

# Anchors and Anchoring

Kim Klaka



image : R Macfarlane

South of Perth  
Yacht Club  
16<sup>th</sup> November  
2021



# Contents

- Anchoring technique
- Required scope
- Anchor types: which is best?
- How big?
- Chain or rope?
- Conclusions

# Who are you?

- Big or small boat? (>9m LOA)
- Power or sail?
- Multihull or mono
- Who do you sail with: partner, family, full crew?

## The sleep test:

Do you sleep soundly at anchor?

## The mooring test:

Would you rather anchor than pick up a mooring?

If you answer “no” to either, you need to work on your anchoring!

# Who goes to the bow?

- Decision-making is at bow.
- Strength needed at bow.
- Boat-handling skills needed at stern.

# Anchoring technique

- Pick a spot with plenty of swinging room.
- Make sure seabed is deep sand or mud.
- Let out 1.5 x water depth.
- Gently motor backwards, letting out rode in a straight line.
- At 3 times depth, cleat off and motor astern for 30 sec.
- Check not dragging, then let out required scope (see later).
- Add rope snubber, have cup of tea then check still not dragging .

# “Required Scope”??

Either:

*5 times water depth and **ALWAYS** at least 20m*

e.g. 3m depth = 20m rode

5m depth = 25 m rode

Or:

