**Dr. Rice’s Emails – Analysis of Lower Springdale Estates Lake and Information on Ponds and Pond Management**

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**Analysis of the electrofishing data from Lower Springdale Estates Lake**

**by Dr. James Rice NCSU Professor Emeritus**

On Fri, Dec 4, 2020 at 6:24 PM Jim Rice <jrice@ncsu.edu> wrote:

Van,

I took a look at the reports and data you sent me, and played around with the data a bit just for fun (attached).  Overall, I'd say things look pretty good.  Here are a few comments.

Black Crappie

It's hard to say a lot from only three fish, but here are a couple comments.  Even when crappie are abundant it is relatively rare to collect them in shoreline electrofishing, so this suggests you have a robust population.  The fish they got represent at least two size classes with good relative weights (94-106), so you are getting recruitment at least in some years and the fish are not stunted (how's that for reading three tea leaves?).  Overpopulation and stunting is a real risk in lakes like yours that are significantly less than about 30 acres.  You aren't there now, but you don't want to flip to that with a year or two of strong recruitment, as it takes 6-8 years for the stunted fish to age out.  The best protection against that is maintaining a good bass population and aggressively harvesting crappie when they are caught.

Redear Sunfish

Though the sample is small it's clear you have a decent population of Redears in the lake, a range of sizes indicating fairly consistent recruitment, and excellent relative weights (90-117) across the size range.

Koi

Wow - that is a big koi!  If you got a picture I'd love to see it!

Bluegill

The bluegill population looks great.  I think their conclusion that the population isn't meeting goals is overly negative (as I understand your goals).  The relative weights and size distribution of these fish is as good or better as in most ponds I've sampled that have good fisheries, unless the lake is being aggressively managed to maximize growth and condition.   I would not stock additional larger bluegill; the lake has plenty of spawners.

Largemouth Bass

I was surprised to see several really large bass in the sample.  Big ones are always relatively rare, and they tend to be underrepresented in electrofishing samples (unless the sample happens to coincide with spawning, which concentrates them in shallow shoreline water).  The fact that they got a few says you probably have a few more out there too.  On the other hand, the absence of any bass between 13.4 and 18.1 inches, and only two 12-inchers, is disturbing, especially coupled with the high abundance of bass in the 10-11.5 inch range.  The high number of these smaller bass suggests that the bass population may be stunting.  The rapid decline in relative weight with increasing size through the smaller size classes is typical of stunting bass (however, their relative weights aren't horribly low).  You may have multiple age classes of bass piling up in the 10-11 inch range because they are eating up the sizes of smaller forage available to them, causing their growth rate to drop to near zero.  The absence of fish in the 14-18 inch range in the sample (indicative of very low abundance in the lake) suggests that this may have been going on for a while.  Relative weights go back up for the few large fish (note that these were left off the graph in the report; see my attached file).  This is also typical of stunted bass lakes; any fish that manage to get big enough to feed on larger prey, or were already large enough when the pond 'flipped' to stunted, generally do quite well as they have very little competition for the larger prey.

If you are happy with the fishing the way things are, you don't really need to do anything.  If you want to see some more fish in that 13-18 inch range, then you ought to implement the recommendation to harvest a whole bunch of those small bass.  That will reduce competition and increase growth rates, getting some fish up into those bigger size groups. The only change I'd recommend is to make the harvest cutoff be 11 inches rather than 12 inches.  There are relatively few fish in the sample between 11 and 12 inches, and these constitute the upper end of the small fish mode.  Better to protect them as they have a jump on growing into the bigger size classes.

