What are the Fastest Pools in Division 1 of the NVSL?

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A perennial discussion topic among swim families in the NVSL focuses on the merits of the various pools, most notably which pool yields the fastest swim times. It is not necessarily a trivial subject. Unlike most pools used for USA Swimming meets, NVSL pools differ substantially from each other in terms of width, depth, pool shape, and even length. The Division 1 competition pools feature examples of much of this variation though all are 25 meters long. So which Division 1 pool is the fastest? Which is the slowest? Do these answers vary by stroke or age group and do the differences really matter all that much?

In this short non-technical essay I present results based on a regression model using data from the 2012 through the 2018 seasons to predict swim times for each pool while controlling for the influence of factors such as team quality, stroke type, and swimmer ages. I focus my discussion on the five perennial division 1 teams – Chesterbrook, Highlands, McLean, Overlee, and Tuckahoe – plus the newly promoted Wakefield Chapel.

Expectations, Data, and Design

I have spent dozens of hours at NVSL swim meets over the last decade and fast/slow pool conversations come up a lot. The consistent consensus among parents and swimmers that I talk to places Tuckahoe as the division's fastest pool and McLean the slowest with mixed contentions about the relative placement of the other pools. I think this consensus is based primarily on anecdotal impressions but is also informed by some physical differences among the pools.

At more than eight lanes Tuckahoe is easily the widest of the pools and is consistently deeper than some. Width and depth helps reduce water turbulence as swimmers churn across the pool. Plus good depth makes it easier to aggressively dive and flip turn (especially for the older swimmers). Another factor in Tuckahoe's favor is the lip of its deck which curves upward and protrudes over the water thus effectively shortening the pool by extending the forward distance a swimmer can dive. (NVSL pools do not use blocks; all diving is done from the deck surface.) That said, I can think of no reason to believe that Tuckahoe's lip provides any advantage with backstrokes starts.

In contrast McLean's six-lane pool is the narrowest among the Division 1 regulars and older swimmers often complain about its shallowness. The other pools are harder to peg. Overlee and Chesterbrook are both eight-lane pools and not too shallow. Wakefield Chapel is hard to gauge but is rather shallow in spots. Highlands is among the most unique pools in NVSL. It has six lanes but those lanes are in the middle of an oval-shaped pool.

While Highlands is the only pool deck that curves there are actually a variety of pool shapes in Division 1. Only Chesterbrook's pool features a true rectangle and is thus the only pool that is consistently the same width. Tuckahoe, McLean, Overlee, and Wakefield all connect to diving wells. There are probably other factors as well that affect two-hand touches and backstroke starts. For instance, I have heard swimmers complain that the slickness of Overlee's walls causes feet to slip for backstroke starts.

In short my baseline expectation is that Tuckahoe has the fastest overall pool and McLean the slowest. Beyond that I expect Tuckahoe to show the biggest advantage on forward-start swims and relays. I do not have any particularly strong expectations beyond that. So let's see what the data show.

Data and Analysis Design

Using data scrapped from the NVSL website (www.mynvsl.com) I compiled the times for all swims for all Division 1 Saturday dual meets for the 2012 through 2018 seasons. (Thus I excluded relay carnivals and individual divisionals.) Dropping swimmer disqualifications yielded a total of 9,083 swims. I start with the 2012 season because it is the first year of the dramatically renovated Overlee pool. As far as I know, there have been no notable changes to any of the Division 1 pools since the start of the 2012 season.

Note though that the composition of Division 1 changes frequently due the relegation and promotion system used by the NVSL. Five teams – Chesterbrook, Highlands, McLean, Overlee, and Tuckahoe – stayed in Division 1 for the entire period. Unfortunately no sixth team has managed to stay in the division for more than two consecutive years. During the period studied Hamlet (2015), Langley (2018), Vienna Aquatic (2013), Vienna Woods (2012), and Wakefield Chapel (2014, 2016-2017) all spent time in the division and Wakefield Chapel is back for the 2019 season. My analysis includes data from all these teams (and their pools) but I focus mainly on the perennial five teams plus Wakefield Chapel. (I will briefly speak to the other four pools below.)

