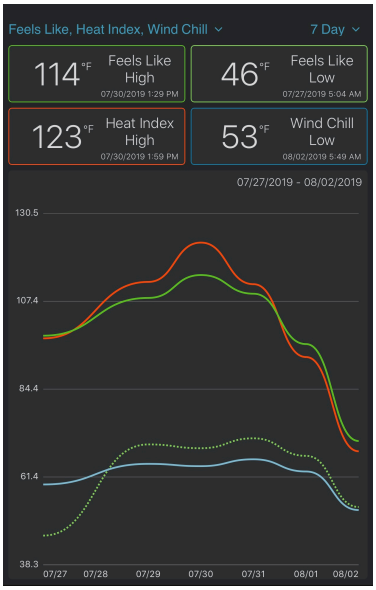
Facility Adoption of Integrated Pest Management BMP's

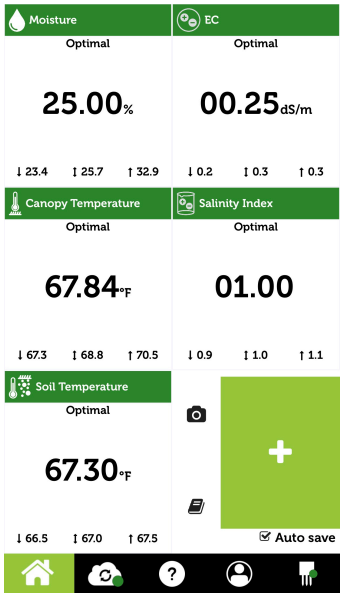
IPM
Val Halla Golf Course uses a science-based approach for managing all areas of the golf course. Years of historical data (weather, product applications, agronomic practices, soil testing, etc.) and state of the art equipment are used to make sound decisions when it comes to fertilizer and chemical applications. All avenues of agronomic and biological methods are exhausted prior to relying on chemical input.

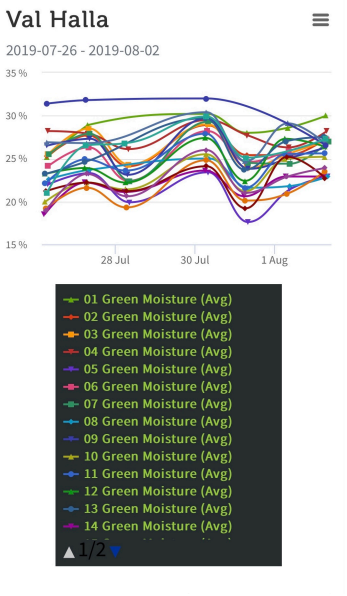
Agronomic Practices
Val Halla uses numerous agronomic practices to keep the turf and soils healthy. Greens, tees, fairways and roughs are aerated multiple times a year using a combination of solid and hollow tines. Greens are core aerated (4-6") in the spring (when enough winter damage has occurred that justifies the removal of the soil). They are then top-dressed with straight sand to fill the holes and over-seeded. The greens are also needle-tined (4-6") multiple times throughout the growing season and deep-tined (10-12") in the fall. Recently, Val Halla has started DryJecting greens which uses quick, high pressure, bursts of water into the soil to create a capillary action that pulls sand into the holes to a depth of 10-14" inches. Tees are solid-tined multiple times a year (cored & top-dressed when warranted) along with greenbanks, collars and approaches. Fairways are 'spiked' every fall. The aeration process is vital to healthy turf. Aeration relieves compaction of the root zone, allows for CO2/oxygen exchange, increases water infiltration and (when cored) removes thatch; or dead organic matter. Verti-cutting (or vertical mowing) is also used for thatch management.

Water Management

Weather plays a key role in turfgrass management. Turfgrass health is greatly affected by temperature, humidity and rainfall. The golf course uses an Acurite weather station that monitors daily highs and lows for temperature and humidity and measures all rainfall. High temperatures and humidity levels provide favorable conditions for disease development. It is for this reason that humidity, rainfall and moisture are all monitored closely and taken into account before any irrigation event is scheduled. The VWC (volumetric water content) of soils are measured multiple times per week using state of the art testing equipment (TDR 300 and POGO Turf Pro) to determine when and if irrigation is needed. Water is applied using a “deep and infrequent” philosophy. Rather than water a little every night, soils are allowed to dry down and water is only applied when the plant needs it. Not only does this closely mimic natural rain events and improve playability but prevents prolonged plant wetness (which encourages disease). When an irrigation event is warranted, all meteorological information is consulted and the course uses its state of the art irrigation system that allows for precise amounts of water to be delivered in different rates/amounts to any of its 600+ irrigation heads. In the event of a surprise rain shower that occurs overnight (in the middle of an irrigation cycle), the central control uses rain sensors that can pause all irrigation, wait for a specified amount of time, measure the amount of rainfall and then either adjust program run times to only apply the total amount of water originally requested (by taking the amount of rainfall into account) or stop further irrigation all together if the total amount desired has been reached from rainfall.





