

What Length Paddle Should I Use!!

Surf Life Saving Australia
Level 3 Coaching
Research Assignment

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By
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Aims

To compare 3 common methods of determining an individuals optimal paddle length for surf ski paddling.

To produce an easy to use, graphical representation of the most accurate method, so that optimal paddle length can be selected for the individual.

Abstract

Since the introduction of the “wing” style blades in surf ski paddling, minimum research has been conducted to determine appropriate paddle length for optimal technique development, performance and to minimise injury. To date, surf paddlers have relied on the extensive research and development conducted within the field of recreational and sprint kayaking to determine paddle lengths. However, paddling in surf presents unique conditions and requirements quite different to those found in flat water or river environments.

Research showed there are several commonly accepted methods of determining appropriate paddle length, however these are generalisations used for kayaking, with surf adaptations based on years of experience and anecdotal evidence. This project intends to compare 3 commonly used methods on a more scientific and objective basis to determine the most accurate. It is hoped this may stimulate more interest in this area and promote further examination and research.

Methods of Measurement

Three common methods used to determine paddle length are;

A). Torso Length.

Measure the torso length by sitting on the floor with your legs slightly bent as you would sit on your ski, with an upright posture. Measure from the top of your head to the floor or your seat area. Compare this measurement to the paddle length chart below (1).

THE CHART										
Torso	Length(mm)	760	781	810	831	861	890	910	940	970
Paddle	Length(m)	1.95	2.00	2.00	2.05	2.05	2.10	2.15	2.20	2.20

B). Reach Over the Top Technique.

Stand next to the paddle in bare feet and extend one arm above your head and curl your fingers over the top of the paddle (Do not hyper extend). The measurement should be taken from the junction between the top of the palm and the beginning of the fingers. This will give total paddle length (2).

C). Elbows at Right Angles.

Place the centre of the paddle shaft on top of the head, holding the shaft with both hands in the paddling grip. Your elbows should be at 90 degrees. Your hands should be no more than 2 hand widths from the beginning of the blade and no less than one.

Hand grips should be slightly inside the 90 degree angle for better paddling technique.

To make it easier to measure, measure from elbow tip to elbow tip with elbows at 90 degrees (3).

Trial Method

All paddlers were measured up using the 3 methods for determining a paddle length.

Paddlers were to use varying length paddles indicated by the 3 methods of measurement as well as their currently used paddle. Paddlers were to paddle over a measured distance and against the stop watch.

The length of paddle used to produce the best performance for each individual was recorded as their best paddle length and plotted on a graph against their body measurements.

Both male and female paddlers were required to use a pre determined blade size and only change the length of the shaft on each separate pass. Male paddlers used a medium Epic blade while female paddlers used a small Brasca FW (copy).

The trial was to look specifically at paddle length and therefore other determining factors for selecting an appropriate paddle, including blade type and size, shaft makeup and shape and angle or feather of the blade were to remain constant.

The trials were done with each group of paddlers finishing their trial under the same conditions in a semi exposed marina. Each paddler was given sufficient time to recover between each pass.

Results

The results showed that no one method of measurement would give a paddle length that was conclusively consistent with having the best performance over the trial distance.

The trial highlighted the importance that every millimetre in paddle length can make a difference in speed especially for younger developing paddlers, where better performance was achieved when they used paddles closer to their ideal paddle length.

The results showed good groupings for generalisation of paddle lengths. Consistently across the three forms of measurement it was found 'the bigger you are the longer the paddle you should use'. As an example, if you have a torso measurement between 850 and 900mm, a standing height with raised arm between 2000mm and 2100mm and an elbow spread between 850mm and 950 mm, you should be using a 2.06m paddle. Your physical strength will determine whether you have a small or medium size blade.