*15m + double the depth*

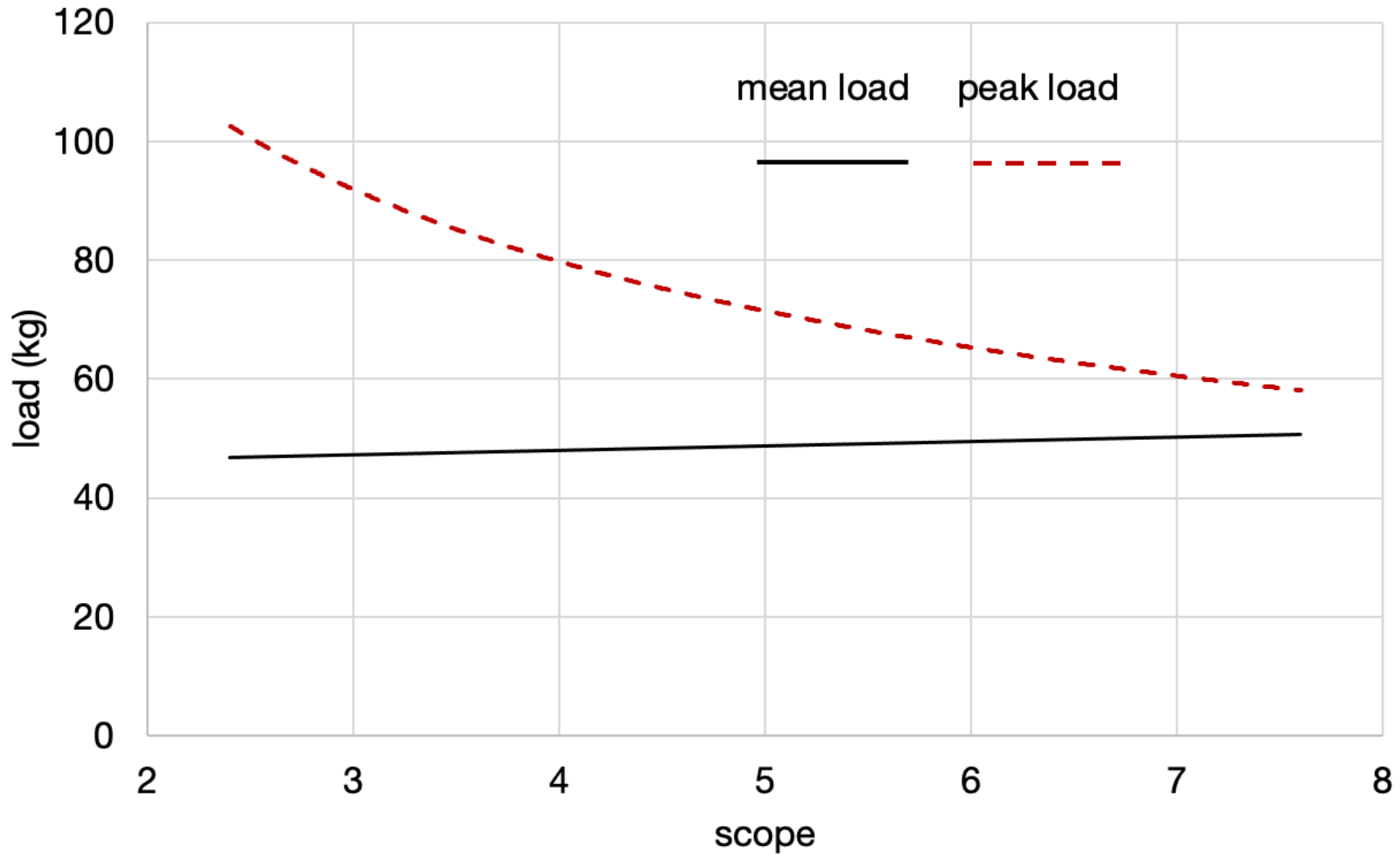
e.g. 3m depth = 21m rode

5m depth = 25 m rode

AND

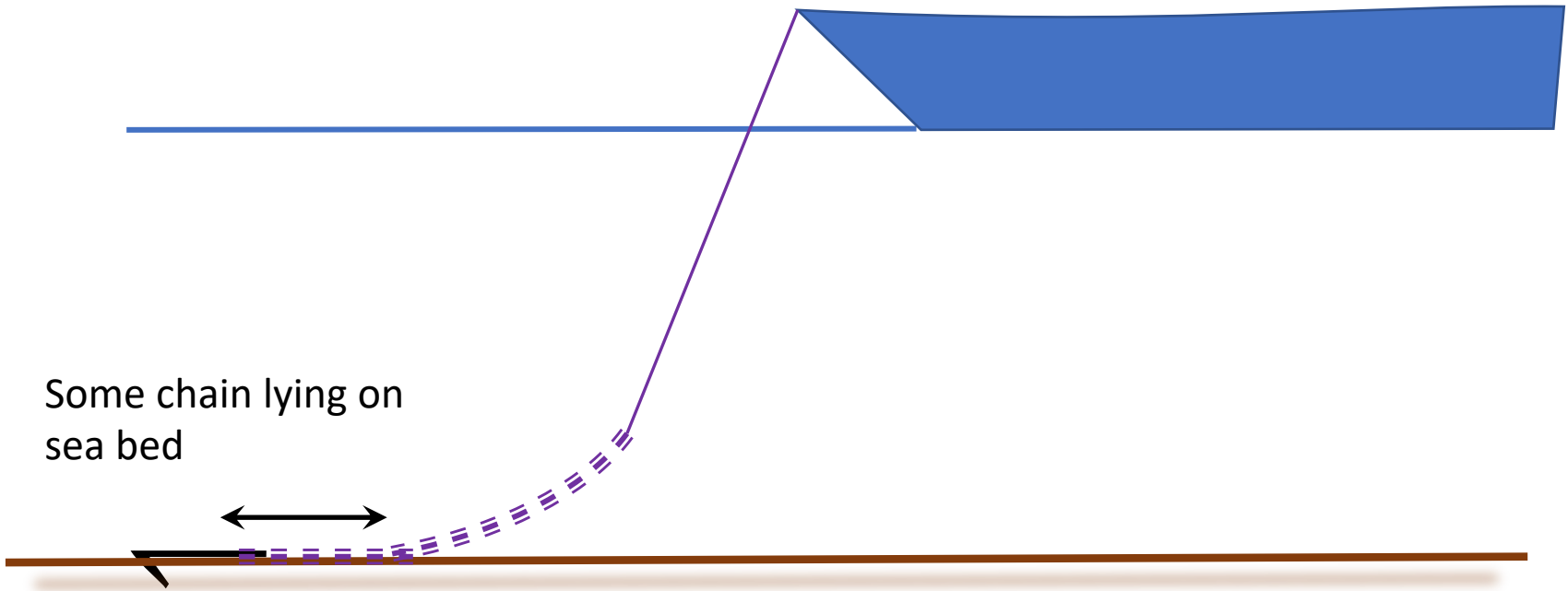
*Always add more if it is rough/windy.*

# load v scope: 10m yacht

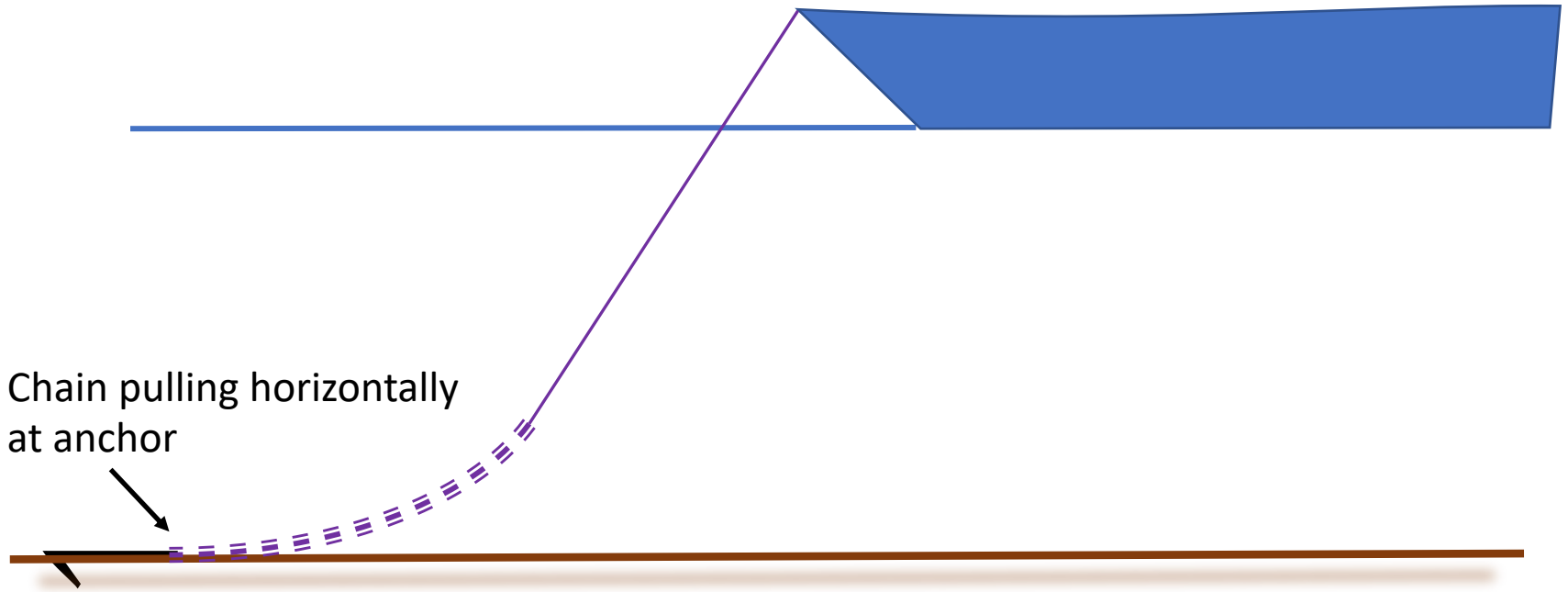


