

I-26 Stream Mitigation

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Abstract

Completion of the I-26 Corridor on new location, from Asheville, North Carolina to the Tennessee state line, would result in 9,900 feet of impact to trout and non-trout waters. In order for the North Carolina Department of Transportation (NCDOT) to construct the road project, the U. S. Army Corps of Engineers (USACE) required in its Section 404 Individual Permit that the NCDOT mitigate for 25,000 feet of stream in Madison County, North Carolina. The purpose of this requirement was to compensate the trout resource for these impacts; the NCDOT was not equipped to conduct this compensatory mitigation. The NCDOT then entered into an agreement with the N. C. Wildlife Resources Commission (NCWRC). Since 1990, the NCWRC had been conducting efforts to improve stream habitat for trout. To aid this mitigation project, a team approach was taken and involved the NCDOT, USACE, WRC, N. C. Division of Water Quality (NCDWQ), and U. S. Fish and Wildlife Service (USFWS). The first approach taken by the team was to identify streams in need to repair due to loss of biological functions. The trend developed that streams needing the most work had landowners not willing to participate in the mitigation project. At this point, the team enlisted the aid of the Natural Resources Conservation Service (NRCS) and the Soil and Water Conservation District to implement the program. The team realized that the NRCS and SWCD had developed relationships with landowners interested in stream work, particularly with erosion problems. With the aid of the NRCS office, a public meeting was held and many interested persons attended. Mitigation planning reports have been developed and conservation easements signed. Three mitigation sites have been implemented. The NCDOT is now working with a similar team in two other North Carolina trout counties.

Introduction

The North Carolina Department of Transportation (NCDOT) is constructing a new segment of I-26 from Mars Hill, North Carolina to the North Carolina/ Tennessee state line near Sams Gap (TIP No. A-10). This link is an important part of the I-26 corridor from Cincinnati, Ohio to Charleston, South Carolina that was included in the Appalachian Development Highway Program Section of the 1973 Highway Improvement Program. The purpose of this act is to improve transportation connections through the Appalachian mountain region.

The final segment of the I-26 corridor in North Carolina included nine (9) miles of road construction on new location across mountainous terrain and traversed a relatively undeveloped area of North Carolina. The project had been divided into two sections for construction purposes: Section C is 6 miles in length and Section D is 3 miles in length. Section C had been described as the largest single construction project in the history of the NCDOT because the project has a contract award of \$105.6 million in October 1996. The NCDOT had to remove unstable soil material prior to actual construction of the highway. By the end of June 1999, the NCDOT had excavated 14.5 million cubic yards of material of an estimated 23.4 million cubic yards. As of June 1999, the NCDOT had spent \$ 3.3 million on sediment and erosion control measures; the budgeted amount was \$ 2.0 million for the entire section. Silt excavation was up to 142,000 cubic yards and over 13,000 linear feet of erosion control silt fence had been used.

Section D had a contract award of \$48.5 million in January 1998 and had the highest cut and fill slopes of the two sections with a 600 foot cut and a 200 foot high fill slope. Construction included a 220 foot high bridge. By the end of June 1999, the NCDOT had excavated 2.3 million cubic yards of material of an estimated 8.85 million cubic yards. Silt excavation had already exceeded 116,000 cubic yards.

Environmental agencies expressed concern over the project and its impacts to natural resources that included 11.79 acres of wetlands and 9,900 feet of stream. Many of the streams in the project area provided high quality habitat for trout. Native brook trout were found in several of these streams, and other streams provided habitat for rainbow trout. The North Carolina Wildlife Resources Commission (NCWRC) managed several of the streams in the project area, including the stocking of streams to enhance public fishing opportunities. This fishing resource was important for its recreational value and as an indicator of environmental health. Trout populations have been shown to be extremely sensitive to water quality degradation, and are dependent on sediment free rocky stream bottoms.

The U. S. Army Corps of Engineers (USACE), Wilmington District and other resource agencies expressed concern regarding the expected impacts on trout streams and tributaries. The agencies were concerned with the loss of stream habitat resulting from the numerous, lengthy culverts and piping to be installed. However, the potential of sedimentation and runoff from upland construction and watershed clearing were of even greater concern.

The USACE decided to require compensatory mitigation for the stream channels that would be placed in pipes and culverts, thereby permanently buried under the highway. The USACE recommended that the NCDOT locate nearby streams suitable for enhancement that were similar in size or larger.