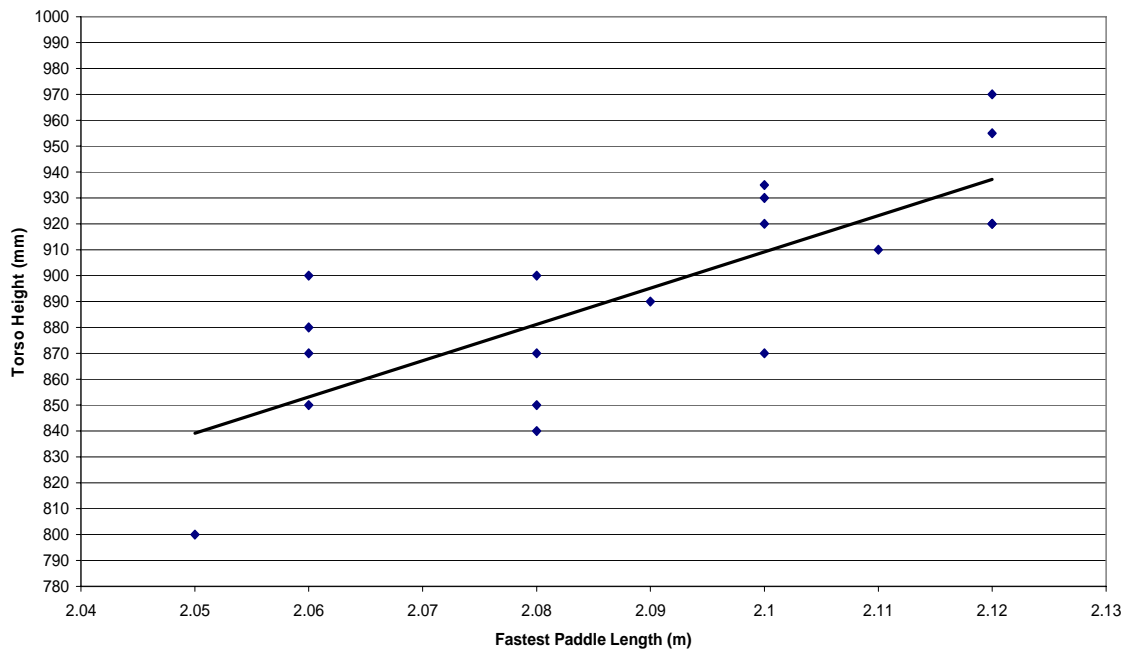
However, if you analyse these measurements and the individual graphs, you end up with paddle lengths between 2.05m and 2.10m. Unfortunately 50mm is too big a variation for surf paddling and more accuracy is required.

The following spreadsheet shows the athletes measurements and the results of their fastest paddle length over the measured distance. These results give us the graph plots and base for our linear regression equations.

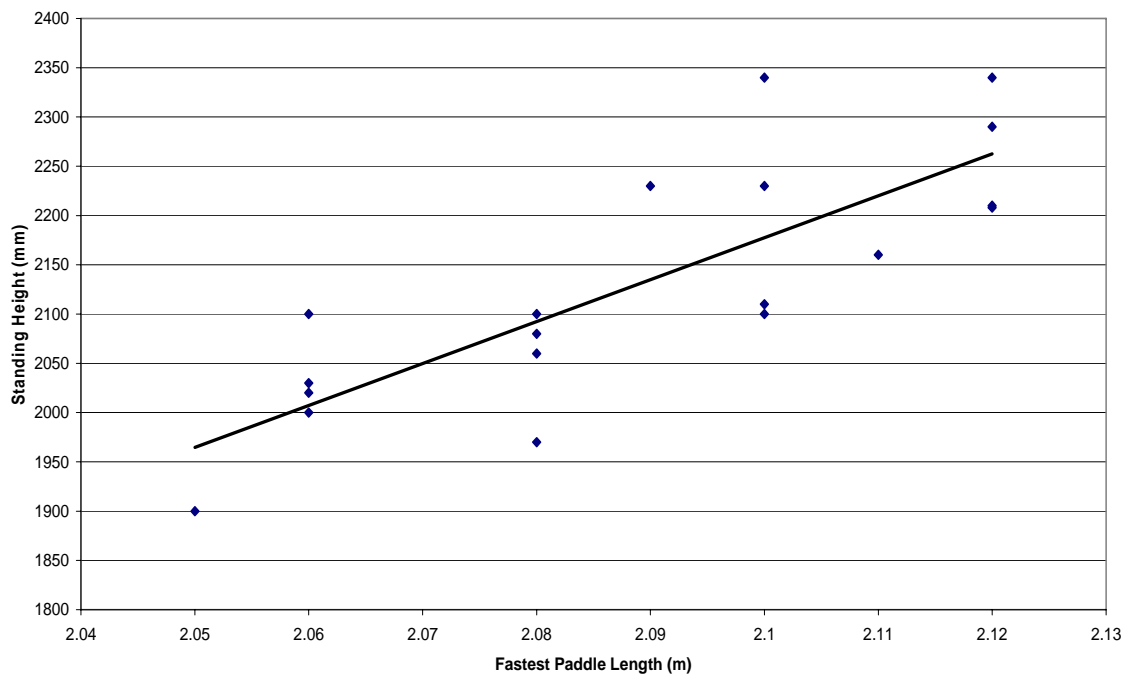
Paddler	Fastest Paddle Length	Torso Height	Standing Height	Elbow to Elbow
A	2.08	840	2060	930
B	2.10	930	2100	970
C	2.06	880	2100	940
D	2.06	900	2020	930
E	2.12	955	2208	1020
F	2.10	935	2340	1000
G	2.12	970	2340	1000
H	2.06	850	2000	850
I	2.09	890	2230	1000
J	2.10	920	2230	940
K	2.08	850	1970	900
L	2.08	900	2080	970
M	2.11	910	2160	980
N	2.12	920	2290	1000
O	2.10	870	2110	1000
P	2.05	800	1900	900
Q	2.06	870	2030	880
R	2.08	870	2100	950
S	2.12	920	2210	960

