



THE FOLLOWING ANALYSIS LOOKS TO DEMONSTRATE THE STRONGEST, DEEPEST AND UP AND COMING NATIONS IN BIATHLON

INTRODUCTION

The success of an athlete is typically defined by his or her race results, which are converted to points. At the end of the season, all points are added up, and the ones with the most points win. A Nation's success can therefore be expressed by looking at the total number of points accumulated by the Nation's athletes during a race, a whole season or a five-season timespan.

In the following eight pages I analyzed biathlon Nations for their strength and depth, and what Nations are up and coming. Page one shows points and the percentage of all points per Nation. Page two and three show Nation's participation, followed by points per participant by season and level on pages four and five. Page six describes the efficiency factor, while page seven allows you to show all information for one specific Nation. The last page shows the strength of Nations through relay race results.

DATA

Context

The analysis uses data from the 2017-18 season until the 2021-22 season (inclusive), including all results of non-team and relay races at the Youth, Junior, IBU Cup and World Cup levels (including World Championships and Olympic Games) with the following exceptions:

- Super Sprint Qualification races are not included
- Race results of athletes/teams who did not finish (DNF) were excluded
- Race results of athletes/teams who did not start (DNS) were excluded
- Race results of athletes/teams who were disqualified (DSQ) were excluded
- Race results of athletes/teams who were lapped during the race (LAP) were excluded
- Any individual and relay race results that were 'null' were excluded

Additional notes


- Some Nation abbreviations were grouped as they represent the same Nations:
 - Greenland is one of the three constituent countries that form the Kingdom of Denmark and is represented in the data as both GRL and DEN. The analysis shows them as DEN&GRL
 - Russia has been represented in the data as RUS (Russia), OAR (Olympic Athlete of Russia), RBU (Russian Biathlon Union), ROC (Russian Olympic Committee) and NAR (Neutral Athlete of Russia). The analysis uses RUS* to represent them
- Some athletes have multiple names, i.e. Alexander -vs- Alexandr Loginov. The data for those names have been grouped as one
- Athletes that changed names due to marriage etc. have not been grouped and are represented separately

Calculated data for the analysis

- Race result points per athlete were calculated according to rule 15.8.2.1 as per the IBU document '03|Event and competition rules', version 2021, page 73. These points are used to represent a Nation's strength
- The number of athletes is calculated per Nation, season, gender and level. As athletes participate at different levels and multiple seasons, these numbers cannot be simply aggregated per Nation, and are only used to represent Nation's depth per season and level
- The number of race participants is also calculated per Nation, season, gender and level, but at a race level; therefore they can be aggregated and represent Nation's depth for multiple seasons and levels, as races are specific to level and season

TOOLS

The data calculations, data analysis and presentation of the results were executed using Google Sheets and Tableau Public. The interactive version of this work, which can be found on <https://public.tableau.com/app/profile/rj7974>, allows you to see more details in tooltips by hovering your mouse over chart data points, lines and areas. It also gives you the ability to select any Nation of preference on pages three, six and seven (look for the orange bar and arrows indicating where to select, and where to see the results of the selection). The dashboard can be downloaded as a PDF, but for the best quality and to avoid seeing white edges, I recommend downloading the pages as images and combining those into one PDF:

- Click on the download icon either at the top right of the webpage or in the bottom right of the dashboard: 
 - PDF > Specific sheets from this workbook > Select All > Automatic Scaling, Letter, Portrait > Download
 - Image > this saves the current page as a PNG file. Do the same for all pages and combine them into a PDF

