

Perspective

problem should combine analytical measures, such as the collection of precipitation data, with the inherent flexibility associated with human judgement. In short, the current precipitation shutdown guidelines are an oversimplification of a complex natural system. Therefore, more often than not, the application of these guidelines results in less than optimum outcome.

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¹ Ministry of Forests Memorandum from the Assistant Deputy Minister to all Regional Managers dated September 19, 1994. ▲



Technical Tip

Rock Climbing, Fly Fishing, and LWD Anchors

Mike Parker

One of the perks of fisheries work is finding scenic spots in Mother Nature's playground for our outdoor activities. I have found some great pools through which to drift a fly, along with the odd rock climbing wall where a stream has endlessly battled against a limestone cliff trying to erode it away. Strangely enough, these two activities popped into my caffeine-stimulated brain while reading an article by Rick Rodman on the use of Manta Ray Anchors in a recent issue of *Streamline* (Vol. 5 No. 2). He mused about the potential reasoning behind a cable failure, the only one he had had in the two years his structures had been in the Little Slokan River.

Rick's cable failure had been immediately below the clamp that fastened a loop around the log he had anchored. I have seen the same failure before on other projects, and a connection popped into my mind between this and a similar failure described in a book I had once read on rock climbing anchors. Its relevance to LWD Anchors was immediately apparent to me.

I have always attempted to draw the anchor cable as tightly as possible around a log, and this practice

seems to be the rule on most projects I have seen. First, this helps to keep the cable from sliding along or off the log when it had not been run through a drilled hole in the log. Second, it made for a neater appearance. Aesthetics is always important when the public may see your work. Unfortunately, this practice apparently produces a weaker anchoring system than a larger, loose loop might.

The applicable reference to failure in rock climbing anchors came from a book by John Long, a longtime professional rock climber whose articles I have read over the years. He recently produced a book entitled *More Climbing Anchors* (1996) as part of the *How to Rock Climb* series that has existed for many years. When it is your life on the end of the line and not a piece of LWD, I guess you think a bit more about your anchors. As explained in the book and diagrammed in Figure 1, it is actually possible to create a cumulative strain greater than the actual force being applied. By tightly wrapping a log with a cable such that the angle of the cable at the loop is greater than about 40°, a "load multiplication" occurs at the point of your cable clamp. Therefore, some cable failures may be avoided

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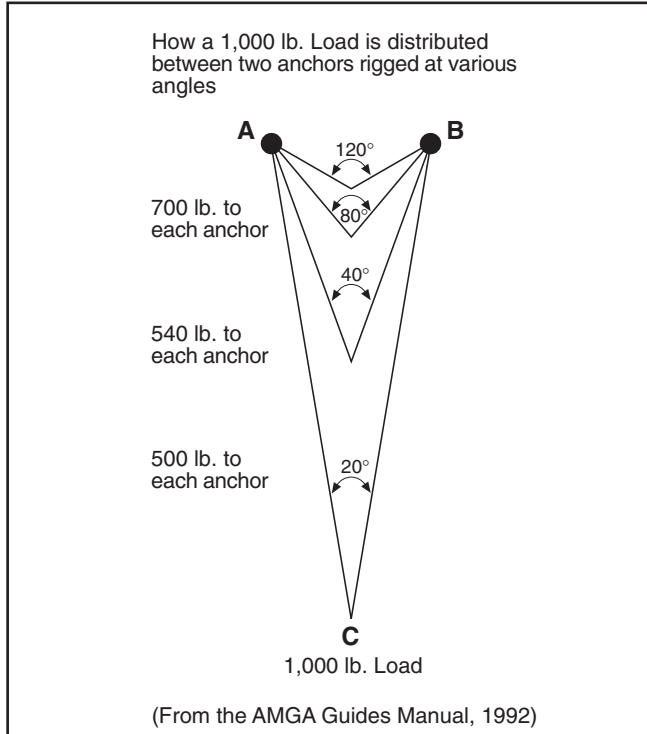


Figure 1. The cumulative strain is greater than the actual force being applied.

by putting aesthetics aside and leaving a little more slack in the loop.

