheds selected within this subbasin.

Upper White Oak River and Gibson Branch Watershed (HU 03020106010010)

This 68-square mile drainage area includes channelized and otherwise degraded reaches of the upper White Oak River and its tributary, Gibson Branch. At least one resource professional noted that development in the Maysville area has impacted Gibson Branch. Evidence of nutrient enrichment [algal mats] has been noted at the Division of Water Quality sampling station on the upper White Oak mainstem just south of Maysville [station B-2]. The N.C. Coastal Federation [NCCF] is working towards land acquisition and preservation along the upper White Oak mainstem, with the assistance of the Clean Water Management Trust Fund [CWMTF]. Despite being rated "Fully Supporting" for the aquatic life and secondary recreation [AL/SR] use support category, the upper White Oak River and its tributaries may provide good sites for stream, riparian buffer, and wetlands restoration (or enhancement) that could benefit downstream water quality and aquatic and riparian habitat conditions. Protection and restoration of headwater streams and wetlands is an important tool for the maintenance or improvement of downstream water quality, and the NCWRP places a priority on finding suitable restoration sites in such headwater areas. This local watershed also includes at least one Aquatic Natural Heritage Element as identified by the N.C. Natural Heritage Program [NHP], including the Hoffman Forest White Oak Pocosin natural heritage area.

Figure 4.2 depicts major features of this local watershed, including areas considered to have wetlands restoration or enhancement potential by the NC Division of Coastal Management [DCM]. The DCM wetlands restoration/enhancement mapping data -- which represents the latest version of a GIS system first developed by the DCM in the mid-1990s [DCM, 1997] -- have been used as a general screening tool in each of the White Oak subbasins to help identify those local watersheds [14-digit hydrologic units] which may offer a higher probability of locating suitable wetland restoration sites than other local watersheds. The area encompassed by this particular mapping theme includes six different restoration types identified by DCM; the restoration types represent the historic natural wetland types that once existed in a specific area and, therefore, the vegetation community to which the site could be theoretically restored. [The six potential wetland restoration types include: salt/brackish marsh; estuarine shrub/scrub & maritime forest; swamp forests; bottomland hardwood forests; wet flatwoods; and pocosins. Most of the restoration types identified by DCM in the White Oak Basin fall into the category of *wet flatwoods* -- altered as managed pinelands -- or *pocosin* areas (often altered through clearing and ditching).]

Only Figure 4.2 in this Plan, depicting the Upper White Oak River - Gibson Branch watershed, will show the DCM-identified areas containing potential wetland restoration/enhancement sites. This is simply to illustrate the relatively large areas within this Targeted Local Watershed that may contain such sites [and which contributed to its selection] and the general methodology used to assess local watersheds in this manner. In the future, subbasin-specific maps depicting potential wetland restoration areas within the Basin will be available on the NCWRP website.

Webb Creek, Holland Mill Creek, and White Oak River mainstem Watershed [HU 03020106020010]

This local watershed encompasses approximately 22 square miles just west of, and including, the lower White Oak River estuary down to the northern Swansboro area. A high percentage of land (36%) in this watershed has been cleared. An ambient monitoring station on the White Oak River near Stella has shown exceedences of the fecal coliform standard and elevated total suspended solids, suggesting water quality impacts from land-disturbing activities in the area such as logging and construction. Also, as reported in the Basinwide Assessment Report for the White Oak [DWQ, 2000], the headwaters of Webb Creek exhibit severe bank erosion, breaks in the riparian zone, and very little instream habitat. Over 1,000 acres of the White Oak River estuary in this watershed are impaired class SA waters [closed or conditionally approved shellfish harvesting waters; rated NS or PS by the DWQ]. These impaired estuarine waters are affected by fecal coliform inputs in storm water runoff from subdivisions and agricultural land. At least one aquatic Natural Heritage Element occurs in this watershed. The NC Coastal Federation (NCCF) has acquired large riparian tracts for preservation along the White Oak mainstem within this local watershed.

Pettiford Creek and lower White Oak River Watershed [HU 03020106020030]

Although a large percentage of this 25-square mile watershed lies within the Croatan National Forest, this is a rapidly growing region within the White Oak River Basin (including the municipalities of Cedar Point and Cape Carteret) with significant impairment of shellfishing waters due primarily to fecal coliform contamination in storm water runoff. Significant Natural Heritage Areas in this watershed, with high recreational and natural resource value, include the Croatan Pocosin Wilderness, Pringle Road Bay Rims, and Cedar Point/White Oak River marshes. Ongoing 319-funded initiatives in this watershed include a collaborative study of impaired shellfish harvesting areas in Pettiford Creek and the lower White Oak River estuary. Duke University Marine Lab, the White Oak River Advisory Board (WORAB), NC State University (NCSU), the NC Division of Shellfish Sanitation, the Town of Swansboro, and the Carteret CES are all partnering in this study to identify "hot spots" of fecal coliform loading in the watershed and to develop solutions (including storm water BMPs). NCSU's Watershed Education for Communities & Local Officials (WECO) and WORAB are seeking to educate local citizens about water quality and storm water issues in this area. The NCSU College of Design will be doing a land use/land cover analysis of the Pettiford Creek watershed to identify areas needing restoration [White, personal communication, 2001]. Restoration projects undertaken by NCWRP could effectively dovetail with the existing NCSU/WECO/WORAB efforts in this watershed.

Queen Creek and Parrot Swamp Watershed [HU 03020106020060]

This 35-square mile drainage system includes a relatively high proportion [approx. 25%] of cleared lands, and it contains over 800 acres total of impaired shellfishing waters. Runoff from new subdivisions and forest clearing are cited as possible sources of fecal coliform and sediment inputs into stream and estuarine waters within this watershed. Urban sprawl in the Swansboro area and high numbers of wildlife and waterfowl may also be contributing to elevated fecal coliform levels in local waters. In responding to our request for comments on the draft Targeted Local Watershed selections, one Swansboro resident (a recreational fisherman) noted that the abundance of fish species in Queen Creek and the lower White Oak River has conspicuously declined over the years; he attributed this to habitat degradation, excessive sedimentation, and an apparent decline in water quality [Kropinack,

personal communication, 2001]. Camp Lejeune Pocosin Road Flatwoods and upper Queen Creek Tidal Marshes are identified as Significant Natural Heritage Areas in this watershed, and at least one Clean Water Management Trust Fund (CWMTF) property has been acquired in Swansboro, within the boundaries of this local hydrologic unit. The NCWRP is implementing a two-acre wetlands restoration/shoreline stabilization project at Hammocks Beach State Park, near the mouth of Queen Creek -- see pre-construction [left] and post-construction [right] photos below.



Table 4.1: Summary information for Targeted Local Watersheds in White Oak River Basin Subbasin 01

TARGETED LOCAL WATERSHED	UPPER WHITE OAK RIVER & GIBSON BRANCH	WEBB CR., HOLLAND MILL CR. & WHITE OAK	PETTIFORD CREEK & WHITE OAK MAINSTEM	QUEEN CREEK & PARROT SWAMP
County	Onslow, Jones	Onslow	Carteret	Onslow
14-digit Hydrologic Unit #	030201060 10010	030201060 20010	030201060 20030	030201060 20060
Land Area [sq. mi.s]	68.0	21.7	24.5	35.3
Impaired Waters? [NS or PS use support rating] ¹	none	Yes: >1,000 acres of the White Oak mainstem [estuary]	Yes: 270+ acres of SA waters, incl. Bay at mouth of Pettiford Crk.	Yes: 800+ acres of SA waters
Possible Causes/Sources of Degradation ²	nutrient loading, channelization, habitat degradation; stormwater runoff from urban, agric. [NPS]	fecal coliform, nutrients, sediments in urban & agric. stormwater runoff [NPS]; riparian clearing	fecal coliform, sediments, and nutrient inputs from subdivisions, ag. & urban runoff, forest clearing, wildlife [NPS]	fecal coliform, sediments, and nutrient inputs from subdivisions, ag. & urban runoff, forest clearing, wildlife [NPS]
Land Cover - % Cleared	13%	36%	11%	18%
Land Cover - % Developed	0	0	2%	5%
Land Cover - % Forested	87%	64%	86%	76%
Shellfishing Waters? ³	No	Yes	Yes	Yes
NSW, HQW or ORW Waters? ⁴	No	HQW [SA waters]	HQW [SA waters]	HQW [SA waters]
Aquatic Natural Heritage Element(s)? ⁵	Yes	Yes	Yes	Yes
Current 319, CWMTF, or NCWRP Projects?	Planned [NCCF]	Yes	Yes [319; plus WOR Adv. Brd.]	Yes [Swansboro CWMTF; NCWRP Hammocks Beach SP]

