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Turf Advisory Service Report

Gabriola Island Golf Course

November 5, 2012

Att:
Mr. Matt Richards, President
Mr. Chris Jans, Vice President
Mr. Alan Tanner, Greens Chairman
Mr. Mike Stewart, Course Superintendent

It was a pleasure to visit Gabriola Island Golf Course, as it has been over nine years since my last visit. After reviewing the property, I am so impressed with the changes I have seen, and how great the course looks, especially with such a small grounds staff and budget. The recommendations found in this report reflect both new and basic technologies and techniques that can assist staff to provide the best possible playing conditions within budgetary considerations. I found the playing surfaces such as greens, tees, and fairways have improved dramatically over the past nine years.

The main topics of discussion include;

- Existing grounds operation
- Course maintenance programs and cultural practices
- Course equipment and maintenance

Each area covered in this report will have observations followed by recommendations. Should you have any questions concerning the findings of this report, please do not hesitate to contact me.

Gabriola Island Golf Course Analysis
Review Process

Goal: To ensure Gabriola Island Golf Course will be up to date with current practices ***within budgetary limitations***. This will be done by reviewing current practices & procedures of the Grounds Department, and provide a written report outlining findings with recommendations. These recommendations will help improve conditions and ensure the course remains desirable to play for island residents.

Steps Involved:

Agronomic

- Review agronomic practices and materials used, such as grooming schedules, fertility, pest management, irrigation, soil tests, lime requirements, amendment applications, and environmental management practices.
- Review cultural practices & materials such as aeration, topdressing, vertical mowing, over-seeding and all other cultural practices pertaining to course maintenance and conditioning

Labour & Resources & Planning

- Review current labour use, scheduling, compensation packages, and how they compare to the regional market.
- Review equipment maintenance & repair practices, and long-term capital equipment replacement program.
- Review golf course maintenance practices & standards.
- Playability – Review the golf course from a players' perspective, and see if there are areas that can be improved, or areas that can have reduced labour inputs.

Sincerely,

Brian Youell

Brian Youell MS AGCS
Master Superintendent
Uplands Golf Club

Executive Summary

The following are highlights of the written report, and those items that may be implemented because of no cost or little cost. I have also listed items that have financial costs, but will have the great impact to course conditions.

- **Maintenance Standards** – Course standards will provide the baseline for golf course maintenance, course playability, budgeting, and a communication tool. Standards provide a clear outline of what the maintenance budget will, or will not cover in daily course conditioning. In order to get buy-in from all parties, management from the various departments at the course, along with club officials such as the President and Captains should participate in Standards development.

- **Thatch Management** – Thatch is a layer of decaying plant residues that sits on the soil surface. It can cause soft bumpy playing conditions and creates plant health issues. It has taken many years for this layer to build up, so it will take time to gain control of this on some of your putting surfaces. Biweekly sand topdressing on greens and winter applications on fairways will improve conditions, especially during wet months. Renting aeration equipment for quad-tines will increase surface disruption and improve playing conditions as well. Ideally, you would like to disrupt 20% of your surface area each year with aeration practices. You are currently disrupting less than 10%.

- **Irrigation System** – Many of the turf related stresses that I observed are irrigation related. The few heads that I did inspect, had debris in the nozzles, or were sunken to low in the ground restricting proper spray patterns. This creates poor distribution uniformity and drought stress starts shows. Increased drought will see the incidence of Anthracnose fungus on the greens increase. This is what has attacked #2 green and caused serious turf decline.

- **Use Sprayer More Often** – A sprayer can be one of the most valuable assets on a golf course. It gives you more options with fertilizers, and the ability to spoon feed turf and reduce fertilizer inputs. I would also implement the use amendments such as wetting agents that will help water infiltrate into soils. You can also use plant growth regulators on greens and tees to help reduce the need to mow and improve plant health.

- **Superintendent Networking** – I fully understand the difficult economic times that we are in. But the value of networking is even more important when your course is isolated on an island. I could go on for pages all the great things your Superintendent has done, but he is basically doing it on his own, with not much networking with fellow Superintendents. The $160 annual membership cost would pay for itself in one year, with the knowledge he can gain from speakers at meetings and networking with fellow Superintendents. Secondly, many of the larger clubs have a wide variety of used equipment and sprinklers that is sitting

in their yards or given away. This would be an ideal situation to let other courses know what you are in need of, as mentioned much of the has been depreciated and carries no value to clubs.

- **Budget** – After reviewing the grounds budget, there are many different areas that are under-funded. With a limited budget there will be shortcomings regarding course conditioning and improvements. During these economic times, it is unrealistic to expect budget increases and make improvements. I do feel it is important to identify minimal course conditioning requirements and practices, and know the ramifications if these practices are not funded in grounds budget. This will allow budgetary planning so these practices can be implemented when economic times are stronger.

- **Communication –** When in the golf business, much like all other businesses, good communication goes along ways for customer satisfaction, employees being informed, and management having a pulse on the business. I feel there can be improvement with communication between customers and what is happening on course, and how this is being communicated to them. I would also include the Superintendent in the communication process especially when "managing up." Hosting "fireside chats" and other public events can go along way with customers.

- **Audubon –** The Audubon Cooperative Sanctuary Program is an award-winning program that guides a golf course towards environmental certification. There are six levels needed in order to be classified an Audubon Cooperative Sanctuary. They are; Environmental Planning, Water Conservation, Pesticide Safety & Reduction, Water Quality Management, Wildlife & Habitat Enhancement, Community Outreach & Education. This can be a positive step for Gabriola Island and the local community. There is an opportunity to reduce inputs or costs associated with maintaining a golf course with the guidance of this program. This is also a great marketing tool, and may create some interest for Island residents that are environmentally conscientious and may want to join the club. I recommend that Gabriola Island Golf Course pursue certification. The cost is approximately $200 annually to belong to the Audubon Soceity. You are doing many practices already, and I would estimate you could earn three of the six levels of certification right away.

