



April 15, 2019

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Submitted via regulations.gov.

Re: Comments on the U.S. Environmental Protection Agency's and U.S. Army Corps of Engineers' Revised Definition of "Waters of the United States"

Docket ID No. EPA-HW-OW-2018-0149

A. Identity of Commenter

Distinguished associations comprising the U.S. golf industry including the American Society of Golf Course Architects, Club Management Association of America, Golf Course Builders Association of America, Golf Course Superintendents Association of America, National Club Association and National Golf Course Owners Association submit these comments in response to the Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (Corps) proposed rule to define "Waters of the United States" (WOTUS) under the Clean Water Act (CWA).

Golf is a major industry -- mostly comprised of small businesses -- with a profound positive impact on America's economic, environmental and social agendas. Golf's economic engine *contributes \$89 billion annually* to the economy. Nearly 2 million American jobs are tied to the golf industry. The sport offers the opportunity for Americans to improve their fitness and the game generates \$3.9 billion annually for charity. More than 75 percent of golf courses in the United States are public facilities.

Golf courses are among the few sport facilities that are fully integrated into the natural environment. The design, construction and maintenance of each golf course is based on



respecting the inherent characteristics of its environment and the management of every course is based on the stewardship of that environment.

B. Incorporation; Reservation

The golf industry represents many small businesses – golf facilities – all of which are directly impacted by the economy, including the effects of government regulation. We are eager to provide comments to this proposed rule, and ask EPA and the Corps to consider them in the context of the comments of other federal agencies when they addressed similar issues, and those of similarly situated entities. In this latter regard, the golf industry recognizes and supports many of the positions taken by other organizations on this rule, such as Responsible Industry for a Sound Environment (RISE) and Waters Advocacy Coalition (WAC) to the extent that they offer helpful insight of the proposed rule.

Additionally, the golf industry reserves the right to supplement its comments as other information becomes known to it from any source, or to the extent that additional changes are proposed by EPA or the Corps or by any other federal entity.

The EPA and Corps must comply with the federal Administrative Procedure Act (5 U.S.C. §§ 551 et seq.), and the golf industry reserves its rights to require full federal compliance with this law. The golf industry reservations include the right to respond to the comments of others in this rulemaking, and to incorporate such additional comments, as appropriate.

Finally, the golf industry reserves the right to seek the reviews and assistance of other federal agencies, such as the Small Business Administration (SBA), regarding compliance with mandatory requirements of federal law.

C. Golf Industry Supports the Proposed Rule for Its Protection of Waters and Focus on Cooperative Federalism and Regulatory Certainty

While the golf industry opposed the 2015 Rule, it supports the CWA and efforts by the EPA and the Corps to replace it with a rule that both protects the principles of cooperative federalism, and enables industry/responsible parties to proactively apply sound science practices to their land management activities that protect the environment without impacting business, jobs, and communities. We believe this new rule is a step in a positive direction to benefit the United States at many levels including environmental management as well as commerce.

The EPA, Corps and associated organizations should provide easy to understand regulation and policy that enables land managers to achieve success. As a responsible industry, golf course superintendents, architects and builders utilize science based agronomic and environmental best management practices related to golf course management.



The golf industry appreciates the efforts of the EPA and Corps to create a definition of WOTUS that is not all encompassing of water features and better defines which water features are subject to federal jurisdiction. This new rule will allow land managers and owners, like those in golf, the opportunity to do the right thing while achieving their goals. This newly proposed rule is a great step in the right direction that will help many entities in the U.S.

D. Requested EPA and Corps Action

The golf industry is committed to professional golf course design and management including water quality protection, water management and the use of other natural resources as part of our environmental stewardship efforts. Our comments are submitted consistent with that commitment and acknowledgement of the importance of the CWA in protecting and restoring surface waters in this country. EPA and the Corps are urged to consider these comments in drafting its final rule, and to closely consider taking the actions described herein.

The 2015 Rule broadened the scope of CWA jurisdiction beyond constitutional and statutory limits established by Congress and recognized by the Supreme Court. In addition to raising serious legal issues, the 2015 Rule failed to provide clarity or predictability and raised practical concerns with regard to how the rule would be implemented at golf facilities and elsewhere. The significance of the regulatory expansion would be that golf course architects, builders, and superintendents would need federal permission to do any activity that may affect protected waters, or face civil penalties at the present rate of \$37,500 per day for each violation. (These rates, of course, may be subject to future upward revision.) The 2015 Rule would have resulted in redundant and incongruent regulatory requirements inconsistent with the purpose and structure of the CWA. We appreciate the EPA and Corps' consideration given to the ramifications that would be caused by this expanded jurisdiction.