Overall

I don't think you have poor water quality.  Your lake is supporting good populations of fish over good size ranges and mostly with good condition.  There are two ways to deal with your bass situation (if you want to change it).  One is to generate more food for bass, and the other is to reduce the number of bass in the 9-11 inch range so the remaining fish can grow better on the amount of food the lake is currently generating.  Producing more bluegills to feed the bass isn't simply a matter of stocking more adult bluegills; you'd have to increase the productivity of the lake.  Adding lime to raise alkalinity might do a little bit, but generally the relationship of increasing productivity with increasing alkalinity breaks down once alkalinity is over 20 ppm, as you already have.  And I don't think you want to go down the path of adding more nutrients, given that you are already having some algae issues!  Aerating the lake with a diffuser system might increase overall productivity by making more of the lake bottom available for use year-round (while also eliminating the potential for a fish kill due to lake turnover, and potentially reducing algal bloom issues), but do you want to spend the money to go down that road?  Personally, I think you are better off trimming down the bass population so that the fish can grow better while still living within their means.  You don't need more pounds of bass, you need the pounds of bass you have to be repackaged to give you a more preferred size distribution (that is, if you want to change the bass size distribution at all).  I helped do that on a 15-acre lake I have access to, and within two years we were able to dramatically change the bass size distribution.  If you want to aerate the lake for other reasons, fine, but I wouldn't do it just to improve the bass size distribution.

I wouldn't spend the money on another electrofishing survey in the next few years.  The only change in the fish population that you might hope to make is a shift in the bass size distribution, and you can monitor what is happening there easily enough by measuring fish caught via angling.

Treating with Phoslock is a way to reduce your nutrient availability for bluegreen 'algae', but bear in mind that P is the primary nutrient supporting the food web and your fish biomass too, so you could see an overall reduction in fish productivity as well.

Ok, my brain is about empty for now, so here you go.  If you have any questions, give me a shout.

Cheers, Jim

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James A. Rice
Professor Emeritus
Dept. of Applied Ecology
North Carolina State University

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| **Jim Rice**  |

 | Sat, Dec 12, 1:01 PM (3 days ago) |

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| to me  |

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Van,I'm sorry, your last message slipped under my radar.  Green sunfish are fairly common in our streams, and often show up in our ponds and lakes.  The green sunfish you saw in the past may have been a "one-off", or you may have a small "population" of them in your lake, but I suspect they are, and will remain, relatively rare.  Green sunfish like to hang out around fairly dense physical structure, e.g., brush, aquatic vegetation, etc., and you don't have much of that.Bass are indeed cannibalistic, and can eat prey up to about half their length (if not too deep-bodied or spiny).  However, most of the time they eat prey smaller than that.  Also, relatively speaking you don't have very many bass big enough to eat those 9-11" fish, so I wouldn't expect them to make a significant dent.  If they were going to, they would have already anyway.I also forgot to respond to your earlier question regarding compensation.  I certainly did not provide my input with any intent to be compensated.  When I do consulting I always discuss in advance any remuneration (typically $200/hr) and time commitment expectation.  If your Board feels compelled to throw a bone my way they are welcome to send a check to me at Ridge Dr., Raleigh, 27612. But to be very clear, I didn't expect it before, and I don't now, so don't feel at all obligated. Either way, don't let that keep you from asking me questions in the future. Really!  Cheers, Jim |

On Mon, Nov 27, 2017 at 12:01 PM, James Rice <jrice@ncsu.edu> wrote:

Van,

I hope you and yours had a great Thanksgiving.

I certainly have seen variability in how hard bass fight, but not consistent differences among systems.  I think it has more to do with water temperature and other conditions.

As noted in the analysis of the bass data I sent, the condition of bass y'all collected is pretty good.  It doesn't show any signs of the low condition that would indicate the bass are growing poorly due to crowding, so thinning is not warranted.

It's unclear whether or not larger bass are absent from the lake (angler opinions differ on that; our mutual friend, Matt Chitka, seems to think they are in there, though his 'sampling' may not be current).  But the condition of the smaller bass suggests that the growth potential is there for larger bass.  If larger bass are missing right now for some reason (e.g., some kind of fish kill), you ought to see some recruitment over the next few years as fish grow into those size classes.

