



**NOAA**  
**FISHERIES**

Northeast  
Fisheries  
Science Center

# Alternative Survey Trawl Door Evaluation

Northeast Trawl Advisory Panel  
November 21, 2019

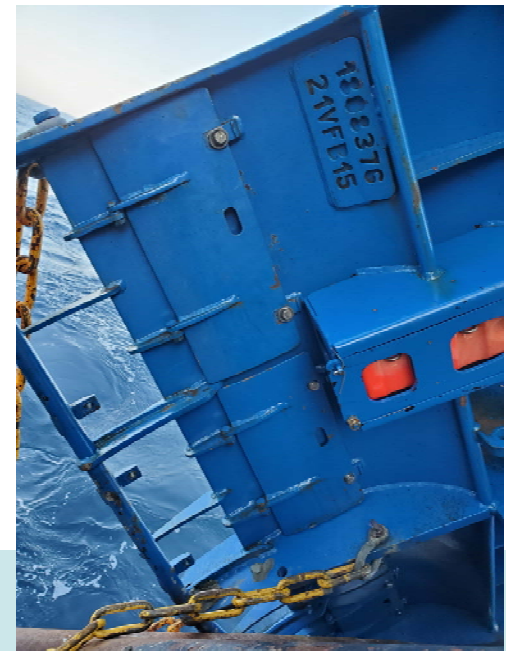
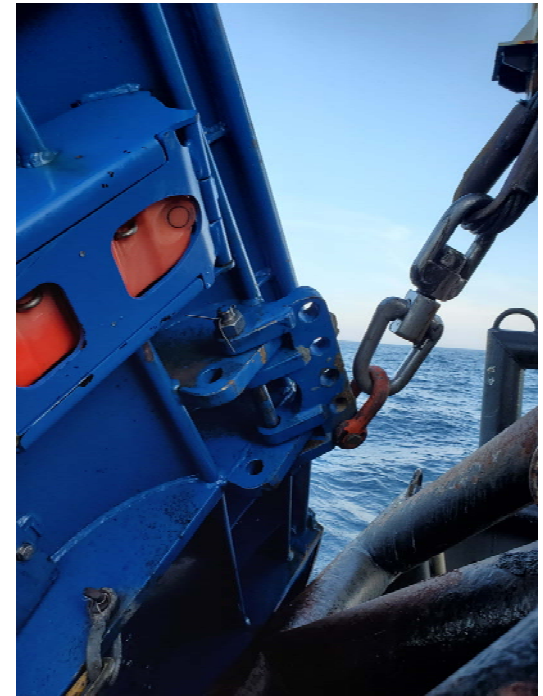
# Alternative Survey Trawl Door Evaluation

- 8 Days on Bigelow – August 21-28
  - Split into 2, 4 day trips to accommodate NTAP participation
  - Participation from Terry Alexander and Dustin Gregg on part 1.
- Doors evaluated:
  - 1.5m<sup>2</sup> Thyboron Type 21 Flipper
  - 66" Thyboron Type IV (NEAMAP)
  - Bison 9's
- Part 1 focused in deep water, near Atlantis Canyon
  - 100m – 350m depths
- Part 2 focused in shallow water, near Montauk, LI
  - ~20m depth



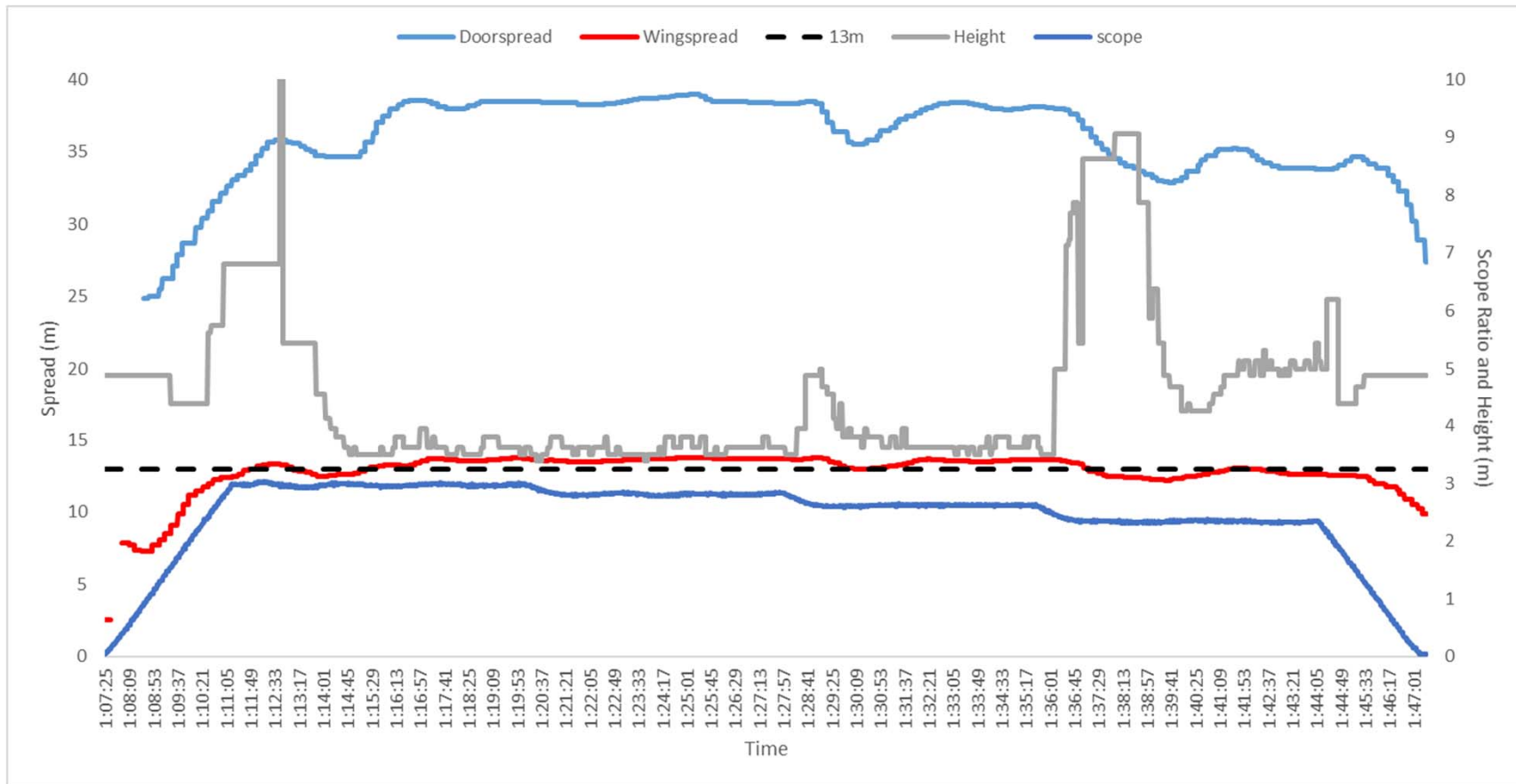
# 1.5m<sup>2</sup> Thyboron Type 21 Flipper Doors