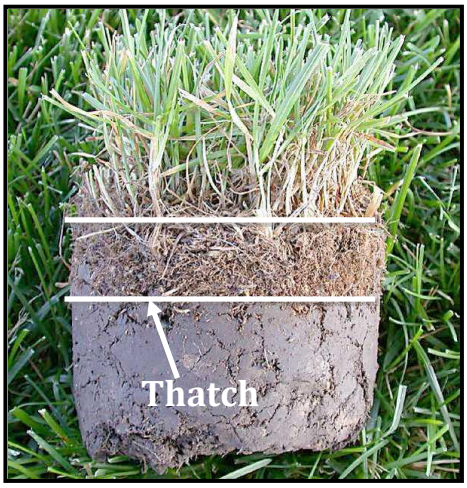
Golf Course Review

AGRONOMIC PRACTICES

Mowing

Observations

Greens, tees, fairways, and rough are all receiving minimal mowing frequencies with current labour available. Mowing heights in general may be higher than industry standards, but necessary due to soil conditions, bedrock, and thatch**.** Scalping will occur on turf surfaces due to thatch levels and turf decline may occur. Thatch is a layer of decomposed and partially decomposed plant residues found on the soil surface, primarily from decaying roots and leaf tissue. The ideal thickness for thatch should be ½". In some cases, your thatch levels can be as thick as four inches. Thatch acts as a sponge, holding water and disease organisms, but also can produce playing conditions that are soft and bumpy.



Recommendations

- **Increase cultural practices -** If there is a desire for lower mowing heights and faster putting surfaces, there will need to be an investment in cultural practices such as vertical mowing and sand topdressing.

- **Reduce Thatch Levels -** See sections on *Aeration* and *Topdressing*. These practices will need to be in place for a minimum of one year before mowing heights are to be lowered. These practices will help reduce thatch accumulation, firm up surfaces, and reduce the potential of turf scalp.

- **Course Setup** – All golf courses have various ways to set up their course for day-to-day play. The primary goal is to provide variety for the golfer, and reduce turf wear by moving hole locations and tee blocks. It is key to remember that we are in the ***"entertainment business"*** so course setup should be fair at all times, especially with hole locations and block placements. Each day is also a presentation, so it is important that course hardware such as flags, poles, and cups are clean and presentable.

- **Bunkers –** With limited staff, bunker conditioning will be lowest priority, so other critical maintenance practices can be implemented.

Aeration

Thatch layers on #1 green with aeration channels

Observations

There are aeration practices in place, but not to the frequency that is required to repair soil structure damage, and reduce thatch.
Also, improper irrigation practices for so many years with an old system has created anaerobic soil conditions and damaged the soil profile. Anaerobic soils do not have adequate oxygen and microbial degradation of thatch is at 20% of normal capacity. Thatch accumulation will continue to increase, as microbes that normally help in thatch decomposition, are not functioning to full capacity. Anaerobic soils also can be prone "black layer", a condition where there is a build up of hydrogen sulphide gas causing blackness to the soil. Hydrogen sulphide gas is toxic to turf roots and can cause serious root decline.

Recommendations

- **Determine What Your Goal is When Determining Your Aeration Practice –** There are three options when aerating; deep-tine aeration, regular core aeration, and close-core aeration. Deep-tine aeration is designed to reduce the sub-compaction layer, by driving tines 6" – 12" into the ground with a slight kick. This is an ideal practice for soil-based growing medium that is usually poorly drained and prone to compaction. Sand based growing mediums differ, as sand is similar to a pail of marbles, no matter how hard you press the marbles together, you cannot compact them any closer together. Sand is a non-compactable growing medium and is used because it maintains porosity for water and air. Deep-

tine aeration in sand growing mediums may not be your best choice. If sand-based greens are older, they may have a build up of organic matter that reduces porosity. I would then suggest using a deep-tine aerator. Deep tine aerators will greatly benefit fairways and traffic areas to relieve sub-compaction layers, the only challenge will be to avoid rocks, drains, and irrigation lines.
If you have a heavy thatch layer, I would highly recommend you switch to core-cultivation, or close-core-cultivation. Ideally you would like to disrupt a minimum 10% of your surface per aeration, and 20% annually.

- ***Increase Surface Disruption***

Ideally you would like to have 20% surface disruption annually through the implementation of various cultural practices. Currently you are getting approximately 7.67% per aeration on greens.
However, deep-tine aeration can be very beneficial for heavy soils that drain poorly. Use this chart to aid in your aeration tine selection. The use of slicers may also be very beneficial through out the season as well. Slicers can open up the soils and are durable when dealing with rocking conditions.

Tine Size	1.25" x 1.25" Centers	2.0" x 2.0" Centers	2.5" x 2.5" Centers	5" x 5" Centers
¼" Hollow Tines	3.14%	1.23%	0.79%	
3/8" Hollow Tines	7.07%	2.76%	1.77%	
½" Hollow Tines	12.57%	4.91%	3.14%	
5/8" Hollow Tines		7.67%	4.91%	
5/8" Hollow Vertidrain				1.23%
¾" Hollow Tines			7.07%	1.77%
¾" Hollow Vertidrain				1.77%
1" Hollow Tines				3.14%
1" Hollow Vertidrain				3.14%
7/8" Drill & Fill (7" Ctrs)				1.23%
Graden Verticutter (15 Blades @ 1" Spacings)	1mm Blade 3.93%	2mm Blade 7.87%	3mm Blade 11.81%	