Cheers, Jim

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On Sun, Nov 19, 2017 at 8:35 AM, Henry Van T Cotter <hvtcotter@gmail.com> wrote:

Jim,

An avid bass fisherman who fishes our Springdale Estates Lower Lake ("Big Lake"), feels that our fish are weaker and less healthy and fight less when hooked than largemouth bass in other bodies of water.  Is this possible?  If so, would there be a way to test her hypothesis?

Another question she raised is, given the apparent lack of large bass in our Lake, should we be removing some of the smaller bass in an effort to allow the others to grow bigger?

As always, many thanks for being willing to give us guidance about our Lake.

With best regards,

Van

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Henry Van T. Cotter

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email: hvtcotter@gmail.com

On Fri, Oct 27, 2017 at 5:06 PM, James Rice <jrice@ncsu.edu> wrote:

Van,

Herons aren't likely to make much of a dent.

Alkalinity of 35ppm is great; a level that most pond owners wish they had.  It doesn't change rapidly, so checking it once every year or two is plenty.

I'm scratching my head re why the lake isn't more productive (if that is in fact what is going on).

Cheers, Jim

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On Fri, Oct 27, 2017 at 3:34 PM, Henry Van T Cotter <hvtcotter@gmail.com> wrote:

Dear Jim,

Thank you very much for the most informative and interesting analysis of our largemouth bass data from Lower Springdale Estates Lake.

Greatly appreciated!

Regarding the slow growth hypothesis:

* I don't know of any otters or comorants feeding on the fish in our Lake.  We do have herons.
* In Oct 2015, the alkalinity was 35 mg/l and pH was 7.4.

So one fact supports the slow growth hypothesis and one does not.  Regarding the alkalinity, is it likely to change over time?  Should we remeasure it / measure it periodically?

Regarding the Wr outliers:

  1.561 was a data entry error, corrected => 0.854

  0.55  probably a mis-measurement

  1.192 might be real

With my best regards,

Van

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Henry Van T. Cotter

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On Fri, Oct 27, 2017 at 1:47 PM, James Rice <jrice@ncsu.edu> wrote:

Van,

Thanks for the information; that makes for a pretty good sample size on largemouth bass.

In the attached Excel file I have calculated Relative Weight (Wr) for each fish, and plotted it against length.  As I think we discussed, Wr is a measure of fish condition, or how plump or skinny the fish is.  It takes into account that the relationship between length and weigh changes a bit as fish get longer, so that once standardized in this way Wr values can be compared across lengths.

The Standard Weight (Ws) equation, based on many thousands of observations, calculates the expected 'normal' weight of the fish based on its observed length.  Relative weight is calculated as the ratio of the observed weight to the standard weight.  Thus, fish with a Wr somewhere close to 1 are nice and fat as bass generally go.  Values well below 1 indicate that the fish are skinny for their length, and fish with values above 1 are really fat.

Three of the values in the dataset (highlighted in orange) were fairly substantial outliers, and I suspect they might reflect errors in measurement or data entry.  I excluded the two most extreme values, Wr = 0.55 and 1.56.  It's remotely possible a bass could be swimming around out there with a Wr of 0.55, but it would look extremely emaciated and you would probably remember it if you saw it.  The Wr of 1.56 is unrealistic in almost any circumstances.  The third extreme value of 1.19 is within the realm of biological possibility, but it would be highly unlikely to have one fish that is extremely fat when none of the others are.  I have left it on the graph, but don't put too much stock in it.

In the file I have plotted Wr vs. length, which is usually a fairly informative plot.  I have also included the data from two other ponds I've sampled in previous years, for comparison.

It is not uncommon for Wr to decline somewhat as fish increase in size up to 300-350 mm or so.  That pattern is evident in the Springdale fish, as well as the two examples I sent you.  Wr values in the 0.8 to 0.93 range are quite typical for the smaller fish.  Wr declines as the fish move up to larger prey items and competition gets stiffer.  You will see that Wr doesn't decline as much by 300-325 mm in the Springdale fish as in the other two examples.  To me, that suggests the fish aren't experiencing strong density-dependence, which would stunt their growth (as is more evident in the HF 1 example, from a pond with a high bass density).