E. Golf Facilities: Science-based Design, Agronomic Practices and Environmental Management

The golf industry has long-standing support through university based agronomic and environmental research that has developed best management practices for design, construction and golf course management. Additionally, these research and best management practices are supplemented by professional education that separates the golf industry from others engaged in development and land management activities. The golf industry implements these best management practices when designing, building/reconstructing and managing a golf facility to ensure successful environmental protection, use of natural resources, healthy landscapes, and business operations. Essentially, golf exists within and depends upon a healthy environment including water quality. Please see **Appendix A** for a listing of specific BMPs implemented on golf courses throughout the U.S. as well as a narrative on how those BMPs are implemented. Please see **Appendix B** for more information on Golf's Best Management Practices: 50 States by 2020 Initiative.



Golf courses that implement best management practices provide for healthy turfgrass and quality playing surfaces that in turn provide for environmental protection, recreational/social benefits and economic benefits. Golf courses are valuable greenspaces in any watershed or community.

F. Understanding Golf In the Watershed

Water is vital for the health, beauty, and economic vitality of golf courses. One only has to look at how a golf course functions to understand the critical role water plays. It is typical for water features to be designed or utilized as an integral part of a course to both enhance the golf experience and serve as storage features for irrigation water. Golf courses have been designed to take advantage of the availability of waters to both enhance the golf experience and provide much needed water for course activities.

Golf courses are designed as a water conveyance system in order to best manage surface water flow from stormwater, flood, or irrigation flow through either natural or man-made conveyances. These waters are conveyed, stored, and/or utilized for irrigation or filtering purposes. Golf courses are also designed to collect runoff from adjacent properties for flood control and pollution prevention. Courses use this runoff as an irrigation source as well. Courses also use reclaimed water to help water purveyors manage excess recycled water. The course irrigates with this water providing filtration and an economical solution for disposal of reclaimed water.

Golf is unlike most other sports in that it does not involve a standard playing field or arena. Instead, golf utilizes the landscape and for that reason maintains a unique relationship with the environment. Understanding and addressing this relationship is essential to the design, construction and management of golf courses. Because of this, environmental issues have long since been a priority within the golf industry. Organizations such as the American Society of Golf Course Architects, Golf Course Builders Association of America, Golf Course Superintendents Association of America, United States Golf Association, National Golf Course Owners Association, Club Management Association of America, National Club Association, Professional Golfers Association of America, National Golf Foundation, and others involved in the game of golf are constantly striving to find the most environmentally responsible approach to the development of new golf courses and the management of existing facilities. The Green Section of the United States Golf Association and the GCSAA's Environmental Institute for Golf (EIFG) provide the golf industry with extensive, ongoing research and education regarding environmental issues and stewardship.

The development of a golf course is a complex process. Qualified professionals provide the expertise necessary to create design solutions for golf courses that are compatible with the environment. A golf course presents the opportunity to meet a need for recreational amenities, while preserving green space that will provide benefits for the future development of an area. Often the green space of a golf course can serve as a protective buffer between sensitive environmental areas and adjacent development. This buffer, which contains extensive turf



areas and vegetation, will also protect water quality by providing soil erosion stabilization and storm water management. Efficient and responsible maintenance practices for the golf course will promote the proper use and conservation of water resources. A golf course can provide enhancement to the environment by incorporating areas for conservation and the promotion of wildlife habitat. Where land has been degraded over time by intensive use or mismanagement, golf courses can provide much needed land improvement. These are benefits that can result when an environmental approach is used for the design, construction and maintenance of a golf course. (Love, William, 2008, *An Environmental Approach to Golf Course Architecture*, American Society of Golf Course Architects)

Architects develop balanced, functional designs through an intense site analysis which includes a detailed report and mapping of a site to identify any and all assets and liabilities. The goal is to identify, avoid, protect or mitigate any protected resources, or better yet, find a way to enhance them by using less valuable ground or space. Future planning and construction are guided by the results of this research and analysis.