A second technique that I encountered in fly fishing may have some limited applicability to this problem of cable failure. As a true neophyte in the sport, I have spent some considerable time pouring over a book on fishing knots by Mark Sosin and Lefty Kreh (1991). If I ever get into the “big one,” I am sure I can lose it all by myself, without the help of a failure at any one of the many knots along a length of fly fishing line. Fastening two loops together can provide a quick means of tethering two pieces of line... or rope cable.

To more easily move ballast rocks into place at rehabilitation sites in the Cariboo, we began employing the use of a loop of cable, glued between two holes. This gives an easy place to fasten a chain with which to carefully lift ballast into place with a hoe. Of course, occasionally these loops would fail, probably (as I think back on it now) for the reason noted above. Forming a too-small loop, or placing the holes too far apart, creates a high degree angle and multiplies the force on the glued ends. Using the loop on the rock to anchor to a piece of LWD via another cable could produce another weak link.

It is easy to run a cable through the eye loop created on the rock, and clamp it back on itself to create a

second eye (Figure 2). Operationally, this is easy and quick. However, it usually causes a terrible crimp in the cable “eyes” where they meet when put under load. The result damages the cable and creates a weakness that may fail. A solution comes from tying fly fishing lines. A stronger option is to produce a square knot with any two loops. Even with heavy wire rope this is quite easy to do, and does not take any additional time. A square knot more evenly distributes stress on the rope, and therefore gives it a higher failure point. The square knot is

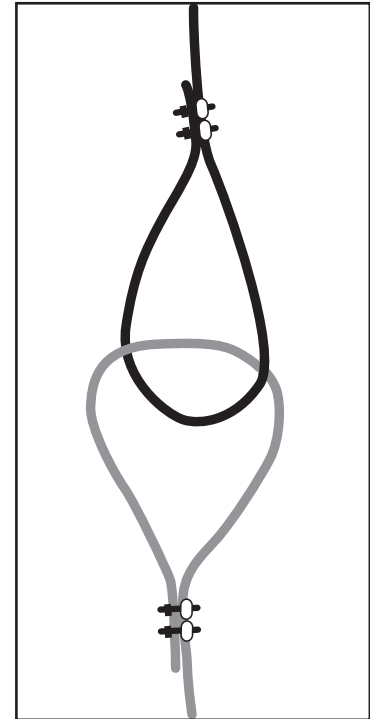


Figure 2. In this diagram the cable runs through the eye loop created on the rock, and then can clamp back on itself to create a second eye.

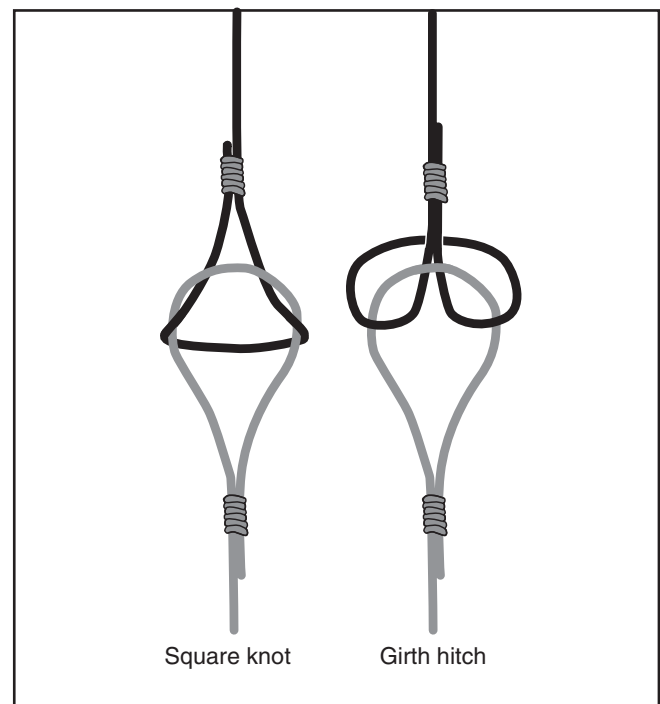


Figure 3. The square knot is tied as shown on the left. It is quite easy, however, to make an error and end up with the girth hitch shown on the right.