However, the Springdale fish don't seem to be growing particularly well, as evidenced by the most abundant size classes topping out at 300-325 mm (12-13 inches).  There may well be some bigger fish out there, but if it wasn't tapering off pretty quickly I think you would have seen a few more.

An alternative possibility is that the fish are growing quite well, but mortality rate is high so few fish are making it past 325 mm.  From what I've gathered, bass harvest is minimal to nonexistent.  Other possibilities are bird or otter predation.  If significant numbers of cormorants hang out at the lake, or if there are any otters using it, either of those could put a dent in the bass population.  Otters especially will target larger fish.

Of these two alternatives I'd be more inclined to think that slow growth is the culprit; the lake may just not be very productive.  I don't remember if we talked about the lake's alkalinity; if it is too low, that could limit productivity.  The remedy for that is to treat the pond with lime, which usually requires application of multiple tons of pulverized limestone per acre.  If the lake has high flowthrough, the effectiveness of liming may be limited.

It would be helpful to get some data on bluegills to see if their metrics support the slow-growth hypothesis.  Perhaps your team of anglers could give it another shot in mid-late May.  If they could find the bluegills on their beds, they could get a representative sample of adults very quickly.  That time of year is also an excellent time to catch good numbers of bass as well.  If you decide to do that, send me the data and we'll see what they look like.

The bass data from your recent sample will serve as a good baseline to detect any significant shifts in the future.

If you are your crew have any questions, let me know.

Cheers, Jim

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On Mon, Oct 23, 2017 at 6:06 PM, Henry Van T Cotter <hvtcotter@gmail.com> wrote:

Dear Dr. Rice,

Great news.  Thanks to the fishing ability of Andra Willis, today we have doubled our data set of Largemouth Bass from Lower Springdale Estates Lake to 42 fish.  The expanded data set is attached.  The correlation coefficient between length and weight remained at 0.94.

With best regards,

Van

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Henry Van T. Cotter

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On Sat, Oct 21, 2017 at 12:32 PM, Henry Van T Cotter <hvtcotter@gmail.com> wrote:

Hello Jim,

We greatly appreciate your willingness to analyze the data from our Fishing Derby.

The Derby was held this morning October 21st, 8 to 10 am.

Location:  Springdale Estates Lower Lake  ("Big Lake")

About 40 participants, not all of whom fished.

5 people fished from boats, the rest from shore.

Only largemouth bass were caught.  We were surprised that no bluegills or black crappies were caught.  We did caught a few baby bluegills in a minnow trap for show and tell.

Number of largemouth bass caught = 21.  The largest was 330 mm, 465 g.

Measurements (lengths and weights) attached.  The correlation coefficient between length and weight was 0.94.

With my best regards,

Van Cotter for the Springdale Estates Lake Committee

p.s. I saw Tom Fox at the State Fair and he mentioned he had worked in your Lab.  (Hope I have his name correct.)

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Henry Van T. Cotter

From: **Henry Van T Cotter** <hvtcotter@gmail.com>
Date: Sat, Sep 16, 2017 at 4:57 PM
Subject: Re: Helpful information from Dr. Rice regarding our Fishing Derby Oct 21st.
To: Paul Naslund <penaslund@gmail.com>

Agreed.  Dr. Rice's analysis of our data should be a good basis for making future decisions.  - Van

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Henry Van T. Cotter

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On Sat, Sep 16, 2017 at 4:15 PM, Paul Naslund <penaslund@gmail.com> wrote:

I would agree.  Maybe we'll have a better idea on how to deal with this in the future, after the data is analyzed.

