

Beaver Damage Management in North Carolina

Twenty-Eighth Summary Report

To NC General Assembly

July 1, 2019 through June 30, 2020



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Executive Summary



44

Counties
Participated



870

Projects
Worked



1,365

Beaver Dams
Removed



\$1,538,607

In Services
Provided

\$8,953,374

In Prevented
Damage

For every

\$1 spent,

\$5.82 in resources
were saved



Reduced NCDOT funding meant fewer projects were worked for preventative maintenance along highway rights-of-way.



Cost to the Landowner

\$25 per site visit

\$125 per dam removed

Beaver Management Assistance Program

Background

The North Carolina Beaver Management Assistance Program (BMAP) was created by state legislative action in 1992 with the express purpose of helping manage ever-increasing problems caused by beaver on private and public lands. The BMAP was structured to be flexible, fair, and feasible. Since its inception, the program has grown more than tenfold from four participating counties during its pilot version to 44 participating in 2019-20. Because of practical and ecological considerations, the program's goal is to address specific beaver damage problems rather than to eliminate beaver from the state. Beaver are present in all North Carolina counties. Their population is considered stable or slightly increasing and is conservatively estimated to be near 500,000. BMAP-related beaver removals account for about 0.5% of the total beaver population annually and around 17% of the total known annual beaver harvest (including recreational trapping and nuisance removals). Even if the combined recreational and nuisance beaver take was as much as 20,000 annually (or 4% of the estimated statewide population), this would have little to no effect on the beaver population. The program instead prioritizes activities first that remove threats to public health and safety, and secondly on assistance to landholders experiencing beaver damage.

The BMAP is implemented by USDA Wildlife Services (WS) through Cooperative Service Agreements with the NC Department of Transportation (DOT), NC Wildlife Resources Commission (WRC), participating counties, and private landholders through a cost-share system. The Cooperative Service Agreements between WS, DOT, WRC, and counties in this summary report cover activities from July 1, 2019 through June 30, 2020.

Beaver Damage Control Advisory Board

The Beaver Damage Control Advisory Board is composed of representatives from nine State/Federal agencies and non-governmental organizations. It meets annually to review the previous year's accomplishments and to make recommendations for the coming year to the Executive Director of the WRC.

Falyn Owens (Chair)	NC Wildlife Resources Commission
Tim Sherrill	NC Department of Transportation
Davis Brinson	NC Association of County Commissioners
Eric Galamb	NC Division of Soil and Water Conservation
Joseph Hudyncia	NC Department of Agriculture and Consumer Services
Bill Pickens	NC Forest Service
Anne Coan	NC Farm Bureau Federation
Justin Faircloth	NC Forestry Association
Todd Menke	USDA-APHIS-Wildlife Services

The Beaver Damage Control Advisory Board hosted a Legislative Field Day on September 13, 2019 near Mount Olive. The field trip included watching two beaver dams being removed with explosives. A short video was produced from footage captured during this event and can be viewed on the main BMAP webpage: www.ncwildlife.org/bmap.

The video can also be viewed directly on YouTube at: <https://www.youtube.com/watch?v=3Qrg6WInozc&feature=youtu.be>.

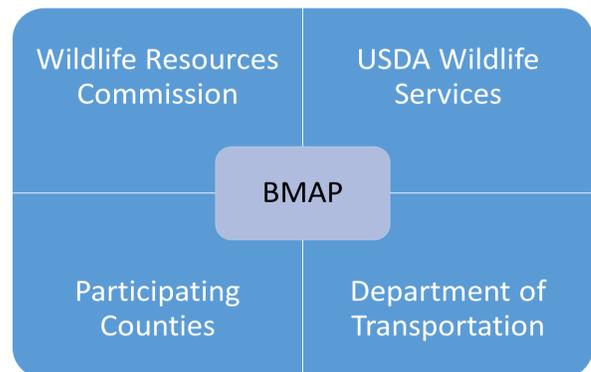


The photos above are from the Legislative Field Day which show a flooded corn crop and timber damaged by beaver in Duplin County. After USDA Wildlife Services conducted beaver damage management activities, normal water drainage was restored and all of these problems were corrected or mitigated.

Program Structure

The BMAP is composed of 4 major entities, each with its own expectations and guidelines.