- Many adjustment options
  - Front tow bracket can be position in 3 holes forward to aft
  - Main towing wire can be positioned in 5 vertical holes
  - Top/bottom backstraps can be positioned in 7 holes forward to aft
  - 4 flaps on aft portion of door can be closed or opened
- Adjusting front tow bracket changes attack angle
  - Forward decreases spread force
  - Aft increases spread force
- Adjusting main towing wire position
  - Up = Heal more inward
  - Down = Heal more outward
- Top and Bottom Backstrap postions
  - Forward increases angle and spread force
  - Aft decreases angle and spread force
  - Offset top/bottom noses up or down depending on position
- Flaps
  - All closed = max spread force
  - All open = min spread force
  - Top 2 open = less spread and heal more inward
  - Bottom 2 open = less spread and heal more outward
  - Middle 2 open = less spread force



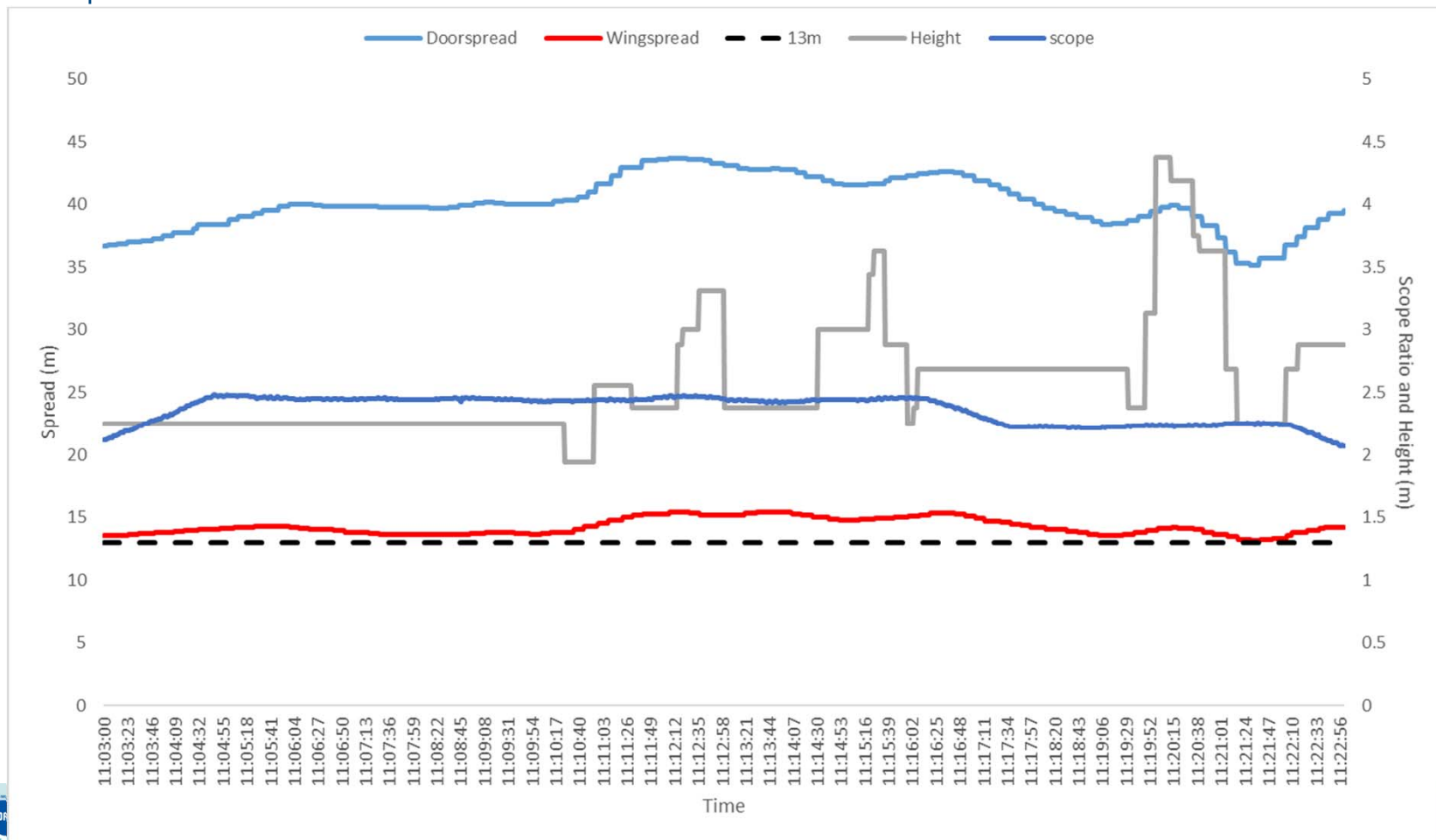
# Thyboron Type 21 Flipper – 100m Depth

- Front Tow Bracket: Forward Hole
- Towing Wire: Hole 4 (2<sup>nd</sup> from bottom)
- Top and Bottom Backstraps: Hole 2 (2<sup>nd</sup> from aftmost)
- Flaps: All closed
- Scope Ratio: 3:1 and reduced to 2.25:1



