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Development of mitigation strategies for inshore demersal longline fisheries in New Zealand: progress report

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Abstract

Sink rates have been measured on a range on inshore demersal longline fisheries in New Zealand. The influence of weighting regimes and float placement is described and some initial recommendations made to reduce the availability of baited hooks to seabirds. Work is underway to expand initial findings and test and develop a novel mitigation device.

Introduction

This paper provides an overview of a series of annual projects forming part of the New Zealand Department of Conservation's Conservation Services Programme (http://www.doc.govt.nz/mcs), and aimed to understand the nature and extent of protected species interactions, and specifically to collect relevant information on protected species interactions that will assist in assessing, developing and improving mitigation measures. The project focused on inshore demersal longline fishing in North-eastern New Zealand, and the interaction of seabirds taking baited hooks.

Port visits were carried out to characterise the fishery and discuss seabird interactions and mitigation measures with skippers. The type of gear employed was described and categorised. Within these categories there was further gear variation, most notably due to the combination, size and spacing of weights and floats added to the line. Time depth recorders (TDRs) were used to measure line sink rates.

Initial results (from work completed in 2009/10)

Mitigation measures observed to be in use were simple, low tech and perceived by fishers to be effective under the right circumstances. Night-setting and tori lines were the most commonly employed mitigation. There was a distinct split of gear types depending on target species. Vessels targeting predominantly snapper (*Pagrus auratus*) fished in shallow water with relatively light gear, long snoods, and small hooks. Other, generally larger vessels, that targeted bluenose (*Hyperoglyphe antarctica*), ling (*Genypterus blacodes*) and hapuku (*Polyprion oxygenios*) in deeper water used heavier gear, shorter snoods and larger hooks. Vessels employed a diverse range in the mixture of weights and floats to the line, examples of which are show in Figure 1.

Line sink rate trials were conducted on six vessels in order to quantify the availability of baited hooks to seabirds during the deployment of longlines. The effect on sink rate of

adding additional weights was also examined. The TDR attachment used is illustrated in Figure 2.

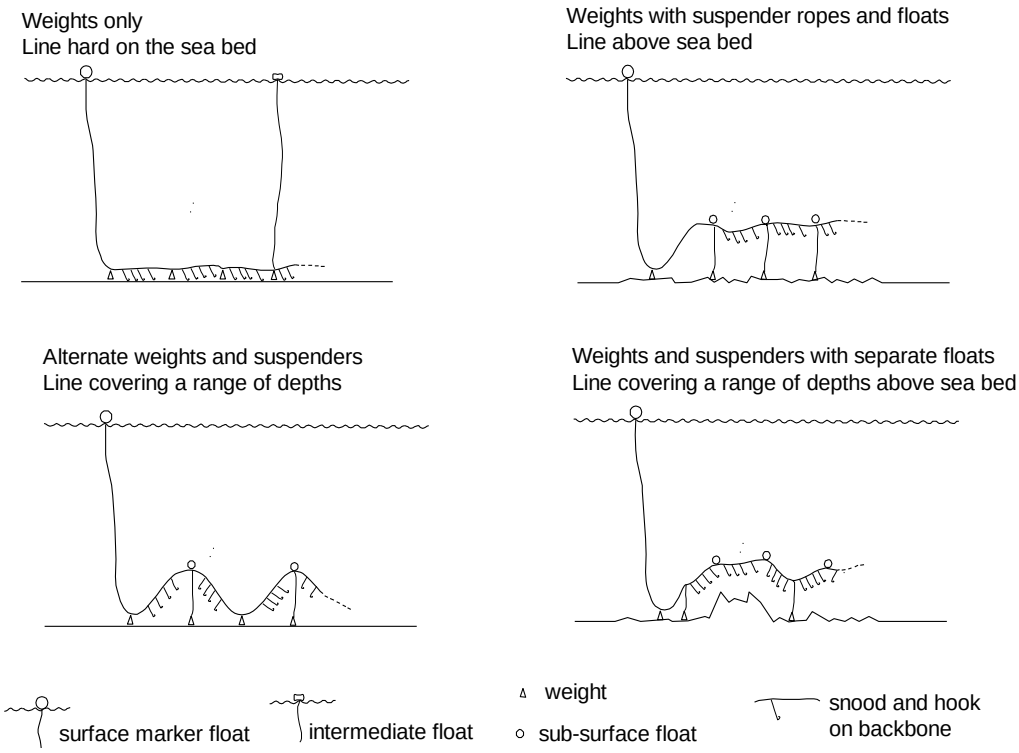

Figure 1. Example line configurations.