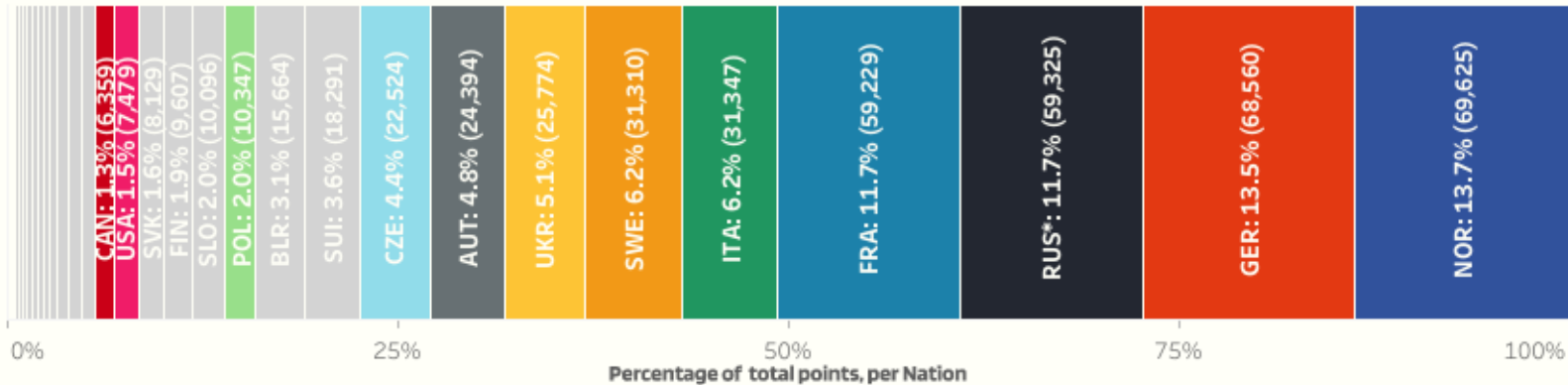


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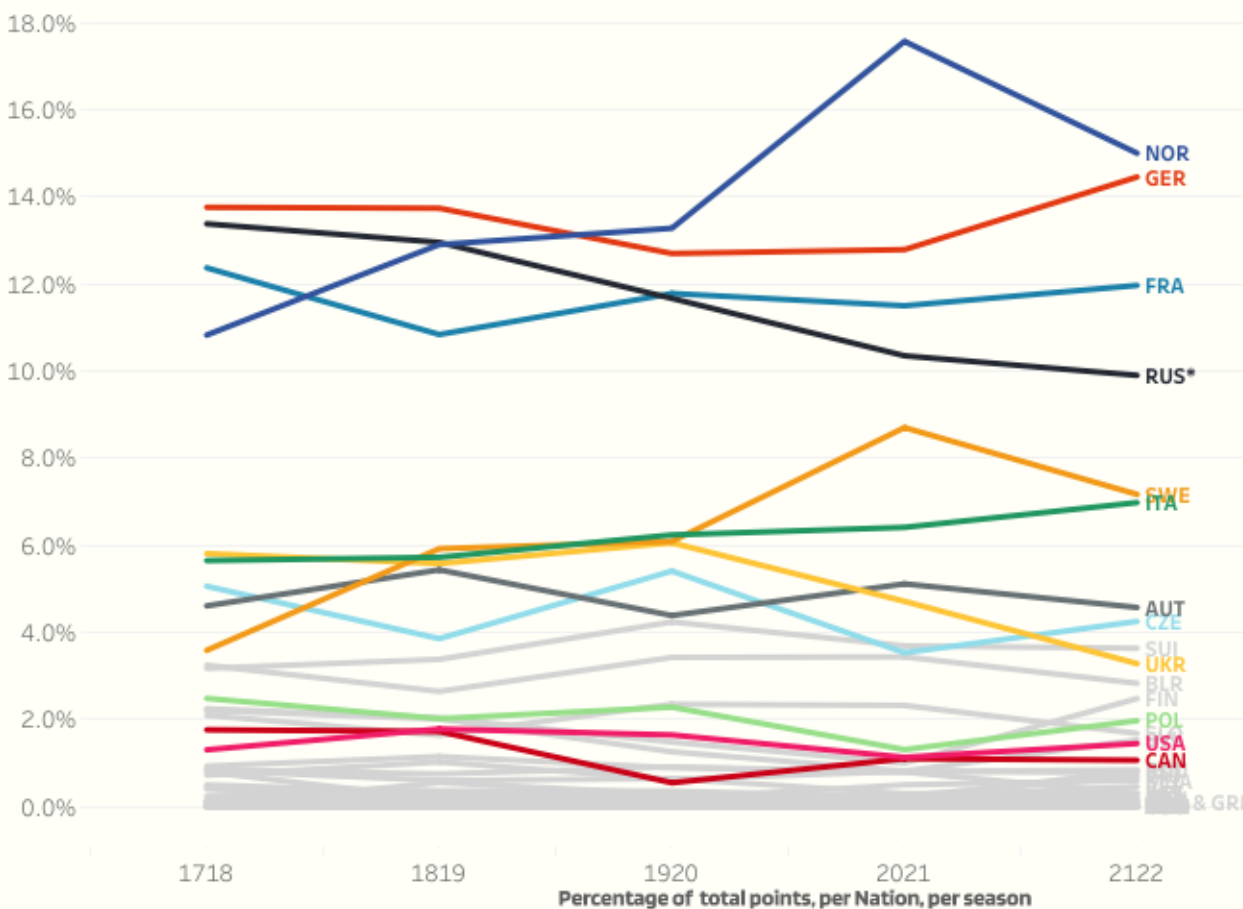
POINTS

The success of an athlete is typically defined by his or her race results, which are converted to points; at the end of the season all points are added up, and the ones with the most points win. A Nation's success can therefore be expressed by looking at the total number of points accumulated by the Nation's athletes during a race, a whole season or a five-season timespan.

TOTAL NR OF CALCULATED POINTS IN ALL FIVE SEASONS COMBINED: 506,605



We can also look at this data season by season, which shows us which countries have been getting relatively more or fewer points of the total number of points in that season. Due to a number of circumstances, like Covid, the seasons vary in total points per season.



To no one's surprise, Norway, Germany, France and Russia* are the leaders in percentage of total points per season with all levels combined, with Sweden and Italy following a little behind. Of those, Germany and Italy appear to make the biggest progress in recent years.

Note that Russia's, Belarussia's and Ukraine's decline in the last season can - at least to some extent - be contributed to the non-participation of their athletes due to the war in Ukraine.



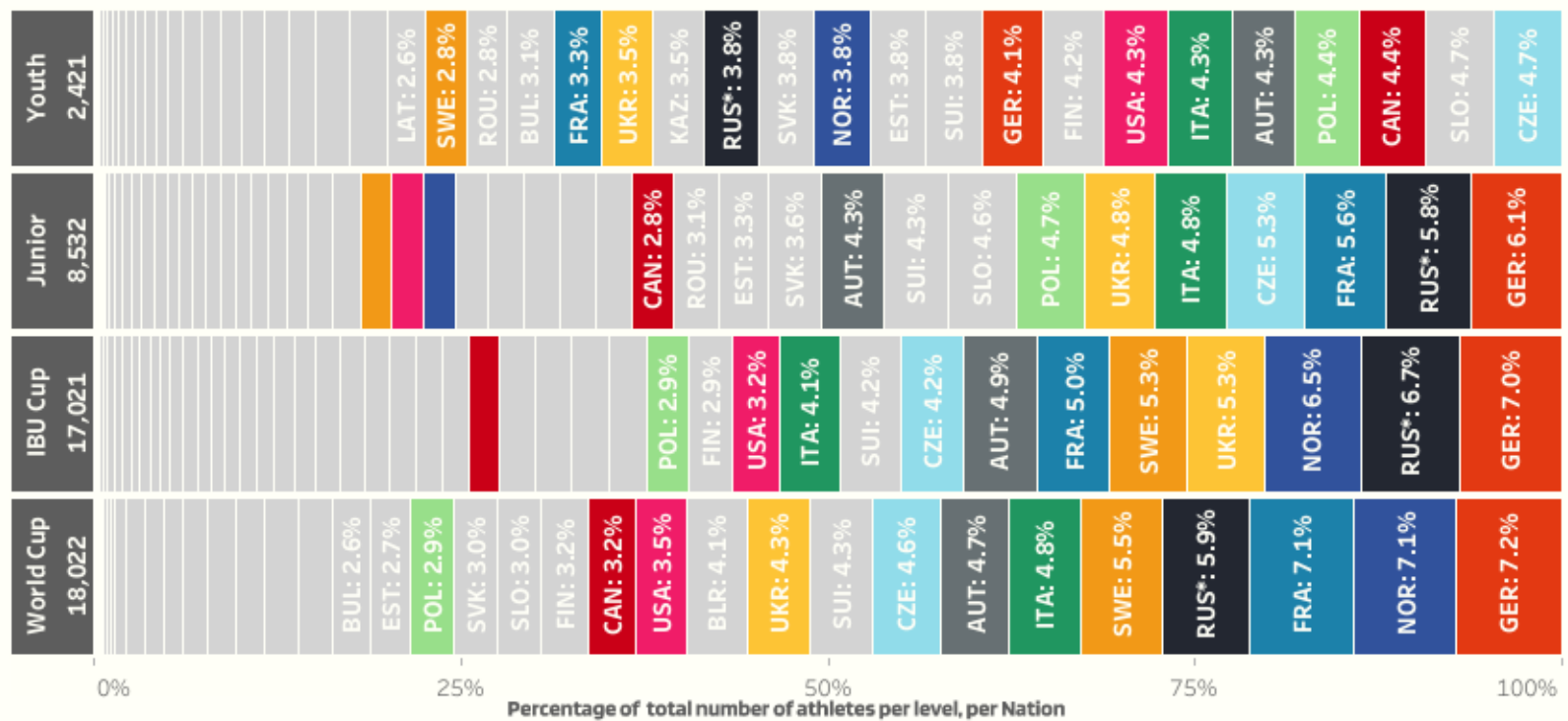
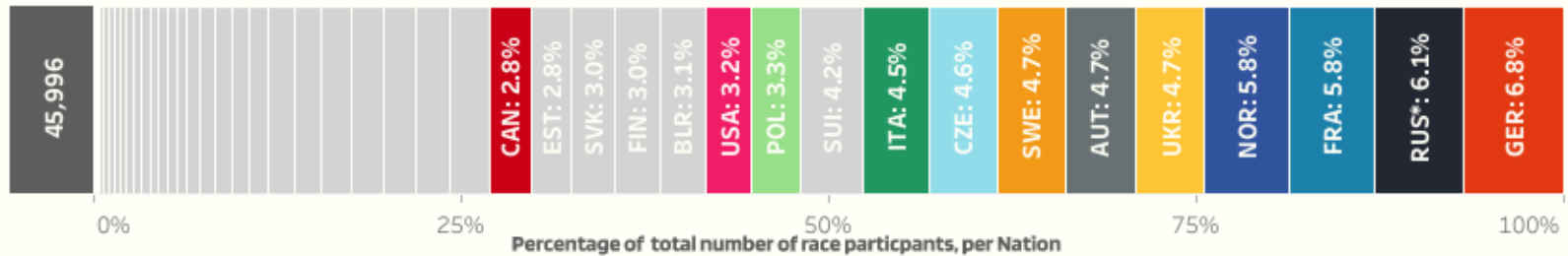
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DEPTH