Identifying the fastest pool requires more effort than simply comparing average swim times across the pools. (Throughout I use average and mean interchangeably.) The better teams should produce faster times regardless of where they swim and that is indeed the case. For example, from 2012 through 2018 Chesterbrook and Overlee dominated the top two spots in the division with Chesterbrook winning the division five times and Overlee twice. Thus it is not surprising that the pools that saw the fastest average times were Chesterbrook and Overlee, respectively.

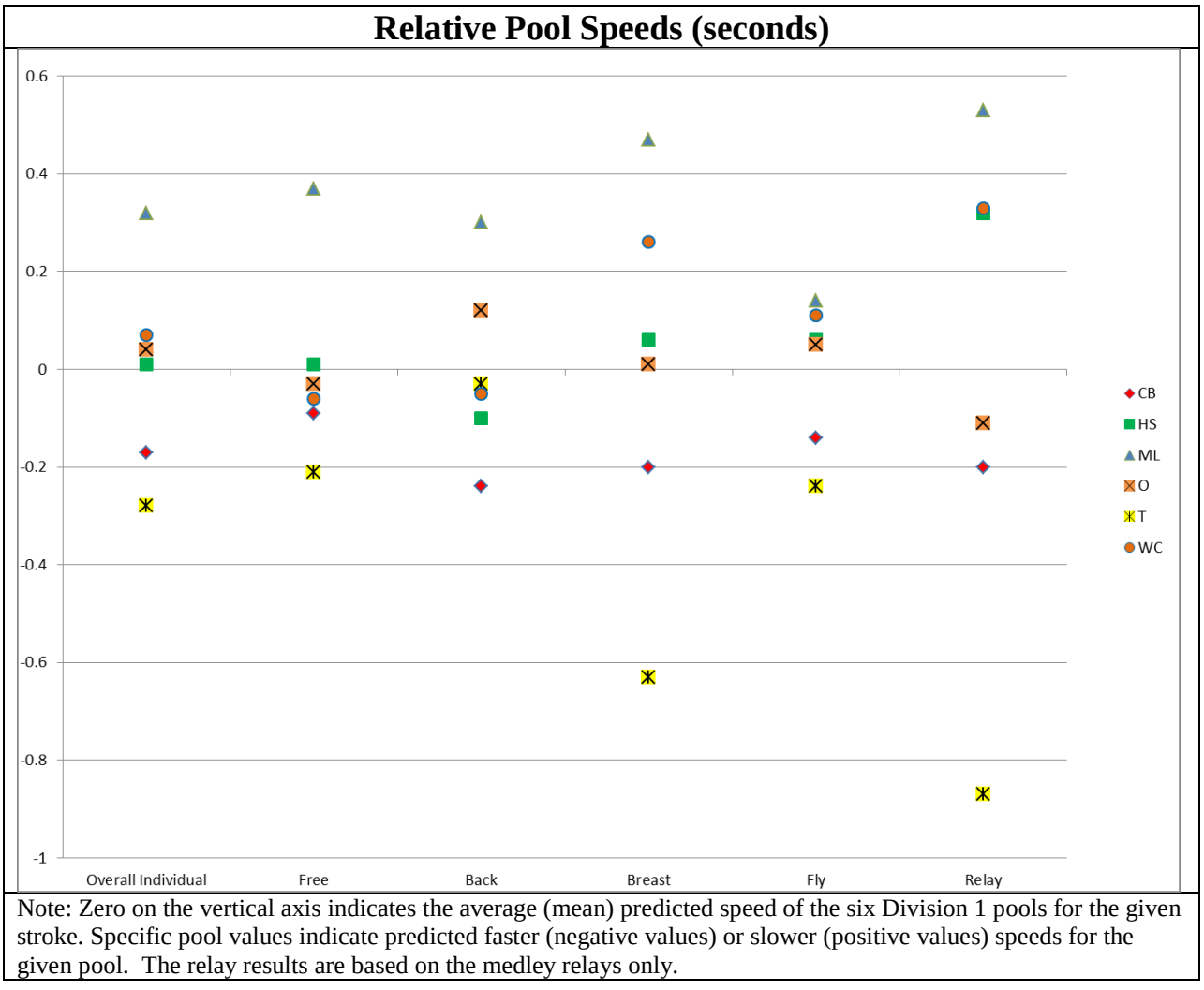
Thus isolating the impact of the pools requires filtering out factors like team quality as well as other influences like swimmers' ages and stroke. Fortunately, multivariate regression analysis provides a direct way to do this. This involves regressing what we are trying to explain (swim times) on the explanatory variables we care about (a variable for each pool, in this case) along with some key controls such as variables for each team (to address team quality) along with other variables to account for swimmer ages, gender, swim distance, year (swims get faster over time), and meet number (swims get faster over the season).

