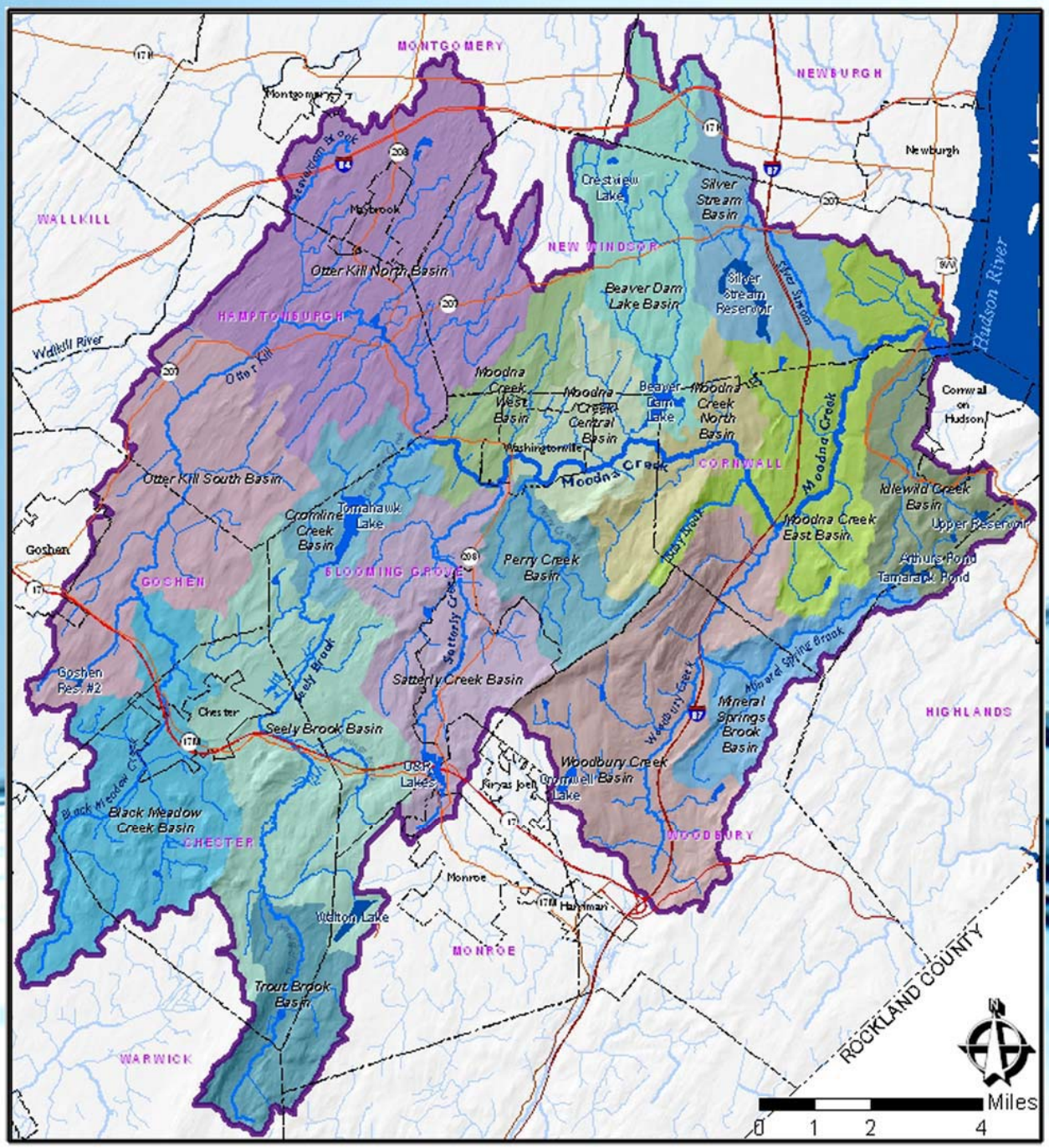
Moodna Creek Watershed Conservation and Management Plan

EXECUTIVE SUMMARY



OCWA

ORANGE COUNTY NEW YORK

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County Executive

Hudson River Estuary

The Orange County Water Authority (OCWA) has been working with municipalities and many other stakeholders for nearly three years to create a management plan for the Moodna Creek Watershed. A Plan is needed to address a range of regional issues including flooding, loss of rare species, to correct water quality conditions in the Moodna Creek and its tributaries, and to secure the sustainable flow of public water supplies for the foreseeable future.