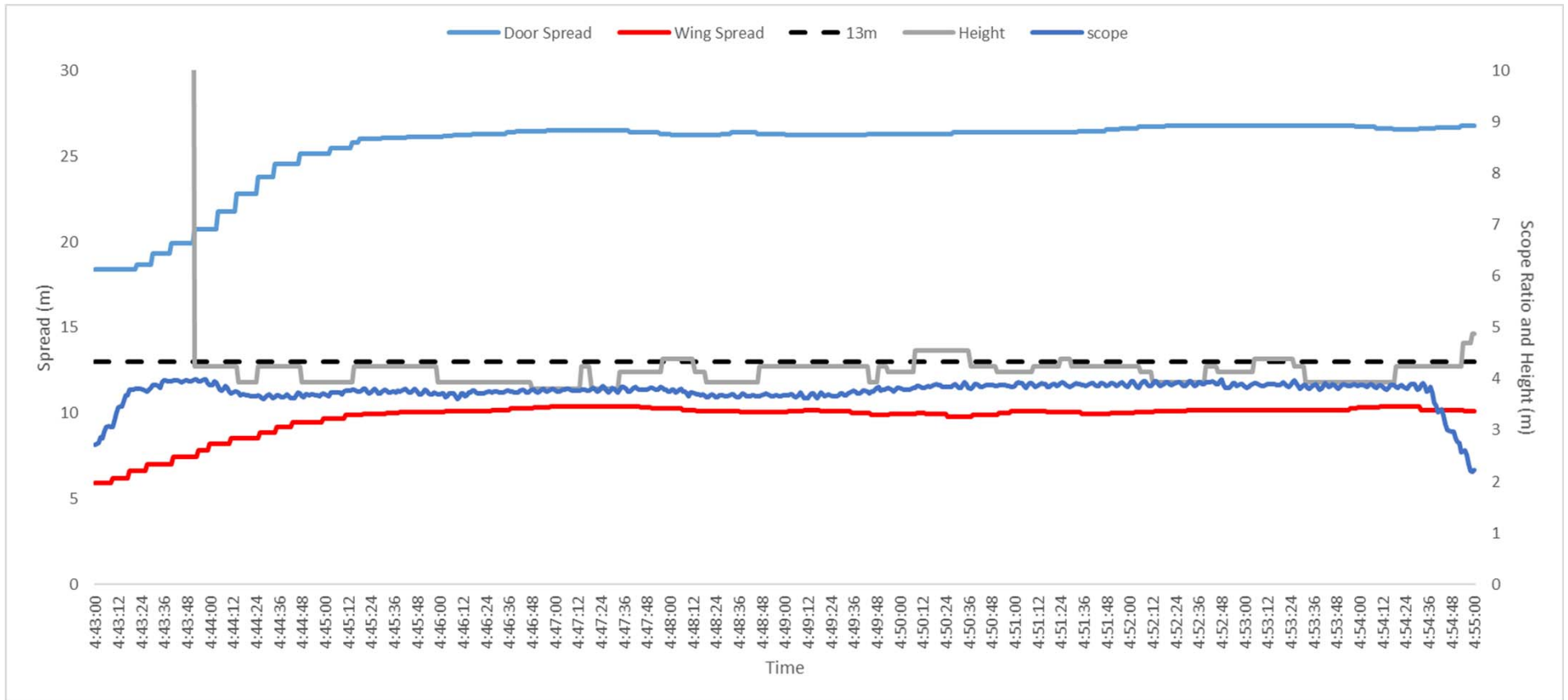
# Thyboron Type 21 Flipper – 350m Depth

- Front Tow Bracket: Middle Hole
- Towing Wire: Hole 5 (bottom)
- Top and Bottom Backstraps: Hole 2 (2<sup>nd</sup> from aftmost)
- Flaps: All open
- Scope Ratio: 2.5:1 and reduced to 2.25:1



# Thyboron Type 21 Flipper – 20m Depth

- Front Tow Bracket: Aft Hole
- Towing Wire: Hole 5 (bottom)
- Top and Bottom Backstraps: Hole 7 (foreword most)
- Flaps: All closed
- Scope Ratio: 4:1



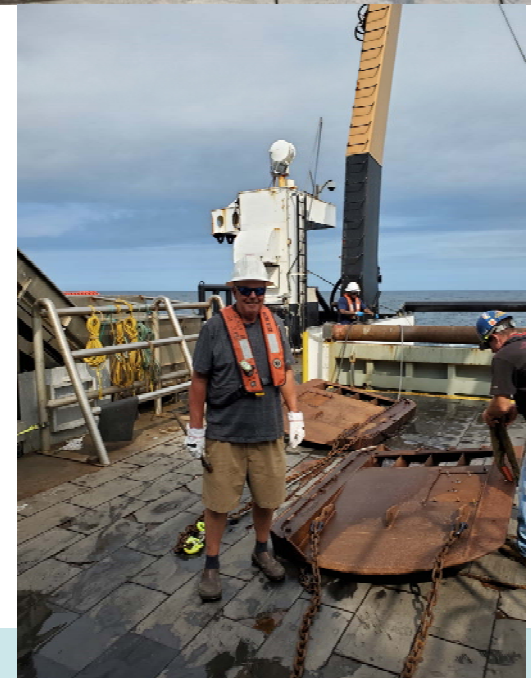
## Thyboron Type 21 Flipper – Results

- OK performance at intermediate (100m) depth
  - Slightly overspread
- Overspread in deep water
  - Unstable and lifted off bottom when scope ratio reduced to 2.25:1
- Underspread in shallow water
  - Could not remain upright beyond scope ratio of 4:1