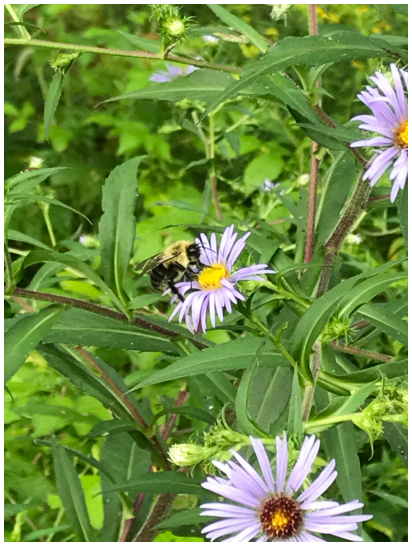


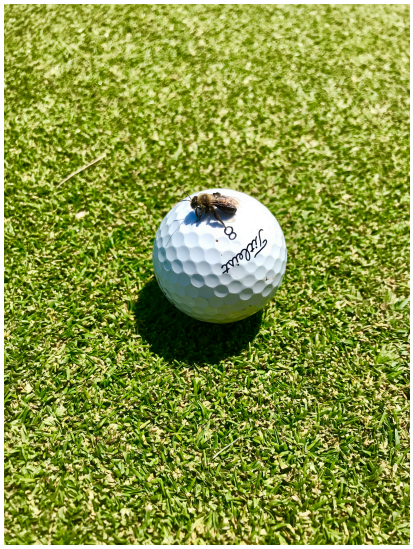
Wetting Agents

Wetting agents are also frequently applied to greens, tees and fairways. These products modify soil properties by bonding to individual particles and allow for the soil to retain moisture more efficiently. This allows for more infrequent irrigation cycles and less water use overall; which greatly reduces the chance for disease presence. By closely monitoring the weather, soil moisture and all irrigation events, it limits the amount of fungicide applications needed by creating less than favorable conditions for disease development.

Alternative Methods
Similar to the benefit of agronomic practices, for instance aeration helps combat weeds as weeds prefer compacted soils, many alternative control methods are used. A prime example is the use of ferrous sulfate heptahydrate (Iron) to help control weeds. Some weeds, such as clover, are sensitive to high rates of iron. Through our use of iron to increase chlorophyll (outlined in the adoption of the 'Golf Fertilization & Nutrient Management' chapter), we have been able to reduce the amount of clover on the golf course while reducing the amount of herbicides used. High rates of iron can cause turfgrass to turn black and fortunately, clover is more susceptible to iron toxicity so these weed plants darken and shrivel up with the normal amounts of iron we apply to turf.

Reduced Risk Pesticides
Whenever possible, we strive to use reduced risk pesticides. Lately, the decline of pollinators has raised significant concern over the effects that some insecticides have on these species. Upon becoming aware of the potential for collateral damage through the use of these products, Val Halla has switched to newer chemistries that pose no known effects on pollinators. These products are more expensive (as are most newer chemistries), however they require significantly less quantities to be effective and also only need to be applied every other year, as compared to annually.





Fertility
Val Halla uses a balanced fertility program to maintain healthy turf. A combination of organic & synthetic fertilizers are both used when and where appropriate. Liquid fertilizers made in-house, are used to “spoon feed” the turfgrass plants every 7-21 days depending on area. This keeps nutrient levels consistent throughout the growing season. Nutrient deficient or over succulent plants are more susceptible to disease. Keeping nutrient levels consistent not only minimizes disease, but helps keep the plant healthy enough to fight off disease naturally. The process of spoon-feeding only gives the plant as much nutrients as it can use at the time; which decreases the chance for leaching and runoff. Special, super-slow release, granular fertilizers are used supplementally on greens and tees in the spring and fall. These products release nutrients at very slow rate, resulting in the same consistent availability to the plant as liquids. All fertilizers used at Val Halla contain little to no, phosphorus. Unlike Nitrogen, the plant will only take in what it needs for phosphorus; anything else has the potential to leach. Phosphorus is the number one contaminant of fresh water resources and also naturally prevalent in heavy, New England soils. For those reasons, phosphorus is only applied when it is actually needed. Through the use of soil testing and a balanced fertility program, Val Halla reduces the amount of chemical input required to maintain healthy turfgrass.

Scouting
When chemical control is required, these products are not used haphazardly. Scouting for disease is done on a daily, and sometimes hourly basis throughout the growing season. Weather, agronomic conditions and years of records and data go into each decision to apply chemicals. Greens are treated bi-weekly preventatively throughout the growing season. This preventative program uses years of historical data to forecast problems and keep disease to an acceptable level. Treating preventatively ultimately requires lower amounts of chemicals than treating curatively. Val Halla uses tank mixing and chemical rotation practices to minimize the amount of product needed. Chemicals are rotated (never using the same one back to back) each application in order to reduce the chance of fungicide resistance (the plant becoming immune to the chemical) which would require higher dosages. Tank mixing (two or more products at the same time) allows for smaller dosages of a few chemicals to be applied rather than a large dosage of one product alone; which overall, minimizes the amount of product needed. Tees and fairways are only treated when scouting warrants and roughs are only spot treated for weeds once in the spring. All applications are made by state licensed applicators and all records are kept in accordance with the Maine Board of Pesticides Control.

Reel & Blade Maintenance
Careful attention is also paid to the sharpness of all blades and reels used for mowing. A dull mower blade can tear the turfgrass leaf and make it more susceptible to disease than a turfgrass leaf that was cut cleanly by a razor sharp mower blade. Val Halla uses sophisticated grinding machines in order to maintain extremely sharp edges. Blades and reels are checked daily, adjusted, swapped out with spares as needed and ground frequently throughout the growing season.

Summary
Through the use of agronomic practices, scouting, precise weather monitoring, data collection, balanced fertility programs, and conservative chemical applications; we can proudly say that Val Halla has a net-positive impact on the surrounding environment. Vegetative buffers surround all of our water bodies and through our water testing efforts we have discovered that the water leaving our property is cleaner and more filtered than when it enters. We are also proud to support environmental initiatives such as *Monarchs in the Rough* and *Operation Pollinator* by transitioning and facilitating naturalized areas as well as numerous bird and bat houses that help foster wildlife habitats. We take our environmental stewardship very seriously and our environmental impact is always at the forefront of our decision making process.