Source: anchor trials Fremantle Feb 2020



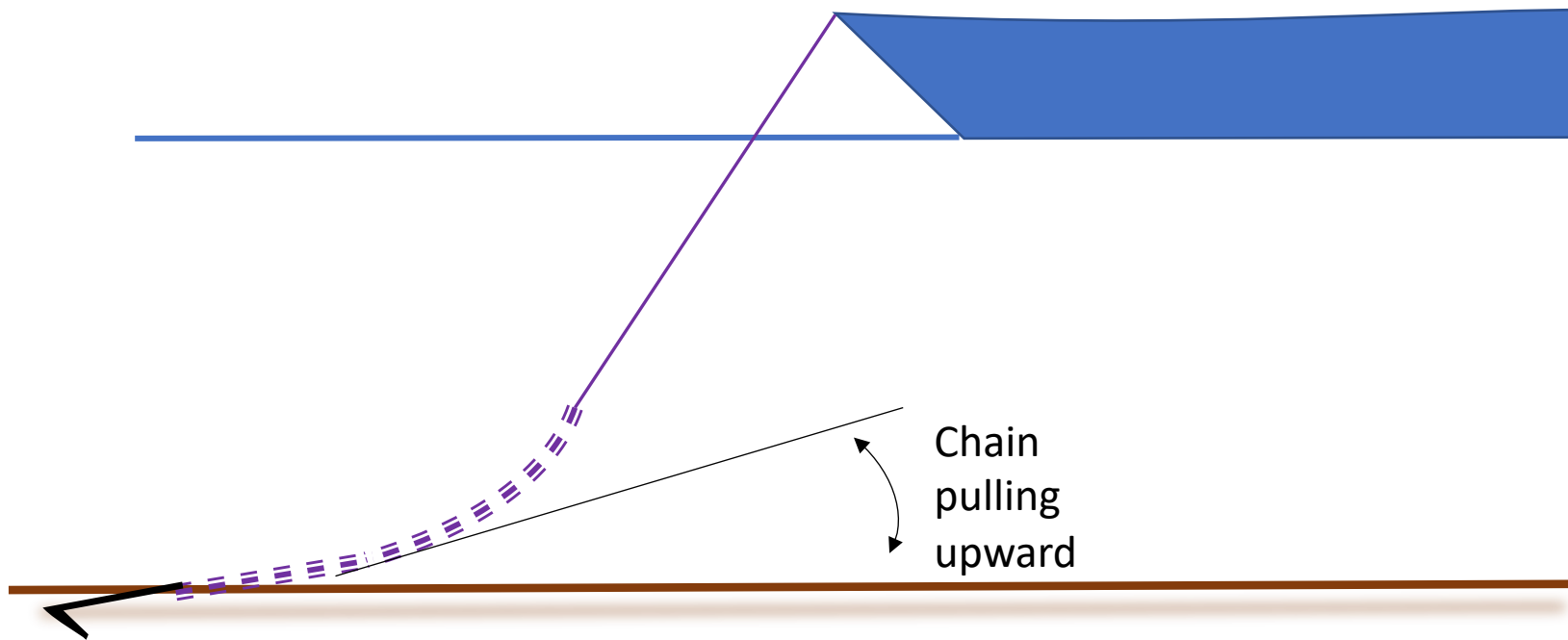


Some chain lying on  
sea bed



Chain pulling horizontally  
at anchor





Chain  
pulling  
upward

# What is the best type of anchor?

Pointless question.....