# Bison 9 Doors

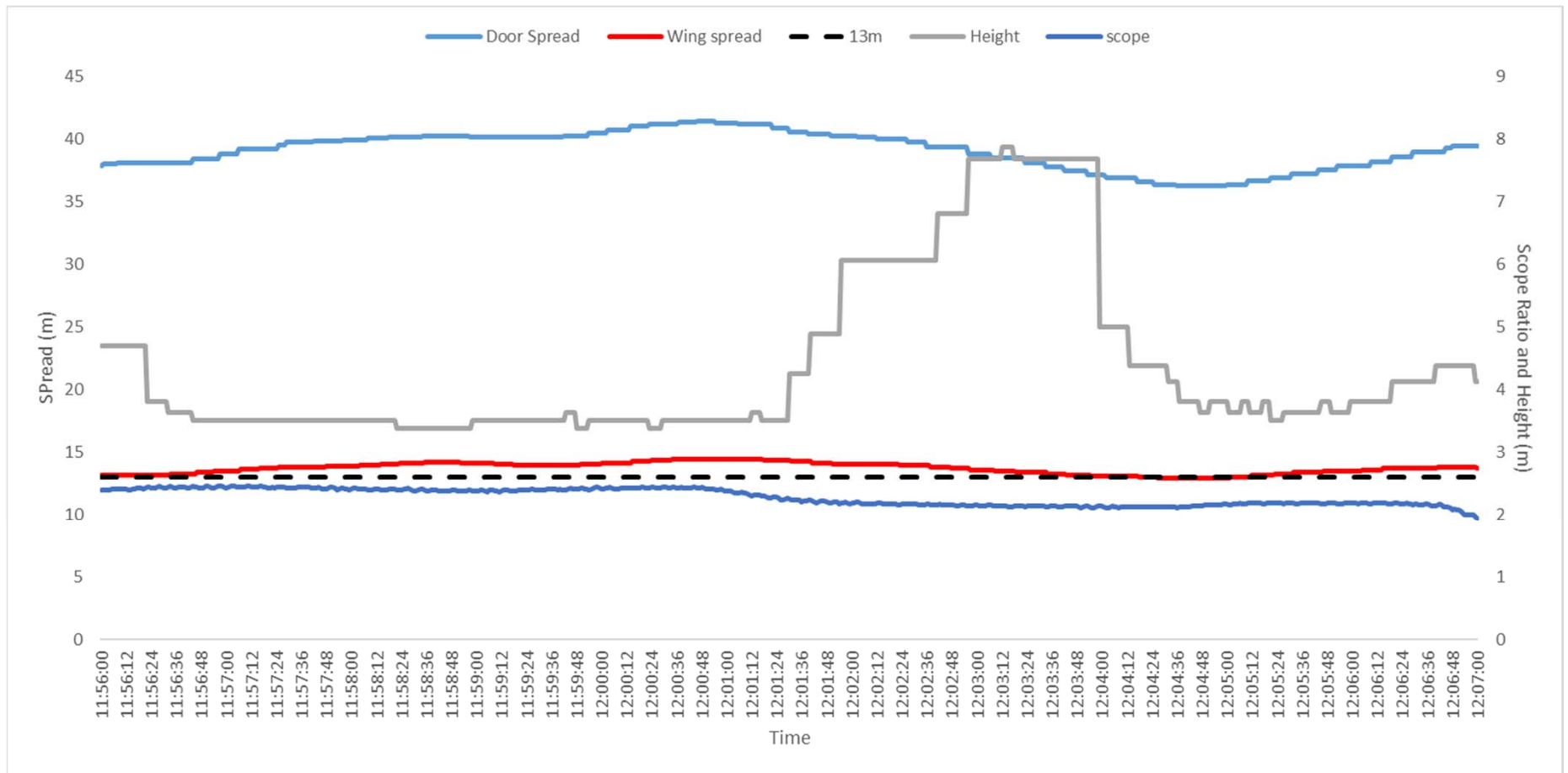
- Loaned by Terry Alexander for testing
  - Refurbished by Trawlworks
- Limited adjustments
  - Main towing wire can be positioned in 2 holes
    - Forward (outer) for less spread
    - Aft (inside) for more spread
  - Top/bottom backstraps can be positioned in 2 holes forward to aft
    - Forward for more spread
    - Aft for less spread
- Bison doors utilize a shooting chain
  - Rigged correctly using Terry's 1970's Bison door manual and high-tech angle gauge





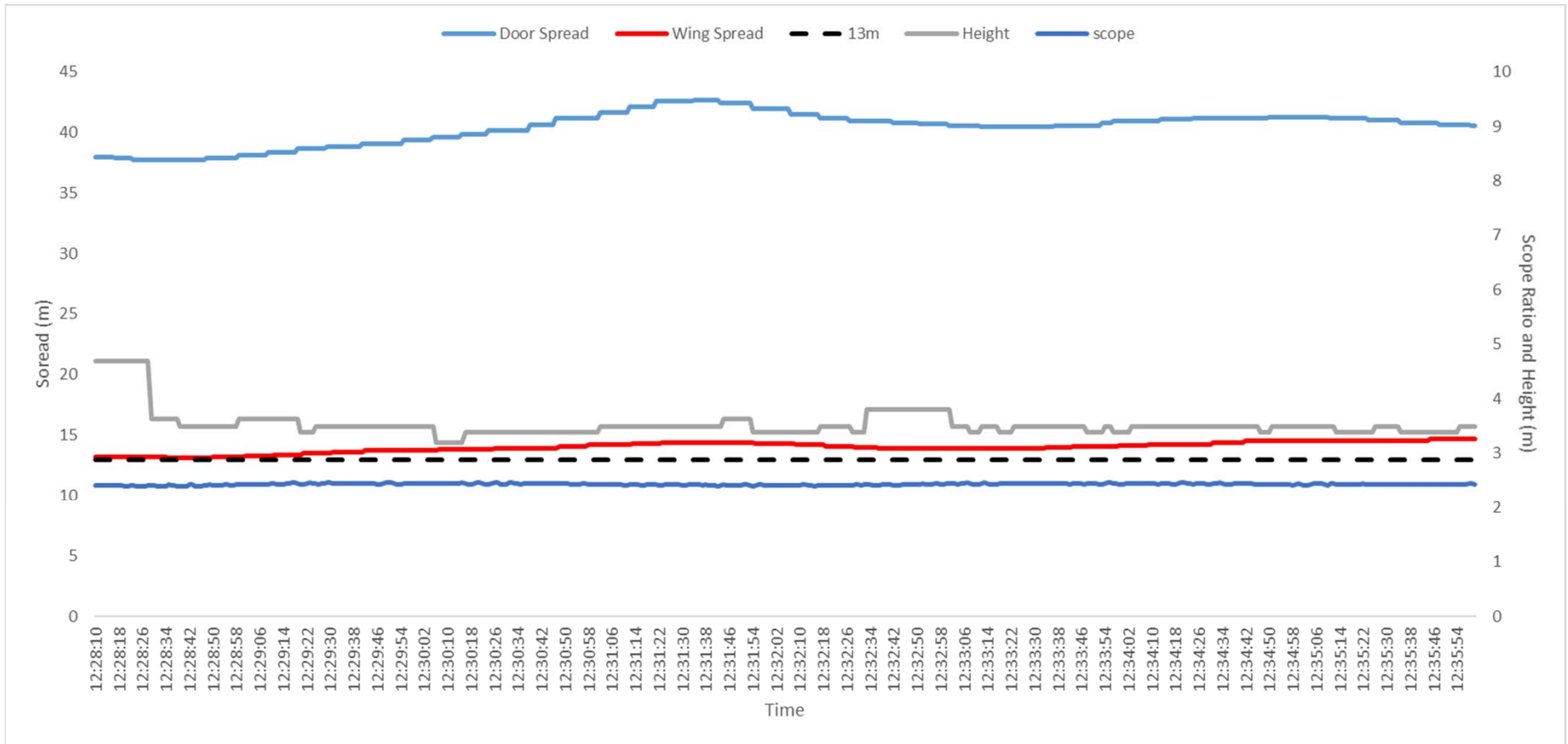
## Bison 9 – 100m Depth

- Towing Wire: Forward outer hole
- Top and Bottom Backstraps: Aft hole
- Scope Ratio: 2.5:1 reduced to 2.25:1