Surface Disruption From Various Methods

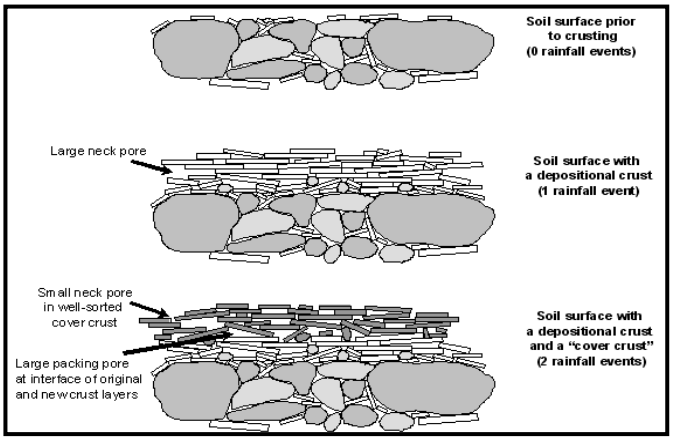
Aerway Slicer durable in all conditions

- **Ensure Aeration Schedules are Set in Place for Quick Turf Recovery** – It is becoming more common to bump aeration schedules to accommodate tournaments and increase revenues. The closer aeration practices can be implemented in ideal weather conditions, the quicker the turf recovery.
Ideally spring aeration should be scheduled between ***mid April*** to the first week of May. Fall aeration should start after the ***first week of September***. If aeration is performed outside of these windows, recovery takes longer and the potential for loss of rounds may occur. If aeration is delayed into the summer, increased stress will occur and the incidence of Anthracnose fungus will increase.

Sand Topdressing

Observations

One of the unique opportunities in the Pacific Northwest is the ability to play golf all year long. This unfortunately has serious consequences, especially if proper cultural practices are not in place. We receive an average of 950 mm of rainfall each year, which mostly falls between October – April. Playing golf during wet conditions has serious consequences, and can cause long-term damage to the soil structure. Rainfall saturates the soil structure, which allows soil particles to become mobile. Golf course traffic from equipment, golfers, and carts, will cause the fine particles to float to the surface causing ***crusting***.



Increased Crusting

The same effect can be found when concrete is poured, and then trowel for a smooth surface. Floating the fine particles to the surface creates the smooth surface. During winter golf, players are in mucky conditions and create this crusting effect. Once the course dries down, a layer of fines are left on the surface that seals off the soil surface. This limits water and air infiltration, increases soil compaction, and surfaces become prone to disease, weeds, and algae growth. If proper practices are not in place, course decline will continue.

Currently there is no real sand topdressing program in place to repair damage. Minimal sand is placed into greens and tees during spring and fall aeration and that's it.

Recommendations

- **Greens Topdressing Program –** Besides the two sand applications the greens receive during aeration, the greens will need biweekly sand topdressing. The sand will help dilute thatch by increasing air and water porosity. Furthermore, the sanding will firm up putting surfaces and provide better playing conditions. Sand applications will increase oxygen in the soil and increase microbial activity, This will help reduce thatch build-up. With the size of your greens, annually you will need approximately 30 tonne of a USGA spec sand for biweekly applications.. This sand will rub into the greens easier, not disrupt the golfer, and will limit mower damage. You should be able to get a copy of your sand specifications from your sand supplier.

Name	Particle Diameter	Recommendation (by weight)
Fine Gravel	2.0 - 3.4 mm	
Very coarse sand	1.0 - 2.0 mm	Not more than 10% of the total particles in this range, including a maximum of 3% fine gravel (preferably none)
Coarse sand	0.5 - 1.0 mm	Minimum of 60% of the particles must fall in this range
Medium sand	0.25 - 0.50 mm	
Fine sand	0.15 - 0.25 mm	Not more than 20% of the particles may fall within this range
Very Fine Sand	0.05 - 0.15 mm	Not more than 5%
Silt	0.002 - 0.05 mm	Not more than 5%
Clay	less than 0.002 mm	Not more than 3%
Total Fines	Very fine sand + silt + clay	Less than or equal to 10%

Ideal sand specifications from the USGA

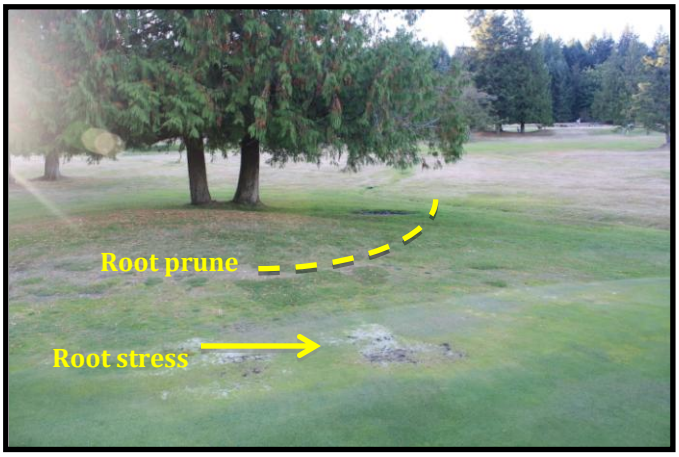
Fairways & Tees

Observations

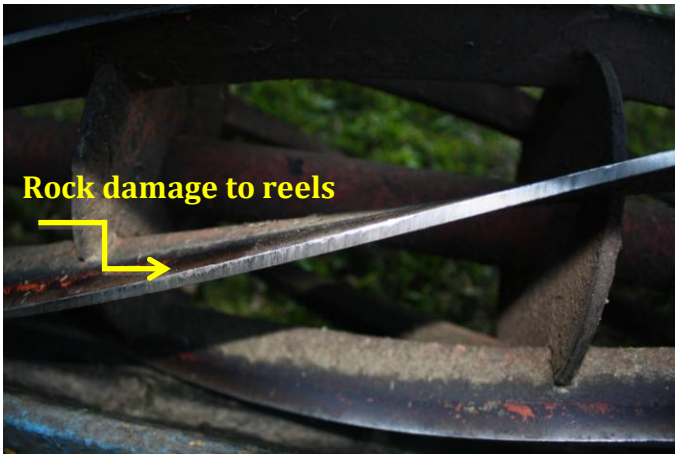
Overall, I am very pleased with the fairways and tees. With your budget limitations, you "get what you get". In other words you cannot expect highly manicured turf with your limited budget. However, I think golf a Gabriola Island Golf Course is how the game should be played, more of a natural state, with a wide variety of golf holes. I am pleased to see how well the tees are doing, and have improved dramatically since 2003.