NC Wildlife Resources Commission (WRC) funds beaver damage management activities as part of a cost-share program with participating counties and landholders within those counties. Activities are conducted to reduce water levels that threaten private roadways, timber, agricultural crops, and general property. Administrative authority for the BMAP rests with the WRC but enabling legislation and cooperative agreement allows WRC to transfer program implementation to USDA Wildlife Services.



NC Department of Transportation funds beaver damage management activities to provide services along state-maintained road rights-of-way in all 100 counties. Activities are conducted to reduce flooding that impacts state roads and threatens roadway infrastructure as well as human health and safety.

Individual counties have the choice to participate annually in the BMAP at various levels. Participation levels range from no participation to baseline participation, and counties have the option to provide additional funding to support expanded program services.

USDA Wildlife Services provides at least \$25,000 annually to facilitate program implementation, and its staff conduct all beaver damage management activities.

Funding Sources and Expenditures

Program funding by source and expenditures from July 1, 2019 through June 30, 2020 are summarized below:

Expenditure Type	Expenditures by Funding Source						Total Costs
	NCWRC	DOT	Counties Baseline	Additional County Funding (a)	USDA-WS (b)	Landholder Cost-Share Collections (c)	
Personnel Costs	\$270,209	\$394,883	\$127,661	\$215,613	\$0	\$45,352	\$1,053,718
Travel & Per Diem	\$793	\$569	\$0	\$0	\$0	\$0	\$1,362
Vehicle Usage (fuel, maintenance, repair)	\$22,556	\$34,559	\$2,084	\$18,312	\$0	\$0	\$77,511
Other Services (telephone, data lines, non-vehicle repairs & maintenance)	\$979	\$385	\$245	\$0	\$25,000	\$1,349	\$27,958
Supplies (, waders, tools, traps, explosives)	\$4,319	\$15,832	\$3,098	\$9,540	\$0	\$4,928	\$37,717
Equipment (laptops/ printers)	\$3,936	\$210	\$5,331	\$6,072	\$0	\$6,636	\$22,185
Pooled Job Costs	\$33,307	\$49,108	\$15,226	\$27,449	\$0	\$0	\$125,090
Indirect Costs to NCWS	\$33,307	\$49,108	\$15,226	\$27,449	\$0	\$6,409	\$131,499
Indirect Costs to APHIS	\$15,594	\$22,992	\$7,129	\$12,851	\$0	\$3,001	\$61,567
Total Expenditures (d)	\$385,000	\$567,646	\$176,000	\$317,286	\$25,000	\$67,675	\$1,538,607

(a) Counties providing additional funding:

Duplin \$135,000; Greene \$6,000; Lenoir \$17,800; Robeson \$61,000; Wayne \$66,792; Fayetteville \$17,694; Wilson \$13,000

(b) USDA Wildlife Services contributed \$25,000 to fund the BMAP in FY 2019-20. Wildlife Services provided additional indirect support to administer the program that is not included in the \$25,000.

(c) BMAP cost-share collections by Wildlife Services from landowners, municipalities, and other sources. As of July 1, 2020, \$7,125 in outstanding landowner cost-share invoices were over 90 days past due.

(d) All funds provided for the program by each funding source were spent in full, with an end-of-year balance of \$0.