Input from local government officials, residents, scientists, educators, and various organizations steered the direction and content of this Plan. This Executive Summary outlines some of the major points found within the fuller Plan and summarizes the actions that the Plan recommends in order to maintain and protect the unique Moodna Creek Watershed.

The concept of developing a watershed plan for the Moodna Creek grew out of discussions between staff of the Hudson River Estuary Program and people living and working in the Moodna Creek Watershed who were interested in drawing attention to local watershed issues. An important step towards development of this Plan was the convening of the Moodna Watershed Coalition, an ad-hoc citizens group that began meeting in early 2004. Meetings of this Coalition eventually led to a grant application and subsequent award from the NYS DEC's Hudson River Estuary Program (Estuary Program) to the OCWA, which matched the State funds in order to research and develop the Plan as well as to perform outreach to municipalities in the Watershed.

The goals for the Moodna Creek Watershed Conservation and Management Plan are to:

- summarize existing conditions in the Watershed
- identify and describe issues that are important to local communities and stakeholders, including assets, existing problems, risks, and opportunities
- develop a prioritized list of action items and recommendations for addressing identified issues

The Plan, therefore, is designed to address local and intermunicipal goals, and also to fit within and support a broad regional context of watershed planning, conservation, and restoration. Because watersheds do not follow municipal boundaries, working in a watershed context facilitates communication and coordination between multiple municipalities. This planning process and the goals for the plan itself include a strong emphasis on facilitating and developing an ongoing, coordinated intermunicipal program addressing watershed issues.

The following are major topics covered in the Plan, followed by a brief description of the leading values or concerns relating to that topic.

Land Use

The Watershed is now a patchwork of open space, agriculture, urbanized areas, suburban development, and water features such as lakes, streams, and wetlands. While it is endowed with substantial tracts of protected open space,

the Watershed has also been under considerable development pressure in the recent past, notably in the last decade. The majority of development has come in the form of residential subdivisions of varying densities and highway or commercial strip style retail.

With this development has come an increase in impervious surfaces – buildings, parking lots, roads, and other hard surfaces – and the subsequent changes in watershed hydrology that occur when precipitation has fewer opportunities to seep into the ground and more chances to rapidly run downhill, picking up pollutants and eroding soil as it moves to the closest stream or catchment. This change in land cover has reduced water quality in many streams, as well contributed to amplifications in recent flood levels and increased erosion and sedimentation damage. Because development activity is expected to continue throughout the Watershed, it is important that municipal regulations be sensitive to water resources, both in terms of water quality and quantity, so as to minimize further alteration of the watershed's natural water cycle and water quality. Failure to do so reduces public quality of life and jeopardizes ecological assets and public health in the areas of flood safety and potable water supply reliability.

Water Quality

Stream water quality varies as much as the land uses within the Watershed, ranging from pristine cold water streams in Black Rock Forest to degraded segments of streams along the main stems of the Moodna Creek, Woodbury Creek, and Otter Kill/Black Meadow Creek, which have all had the dishonor of being on the State's Priority Waterbodies List of low quality streams. Water quality information generally does not exist for lakes, ponds, and wetlands, although some useful information exists for Beaver Dam and Tomahawk Lakes because they have both been included in citizen sampling through a NYS Federation of Lake Associations Program called the Citizens Statewide Lake Assessment Program (CSLAP).

The knowledge base for water quality in the Watershed is based on the relative abundance of stream biomonitoring (which involves gauging water quality through an inventory of aquatic insects living in the stream) that has been done by the OCWA and the NYS DEC. The OCWA's Biomonitoring Project provides a starting point for identifying sites with significant problems and for planning follow up studies to identify and correct these problems. At most sites in the Moodna Watershed, non point source nutrient enrichment was the predominant cause of water quality degradation. However, more work is needed to determine specific locations and causes of impairment.