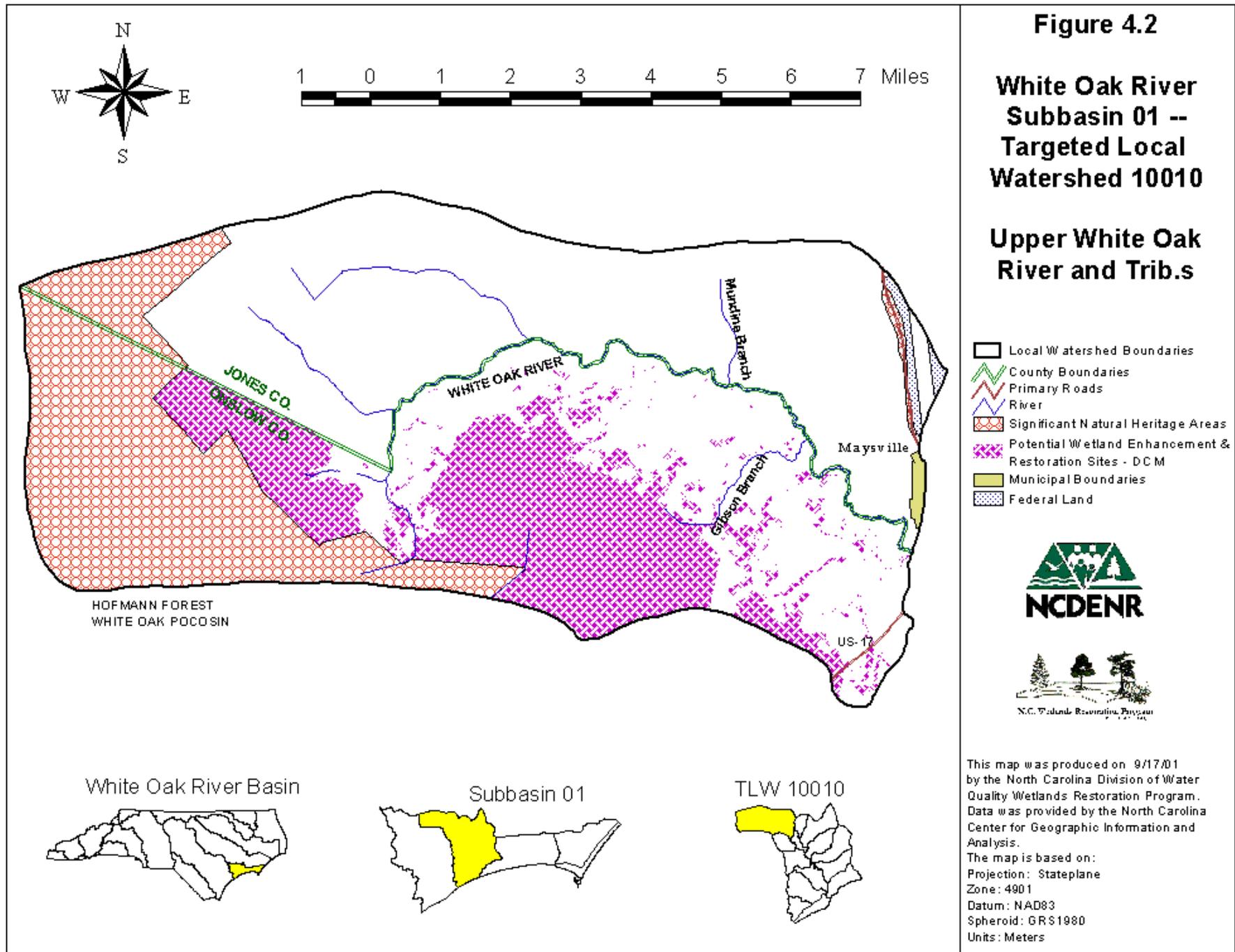
1 See Section 2 for a brief explanation of use impairment. See the *DWQ White Oak River Basinwide Water Quality Plan* for a more complete explanation of DWQ stream classifications & standards and use support ratings.

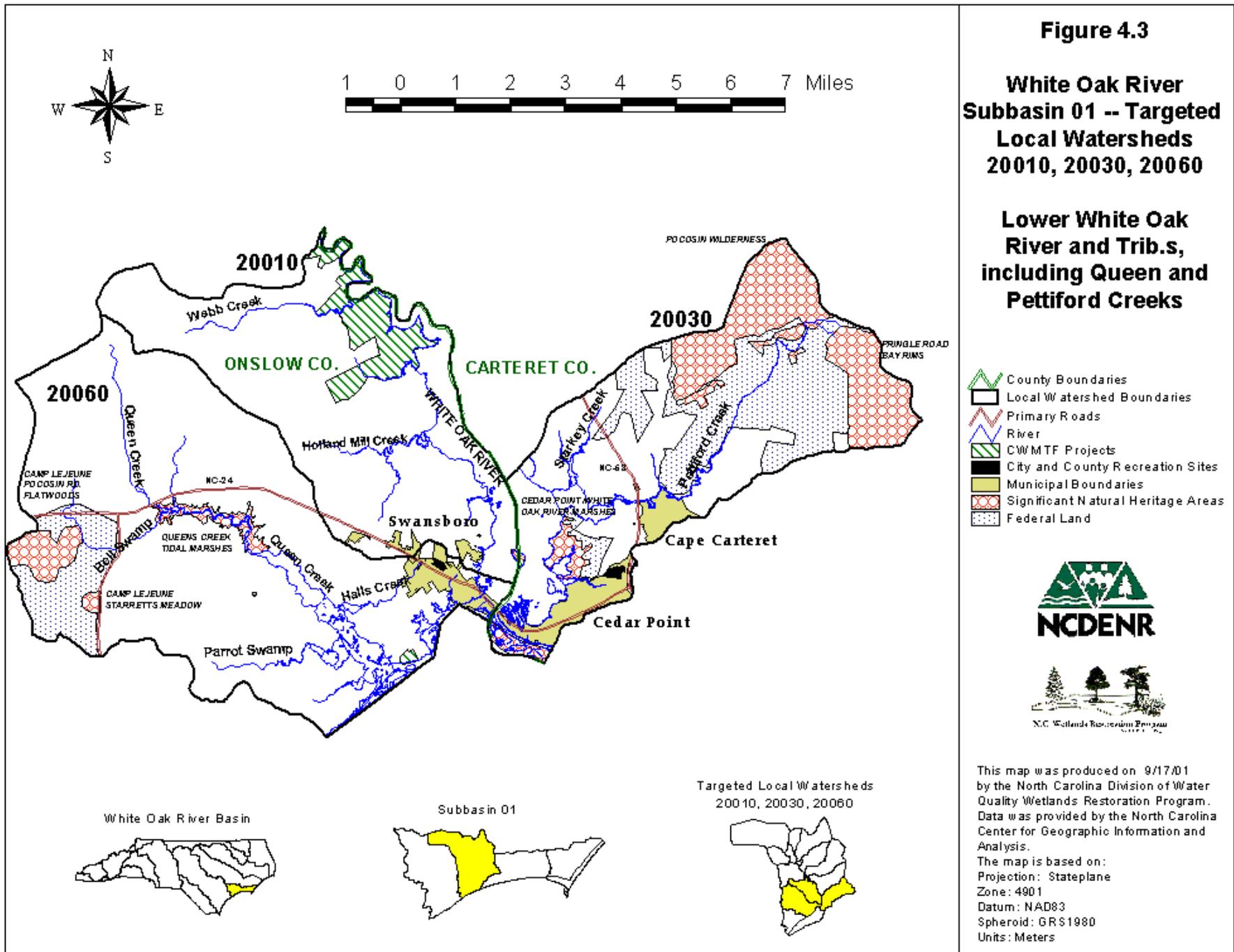
2 Information on possible **causes** [e.g., habitat degradation, sediment & nutrient inputs] and **sources** [e.g., non-point source runoff from agricultural/logging areas] of water quality degradation and use support impairment is obtained primarily from the *DWQ Basinwide Water Quality Plan* and *Basinwide Assessment Report* for the White Oak basin. **Habitat degradation** includes instream sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools/riffles, removal of woody habitat, and streambed scour.

3 Shellfishing Waters are DWQ Class SA waters, whose best use is commercial shellfish harvesting. All SA waters are, by definition, also considered to be High Quality Waters [HQW], which include critical habitat areas or primary nursery areas.

4 NSW = nutrient sensitive waters. **ORW** = outstanding resource waters.

5 Aquatic Natural Heritage elements are special species, habitats, or community types identified by the NC Natural Heritage Program and that occur, or spend some portion of their life cycle, in wetlands, streams, riparian areas, or estuarine waters.





Subbasin 03-05-02

Area (square miles): 462

1998 Population Estimate: 84,359

Land Cover (%):

- Forest/Wetland 67
- Surface Water 9
- Urban 4
- Cultivated Crop 13
- Pasture/managed herbaceous 7

Water Area

Stream Miles: 208

Estuarine Acres: 21,865

Coastal Miles: 15

Shellfish Harvest Acres: 11,122

• **Summary of Impaired Waters**

- *Aq. Life & Secondary Recreation:*

no impaired stream miles

- *Shellfishing Harvesting [SA waters]:*

1,711 acres Partially Supporting

720 acres Not Supporting

Subbasin 03-05-02

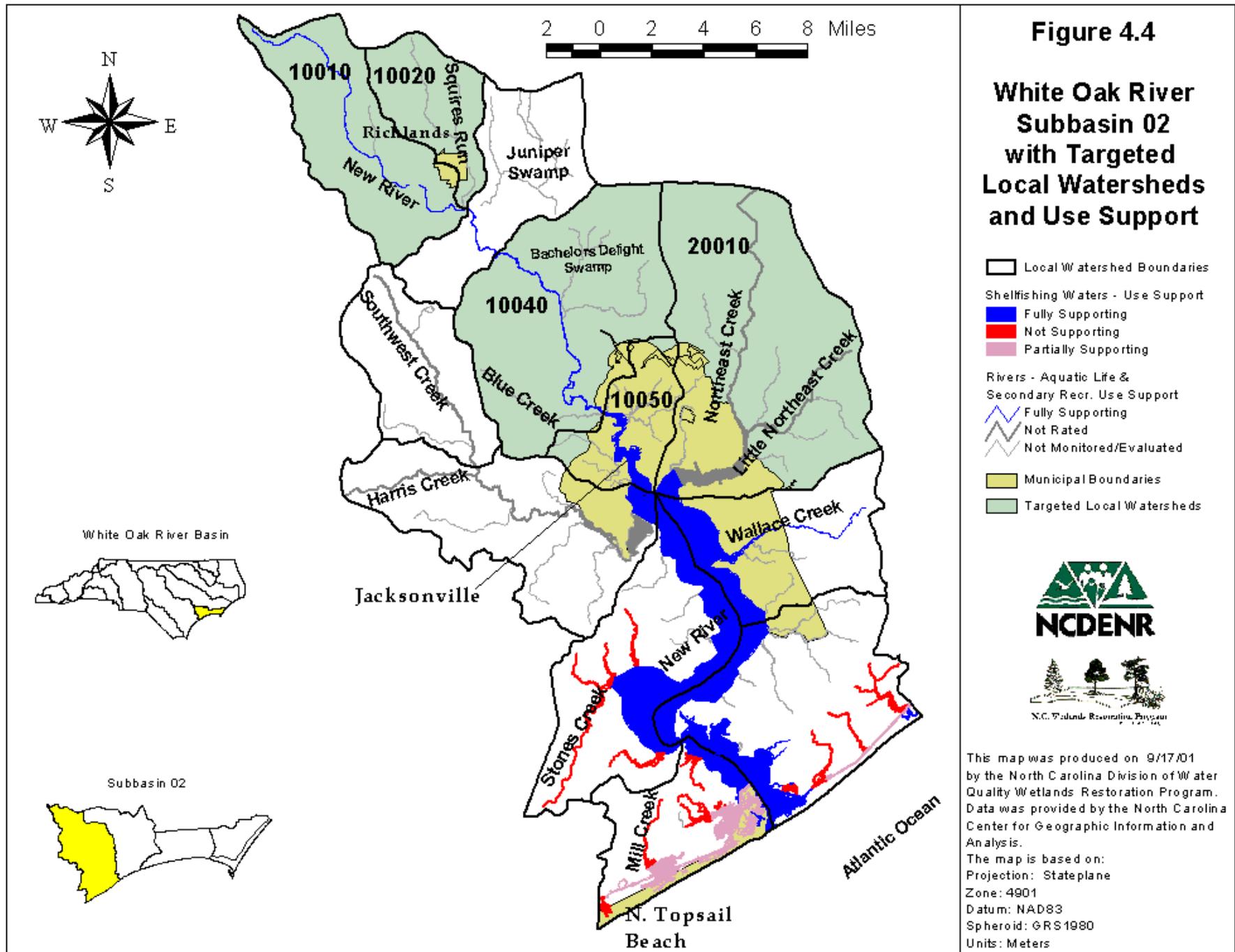
The New River, its tributaries, several small tidal streams and the Intracoastal Waterway (ICWW) make up this subbasin, which lies almost entirely within Onslow County. This is the most densely populated and most heavily developed subbasin within the White Oak basin (over 200 persons per square mile), with most of the development concentrated along the New River: Richlands near the headwaters; Jacksonville and Camp Lejeune Military Base in the middle reaches; and Sneads Ferry near the mouth. Animal operations and agriculture are prevalent in the headwaters area north of Richlands (DWQ, 2001).