Sent from my iPad

On Sep 16, 2017, at 1:40 PM, Henry Van T Cotter <hvtcotter@gmail.com> wrote:

My thought is that it will be best to release all fish caught during the Derby.  That approach is straight forward.  Others' opinions?

Van

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Henry Van T. Cotter

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On Sat, Sep 16, 2017 at 9:19 AM, Paul Naslund <penaslund@gmail.com> wrote:

Are we releasing everything thats too small to keep, releasing everything, or keeping the small ones to benefit the the growth of the other fish in the lake?  This is probably a question for Dr. Rice.

Paul

Sent from my iPad

On Sep 13, 2017, at 10:14 PM, Henry Van T Cotter <hvtcotter@gmail.com> wrote:

Here is Dr. Rice's helpful response regarding how to measure fish. - Van
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Van,

Good question.  The measuring boards we use have a vertical board at the end, aligned with the 0 mm mark.  We push the fish's nose against this board with its mouth closed, then pinch the tail together or slightly bend it to measure the longest lobe of the caudal fin.

Cheers, Jim

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Henry Van T. Cotter

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On Tue, Sep 12, 2017 at 9:17 PM, Henry Van T Cotter <hvtcotter@gmail.com> wrote:

Good question, Paul.  I have reached out to Dr. Rice and will rely his answer back.  - Van

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Henry Van T. Cotter

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On Tue, Sep 12, 2017 at 11:16 AM, Paul Naslund <penaslund@gmail.com> wrote:

Since we're stressing accuracy, ask doctor Rice if the length should be measured with the tail pinched together (longer) or in its natural state.  I ask because game wardens in Canada pinch the tail together when they check your catch.

Paul

Sent from my iPad

On Sep 12, 2017, at 8:53 AM, Henry Van T Cotter <hvtcotter@gmail.com> wrote:

Hi Paul,

Measuring in mm and g will be more accurate than measuring in in and oz and converting so I think we should do the measurements in mm and g.  But we can convert as needed for participants that want to know the in and oz equivalents.  I can prepare look up conversion tables for that purpose.

Best regards,

Van

p.s. I would hope that our school system is teaching the metric system at any early age but I don't know.

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Henry Van T. Cotter

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On Tue, Sep 12, 2017 at 7:51 AM, Paul Naslund <penaslund@gmail.com> wrote:

Unless their teaching the metric system now, most kids cant relate to cm, mm, or grams.  What if we had two columns, one for the measurements kids understand, and one for metric?  We can always do the conversion for Dr. Rice, either at the site, or later.
 Paul

Sent from my iPad

On Sep 11, 2017, at 12:07 PM, Henry Van T Cotter <hvtcotter@gmail.com> wrote:

Dear Fishing Derby Crew,

I heard back from Dr. Rice, Professor of Applied Ecology & Extension Fisheries Specialist at NCSU, this morning.  He is the person who conducted that great demo and presentation at our Big Lake in 2015.

He confirmed that he is willing to analyze the data on the fish (species, length in mm, weight in g) that we obtain during our Fishing Derby and comment on the fish population structure in our Big Lake.  It would be best if we could provide data on 30-40 fish per species.

I will purchase 3 kitchen scales for weighing fish at the three measuring stations during the Derby.

I was able to obtain 13 copies of the booklet called **North Carolina Sport Fish Identification Pocket Guide** that he mentions.

His email follows below.

Best regards,

Van
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On Mon, Sep 11, 2017 at 11:06 AM, James Rice <jrice@ncsu.edu> wrote:
Van,

Good to hear from you.  I'll be happy to analyze the data for you.  I'm not sure at this point if I will be able to come by, but we'll see.

A digital kitchen scale is perfect for this purpose.  For under $30 you can get a scale that weighs in 1-g increments up to ~11 lb/ 5 kg.  You will want a shallow tray to put the fish in on the scale.  Tare the scale with the tray on it before putting the fish in.  Weights in grams and lengths in mm would be best.