Wastewater Treatment

The Watershed is served by a combination of private septic systems and municipal or community sewer systems. While the number of septic users is unknown and likewise so is the volume of wastewater treated by septics, the total permitted discharge of treated wastewater from sewer systems into various

surface waters in the Watershed is approximately eight million gallons per day, a volume comprised of 11 municipal and 6 private systems. Even when wastewater treatment systems are functioning properly, such discharges of treated effluent include significant amounts of nutrients. Additionally, a number of wastewater treatment systems in the Moodna basin currently have significant problems including major infiltration and inflow (I&I) conditions and treatment plants that need upgrades.

Because research has shown that nutrient loading is the most widespread water quality problem in streams in the Watershed, identifying and resolving detrimental wastewater inputs could likewise increase overall water quality. Such research priorities include lake communities, higher density neighborhoods that rely on septics (such as Mountain Lodge Park), and operators with recent SPDES permit violations.

Water Supply

The issue of water supply is a priority for all municipalities within the Watershed. In Orange County, roughly one-third of drinking water supply is from municipal systems using surface sources, one-third is from municipal systems using groundwater sources, and the remaining one-third is from private wells. Municipal water systems are supplied either exclusively by wells, or by a combination of wells and reservoir water.

Past decades have revealed vulnerabilities in many water supplies, most specifically during the severe drought in the 1960s and the smaller droughts during 2001 and 2002, during which times many community suppliers had to utilize emergency supplies. Additional analysis, data collection, and additional regulation is needed to safeguard water supplies, as is recalculation of safe yields for certain water supply sources. Another liability lies in the fact that all of the municipalities in the Watershed that rely on surface water supplies use reservoirs that reside outside of their municipal boundaries. This separation complicates reservoir management since factors influencing the reservoir may be out of the control of the municipality owning the reservoir. Protecting both surface water and groundwater supplies is a major priority and efforts should be taken at many levels to ensure reliable, clean water is available in the future.

Climate and Water Resources

Climate records from around the world and from local sources suggest that our future climate will be out of the range of what has been observed in our recent past, thus complicating decision-making that takes any natural resource into account. Both temperature and precipitation trends (in addition to many other factors) are expected to be impacted dramatically; research suggests that both are expected to increase on average, giving the Hudson Valley a hotter, wetter climate with longer summers. But an increase in average precipitation does not necessarily mean abundant available water supply, however, since evaporation rates will increase along with rising temperatures. As well, precipitation patterns are likely to shift towards the extremes, with heavy rainfalls (and floods) interspersed with periods of little or no precipitation. Groundwater recharge

rates could subsequently decrease, since slow precipitation best serves to refill aquifers.

Responses to climate change can be categorized as either adaptation (adjusting to changes once they have occurred) or mitigation (proactively working to reduce greenhouse gas emissions to slow the rate of climate change). Local efforts to *adapt* to climate change enhanced water conservation measures; widespread use of Low Impact Design stormwater practices; protection of streams, wide riparian buffers, and floodplains from development or alteration; and careful consideration of appropriate designs for drainage infrastructure, bridges, and other infrastructure that may be affected by changing runoff and stream flow patterns. Local efforts to *mitigate* climate change include: land use planning efforts that reduce vehicle miles traveled (VMT); increases in energy efficiency in all sectors; increased usage of renewable energy sources; and planting trees. More research is needed to determine impacts to water resources, but safe yield estimates for water supplies should be reassessed to include likely factors such as increased droughts and stormwater runoff.

Flooding

Concerns about flooding were voiced repeatedly by stakeholders throughout this planning process, and indeed many areas of the Watershed have experienced repeated floods, especially in recent years. During the past decade alone, the Moodna Creek and numerous tributaries (notably the Otter Kill and the Cromline, Satterly, and Perry Creeks) have repeatedly swelled over their banks and caused significant damage. Nowhere are these impacts more concentrated and frequent than in the Village of Washingtonville, where floodwaters have caused much damage throughout the Village's history and where two primary bridges and several roads were closed in the flood event of April 2007.