Nutrient enrichment occurs in headwater tributaries and estuarine portions of the New River, and periodic elevated fecal coliform levels appear to be a recurring problem in the waters of this subbasin. Fish kills are noted as a "chronic occurrence throughout the mainstem of the New River" (DWQ, 2000). Headwaters of the New River, Southwest Creek and Northeast Creek drain swampy areas (with naturally low pH and dissolved oxygen conditions); these reaches have a

supplemental classification of nutrient sensitive waters (NSW).

Figure 4.4 depicts the Targeted Local Watersheds selected within this subbasin, as well as use support ratings for monitored streams and estuarine waters. The text box to the upper left summarizes major characteristics of the subbasin, including a summary of impaired waters in the aquatic life (class C and SC) and shellfish harvesting (class SA) use support categories. Monitored waters classified for primary recreation (class B and SB) in this subbasin showed no impairment based on the most recent assessment conducted by DWQ [i.e., were rated as either fully supporting (FS) or were not rated (NR)]. Based on an evaluation of restoration need and opportunity, the NCWRP has selected five Targeted Local Watersheds in this subbasin, the most of any of the White Oak River subbasins.

Four of the five Targeted Local Watersheds in this subbasin are the focus of a NCWRP Local Watershed Planning initiative, scheduled to begin in the fall of 2001. This process seeks to develop a comprehensive local watershed management plan for addressing water quality and habitat degradation issues in a cluster of watersheds comprising the upper New River drainage system, from Jacksonville to Richlands. For additional information on the NCWRP Local Watershed Planning initiative in the White Oak River Basin, contact Bonnie Duncan at (919) 733-5315.



Targeted Local Watersheds in Subbasin 02

The five Targeted Local Watersheds (TLWs) in this subbasin can be grouped geographically and hydrologically into three distinct areas, each of which is discussed below. Table 4.2 presents a summary of pertinent information for each of the five TLWs selected in this subbasin. Figures 4.5 and 4.6 depict the major hydrologic and natural resource features within these watersheds.

Upper New River & Cowford Branch Watershed [HU 03030001010010] and Mill Swamp & Squire Run Watershed [HU 03030001010020]



These two local watersheds comprise the upper tributaries and mainstem of the New River in northwestern Onslow County, a predominantly rural area. Together, these watersheds cover an area of approximately 53 square miles, a significant percentage of which (over 45% total) has been cleared or otherwise developed. A DWQ benthic monitoring station located just downstream of these two watersheds on the New River mainstem has exhibited a continued decline in water quality in the upper New River system throughout the 1990s (DWQ, 2000). Possible reasons for this decline include: increased agricultural inputs; road construction impacts [widening of NC 24/258]; and channelization along some reaches of the New River. The photos at left illustrate conditions at two areas of the upper New River near Highway NC-24 [August 2001]. Channelization, streambed scouring, unstable streambanks, instream sedimentation, ditching & culvert installation to drain agricultural fields, and little or no riparian buffer adjacent to agricultural fields were all observed at these locations. Such areas represent an opportunity for potential stream and riparian buffer restoration projects. [Mapping of potential wetlands restoration and enhancement sites by the DCM indicates that many such areas, both riparian and non-riparian, occur within these two local watersheds.]



Staff of the Onslow Soil & Water District noted that some areas of the upper New River and its tributary streams are planned for channel clearing [post-storm de-snagging operations] to remove downed trees, limbs, and other debris which may be obstructing stream flow in these reaches. Such operations may reduce overbank flooding, particularly at bridge crossings and roadway culverts, but also have the potential to contribute to further degradation of instream and riparian habitat. At least one Resource Professional commented that stream conditions in Squires Run have been affected by increased erosion and sediment inputs from new developments and land clearing in the area around the Town of Richlands. Land clearing for logging operations may be another source of water quality impacts in these two watersheds of the upper New River.

These two local watersheds are included in the NCWRP Local Watershed Planning focus area [see page 24].

Bachelors Delight Swamp, Half Moon Creek and New River Watershed [HU 03030001010040]

This 58-square mile watershed is over 70% forested and its headwater area includes the



Hofmann Forest White Oak Pocosin Natural Heritage Area; however, this watershed has some areas that have been significantly thinned or cleared for logging operations. The photo at left shows such an area along Bachelors Delight Swamp. Such areas may contain good candidate sites for stream or wetlands restoration. Some reaches of the New River have been channelized in this watershed. The lower reaches of this watershed, along the New River mainstem, include large potential preservation tracts of a Natural Heritage Area: New River Swamps and Marshes.

This local watershed is included in the NCWRP Local Watershed Planning initiative [see page 24].

Brinson Creek, Wilson Bay, Jacksonville Urban Streams & upper New River Estuary Watershed [HU 03030001010050] and Northeast Creek & Little Northeast Creek Watershed [HU 03030001020010]

These two local watersheds together comprise over 90 square miles of land area, over 25% of which has been cleared and/or developed. These watersheds encompass the bulk of the Jacksonville urban area and the northern portion of Camp Lejeune Marine Corps Base. Impacts from stream channelization and urban stormwater runoff occur throughout these areas.



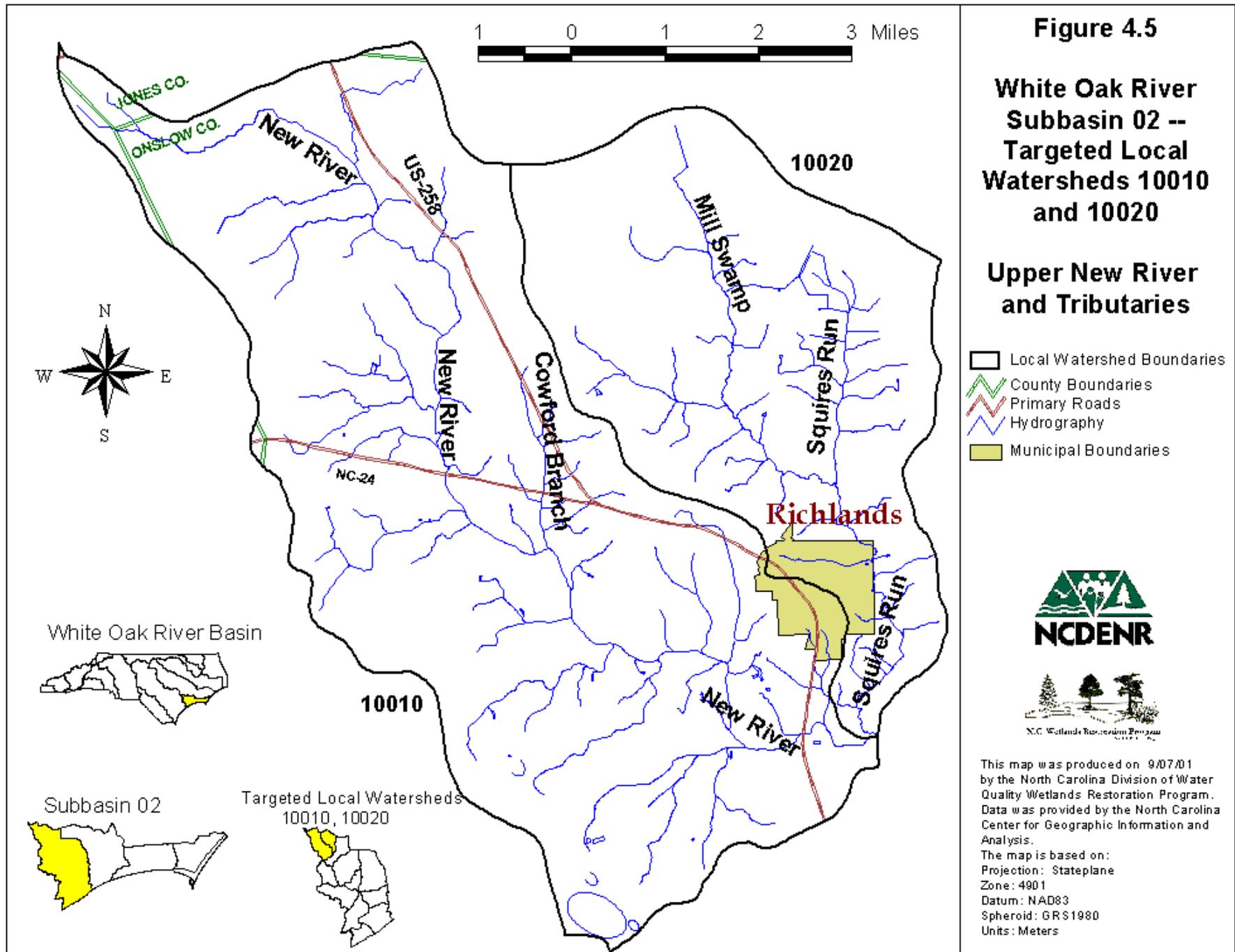
Opportunities for stream and wetland restoration (and implementation of stormwater BMPs) are actively being explored within these watersheds. CWMTF and 319 grant monies were obtained in fiscal years 1997 and 1998 to initiate some of these projects in the Jacksonville area. A current NCWRP project at Sturgeon City is designed to restore five acres of brackish marsh at the site of an old municipal wastewater treatment plant on Wilson Bay [photo at left]. A city park at the confluence of Northeast and Little Northeast Creeks in eastern Jacksonville contains what appear to be high-quality tracts of tidal forests [photo below left]. These and other sites create a foundation of wetland preservation and restoration properties that, if supplemented with additional restoration projects and water quality protection tools, could form the basis for long term water quality protection in these two watersheds.