Necessary permits and approvals are sought once a plan is in place. Regulatory permitting may be necessary during course design, development, renovation and construction and can involve federal, state and occasionally local level regulatory agencies. This work typically includes jurisdictional determinations from the Corps before proceeding as well as obtaining individual or general permits. The 2015 Rule could have dramatically increased development and operational costs beginning at the earliest stages of the design or master planning process when a site assessment is being done to determine if a new golf course will be physically, environmentally and economically possible and sustainable, or an existing course can improved to a higher standard.

After design, construction and grow in, golf course maintenance/agronomic practices follow. These activities typically do not require federal permitting and jurisdictional determinations. Pest control measures and nutrients used on a golf course are tools that help ensure a healthy playing surface for the game. Furthermore, they help protect a valuable and ecologically important piece of land and adjacent waters.

With this as background, the scope of CWA jurisdiction is of fundamental importance to the golf industry. Changes to CWA regulations that would change the scope of federal jurisdiction will have substantial effects on the ability to finance and develop new projects and perform routine maintenance. Defining WOTUS within the CWA should be very succinct and clearly understood to avoid unnecessary impacts to golf course operations. Providing for a sustainable definition of WOTUS is paramount. The definition literally impacts millions of additional people beyond those in this segment of the recreation industry. A final rule may bring forth litigation, thereby exacting heavy legal fees and costs, and the delays and uncertainties of the judicial process. Such a potential outcome should be avoided.



Section 404 allows the Corps to issue permits for discharges of “dredge and fill” material into WOTUS. Golf course development and renovation/expansion processes would have required additional time-consuming and expensive hydrologic evaluations/hydrologic studies, wetlands delineations, stream assessments, project design, etc. and more 404 permitting by the Corps and EPA and state equivalents under the 2015 Rule. More unnecessary permits would have been needed for the design and construction of channelized areas, drainage, landscape features (wetlands), grassy bioswales, construction of bridges, culverts, etc.

Regarding the maintenance of golf courses, 404 permits are necessary for discharges that would result from moving soil, dredging ponds/wetlands, and fixing stream alignments or banks below the ordinary high water mark including rip rap for erosion protection. Expansion of the definition of WOTUS under the 2015 Rule would have required burdensome federal permits for activities including erosion control (rock and vegetation, grading and fill activities), planting trees and drainage maintenance.

With the proposed rule, there will be an appropriate balance of individual, regional or nationwide Section 404 permits. The proposed rule better ensures cooperative federalism with the approval or denial of projects. 404 permits would not be expanded to include ephemeral streams and other areas that are currently not under the jurisdiction of the CWA.

With the proposed rule, the time and costs involved in the development of a new or renovated golf course would likely not expand as greatly as with the 2015 Rule. There would not be the substantial increase in the administration time and cost to navigate a more complex and uncertain permit review and approval process. The 2018 Rule potentially presents less burdensome design constraints and/or mitigation requirements and overall project costs associated with a more sustainable definition of WOTUS.

More projects may now qualify for nationwide and general permits resulting in decreased utilization of the individual permit process that involves more time and expense. Without the jurisdiction of the CWA being greatly expanded to cover such areas as man-made ditches, developing new golf course or other outdoor recreational facilities, as well as the renovation or updating of existing golf courses and other facilities, would not be severely impacted in the future.

If almost all water bodies on a golf course were deemed a WOTUS as proposed in the 2015 Rule, many routine golf course maintenance activities (such as fertilizer and pesticide applications) would have been deemed to result in a “discharge” to those so called WOTUS. Activities that result in a “discharge” cannot legally go forward without a required Section 402 National Pollutant Discharge Elimination System (NPDES) permit. Most important, there is no legal right to a permit to “discharge” into WOTUS, or any deadline on EPA’s process to issue a permit. Permitting could have taken months or even years, or permits may simply not have been unavailable.



Under the 2015 Rule, golf facilities could have been required to get permits for all activities in or near WOTUS and that would have meant a substantial increase in costs to our small businesses for permits, mitigation, monitoring and assessments as well as increased costs for permit review and issuance to be borne by state governments. It also would have increased our liability to manage the property due to the threat of citizen action lawsuits. The 2015 Rule could have been a significant vehicle for lawsuits on golf courses because it presumed that all waters were subject to federal jurisdiction.