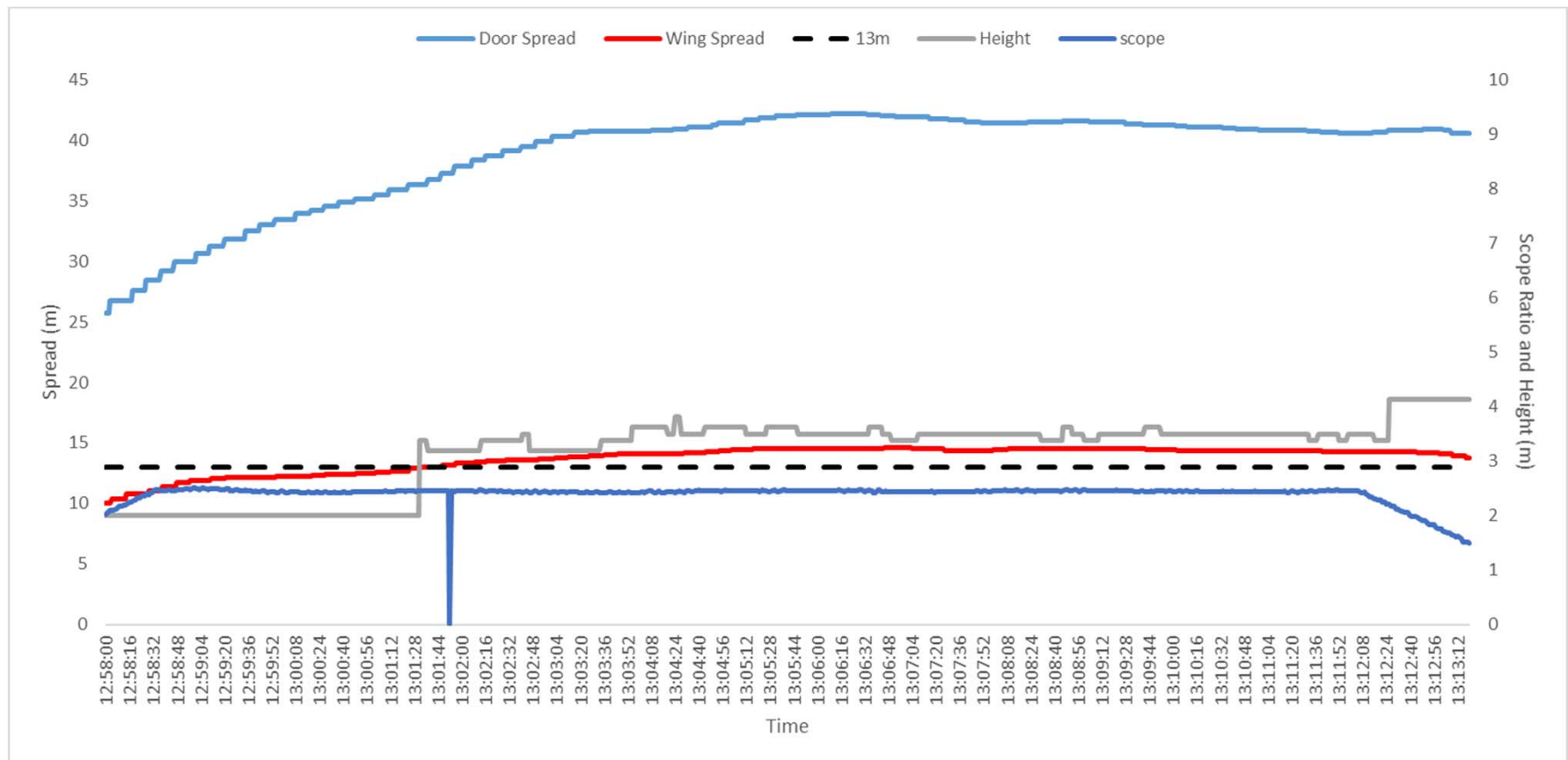
# Bison 9 – 100m Depth

- Towing Wire: Forward outer hole
- Top and Bottom Backstraps: Aft hole and Pinched Together 5 links forward
- Scope Ratio: 2.5:1