Only looking at total points does not consider that some Nations have more athletes and participants than other Nations, skewing the numbers when we want to show success at a Nation's level. So first let's look at the number of individual athletes that represent a particular Nation, and then at the number of individual race participants per Nation, noting that as we show multiple levels and seasons, most athletes are counted as race participants more than once.

TOTAL NR OF UNIQUE ATHLETES IN ALL FIVE SEASONS AND ALL LEVELS: 1,941

TOTAL NR OF RACE PARTICIPANTS IN ALL FIVE SEASONS AND ALL LEVELS: 45,996



Based on the data in the chart above, we can draw several conclusions:

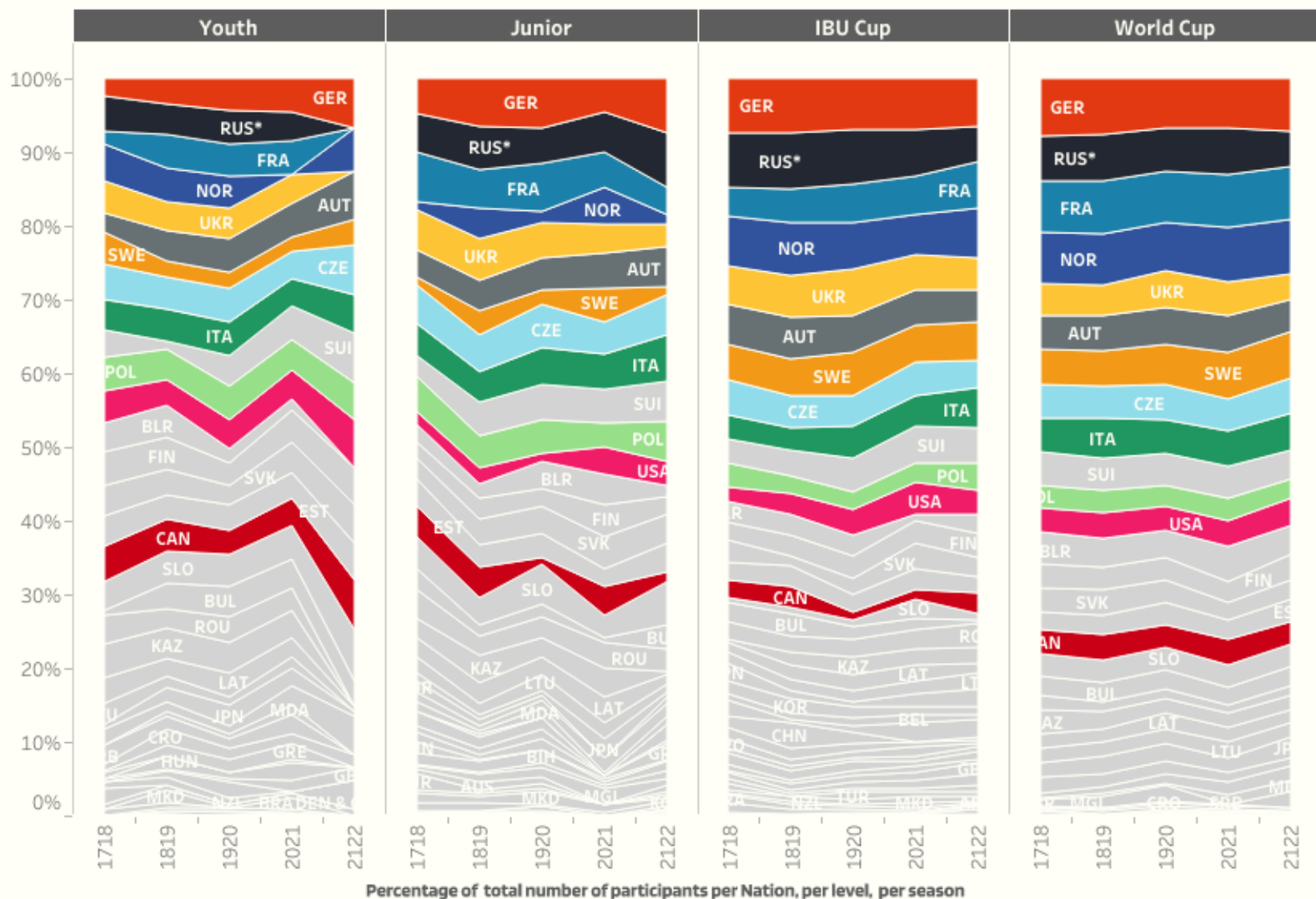
- In all levels of IBU competitions in the last five seasons, Germany provided the largest number of participants (6.8% | 3,112)
- Out of 51 Nations, the top-10 (GER, RUS*, FRA, NOR, UKR, AUT, SWE, CZE, ITA and SUI) provide 51.9% of the participants
- Most participants race at the World Cup level, but when considering the number of races the World Cup has the lowest ratio:
 - Youth 2,421/30 = 80.7
 - Junior 8,532/98 = 87.1
 - IBU Cup 17,021/207 = 82.2
 - World Cup 18,022/248 = 72.7
- All other smaller Nations together (41) have a higher percentage of athlete representation in the lower levels and declining percentages of athlete representation as the level increases:
 - Youth 62%
 - Junior 55%
 - IBU Cup 47%
 - World Cup 45%