The proposed rule impacts the entirety of the CWA. This is significant and will have far reaching impacts. The golf industry is pleased that the proposed rule’s categories of WOTUS and associated definitions now better reflect environmental sustainability – a balance between people, planet and profit.

We believe the proposed rule more clearly defines federal jurisdiction and simplifies federal jurisdiction which helps eliminate duplicate and costly permitting, mitigation when you have both federal and state regulations governing water features. It still protects surface waters but it is headed in a much more sustainable direction.

G. Golf Industry Comments on the Proposed Rule

The golf industry supports the proposed rule but would like to offer specific comments that we believe must be considered to improve the clarity and implementation of the rule. We ask the agencies to consider these comments as they develop a final rule.

Tributaries:

The complexity of including detailed science in definitions for intermittent streams, tributaries, etc. was identified within the *Federal Register* as well as the call for a more legal definition. We agree that a more easily understood regulatory policy should be implemented at the federal level. Because of the environmental variation and complexity across the U.S. for items such as flow, duration, etc. we first and foremost respectfully request the agencies leave the federal regulatory authority over surface waters at the perennial or traditional navigable waters level. The agency should clarify the remaining ambiguities associated with defining intermittent. **We ask EPA and the Corps to draw their jurisdiction at perennial waters** – the primary water system and the Traditional Navigable Waterways. This will make regulatory compliance an even simpler system and allows the states to govern the rest of waters and the connectivity. We believe that the states know their environments and what’s best in terms of their needs and what their key issues are.

Should the agencies decide to include intermittent waters in the definition of tributary, then keep the definition simple. Should the proposed rule incorporate jurisdiction over intermittent streams, then the golf industry believes that the definition of intermittent flow should be more clearly defined. The definition should focus on 90 consecutive days of continuous flow



and/or inundation and not on volumetric considerations such as the average annual flow volume of greater than “Y” cubic feet per second. The definition would not include the traditional physical characteristics such as the ordinary highwater mark, debris, etc.

The golf industry encourages the EPA and Corps to consider issues surrounding determining flow due to the lack of a central and complete data source on stream flows especially for those drainages in question. The agencies should consider the costs associated with determining flows by landowners for every drainage in order to determine jurisdiction. Allowing the jurisdiction determination to be based upon observations of continuous flow and/or inundation over 90 days can be supported by local historical weather data (rolling 30-year period), drainage areas, precipitation and a basic aquatic life assessment (when available). The agencies should consider the similar processes used by many states to determine water use/water rights and allocations. This determination based upon observation would be more easily achieved by landowners, golf course superintendents, and others responsible for compliance. Simple observation techniques can account for groundwater influence, water releases from reservoirs/impoundments, etc. to stream flow if necessary.

In addition, the incorporation of a general flow criteria may not account for a stream’s biological value/benefit. The agencies should consider that aquatic species depend upon different stream flow scenarios ranging from high volumes of flow to low flow volumes. Continuous flow or inundation periods better allow for either flow scenario and help to protect aquatic habitat/life over time. Water quality is a key element of the CWA, but the specific aquatic life/habitat component should be taken into consideration. The biological function of the stream in conjunction with the chemical and physical properties of non-perennial streams are best determined at the state level.

Lastly, ephemeral streams and other excluded conveyances should be clearly defined and exempted. Other terms such as “typical year” and “flooding” should be clearly defined as well as applied to each category of the CWA. The golf industry supports the use of the rolling 30-year period pertinent to the areas in question and when defining a typical year.

Ditches

The golf industry does not support the creation of ditches as another category within the CWA. Instead, we ask the agencies to make explicit in the WOTUS Exclusions of the 2018 final rule that ditches used for stormwater, flood, irrigation, and other water management activities are excluded from CWA jurisdiction. Golf courses are designed to manage water flow from precipitation, irrigation and in some cases from the neighboring properties. And this is generally controlled through manmade structures and ditches. Ditches and channels that are not jurisdictional (carrying perennial streams or TNW) must be clearly defined and exempted.