Determining the causes of flooding at specific sites involves complex research and analysis and was thus beyond the scope of this Plan. However, it is clear that in many cases, limiting degrees of flood damage has the best chance of success if handled in an intermunicipal way where stream reaches drain several Towns. In general, flooding appears to have caused property damage in the Watershed due one or a combination of the following factors: houses, roads, or other man-made improvements that are vulnerable because they lie within floodplains; the abundance of bridges, dams, culverts, abutments and other features in the Watershed that both concentrate and impede flow of surface water; land use changes that increase rates of stormwater runoff; filling of floodplains; and climatic variations that have led to more intense precipitation events.

Actions can be taken at the local, state, and federal level to alleviate certain aspects of flooding or flood damage, ranging in cost and complexity. At the higher end of the cost scale, but also high in terms of benefits, is work by thThe ACOE will soon release a Comprehensive Response Document focused on

flooding in the Watershed. This Document has the potential to lead to additional research and reporting that would ultimately result in recommendations of specific construction projects that would reduce flooding impacts. But in order for the ACOE to proceed with such time- and resource-intensive research, the work needs to be authorized by the US Congress and a local funding match has to be secured. Other methods of minimizing or understanding future flood impacts include but are by no means limited to adopting local regulations that incorporate Low Impact Development (LID) design techniques, enhancing local floodplain management regulations, maximizing forested or natural cover on land that drains to flood-prone areas, and installing a system of stream gages to measure (and ultimately predict) water levels in the Watershed.

Ecological Resources

The Watershed supports abundant biodiversity, including many species that are endangered, threatened, or of special concern in the state or in the nation. There is also an extremely rich diversity of amphibians and reptiles, many of which have declining populations in the region. Watershed residents rely in large part on benefits that this ecosystem, especially the forested parts of the Watershed, provides. Such ecosystem benefits include water and air filtration, water flow regulation, and local climate stabilization in addition to the scenic and recreational values that are enjoyed by residents and visitors. Significant biological resource areas - including the mouth of the Moodna Creek, large or rare forests, riparian corridors, wetlands, grasslands, shrublands, and caves – should be maintained, managed and/or protected to ensure a diverse, and thus healthy, ecosystem in the future.

Riparian Areas

Riparian buffers – vegetated areas along the banks of a natural watercourse - provide numerous benefits to water quality, plants and animals, and local landowners. Buffers offer protection against pollution and the adverse affects of human activities by reducing nutrient and sediment runoff, stabilizing stream banks and thus reducing erosion, providing food and shelter for valuable aquatic and terrestrial species, controlling fluctuations in stream temperature, and improving the aesthetic quality of the stream community. Riparian areas are invaluable in protecting water quality and habitat within the Watershed and should therefore be maintained, protected, and reestablished whenever possible.

Recreation

While the Watershed provides abundant recreational opportunities, many of which are nature-based, few of these involve the use or appreciation of a water body. Hikers can enjoy miles of trails within the State lands or in Black Rock Forest, or utilize four long distance trails (the Heritage, Highlands, or Appalachian Trails or the Long Path) that have paved and natural segments; some of these trails also allow for other users such as horseback riders or cyclists/mountain bikers. Active recreation users take advantage of municipal parks with ballfields and other amenities. But there are only six known legal public access points to lakes or streams within the Watershed, all located within either the Town of

Cornwall or New Windsor. More public access points are needed in order to enhance public usage, appreciation, and ultimately stewardship of the Moodna Creek, its tributaries and lakes within the Watershed.

The following are summaries of the **Recommended Actions** the Plan endorses, organized by category. The full Watershed Plan includes more detailed information on the level of priority (high, medium or low) of each recommendation as well as who would logically be the lead entity.

1. PLANNING AND COOPERATION

A. An intermunicipal or watershed group should be created to develop a long-term mechanism for intermunicipal coordination on priority watershed goals.

The OCWA and Orange County Planning Department (OCPD) should invite watershed municipalities to participate in the development of an intermunicipal or watershed group/council/committee. The OCWA, Planning Department and other County departments should commit to provide sufficient technical and administrative support to this Group to enable it to become a self-sustaining entity over time.