The fish you caught appears to be a largemouth bass.  All features I can make out point that way, and that is what I expect to be in there, but without a side view with the mouth closed I can't give you a 'certified positive' ID.  The NCWRC has a pretty good guide to NC fishes at <http://www.ncwildlife.org/Learning/Species/Fish>.  They also have a booklet called **North Carolina Sport Fish Identification Pocket Guide** that would suit your purposes.  I don't see a copy of it online, but you may be able to get copies from the Raleigh office (see info at <http://www.ncwildlife.org/Fishing/Learn-Resources/Publications#3306292-fish-management-and-identification>, or call NCWRC Inland Fisheries Division at 919-707-0220).

The ones you are most likely to have (and catch by hook and line) are:

Largemouth Bass

Bluegill

Redear Sunfish

You may also have:

Black Crappie

Channel Catfish

and possibly:

Green Sunfish

Redbreast Sunfish

One or more of the Bullhead catfish species

Cheers, Jim

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Henry Van T. Cotter

From: **James Rice** <jrice@ncsu.edu>
Date: Mon, Mar 9, 2020 at 7:38 PM
Subject: Re: Bald Eagles dining on Springdale Estates Fish
To: Henry Van T Cotter <hvtcotter@gmail.com>

Henry,

I wouldn't expect eagles to make a significant dent in the population - not like otters or a flock of cormorants.  The eagles wouldn't be there if you didn't have plenty of fish.  Enjoy the bird watching!

Cheers, Jim

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James A. Rice
Professor Emeritus
Dept. of Applied Ecology
North Carolina State University

On Mon, Mar 9, 2020 at 1:36 PM Henry Van T Cotter <hvtcotter@gmail.com> wrote:

Hello Jim,

For the past 2 weeks, 3 or more bald eagles have been dining on the fish (photos attached) in Upper Springdale Estates Lake.  They seem to prefer large sunfish (specifically bluegills if my id is correct).  On Sunday, there were a dozen or more bluegills, scattered around the Lake on shore and in the shallow water, both alive, though probably mortally wounded, and dead, with the telltale talon injuries from the eagles.  My wife Irene saw a juvenile bald eagle snatch a fish from the Lake and we watched it dine high in a tree.  Odd that the eagles would leave so many uneaten fish - the fish must fight enough to escape the talons.

Along with the cormorants and blue herons, the fish are supporting a lot of birds.  Can we take this as a sign of healthy fish populations?    Could the eagles effectively decimate the large bluegill population is such a small lake (photo attached)?

Best regards,

Van

Thu, Nov 28, 2019 at 11:59 AM Henry Van T Cotter <hvtcotter@gmail.com> wrote:

Hi Jon,

Thanks for keeping me in the loop.  I agree fully with your conclusions.  That is, not to proceed with aeration of any type.  The natural look of the Lake is fine just as it is.  My aesthetic comment was not an endorsement, just passing along a potential reason to do it IF the community wanted to proceed.  And again I agree with you, I would not support doing it and would not personally see it as an asesthetic improvement.

Happy Thanksgiving!!

Van

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Henry Van T. Cotter

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On Mon, Nov 25, 2019 at 11:02 AM Jon Ehret <jtehret@gmail.com> wrote:

Hi Van,

Thank you for reaching out to Dr. Rice.

Just wanted to share the opinion I sent to the other board members.

I forgot to mention about restocking, but I'm definitely opposed to that. If that comes around as "a thing", I'll chime in.

Thanks again!

---------- Forwarded message ---------
From: **Jon Ehret** <jtehret@gmail.com>
Date: Mon, Nov 25, 2019 at 10:59 AM
Subject: Re: FW: Aeration - good for the fish?
To: Paul MacDougal <paulmacd@acm.org>
Cc: bod <bod@springdaleestates.org>

My personal opinion, I would rather not have a fountain.

It doesn't sound like it has a big benefit to the fish population, plus represents costs/maintenance and other long-term commitments.