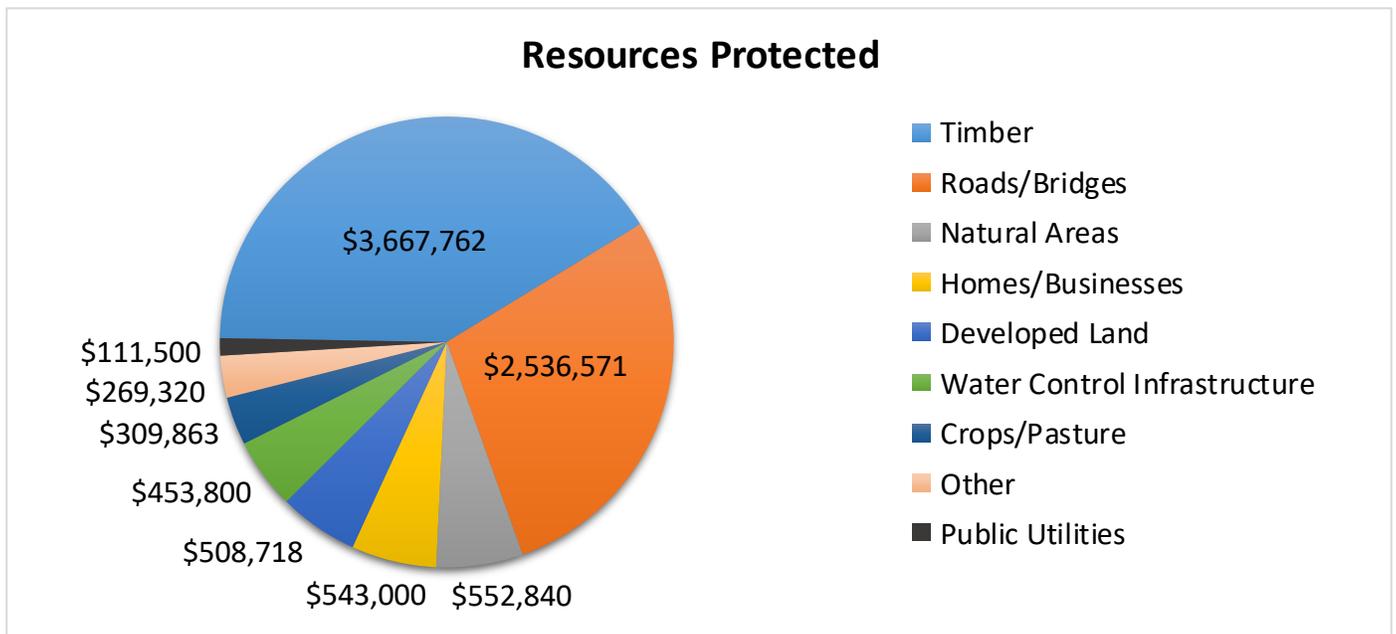
Program Statistics in Summary

The Cooperative Service Agreements between WS, DOT, WRC, and participating counties resulted in a total of 870 projects worked from July 1, 2019 through June 30, 2020. An additional 500 adjacent landholders benefitted from BMAP services at no cost to them.

Projects Worked	Dams Removed w/ Explosives	Dams Removed Manually	Beaver Removed
870	471	894	2,513

Damage Economics in Summary

USDA Wildlife Services staff and cooperators reported that BMAP services prevented the impending loss or repair expenditures of an estimated \$8,953,374 in roads and bridges, timber and other agricultural resources, railroad trestles, dams and ditches, city and county sewer systems and water treatment facilities, landscape plantings, and other resources such as homes, airport runways, and golf courses. Comparing BMAP expenditures to savings, the estimated cost benefit ratio was 1 to 5.82. In other words, for every \$1.00 spent, \$5.82 in resources were saved. Also, the benefits of BMAP services reported by the DOT does not include projected future savings estimates, which can be significant. Furthermore, the cost-benefit ratio does not include the benefits of educational activities such as training individuals to address their own beaver damage problems. It also does not include any state revenue generated from taxes on timber sales that otherwise would have been lost had beaver destroyed the timber, or indirect losses due to agriculture from farmers being prevented from planting or using land that is flooded or saturated.



In the chart above, Natural Areas include undeveloped areas that are not considered “working lands” (e.g., wetlands). Homes/Businesses include public buildings (e.g., schools and offices). Developed Land includes golf courses, landscaped areas, cemeteries, yards, etc. Water Control Infrastructure includes dams, dikes, ditches, and drainage systems.

Beaver Damage Examples

Beaver damage can take many forms, but the situations depicted below are typical.

The photos below show a pasture, road, and timber in Chatham County affected by two beaver dams. After BMAP activities were conducted, drainage returned to normal and all these damages were controlled.



In the photos below, timber and a railroad track were damaged due to a beaver dam inside a box culvert in Wake County. After BMAP activities were conducted, normal drainage was restored.