These graphs show paddlers A to S fastest paddle length against the three forms of measurement.

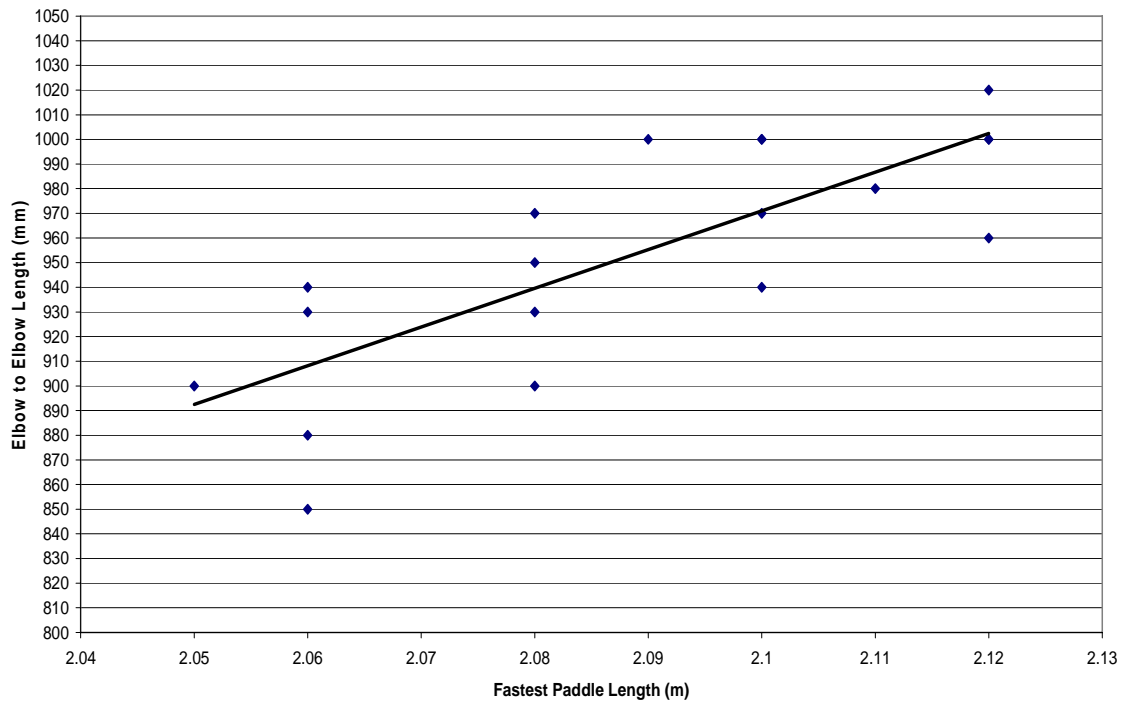
Torso Height



Standing Height



Elbow to Elbow



Discussion

As the objective of the exercise was to produce a single line graph for measurement we looked at the combinations of body measurements against the paddle length that produced the fastest time or ideal paddle length.

