

Simplified Guide to Writing Watershed Restoration Plans:

Watershed Restoration Plans: provide the framework to restore an impaired waterbody and provide guidance for future protection of that waterbody. Plans should be specific to a watershed, 10 – 14 digit HUC, should provide a clear indicator of waterbody pollutants, and should provide management measures that when implemented will work to restore water quality. In accordance with US EPA's Watershed Program there are nine key elements which must be present within the plan in order to qualify for 319 Grant funding, 319 refers to section 319 of the Clean Water Act. Section 319 allows US EPA to provide money to states for nonpoint source projects, funding can be used for technical and financial assistance, education, training, technology transfer, demonstration projects, and monitoring of nonpoint source implementation projects. This guidance has been created to assistance grantees in the writing and implementation of nine element plans, for a more detailed description please see the US EPA handbook on the creation of nine element plans:

http://www.epa.gov/owow/nps/watershed_handbook/

The EPA handbook linked above is comprehensive and can be overwhelming for grantees preparing their first watershed plan. NC DWQ hopes grantees will find this simplified version easier to follow, grantees are encouraged to contact Kimberly.Nimmer@ncdenr.gov, Heather.b.Jennings@ncdenr.gov, or Paul.Clark@ncdenr.gov for further guidance or assistance when preparing nine element Watershed Management Plans. NC DWQ is also happy to review and provide feedback on all plans during the development process, as well as provide edits on plans that have been completed. Nine-element watershed plans that will be produced should be viewed as working documents and require regular updates to keep watershed protection in the specific area moving in the right direction.

EPA's 9 – Key Elements for Watershed Plans

1. An identification of the causes and sources or groups of sources that will need to be controlled to achieve pollutant load reductions estimated in the watershed
2. A description of the NPS management measures that will need to be implemented to achieve load reductions as well as to achieve other watershed goals other goals identified in the watershed management plan (protection measures, future impacts in the watershed)
3. An estimate of pollutant load reductions expected for the management measures
4. An estimate of the amount of technical and financial assistance needed, associated cost or sources, and authorities that will be relied upon to implement the plan
5. An information and education component that will be used to enhance public understanding of the project
6. A schedule for implementing the nonpoint source management measures identified in the plan that is reasonably expeditious
7. A description or interim, measurable milestones for determining whether nonpoint source management measures or other management control actions are being implemented

8. A set of criteria that can be used to determine whether pollutant load reductions are being achieved over time and substantial progress is being made towards attaining water quality standards
9. A monitoring component to evaluate the effectiveness of the implementation efforts over time measured against the criteria established to measure achieved pollutant load reductions

Watershed Management Plan Template:

Overview

The overview should include descriptive information about the watershed including location, size, brief statement of impairment, land use within watershed, and background of activities in the watershed. NC DWQ Basinwide Plans should be used as reference for current watershed conditions and watershed areas of need; they can be accessed at <http://portal.ncdenr.org/web/wq/ps/bpu/basin>

Identification of Causes and Sources (1)

Water quality data should be compiled before, during, and after implementation of the watershed management plan in order to gain full understanding of the watershed system. In this section please define watershed function, stressor (cause), source origin, and measurement indicators.

You may find using the EPA Watershed Plan Builder Tool beneficial, to access click the link below:

<http://java.epa.wsplanner/#>

- *Watershed Function: Beneficial watershed characteristics, watershed function (ex. Aquatic habitat, fish community, water supply watershed, recreation)*
- *Stressors (causes of impairment): physical, chemical and/or biological sources degrading the watershed function*
- *Indicator: the measures of impact associated with stressors (ex. Water quality measurements, waterbody advisories)*

Identification of causes and sources can be easily summarized in table format; the table below has both agricultural and urban examples