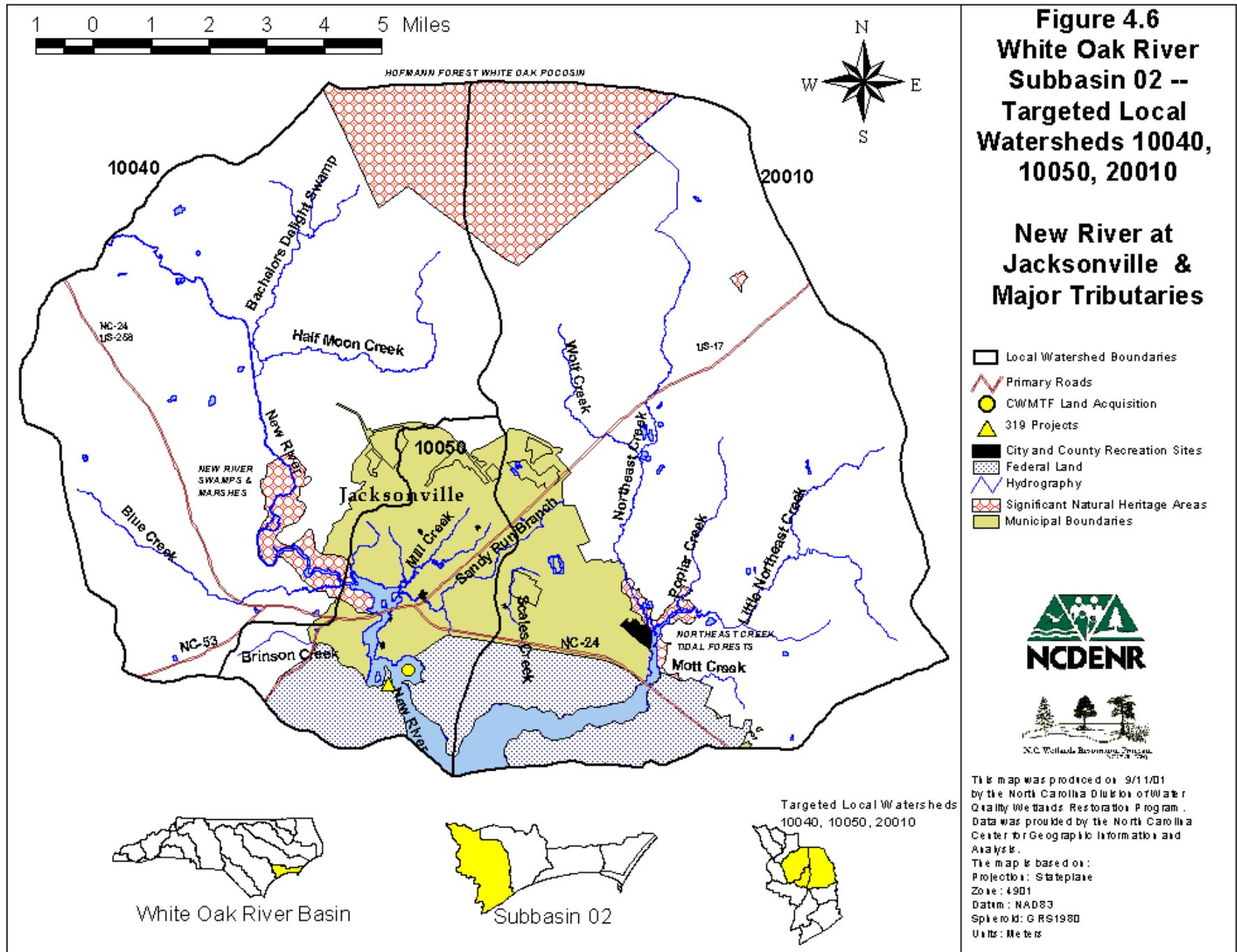


The Brinson Creek-Wilson Bay local watershed is included in the focus area for the NCWRP Local Watershed Planning initiative [see page 24]. This initiative is being developed in cooperation with the City of Jacksonville, Onslow County, and other local stakeholders.

Table 4.2 Summary Information for Targeted Local Watersheds in White Oak River Subbasin 02

TARGETED LOCAL WATERSHED	UPPER NEW RIVER & COWFORD BRANCH	MILL SWAMP & SQUIRES RUN	BACHELORS DELIGHT SW., HALF MOON CRK. & NEW R. MAINSTEM	BRINSON CR., WILSON BAY & UPPER NEW R. ESTUARY	NORTHEAST & LITTLE NORTHEAST CREEKS
County	Onslow	Onslow	Onslow	Onslow	Onslow
14-digit Hydrologic Unit #	030300010 10010	030300010 10020	030300010 10040	030300010 10050	030300010 20010
Land Area [sq. mi.s]	35.4	17.3	57.6	16.5	76.7
Impaired Waters? [NS or PS use support rating] ¹	Yes: mainstem New R. is PS for fish consumption	Not Rated [insufficient data]	Yes: mainstem New R. is PS for fish consumpt.	Yes: Brinson Cr. (2.9 mi.) is PS for fish consumpt.	Yes: Northeast Cr. (10.3 mi.) is PS for fish consumpt.
Possible Causes/Sources of Degradation ²	nutrient loading, channelization, habitat removal/degradation; new subdivisions, urban runoff, logging impacts [NPS]	nutrient loading, channelization, habitat removal/degradation; new subdivisions, urban runoff, logging impacts [NPS]	nutrient loading, channelization, habitat removal/degradation; new subdivisions, urban runoff, logging impacts [NPS]	nutrients, sediment in stormwater runoff; urban & agric. NPS; subdivisions, road construction	nutrients, sediment in urban & agric stormwater runoff [NPS]; subdivisions, road construction; stream clearing/de-snagging
Land Cover - % Cleared	45%	45%	27%	12%	19%
Land Cover - % Developed	2%	1%	2%	26%	6%
Land Cover - % Forested	52%	54%	71%	62%	75%
Shellfishing Waters? ³	No	No	No	No	No
NSW, HQW or ORW Waters? ⁴	NSW	No	NSW	NSW	NSW
Aquatic Natural Heritage Element(s)? ⁵	No	No	Yes	No	Yes
Current 319, CWMTF, or NCWRP Projects?	No - potential	No - potential	No - potential	Yes [319; NCWRP/CWMTF]	No - potential
<p>1 See Section 2 for a brief explanation of use impairment. See the <i>DWQ White Oak River Basinwide Water Quality Plan</i> for a more complete explanation of DWQ stream classifications & standards and use support ratings.</p> <p>2 Information on possible causes [e.g., habitat degradation, sediment & nutrient inputs] and sources [e.g., non-point source runoff from agricultural/logging areas] of water quality degradation and use support impairment is obtained primarily from the <i>DWQ Basinwide Water Quality Plan</i> and <i>Basinwide Assessment Report</i> for the White Oak basin. Habitat degradation includes instream sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools/riffles, removal of woody habitat, and streambed scour.</p> <p>3 Shellfishing Waters are DWQ Class SA waters, whose best use is commercial shellfish harvesting. All SA waters are, by definition, also considered to be High Quality Waters [HQW], which include critical habitat areas or primary nursery areas..</p> <p>4 NSW = nutrient sensitive waters. ORW = outstanding resource waters.</p> <p>5 Aquatic Natural Heritage elements are special species, habitats, or community types identified by the NC Natural Heritage Program and that occur, or spend some portion of their life cycle, in ponds, streams, riparian areas, or estuarine waters.</p>					





Subbasin 03-05-03

Area (square miles): 228

1990 Population Estimate: 11,404

Land Cover (%):

- Forest/Wetland 59
- Surface Water 26
- Urban 4
- Cultivated Crop 7
- Pasture/managed herbaceous 4

Water Area

Stream Miles: 18

Estuarine Acres: 34,723

Coastal Miles: 25

Shellfish Harvest Acres: 34,146

• **Summary of Impaired Waters**

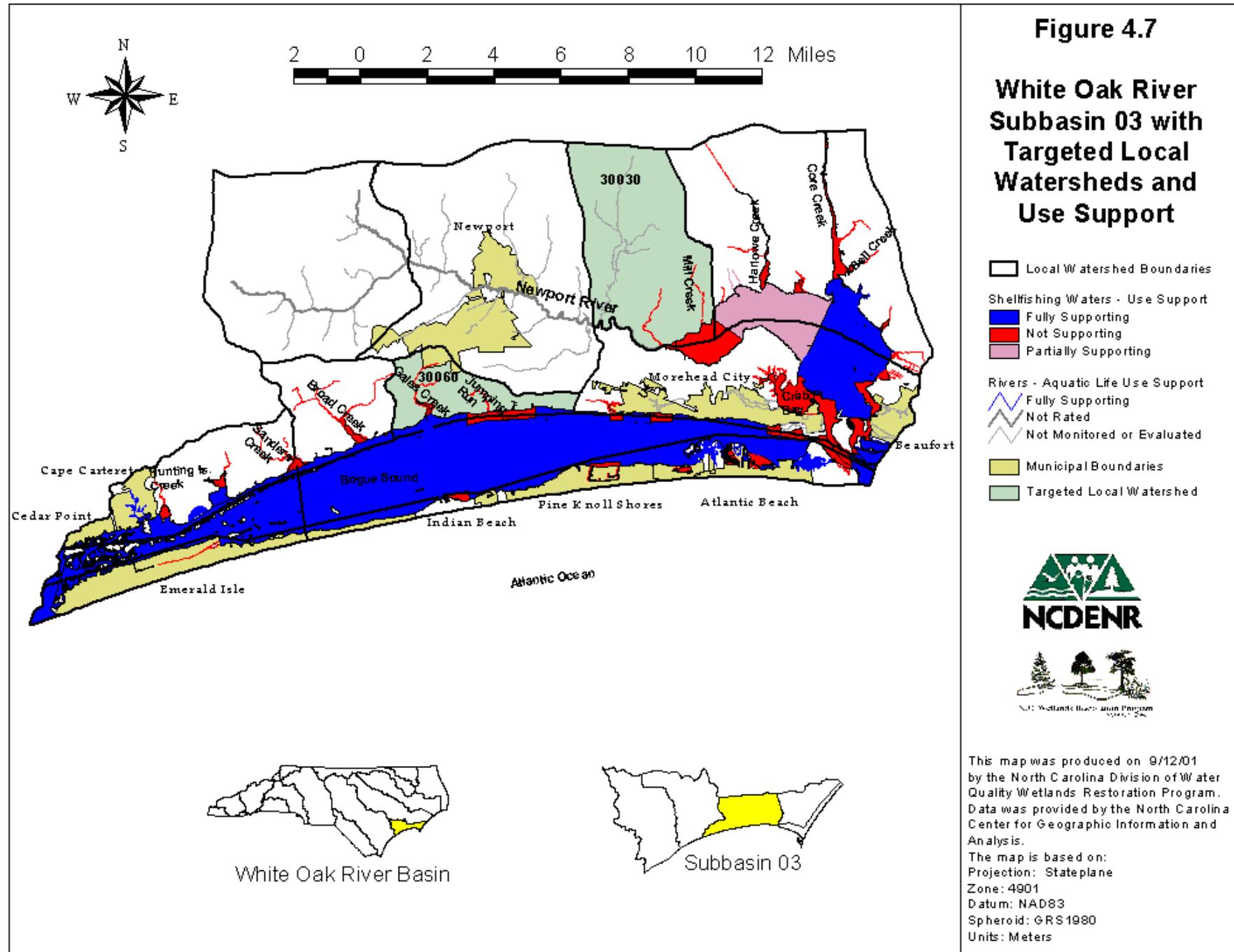
- *Aq. Life & Secondary Recreation*:
no impaired stream miles