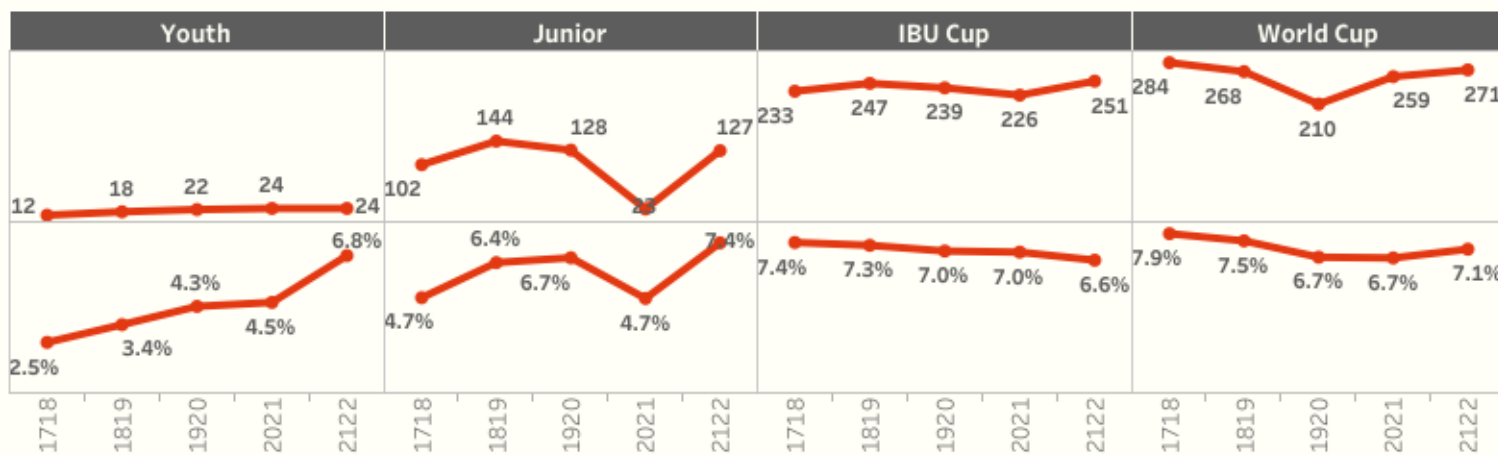
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DEPTH TRENDS

How have Nations developed their participants over the last five seasons? Do they have young talent coming up, waiting to make the jump? Do they room at the World Cup level to give new athletes a chance? The following chart gives some insight to help answer these types of questions.



SELECT ANY NATION IN THE CHART ABOVE TO SHOW ITS DETAILS BELOW



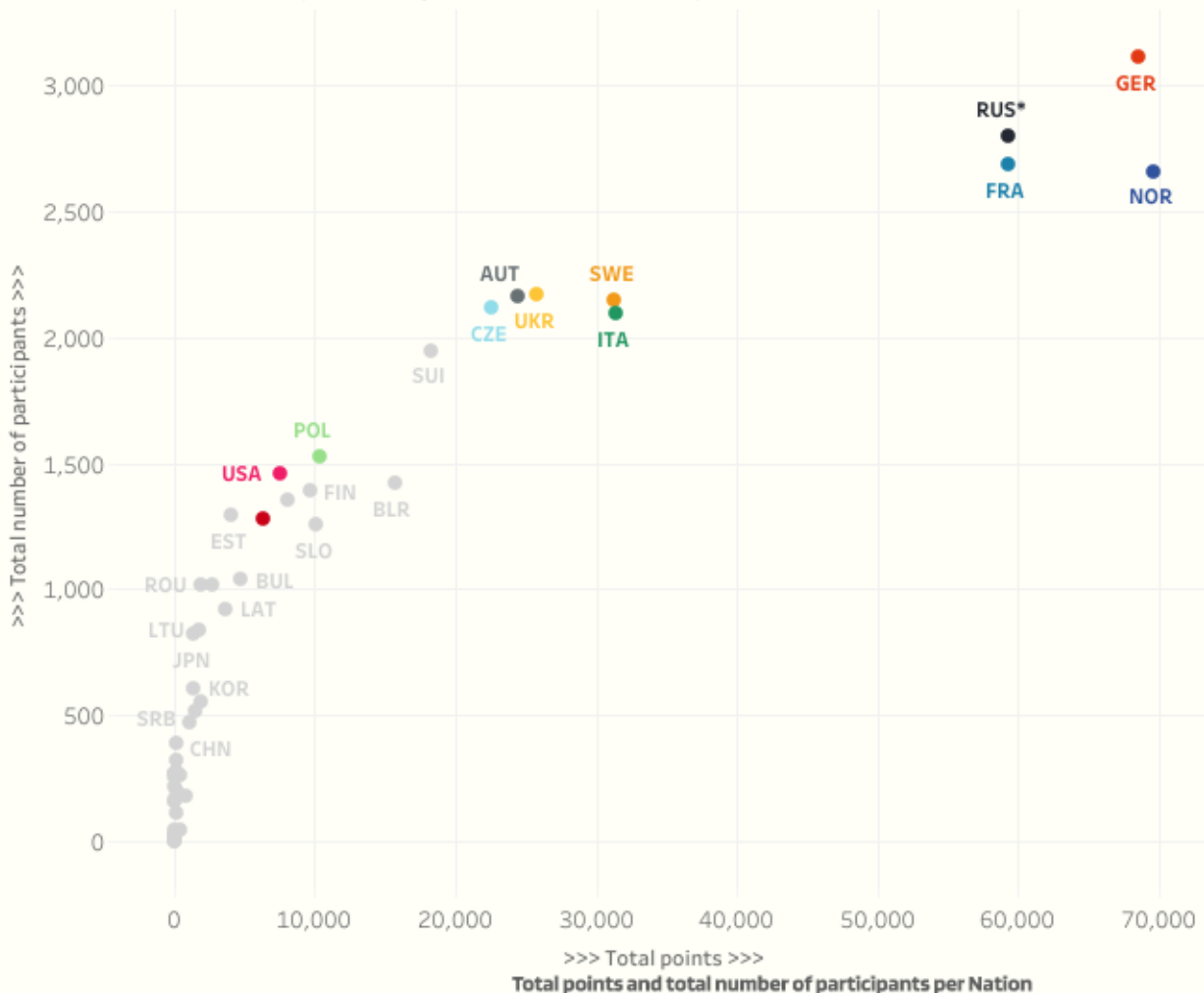
Number of participants, and percentage of total number of participants per level, per season for GER (note that if a Nation has 0 participants for a given year, the year will not show up)



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STRENGTH

Now that we know the total points as well as the number of participants for any Nation, we can express the strength of a Nation as a relative measure that allows us to fairly compare Nations. The following chart compares Nation's number of participants over the last five seasons with the total points they scored over that time period.