The NCDOT had expected to mitigate for wetland impacts resulting from the road project. The NCDOT had a wetland mitigation site already purchased and an in-depth mitigation planning study underway. The NCDOT believed that this wetland mitigation proposal would enable the NCDOT to meet its compensatory mitigation under Section 404 of the Clean Water Act. However, the requirement for stream mitigation was unexpected. The NCDOT did not have the technical knowledge or expertise to implement such a mitigation requirement. This type of mitigation was also new ground for the USACE. Since 1997, the NCDOT has worked cooperatively with interested agencies to plan and implement stream mitigation to comply with this requirement.

The purpose of this paper is to describe the process, problems and solutions encountered by the NCDOT and the resource agencies in this effort to implement a compensatory mitigation requirement for impacts to trout streams.

Section 404 Permit Requirements

The USACE issued a Section 404 Individual Permit for TIP No. A-10 on August 28, 1996 (USACE Action Id 199505135). This permit included wetland mitigation as well as two additional requirements.

The permit requires that the NCDOT monitor its construction-related impacts. The NCDOT implemented a monitoring program that included qualitative studies of fish and macroinvertebrates, sedimentation, and pH. The NCDOT collected baseline data for the monitoring program along impacted streams and control streams, streams that are in the same watershed but not impacted by project construction. The NCDOT has been monitoring the construction of TIP No. A-10, and providing information collected to the USACE and other environmental agencies. Biannual meetings have also been held to discuss the results of the monitoring program.

The USACE also requires that the NCDOT provide 25,000 feet of mitigation for stream impacts associated with project construction. A copy of the draft Memorandum of Agreement between the NCDOT and the NCWRC was included in the permit. The topic of this paper is the implementation of this permit requirement.

NCDOT/ NCWRC Memorandum of Agreement

The NCDOT sought the assistance of the NCWRC when it became apparent that the USACE would require compensatory mitigation for impacts to trout habitat. The NCWRC has considerable expertise in fishery habitat enhancement and has been improving/rehabilitating trout streams in western North Carolina for some time.

This mitigation project provided an opportunity for the two state agencies to work together for mutual benefit; the NCDOT would benefit by implementing stream mitigation as part of its permit to construct I-26 and the NCWRC would benefit by improving and restoring trout streams in western North Carolina. Accordingly, the two agencies signed a Memorandum of Agreement (MOA) to establish this working relationship. The MOA states that the NCDOT would adhere to the following terms:

- a) compensate the NCWRC at \$50.00 per foot of mitigation work, for a maximum amount of \$1,250,000;
- b) handle land acquisition and compensation for stream mitigation sites identified by the NCWRC; and,
- c) provide funds to cover costs associated with any required maintenance for five (5) years after completion of the stream work.

The NCWRC has assumed responsibility for implementing the following terms of the MOA:

- a) identify the preferred mitigation areas for implementing for 25,000 feet of off-site trout stream enhancement mitigation;
- b) develop mitigation planning documents approved by the USACE and NCDOT;
- c) implement all physical stream restoration/enhancement activities described in the approved mitigation planning document;
- d) complete mitigation work within five (5) years of MOA execution or within three (3) years of the date of receipt of easement;
- e) meet the established criteria of the mitigation planning document; and,
- f) maintain the stream mitigation work for ten (10) years after the NCDOT completes its maintenance requirement.

Mitigation Review Team

Construction of the final stretch of I-26 was the first project in North Carolina to require stream mitigation. The NCDOT believed that it would be best to assemble a team that included the natural resource agencies to implement this new, ambitious program. The initial mitigation review team (MRT) consisted of biologists from the NCDOT, USACE, NCWRC, North Carolina Division of Water Quality (NCDWQ), and U. S. Fish and Wildlife Service (USFWS). A representative from the NCDOT Right of Way Branch (ROW) attended the meetings because this person was responsible for conducting landowner contacts for the mitigation work. The purpose of this group was to solve problems associated with implementing this new mitigation concept.

After several team meetings, the MRT realized that additional expertise was needed to solve certain problems. Both the Natural Resources and Conservation Service (NRCS) and the Madison County Soil and Water Conservation District (SWCD) were brought in as full members. Other divisions of the NCDOT, including Hydraulics, Location and Surveys, and Legal Section, did not become team members but provided valuable technical assistance, experience and man power to meet the mitigation need.