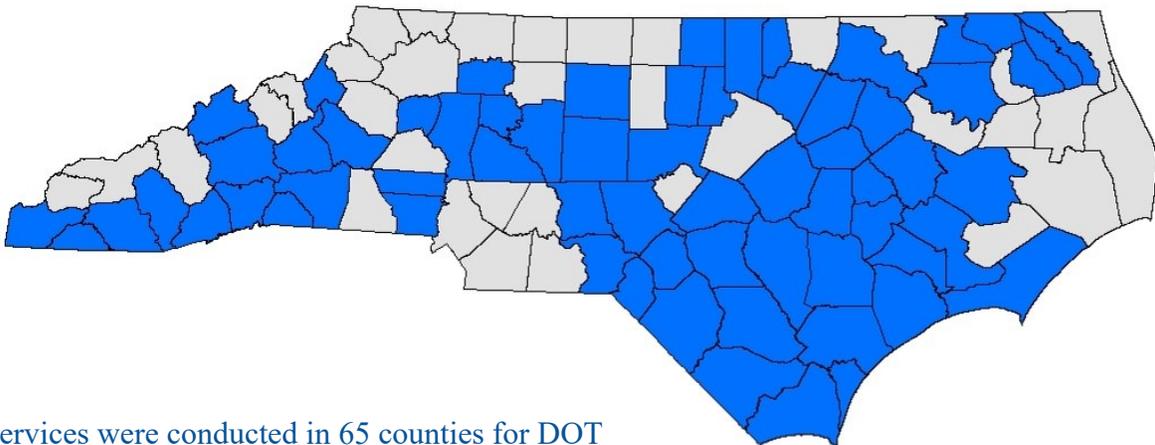
The photos below show water going over Banks School Road in Lenoir County that caused a car to hydroplane into a field. The left photo shows skid marks made by the car, and the right shows the car after skidding into the field. BMAP services prevented additional threats to the driving public.



NC Department of Transportation

Beaver management services to the North Carolina Department of Transportation (DOT) were available in all 100 counties regardless of a county's participation in the program. Due to health and safety concerns along roadways, DOT agreements continued to receive priority, but response to these projects was balanced against any backlogged requests on public and private lands. DOT received on average 4 to 6 completed agreements in counties where DOT work was done. Services were provided based on demand and the program's ability to meet those demands at current funding levels. Counties that did not participate in BMAP during this fiscal year received services on DOT rights-of-way where requested. There were no additional cost-share charges to the DOT relating to beaver damage management along state-owned highways, roads, and bridges throughout North Carolina. When beaver damage management work was conducted on adjacent properties to resolve a problem affecting DOT rights-of-way, those landholders were not charged for services.

Operational Statistics - DOT



BMAP services were conducted in 65 counties for DOT

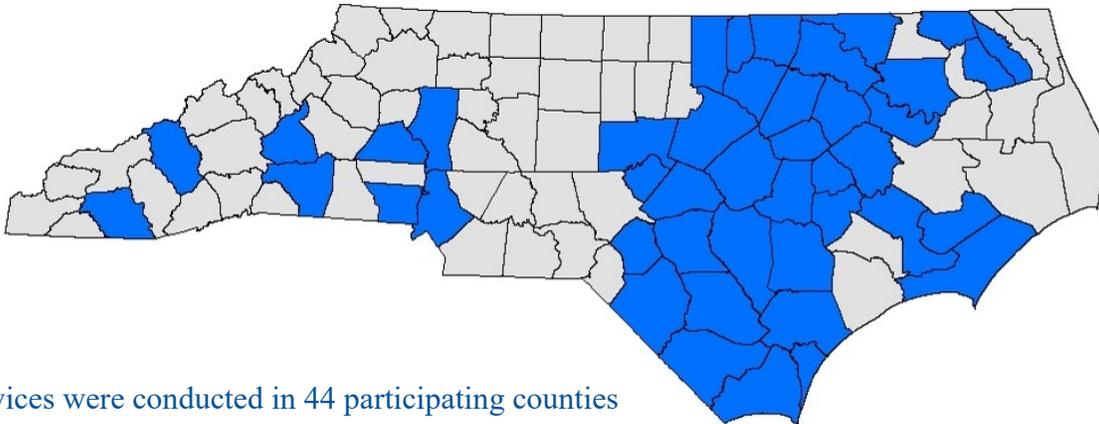
Beaver damage management activities were conducted on NC Department of Transportation property in 65 of North Carolina's 100 counties. DOT received a total of 305 completed projects, resulting in the removal of 846 beaver and 439 dams. In addition, WS worked with 400 adjacent landholders who benefitted from these services at no cost to them.