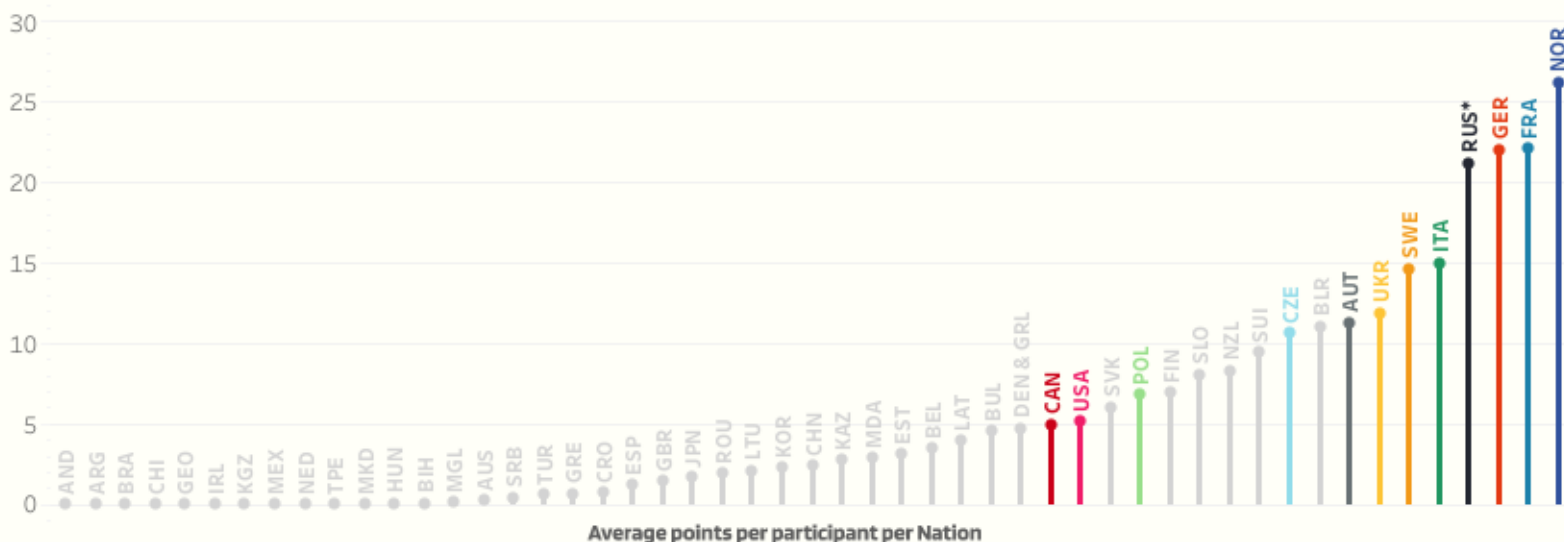
For the last five seasons and all levels combined, Norway, Germany, Russia* and France separate themselves from the rest of the field in total points and participants. They can truly be considered the big Nations in biathlon.

Sweden, Italy, Ukraine, Austria, the Czech Republic and Switzerland make up the rest of the Top 10 Nations.

A third group has clearly been investing in the sport and is trying to catch up to the Top 10 Nations.

The last group has small participation and a low amount of points.

When we divide the total points by the number of participants we get an average of points per participant per race value. In other words, if any given athlete would race one race for his/her Nation, they can expect, on average, this calculated point value.