Figure 2. TDR and housing, total length including clip is 32cm

Increasing the amount of weight on the line increased sink rate, most appreciably below 5m (e.g. see Figure 3). We recommend that to increase sink rate through use of attached weights, closely spaced regular sized weights are used. Intermediate surface floats also impacted sink rates (e.g. see Figure 4) and we recommend that deployment of surface floats is associated with larger than normal weights to avoid reducing the sink rate of the line. Setting speed influences the distance behind the vessel that hooks are available and should be considered, particularly in relation to tori line length (e.g. see Figure 5).

When additional weights were added sink times reduced, reducing the distance behind vessels that hooks reached a given depth, and the variability in sink times also reduced (Figures 6 and 7). This was more pronounced for sink times below 5 m (Figure 7) compared to sink times to 5 m (Figure 6).

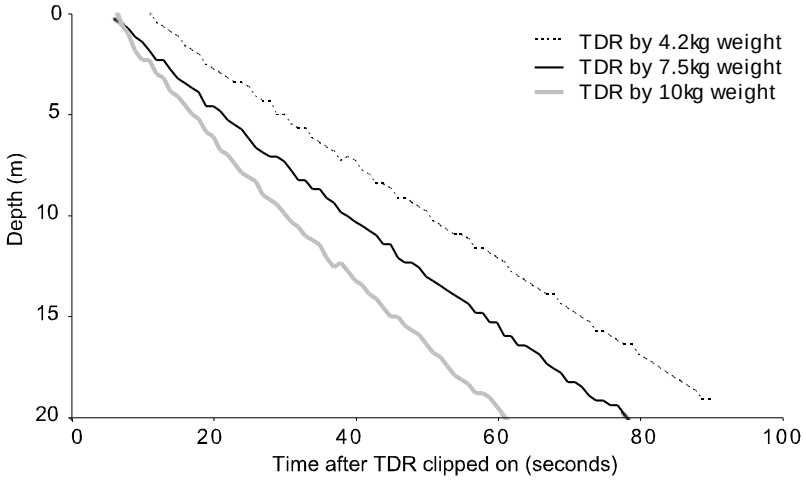

Figure 3. Time-depth profiles for TDRs on the same line positioned next to different sized weights

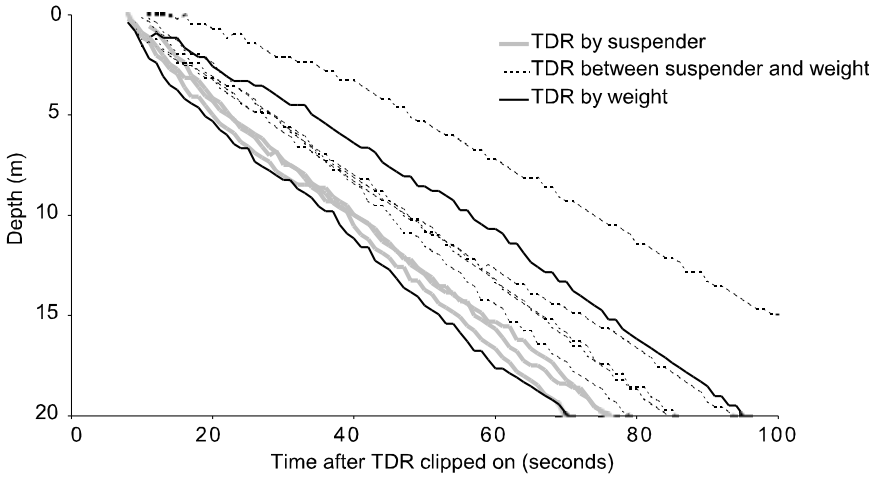

Figure 4. Time-depth profiles for TDRs on a typical snapper set. The two slowest sinking TDRs were within 50 m of a surface float.