- *Shellfishing Harvesting [SA waters]*:
2,763 acres Partially Supporting
4,700 acres Not Supporting

Subbasin 03-05-03

This subbasin encompasses the center of Carteret County, extending from Croatan National Forest and the Town of Cape Carteret to Beaufort and Beaufort Inlet, and including all of Bogue Banks and the Outstanding Resource Waters of western Bogue Sound. Most of the development is concentrated in the immediate coastal regions of Morehead City and Beaufort, and in the towns on Bogue Banks. Most of the waters in this subbasin are estuarine, with the Newport River the only major freshwater stream. Documented water quality impairment in this subbasin is due to pollution of estuarine shellfishing waters by fecal coliform contamination. This amounts to over 7,400 acres of impaired shellfish harvesting areas, which constitutes approximately 22 percent of the total designated shellfishing acreage of the subbasin. There are also indications of nutrient loading, channelization, and habitat degradation in the upper Newport River [DWQ, 2001]. Nonpoint source pollution in the form of stormwater runoff from urban areas, subdivisions, campgrounds, marinas, agriculture and forestry is the most likely source of water quality impairment in this subbasin.

Figure 4.7 depicts the use support ratings for streams and estuarine waters in Subbasin 03. It also highlights the two Targeted Local Watersheds chosen within this subbasin.



Targeted Local Watersheds in Subbasin 03



Table 4.3 summarizes pertinent information for the two Targeted Local Watersheds in this subbasin. Figures 4.8 and 4.9 depict the major hydrologic and resource features for the two TLWs.

Newport River, Black Creek and Mill Creek Watershed [HU 03020106030030]

This 20-square mile watershed includes a stretch of the Newport River and its tributaries just downstream of Newport, extending into the estuarine [class SA] waters of the Newport River due north of Morehead City. It encompasses approximately 300 acres of impaired shellfishing waters. The watershed is 99% forested, including large tracts of former pine plantation (ditched/drained pine flats and pocosins) which could provide good wetland restoration opportunities. The Division of Coastal Management (DCM) classifies much of the existing or altered wetland areas within this watershed as having *exceptional or substantial "functional significance"*, in terms of their water quality, hydrology, and habitat functions (DCM, 1999). Several local resource professionals commented on the development threat to the former pine plantation areas in this watershed, in addition to the encroaching development and new home sites [and septic systems] being constructed in the marginal (hydric) soils along Mill Creek and north of the Newport River. The NC Coastal Land Trust holds an easement on riparian lands amounting to over 1,100 acres along Black Creek and the Newport River in this watershed. According to one resource professional, there is at least one 319-funded agricultural project in the watershed.

Gales Creek, Jumping Run Creek and the ICWW Watershed [HU 03020106030060]

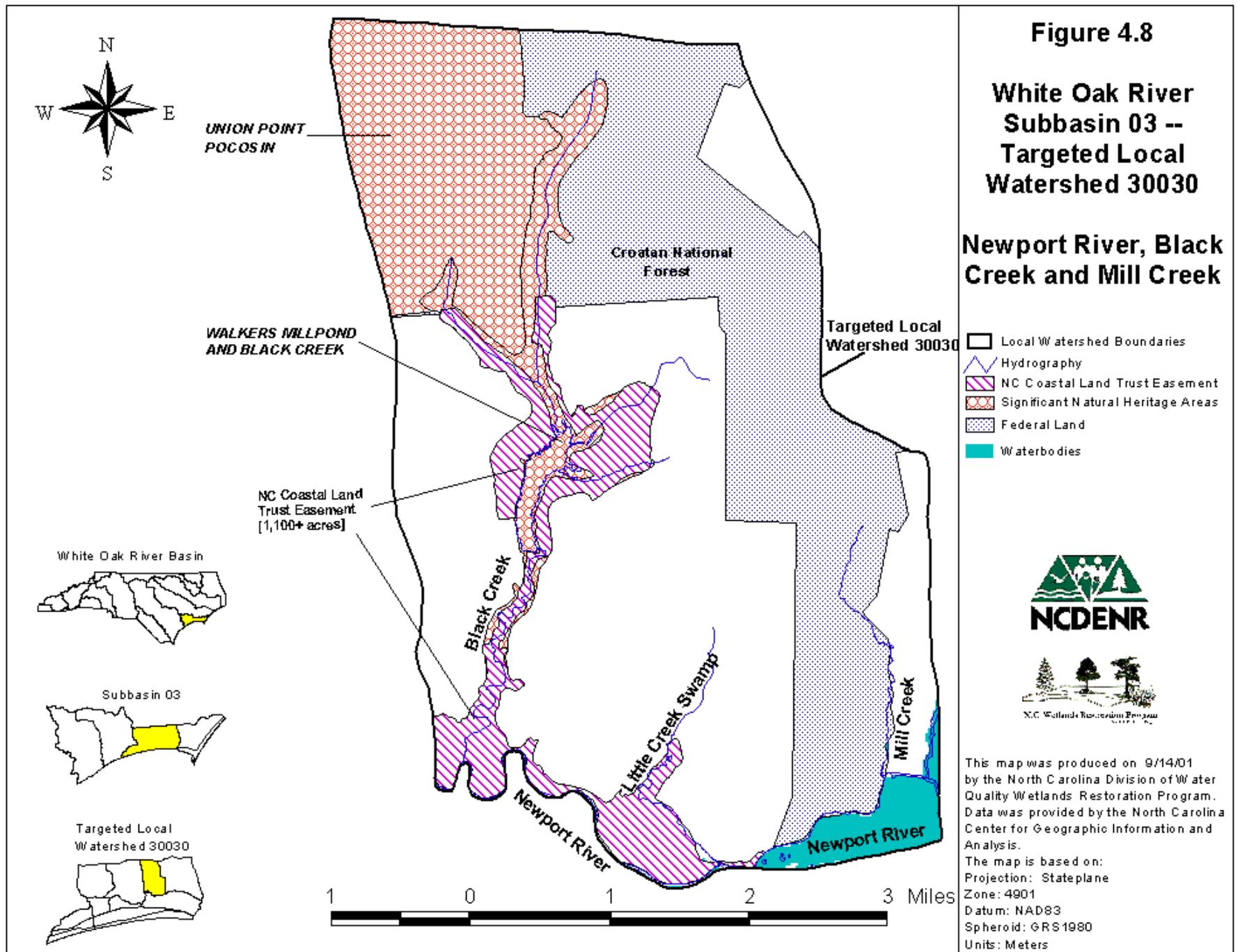
This relatively small local watershed (only 7.6 square miles in area) includes approximately 50 acres of impaired shellfishing waters attributed to fecal coliform contamination in storm water runoff. Under the direction of NC Sea Grant, Section 319 and CWMTF monies have been used to monitor water quality in the watershed and to implement demonstration-scale BMPs for urban planning and storm water management. The NCWRP, in collaboration with the Carteret-Craven Electric Cooperative (CCEC), is restoring 4.4 acres of