Source	Potential Stressors	Indicator	Watershed Function
Increased impervious surface	<ul style="list-style-type: none"> • increased peak flows • eroded streambanks • degraded streambed 	flow and cross section measurements, temperature	fish/benthic habitat or community rating, trout waters
Land disturbing activities, development	<ul style="list-style-type: none"> • increased sediment in water column 	TSS, turbidity	Fish/benthic habitat, water supply, recreation
Livestock in stream	<ul style="list-style-type: none"> • increase in fecal readings • excessive nutrients • sediment in water column 	DO, nutrients, TSS, turbidity measurements	fish/benthic habitat, water supply, recreation

Fertilized Land Application, Animal Operation on Streambank	<ul style="list-style-type: none"> excessive nutrients algae bacteria readings 	DO, bacteriological measurements, nutrients	Fish/benthic habitat, water supply, recreation
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Description of NPS Management Measures (2)

This section should describe management measures currently in place throughout the watershed, and/or measures scheduled for implementation that will result in pollutant load reductions necessary to achieve water quality standards. Measures can be implemented for a variety of purposes such as:

- protecting water resources and downstream areas from pollution and flood risk
- conserving, protecting, and restoring priority habitat areas
- preserving and establishing aquatic and terrestrial buffers

Management measures can also help control pollutant loads to receiving waterbodies by:

- reducing the availability of pollutants
- slow the transport or delivery to the pollutant to the waterbody
- treating the pollutant before or after it is delivered to the waterbody

Management measures should target the causes and sources outlined in the previous section, table format is acceptable for the description of nonpoint source management measures, see below

Possible Management Measures	Stressor	Targeted Load Reduction	Evaluation Measures
Stormwater Wetland	<ul style="list-style-type: none"> increased peak flow eroded streambanks degraded streambed 	Sediment: ft ³ /sec and ton sediment/yr	Flow, streambed composition, TSS
Riparian Buffer Plantings	<ul style="list-style-type: none"> Increase temperature Low DO eroded streambanks 	Temperature: degrees DO: mg/L Sediment: tons/yr	Temperature, DO, Cross Section measurements
Livestock Exclusion Fencing	<ul style="list-style-type: none"> Excessive Nutrients Algae Bacteria Low DO 	Sediment: ton/yr, Nitrogen & Phosphorus: lbs/yr DO: mg/L	Nitrogen/Phosphorus, DO, TSS and Turbidity

Estimate Pollutant Load Reductions (3)

When the pollutant of concern (cause) has been identified the watershed plan should describe the relationship between the water quality standard and the identified pollutant sources. The cause-effect relationship should be used to determine loading acceptable to achieve the water quality standards or targets. If there is a TMDL completed on the waterbody in question, the loading target will be stated within that document. If the cause has not been established it is not necessary to estimate existing

pollutant loads in this section the goal of the watershed management plan should be to determine the pollutant and embark on a method to reduce the pollutant watershed wide.

There are several load reduction tools available for calculation, NC DWQ allows the grantee to choose the best tool. Examples of available tools are (but not limited to):

- Spreadsheet Tool for the Estimation of Pollutant Load (STEPL): The tool calculates amount of nitrogen, phosphorus, biological oxygen demand (BOD), and sediment generated from watershed based on land use, activities, precipitation, soils and BMPs implemented. Tool calculates existing watershed loads as well as load reductions estimates for BMPs installed throughout the watershed. For more information on STEPL: <http://it.tetrattech-ffx.com/steplweb/>
- Revised Universal Soil Loss Equation 2 (RUSLE2): RUSLE2 is a model that predicts average annual erosion, or soil loss. For more information on RUSLE2, please see: <http://www.ars.usda.gov/Research/docs.htm?docid=20222>
- Long Term Hydrologic Impact Assessment (L-THIA) Model: This online tool allows users to assess water quality impacts of land use changes. Watershed specific climate data is built into the model which estimates changes in recharge, runoff, and nonpoint source pollution resulting from past or proposed development. Please see the following website: <https://engineering.purdue.edu/~lthia/>
- Export Coefficient Model: Export coefficients for different land uses are multiplied by the specific land use acreage to obtain a nutrient load for that land use. For the spreadsheet tool download please see: <http://www.water.ncsu.edu/watershedss/>
- Nutrients: North Carolina Agricultural Nutrient Assessment Tool (NCANAT) contains both the Nitrogen Loss Estimation Worksheet (NLEW) and the Phosphorus Loss Assessment Tool (PLAT). For additional information on NCANAT and nutrient management in North Carolina, visit: <http://nutrients.soil.ncsu.edu/resources/index.htm>