Rocks being hit by fairway mower

The same can be said for the fairways as well, there is definitely a stronger stand of turf. Some tees are under drought stress due to tree root competition, bedrock, and poor distribution uniformity with the irrigation system. As the picture illustrates, roots from trees can cause serious drought issues on greens as well. Root pruning can be achieved either by renting a trencher, or using a backhoe with a narrow bucket. Depth does not need to exceed 18". This will break the roots and should help an area for approximately five years.



Recommendations



- **Fairway Rock Removal** – This may seem like a daunting task at first, but if the club adopts a rock removal program, you will maintain a better quality of cut with your gang mowers. The quality of turf we maintain is highly dependent on a good quality of cut. ***It will only take on knick on one reel, and you have lost your quality of cut.*** It can take hours to repair and re-sharpen a reel, and in your case you would have to send the equipment out to be repaired, costing hundreds of dollars per reel. I know Ike MacKay mentioned he had a backhoe that could be used to remove some of the rocks. As you know many of your rocks are peaks to massive bedrock buried below, so if a pick attachment were available on the island to chip the rocks, would be a great asset as well.

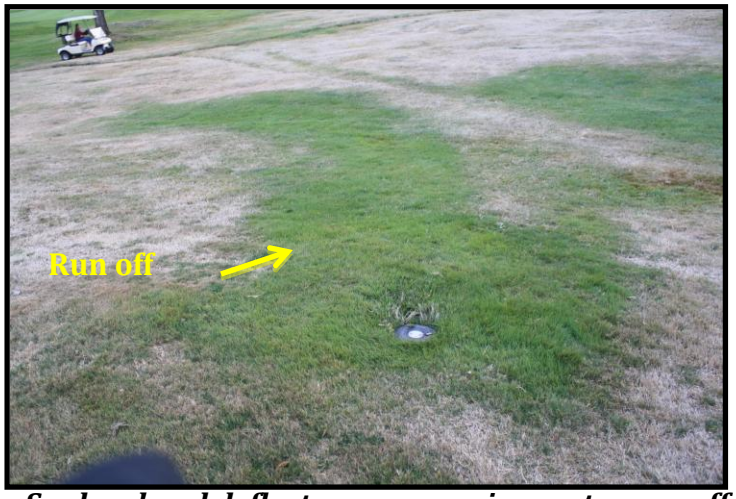
  At the other end of the spectrum, there are many depressions on the fairways that can bang equipment and also become a safety hazard. I would recommend stockpiling or excavating soil from some other area of the course to fill in the more serious depressions.

- **Tees Overseeding –** There are many tees that are extremely worn due to size, shading, or drought related stresses. I would recommend overseeding your tees with a seed mix of perennial ryegrass, chewings fescue mix. The ryegrass has great colour, good wear tolerance and can germinate rapidly. The fescues grow well in low fertility, shady conditions, and have a very high drought tolerance. The seed can be introduced with a divot mix and can be placed after a golfer takes a divot. Another option will be to introduce the seed right after aeration.

To ensure soil/seed contact, either sand topdressing, or breaking cores downs will ensure good germination success. I would recommend a high phosphorous fertilizer on your tees if you intend to overseed. Phosphorous is key for seed germination, rooting, and early establishment.

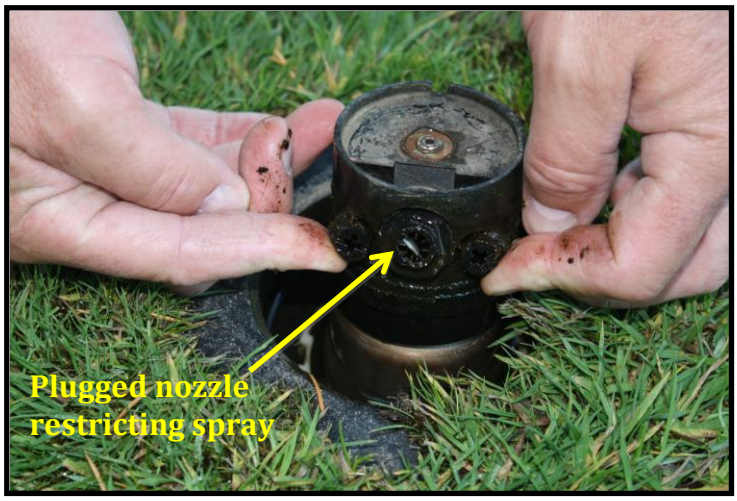
Irrigation Practices

Observations - Irrigation is one of the most difficult jobs for a golf course Superintendent to manage. Most golf courses will have two or three irrigation technicians to manage their system. I feel this is one of the most limiting factors for healthy turf at your course. Sunken heads restrict proper spray and distribution uniformity is a real challenge. As the image illustrates the head at the back of #2 green is low and water is deflected from where it should be going.



Sunken head deflects spray causing water run off

Poor water distribution compounds turf stress by causing drought conditions on the green, which lead to Anthracnose fungus killing much of the green.
Other issues are casual water puddles such as # 5 fairway, which may be leaky pipe joints, and numerous heads that are plugged or broken. Unfortunately the irrigation challenges are great, and your labour resources are limited to manage repairs needed.