Issues Encountered by the MRT

The MRT had the responsibility of resolving issues and working to implement mitigation on trout streams. Issues that the MRT had to resolve included:

- ? clarification of the MOA
- ? identification of mitigation sites
- ? selection of mitigation sites
- ? acquisition of the mitigation site
- ? stream buffer widths
- ? success criteria
- ? monitoring practices
- ? assignee of the conservation easement
- ? enforcement of the conservation easement
- ? maintenance of the conservation easement
- ? Section 404/401 authorization to implement the mitigation work.

As of this paper, the MRT has met eight (8) times. The issues and solutions addressed by the MRT for this paper include NCDOT/NCWRC MOA, mitigation site selection, land acquisition (conservation easements) and monitoring/success criteria.

Clarification of the MOA

Once it became apparent that the USACE would require compensatory mitigation for stream impacts, the NCDOT/ NCWRC discussed, drew up and signed the MOA within a six month time period. The MOA was hastily put together in order to meet the requirements of the Section 404 Individual Permit for stream mitigation and to meet the NCDOT's date to let the project to construction.

The initial MRT meeting in February 1997 began with a review of the MOA signed by the NCDOT and NCWRC to satisfy the Section 404 compensatory mitigation requirement. The purpose of this review was for the MRT to understand its mission and to begin brainstorming about how to implement this mitigation program. From this review, the MRT noted that ambiguity existed in the MOA's goals, long term maintenance was not adequately addressed in the MOA, and that the MOA was unclear in its accounting of stream mitigation footage.

The MRT realized that the MOA established two potentially conflicting goals. One goal was meeting the linear footage requirement of 25,000 feet of mitigation, which was the NCDOT's priority. However, the MOA also created a second goal; the incentive for exhausting the entire \$1.25 million that was established to perform the mitigation work. The MRT agreed that the goal for the stream restoration was to restore 25,000 linear feet of streams for stream impacts associated with the construction of TIP No. A-10. Funding for this mitigation effort ceased when the linear footage goal was met.

The MOA stated that conservation easements would be maintained by the NCDOT for five (5) years after implementation and ten (10) years by the NCWRC after the NCDOT's maintenance period ended. The MRT noted that the issue of long term maintenance (for perpetuity) was not considered in the MOA nor was the NCWRC provided with funding for their maintenance of the easement and mitigation work. It was suggested that the money from the MOA be placed in a trust to acquire interest and replenish itself. The MRT also expressed concern that by setting money aside for maintenance sufficient funding would not be available to meet the restoration goal of 25,000 linear feet of stream. The question arose about the possibility of the NCDOT setting aside an extra sum of money to begin the maintenance fund. However, the NCDOT decided that since the MOA was intended to establish a partnering effort, the NCDOT would not provide any additional money to the NCWRC for its ten (10) year maintenance of the easements.

Confusion also existed in regard to the accounting system for crediting the NCDOT and NCWRC for mitigation work. Would mitigation credit be generated if the stream work occurred on only one side of the stream? How would the NCDOT be credited if only one side of the stream was restored? Should varying mitigation credits be implemented for differing types of mitigation work, such as fencing, being designated at a lower credit ratio than the installation of root walls.

The USACE said that the linear footage requirement included both sides of the stream banks. One side of the stream bank could be restored for mitigation credit, although the USACE discourages the pursuit of such mitigation. Mitigation credit could be generated by mitigation on one side of the stream bank, although such mitigation would not receive full the mitigation credit.

As for the issue of varying credit ratios based on the type of mitigation work implemented, the MRT decided that the wording of the MOA was unclear in the permit. It was decided that implementing a credit system for various types of mitigation work would not be fair at this time and that any type of mitigation work on both sides of the fence would constitute one foot of credit.

The NCDOT requested a modification to the Section 404 permit in April 1997 in order to place additional 912 feet of stream into a culvert. A dilemma developed over whether this impact was covered in the original permit, and therefore, whether the mitigation for this additional impact was included in the MOA. The NCDOT believed that this additional impact and any required mitigation were covered in the MOA. A 2:1 ratio was mentioned in the MOA and the Section 404 Permit. With 9,990 feet of impact permitted and 25,000 feet of mitigation to be implemented, the NCDOT believed that a buffer existed and that the additional impact was covered by the MOA.

The USACE decided that the stream impacts associated with the Section 404 permit modification request was not included in the buffer created between the impact, the proposed 2:1 mitigation ratio and the MOA goal of 25,000 feet of mitigation. Therefore, the NCDOT agreed to supplement the MOA to include the additional work resulting from the stream impacts authorized in modification of the Section 404 permit. Therefore, a supplemental agreement was signed by the NCDOT and NCWRC, thereby increasing the total mitigation work of the MOA by \$45,600 (912 additional feet of mitigation).