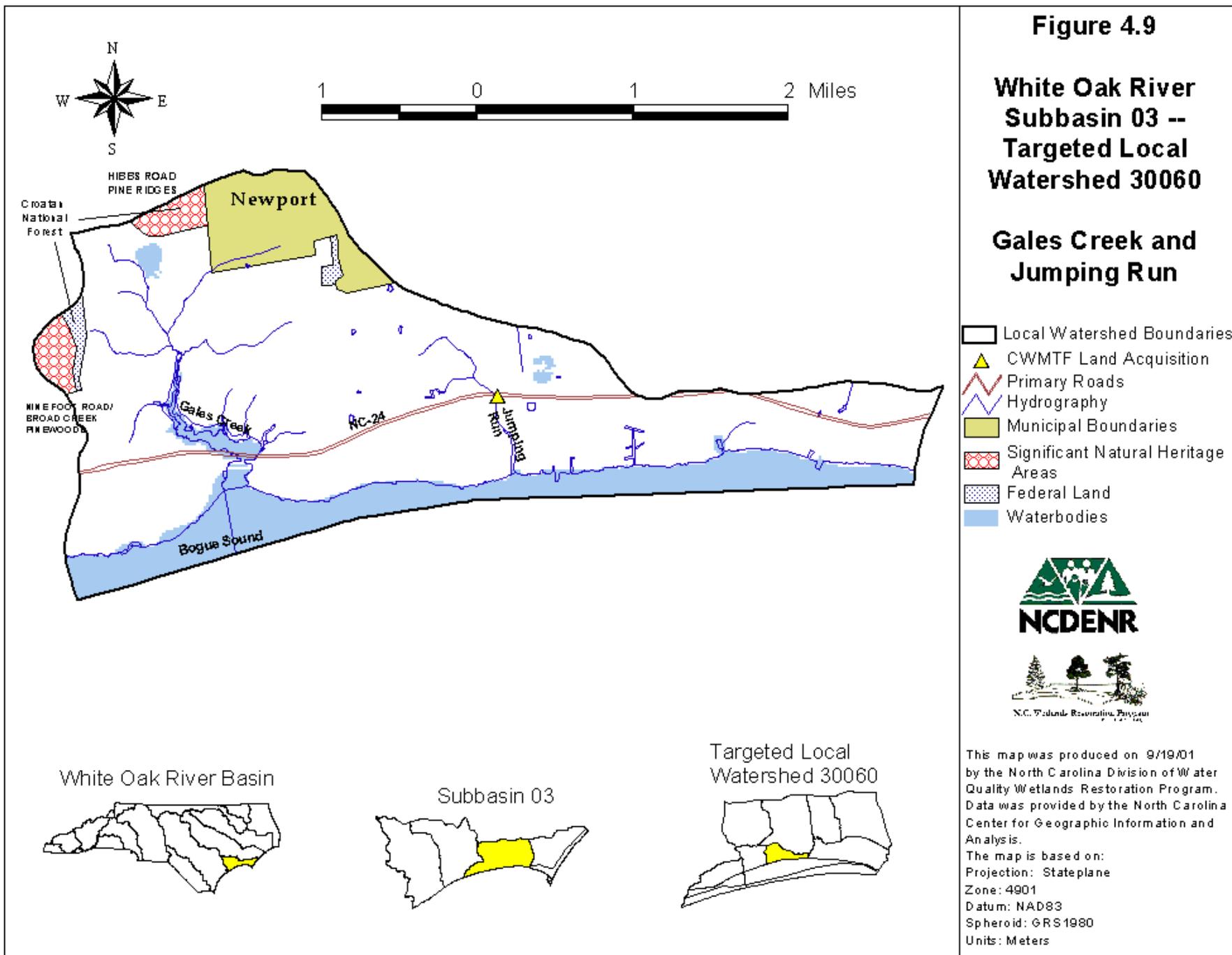


wetlands along Jumping Run Creek adjacent to the CCEC facility [photo at right]. This project is designed to restore headwater wetlands, provide retention and treatment of freshwater runoff from the upper Jumping Run Creek watershed, and reduce storm water inputs of nutrients and fecal coliform bacteria into closed shellfishing waters in the watershed. This project should contribute to the eventual removal of shellfish harvesting restrictions in local waters. It also represents a unique partnership between public agencies and private industry to work toward local water quality improvement. As this watershed faces future development pressures and expanding land clearing activities around Newport and Highway NC-24, identifying it as a Targeted Local Watershed is intended to encourage additional water quality and habitat restoration initiatives here.

Table 4.3 Summary Information for Targeted Local Watersheds in White Oak River Subbasin 03

TARGETED LOCAL WATERSHED	NEWPORT RIVER & BLACK CREEK	GALES CREEK, JUMPING RUN CREEK & ICWW
County	Carteret	Carteret
14-digit Hydrologic Unit #	030201060 30030	030201060 30060
Land Area [sq. mi.s]	19.7	7.6
Impaired Waters? [NS or PS use support rating] ¹	Yes: approx. 300 acres of SA waters are NS [upper estuary of Newport R.]	Yes: approx. 50 acres of SA waters are NS [Gales & Jumping Run Creeks]
Possible Causes/Sources of Degradation ²	fecal coliform in stormwater runoff [NPS]; subdivisions, marinas, agric./forestry, wildlife	fecal coliform in stormwater runoff [NPS]; urban areas, subdivisions, marinas, agric. lands, wildlife
Land Cover - % Cleared	1%	11%
Land Cover - % Developed	0%	7%
Land Cover - % Forested	99%	82%
Shellfishing Waters? ³	Yes	Yes
NSW, HQW or ORW Waters? ⁴	HQW [SA waters]	HQW [SA waters]
Current 319, CWMTF, or NCWRP Projects?	Yes [Coastal Land Trust; 319]	Yes [CWMTF; NCWRP]
<p>1 See Section 2 for a brief explanation of use impairment. See the DWQ <i>White Oak River Basinwide Water Quality Plan</i> for a more complete explanation of DWQ stream classifications & standards and use support ratings.</p> <p>2 Information on possible causes [e.g., habitat degradation, sediment & nutrient inputs] and sources [e.g., nonpoint source runoff from agricultural/logging areas] of water quality degradation is obtained primarily from the <i>DWQ Basinwide Water Quality Plan</i> and <i>Basinwide Assessment Report</i> for the White Oak basin. Habitat degradation includes instream sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools/riffles, removal of woody habitat, and streambed scour.</p> <p>3 Shellfishing Waters are DWQ Class SA waters, whose best use is commercial shellfish harvesting. All SA waters are, by definition, also considered to be High Quality Waters [HQW], which include critical habitat or primary nursery areas.</p> <p>4 NSW = nutrient sensitive waters. ORW = outstanding resource waters.</p> <p>5 Aquatic Natural Heritage elements are special species, habitats, or community types identified by the NC Natural Heritage Program and that occur or (in the case of species) spend some portion of their life cycle in wetlands, streams, riparian areas, or estuarine waters.</p>		

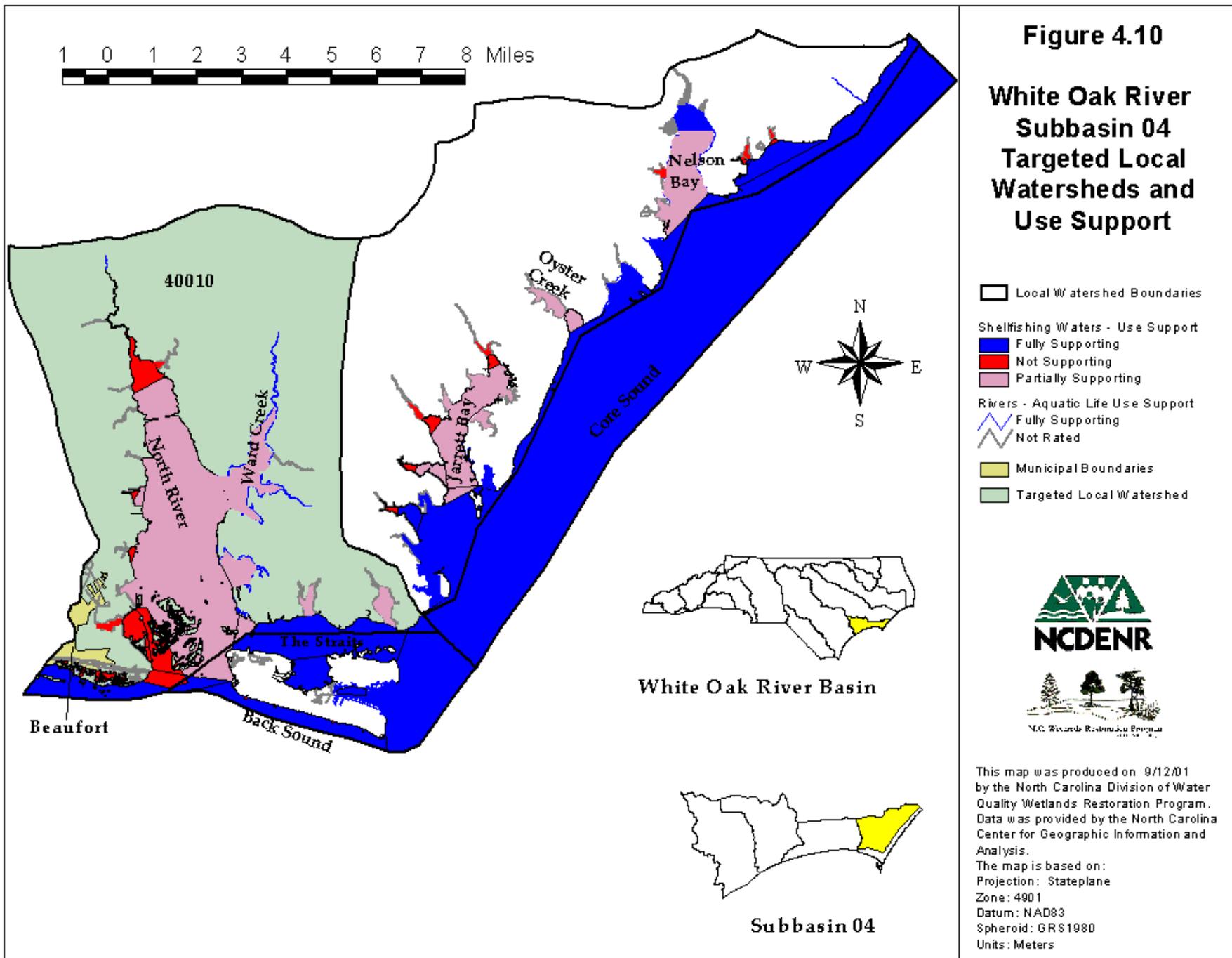




<u>Subbasin 03-05-04</u>	
Area (square miles):	170
1998 Population Estimate:	8,514
<u>Land Cover (%)</u> :	
• Forest/Wetland	35
• Surface Water	40
• Urban	1
• Cultivated Crop	23
• Pasture/managed herbaceous	1
<u>Water Area</u>	
Stream Miles:	6
Estuarine Acres:	39,498
Coastal Miles:	0
Shellfish Harvest Acres:	39,176
<ul style="list-style-type: none"> • <u>Summary of Impaired Waters</u> - <i>Aq. Life & Secondary Recreation</i>: <ul style="list-style-type: none"> no impaired stream miles - <i>Shellfishing Harvesting [SA waters]</i>: <ul style="list-style-type: none"> 10,132 acres Partially Supporting 1,403 acres Not Supporting 	

Subbasin 03-05-04

This subbasin is dominated by the estuarine waters of the North River drainage, Core Sound, and the tributary bays to Core Sound stretching from Harkers Island to the Town of Atlantic. There are no major freshwater streams in this subbasin and no documented impairment of such waters, although the upper North River shows evidence of nutrient loading, channelization, and habitat degradation or loss (DWQ, 2001). A large portion of the land use is cultivated cropland (Open Grounds Farm), primarily former pocosin wetlands and pine flats that have been ditched and drained. In this subbasin, over 11,500 acres of class SA waters are considered impaired in the shellfish harvesting use support category, which represents approximately 30% of the total estuarine acres. The cause of impairment is fecal coliform bacteria contamination, whose primary sources include runoff from subdivisions, agricultural land, domesticated animals, forestry practices, wildlife, and septic systems (DWQ, 2001). These impaired shellfishing waters include the North River-Ward Creek waters and most of the major tributary bays to Core Sound [see Figure 4.10].