Using the variables noted above I ran separate regressions (OLS) with separate models for each stroke plus one regression for all individual strokes (including a control for stroke). I ran a sixth regression for the medley relays. I excluded the mixed-age freestyle and the 8 & under freestyle relays. (Technical note: The above discussion purposely glosses over a variety of technical issues regarding issues like multi-level data, time series, etc that I addressed in producing these results.)

Results

Using the given regression results I produced a predicted swim speed for each pool given completely average conditions: average team, average age, etc. I break this all down by age group and gender later, but the figure below provides the key results. What is the faster pool in Division 1? It's Tuckahoe…mostly. What pool is the slowest? Yeah, it's McLean.

The figure shows how fast or slow the pool is for the given stroke(s) as compared to the average (i.e., mean) pool speed in the division. Thus a negative number indicates the pool is faster than the average pool while a positive numbers indicates the pool is slower than the average pool.



Note: Zero on the vertical axis indicates the average (mean) predicted speed of the six Division 1 pools for the given stroke. Specific pool values indicate predicted faster (negative values) or slower (positive values) speeds for the given pool. The relay results are based on the medley relays only.

"Overall Individual" presents the predictions across all four individual strokes. Tuckahoe is 0.28 seconds faster than average while McLean is 0.32 seconds slower than average. Put a bit differently, controlling for factors like team quality and swimmers' ages, a swim at Tuckahoe is 6/10s of a second faster than a swim at McLean. Chesterbrook is also noticeably fast in the overall category while the other three pools cluster near the mean and are statistically indistinguishable from each other. Freestyle shows similar results.

Backstroke gives us a rather different picture. McLean remains the slowest but Chesterbrook is the fastest pool for backstroke. Tuckahoe is about average, Highlands is faster than average and Overlee is slower than average.

Breaststroke shows the widest spread among the individual strokes with breaststrokers at Tuckahoe racing a full second faster than breaststrokers at McLean. Butterfly shows the narrowest spread though the fly results largely mirror the other forward-start results. Medley relays are the longest events (100 and 200 meters) and show the widest spread and a huge advantage for Tuckahoe. Relays at Tuckahoe are 2/3rds of a second faster than Chesterbrook (.67), almost a second faster than average (0.87), and almost a second and half faster than McLean (1.4). (Here's nominating Tuckahoe as permanent host of the Relay Carnival.)

Some Conclusions and Assertions

For those itching to really dig into the numbers, the table below breaks down predicted swim times for the pools by stroke, age group, and gender. Overall I think it is clear that Tuckahoe is the fastest pool in the division but Chesterbrook is the second fastest overall and the fastest at backstroke. As I noted earlier both those pools are at least eight-lanes wide so that is probably a factor (though Overlee is also eight-lanes). Tuckahoe's dominance at forward-start swims and especially its huge dominance in relays suggest to me that its protruding deck lip plays a big role. While the relays have an in-water backward start, the other three swimmers in a relay forward dive off the deck. That bit of extra forward distance accumulates.

Other Pools and Possible Extensions

The four other visitors – Hamlet, Langley, Vienna Aquatic, and Vienna Woods – to Division 1 since 2012 are in the database but I cannot really make strong conclusions about them. Of just those four, Vienna Woods is probably the slowest, perhaps even slower than McLean, and Hamlet appears to be the fastest, but the differences are not substantially or statistically significant.

The basic approach I have used here can be used to answer some further questions such as whether there is a home-pool effect and whether particular pools are better for some visitors than others. Certainly the same approach can be used to examine the other divisions separately but what would be quite interesting is an analysis of all of the NVSL. What is the fastest pool overall? The difficulty here is overcoming the fact that not all teams swim at all pools and by definition the teams get slower farther down the ladder of divisions. However, it's conceivable that an analyst could exploit the NVSL's promotion/relegation system – with teams swimming in

different divisions over time – to produce comparisons among pools. This approach would be roughly analogous to the way analysts produce computer rankings for college basketball and baseball teams, even though any given team only plays a fraction of the entire NCAA.