Plus, I like the natural look of our lake, which I think a fountain would definitely take away from (unless we went the route of a diffuser type aeration (would basically create areas of bubbles around the lake, which would not be all that obvious, but I think would be a lot more complicated/costly).

Just my $0.02.

On Sat, Nov 23, 2019 at 9:40 AM The MacDougals <paulmacd@acm.org> wrote:

**From:** Henry Van T Cotter [mailto:hvtcotter@gmail.com]
**Sent:** Thursday, November 21, 2019 4:53 PM
**To:** paulmacd@acm.org
**Subject:** Fwd: Aeration - good for the fish?

Paul,

Could you please pass Dr Rice’s informative and helpful information on aerating and on restocking Big Lake along to the Springdale Estates Board?  Thanks!

My take is that from a fish standpoint neither is necessary but from an aesthetic standpoint we could add an aeration fountain.

Van

Henry Van T. Cotter

Begin forwarded message:

**From:** James Rice <jrice@ncsu.edu>
**Date:** November 21, 2019 at 12:08:57 EST
**To:** Henry Van T Cotter <hvtcotter@gmail.com>
**Subject:** **Re: Aeration - good for the fish?**

Van,

Aeration comes in many forms, but functionally there are two types.  Some pick up water from the top few feet of the water column and circulate it.  Most decorative fountains fall into this category.The water they spray up in the air or get moving is picked up from the top few feet of the water column, which is already oxygenated, so it doesn't change oxygen availability substantially.  In a severe crisis it would provide a small area of refuge, but that is probably the only potential benefit for fish.  They don't pose any negatives for fish though.

The other general class of aerators brings water up all the way from the bottom and generates a slow circulation that mixes the entire water column  This breaks down the  thermal stratification of the pond, so the whole water column is oxygenated.  As a result, the fish can use the whole water column and all of the bottom of the pond (if they choose to) throughout the summer, when it would normally be off limits due to low oxygen.  The availability of oxygen on the bottom will also result in oxidation of organic matter, and help reduce the buildup of organic matter on the bottom of the pond.  And of course it will prevent a fish kill due to a pond turnover (because there is no stratification to turn over!).

Some aerators of this type use a large, slow-moving fan or propeller to draw water upward and create the circulation (like the SolarBees they put in Jordan Lake).  The other type, diffuser aerators, injects air bubbles at the bottom of the pond; the column of rising bubbles generates the circulation.  The bubbles themselves don't provide much of the oxygen infusion, but circulating the water along the surface does.  There is a blower on land connected to one or more hoses that run out to a heavy-duty aeration nozzle (think aquarium stone on steroids).  This type of aerator is the most effective and usually also the most cost-effective. Aesthetically, these aerators don't affect things much.  There is no aerator floating on the surface as there is with all the other types.  All you will see is a patch of water where the small bubbles are breaking over each aerator.

If your objective is to benefit the fish population then I would recommend the diffuser type aerator.  If folks want the aesthetics of a fountain (some are lighted as well) then that is a fine choice too - just be aware that it doesn't provide the same benefits to the fish.  But either type is completely optional, not required (from a fisheries perspective).  The chances of your lake experiencing a severe fish kill are extremely low, and fish get along just fine in the vast majority of our ponds and lakes without aeration.

Regarding stocking, there is no need to stock additional fish unless your fish populations experience some kind of extreme event and get really out of whack.  All the species you have maintain themselves by natural reproduction.

Cheers, Jim

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On Tue, Nov 19, 2019 at 9:06 PM Henry Van T Cotter <hvtcotter@gmail.com> wrote:

Hello Jim,

This evening at our Springdale Association of Homeowners annual meeting, it was proposed to add a fountain or other aeration device to our 'Big Lake' (Lower Springdale Estates Lake).  Would that be beneficial to the fish population?

Someone also suggested 'restocking' the Lake, but that does not seem necessary to me as there does seem to be healthy populations of bass, crappie and sunfishes.

Thanks!

Van