Many water features and ditches on golf courses have been created in upland situations and in fact manage stormwater from developed areas or incorporate the management of recycled



water for irrigation from these areas. Others either incorporate natural water features or may be located in floodplains with similar purposes for stormwater management, irrigation, drainage, etc. These ditches or other conveyances may distribute flows across upland features or may be tied to a jurisdictional stream. Previously an outfall structure from a ditch or similar conveyance that is tied to a jurisdictional stream and within the limits of the ordinary highwater mark may have led to the ditch or conveyance as jurisdictional. The golf course industry asks that all ditches and surface water conveyances be exempted regardless of their connection to a jurisdictional water unless that ditch or conveyance is a perennial, TNW or jurisdictional intermittent stream itself.

Once developed a golf course or other landscape can be impacted by future development within its watershed or drainage area where impervious areas increase and thereby impact the landscape requiring the need for additional features and ditches/conveyances. Some may need to be tied to a jurisdictional water. The golf industry requests the rule to properly exclude ditches and similar conveyances that are used for water management (stormwater, irrigation, flood, etc.) and are not waters of the U.S. as described herein (wetlands, tributaries, etc.).

Lakes and Ponds

Also, critical to the golf industry is that it is made explicit in the proposed rule, that ornamental, artificial, irrigation, and stormwater lakes and ponds be clearly exempted in the WOTUS Exclusions section of the rule. In most cases, golf courses are using these ponds and lakes for irrigation and stormwater control purposes.

The golf industry includes the following remarks related to the establishment of a distinct jurisdictional category for lakes and ponds. Adjacent wetlands in this proposal are jurisdictional if they have a direct hydrologic connection. We believe the lakes and ponds should receive the same treatment. We disagree that lakes and ponds should be considered jurisdictional if they are flooded by a WOTUS in a typical year. Incorporate a direct hydrologic connection such as an inlet or outlet that is to a jurisdictional water of the U.S. in addition to the aforementioned exemptions for lakes, ponds and ditches.

Otherwise, we believe the agency should provide additional clarity on how to determine when a lake or pond is “flooded by” other jurisdictional waters “in a typical year.” In the event that flooding by a WOTUS in a typical year remains in the definition of a jurisdictional lake or pond, we then offer that the closest jurisdictional stream or adjacent stream be the influence and a 1 in 5-year event be the frequency. The golf industry supports the use of the rolling 30-year period pertinent to the areas in question and when defining a typical year.

Adjacent wetlands

The golf industry supports the definition of jurisdictional wetlands that abut or have a direct hydrologic connection to a WOTUS in a typical year. We do ask the agency to provide



more clarity on how to determine that a wetland is inundated by a jurisdictional water in a typical year. The traditional characteristics to determine a wetland including hydrology, hydrophytic plants, and hydric soils should remain in place. The proposed definition pertains to jurisdictional wetlands as a wetland still needs to be properly defined. The golf industry supports the use of the rolling 30-year period pertinent to the areas in question and when defining a typical year.

Waters/Features to be excluded from WOTUS

As stated previously, we ask the agency to make explicit that lakes, ponds and ditches that are artificial, ornamental, or provide for irrigation, water management or stormwater management are not jurisdictional. Golf course superintendents, architects and builders must be able to manage water flow on a golf property. We do so with the backing of millions of dollars of investments in research, our expansive stewardship efforts and the professional land management training that is focused on the protection of the environment as an industry. Unnecessary regulation of these features located on golf courses can destroy the business and the recreational benefits we have. Golf properties will still be governed by the states eliminating the need for duplicate regulation.

The golf industry also believes the agencies should not make the waters/features excluded from the proposed rule dependent on whether they were construction in only uplands. Tying the exclusions to uplands is not a determination based on current conditions and will certainly limit the utility of the exclusions. We ask the agency to remove the requirement that features be created in uplands to qualify for relevant exclusions.

Further, the agencies should clarify and make explicit in the final rule that any feature that qualifies for one of the rule’s exclusions is not a WOTUS, even if it could arguably fall within a WOTUS category based upon its particular features.

H. Golf Industry Final Comments

Environmental sustainability is at the heart of golf course design, construction and management. Sustainability in golf is about ensuring profitable operations while making decisions that are in the long-term interest of the environment and communities. The aim is to continue to make improvements through golf courses that professionally and properly designed, constructed and managed to conserve resources, reduce inputs and waste and provide playing conditions that satisfy today’s golfers, as well as those in the future. The golf industry has also sought to work cooperatively with EPA and with States, and continues to ask that a more limited, and positive regulatory approach be ultimately adopted.