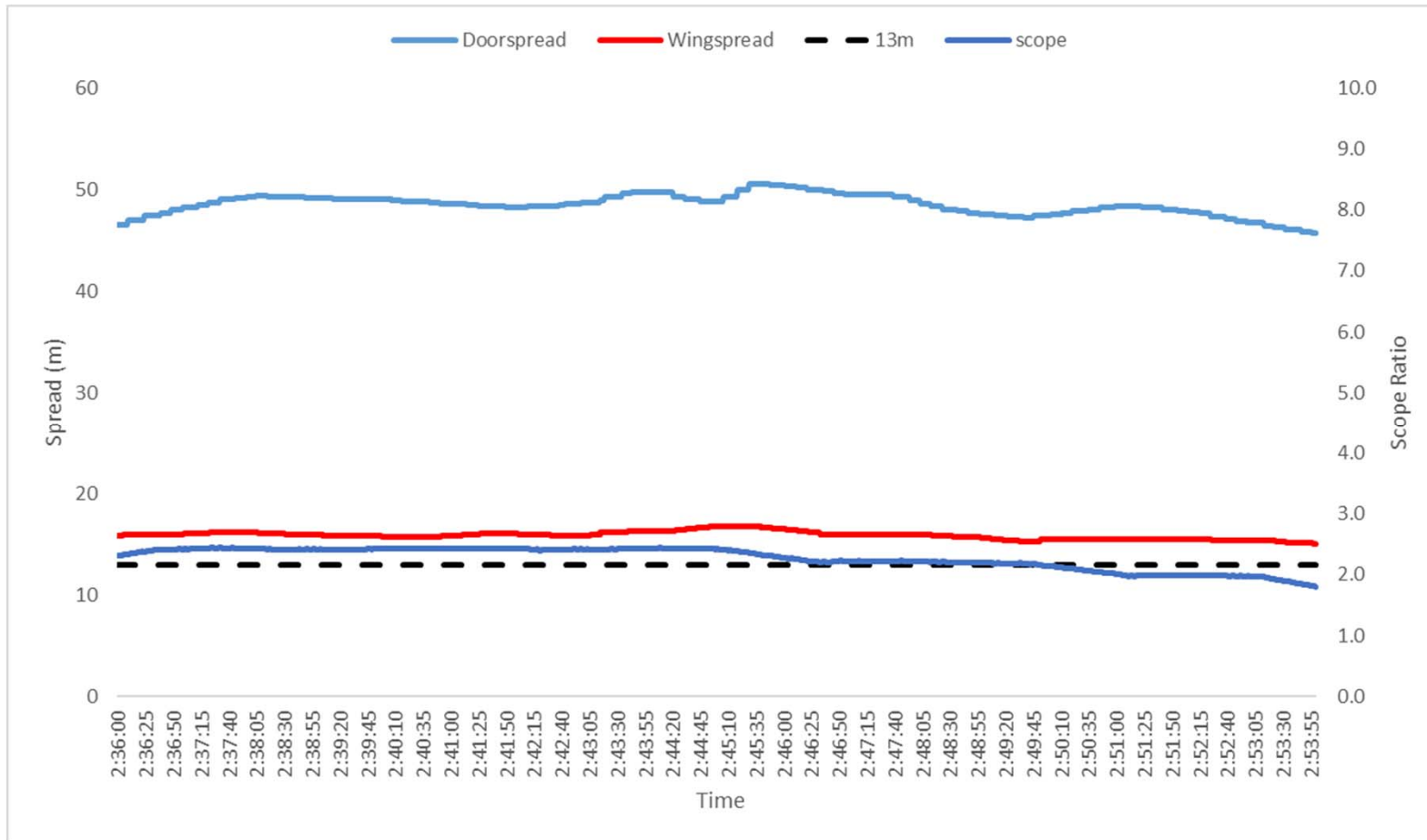
## Bison 9 – 100m Depth

- Towing Wire: Forward outer hole
- Top and Bottom Backstraps: Aft hole and Pinched Together 5 links forward
- Removed Shooting Chain
- Scope Ratio: 2.5:1



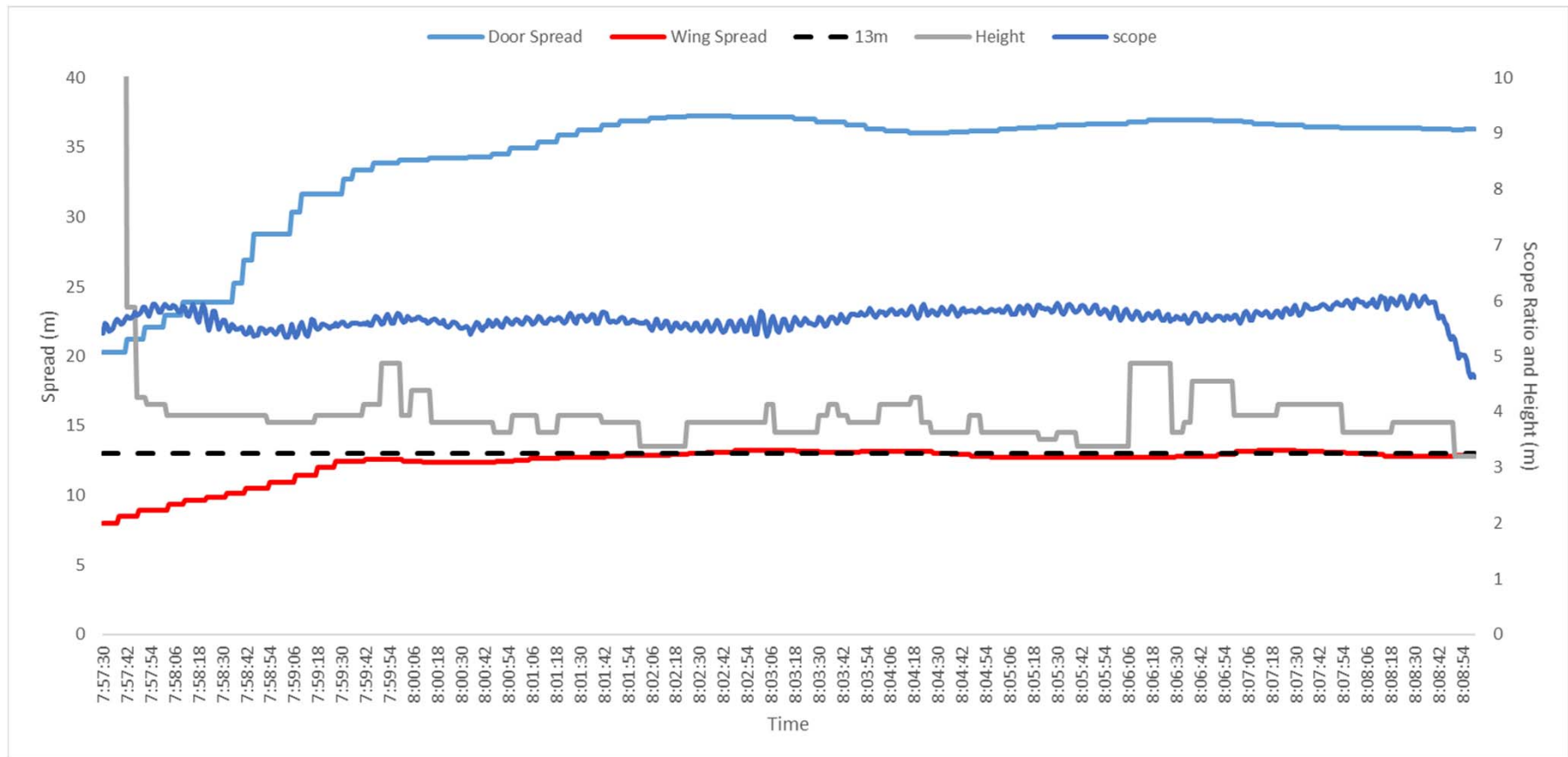
## Bison 9 – 350m Depth

- Towing Wire: Forward outer hole
- Top and Bottom Backstraps: Aft hole
- Scope Ratio: 2.5:1 to 2:1



## Bison 9 – 20m Depth

- Towing Wire: Aft inside hole
- Top and Bottom Backstraps: Forward Hole
- Scope Ratio: 6:1