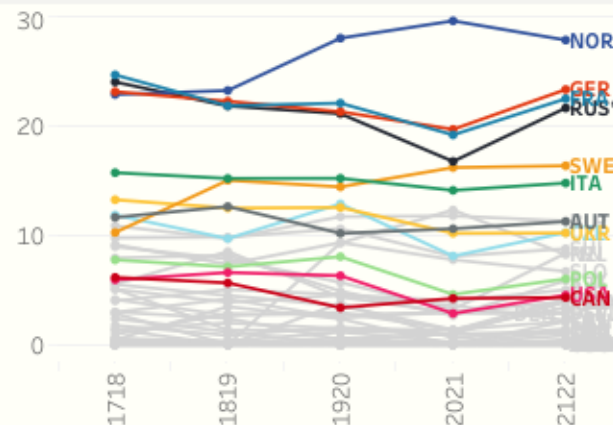




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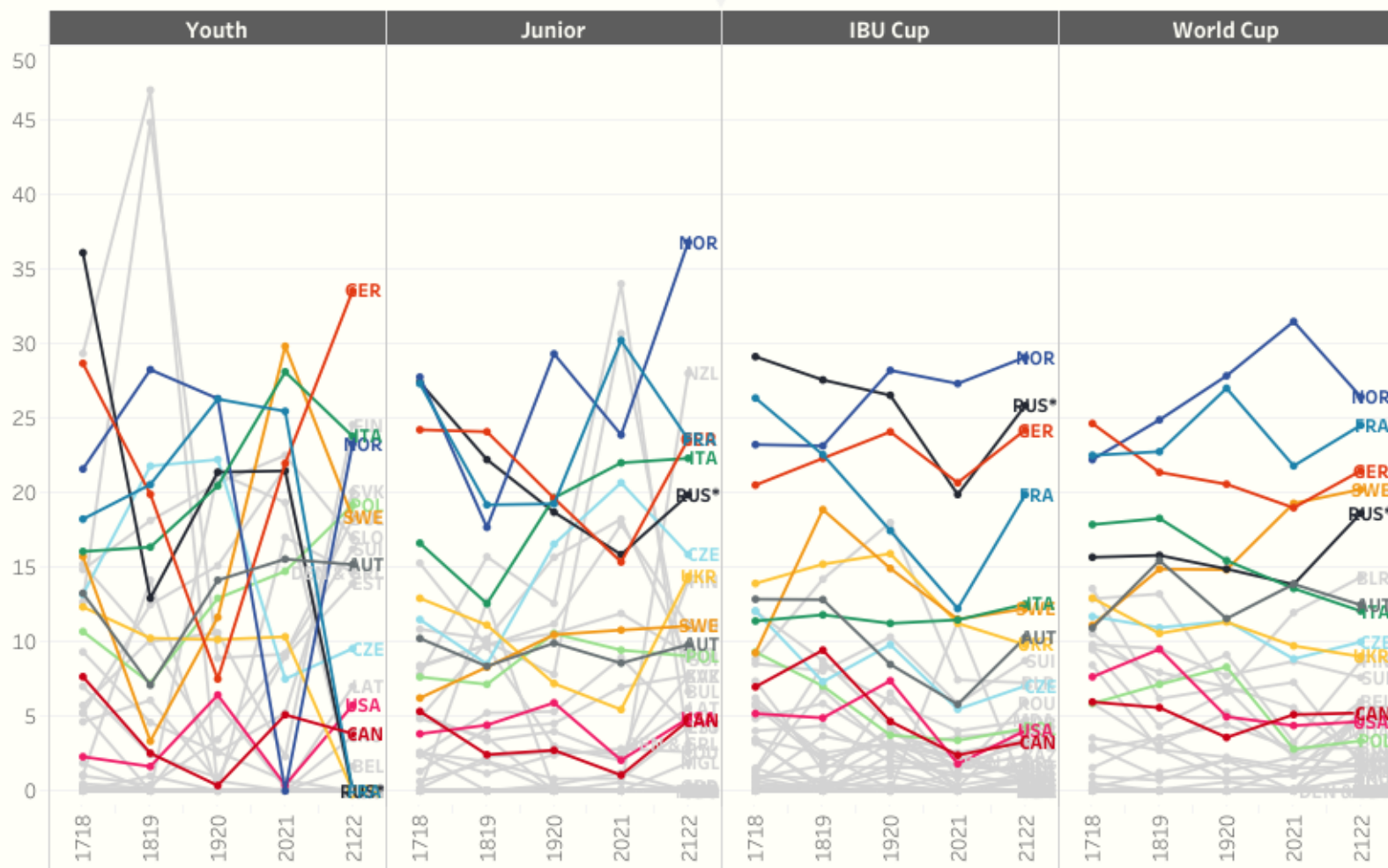
STRENGTH PER SEASON AND LEVEL

With the average points per participant per Nation figured out, we can now look at that value per season and per level. The chart to the right shows the values per Nation, per season. It emphasizes which countries have gotten stronger over the last five seasons, and which ones have gotten weaker.



Average points per participant, per Nation, per season

The chart below shows the same values per Nation, per season, but then spits them between the different levels. Now we can see which Nations are developing well at the lower level, which ones are levelling off or dropping at the World Cup level, etc.



Average points per participant, per Nation, per level, per season

Due to a low number of races these averages can fluctuate drastically. Both NOR and GER had one low year but are close to the top in most years. SWE has come up and so have ITA, FIN and POL.

NOR, FRA, GER, ITA and RUS* have all done well at this level, and CZE, UKR and FIN had some strong years too. NZL and DEN & GRL have done quite well in recent years.

NOR, RUS*, GER and FRA are above the rest of the field, followed by ITA, SWE, AUT, UKR and SUI. BLR had a few strong years but has declined somewhat recently.

Again NOR, FRA, GER and RUS* with the addition of SWE in recent years are leading the pack. BLR has progressed, while AUT and ITA have declined in the last five seasons.



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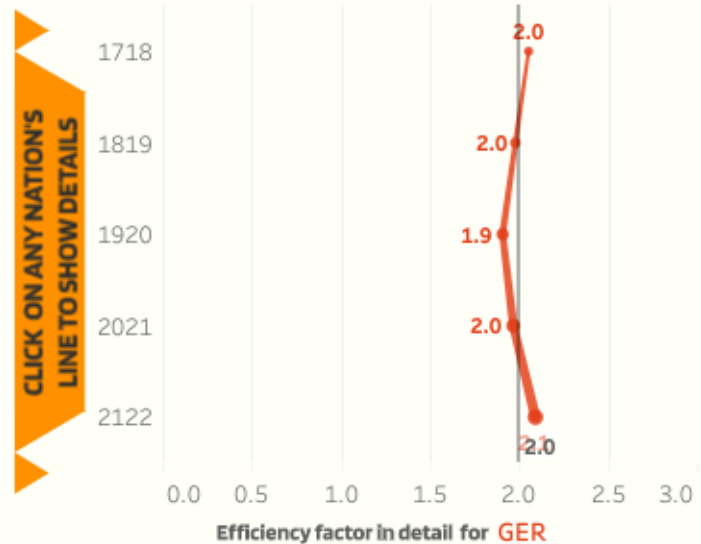
EFFICIENCY FACTOR



The most successful Nations will have a high average points per participant value, but we can also look at how many points they score relative to the whole field, and compare that with how many participants they have relative to the whole field.

Taking the percentage-of-total-points-overall value for a Nation, and dividing it by the percentage-of-total-participants-overall value for that Nation, gives us an efficiency factor. This factor is based on the percentage of totals, rather than just absolute counts. The larger the factor, the more efficient the Nation is in scoring points.

The chart on the left shows the factor per Nation per season, with an average for all seasons combined. Details for a selected Nation are shown below.



For example, Germany has a very consistent efficiency factor in all seasons, around 2. That means that their share of all the points available was twice as large as their share of all participants racing.

In the 2021-2022 season Germany had:

- 14.5% of all points available
- 6.9% of all participants racing
- An efficiency factor of $14.5 / 6.9 = 2.1$

In addition, the charts show a Nation's consistency: the wider the spread of the seasonal values, the less consistent a Nation is season by season. An almost vertical line on the other hand shows a strong consistency.

