MARYLAND DEPARTMENT OF NATURAL RESOURCES
River/Stream Management Strategy

Guiding Principles
(November, 2012; Updated July, 2014)

The following "Guiding Principles" embrace those concepts and values that the Maryland Department of Natural Resources (DNR) "believes in" and will apply to the development of policies and strategies to guide our actions and recommendations pertaining to the management of Maryland's rivers and streams. These Guiding Principles provide a science-based perspective on rivers and streams intended to help DNR's Environmental Review Unit effectively evaluate and consistently formulate sound recommendations on proposed projects that could adversely impact these important aquatic resources. These Guiding Principles convey a set of values that all DNR units will embrace in making management recommendations and decisions that affect the State's rivers and streams.

These principles also recognize that recreational fishing is an important benefit of our rivers and streams, and DNR is charged with promoting and protecting these opportunities. In return, recreational fishing raises public awareness and fosters a strengthened sense of environmental stewardship and support for programs designed to protect these fishery resources and their aquatic habitats.

The word "streams" in the following list of Guiding Principles refers to all flowing waters of the State from headwater tributaries to the head-of-tide in Coastal Plain rivers. The term "stream restoration" is a broadly-used and often undefined label for an array of actions. These actions include not only projects that can legitimately be labeled "restoration" in a holistic, ecological context; but also other projects that should more accurately be defined as "rehabilitation" or "stabilization" or "reclamation" or "enhancement" or "engineering", each action and associated projects having different goals and objectives. Therefore, this list of Guiding Principles uses the more generic umbrella term "Aquatic Habitat Management" to encompass this array of actions called "stream restoration". Although the following Principles are grouped under a series of distinct headings, DNR recognizes many of these principles cannot be easily categorized and may be applicable to more than one subject heading. Moreover, certain principles may be more applicable, or of greater import than others, when applied to the review of a specific aquatic habitat management proposal. As such, some discretion or leeway in their interpretation or use as applied to specific stream projects is expected, particularly when their application must be balanced against other valid

public concerns for environmental justice, economic impact, public recreation and impact to landowners. These principles provide general guidance to support more specific "Environmental Review Guidelines for Stream Restoration Projects" and other management decisions associated with Rivers and Streams.

I. Protect Streams and Aquatic Habitat Resources

A. The biological, physical, and chemical condition of streams (and, by inclusion, watersheds) should be protected and not allowed to degrade.

B. High quality streams serve as biodiversity strongholds and models of high ecological integrity and should receive special protection consideration.

C. The level of protection (e.g., minimum riparian buffer width, storm water controls, impervious surface limitations) afforded to a stream for the maintenance of ecological integrity should be based on the best possible scientific information available. In the absence of adequate information and if the potential for risks is not certain but could be high, the most protective measures available should be carefully considered.

D. Preservation or protection of aquatic habitat is often more economically cost-effective and more ecologically beneficial and efficient than trying to restore the habitat after it is degraded. This is especially true for sensitive species and rare habitats that can never be fully restored once degraded.

E. Aquatic Habitat Management projects should strive to eliminate or minimize the sources (causes) of the degradation and not just deal with the symptoms.

F. Whenever possible and practical, a prioritization strategy should be used to decide when, where, and how limited dollars will be spent to achieve maximum benefits from stream protection or restoration projects. One possible strategy is the triage approach described in Appendix F.

II. Protect Rare and Sensitive Species

A. Aquatic Habitat Management projects should not put any imperiled species or their habitats at risk.

B. The current biological diversity of Maryland's streams should be protected. This includes protection and maintenance of all RTE species and other species of greatest conservation need (GCN).

C. Where possible, improving habitat, re-establishing extirpated stream species, and expanding the distribution of rare species into historical habitats should be explored.

D. Freshwater fisheries management and/or regulations and game fish stocking will continue to be pursued and should utilize an adaptive management approach and never put a RTE species at risk of decline or extirpation, prevent their population recoveries, and to the maximum extent possible, never compromise the ecological integrity of stream ecosystems. Management may include native,

naturalized or possibly non-native species. This shall be done in a way that will not preclude the restoration, maintenance or rehabilitation of targeted native, GCN or RTE species.

III. Promote Healthy Stream Corridors

A. The integrity of established riparian forests should not be compromised to re-configure stream channels, reconnect stream channels with their flood plains, or to remove legacy sediments, without ample justification and approval as an integral component of a holistic, whole-watershed management action.

B. Aquatic Habitat Management projects should consider how practices can be modified to enhance the resiliency of stream corridors to land use and/or climate change. Some elements of this resiliency would include: (1) wide riparian corridors to reduce the impacts of high flows on in-stream species, (2) high diversity of native vegetation to resist the impacts of invasive species, pests, and fire, and (3) diverse habitat features such as deep pools, complex woody debris presence, and strong connections with the hyporheic zone.