The Group should review the findings of the Moodna Watershed Conservation and Management Plan and prioritize several major focus areas for project development and implementation and set measurable benchmarks and goals for implementation. Immediate work to address potable water, flood protection, and public access issues is recommended. The OCWA, with guidance from the Group, should research Federal and State funding programs, and other funding sources that can support collaborative projects. The Group, with the OCWA's support, should develop a proposed strategy for sustainable funding and other mechanisms for maintaining professionally-staffed technical and educational capacity to support ongoing intermunicipal collaboration on watershed protection and enhancement projects and programs.

B. Protect Riparian Buffers from Development

Municipal regulations should include language that ensures protection of important riparian (streamside) buffer areas from encroachment and degradation, and planning boards should be vigilant to guarantee that the intent of such laws is implemented. Continued free distribution of "Trees for Tribs" by the DEC's Hudson River Estuary Program can be explored throughout the watershed with any willing landowners.

C. Enhance Habitat Protection during Development Approval Process

Municipal boards and planning boards should develop "Habitat Assessment Guidelines" or biodiversity review standards, currently used by some towns in Ulster and Dutchess counties, to identify important resources early in the planning process, and to have preliminary discussions on conservation priorities before serious site planning begins. Such guidelines would serve to make review of ecological impacts more efficient, timely, and predictable.

D. Greenway Compact Program

Orange County should become a Greenway Compact Community Benefits include: technical and financial assistance for community planning efforts, a potential 5% rating advantage over non-compact communities for receiving competitive state funding for Greenway projects, opportunity to offer a streamlined environmental review process for activities, and protection from certain lawsuits that regard the acquisition of land or the adoption of local land use regulations consistent with a regional Greenway Plan.

2. REGULATORY CHANGE

A. Audit and update local codes to promote low impact development

The Orange County Planning Department should work with willing municipalities to complete the Better Site Design Roundtable process developed by the DEC's Hudson River Estuary Program.

B. Fund a regional stormwater monitoring and enforcement agent

Evidence suggests that there is a widespread need to improve compliance with stormwater pollution prevention plans (SWPPPs) and that water quality would improve if erosion and sedimentation were decreased within the Watershed. One method for enhancing stormwater management would be to have a regional stormwater specialist, who could logically be stationed with the OCSWCD. Such a specialist could coordinate training opportunities and also offer technical assistance to local stormwater management officers, or their equivalent, to implement an effective stormwater and erosion control program, MS4 communities, in particular, could benefit from the technical support this specialist could provide.

C. Draft new or update existing Department of Health watershed protection rules and regulations for all reservoirs within the Watershed

These state-enabled rules and regulations allow a municipality whose reservoir is outside of their municipal boundaries to enact regulations to control activities in the watershed of their reservoir. This would require working with NYS to lift the apparent moratorium on creating new or updating existing rules and regulations. An alternative to these rules would be to get complimentary language in local codes or to create intermunicipal protection agreements.

D. Support development of local conservation advisory councils (CACs)

Municipalities should create new, or empower existing, conservation advisory councils (also known as environmental commissions) in order to develop municipal natural resource inventories and/or open space plans, and to advise their municipality on environmental reviews. Ideally, the municipal board will empower the CAC to become a Conservation Board, which has enhanced authority.

E. County adoption of official map showing high priority resources and drainages

Enabled by Section 239-e of NYS General Municipal Law, Counties can adopt an official map showing specific natural and man-made features. An official map then serves as a legal tool for certain land use decisions and infrastructure improvements and can afford enhanced protections to water resources. Orange County should use this tool to identify important drainage segments and watershed sites needing attention.

3. RESEARCH

A. Research and inventory all hydraulic constrictions

In order to pinpoint structures that cause or exacerbate flooding, the Watershed's bridges, culverts, and dams should be assessed for their capacity to cause flooding. Stream constrictions can both speed water flow to lower watershed areas and cause backups that flood upstream areas.