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tied as shown in Figure 3. An easily made error with highly flexible rope (such as my fishing line!) is the girth hitch, also shown in Figure 3. With wire rope you likely will not encounter this problem, but you should be aware of it.

So, no matter how carefully you make your ballast calculations, how well you clean the drilled rock holes to ensure epoxy will hold, and how securely you clamp cables to connect the whole system together, the sum is only as strong as the weakest link. Hopefully, the above suggestions will help strengthen what is often the weakest link.

So, can I take credit personally for these potentially helpful hints? In short, no — they are the product of John, Mark, Lefty, and a good strong cup of coffee. But, as you may not have had the opportunity to sit down with all of the above at one time, I hope this may provide some thought to go with your next java or project.

References:

Long, J. and B. Gaines. 1996. *More Climbing Anchors*. Chockstone Press, Evergreen Colorado. p.83.

Sosin, M. and L. Kreh. 1991. *Practical Fishing Knots*. Lyons and Burford Publishing. New York.

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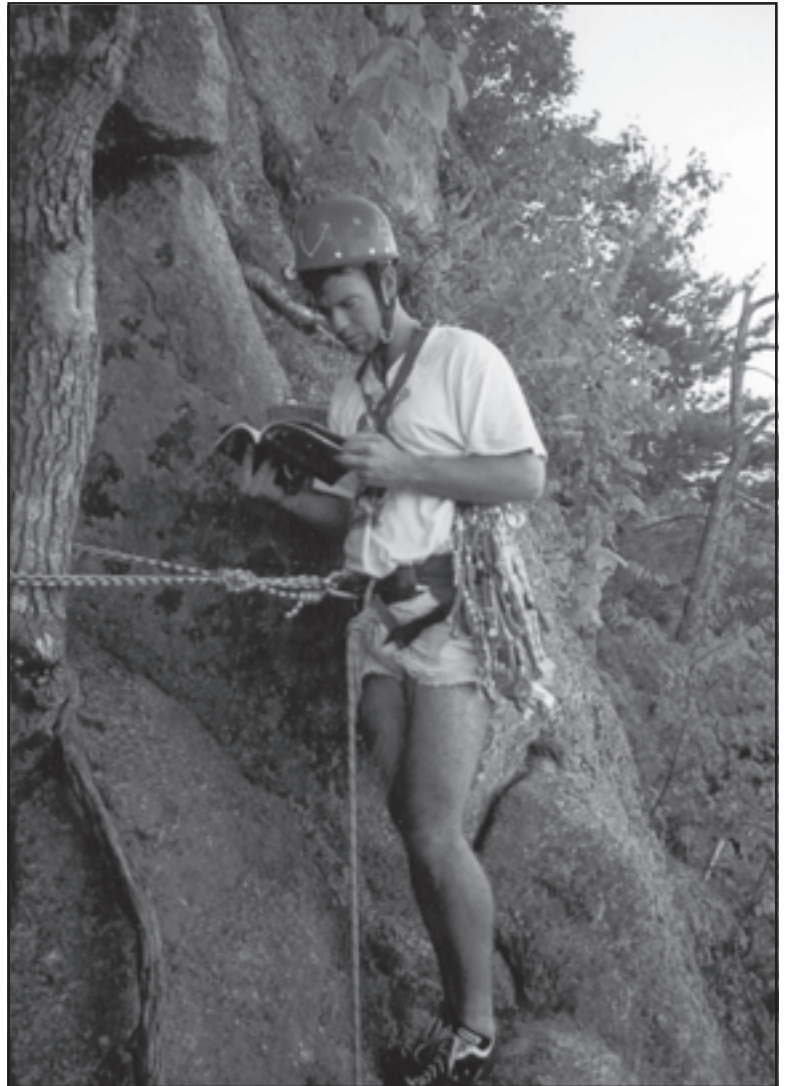


Figure 4. The author finds himself between a rock and a hard place, using his handy fly-tying book to try and anchor this LWD to a river. Where is a cup of coffee when you need it?