Targeted Local Watersheds in Subbasin 04

Of the four local watersheds which comprise this subbasin (one of which is simply the open waters of Core Sound), one watershed has been selected as a Targeted Local Watershed for stream and wetlands restoration: the North River - Ward Creek drainage system. Table 4.4 summarizes important information for this watershed, and Figure 4.11 depicts its major hydrologic and natural resource features.

North River and Ward Creek Watershed [HU 03020106040010]

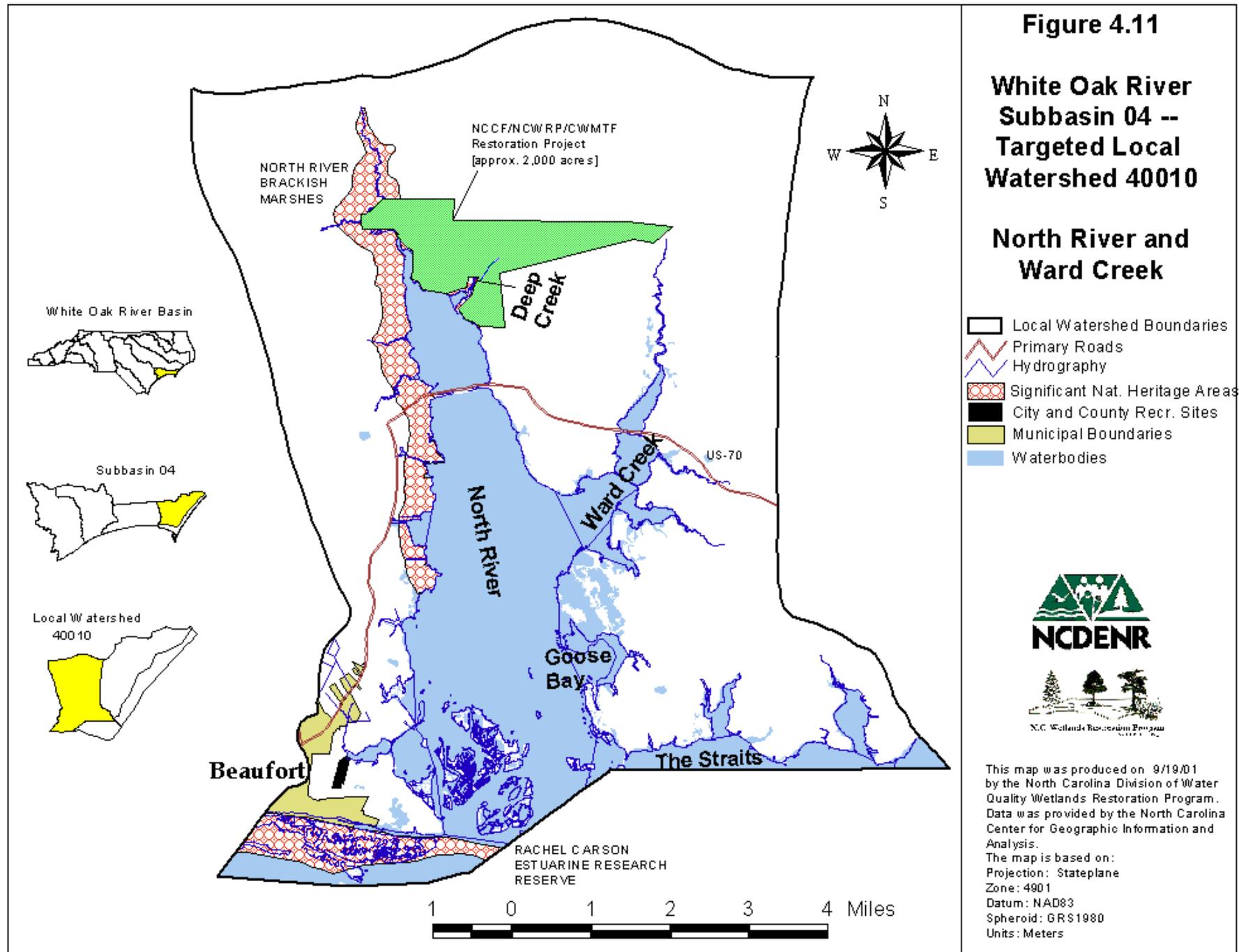
This 66-square mile watershed is dominated by the estuarine waters of North River, Ward Creek, Goose Bay, and The Straits just north of Harkers Island. Nearly 50% of the land area has been cleared, primarily for agriculture (Open Grounds Farm). Over 9,000 acres of class SA waters are rated as impaired for the shellfish harvesting use support category in this watershed. The North River and Deep Creek brackish marsh wetlands are considered a Significant Natural Heritage Area, and a major restoration project is under way on approximately 2,000 acres of land at North River Farms in central Carteret County. This project is a joint effort involving CWMTF, 319, NCCF and NCWRP resources; it includes marsh restoration, forested wetland restoration, and riparian buffer establishment in an area abutting the upper North River and Deep Creek [see Figure 4.11]. It encompasses more than 30,000 linear feet of drainage canals [photo



at left] and more than 70,000 feet of inter-field ditches, and it is designed to treat runoff from 10,000 acres of cropland. As such, it will be one of the largest habitat and water quality restoration projects in the nation. Its basic goal is to improve water quality in the North River estuary, which is a primary nursery area for Core Sound fisheries. Additional opportunities for wetlands restoration may exist in this watershed -- along Ward Creek and its tributaries and the tributary bays to North River and The Straits.

Table 4.4 Summary Information for Targeted Local Watershed in White Oak River Subbasin 04

TARGETED LOCAL WATERSHED	NORTH RIVER & WARD CREEK
County	Carteret
14-digit Hydrologic Unit #	030201060 40010
Land Area [sq. mi.s]	66.2
Impaired Waters? [NS or PS use support rating] ¹	Yes: > 9,000 acres of SA waters [North R., Ward Cr. & tributary bays/creeks] are PS or NS for shellfish harvesting
Possible Causes/Sources of Degradation ²	fecal coliform in stormwater runoff [NPS] from subdivisions, agric. land, wildlife; upper North River: nutrient loading, channelization, habitat loss/degradation
Land Cover - % Cleared	45%
Land Cover - % Developed	1%
Land Cover - % Forested	54%
Shellfishing Waters? ³	Yes
NSW, HQW or ORW Waters? ⁴	HQW [SA waters]
Aquatic Natural Heritage Element(s) ⁵	Yes
Current 319, CWMTF, or NCWRP Projects?	Yes [CWMTF/NCCF/NCWRP North River restoration project: approx. 2,000 acres]
<p>1 See Section 2 for a brief explanation of use impairment. See the DWQ <i>White Oak River Basinwide Water Quality Plan</i> for a more complete explanation of DWQ stream classifications & standards and use support ratings.</p> <p>2 Information on possible causes [e.g., habitat degradation, sediment & nutrient inputs] and sources [e.g., nonpoint source runoff from agricultural/logging areas] of water quality degradation is obtained primarily from the <i>DWQ Basinwide Water Quality Plan</i> and <i>Basinwide Assessment Report</i> for the White Oak basin. Habitat degradation includes instream sedimentation, bank erosion, channelization, lack of riparian vegetation, loss of pools/riffles, removal of woody habitat, and streambed scour.</p> <p>3 Shellfishing Waters are DWQ Class SA waters, whose best use is commercial shellfish harvesting. All SA waters are, by definition, also considered to be High Quality Waters [HQW], which include critical habitat or primary nursery areas.</p> <p>4 NSW = nutrient sensitive waters. ORW = outstanding resource waters.</p> <p>5 Aquatic Natural Heritage elements are special species, habitats, or community types identified by the NC Natural Heritage Program and that occur or (in the case of species) spend some portion of their life cycle in wetlands, streams, riparian areas, or estuarine waters</p>	



Important Local Watersheds Outside Targeted Local Watersheds

The 12 local watersheds that have been "targeted" in this Plan represent those which, in the best professional judgment of the NCWRP and based on the best available information, are (1) likely to provide the best opportunities for stream, wetlands, or riparian buffer restoration; and (2) which may have ongoing water quality initiatives and projects that could be linked with NCWRP restoration projects; and (3) which also have a clear and significant need for water quality and aquatic habitat restoration. The fact that a given local watershed within the White Oak River Basin may not have been selected as a Targeted Local Watershed in this Plan does not necessarily mean that the watershed is not worthy of water quality or habitat restoration initiatives. The White Oak River Basin contains many local watershed units, beyond the 12 Targeted Local Watersheds identified in this plan, that may hold unique or significant natural resources and that may be affected by nonpoint source pollution.

One interested citizen in the White Oak River Basin brought to our attention a sub-watershed within a local watershed that we have not specifically targeted in this Plan. Wading Creek is a small tributary stream that flows directly into the Newport River estuary about one mile north of Beaufort. [It is within the Harlowe Creek-Core Creek-lower Newport River watershed unit.] It is an impaired water body, with 16 acres from its source to the Newport River closed to shellfish harvesting due to excessive fecal coliform bacteria levels (DWQ, 2001). According to observations made by local citizens, its degradation has occurred primarily within the last few years, and there are no obvious sources of pollution in this small watershed. It, like so many other tidal creeks in the White Oak basin, has most likely been impacted by contaminated storm water runoff from urban and/or agricultural areas (including possible contributions from wildlife populations, waterfowl, etc.). It was reported that landowners along Wading Creek would be eager to work with the NCWRP in any restoration efforts that might be undertaken here in the future (Hooper, personal communication, 2001). The NCWRP appreciates the information and recommendations we receive from interested citizens in the Basin. We generally focus our restoration efforts in Targeted Local Watersheds (TLWs); however, we will consider other opportunities for restoration projects that may fall outside of our TLWs, if they make good economic, hydrologic, and ecological sense.