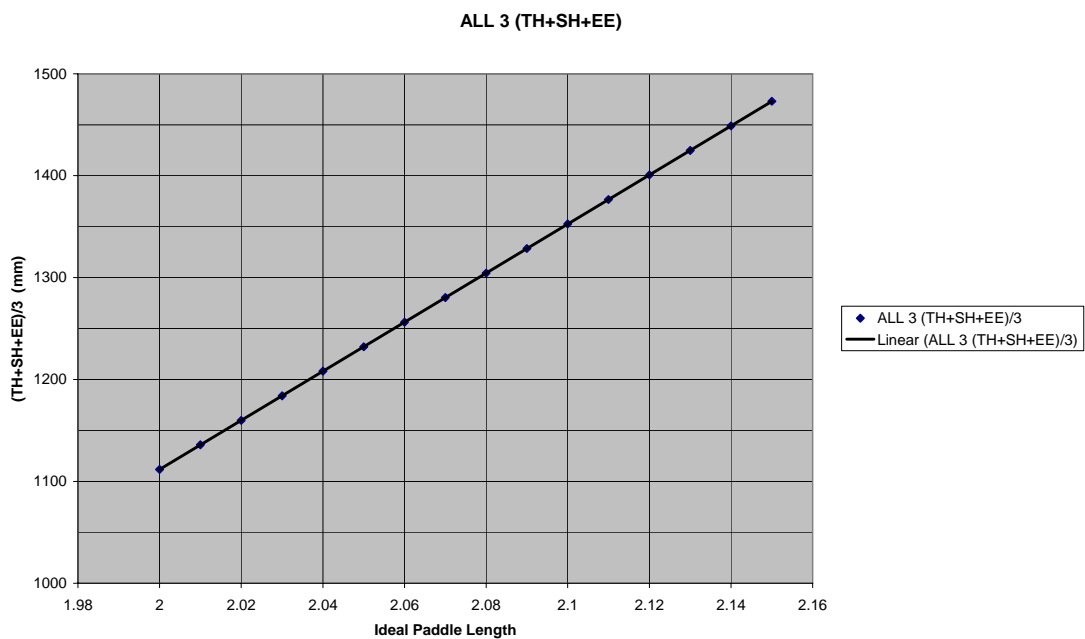
We tried two methods of calculations using the results of the trials.

- A)** Averaging the measurement of Elbow to Elbow (EE) and Torso Height (TH).
- B)** Averaging the measurements of all three Elbow to Elbow (EE) Torso Height (TH) and Standing Height (SH).

To enable us to work out these comparisons we had to produce a series of linear regression equations for the line of best fit which are as follows.

The combined averages have been plotted with the use of a graphic calculator to show comparative results of ideal paddle length against the research results of fastest paddle length.

Paddler	Fastest Paddle Length	Torso Height	Standing Height	Elbow to Elbow	TH+EE/2	IPL	TH+SH+EE/3	IPL
A	2.08	840	2060	930	885	2.06	1276.67	2.07
B	2.1	930	2100	970	950	2.10	1333.33	2.09
C	2.06	880	2100	940	910	2.08	1306.67	2.08
D	2.06	900	2020	930	915	2.08	1283.33	2.07
E	2.12	955	2208	1020	987.5	2.13	1394.33	2.12
F	2.1	935	2340	1000	967.5	2.11	1425.00	2.13
G	2.12	970	2340	1000	985	2.13	1436.67	2.13
H	2.06	850	2000	850	850	2.04	1233.33	2.05
I	2.09	890	2230	1000	945	2.10	1373.33	2.11
J	2.1	920	2230	940	930	2.09	1363.33	2.10
K	2.08	850	1970	900	875	2.05	1240.00	2.05
L	2.08	900	2080	970	935	2.09	1316.67	2.09
M	2.11	910	2160	980	945	2.10	1350.00	2.10
N	2.12	920	2290	1000	960	2.11	1403.33	2.12
O	2.1	870	2110	1000	935	2.09	1326.67	2.09
P	2.05	800	1900	900	850	2.04	1200.00	2.04
Q	2.06	870	2030	880	875	2.05	1260.00	2.06
R	2.08	870	2100	950	910	2.08	1306.67	2.08



Results.

Using all three forms of measurement $(EE + TH + SH)/3$.

27.8 %	Equal to trial fastest paddle length
50.0 %	+/- 10mm
16.7 %	+/- 20mm
5.5 %	+/- 30mm

Using two forms of measurement $(EE + TH)/2$.

11.2 %	Equal to trial fastest paddle length
61.2 %	+/- 10mm
22.1 %	+/- 20mm
5.5 %	+/- 30mm

Conclusion. (Recommendations)

The results from averaging the three forms of measurement and plotting them on the combined graph showed that we have 77.8% of paddlers measured for ideal paddle length within +/- 10mm of their fastest tested paddle length and 16.7% within +/- 20mm.

To have 94.5% of the sample within 20mm of their fastest or ideal paddle length is encouraging, especially for developing young or novice paddlers.