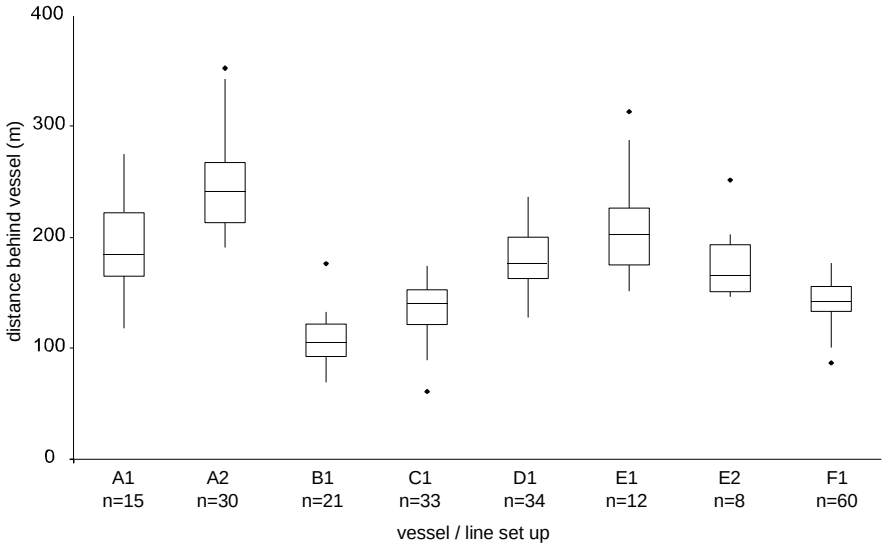

Figure 5. Distance behind the vessel that TDRs reached 15m depth, for 8 different line set ups tested during normal fishing operations. B1 had the most weighting (5 kg per 100 m), A2 the least (1 kg per 100 m).

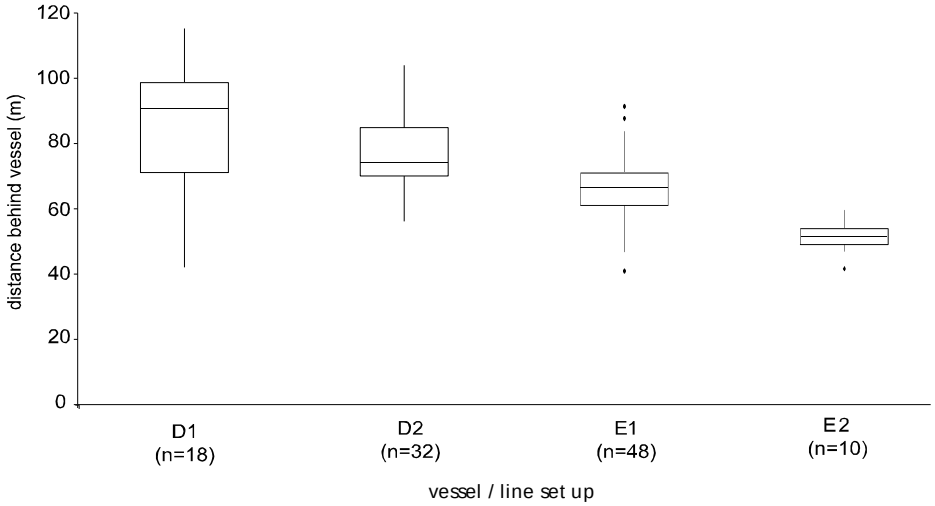

Figure 6. Distance behind vessel that TDRs reached 5 m for two different weighting regimes (1 and 2) for two vessels (D and E). Weighting regime 1 had twice as many hooks between weights as regime 2

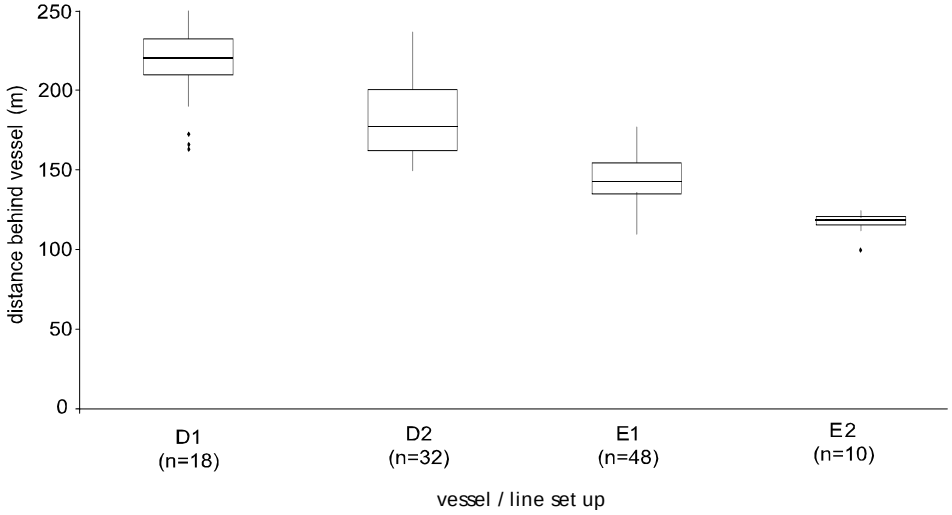

Figure 7. Distance behind vessel that TDRs reached 15 m for two different weighting regimes (1 and 2) for two vessels (D and E). Weighting regime 2 had twice as many hooks between weights as regime 1

More detailed results from 2009/10 are reported in Goad et al (2010).