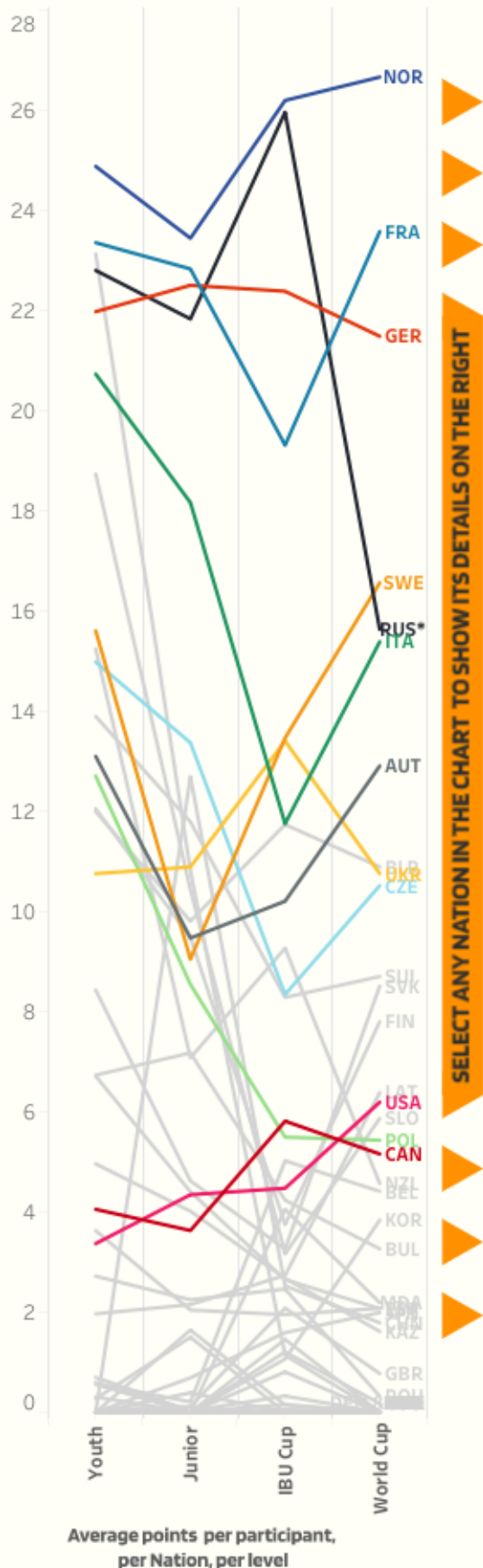
Again looking at Germany, their lowest factor was 1.9 in the 2019-20 season, and their highest was 2.1 in the 2021-22 season, a spread of only 0.2



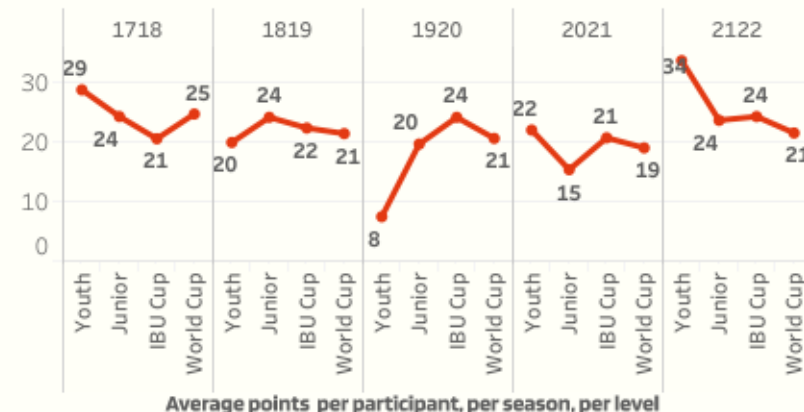
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NATION DETAILS FOR: GER

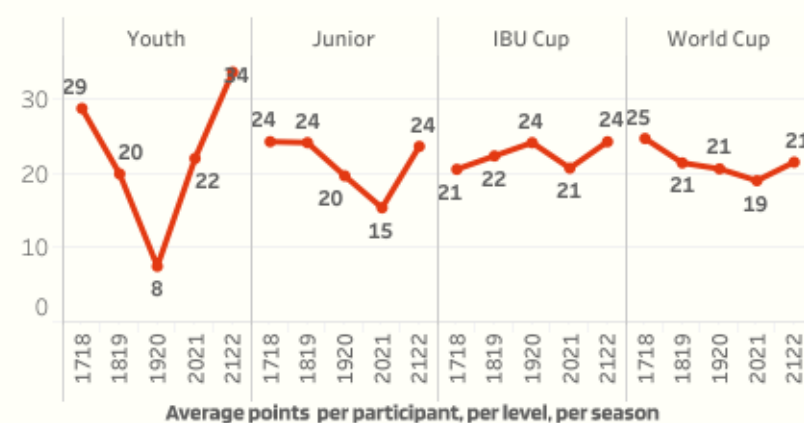
(select Nation in chart on left to change)



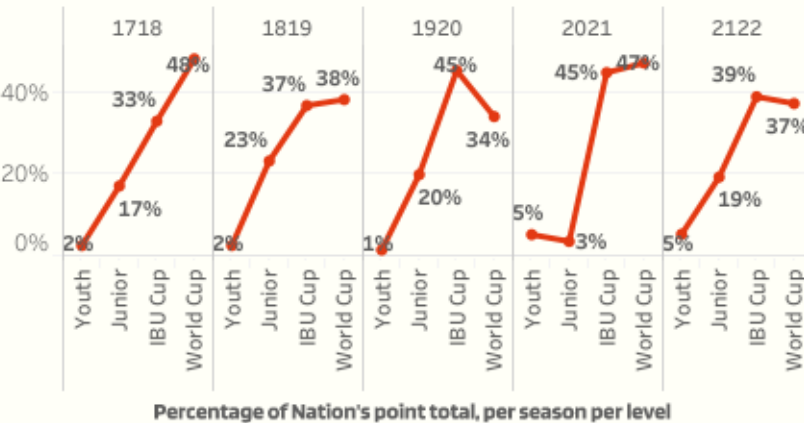
SELECT ANY NATION IN THE CHART TO SHOW ITS DETAILS ON THE RIGHT



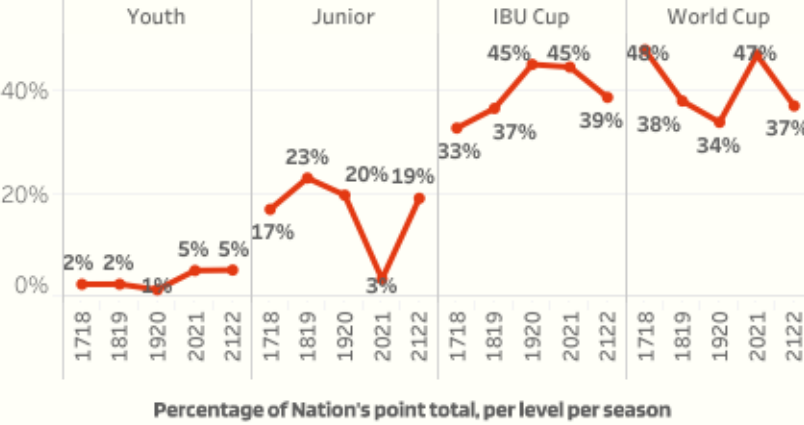
With the average points per participant per Nation, we can see how the levels compared when looking per season