Recommendations

- **Prioritize Repairs** - I would focus on key areas first such as greens and tees. Raise heads so grass is not deflecting nozzle through, ensure heads are level. Irrigation is not an exact science when water is thrown is a circular pattern, 60 – 90 feet and 20 feet in the air. If heads are to low or crooked, distribution is greatly reduced and stress areas will show up much faster. Check to ensure all nozzles are free of debris, and I would also check to see what nozzle sizes are in each

head. Over the years nozzles are replaced with not much consideration on the effect of different nozzle sizes. Sprinkler head spacing is set for specific nozzle sizes. These repairs will be very time consuming. On average, it will take one hour to dig up, service, level, and back fill. Once you count the heads on course, you will quickly understand how monumental this task will be.

- **Post Request for Irrigation Parts** – As I mentioned, the value of networking when your Superintendent is a member of an association can pay for itself. The British Columbia Golf Association has a Vancouver Island Chapter, irrigation requests can be posted online, and there may be courses that have old Toro heads that are in perfect shape and not being used. We installed a new system in 2003 and I gave away over 600 heads that were still in perfect operational order.

- **Scheduling** – Irrigation control with your clocks can be limiting, but you can change sprinkler start times on your greens. If you program to run your greens as close as possible to early morning, you reduce the leaf wetness period. This will reduce fungus pressure. Most fungus requires a ten hour leaf wetness period to before spores infect.

- **Use of Moisture Meters** - I would recommend purchasing a TD 100 moisture meter from Spectrum Technologies, the cost of the meter is approximately $750. They will help staff identify moisture levels in growing mediums. Ideally you will be able to ***"water to the number."*** Ideal moisture levels in soils should be between 20-25%, in our case we had levels at approximately 40%. This will definitely help you reduce your water consumption, improve plant health, and provide better playing conditions. The other option is to purchase a garden moisture from a garden centre. They range between $30-$100. They are a great diagnostic tool before turf loss shows up.

- **Wetting Agents** – These products are used on a regular basis to improve water infiltration into soils, and can reduce hydrophobic soil conditions that repel water. Hydrophobic soils are naturally occurring, and are caused by a waxy fungal coating around sand particles. Hydrophobic conditions will cause water to move to other areas that will absorb water, thereby increasing wet spots on the

Hydrophobic conditions on #2 green lead to Anthracnose fungal invasion

golf course, and also increase water use. I would recommend the use of wetting agents onto greens and tees.

As this picture illustrates, a droplet of water will sit on this profile for hours, only until wetting agents are used, will the water penetrate. The only other option is to redistribute soil particles through aeration and sand topdressing.

Plant Health Management

Observations

I would describe the plant health management strategies as minimal, primarily because of budgetary restrictions. I commend your Superintendent for the work he has done with the soil tests and soil nutrient management. Overall, soil nutrient levels are pretty good for your budget limitations. A soil test is much like a doctor reading blood tests, "you cannot prescribe a solution until you see what you have." More importantly, if nutrient levels are at adequate levels, then you can temporarily remove them from your fertility program and save money.

There is a lack of use of products that will be beneficial to course conditions such as the use of wetting agents, foliar nutrition, and plant growth regulators. These products can be expanded for use out on fairways, and have a dramatic impact to course conditions.

I tested three greens on your course, #1, #2, and #5 green. I have grouped recommendations into one course of action.

Recommendations

- **Soil Test Greens Annually** – For the purpose and need of this report, I covered your costs for the soil tests I completed. Ideally you would like to test all nine greens once per year. A soil test as you will see in the reports I have attached, gives you a full readout of what is happening in your growing mediums. Soil tests are the foundation of a turf management plan.

- **Test for Boron** - I suggest that you get boron tested in your soil tests. Boron is known to be chronically low in our region. Even though boron is required in such low amounts, it is a key micronutrient that improves nitrogen availability, translocation of sugars, water use, and carbohydrate metabolism. Boron deficiency can occur from excessive potassium levels, excessive calcium levels, high soil pH, low organic matter, low moisture, and highly leached soils. This basically describes a typical sand-based growing medium found in a golf green or new tee.

- **Make Fertility & Liming Recommendations Based on CEC Values** – This will make it easier for you to make agronomic decisions. As you can see PPM numbers and graphs can be all over the place, this is because of your different growing mediums. It will be easier for you to work on the percentage values of your CEC. Sand-based mediums usually have CEC values of less than 5%. Soil-based mediums have a higher silt and clay content thereby increasing the CEC values.

- **Target Cation Nutrient Range** - I recommend the following nutrient base saturation targets;

- Calcium – 60% - 70%

- Magnesium – 10% - 20%

- Potassium – 3% - 5%

- Hydrogen - < 15%

- Sodium < 3%

All of these cations add up to 100 % of the CEC value. If Hydrogen is excess, then others will be limiting, there by causing nutrient deficiencies.

- **Macro Nutrients, Secondary Nutrients, & Minors Expressed in PPM**
  Another method for reading your soil tests is the parts per million values. There is a large variability in ppm range, as the CEC range and the soils ability to hold nutrients affect these numbers. As mentioned, minor nutrients are not required in large amounts, but are critical for plant growth. The following are ideal target levels for the various nutrients in parts per million.

Primary Nutrients

Nitrogen – N values are not used in recommendations because of its volatility and use.