Projects Worked	Dams Removed w/ Explosives	Dams Removed Manually	Beaver Removed
305	83	356	846

NC Wildlife Resources Commission

The North Carolina Wildlife Resources Commission (WRC) funds beaver damage management activities as part of a cost-share program with participating counties and landholders within those counties. County participation is required before any direct beaver damage management assistance is provided to landholders. Participation in the program is open to all North Carolina counties. Participating counties received 10 to 14 agreements (6-8 non-DOT and 4-6 DOT) each, on average. Services in each county were provided based on demand and the program's ability to meet those demands at current funding levels.

Operational Statistics - WRC

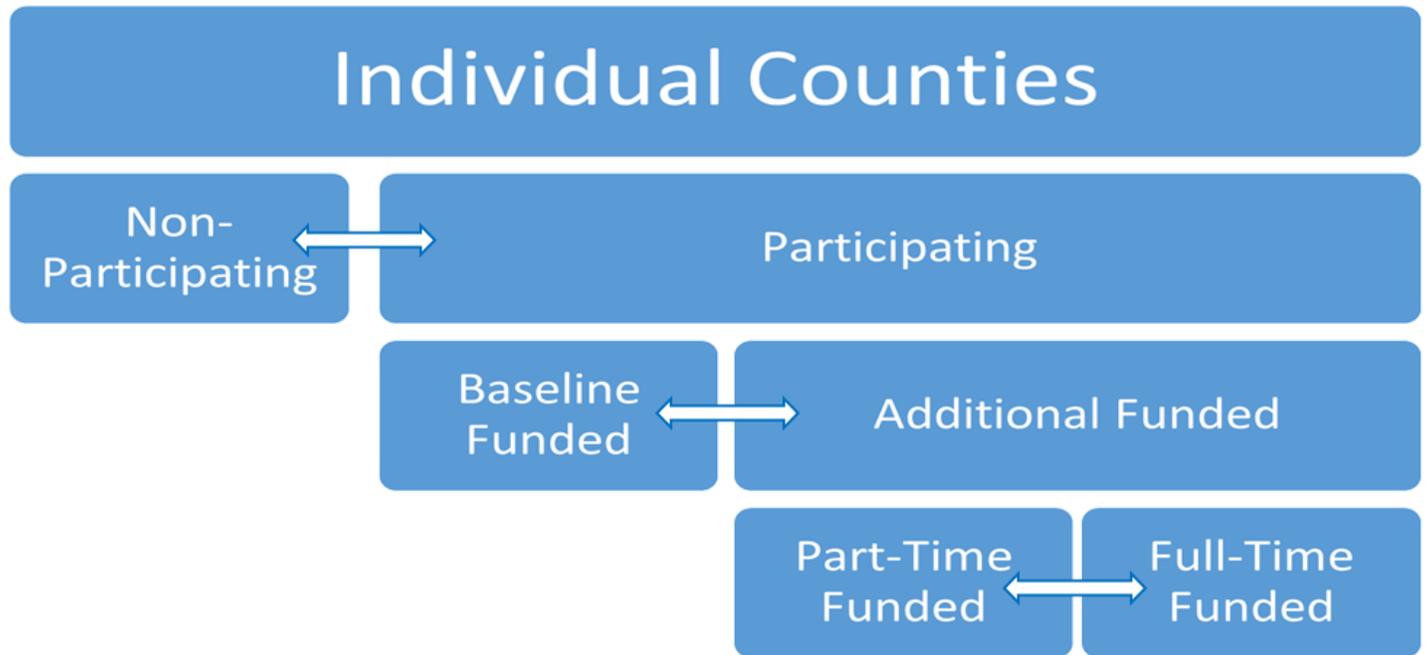


BMAP services were conducted in 44 participating counties

Beaver damage management activities were conducted in 44 participating counties with combined funding provided by WRC, participating counties, and individual landholders. A total of 446 projects were completed and resulted in the removal of 1,312 beaver and 681 dams.

Projects Worked	Dams Removed w/ Explosives	Dams Removed Manually	Beaver Removed
446	291	390	1,312

Individual Counties



Individual North Carolina counties are invited to participate in the BMAP on an annual basis and must opt in each year. Counties can choose several levels at which to participate, from baseline coverage to funding a full-time BMAP professional in that county (see diagram above).

Non-participating counties – Landholders in non-participating counties have access to beaver damage management services through USDA Wildlife Services if requested. They are not eligible to receive services at the BMAP cost-share rate and must pay full market cost for services rendered.