At the August 1997 meeting, the NCWRC updated the MRT concerning the MOA in regard to paying for easement maintenance work and the NCDOT's permit modification request from April 1997. The NCDOT decided that the NCWRC would receive the entire \$1.25 million for implementing the mitigation work. Any remaining funds from this money would be utilized for easement maintenance work by the NCWRC.

The MRT also realized that the MOA did not include money for long term maintenance of the mitigation sites. The NCWRC wanted the NCDOT to establish a maintenance account for the NCWRC to utilize. The NCDOT believed that it should not have to pay for the maintenance work done by the NCWRC after the NCDOT's maintenance period had ended. These issues could not be solved by the MRT and were directed toward the administrators of the NCDOT, NCWRC and the USACE.

The MRT also discussed the possibility of preserving stream corridors by purchasing easements and whether the NCDOT could generate credits for this preservation. The USACE informed the MRT that the purpose of requiring stream mitigation in the Section 404 permit for TIP No. AA-10 is not the preservation of stream stretches, but restoring streams. Therefore, the USACE would not consider preserving stream stretches as a part of the Section 404 compensatory mitigation requirement for streams; this mitigation type would not count toward the MOA mitigation goal. The USACE did note that preservation would be considered only if: a portion of the stream section had only preservation opportunities; the preservation section was part of a larger stream segment where restoration opportunities existed; and a threat to the stream section could be proven to exist.

In August 1999, the NCDOT had to modify the Section 404 permit for an additional stream impact. The MOA between the NCDOT and NCWRC was supplemented a second time for an additional \$ 21,650 to mitigate for 433 feet of stream.

The MOA was amended twice during its two and a half years of existence. The total amount of mitigation is now 26,345 feet. Total cost of mitigation based on the MOA is \$ 1,317,250.

Mitigation Site Identification

The MRT developed a protocol for finding suitable mitigation sites only after much discussion, and trial and error. The MOA stated that stream work had to be performed in Madison County, but there were not any other requirements.

The USACE suggested that the priorities for stream mitigation work should mirror those required for wetlands: in close proximity to the road project; in the same watershed; and, with similar stream characteristics to those impacted. Based on this recommendation, the MRT agreed that mitigation efforts should focus on two watersheds in the project vicinity. It was decided that U.S. Forest Service land would not be considered for stream mitigation on this project, since these areas are considered to be already protected.

Stream searches initially began by identifying potential mitigation sites based on the stream's need for mitigation work. The NCWRC conducted drive-by searches of stream stretches in Madison County and identify streams that needed bank stabilization, lacked buffers and shading, or offered other potential for enhancement.

The MRT acknowledged at the February 1997 meeting that the NRCS may be contacted to assist in identifying streams for restoration. The MRT did not intend at that time for the NRCS to become a member of the team but to assist in site identification by providing a list of landowners that were likely willing to have stream mitigation done on their property.

The NCWRC located several properties on which mitigation efforts were needed. The NCWRC contacted these property owners regarding the potential use of their property for stream mitigation. Contacts with the property owners did not fare as well as the search process did in identifying streams needing restoration. Many landowners did not have any interest in having their streams repaired. The landowners were satisfied with the present condition of the stream and did not want the government on their property. The MRT discussed these attempts to identify sites and that a different search approach was warranted.

The MRT decided that a public meeting was likely the best alternative to solicit potential mitigation sites. The purpose of the meeting was to inform the public about the MRT's efforts to improve and restore trout habitat in Madison County and to meet property owners that would be interested in this work. The MRT hoped that by starting with these interested landowners, their neighbors would become interested in stream mitigation either by seeing success or by neighborly persuasion. The MRT believed that some property owners may be able to convince other landowners better than the MRT. The USACE and NCWRC developed the presentation for the public meeting, and the NCDOT took a low profile with the public meeting.

In the summer of 1997, the MRT asked the NRCS and the SWCD to become team members because the MRT believed that these two agencies could assist in landowner contacts, site selection and stabilization practices related to farming and grazing. The mission of these two agencies is to protect natural resources by specifically assisting farmers in stream stabilization practices. The NRCS and SWCD had served the residents of Madison County for years and had formed good, trusting relationships with landowners. These two agencies also had experience in many of the techniques used to stabilize streams, such as fencing out livestock and installing watering devices.