Golf courses are designed to protect the chemical, biological and physical properties of surface waterbodies. The design, construction and operational management practices ensure this. The golf industry promotes agronomic BMPs to protect water quality. Excessive regulation can



impact all of this. It’s difficult to stay in business with expansive and overly burdensome regulations.

The golf industry should be recognized for its work on science based best management practices. The EPA and the Corps should work with the golf industry to identify best management practices on golf courses that would be exempt from any 402 or 404 Clean Water Act permitting if those practices are performed in, over or near “waters of the U.S.”

The golf industry supports the proper implementation of the CWA and supports the goals of the CWA itself. Golf courses are designed to accommodate surface runoff through natural landscaping, implementation of structural BMPs (bio-swales, detention basins, ponds, etc.) for drainage/stormwater filtering, and complex drainage systems. Golf courses function as greenspaces providing solutions for brownfields and stormwater-related impacts within urban landscapes. In addition, a golf facility that utilizes agronomic and environmental best management practices is a professionally managed landscape that functions as valuable greenspace in any watershed. Turfgrass and other associated features on the golf course (90% of an 18-hole golf course is valuable greenspace) help to filter pollutants.

We appreciate the opportunity to comment on these issues which have such a potentially significant impact on our industry. We request the agencies look at how the proposed rule will affect an industry largely comprised of small business members who strive to enhance the environment as they also make important contributions to the economy.

We applaud EPA and the Corps for issuing a proposed new definition of WOTUS that is more consistent with the available science and with the limits established by Congress and recognized by the Supreme Court. We great appreciate that this rule has more clarity, predictability and consistency while respecting the role of the states and tribes in protecting the nation’s water resources.

The golf industry looks forward to working with the Agencies to pursue what we believe are common goals. Please forward any questions or comments to Chava McKeel, GCSAA Director of Government Affairs, by phone at 800.472.7878, ext. 3619, or by e-mail at cmmckeel@gcsaa.org, or direct mail at GCSAA, 1421 Research Park Drive, Lawrence, KS, 66049.

Thank you for considering these comments and recommendations.

Sincerely,

Rhett Evans, Chief Executive Officer, Golf Course Superintendents Association of America

Jeffrey Morgan, FASAE, CAE, President and Chief Executive Officer, Club Management Association of America



Jay Karen, Chief Executive Officer, National Golf Course Owners Association

Henry Wallmeyer, President & CEO, National Club Association

Chad Ritterbusch, Executive Director, American Society of Golf Course Architects

Justin Apel, Executive Director, Golf Course Builders Association of America



APPENDIX A

BEST MANAGEMENT PRACTICES USED IN GOLF COURSE MANAGEMENT

Some water quality protection best management practices examples include and are not limited the following:

1. Planning, Design and Construction
 - 1.1. Select appropriate sites and perform environmental analysis for best design.
 - 1.2. Minimize the need to alter or remove existing native landscapes.
 - 1.3. Provide opportunities for restoration.
 - 1.4. Retain or implement native vegetation/materials.
 - 1.5. Use environmentally sound construction techniques.
 - 1.6. Demonstrate responsible land and water use practices based on water data.
 - 1.7. Develop and implement strategies to effectively control sediment, minimize the loss of topsoil, protect water resources, and reduce disruption to wildlife, plant species and designed environmental resource areas.
2. Irrigation
 - 2.1. An efficient irrigation system maximizes water use, reduces operational cost, conserves supply and protects water resources.
 - 2.2. Irrigation scheduling must take plant water requirements and soil intake capacity into account to prevent excess water use that could lead to leaching and runoff.
 - 2.3. An irrigation system should be operated based only on the moisture needs of the turfgrass, or to water-in a fertilizer or chemical application as directed by the label.
 - 2.4. Responsible irrigation management conserves water, reduces nutrient and pesticide movement.
3. Surface Water Management
 - 3.1. Stormwater capture is desirable where the lowest quality of water is needed to conserve potable water, maintain hydrologic balance, and improve water treatment.
 - 3.2. Install berms and swales to capture pollutants and sediments from runoff before it enters the irrigation storage pond.
 - 3.3. Accommodate natural lake processes in the construction of lakes and ponds; include herbaceous and woody vegetation and emergent and submergent shoreline plants to reduce operational costs.
 - 3.4. Use integrated pest management (IPM) strategies and native or naturalized vegetation wherever practical.
 - 3.5. Apply fertilizer and reclaimed (reuse) irrigation/fertigation appropriately to avoid surface water and groundwater contamination.
4. Water Quality Monitoring and Management