Work under analysis (2010/11)

During 2010/11 line sink rates were measured from a further 29 sets on four vessels, targeting snapper, bluenose, ling and hapuku. The focus was to further investigate the impact of the following factors in relation to line sink rate:

- Weighting regime
- Use of floats
- Line tension

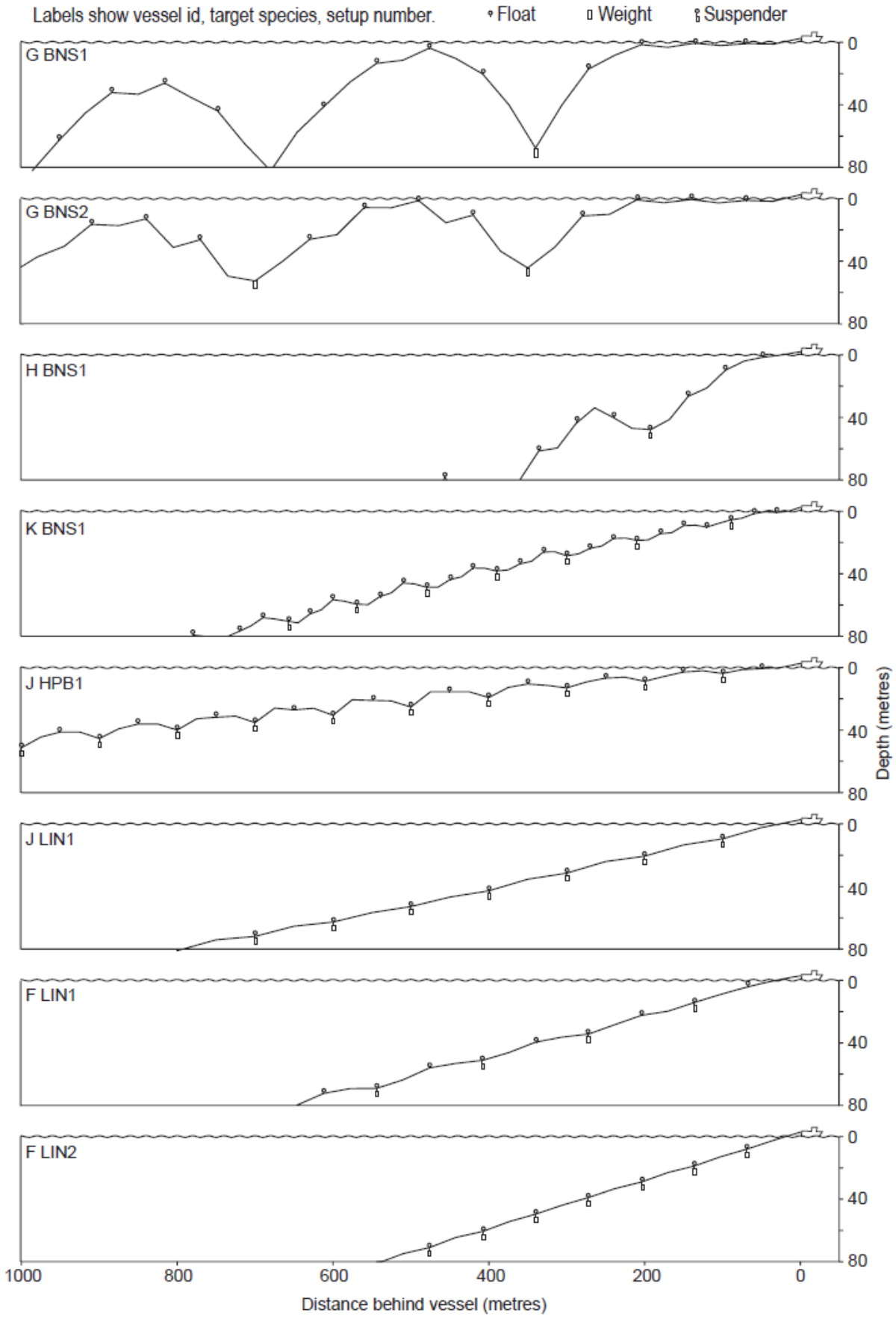

Figure 8. INTIAL RESULTS - composite profiles of longlines sinking behind vessels for the different line setups investigated. BNS denotes bluenose, HPB hapuku and LIN ling.