Phosphorous	30 - 37 ppm
Potassium	151 - 200 ppm

Secondary Nutrients

Magnesium	180 – 360 ppm
Calcium	1,800 – 3,600 ppm
Sulphur	8 – 14 ppm

Micro Nutrients

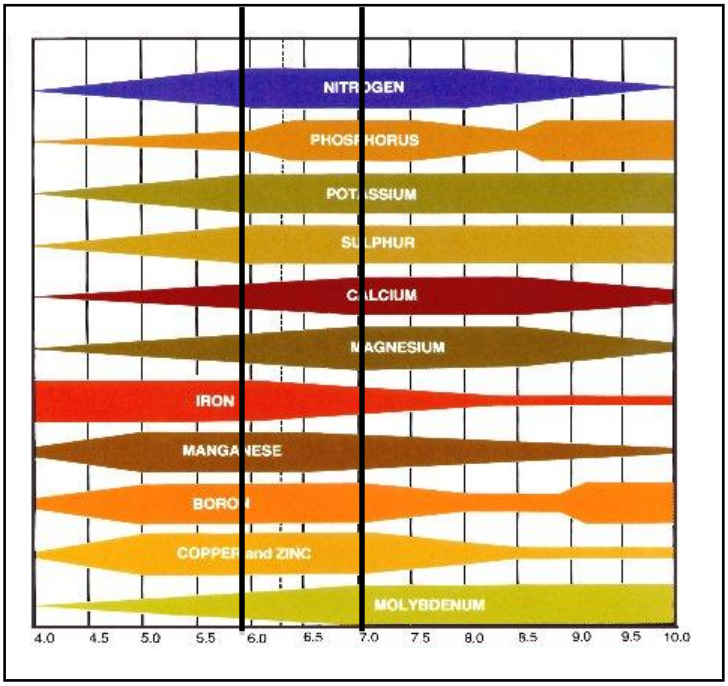
Zinc	4 – 6 ppm
Copper	1.2 - 3 ppm
Manganese	20 – 50 ppm
Iron	10 – 50 ppm
Boron	1.2 – 2.5 ppm
Sodium	30 – 50 ppm

Lime Applications

Observations

- It seems that you have been applying limited amounts of lime. Lime applications are instrumental in any successful turf management program. One of the primary reasons for lime use is to raise the soil pH, thereby increasing nutrient availability. Ideally if your pH is between 6 – 6.5, you will not have nutrients tied up by the soil, and make them more plant available. Lime also flocculates soil particles, combining small particles to form large ones and increasing soil porosity.

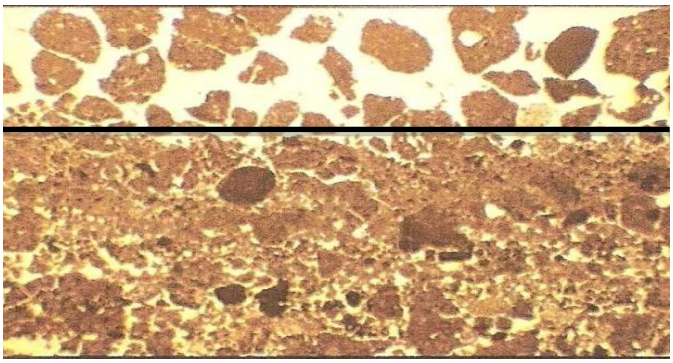
- Two causes of calcium and magnesium loss in soil are environmental conditions and irrigation water. We live in a region



Ideal pH of 6 – 6.5 Ensures Nutrient Availability

that receives approximately 950 mm of rainfall per year. Overtime this depletes calcium and magnesium from the soils.

- Secondly, irrigation water may be lacking in minerals and strip nutrients from the soil.. The addition of water during irrigation is very slow to infiltrate because the water has to absorb minerals from the soil, balance itself, and only then does it finally penetrate into the soil. This will strip minerals from the soil.



Lime Application above the black Line causes soil particles to flocculate and increase air and water movement

Gabriola Island Soil Test Recommendations for Greens

After reviewing your soil tests, I have the following recommendations.

Lime Applications

Liming is the main issue for your greens and will have the great impact when applying lime. Magnesium is slightly low but not too bad.

1. I would recommend applying dolomite lime at 15 pounds per 1,000 square feet. This will meet your magnesium needs of .9lb per 1,000 square feet for the year, along with your first Calcium application.

2. I would recommend 3 additional applications of Calpril fine on greens at 10 pounds per 1,000 square feet. This will meet your Calcium requirements for the year. Space out your applications every 6-8 weeks before summer.

This is based on the following factors:

- Very low Calcium % base saturation
- High exchangeable and soluble sodium
- High levels of hydrogen, which take up space on the soil colloid that is not occupied by a base cation.
- High soluble Magnesium and low soluble Calcium. The plant will take up what is more accessible, which can lead to difficulty in ensuring adequate Calcium is available for plant functions.
- High Sulphates, Chlorides and Bicarbonates. Calcium is used to buffer, as well as flush the anions, high sulphates, and chlorides. This may also indicate some

physical issues with soil performance. They are both mobile in the soil, and when seen in high concentrations they may indicate an obstruction to water flow or poor percolation rates of water. If these are note corrected with liming, you will see an increase in moss and algae at the surface.

Micro Nutrients

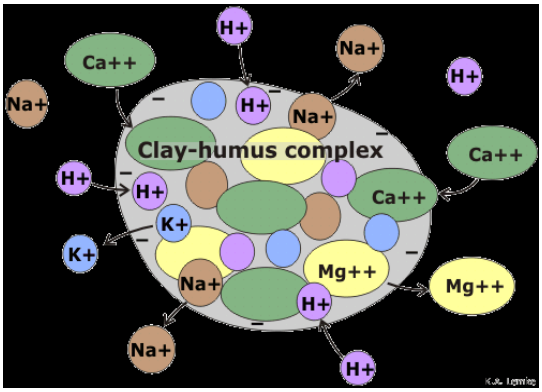
Phosphate levels are high, which can lead to tie up issues with other nutrients. Micronutrient levels are all low, with the exception of iron, which is almost entirely tied up (likely with Phosphorus). The most effective way to deliver micronutrients to the plant is through foliar applications on a regular interval. If this is not a possibility I would recommend Manganese, Zinc and Boron applications. Iron is prevalent, and can be freed up using humic acid, or by supplying in the form of foliar applications as well.

Micronutrient Amendment guidelines based on lab results:
Zinc - .3 lbs per 1,000 square feet annually over multiple applications.
Boron – .002lbs per 1,000 square feet annually.
Manganese .1 lbs per 1,000 square feet annually over multiple applications.