- 4.1. Golf course owners are responsible for the reuse of sediment, the Total Maximum Daily Loading (TMDLs), mitigation, and watershed basin management action plans (BMAP).
 - 4.2. Wetlands are protected areas; consult with federal and state agencies before altering natural aquatic areas.
 - 4.3. Studies of water supplies are needed for irrigation systems, including studies of waterbodies or flows on, near, and under the property are needed to properly design a course's stormwater system and water features to protect water resources.
 - 4.4. Superintendents should monitor designated waters in their area for the persistence of highly toxic herbicides and algaecides in the environment.
 - 4.5. Coordinate construction/renovation activities to minimize the amount of disturbed area and possible risk of contamination via runoff.
 - 4.6. Plan construction/renovation activities in phases to limit soil disruption and movement.
 - 4.7. Sod, sprig, or reseed bare or thinning turf areas.
 - 4.8. Mulch areas under tree canopies to cover bare soil.
 - 4.9. Seek professional assistance from an environmental specialist to design an appropriate water sample collection strategy.
5. Nutrient Management
- 5.1. Apply nutrients when turfgrass is actively growing.
 - 5.2. Apply slow-release N fertilizers at the appropriate time of year to maximize the products' release characteristics. For example, an application of slow-release N to warm-season turfgrasses in fall may not be as effective as the same application applied in early summer because of the prolonged release time in fall.
 - 5.3. Follow N application rate recommendations from your local land-grant university.
 - 5.4. N application rates from slow-release materials should take into consideration the release rate of the chosen material. If insufficient material is applied, the desired response may not be observed.
 - 5.5. Consult your local land-grant university for efficient N:K in your location.
 - 5.6. Calibration reduces environmental risk and increases profitability.
 - 5.7. Proper fertilizer storage, loading, and clean-up reduce environmental risk.
 - 5.8. Avoid applying fertilizer to soils that are at, or near, field capacity or following rain events that leave the soils wet.
 - 5.9. Do not apply fertilizer when the National Weather Service has issued a flood, tropical storm, or hurricane water or warning, or if heavy rains are likely.
6. Integrated Pest Management
- 6.1. Chemical pesticide applications should be carefully chosen for effective and site-specific pest control with minimal environmental impact.
Identify key pests on key plants.
 - 6.2. Determine the pest's life cycle, and know which life stage to target (for an insect pest, whether it is an egg, larva/nymph, pupa, or adult).
 - 6.3. Use cultural, mechanical, or physical methods to prevent problems from occurring (for example, prepare the site, select resistant cultivars), reduce pest habitat (for example,



practice good sanitation, carry out pruning and dethatching), or to help promote biological control (for example, provide nectar or honeydew sources).

- 6.4. Decide which pest management practice is appropriate and carry out corrective actions. Direct control where the pest lives or feeds.

These are just a few best management practices other categories include pesticide management (storage, selection, handling, etc.), cultural practices, maintenance operations, landscaping, energy, and more. BMP resources related to water quality protection in golf:

<https://asgca.org/wp-content/uploads/2016/07/environmental-course-development.pdf>

https://www.gcsaa.org/docs/default-source/Environment/bmp-planning-guide-print.pdf?sfvrsn=24cee83e_0

Golf courses are an effective resource for controlling stormwater runoff from adjacent, specifically developed properties. Through design, stormwater can often be detained for controlled release to help mitigate flooding or erosive flow. Also, stormwater can be detained on a golf course and utilized as a source of irrigation water. Stormwater and irrigation water that is captured on the golf course and recycled, provide a beneficial supplement to the required water supply or in some cases, provide the entire source for irrigation resulting in significant conservation of local water resources that otherwise would have to be managed downstream.