---

## Bison 9 – Results

- Overspread performance at intermediate (100m) depth
  - Lost bottom contact when scope ratio reduced to 2.25:1
- Overspread in deep water
  - Lost bottom contact when scope ratio reduced to 2.25:1
- Achieved stable target spread in shallow water



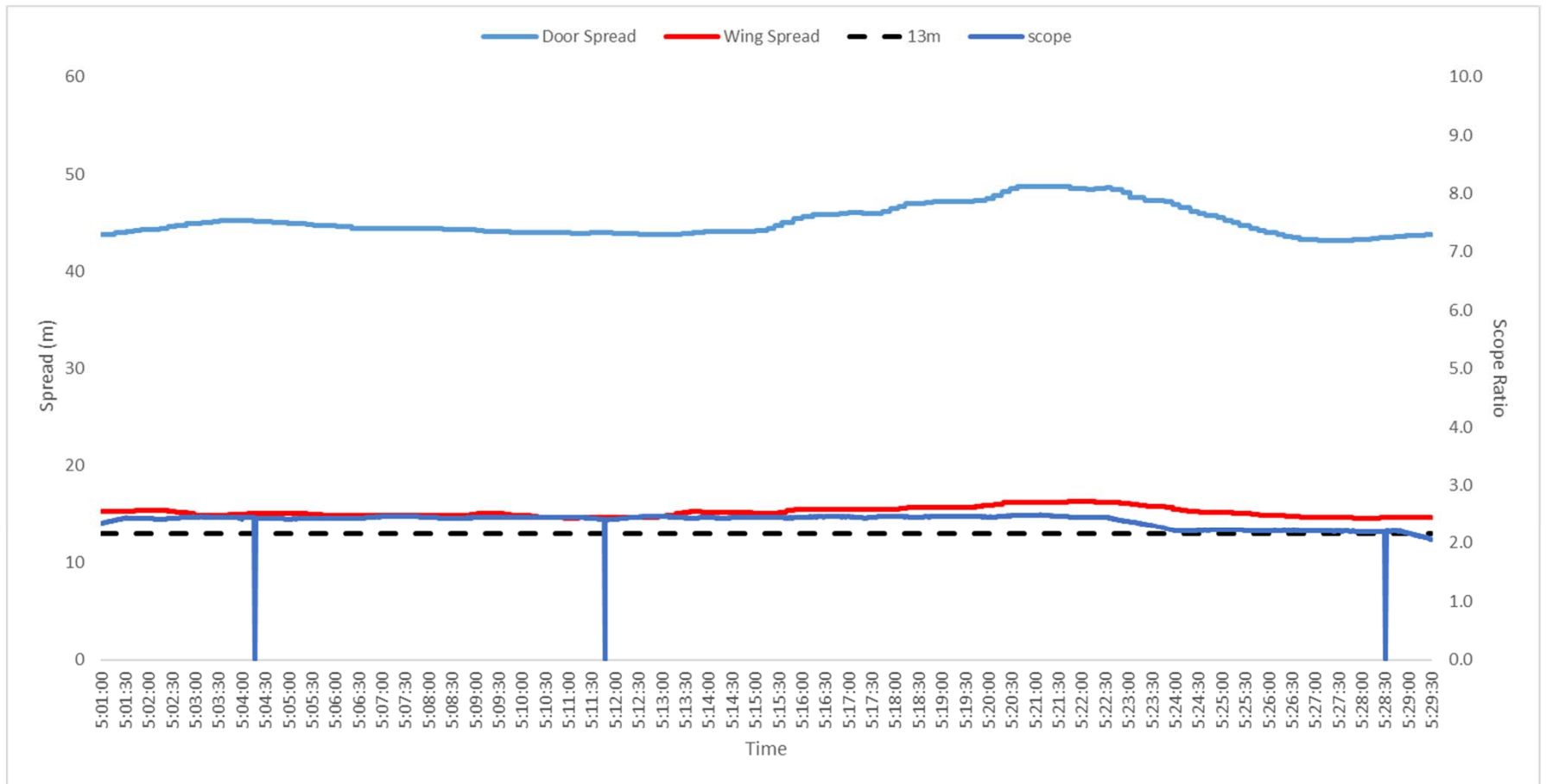
# Thyboron Type IV 66" Doors

- Loaned by VIMS for testing
  - New knife edges
- Several adjustments
  - Main towing wire can be positioned in 3 holes
    - Forward for less spread
    - Aft for more spread
  - Towing chain can be used
    - Links 5+7 standard
    - Links 6+8 for more spread
    - Links 4+6 for less spread
  - Top and Bottom Backstrap 3 hole positions
    - Forward increases spread force
    - Aft decrease spread force
    - Can shorten or lengthen top chain to adjust heel and offset backstrap holes to adjust nose up or down
  - Long chain on backside
    - Shortened for more spread
    - Lengthened for less spread