All of these micronutrient applications can be achieved if your granular fertilizers have a trace element package within the fertilizer blend.

Fertility Products & Programs

Observations



Overall, the staff have done an excellent job in developing fertility programs, however I would like to suggest a few changes.
I am providing background on the various fertilizer products on the market. You get what you pay for when purchasing fertilizer. With the limited staff you have, I feel it is best to purchase products that are truly **"controlled release" products".** These products will deliver nutrients over a defined period on a consistent basis. This reduces excessive growth, and also guarantees nutrient delivery over a 6-8 week period.

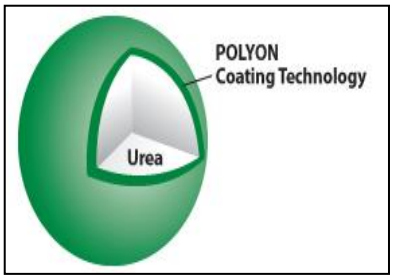
Recommendations

- **Controlled Release Products -** I am not concerned what brand of fertilizer, or even the analysis. I am more concerned with what's in the bag. Lower quality of If you were to narrow it down, I would look for a product that has an analysis of

20-0-15, a minimum 60% controlled release from either polymer-coated or methylene urea. You can add 1-3% phosphorous in your blend as well.

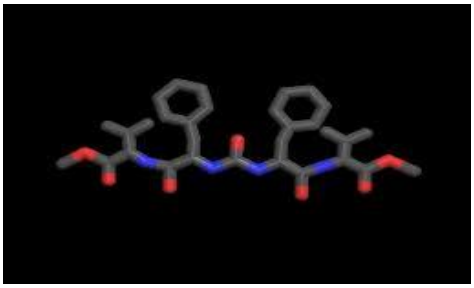
- **Use Controlled Release vs. Slow Release Fertilizers -** I would recommend using controlled release products such as polymer-coated products or methylene urea. These products are designed to release nutrients at a controlled rate. Basic slow release products such as sulphur-coated urea and urease inhibitors have a tendency to release at a quicker rate in the beginning, thereby reducing nutrient longevity. Yet you were lead to believe they may last 4-6 weeks. Because of the poor release characteristics, you see turf thin out, lack vigour, has reduced stress tolerance, and increased turf decline. Controlled release products may seem more expensive up front, but their longevity will far out perform cheaper sources.

- **Polymer Coated Products -** On sand based fields I would recommend using a polymer-coated product. Because your sand based-fields have extremely low organic content, they will also have lower microbial populations. Polymer-coated release characteristics are influenced by moisture. The polymer coating has tiny holes and surrounds the urea particle. As long as turf is receiving moisture through rainfall and irrigation, these products will give you a longer, more consistent nutrient release.



Polymer Coated Products

- **Methylene Urea Products** – Methylene urea is a second option for soil based-mediums. These are premium controlled release products, and nutrient release is from microbial activity. The length of the methylene urea chain determines how quick microbes can convert the product to plant available forms. This is one of the best products for soil.



Methylene Urea Chain Length Determines Nutrient release

- **Slow Release Content in Blends -** Your fertilizer should contain between 60%-70% controlled released nutrients. There has been a trend to have lower slow release contents in a fertilizer bag, especially in the spring and to reduce costs. These products can cause excess growth in early spring, and creates a grass-clipping nightmare for your mower operators. These products also have a tendency to only last 2-3 weeks. By increasing your slow release content, you can reduce your clippings, and also have a nutrient reserve always maintained in the soil.

- **Change from Potassium Chloride to Potassium Sulphate –** Potassium chloride as a nutrient source has one of the highest salt indexes of any fertilizer. This draws moisture out of the plant, and the high salt index will kill your microbial populations found in your growing mediums. These are the same microbes that convert nutrients to plant available forms. This product is used to reduce the cost of a fertilizer bag by $1 - $2. I would recommend that all of your potassium sources are potassium sulphate, this may increase fertilizer costs by $1 - $2 per bag. The sulphate is far more beneficial for microbial populations, and sulphur also has many benefits in plant health.

- **Apply Fertilizer based on Soil Temperatures Rather Than Calendar Dates –** In most cases nutrient benefits for plant growth starts at approximately 13 degrees Celsius. This is when soil temperatures start to warm microbial populations. The microbes need to be active in order to convert nutrients to plant available forms.

LABOUR, RESOURCES & PLANNING

Labour

Observations

The accomplishments Mike and his small staff do on a daily basis, and resources available, is nothing shy of ***"amazing"***. I would have to say this is the smallest staff I have seen on a 9-hole golf course for the size of property you have. Further more the Superintendent plays a key role in irrigation repairs, and equipment maintenance, as there is an absence of a mechanic and irrigation technician. If you were to purchase all of your equipment new, I would estimate, you have approximately $250,000 of equipment. This is a big responsibility, hence the reason most golf courses carry a full-time mechanic. To expand on the roll of your Superintendent, the replacement cost of an irrigation system for a 9 - hole course is approaching $700,000.

For the purpose of this section, I will define what I would call "essential service". One of the biggest changes in the golf industry in the last twenty-five years is the expanded maintenance requirement for weekend golfer demands.

Essential Start-Up Labour Requirements

Essential start-up labour requirements is the number of staff needed first thing in the morning to condition the course, stay ahead of play, and be efficient.

Recommendation

- **Staffing Increase to Meet Essential Start Up** – I would look to have more four-hour positions on staff. Hit the course in the morning and staying ahead of play on key jobs, will ensure efficiency and keep labour costs in check. Possibly look for retirees that may want work for golf privilages.

- **Course Maintenance Standards** – As mentioned through out the report, golf course maintenance standards would be the number one priority. Standards set a baseline of course conditions. Most golf courses have increased their maintenance frequency and practices to meet the needs of the golfers. With your current labour and budget size, I see the opposite happening, yet expectations from some golfers can be unrealistic. This will allow the Board of Directors and staff to see what they are getting for the budget you operate with.