The MRT decided that all Madison County residents should be invited to the meeting and opportunity to participate in implementing stream mitigation on their property. The MRT had considered at one time having only a private meeting with landowners contacted by the NRCS/SWCD. However, the MRT realized that potential mitigation sites could be excluded and property owners left out of participating in the mitigation project. The MRT noted that it was the public's resources that were impacted by the road project, and the public should have a voice in the mitigation. To disseminate information about the public meeting, a public notice was issued and placed in the local newspaper and local post offices. A local newspaper ran an article featuring the mitigation and public meeting to be held in January 1998. However, the NRCS/SWCD also specifically contacted and invited landowners who might have an interest in the stream mitigation. The NRCS and SWCD distributed information about stream mitigation, that was being referred to as the AA-10 Stream Restoration Program, to landowners that they encountered on a consistent basis.

Prospective landowners were informed that they would have to submit an application to participate in the program. The MRT believed that by submitting an application a landowner was formally expressing a willingness to participate in the stream restoration program. An application form included the property owner's name, address, phone number, stream name, estimated stream length on the property, estimated stream width,

existing land use, directions to property and questions regarding ownership (sole owner and owning both side of the stream). The back of the application included a map of Madison County so landowners could locate their property.

There were 35-40 people in attendance at the public meeting held in January 1998; this number of attendees exceeded the expected attendance figure for the meeting. At the public meeting, the USACE described the Section 404 permit process and its requirement of compensatory mitigation for the NCDOT=s impacts to trout streams. The NCWRC presented the NCDOT/NCWRC MOA, standard mitigation practices on streams to improve trout habitat, the general process that the mitigation would follow, and general information regarding easements. In addition to the distribution of applications, attendees also received two pamphlets developed by the NCWRC. One pamphlet focused on conservation easements and the other pamphlet concerned basic information regarding a landowner=s participation in the A-10 Stream Restoration Program.

As of August 1999, the MRT had received more than enough interest in stream mitigation on private property to meet its goal. Three were pushed forward to mitigation planning with a total linear footage of

Mitigation Site Selection

The MRT wanted to remove the element of perceived bias by the public in its stream selection process. Therefore, the NCWRC developed an index to rank a stream=s mitigation potential and need. This index enabled the MRT to justify stream selection. Criteria that the index rated included construction access, presence of existing utilities, potential historic structures, wasted materials present, potential public impacts, existing bank erosion, amount of altered riparian zone, existing in-stream habitat, and channel stability.

As the public meeting approached, the MRT contemplated in November 1997 the issue of being overwhelmed with applications as a result of its planned public meeting. The MRT decided that a prioritization of stream reaches was needed to assist in site selection. The MRT had already been contacted by one group of landowners interested in mitigation work along a creek that was outside of the two watersheds identified as a priority at February 1997 meeting. Criteria for application prioritization included: 1) proximity to the I-26 project; 2) the degree of degradation to a stream stretch (high restoration potential); 3) the amount (length) of stream available in corridor to perform mitigation; 4) the presence of trout/ fish species in the stream; 5) if the stream is a tributary to a high quality trout stream; and, 6) the proximity of the stream to other interested landowners. The MRT agreed that applications would be accepted for a month after the meeting, and then commence stream selection for mitigation work. This information on the prioritization and selection process was included in the slide presentation at the public meeting, so that the public would understand from the beginning how sites would be selected. Applications to have mitigation performed on a property were distributed at the meeting. An application form included the property owner=s name, address, phone number, stream name, estimated stream length on property, estimated stream width, existing land use, directions to property and questions regarding ownership (sole owner and owning both side of the stream). The back of the application included a map of Madison County so landowners could locate their property.

By March 1998, the NCWRC and NRCS had contacted and visited each landowner who had submitting an application to participate in the A-10 Mitigation Program. This site visit included a general assessment of the stream reach using the index developed by the NCWRC and a brief determination of the mitigation opportunities at each site. Other information collected on each site stream order/location in watershed, stream size, existing channel conditions, fish species present and/or NCWRC designation of stream, proximity of landowner to other interested landowners, and status of stream and property (i.e. if the landowner owned both sides of the stream). The sites were ranked based on the index rating. The MRT reviewed this information and decided which sites would be forwarded to conceptual mitigation planning.

During the meeting in March 1998, the question arose about allowing future interested landowners along a stream restored stream stretch in the program. The group response was that the MRT would be committed to the current project sites and that would still be interested in performing work on the land, although funding might not be available at that particular time. The NCDOT said that after the A-10 permit requirements are met for stream mitigation, funding additional easements would not be available. Therefore, landowners would relinquish rights in a conservation easement without receiving compensation for the land rights that they surrendered.