Wetlands Restoration Program Local Watershed Planning Initiative

In addition to identifying Targeted Local Watersheds in our Watershed Restoration Plans for each of the major river basins in North Carolina, the primary aim of which is to encourage water quality and habitat restoration efforts in these local watersheds, NCWRP has also initiated Local Watershed Planning Initiatives in selected high-priority local watersheds across the State. NCWRP is using funds provided by the NC Department of Transportation (DOT) to develop Local Watershed Plans over the next seven years in watersheds with water quality restoration needs and where future DOT projects are expected to significantly impact wetlands, streams and riparian buffers. During fiscal year 2001-2002, a Local Watershed Planning process will be initiated in a cluster of local watersheds [14-digit NRCS hydrologic units] in Subbasin 02 of the White Oak River Basin. Local Watershed Plans will consider all sources of pollution/degradation in a watershed and recommend a comprehensive strategy for improving water quality through a consensus-driven process involving local stakeholders. In accordance with the overarching strategy of NCWRP, restoration projects identified through this process will

be linked to other water quality improvement efforts initiated at the local level, such as stormwater management projects, water supply protection strategies, land use planning guidelines, and BMPs for reducing sediment and nutrient pollution.

Bonnie Duncan is the NCWRP Watershed Planner for this initiative in Subbasin 02 of the White Oak basin, and she can be contacted at (919) 733-5315 for additional information regarding this effort.

SECTION 5: CONTACT INFORMATION FOR THE WHITE OAK RIVER BASIN

The NCWRP can implement restoration projects cooperatively with other state or federal programs or environmental groups. The NCWRP believes that integrating wetland or stream restoration with other projects such as stormwater management practices, agricultural BMPs, or pollutant source studies will often increase the overall water quality benefits of the project. In selecting Targeted Local Watersheds, the NCWRP considers completed and current restoration efforts in the watershed to determine if there are opportunities to link NCWRP projects with these efforts through the watershed approach. *Section C* of the White Oak River Basinwide Water Quality Plan (DWQ, 2001) -- *Current and Future Water Quality Initiatives* -- provides a comprehensive overview of current and planned water quality initiatives and projects in the White Oak River Basin, some of which may act as building blocks for current or future NCWRP project efforts. Many of these projects are highlighted in the discussion of Targeted Local Watersheds (Section 4) in this Plan.

The following tables provide contact information for the key projects and programs discussed in Section 4 of this Plan.

Table 5.1 Contacts for **Federal** water quality programs and initiatives in the White Oak River Basin.

ORGANIZATION/PROGRAM	CONTACT	ADDRESS	PHONE	E-MAIL / WEB SITE
Environmental Protection Agency Region IV 319 Program	Tony Able	U.S. EPA, Region 4 Coastal & NPS Section 61 Forsyth St., S.W. Atlanta, Georgia 30303	(404) 562-9273	mailto:able.tony@epa.gov www.epa.gov
USDA - Natural Resource Conservation Service				www.nc.nrcs.usda.gov
Carteret County	Todd Kelly District Tech.	P.O. Box 125 Beaufort, NC 28516	(252) 728-4078	mailto:todd-kelly@nc.nacdnet.org
Jones & Craven County	Andrew Metts District Conservationist	302 Industrial Drive New Bern, NC 28562-5434	(252) 637-2547	mailto:ametts@nc.usda.gov
Onslow County	Harry Tyson District Conservationist	604 College St. Jacksonville, NC 28540	(910) 455-4472	mailto:htyson@nc.usda.gov <u>v</u>

Table 5.2 Contacts for **State** water quality programs and initiatives in the White Oak River Basin.

ORGANIZATION/PROGRAM	CONTACT	ADDRESS	PHONE	E-MAIL / WEB SITE
Clean Water Management Trust Fund	Eastern Field Rep. - Damon Tatem	505 Copley Dr. Kill Devil Hills, NC 27948	(252) 441-6672	mailto:damon@cwmtf.net
Division of Forest Resources District 4	Ralph Cullom, District Forester	3810 M.L.King Jr. Blvd. New Bern, NC 28562	(252) 514-4764	mailto:ralph.cullom@ncmail.net
Division of Land Resources Land Quality - Erosion Control	Dan Sams Wilmington Regional Office	127 Cardinal Drive Ext. Wilmington, NC 28405	(910) 395-3900	mailto:rick.shiver@ncmail.net
Division of Soil and Water Conservation - District Offices				www.enr.state.nc.us/DSWC/
Carteret	Todd Kelly	P.O. Box 125 Beaufort, NC 28516	(252) 728-4078	mailto:todd-kelly@nc.nacdnet.org
Jones		P.O. Box 40, Market St. Trenton, NC 28585	(252) 448-2731	
Onslow	Bill Norris	604 College St., Jacksonville, NC 28540	(910) 455-4472	mailto:bill_norris@co.onslow.nc.us
Cooperative Extension Svc.				
Carteret County	Ray Harris, Ext. Director Lisa Wimpfheimer	303 College Circle, Morehead City, NC 28557	(252) 222-6352	mailto:ray_harris@ncsu.edu
Onslow County	Diana Rashash	604 College St. Jacksonville, NC 28540	(910) 455-5873	mailto:diana_rashash@ncsu.edu
Jones County	Minton Small, Ext. Director	P.O. Box 218 Trenton, NC 28585	(252) 448-9621	
Division of Water Quality				www.h2o.enr.state.nc.us
Wilmington Regional Office	Rick Shiver, WQ Supervisor	127 Cardinal Drive Ext. Wilmington, NC 28405	(910) 395-3900	mailto:rick.shiver@ncmail.net
Basinwide Planning Program	Cam McNutt Basinwide Planner	1617 Mail Service Center Raleigh, NC 27699-1617	(919) 733-5083 ext. 575	mailto:darlene.kucken@ncmail.net http://www.h2o.enr.state.nc.us/basinwide/index.html
Section 319 Grant Program	Sean Groom	1617 Mail Service Center Raleigh, NC 27699-1617	(919) 733-5083 ext. 582	Sean.Groom@ncmail.net http://www.h2o.enr.state.nc.us/nps/319.htm
Wetlands Restoration Program	Hal Bryson - Watershed Planner Larry Hobbs - Project Implementation	1619 Mail Service Center Raleigh, NC 27699-1619	(919) 715-7452	mailto:hal.bryson@ncmail.net mailto:larry.hobbs@ncmail.net http://www.h2o.enr.state.nc.us/wrp/index.htm
Modeling Unit/TMDLs	Michelle Woolfolk	1617 Mail Service Center Raleigh, NC 27699-1617	(919) 733-5083 ext. 505	mailto:andy.mcDaniel@ncmail.net
Division of Marine Fisheries	Anne Deaton	127 Cardinal Drive Ext. Wilmington, NC 28405	(910) 395-3900	mailto:anne.deaton@ncmail.net
DENR - Div. of Environmental Health	Alice Anderson, Pest Mgt. J.D. Potts, Shellfish Sanitation	205 Country Aire Suites, Morehead City, NC 28557	(252) 726-8970 and -6827	mailto:alice.anderson@ncmail.net mailto:jd.potts@ncmail.net

Table 5.3 Contacts for **Local** Water Quality Programs and Initiatives in the White Oak River Basin.

ORGANIZATION/PROJECTS	CONTACT	ADDRESS	PHONE	E-MAIL / WEB SITE
Duke University Marine Lab	Michael Orbach; Bill Kirby-Smith	135 Duke Marine Lab Road Beaufort, NC 28516-9721	(252) 504-7655	<a href="http://www.env.duke.edu/marin
elab/marine.html">http://www.env.duke.edu/marin elab/marine.html mailto:mko@duke.edu
City of Jacksonville, NC	Glenn Hargett, Community Affairs		(910) 938-5220	http://www.ci.jacksonville.nc.us/
New River Foundation, NC Watershed Coaliton	Pauline Joos	P.O. Box 1543 Jacksonville, NC 28541	(910) 347-4830	mailto:joos@earthlink.net
NC Coastal Federation	Jim Stephenson	3609 Hwy 24 Newport, NC 28570	(252) 393-8185	mailto:jims@nccoast.org
NCWRP - Local Watershed Planning Initiative	Bonnie Duncan, Watershed Planner	1619 Mail Service Center Raleigh, NC 27699-1619	(919) 733-5315	mailto:bonnie.duncan@ncmail.net
White Oak River Advisory Board	Christy Perrin NCSU - WECO	Box 8109, 332 Nelson Hall Raleigh, NC 27695	(919) 515-9602	mailto:christy_perrin@ncsu.edu
Carteret-Craven Electric Coop.	Craig Conrad	P.O. Box 1499 Morehead City, NC 28557	(252) 247-3107	mailto:craig.conrad@carteretcraven.ncemcs.com
Carteret County	Stacy Allen, Dept. of Planning	Courthouse Square Beaufort, NC 28516	(252) 728-8497	mailto:stacya@mail.co.carteret.nc.us
NC Coastal Land Trust	Camilla Herlevich	3806-B Park Ave. Wilmington, NC 28403	(910) 790-0392	mailto:nccoast@wilmington.net
USMC Marine Corps Base Camp Lejeune	Scott Brewer, Environmental Mgt. Div.	PSC Box 20004 Camp Lejeune, NC 28542-0004		

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- NC Wildlife Resources Commission, Division of Inland Fisheries. *Fisheries Management Plan for the White Oak River Basin*. May 1998.
- White, Nancy. N.C. State University, School of Design - Extension Programs. Personal Communication to NCWRP, August 2001.

APPENDIX 1

LIST OF TARGETED LOCAL WATERSHEDS

The following is a comprehensive list of local watersheds targeted by the NCWRP in the White Oak River Basin. Other agencies, individuals and private groups are encouraged to target their search for restoration sites within these local watersheds. The watershed codes are the fourteen-digit codes for each local watershed in the state that have been designated by the USDA Natural Resources Conservation Service (NRCS).

<u>DWQ Subbasin</u>	<u>Local Watershed Name</u>	<u>14-Digit HU Code</u>
01	Upper White Oak River & Gibson Branch	030201060 10010
01	Webb Creek, Holland Mill Crk. & White Oak River	030201060 20010
01	Pettiford Creek & lower White Oak River	030201060 20030
01	Queen Creek and Parrot Swamp	030201060 20060
02	Upper New River and tributaries	030300010 10010
02	Mill Swamp and Squires Run	030300010 10020
02	Bachelors Delight Swamp & New River	030300010 10040
02	Brinson Creek, Wilson Bay & New River Estuary	030300010 10050
02	Northeast and Little Northeast Creeks	030300010 20010
03	Newport River and Black Creek	030201060 30030
03	Gales Creek and Jumping Run	030201060 30060
04	North River and Ward Creek	030201060 40010