The other way around, we can see per level how the average points per participant trended over the seasons



When we look at the Nation's total points overall, we can see how many of those were won at what level per season



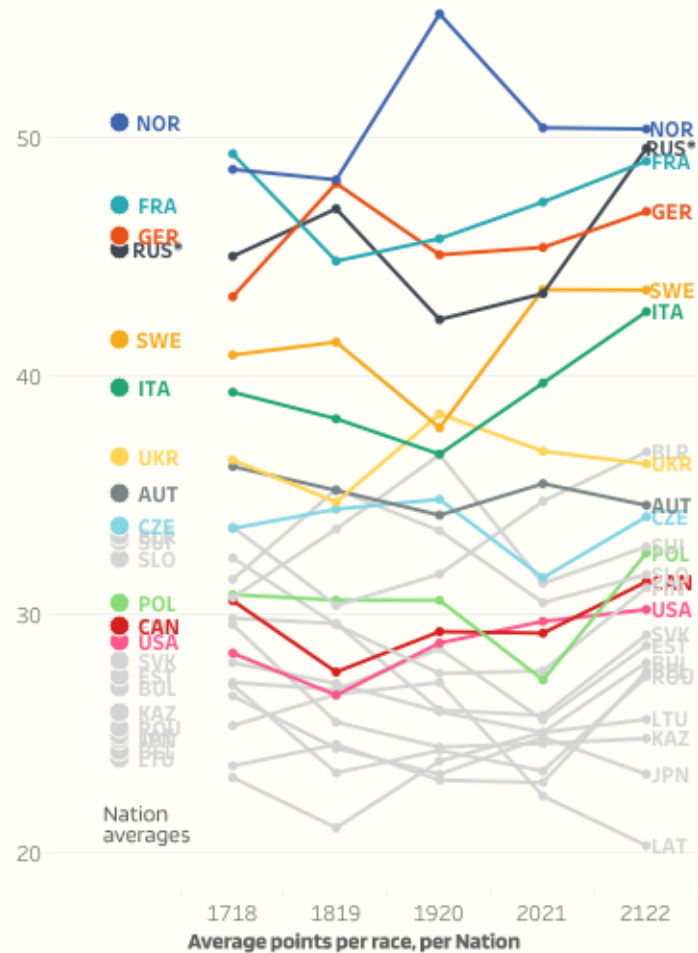
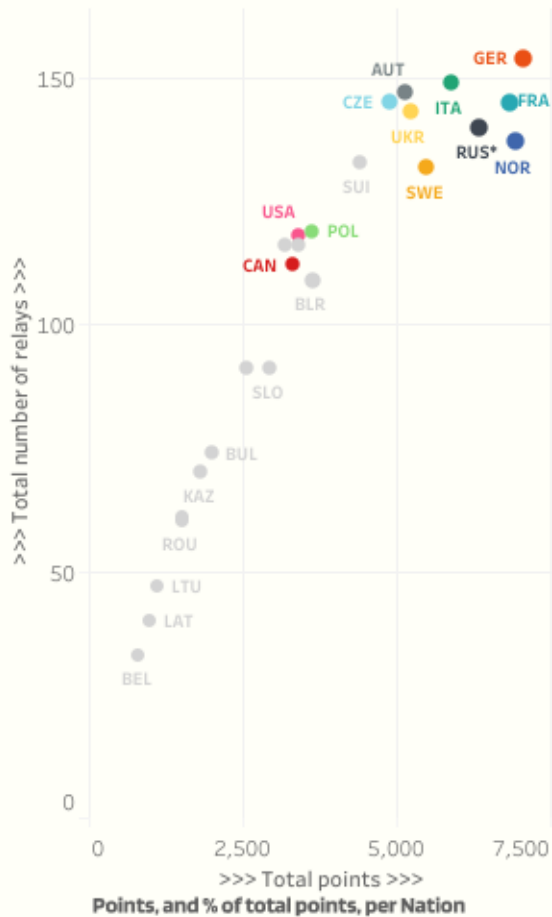
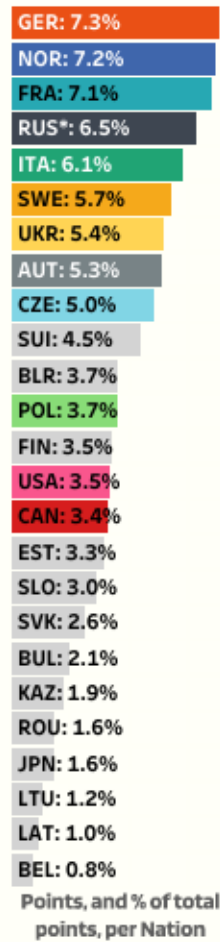
Once again, we can turn that around, to see that percentage of the total points were won per season, but as a seasonal trend per level



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RELAYS

Relays are a bit different than individual races when it comes to determining the stronger and weaker Nations, as many Nations don't always have enough athletes to enter a team, especially for competitions at the different levels. Also, at the junior and youth levels relays aren't that common. The charts below show (percentage of) total relay race points, the balance between points and relays participated in, and average points per race. Any Nation that has not scored at least a point in each season or at each level is not displayed but is included in the calculations.



The above confirms that Norway is a very strong biathlon country, with an average score of 50.6 points per relay race. In both total points and average points per race they are right at or near the top of every chart, and that for every season in the last five years. Other Nations in the upper regions are Germany, France and Russia, with Sweden and Italy just a little behind but getting closer in the last couple of seasons.

The last chart below shows the depth of Nations by looking at the average points per relay race but split by level. It's pretty much the same Nations mentioned above that do well, but countries like Italy, the Czech Republic, Slovenia, Poland and Slovenia have done well at the younger levels in the last five seasons. Perhaps a sign of what's to come in the next couple of seasons!

	NOR	FRA	GER	RUS*	SWE	ITA	UKR	AUT	CZE	BLR	SUI	SLO	POL	CAN	FIN	USA	SVK	EST	BUL	KAZ	ROU	LAT	JPN	BEL	LTU
Youth	53	46	46	42	33	45	31	34	37	30	30	40	37	26	36	28	28	30	29	29	26	25	22	22	22
Junior	46	51	48	48	34	46	35	34	38	34	36	36	37	27	33	27	30	28	29	26	27	25	22	23	26
IBU Cup	48	45	47	51	41	37	40	35	34	33	32	29	30	34	29	30	27	30	30	27	26	28	28	28	29
World Cup	52	47	44	43	43	38	36	35	32	34	33	29	27	30	28	29	27	27	25	25	23	24	25	24	22

Average points per race, per Nation, per level