- No type is good in all conditions and
- You need more than one anchor.

# How many anchors?

For offshore cruising:

1. One main anchor
2. Second anchor for double-anchoring
3. Third anchor for different seabed
4. Fourth anchor in case you lose one (or lend it to friends!)
5. Dinghy anchor (VERY important!!)

For local boating e.g. Rottneest maybe reduce to 2 + dinghy anchor

# Pre-19<sup>th</sup> century anchor fisherman



# 20<sup>th</sup> century anchor types



CQR style



Delta



Fortress and Danforth

# 21<sup>st</sup> century anchors

Rocna



Manson



Mantus



Spade





# Holding power

	Neeves	Hodges & Springer	Allisy	Sezerat	Gree
Britany			M	M	H
Claw/Bruce	L	L		L	M/L
CQR	L	L	L	H	M
Delta	L	M/H	M	M	
Fortress		H	H	L	H
Kobra	H		H	H	
Manson		H	H		
Oceane		H			
Rocna		H			
Sarca	H	M			
Spade	H	H	H	H	
Wasi Bugel		M			
West Marine Performance 20		L			
Fisherman	L				L

L= Low holding power:      M = Medium:      H = High

# Re-setting

	Neeves	Hodges & Springer	Allisy	Sezerat	
Britany			A		
Claw/Bruce	P	P		P	
CQR	P	P	P	P	
Delta	A/G	A/G	A/P		
Fortress		G		P	
Kobra	G		G	G	
Manson		G	G		
Oceane					
Rocna	A	G			
Sarca	A/G	G			
Spade	G	G	G		
Wasi Bugel					
West Marine Performance 20					
Fisherman	P				

P = Poor re-setting: A = Average: G = Good

# Matching anchor to seabed

Seabed type	Hardness	Shear strength	Anchor type
<b>Mud</b>	Very soft – soft	Weak	flat are best, claw OK, plough not so good
<b>Silt</b>	Soft – medium	Medium	All Ok
<b>Gravel</b>	Soft (between pebbles)	Weak	New gen (large surface area + tip weight)
<b>Clay</b>	Medium	High	Heavy old ones and new gen
<b>Sand</b>	Medium-hard	Medium-high	New gen good. Flat and plough can skid on hard sand
<b>Rock</b>	Impenetrable	Very high	Fisherman
<b>Weed</b>	-	-	Difficult - Flat and/or sharp-tipped