I would conclude that this form of measurement combined with the graph gives us a easy to use, graphical representation of the most accurate method of selecting the optimal paddle length for the individual.

Recommendations.

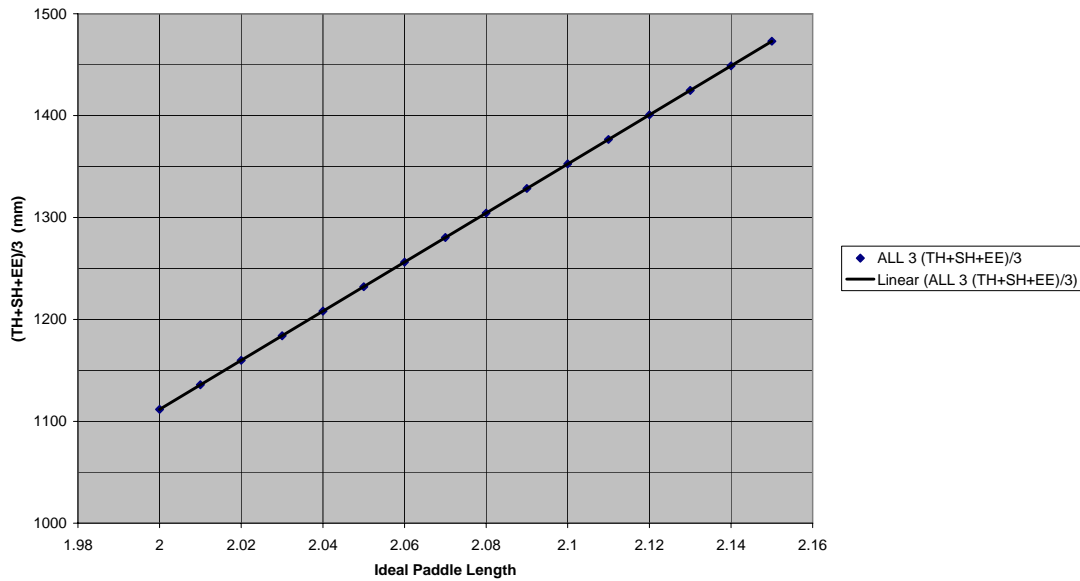
We have used the results of the trials to come up with a single line graph that is hopefully a simplistic method of measurement resulting in the best fit paddle length for the individual.

Experienced paddlers may find they use a different length paddle under different conditions.

Combined Graph

Surf Paddle Length

ALL 3 (TH+SH+EE)



Torso Height(mm)
 + Standing Height(mm)
 + Elbow to Elbow(mm)

 TOTAL(mm)
 Divide by 3

Average (mm) = (m) Ideal
 Paddle Length

Addendum: Paddle Blade size.

Our trial was to determine optimum paddle length and not to compare performance of different blades. A generalisation is to state that sprint blades come in small, medium and large sizes and physical strength can determine what size blade you use. The decision about blade size should be made between the coach and the athlete and if you are fortunate enough to be able to trial different sizes and makes of blades in varying conditions then this is a bonus. Ask other paddlers for feedback, just because they like them doesn't mean they are the right ones for you. In some areas it's a matter of what is available so do your research and ask around before you buy. I would recommend that younger u/17 surf ski paddlers start with carbon blades rather than fibreglass. Fibreglass blades have a lot of flex and I have found that committed young paddlers out grow them within the first 12 months and it becomes expensive by having to buy a second set of paddles or change blades so soon after taking up the sport.

To elaborate a little more on these statements I will include some general recommendations that I use at my club with 80 paddlers between the ages of 16 and 60.

New Paddlers

Male/ Female	Under 17	Small blades Medium blade for male if well developed.
Female Paddlers	Open/under 19	Small blades Medium blades if physically strong and experienced.
Male Paddlers	Open/under 19 become	Medium blades as they stronger then medium/ large if needed.
Male Paddlers	Open used	Large blades should only be by big men with years of paddling experience.
Masters	Not in open competition	Medium to small blades

For all new paddlers I set or recommend that the blade angle be set at 65 degrees.

It's better for the paddler to have the correct paddle length and a slightly smaller blade than it being too big, which encourages faults in their technique.

The paddler should be able to

- Develop good technique.
- Have good posture for arm and body rotation.
- Sit over the pull stroke and not fall away.
- Be able to accelerate in the stroke, especially in whitewater.
- Be able to race 700m and not just 400m because they are unable to pull their blade through the water.

References

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