Participating counties at Baseline Funding – In FY 2019-20, counties could participate in the BMAP for a \$4,000 fee. A county’s participation fee is combined with funding provided by the NC Wildlife Resources Commission to offset the cost of beaver damage control services to landholders in that county. Landholders in participating counties were eligible for services as a reduced cost-share rate of \$25 per visit and \$125 per large dam. The 44 counties listed below participated at the baseline level during FY 2019-20.

Bertie	Cumberland	Halifax	Macon	Pasquotank	Wake
Bladen	Duplin	Harnett	Martin	Pender	Warren
Brunswick	Edgecombe	Haywood	McDowell	Perquimans	Wayne
Carteret	Franklin	Hoke	Mecklenburg	Pitt	Wilson
Catawba	Gates	Iredell	Nash	Robeson	
Chatham	Gaston	Johnston	New Hanover	Rutherford	
Columbus	Granville	Lee	Northampton	Sampson	
Craven	Greene	Lenoir	Pamlico	Vance	

Educational Activities

Advice and information, or “technical assistance” was provided to landholders statewide through on-site visits, written/telephone consultations, and educational programs and exhibits. USDA Wildlife Services distributed thousands of leaflets to landholders and the general public on how best to address beaver damage on their property. The BMAP strives to educate landholders and others about both positive and negative aspects of beaver activity so they can make informed decisions about management options on their land. If landholders decide to address a beaver damage problem themselves, whether by lethal or non-lethal means, they are always given the option to do so with direction and training provided by USDA Wildlife Services at no cost.

State Fiscal Year 2020-21

The BMAP continues to be popular among landholders, counties, municipalities, businesses, and the DOT. Landholders who request BMAP services are often faced with significant losses as a result of beaver activity. The severity of these losses is evident by sustained demand and support for the program. As in previous years, BMAP participants continued to show little interest in conducting damage management activities themselves, which is most likely due to lack of ability and/or time. USDA Wildlife Services specialists will, however, continue to make concerted efforts to encourage individuals to solve their own problems through on-site training and damage management workshops.

Estimated Funding Sources for State FY 2020-21

NC Department of Transportation	\$750,000
NC Wildlife Resources Commission	\$385,000
43 Participating Counties	\$258,000
USDA Wildlife Services	\$25,000
Private Cost-Share (estimated)	\$68,000
Counties Providing Additional Funds	\$452,000
Total	\$1,938,000

Obtaining Services

How Counties Participate

All counties were eligible to participate in FY 2019-20 through an annual participation fee of \$4,000 per county. Individuals residing in these counties could obtain assistance with beaver damage by contacting their county Cooperative Extension Service or Soil and Water Conservation District office. Statewide assistance with beaver damage problems was also provided to the DOT. All requests for assistance received an immediate response, but the start of direct assistance activities varied based on the workload of USDA Wildlife Services personnel at the time of the request.

Cost Share

Individuals in participating counties paid a small cost-share fee for services. There was no charge for time spent discussing the program and signing paperwork. During this assessment, USDA Wildlife Services personnel discuss both the positive and negative impacts of beaver with the landholder and recommend the best course of action. If damage management activities are recommended, time and costs are estimated before work begins. Landholders wishing to conduct their own work were provided individualized training at no cost. The cost-share fee for individuals in participating counties was \$25 for each visit to their property, with no charge for travel time. There was also a \$125 charge per large dam removal. USDA Wildlife Services personnel average about 10 visits over a 30-day period to resolve a beaver problem. After 15 visits to a landholder's property in any one year, costs to the landholder increase to the full market value of beaver removal services.

Assistance Priorities

Requests for assistance are handled on a first-come, first-served basis with top priority given to projects that address threats to public health and safety, particularly along highway rights-of-way and county-owned property. Work for individual landholders is next, followed by work for soil and water conservation districts, municipalities, corporate landholders, and others.

Additional Information

For additional information about the BMAP please call or write:

USDA Wildlife Services, 6213-E Angus Drive, Raleigh, NC 27617, 1-866-487-3297

- OR -

NC Wildlife Resources Commission, Division of Wildlife Management at 1751 Varsity Drive, Raleigh, NC 27606, 1-919-707-0050.