Predicted Swim Times Per Pool by Age Groups, Gender, and Event
(Times in Seconds; Fastest, Slowest)

Pool	Age Group	Freestyle		Backstroke		Breaststroke		Butterfly		Medley Relay	
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Chesterbrook	8 & Under	19.67	20.72	24.74	25.41	27.89	29.01	23.59	24.23		
Highlands		19.76	20.82	24.88	25.56	28.15	29.27	23.79	24.43		
McLean		20.13	21.18	25.29	25.96	28.56	29.67	23.87	24.51		
Overlee		19.73	20.78	25.11	25.78	28.10	29.21	23.78	24.41		
Tuckahoe		19.55	20.60	24.95	25.62	27.45	28.57	23.49	24.13		
Wakefield Chapel		19.70	20.75	24.94	25.61	28.35	29.46	23.84	24.47		
Chesterbrook	9-10	36.07	37.12	43.41	44.08	49.14	50.25	19.70	20.33	73.04	78.03
Highlands		36.17	37.22	43.55	44.22	49.40	50.51	19.90	20.53	73.20	78.19
McLean		36.53	37.58	43.95	44.63	49.80	50.92	19.98	20.61	73.77	78.76
Overlee		36.13	37.18	43.77	44.45	49.34	50.46	19.88	20.52	73.13	78.12
Tuckahoe		35.95	37.00	43.62	44.29	48.70	49.81	19.59	20.23	72.37	77.36
Wakefield Chapel		36.10	37.15	43.61	44.28	49.59	50.71	19.94	20.58	73.57	78.56
Chesterbrook	11-12	33.13	34.18	39.68	40.36	44.74	45.86	38.29	38.93	65.61	70.60
Highlands		33.22	34.28	39.83	40.50	45.00	46.12	38.49	39.13	65.77	70.77
McLean		33.59	34.64	40.23	40.91	45.41	46.52	38.57	39.21	66.34	71.33
Overlee		33.19	34.24	40.05	40.73	44.95	46.07	38.48	39.11	65.70	70.69
Tuckahoe		33.01	34.06	39.89	40.57	44.31	45.42	38.19	38.83	64.94	69.94
Wakefield Chapel		33.16	34.21	39.88	40.56	45.20	46.32	38.54	39.17	66.14	71.14
Chesterbrook	13-14	30.18	31.24	35.96	36.63	40.35	41.46	34.40	35.03	58.18	63.17
Highlands		30.28	31.34	36.10	36.78	40.61	41.73	34.60	35.23	58.34	63.34
McLean		30.65	31.70	36.51	37.18	41.02	42.13	34.68	35.31	58.91	63.90
Overlee		30.25	31.30	36.33	37.00	40.56	41.67	34.58	35.22	58.27	63.27
Tuckahoe		30.06	31.12	36.17	36.84	39.91	41.03	34.30	34.93	57.51	62.51
Wakefield Chapel		30.22	31.27	36.16	36.83	40.81	41.92	34.64	35.28	58.72	63.71
Chesterbrook	15-18	27.24	28.30	32.24	32.91	35.96	37.07	30.50	31.14	122.90	127.90
Highlands		27.34	28.39	32.38	33.05	36.22	37.33	30.70	31.34	123.00	128.00
McLean		27.70	28.76	32.79	33.46	36.62	37.74	30.78	31.42	123.60	128.60
Overlee		27.30	28.36	32.61	33.28	36.16	37.28	30.69	31.32	123.00	128.00
Tuckahoe		27.12	28.18	32.45	33.12	35.52	36.63	30.40	31.04	122.20	127.20
Wakefield Chapel		27.27	28.33	32.44	33.11	36.41	37.53	30.75	31.38	123.40	128.40

Note: All individual events are 50 meters except 8 & under events and 9-10 butterfly. Freestyle relays are excluded. Medley relays are 100 meters excepting the 15-18 age group who race 200 meters.