B. Install and maintain system of river/stream gages

The installation of a gage on the Moodna Creek is recommended just after the confluence of Cromline Creek and the Otter Kill, which is upstream of communities that have been heavily impacted by flooding: Washingtonville, Blooming Grove and Cornwall. Stream gages collect data on water levels/flows, which is indispensable for: forecasting and predicting the impact of floods and droughts; managing ground and surface-water resources; affecting decisions regarding the design of bridges, culverts and other hydraulic structures that must function safely during floods; and informing recreational users, such as fishermen and kayakers, about water levels.

C. Reassess safe yields for public and community water supplies

The OCWA's Water Master Plan found that safe yield estimates for many public water supplies should be recalculated. In the Moodna Watershed, these reservoirs/lakes include: Brown's Pond\Lake Washington, Goshen's Reservoirs 2, and Black Rock Forest Reservoirs.

D. Continue stream biomonitoring research and determine causes of pollution

Data collected through stream water quality biomonitoring is valuable and should be continued. The OCWA has completed sampling every year since 2004 and plans to continue, but there is a need for additional and ongoing data collection in order to determine sources of pollution and identify

emerging or future trends. Additional research at problem sites can enhance understanding of causes of water quality impairment and lead to mitigation measures, while sampling at sites where sampling has not yet occurred will create baseline data to which future sampling can be compared to establish trends. Illicit discharges and other point sources of pollution should be identified and rectified so as to help improve water quality.

E. Research nutrient loading

Water quality sampling has proven that excess nutrients, from various sources but most notably inadequately treated wastewater, are among the most widespread pollutants in the Watershed. Identifying sources of nutrient loading is a first step in resolving this issue.

F. Support community stream walks and/or monitoring

Residents, students, CAC members and other stakeholders should receive support and encouragement to conduct strategic field assessments of streams within the Watershed. The information gained from these site visits, which can include water quality sampling, can be used for many purposes, including the identification of: point sources of pollution, riparian areas in need of protection or restoration, water quality status, important habitats, potential public access points, stormwater retrofits, etc.

G. Expand public access to water related recreation

Few opportunities currently exist to legally access the Moodna Creek, its tributaries, and lakes in the Watershed. Potential access points were identified in the Plan; these and other potential water-related recreation sites should be further explored.

H. Continue biological research and restoration

Additional field research, especially on fish and aquatic communities in the Moodna Creek and its tributaries, should be performed to better understand local biological resources. Areas that are being overrun with invasive species should be identified and restored with native vegetation, particularly in riparian areas and wetlands whose functions are critical to watershed health. Areas with exceptionally rich or unique biodiversity should also be more thoroughly studied and documented so that protection measures can be devised and implemented.

I. Continue and follow up on climate change research

Some preliminary recommendations are to evaluate the sensitivity of safe yield and dependable yield to projected changes in drought frequency and intensity, keep plans flexible in the face of uncertainty, to encourage and maintain familiarity with major climate change studies, and continually conduct historical climate analyses.

J. Inventory and repair areas endangered by erosion

Certain streambanks that have been eroded by high velocity streamflow are threatening to undermine infrastructure and property. Such areas include at least Mill Street and Forge Hill Road in the Town of Cornwall, although there are undoubtedly other areas in need of mitigation or restoration to prevent further streambank loss. Research should be conducted to identify badly eroded areas and corrective measures should be identified.

K. Calculate or otherwise assess interbasin transfers of water and wastewater

Water is transported across the boundaries of the Watershed both for community water supply reasons and for the transport of wastewater, and therefore a calculation of interbasin transfers would enable a better understanding of the water budget in the Watershed.

L. Maintain a library of sample and model codes

Municipalities would be more likely to incorporate model language into their regulations if an inventory of model codes was available; the County Planning Department would be an appropriate clearinghouse for such information.

4. EDUCATION / OUTREACH

A. Promote understanding and implementation this Watershed Plan

Planning boards, municipal boards, conservation advisory councils, and other decision makers should be offered training and information to understand the recommendations of the Watershed Plan, how the Plan fits into their role as land-use decision makers, and how they can be partners in Plan implementation.

B. Educate and foster public understanding on the needs of biological resources, including forests, wetlands, rare species, and other natural areas

Increase public understanding of important local biological resources to ensure their persistence in the watershed. This should be done through outreach and education for residents, students, municipal leaders, decision makers (planning boards etc.), conservation leaders and other stakeholders.