Financial and Technical Assistance (4)

The financial and technical assistance section should take into account all aspect of watershed management and project implementation. It is import to budget funds for administration or management services, salaries, associated regulatory fees, supplies, and in-kind services such as volunteer work and donation of supplies or facilities. Financial assistance to support management measures can come from a variety of sources including: federal, state, local grants or loans, utility fees, or private assistance. Possible sources of finding in North Carolina are (examples, but not limited to):

- North Carolina Agricultural Cost Share Program
- North Carolina Clean Water Management Trust Fund
- North Carolina State Revolving Fund
- A more complete list can be found: <http://portal.ncdenr.org/web/wq/ps/bpu/urw/funding>

Technical assistance is vital throughout the watershed management planning process, from conception through implementation. Technical design is important for project design, best management practice (BMP) engineering design, site location – choosing correct BMP location, and project oversight. Technical assistance is offered by many agencies and organizations, including local conservation districts, state resource agencies, universities, and federal agencies. For specific BMP technical assistance please consider the following for reference (but not limited to):

- North Carolina Division of Water Quality stormwater manual, <http://portal.ncdenr.org/web/wq/ws/su/bmp-manual>
- North Carolina Division of Soil and Water Conservation, Nonpoint Source Program, <http://portal.ncdenr.org/web/swc/nonpointsourceprograms>
- Natural Resource Conservation Service, <http://www.nc.nrcs.usda.gov/>
- North Carolina State Water Quality Group, <http://www.bae.ncsu.edu/programs/extension/wqg/>

Education and Outreach (5)

The education and outreach component should be present throughout the entire watershed planning process. Identifying key stakeholders is important in the development and implementation of watershed plans, and marketing is a great way to draw interested stakeholders to the planning process. Without interested stakeholders and willing participants it is virtually impossible to implement a successful watershed plan, and restore waterbodies to designated uses. Education and outreach will raise awareness which can lead to attitude and behavioral changes within the watershed.

Integrate local, state, and federal programs into the watershed planning process. Once integrated these agencies and programs can directly tie into the need for financial and technical assistance, here is a list of possible programs to include (but not limited to):

- North Carolina Division of Water Quality Basinwide Planning, Basinwide Planners have direct knowledge of conditions of all watershed throughout North Carolina’s 17 river basins <http://portal.ncdenr.org/web/wq/ps/bpu>
- North Carolina Cooperative Extension Service, Extension staff have established relationships throughout the counties they serve <http://www.ces.ncsu.edu/>
- North Carolina Division of Soil and Water Conservation, staff have established relationships in their districts with farmers and producers <http://portal.ncdenr.org/web/swc/findyourdistrict>
- Initiate contact with local government boards, groups, organizations, and municipalities <http://www.nclm.org/resource-center/municipalities/>

Implementation Schedule for NPS Measures (6)

The implementation schedule component of the watershed plan involves turning the goals and objectives outlined in the above sections into specific task. The schedule should include a timeline of when established task should be implemented and accomplished, including the agency/organization responsible for implementation. Timelines should cover the entire watershed recovery process, setting both short and long term goals to be achieved. Task outlined in the implementation schedule should be specific yet broad enough to allow for changes in the future implementation should a different organization take over the implementation work. Again, this component can be easily summarized in a table, see below:

Parameter	North Carolina Creek Watershed Management Plan	Project Workplan
Duration	2011 – 2021, full recovery	2011 – 2014
Geographic Scope	200,000 acres	20,000 acres
Critical Areas	55,000 acres	5,000 acres
Goal Statement	Improve watershed conditions to support fish/benthic habitat	reduce sediment loadings from priority subwatershed X
Objectives and Key	Increase Index Biotic Integrity (IBI) from	install 5,000 feet livestock