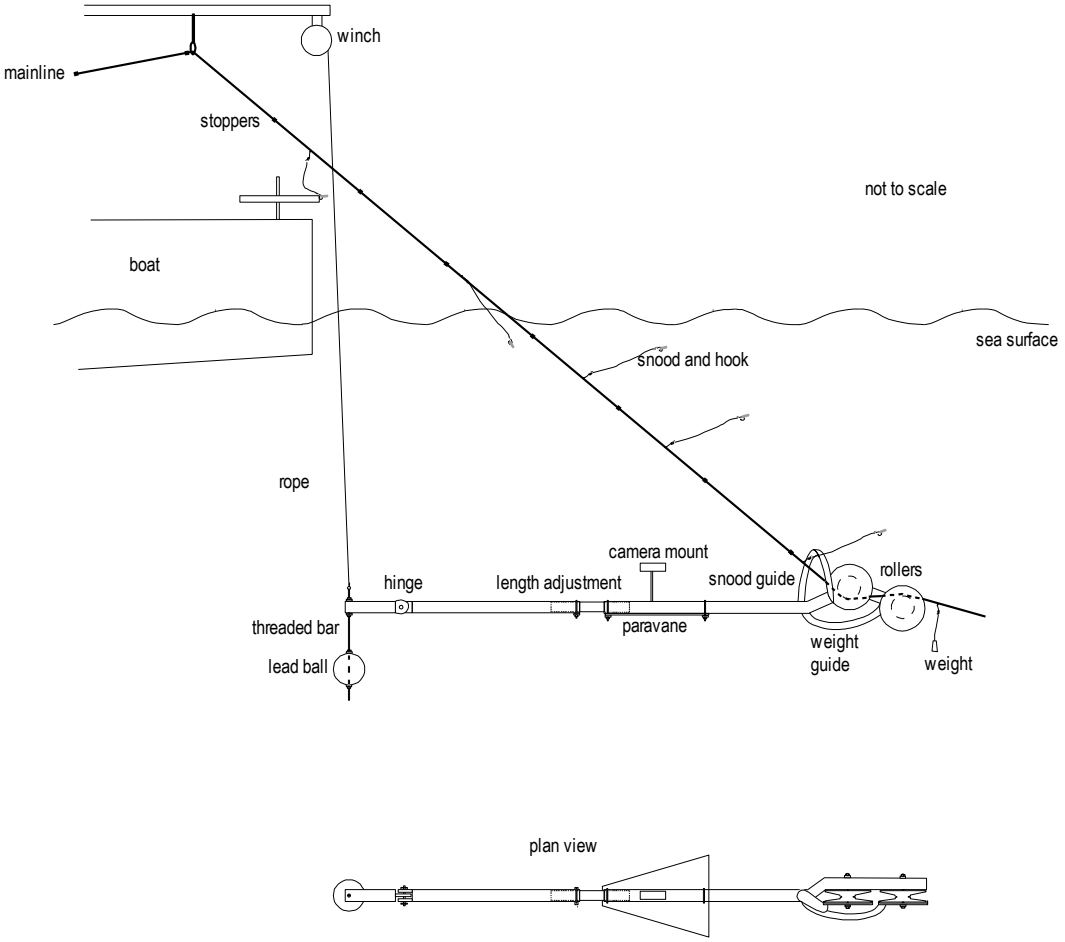

Figure 9. Prototype of underwater setting device developed by Dave Kellian.

Data is currently being analysed, however Figure 8 shows some early results that illustrate the range of sink profiles recorded, clearly showing the large influence of floats in slowing sink rates.

Initial sea trials and development of a novel mitigation device were also undertaken. The device is an under water setting device developed by Dave Kellian. A prototype is shown in Figure 9.

Full results from work conducted in 2010/11 will be reported very shortly.

Further plans (2011/12)

Two further projects have been approved for 2011/12 (Department of Conservation 2011). One aims to build on results from the previous sink rate trials and develop strategies to increase line sink rates in inshore demersal longline fisheries. The other aims to identify and develop one or more novel methods to mitigate seabird captures in inshore demersal longline fisheries by reducing the availability of hooks to seabirds.

References

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