Acquisition of the Mitigation Site

The NCDOT usually acquires wetland mitigation sites in fee simple purchase (purchasing land outright from a property owner) and then implements mitigation work. The property is then transferred to a conservation group with the restriction that the property will be maintained in a natural state. This process has not proceeded as simply with stream mitigation as it did with wetland mitigation.

The difficulty in acquiring stream mitigation sites lies in obtaining landowner permission while still satisfying the Section 404 mitigation requirement. The MRT believed that the typical landowner would not accept this concept of fee simple acquisition for a stream reach. If a landowner=s property agreed to a fee simple acquisition, the original property would split into two properties with the NCDOT stream mitigation site located in the middle of the two properties. The landowner likely desired to maintain some control over the stream, such as access to the stream. Therefore, the MRT dismissed the concept of purchasing land in fee simple in order to implement the mitigation work.

The NCRS/SWCD had some experience in working with easements through its cost share program. The NCRS/SWCD established easements with landowners in order to assure that stabilization work benefits the environment. The standard time period of an easement in the cost share program between landowners in Madison County and the NRCS had been ten years. Another purpose of the temporary easement is for the NRCS to enter the property in order to perform work on the stream or to perform maintenance work along the stream reach. This type of easement would not effectively satisfy the requirement for perpetual protection of the USACE. Conservation easements offered a better alternative for site acquisition. The NCDOT purchased the conservation easement from the landowner. The NCDOT acquired certain land use rights over the property containing the stream that the landowner agreed to relinquish. The conservation easement had to be in perpetuity because the stream habitat loss was permanent and the Section 404 permit required that mitigation work remain in perpetuity. The conservation easement stated that it was in perpetuity, although the assignee must re-record the easement after twenty years. With conservation easements, the landowner convey land use rights to a particular person/group (i.e. assignee). Discussion of whom the assignee would be for the conservation easement was first initiated in May 1997. The NCDOT did not want to be the assignee of the easements after its five (5) year maintenance of the conservation easement was complete because the NCDOT=s mission of providing transportation services for its citizens does not include long term management of conservation areas. The NCDOT wanted another MRT member to be the assignee or know whom to give the easement. Legal problems also potentially existed if the NCDOT acquired the conservation easement from a landowner and then conveyed the easement to a separate entity that was unknown by the NCDOT and landowner at the time that the easement was originally signed. The MRT suggested that landowners be informed at the initial discussions that the NCDOT would purchase the easement, and transfer the easement to a conservation group after the NCDOT=s maintenance was completed.

The MRT discussed the possibility of private conservation groups receiving the easements, but this transfer would require additional funding as these groups expect to cover their costs. The MRT also considered conveying the easements to N. C Wetland Restoration Program (NCWRP), an agency whose mission is to restore wetlands and streams in North Carolina. The NCWRP was established with the authority to hold conservation easements, although restrictions included that the property must be five (5) acres in size, and a fee must be paid. The MRT realized that its sites did not meet the five acre minimum threshold, so the NCWRP was no longer considered as a potential assignee. Ultimately, the landowners settled the question. Many of the landowners were not willing to convey easements to the NCDOT or an unidentified conservation group.

In July 1998, the NCWRC agreed to be the assignee of the conservation easements. The NCWRC took this responsibility because it had worked very closely with the landowners and built trust with them. The NCDOT was included in the conservation easement but only as an administrator of the easement the NCDOT was paying for it.

The NCDOT ROW was responsible for overseeing the signing of the conservation easement. The NCDOT ROW noted an extended period of time may be needed to acquire the easement for several reasons, including: surveying the easement boundary on the property plat, negotiating with the conditions of the easement itself; appraising the value of the rights relinquished by the landowner via the easement, and the identifying tax benefits from the easement.

The NCDOT Legal Section developed a standardized conservation easement. This standardized easement established rights that the MRT required that landowner relinquish upon signing the easement. Several examples of conservation easements were reviewed by the MRT in order to understand the format, to determine what rights should be relinquished, and to ensure that the easement addressed all of its concerns.

Flexibility was a key part of working with property owners and negotiating rights to be assigned by both parties. Beginning with conceptual mitigation planning, the NCWRC began discussions with the property owner concerning the land use rights that would be purchased as part of the conservation easement.