C. Engage and support residential lake communities in lake management

Lake health and public awareness of contributors to water quality degradation could be improved through outreach to lake communities to encourage enrollment in the Citizen Statewide Lake Assessment Program (CSLAP) or other monitoring program. This would create a sense of ownership and stewardship among lakeshore property owners and ideally result in increased management of lake-side activities.

D. Enhance the OCWA's Water Conservation Education Program and develop adult curriculum and training for watershed protection topics

It is recommended that water conservation education programs, such as those sponsored by the OCWA, include local watershed information in the curriculum. It is also recommended to expand and adapt this type of education for the purpose of training adults. Training and technical support on scientific, legal, policy, land use planning and economic matters should be provided to watershed municipalities and other stakeholders, as needed, based on issues identified in this Plan and on priorities developed by the Watershed Group.

E. Reach out to owners of important water resources

Landowners whose property includes an important water resource should be identified and contacted. These landowners should be educated about the importance of land management techniques that enhance and protect water quality. The need for restoration, mitigation, conservation, or further education can then be assessed.

F. Enhance knowledge and effectiveness of LID facilities through demonstrations and training

Municipal leaders, stormwater professionals, and others should be educated about specific design options for LID stormwater facilities. Education should include review of demonstration sites. Example demonstrations include pervious pavement, rain barrels, riparian plantings, rain gardens and other bioretention facilities and so forth. One demonstration site already exists in the Watershed; a rain garden treats parking lot runoff at Black Rock Forest's headquarters.

5. SAFETY / HAZARD MITIGATION

A. Convene a Moodna Creek Watershed Flood Summit

The OCWA, in partnership with the County, should convene a Flood Summit to provide community leaders in the Moodna Creek watershed with an opportunity to meet with officials from NYS DEC, the Army Corps of Engineers, and other agencies involved with flood safety and risk mitigation. The OCWA should work with watershed municipalities and other agencies to communicate concerns about flooding issues to the Army Corps of Engineers in connection with a current (phase one) study of flooding problems in the Moodna. This Army Corps study has the potential, after several more steps, to lead to a major commitment of Federal resources to study flooding issues and potential responses in the watershed. At the same time, municipalities, the OCWA and other stakeholders should begin planning funding strategies for providing the local matching funds that are required for the last phase of ACOE study (i.e. Feasibility Study).

B. Inventory ownership and management of dams

There is currently no coordinated system in place for managing the release of water from dams. A cooperative and coordinated approach is needed to manage water control structures at dams to ensure that detrimental downstream impacts, such as flooding and erosion, are minimized or eliminated.

C. Assess Groundwater Sustainability

There is a need for a cumulative assessment of water withdrawals and long-term sustainability of groundwater availability, especially in areas experiencing the impacts from increased water withdrawals through wells, new impervious surfaces, and in some cases installation of sewer lines that can actually deplete shallow groundwater.

D. Assess feasibility of removing obsolete dams and secure funding for dam removal

Approximately 210 dams potentially exist in the Watershed, according to research done by the DEC's Hudson River Estuary Program, and many of these dams are no longer in use. Dams that would help to alleviate flooding and erosion or help improve fish migration in the Watershed should be identified and dam removal studies should be completed for the highest priority dams. A dam removal study has already been completed for a dam on the Moodna Creek behind the Lafayette paper Mill site (see Appendix D); the removal of the dam has already been designed and permitted byt funding needs to be secured in order to complete the project.

6. SITE SPECIFIC

A. Protect and enhance Lafayette Paper Mill site (Town of New Windsor)

This abandoned mill is bookended by the Moodna Creek on one side and Forge Hill Road/County Route 74 on the other, making it an ideal site for public access to the Creek. However, the site needs remediation in order to be deemed safe for public access, and currently no funding has been secured for remediation. Additionally, work should be performed in and along the Moodna Creek behind this site in order to alleviate flooding and erosion; such work includes removal of the dam and excavation of the floodplain coupled with riparian plantings.