C. Aquatic Habitat Management projects should accommodate animal migration corridors, and redundant habitats should be created for those species most vulnerable to climate change, as identified by DNR.

D. Riparian vegetation plantings should use native species and be incorporated into all Aquatic Habitat Management projects wherever it is justified and feasible.

IV. Promote Healthy Aquatic Habitats

A. Aquatic Habitat Management projects should strive to achieve the chemical, physical, and biological integrity goals of the Federal Clean Water Act and also the nutrient and sediment reduction goals of the Chesapeake Bay Program

B. Aquatic Habitat Management projects should not degrade aquatic or terrestrial plant or animal communities in the pursuit of water chemistry or hydro-geomorphic goals.

C. Stream connectivity should be maintained to allow aquatic species to complete those activities necessary for their particular life cycles and to protect the genetic integrity and longevity of their populations in the face of changing environmental conditions.

D. Spawning migrations and other movements of fishes and other stream biota should not be blocked by human actions, unless justified and approved for resource management reasons.

E. Removal of dams and other obstructions in streams should not inadvertently facilitate the spread of invasive species; however, removal projects may be appropriate where the projected ecological benefits outweigh the risk of invasive species spread.

F. Stocking of streams intended to replace, restore, mitigate for, or enhance biological diversity should use species native to or naturalized in the focal watersheds.

V. Enhance Stream Resilience to Change

A. Because rivers and streams are by nature dynamic and expected to display changes over time, Aquatic Habitat Management projects should allow for variations in channel morphology and position. Projects should also account for unexpected increases in the intensity and frequency of 100-year floods and projections for sea level rise.

B. Enhanced stream connectivity and the maintenance thereof should be considered in the context of a changing climate and the need for freshwater, temperature-sensitive aquatic animals to migrate to more favorable habitats, often further upstream, as temperatures warm and sea level rises.

C. Aquatic Habitat Management projects should identify and protect those aquatic habitats most sensitive to climate change, particularly those that are naturally variable (e.g., vernal pools; intermittent, ephemeral, and perennial headwater streams).

D. Minimum flow requirements in Maryland streams should be adequate to protect aquatic species and ecological integrity in areas located downstream from dams, water diversions, and points of water withdrawals. Modeling efforts to assess these minimum flows should take into account climate change impacts and variations in water levels associated with lower summer base flows and higher fall-winter flows, current hydrologic trends, and future changes in hydrological dynamics.

VI. Employ a Systems Approach for Aquatic Habitat Management

A. Aquatic Habitat Management projects should take advantage of the natural resiliency of streams, recognize their ability to repair themselves, and decide when doing little or nothing to moderately-degraded streams may be most prudent. Repair of severely-degraded streams that possess almost no ability to recover should be justified by a comprehensive analysis or avoided.

B. Aquatic Habitat Management projects should have clearly defined goals that can be effectively assessed with data collected during the pre- and post-manipulation phases. This Guiding Principle recognizes that some individual projects/management actions are implemented with no or only a limited ability to have a measurable short term benefit, (due to lag times between implementation and response) yet the incremental and cumulative habitat improvements realized by several such projects/management actions may still be considered worthwhile toward achieving long term goals.

C. Aquatic Habitat Management projects should utilize an Adaptive Management approach and complete a full cycle of actions, from generating hypotheses about how the ecosystem will respond to interventions, through monitoring/evaluating and learning from the measured responses, and to applying the knowledge gained to future management actions in the subject system and in other systems.

D. Aquatic Habitat Management projects should ideally include several years of pre-manipulation monitoring to characterize the seasonal and annual variability of baseline conditions and several years of post-manipulation monitoring to evaluate project effectiveness against the backdrop of system variability. This Guiding Principle recognizes that to adequately evaluate the effectiveness of riparian vegetation plantings will usually require decades, not years, of post-manipulation monitoring. For some projects, monitoring should reach beyond the baseline parameters and assess ecosystem function, rather than just ecosystem structure. In other cases, commonly accepted principles, existing data, or a similar project scope or conditions may preclude the need for extensive monitoring.

E. Review of Aquatic Habitat Management projects proposed as "compensatory mitigation" to offset permitted instream and riparian area impacts should recognize that such "mitigation" will often still result in a net loss of habitat, and not complete "remediation" to pre-impact conditions or "replacement" of the ecological services provided by the lost habitat.

F. Aquatic Habitat Management projects should be designed to minimize the need for future human intervention for maintenance.