The MRT discussed rights/ uses that would be allowable and unallowable in the easement. The MRT's concern regarding the rights involved the potential for water quality degradation since the purpose of the mitigation work was to improve habitat for trout. Rights of concern to the MRT included selective timbering and planting of row crops, particularly if a large amount of easement was established along the restored stream. The decision about acquiring and relinquishing some rights required resolution on a case by case basis. In the previous work on conservation easements, the NCWRC had endorsed selective trimming of trees that had shaded farmland and reduced crop growth. The MRT considered burning of vegetation inside the easement and the watering cattle directly from the stream as unallowable uses of the conservation easement.

The NCWRC used this standardized conservation easement document as a starting point for discussion with the property owner. Since the NCWRC was responsible for developing the mitigation plans and receiving the conservation easement, the NCWRC and the NCDOT ROW were both involved in discussions with the property owners.

The MRT also had to resolve the appropriate easement width. Discussion was first initiated on this topic at the May 1997 meeting. Based on its experience in property acquisition, the NCDOT ROW recommended that the MRT be flexible the easement widths. Since the width would depend on the landowner, the decision on an easement width would have to be made.

The MRT decided to establish a minimum width requirement so that a negotiating element with the landowner could be established. The MRT established a minimum easement width of thirty (30) feet, fifteen (15) feet from top of the stream bank.

Monitoring and Success Criteria

The MRT began discussing success criteria at its initial meeting in February 1997. One idea was to use the stream rating index that the NCWRC was developing to assist in gauging success. The initial process was to compare the initial score of the stream versus the yearly rating of the stream. The MRT noted that gauging success would be easier for physical aspects of stream work than for biological benefits derived from the mitigation work. The MRT also discussed testing for suspended sediments, amount of light, temperature, invertebrates present, dissolved oxygen, pH level and vegetation viability.

At the July 1998 meeting, the MRT reviewed a proposal from a group of local college professors regarding its interest in monitoring the stream sites and developing success criteria. Monitoring included water chemistry and temperature, level of coliform bacteria, diversity of aquatic macroarthropods, development of riparian vegetation, and bird use of the riparian zone. The sites were to be sampled throughout the year as appropriate for the type of monitoring. The MRT decided that the monitoring proposed by local college was not practical, and that the MRT should institute its own monitoring program for the mitigation sites.

However, the MRT has yet to finalize monitoring and success criteria for the mitigation sites associated with this mitigation project. It is expected that monitoring and success criteria will be more qualitative oriented in nature than quantitative. Types of monitoring are likely to include: reference photographs of vegetation and stream bank stability at established points along a stream segment; reference cross sections of the stream at established locations (once a year); recording of water temperature (during summer months); and, fish and benthic sampling. The monitoring of these stream segments may extend for four to five years.

The Stream Mitigation Process

The following information provides greater detail regarding steps taken in the stream mitigation process.

Conceptual Mitigation Plan

The NCWRC evaluated each stream to determine the needed restoration activities and developed the conceptual plans. The NRCS provided assistance for stream segments requiring livestock water devices and livestock crossings. The NCWRC discussed the mitigation concepts with the landowner so that the mitigation plan would not propose an action to which the landowner would later object.

The mitigation plan consisted of four sections: introduction, project objective, existing conditions and proposed mitigation actions. The planning document was written with the landowner in mind. An outline of mitigation actions to be undertaken on the property was included in the introduction such as the assignee of the easement, the need of location and survey work, the signing of the conservation easement and the development of design plans.

The existing conditions of the site were also noted, as well as the proposed mitigation actions. Mitigation actions suggested to this point included: improving stream sinuosity; constructing a floodplain; restoring trout habitat with plunge pools using root wads; planting riparian vegetation; and, excluding livestock from the stream by fencing and installing watering facilities.

The conceptual mitigation plan was also attached to the conservation easement. This information regarding the proposed mitigation actions also assisted with any enforcement against the landowner if the easement or actions taken as part of the mitigation activities were damaged.

Location and Survey Information

The conservation easement included a property boundary plat that depicted the easement limits. A continual concern for the NCDOT and NCWRC at all phases of mitigation planning was that a property owner would become unwilling to participate in the A-10 Stream Restoration Program. Location and survey work had the potential of being the most expensive component to mitigation planning. It was the opinion of the NCDOT and NCWRC that a signed easement would be the only guarantee that mitigation work would occur on a property. The NCDOT Location and Survey Unit (L&S) was relied upon to provide guidance for this part of the conservation easement.