Management and club officials such as the Club President and Captains provide insight on reasonable conditions. A standard will state the ideal conditions for a given area, and from the statement, requirements such as mowing frequencies, cultural practices, and labour requirements are clearly defined to support the standard.

This is a great tool for budgetary purposes and long range planning.
Grounds operations budgets typically see minimal increases each year, and the staff do the best they can with these resources. This can lead to in consistent conditions and frustrated customers. A maintenance standard book may cover 15 – 25 key areas regarding course maintenance, and each standard is usually 1-2 pages in length. ***In order for standards to have credibility and buy-in, course management and key stakeholders such as the Club President and Captains need to be involved.***

Communication

I have not had a chance to fully review communications, but in the declining golf market, communication is paramount. The use of email an news letters to inform our customers on key events and business related issues will help reduce misunderstandings. In the major market in the golf industry, 18-hole courses that use to have 3-4 year wait lists, find they are under subscribed by 100 members and more. The shortfall of revenues means a decline in conditions and service, everyone should be informed on the challenges in the industry.

Budget

Observations

After reviewing the various budget expenses, I would suggest your golf course is very light when it comes to the grounds budget as it relates to course condition expectations. I my view your budget is more of a reactive, rather than proactive. Planning will be needed, to grow funding to condition the course and keep the club fully operational. Realistic discussions will need to take place at all golf facilities on how to best deal with declining revenues, as this may be the new business model all clubs will have to manage under.

Recommendations

- **Standards for Budget Guidance** – ***It is not realistic to think increased funding will be coming anytime soon, especially with the economic times we face***. Once maintenance standards have been created you can use it as a tool to develop budget plans. The standards can also be used as a communication tool to educate management and the golfing public how the budget funds the various areas in golf course maintenance.

Staffing & Compensation

Observation

One of the most obvious observations in my review is the limited staffing that is currently in place. If you don't have the adequate numbers of staff to perform basic maintenance procedures on a consistent basis, it will be very difficult for you to add new programs to your maintenance. Furthermore to expect any type improvements with limited staff, will just not happen. The use of four-hour shifts will aid in efficiency, reduce potential benefit costs, and increase maintenance frequencies.

As you can see by this report, the Superintendent is far more than just another worker with minimal responsibility. A Superintendent is a Manager that is managing a multi million-dollar asset that is alive, and to provide great conditions, turf has to be at a near death state. There are numerous things that can cause catastrophic loss to a golf course regarding conditions and plant health. Because of this, the hours of dedication will be large, especially when you have a small grounds department, and limited resources.

I am not exactly sure what your Superintendent is being paid, but on Vancouver Island full time ground staff on a golf course is averaging $45,000 per year. Most 9-hole courses on Vancouver Island are paying their Superintendents between $45,000 - $55,000. I bring this to your attention, that you are in a unique situation to have some one as talented as Mike living on an Island, and you don't want to loose him as he has to wear "many hats" to manage the course with limited resouces.

Equipment & Shop

I have reviewed the maintenance facility and course equipment and seen some additions to the fleet.

Shop Repair Area - Even though your maintenance facility is antiquated by today's standards, it still holds most of your equipment, but not all of it. If equipment is not cared for, or you do not have the tools to fix equipment properly, you will see a decline in equipment life.

Additional Triplex Mower– I would suggest you get another triplex mower. You lost the use of a triplex mower that has a diesel engine. The replacement cost for a diesel engine is approximately $9,000 and not recommended. Once again, most of my triplexes that I trade in, I receive between $500 - $1,500 trade in value. Currently your Superintendent has to do a lot of labour intensive work to change cutting units to verticut or mow turf at different heights on course such as tees.

Audubon

Observations

Gabriola Island Golf Course already displays a wide variety of environmental initiatives on property. The maintenance staff has been diligent with best management practices and environmental management.

Recommendations

- **Join Audubon Cooperative Sanctuary Program –** You can work towards environmental certification to become a Cooperative sanctuary. The six levels are; Environmental Management, Pesticide Safety Use & Reduction, Water Quality Management, Water Conservation, and Community Outreach & Education, and Wildlife & Habitat Management. Through this process you audit your practices and look at ways to do things in an environmentally friendly manner. There is an opportunity to reduce mowing acreage in certain areas and use that labour else where, along with other cost saving measures. The marketing aspect of this program will fit in well with any Green Initiatives you

can promote to Island residents. After reviewing your facility and the course, I know your course can achieve this certification.

- **Use Google Earth –** This is a free online mapping program that is geo-referenced and is ideal for mapping the course, measuring, and looking at areas to naturalize, and planning projects. Looking at your course from a birds-eye view can help you assess areas that can be naturalized, and reduce the need to mow, water, and wear and tear on equipment. I saw numerous areas on course that are truly out of play and could be naturalized. I feel your course Superintendent and Board members could define these areas. This would great start to keep costs in check, and to reallocate labour to serious issues such as irrigation system repairs.

Summary

Gabriola Island Golf Course has improved dramatically over the past nine years. As a golfer, I know the valuable role your course plays in the island community. It has so many positives about the course, the staff, and the people who enjoy the facility.

The basic foundation of golf course maintenance is in place, but not to the level to stay competitive and draw more island residents to play. It will take time to implement programs, especially those that will need financial backing. That is why I would start with lower cost changes such as maintenance standards and the Audubon Program. Sand topdressing on greens and wet areas will be the one item that will change the playability of the course, and would be one area that I would focus on.

After spending time with Mike, and what struck me, was how proud he is of the course, and the accomplishments. He acted more as an owner, not as an employee. With the guidance of course maintenance standards, and four-hour labour positions, consistent conditions will be a part of what Gabriola Island Golf Course stands for.

Thank you for the opportunity to work with you and I wish you continued success.

Sincerely,