# Holding power in sand 15kg anchor

20<sup>th</sup> century

<b>Delta</b>	<b>CQR</b>
450kg	200kg

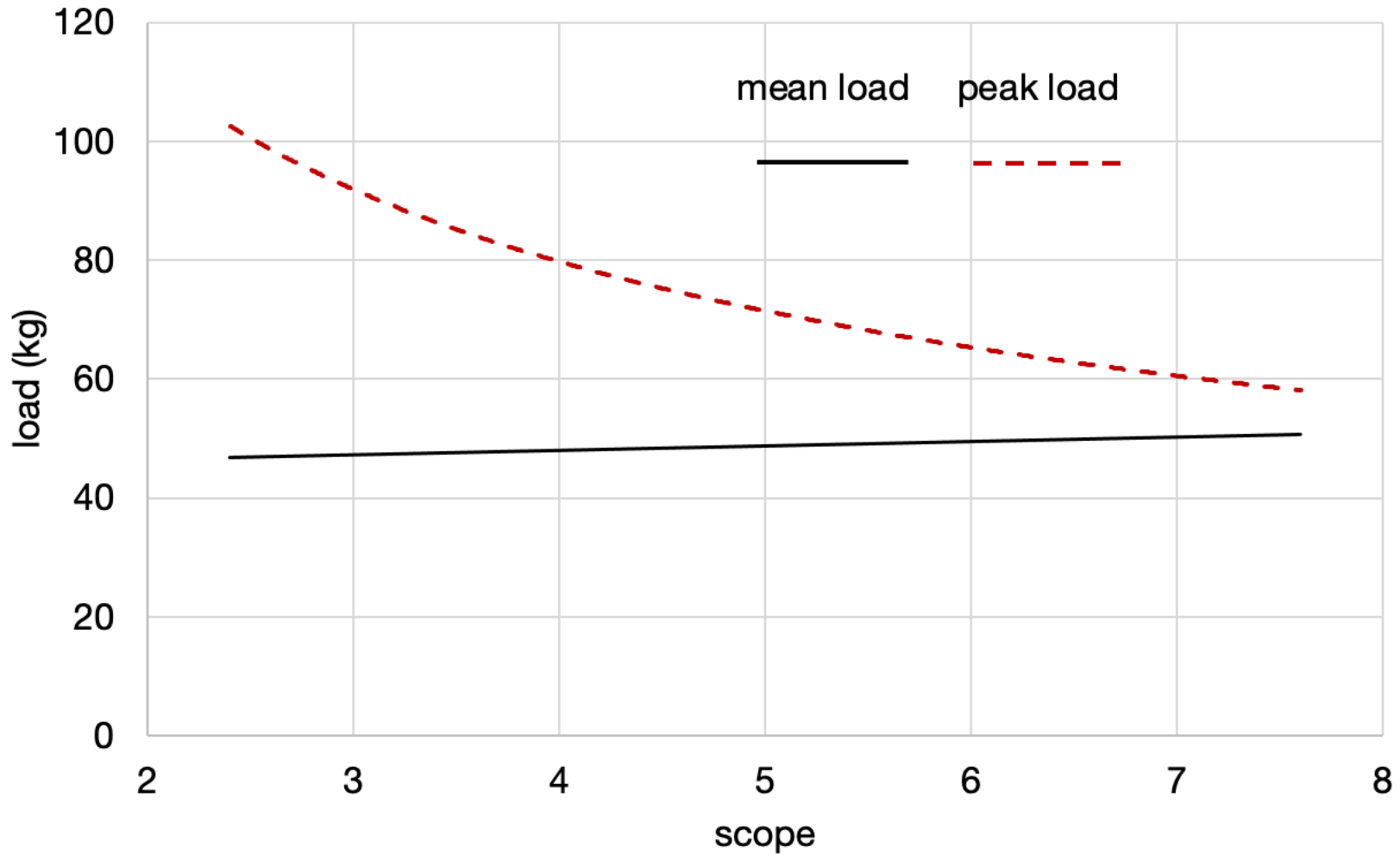
21<sup>st</sup> century

<b>Manson</b>	<b>Spade</b>
1080kg	1900kg

from Yachting Monthly Nov 2009

Max load on anchor = ??? kg

# load v scope: 10m yacht



Source: anchor trials Fremantle Feb 2020

# Holding power in sand 15kg anchor

20<sup>th</sup> century

<b>Delta</b>	<b>CQR</b>
450kg	200kg

21<sup>st</sup> century

<b>Manson</b>	<b>Spade</b>
1080kg	1900kg

from Yachting Monthly Nov 2009

## Max load on anchor in 40kn wind = 300kg

From anchor trials on a 10m sailing yacht Feb 2020

For 10m flybridge powerboat add maybe 25-50% i.e. 400-600kg

# Recommended size of anchor

- The biggest you can handle
- Always select bigger than recommended!
- For 20<sup>th</sup> century anchors:

$$\textit{Weight (kg)} = 3x \textit{LOA(m)} - 16$$

e.g. For 8m boat, use at least 8kg anchor

For 10m boat , use at least 14kg anchor

For 21<sup>st</sup> century anchors, go down one size if you must.

# Chain or rope?

Strength v. weight v. stretch v. chafe

Options:

✓ Galvanised chain

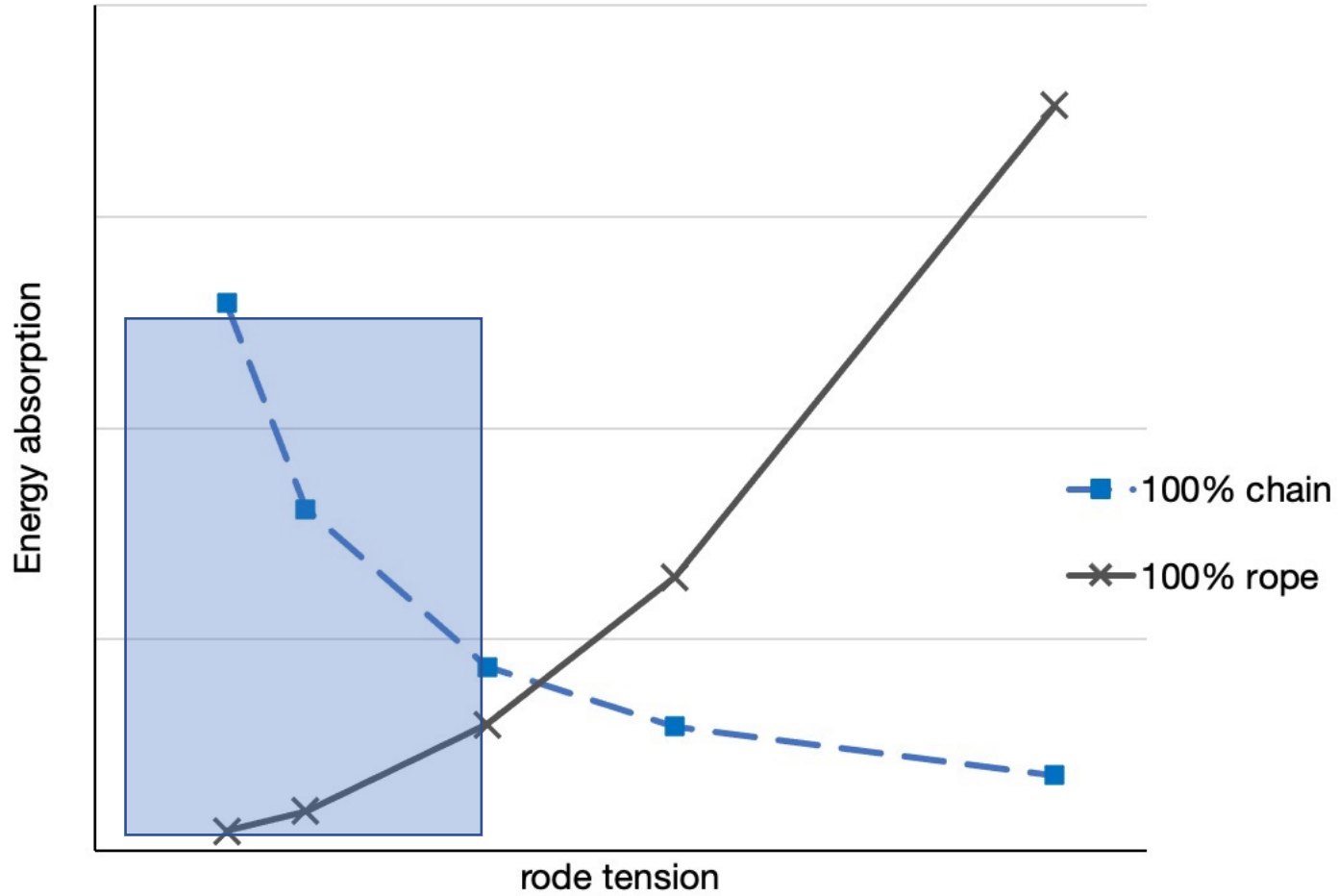
xStainless chain

✓ Nylon rope

x“silver” rope



## Energy absorption from slack to taut

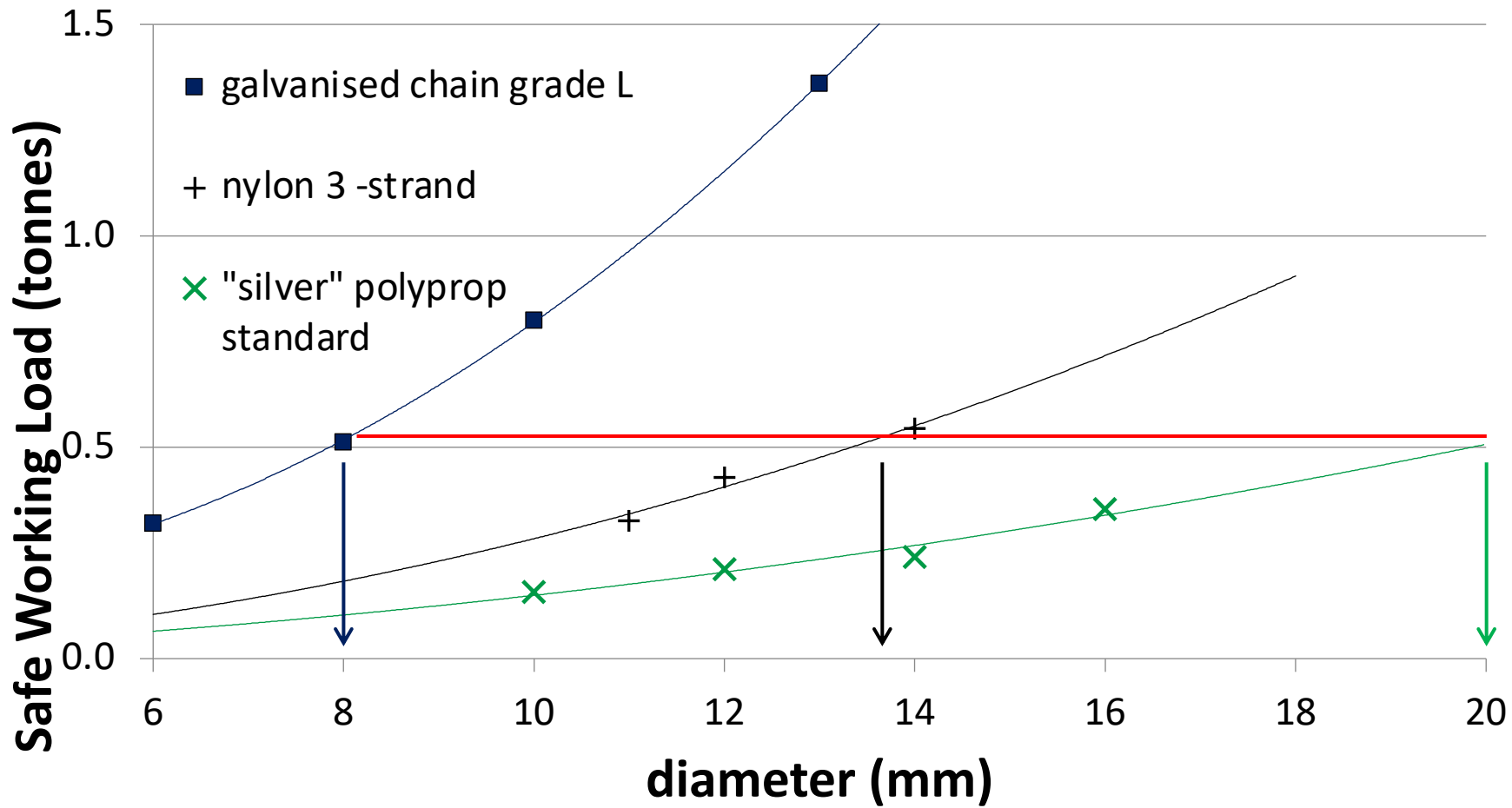


# Stretch

- Shock load that breaks a chain, so the key is to reduce the shock load by introducing stretch (rope) or catenary (weight)
- Chain will end up taut at some time, so you **must** have **some** rope in the system.
- So use either mixed rope/chain or a snubber

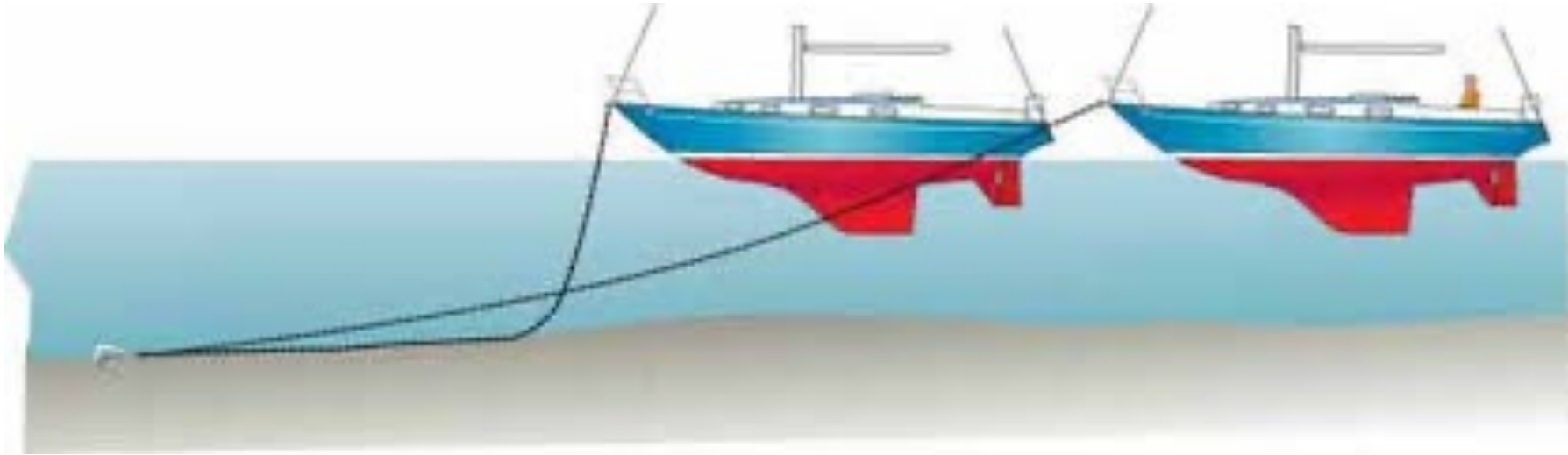
# Snubbers

- It takes the load off the windlass and
- it provides some stretch in the system.
- *a small diameter nylon snubber is strong enough and provides the stretch you need; whereas a large diameter snubber defeats its purpose.*



# Chafe

(1) on seabed



- Rope part must not touch seabed
- So max rope length = water depth!
- Suggest 50m chain + x of rope where x depends on how much total rode you want/need

# Chafe (2) at stem head



# Weight: rope v. chain

size	Weight(kg/m)
13mm nylon ( about same strength as 8mm chain)	0.106
5/16" (approx. 8mm) chain	1.6
3/8" chain	2.4
1/2" chain	4.2

# Weight – the entire anchoring system

item	Weight (kg)
Anchor	16
Windlass	15
Battery	21
60m 8mm chain	98
snubber	5
<b>Total weight</b>	<b>155 kg</b>

Typical values for a 10m LOA 5 tonne yacht

**Then add the weight of the other 4 anchors and rodes!**



# Conclusions

- The new generation anchors are better than the older ones, but the older ones are OK.
- The first 20m of rode should be chain
- If you have all-chain rode then you must use a snubber
- Learn how to use your anchor system.