The NCDOT asked the NCWRC to delineate a conservation easement boundary for a stream project, and NCDOT L&S performed a preliminary survey of the conservation easement for one property. The NCDOT realized that permanent access to the stream reach may be needed on some properties. The NCDOT recommended that the NCWRC also secure an ingress/egress easement in addition to the conservation easement. This second easement allowed the NCWRC to maintain access through the property to the conservation easement after the property had been purchased from the original owner. Based on this information and the valuable experience of the NCDOT L&S, the following suggestions became standard protocol in securing the property survey and pertinent easements.

The NCWRC representative delineated the conservation easement and any ingress/egress easement that are relatively straight in nature. The NCWRC conducted a review of these easements with the property owner to obtain concurrence for the boundary survey. The NCDOT L&S conducted a preliminary survey of the conservation and ingress/egress survey, securing enough points to reference the proposed easements on the property plat. The NCDOT ROW performed an appraisal of the property and conservation easement area, and an offer reflecting the fair market value

for the easement was made to the property owner. After agreeing to the rights relinquished in the conservation easement, the signed easement would be recorded in the county court house as part of the property. Upon finalization of the conservation easement, NCDOT L&S conducted a final monument survey of the conservation easement.

The NCDOT was concerned that I would invest many hours in the planning for a site, including mitigation planning, discussions with the landowner on the easement boundary and a boundary survey for the easement, only to have the property become unwilling to allow implementation of the stream mitigation. It was the opinion of the NCDOT and NCWRC that a signed easement would be the only guarantee that mitigation work would occur.

Design Plans

The mitigation concepts had to be translated into design plans so a contractor could bid to work on a project. The NCWRC began working on design plans after approval of the mitigation planning document and signing of the conservation easement.

The plan view of the site indicated the location of the conservation easement and a second plan view depicted station numbers and location of reference cross sections. Longitudinal profiles of the stream were also part of the design sheets that also contained profile data for reference streams. Cross sections of stream included sections of the mitigated stream and a table of cut and fill quantities. General notes consisted of stream bank profiles (such as stream bank stabilization and flood plain creation notes), structures (root wad installation and rock vane installation), as well as proposed plantings in the riparian zone. Site specific notes were the last item in the design plans such as contractor=s responsibilities, NCWRC=s responsibilities, equipment provided by contractor, and construction sequencing. Upon completion of the design plans, the NCWRC distributed these plans to the MRT for review and comments.

After the design plans were finalized, the NCDOT=s existing Section 404 permit was modified to authorize the mitigation work. The letter requesting modification included reference to the site name, completion of the conceptual mitigation planning document and a note if design plans had been altered since submission to MRT.

Implementation

Two sites had been implemented at the time of this paper, and a third site had been scheduled for construction. The NCWRC provided management and oversight of the project construction activities. Implementation required the use of a track hoe, rubber tire front end loader, dump truck and two to three laborers. Typically, the contractor constructs 100 to 200 feet of stream mitigation in a day.

Conclusions

The key ingredient to implementing stream mitigation was the landowner. The landowner had to be willing to have stream mitigation implemented on the property and to relinquish land use rights on the land containing the stream. Attempts to identify stream mitigation based on a stream=s need of mitigation proved unproductive. The established working relationship between the NRCS/SWCD and landowners enabled the MRT to identify mitigation sites more efficiently. The MRT identified potential mitigation sites through the public meeting to meet and exceed its mitigation goal of 26,345 feet.

Interagency cooperation provided diversity of knowledge and experiences that the MRT used to resolve problems and implement stream mitigation. The MRT allowed each concerned agency to voice thoughts on the implementation process from the beginning. This cooperation made the process productive because issues were dealt with during the process instead of backtracking after a decision was made.

Based on the experiences in implementing a stream mitigation program, the MRT has developed a general action plan to obtain a conservation easement and implement stream mitigation on a landowner=s property.

10 Identify stream mitigation sites by requesting the assistance of the NRCS office to identify potentially interested landowners.

20 Hold a public meeting to describe and discuss stream mitigation, its benefits, and conservation easements.

30 Contact applicants and evaluate restoration potential of a site.

40 Select mitigation sites for mitigation planning.

50 Develop a conceptual mitigation plan for the site.

60 Delineate a conservation easement boundary that the landowner approves.

70 Conduct a preliminary survey of the conservation easement boundary.

80 Appraise the land and conservation easement.

90 Sign the conservation easement, and record conservation easement to property deed.

100 Perform a final survey of the conservation easement limits, including monuments.

110 Develop design sheets for implementing the stream mitigation at the site.

120 Obtain Section 404/401 authorization to implement stream mitigation work.

130 Implement the stream mitigation design.

140 Monitor the mitigation work.