Additional Services Provided by USDA-WS

Participating counties occasionally request expanded BMAP services in addition to those received under the cost-share program at baseline. Generally, requests for additional assistance require hiring additional experienced personnel, which is inherently difficult, especially if such a request is for seasonal or less than full time work. If USDA Wildlife Services is able to accommodate such requests, any additional work provided to landholders in the county follow BMAP policies and procedures. Cost share fees paid by landholders are used to support the overall BMAP. Any county requesting additional assistance pays full program costs (labor, vehicle usage, supplies and equipment, etc.). In addition, both landholders and the DOT will receive services. To receive additional services, a county must enter into a cooperative service agreement with USDA Wildlife Services with payment going directly to USDA Wildlife Services.

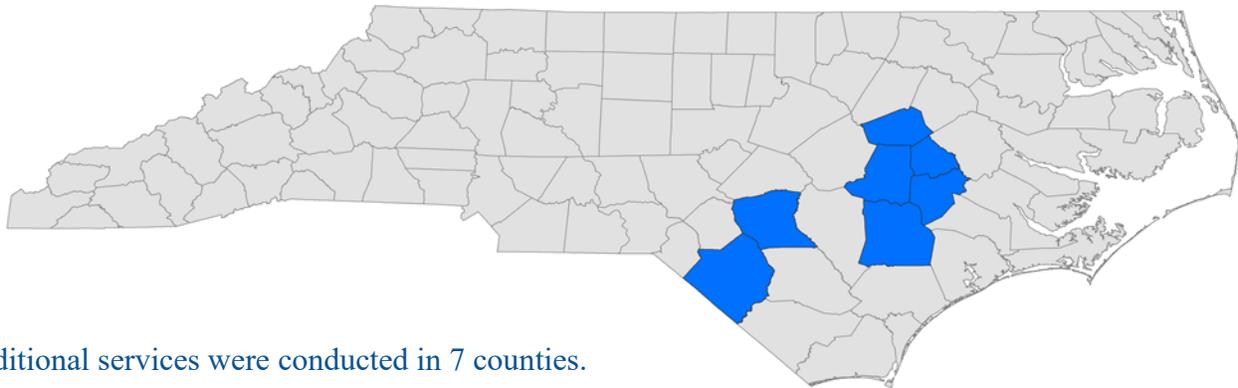
Participating counties with Additional Funding – Expanded services were conducted in 6 participating counties and 1 city that provided additional funding beyond the baseline \$4,000. These counties/city provided additional funding directly to USDA Wildlife Services to cover the remaining expenses of a part-time, full-time or sometimes multiple full-time beaver damage management specialists. Counties that participated at one of these levels included:

Multiple full-time personnel – Duplin County (\$135,000)

Single full-time personnel – Robeson (\$61,000) and Wayne (\$66,792) Counties

Part-time personnel – City of Fayetteville (\$17,694), Greene (\$6,000), Lenoir (\$17,800), and Wilson (\$13,000) Counties

Operational Statistics – Additional Services



Additional services were conducted in 7 counties.

A total of 162 projects were worked resulting in the removal of 446 beaver and 320 dams.

Projects Worked	Dams Removed w/ Explosives	Dams Removed Manually	Beaver Removed
162	110	210	446

Beaver Research



American beaver (*Castor canadensis*) are semi-aquatic herbivores and referred to as ecosystem engineers because of their ability to change ecological community structure and diversity through dam-building behavior. On Fort Bragg Military Installation, such behavior creates and/or preserves critical habitat for 3 plants and 1 endemic butterfly listed as federally endangered under the Endangered Species Act. However, beaver also create conflict with military operations and human health/safety where their dam-building causes excessive flooding.

USDA Wildlife Services initiated a research study to 1) quantify beaver movements and space use throughout their annual cycle, 2) quantify behavioral responses of beavers to non-lethal damage management practices, and 3) examine the amount of overlap in relation to the spatial distribution of beavers and federally endangered species. From August 28 – September 7, 2018, 50 beavers were live-captured and fitted with a tail-mounted VHF transmitter (yellow arrows in above photos) then released. Over 15,000 locations of radio-tagged beavers are currently being analyzed to estimate survival, construct home ranges, and conduct habitat use analyses. Movement and location data will be cross-referenced to areas of critical habitat for the Saint Francis' satyr (*Neonympha mitchellii francisci*), rough-leaved loosestrife (*Lysimachia asperulifolia*), Michaux's sumac (*Rhus michauxii*), and American chaffseed (*Schwalbea americana*). Results will help inform integrated management planning and could identify locations where critical habitat for federally endangered species may be created and/or maintained.