Western Australian Cruising Guide (free download at <https://fsc.com.au/cruising-section/wa-cruising-guide/>)

e-book “Sailing Yacht Design: a guide for boat owners, crew and buyers” available from all good on-line bookstores, or from:

<https://books2read.com/u/mqrRL1>

(or just Google “Klaka yacht design”)

# References

## 1: General

- Beggs G. (2011) “Anchoring” Kindle e-book April 2011.
- Gree A. (1984) “Anchoring and Mooring” Adlard Coles Ltd.
- Klaka K. (2003) “ How to anchor a boat” Fremantle Sailing Club seminar November 2003.  
[http://www.fsc.com.au/cproot/443/3/How%20to%20anchor%20a%20boat\\_publication.pdf](http://www.fsc.com.au/cproot/443/3/How%20to%20anchor%20a%20boat_publication.pdf)
- Klaka K & Macfarlane R. (2020) “ New developments in anchoring” FSC seminar September 2020 <https://www.youtube.com/watch?v=KVV0BhU9swc>
- Lynn D. (2014) “The complete guide to anchors and anchoring” Kindle e-book August 2014.
- Poiraud A., Ginsberg-Klemmt A., & Ginsberg-Klemmt E. (2008) “The complete anchoring handbook” International Marine/McGraw Hill. Also Kindle e-book.
- Wells D. (2013) “ Anchor anywhere” Yachting Monthly December 2013.
- Chains Ropes and Anchors (NZ) <http://www.chainsropesandanchors.co.nz/advice> accessed 6 Nov 2014

# References

## 2: Anchors

- Allisy D. (2009) “Which anchor is best?” from Voiles et Voiliers, reprinted in Yachting Monthly November 2009.
- Anon (2012) “Rocna roulette update” Cruising Helmsman September 2012.
- Cox V. (2012) “We test a Rocna anchor to destruction” Yachting Monthly April 2012.
- Cox V. (2014) “How well will my anchor hold here?” Yachting Monthly February 2014.
- Hodges T. & Springer W. (2006) “Ultimate holding power” Yachting Monthly December 2006, also in Sail magazine.
- Moser J. Power and Motoryacht February 2007.  
<http://www.powerandmotoryacht.com/boat/anchors-aweigh> accessed 18th Aug 2014
- Neeves J. (2011) “Head to head of anchors” Cruising Helmsman October 2011.
- Neeves J. (2012) “Rocna roulette” Cruising Helmsman July 2012.
- Neeves J. (2013) “High performance anchors for mutlis” Cruising Helmsman June 2013.
- Sezerat A. (2003) “The ultimate anchor test” from Voiles et Voiliers May 2003, reprinted in Yachting World January 2004.

# References

## 3: Chain and rope

- Cox V. (2013) “ How to choose chain that won’t jam or slip in your windlass” Yachting Monthly summer 2013.
- Cox V. (2013) “ How to choose anchor chain you can trust” Yachting Monthly January 2013.
- National Association of Chain Manufacturers (2010) ”Welded steel chain specifications”.  
[http://www.nacm.info/Downloads/NACM\\_Welded.pdf](http://www.nacm.info/Downloads/NACM_Welded.pdf) accessed 5 Nov 14
- Putt J. (2004) “Anchor Chain Selection, Regalvanising and a case of Caveat Emptor”
- Fremantle Sailing Club Cruising Section 10th June 2004.  
<http://www.fsc.com.au/cproot/2690/3/Anchor%20chain%20selection.pdf> accessed 18th Aug 2014
- Selkirk D. (2013) “From A to zinc: caring for your ground tackle” Cruising Helmsman November 2013.
- Bullivants “ Handling Safety Handbook” 4<sup>th</sup> Edition
- Chapter 2 “ Fibre rope” pp30-37  
<http://www.bullivants.com/FlippingBooks/02FibreRope/files/assets/common/downloads/publication.pdf>
- Chapter 3 “ Chain and fittings” pp38-79  
<http://www.bullivants.com/FlippingBooks/03ChainAndFittings/files/assets/common/downloads/publication.pdf> (Note: the units for chain weight are incorrect; they should be m/100kg not kg/100m)
- Engineering Toolbox “ Nylon rope strength” [http://www.engineeringtoolbox.com/nylon-rope-strength-d\\_1513.html](http://www.engineeringtoolbox.com/nylon-rope-strength-d_1513.html) accessed 19th August 2014.

# References

## 4: Windlasses

- Barrell E. (2012) “Anchor windlasses” Yachting Monthly November 2012.
- Champion J. (2013) “ Heavy metal and how to move it part 1” Cruising Helmsman November 2013.
- Champion J. (2013) “ Heavy metal and how to move it part 2” Cruising Helmsman December 2013.
- Green K. (2010) “ Weighing up windlasses” Cruising Helmsman September 2010.