Golf course superintendents are very active in controlling runoff on golf courses. The BMPs used by golf course superintendents focus on protecting water quality by reducing the movement of sediment, nutrients and pesticides to water. Buffer strips are used extensively on golf courses to reduce the amount of sediments, nutrients and pesticides reaching surface water. Nutrients are applied based on turfgrass needs and are often applied in a slow release form or at extremely low rates applied every 1 or 2 weeks. Superintendents use multiple tactics to determine when to make a fertilizer application and routinely calibrate fertilizer application equipment (Throssell et al., 2009a)[1]. Pesticides are applied following IPM principals and superintendents use multiple tactics to determine if a pesticide application is needed.

Irrigation is an important resource to produce a healthy turfgrass stand and to minimize the movement of nutrients and pesticides to water. Superintendents regularly update their irrigation systems to improve the performance of the system and use multiple methods to determine the need and timing of irrigation (Throssell et al., 2009b)[2]. Applying the proper

[1] Throssell, C. S., Lyman, G. T., Johnson, M. E., Stacey, G. A., and Brown, C. D. 2009a. *Golf course environmental profile measures nutrient use and management and fertilizer restrictions, storage, and equipment calibration*. Online. *Applied Turfgrass Science* doi: 10.1094/ATS-2009-1203-01-RS.

[2] Throssell, C. S., Lyman, G. T., Johnson, M. E., Stacey, G. A., and Brown, C. D. 2009b. *Golf course environmental profile measures water use, source, cost, quality, and management and conservation strategies*. Online. *Applied Turfgrass Science* doi: 10.1094/ATS-2009-0129-01-



amount of irrigation at the necessary time leads to healthy turfgrass and reduces leaching. In addition, irrigation can be used to move nutrients, and certain pesticides, into soil where they will have their desired effect. A light, controlled irrigation will move fertilizer, and certain pesticides, into the lower turfgrass canopy and thatch where they are less prone to movement.

Superintendents closely monitor weather. Many golf facilities have an on-site weather station and others use a weather reporting service and all have weather information available via the Web. Research and experience show that weather, to a large degree, dictates turfgrass performance and superintendents monitor the weather so they can respond accordingly. Disease outbreaks are directly correlated with weather and by monitoring weather and using prediction models, superintendents can time pesticide applications for maximum effect. Additionally, weather forecasts are used to help time nutrient and pesticide applications. If severe weather is predicted in the coming 24 to 48 hours, superintendents will delay nutrient and pesticide applications to avoid potential runoff.

Golf course superintendents and their staff are trained and licensed to apply pesticides properly. To prevent pesticides from reaching waterways, golf course superintendents apply pesticides at recommended rates. Also, the latest technology in application equipment is used on golf courses which allows for precise application of pesticides and minimizes the risk of runoff.



APPENDIX B

GOLF'S BEST MANAGEMENT PRACTICES: 50 STATES BY 2020 INITIATIVE

The GCSAA launched the Golf's Best Management Practices: 50 States by 2020 Initiative. The goal is to have all 50 states by the end of 2020 with a comprehensive environmental and agronomic BMP program in place. In 2017, GCSAA with program support and funding by the United States Golf Association through the Environmental Institute for Golf launched the BMP National Template and Planning Guide resource for states to use to develop their state BMP programs.

The need for state-level BMP programs and, ultimately, golf facility-written BMP plans for nutrient, drought, and water management and integrated pest management (IPM) is greater than ever. Golf courses, many of which are located in urban environments under the watchful eye of concerned citizens, face heightened scrutiny from the public, media and special interest groups regarding the use of inputs (that is, water, pesticides, fertilizers, etc.) and commonly held misconceptions about golf course management. The industry understands how critical it is to demonstrate sustainable methods of land management.

GCSAA's BMP Planning Guide and Template makes it easy for golf allies in the state to work with regulatory agencies and watershed groups in each state to follow key steps in developing a golf course management state BMP program. Read more: <https://www.gcsaa.org/environment/bmp-planning-guide#ixzz5kgyB6Oqy>

- In 2017, the BMP program included 7 finalized comprehensive golf centric BMP programs. At the end of 2018, there were 14 comprehensive state programs.
- Today, there are currently 36 states with programs under development.
- In 2018, the Facility BMP Planning Guide was launched helping golf facilities create a facility manual using their state BMP guides.
- The industry continues to provide education and resources to golf course superintendents in support of these science based BMPs.
- More than \$436,505 in grants in 43 states has been distributed for BMP programs through the EIFG and funding by the PGA TOUR and United States Golf Association.