Appendix

Beaver Management Assistance Program OBTAINING SERVICES

Since beavers were successfully reintroduced to North Carolina in 1939, this native species has thrived, benefitting wildlife and people by creating wetland habitat, reducing erosion, and improving water quality across the state. Damages caused by beaver activity, however, can be substantial and costly. The Beaver Management Assistance Program (BMAP) aims to help manage beaver-related problems on private and public lands. Because of practical and ecological considerations, the program is not designed to eradicate beaver populations; rather its aim is to assist the NC Department of Transportation, local governments, and private landholders in addressing specific beaver damage issues.



BMAP specialists work to educate customers about a variety of beaver management strategies, such as exclusion, pond levelers, and other nonlethal techniques. When deemed necessary, they will remove beaver and/or dams using humane and environmentally acceptable techniques.

In 2017-2018, BMAP services prevented the impending loss or repair costs of an estimated \$9.08 million in roads, bridges, timber and other agricultural resources, railroad trestles, dams, sewer systems, water treatment facilities, landscape plantings, homes, airport runways, and golf courses. Comparing the costs of BMAP to its savings, for every \$1.00 spent, \$4.86 in resources were saved.

County Cost-Share

Counties are invited to participate each year by contributing a \$4,000 participation fee, which grants them access to additional funding provided by the NC Wildlife Resources Commission. Landholders experiencing beaver damage in these counties may reach out to their county's BMAP contact to receive assistance.



Landholder Cost-Share

Landholders pay the following cost-share fees for services:

- \$25 per site visit
- \$125 per dam removed

Initial damage assessments are provided at no charge. Beaver management specialists average 10 visits over a 30-day period to resolve the problem. Costs to the landholder increase after 15 visits to the full market value of beaver management services.

Landholders willing to conduct beaver management activities themselves are provided individual training at no cost.

Service Priorities

Requests for assistance are handled on a first-come, first-served basis. However, projects that address threats to public health and safety receive top priority.

Updated July 2, 2019

County BMAP Contacts: July 1, 2019 – June 30, 2020

Bertie	252-565-2731	Lee	919-775-5624
Bladen	910-862-4591	Lenoir	252-527-2191
Brunswick	910-253-2508	Macon	910-934-5025
Carteret	252-222-6360	Martin	252-792-4350 x 3
Catawba	828-465-8240	McDowell	828-652-4434
Chatham	919-542-8228	Mecklenburg	980-721-3760
Columbus	910-642-2196 x 3	Nash	252-459-9800
Craven	252-633-1477	New Hanover	910-798-6667
Cumberland	910-321-6860	Northampton	252-534-2501
Duplin	910-296-2120	Pamlico	252-745-4121
Edgecombe	252-823-8187 x 3258	Pasquotank	252-338-3954
Franklin	919-496-3344	Pender	910-259-1233
Gates	252-357-1400	Perquimans	252-426-8484
Gaston	704-922-2152	Pitt	252-902-3250
Granville	919-603-1350	Robeson	910-671-3022
Greene	252-747-3705 x 3	Rutherford	828-287-4220 x 3
Halifax	252-583-1131	Sampson	910-592-7161
Harnett	910-893-7584	Vance	252-438-8188
Haywood	828-452-2741 x 3	Wake	919-250-1055
Hoke	910-875-3461	Warren	252-257-3640
Iredell	704-873-6761	Wayne	919-731-1650
Johnston	919-989-5100	Wilson	252-237-5147 x 3



Before and after BMAP services resolved flooding and associated public health and safety concerns along East Powersville Road in Robeson County.
Photos: Bo Benton
USDA Wildlife Services.



Additional Information

Learn about BMAP online at <http://www.ncwildlife.org/BMAP>.

Statewide Contacts:

USDA Wildlife Services
6213-E Angus Drive, Raleigh, NC 27617
866-487-3297
Email: todd.a.menke@aphis.usda.gov

NC Wildlife Resources Commission
1751 Varsity Drive, Raleigh, NC 27699
919-707-0068
Email: falyn.owens@ncwildlife.org

Updated July 2, 2019