Elements	22 to 78, identify sediment sources, identify load reduction expected, indentify BMPs	exclusion fencing, establish 2,000 acre riparian plantings
Implementation	Restore 1 to 1.5 miles riparian area/year, fence livestock out of 15,000 ft of stream, field buffers in 100 fields	Hold two workshops per year, install at least 1,500 ft livestock exclusion fencing per year, establish at least 750 acres riparian plantings
Costs	\$3 million over 10 years	\$250,000 over 3 years
Schedule	Establish Interim Milestones, stabilize 15,000 streambanks by 2019, establish 1.5 miles riparian planting by 2021	See Key elements above
Monitoring	environmental –water quality, IBI, acres treated, Social – landowner partnerships	Feet of stream buffers established, workshops provided

Measureable Milestones for Determining Implementation of Management Measures (7)

Milestones should be seen as goals to measure watershed improvement by, it may help to establish:

- Short-term goals (1 – 2 years)
- Mid-term goals (2 – 5 years)
- Long-term goals (5 – 10 years)

Milestones are measures of what needs to be accomplished over time to fully implement the watershed management plan. Measureable milestone tasks should be organized by priority, set out in the goals, task need to be accompanied by time estimates and responsible parties within the established timeframe. Management plans should be forward thinking, and alternatives should be listed if a milestone have not been achieved, and advantages included for task that are completed before the established milestone timeframe. For simplification the measureable milestones can be included in the implementation table illustrated in the above section.

Criteria to Determine Load Reductions (8)

The management plan should provide a time estimate and criteria by which the pollutant controls will result in water quality standard (numeric value) attainment. Criteria selection can be important in an adaptive management approach by providing methods to reevaluate watershed implementation plans if substantial progress is not being made. The table below demonstrates how the indicators of the selected criteria are meeting the pollutant targets set in the management plan.

Pollutant Issue	Target Indicators
Sedimentation	Total suspended solids concentration and load
Pathogens, Bacteria	<ul style="list-style-type: none"> • Bacteria counts • Fecal measurements • Number of shellfish bed open/close
Algae, Eutrophication	<ul style="list-style-type: none"> • Phosphorus Load • Incidence of Algae Blooms

Monitoring Component (9)

The most important element of the watershed plan is monitoring, monitoring tracks and evaluates the effectiveness of implementation efforts using the criteria set forth in all eight (8) of the above sections. Monitoring programs should be designed to track progress in meeting load reduction goals and attaining water quality standards. Measurable progress is critical to ensuring continuing support of all watershed projects, and progress is best demonstrated when monitoring data accurately reflects water quality conditions relevant to the identified problems. Multiple years of monitoring is needed before, during, and after implementation of management measures in order to document water quality changes. Year-to-year variability can be large dependent on environmental factors such as drought, so two years of pre- and post-management practice implementation is likely necessary to document significant changes in water quality.

Monitoring plans should address the following:

- Identify purpose of monitoring, including all valuable indicators
- Consider data quality needed to meet the goals and objectives in the management plan
- Define who and how the data will be used
- Collect background information in the watershed that can be used to refine the goals and objectives if needed
- Provide the identity and experience of the monitoring plan preparer
- Description of the monitoring plan
 - Parameters to be monitored
 - Method of analysis
 - Monitoring frequency
 - Monitoring site locations (best defined on map)

Data collectors can vary depending on the complexity of the management plan, data collectors can be as follows (but not limited to):

- North Carolina Division of Water Quality, Environmental Sciences Section
<http://portal.ncdenr.org/web/wq/ess/home>
- North Carolina State Water Quality Group,
<http://www.bae.ncsu.edu/programs/extension/wqg/>
- The Volunteer Water Information Network (VWIN), <http://eco-wnc.org/water-quality/vwin/vwin-2/>