B. Protect and clean up Idlewild Glen and Gorge (Town of Cornwall and Village of Cornwall-on-Hudson)

Idlewild Glen begins in Black Rock Forest but ultimately passes through an urbanized landscape, then the Idlewild Gorge before joining the Moodna Creek near the Hudson River. Mitigating or resolving the documented wastewater pollution in the Gorge, as well as identifying other sources of impairment, would help improve water and environmental quality in the Glen.

C. Identify potential riparian restoration and conservation projects

Using information such as aerial photography and the analysis completed by John Mickelson (see Appendix B), stakeholders should strategically visit stream-side areas and assess their potential for conservation or restoration.

D. Lower Moodna erosion assessment (Towns of New Windsor and Cornwall)

The Moodna Creek from Rt. 32 downstream almost to Rt. 9W has some significant streambank erosion problems. Near Rt. 32, and farther downstream where the Creek runs along Old Forge Hill Road., there are several very steep areas where the streambank and adjacent hillside are eroding. It's not known how quickly this is progressing, but the County and the towns of New Windsor and Cornwall should evaluate the potential near-term risks to buildings and roads at these sites, and begin planning mitigation measures that may be needed at some point in the future.

E. Assign historic landscape protection to the Moodna Viaduct and valley area (Towns of Cornwall and Blooming Grove)

Explore potential of a local, state, or federal designation for this landmark landscape, which includes Schunnemunk Mountain, the MetroNorth railroad trestle, and the Moodna Creek valley.

F. Complete a management plan for County-owned lands at Black Meadow Creek (Towns of Chester and Warwick)

County lands surrounding Glenmere Lake (which is in the Wallkill River Watershed) also encompass part of the Black Meadow Creek and have unique and impressive biological resources. A management plan could help to protect the rare biodiversity found on this property and also suggest potential types of public access to the property.

G. Pilot and demonstrate decentralized wastewater projects (Mt. Lodge Park, Town of Blooming Grove and elsewhere)

The once-seasonal community of Mountain (Mt.) Lodge Park has documented wastewater treatment problems. This fact, combined with high groundwater, poor road drainage, steep slopes, and poor drinking water, result in a high likelihood for public health issues. Because lot sizes are generally inadequate for conventional septic systems, a recent study (Fuss & O'Neill/OCWA, 2008) recommended replacement of existing failing and/or insufficient wastewater systems using a Decentralized Wastewater Treatment approach. This Plan recommends the same, and also recommends that research be done in other areas of the Watershed to assess need for such an approach elsewhere.

H. Remove steel I-beams from Moodna Creek Streambed

Unused and rusted steel I-beams are vertically embedded in the Creek beneath the Forge Hill Road bridge and should be removed because they pose a hazard to boaters.

7. CONSERVATION

A. Protection of Riparian Areas

Riparian buffers should be maintained and restored as necessary to protect habitat and preserve channel stability. Approaches that have been used to protect existing buffers include: fee simple acquisition, conservation easements, municipal planning tools, riparian buffer ordinances, and development tools.

B. Identify, protect, and manage important habitats

Organizations such as Hudsonia, Ltd, the Hudson River Estuary Program, the New York Natural History Council, and others can assist in habitat identification. High priority habitats include: large, unfragmented forests blocks; vernal pools; submerged aquatic vegetation beds in the mouth of the Moodna Creek; any habitat used by a rare species at any point in its life cycle; large contiguous grasslands or meadows; active farmland; forested and shrub wetlands; and riparian buffers/stream corridors. Protection methods include purchase by a conservation organization or municipality, conservation easement, or (for habitats that are found on private land or even public parks) outreach to the landowner on appropriate habitat management, if appropriate. Forest management options include participation in the DEC's Cooperative Forest Management Program and other forest stewardship programs (e.g. 480[a]) , outreach to owners of large forest tracts regarding management, reduction in herbivore populations & protection/enhancement of native carnivore species

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For a copy of the full Moodna Creek Watershed Conservation and Management Plan and other background information visit the OCWA's Website http://waterauthority.orangecountygov.com/ or call 845-615-3868 to request a CD or paper copy.

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