# Thyboron Type IV – 350m Depth

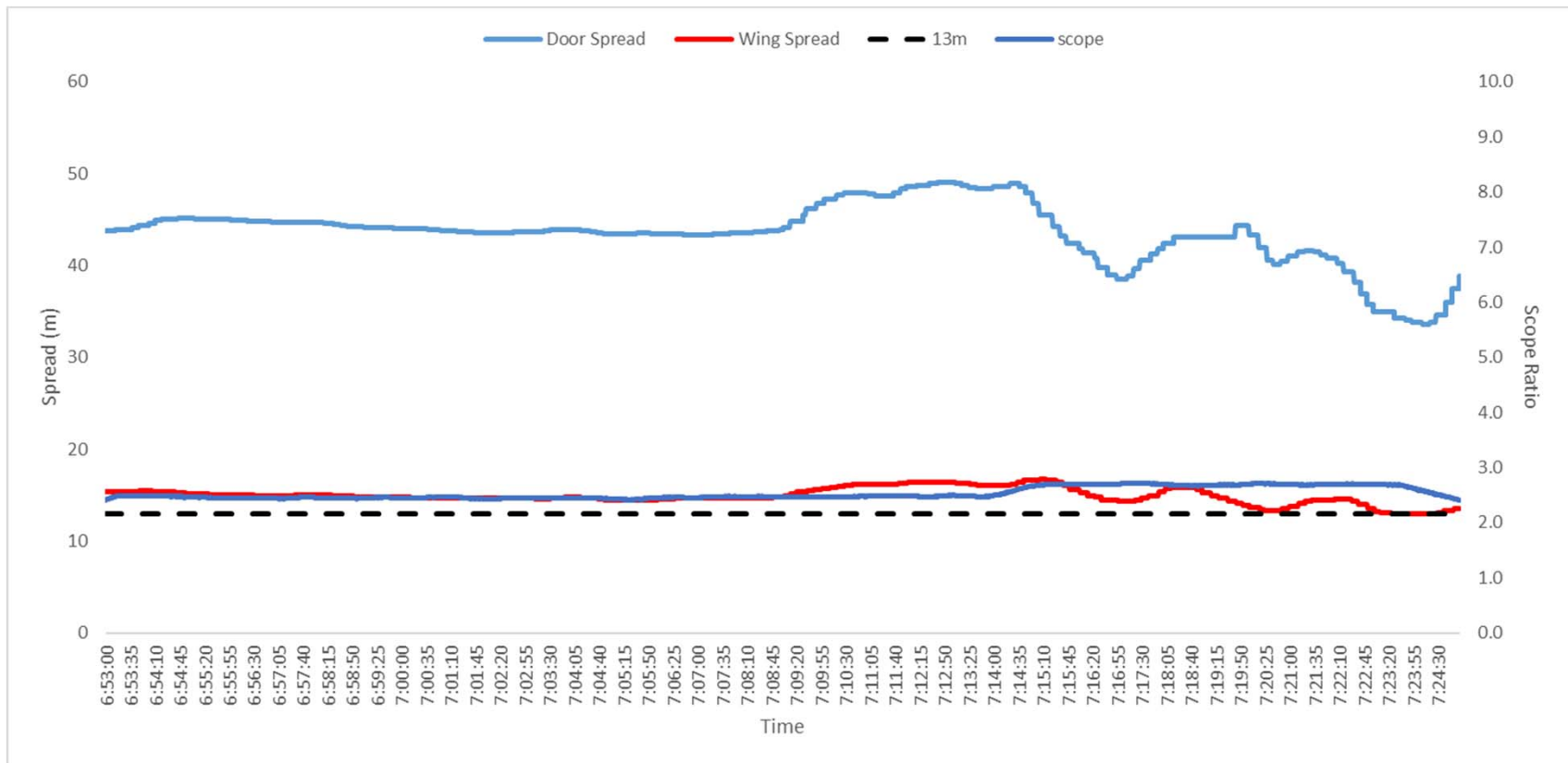
- Front Tow Chain: 3+5
- Top and Bottom Backstraps: Aft Hole
- Top Chain: No links hanging (12 links)
- Scope Ratio: 2.5:1 to 2.25:1





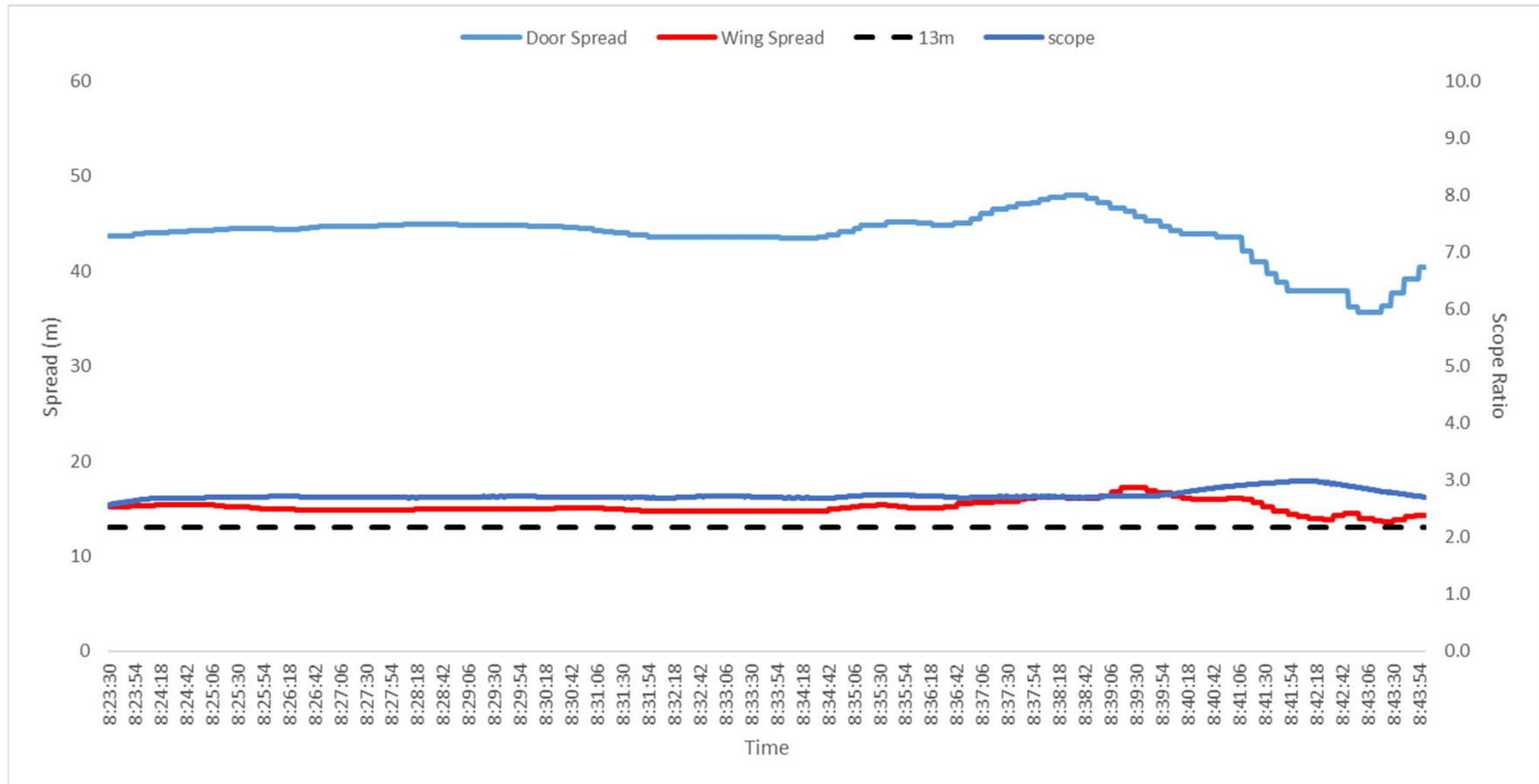
# Thyboron Type IV – 350m Depth

- Front Tow Chain: 3+5
- Top and Bottom Backstraps: Aft Hole
- Top Chain: No links hanging (12 links)
- Scope Ratio: Increased 2.5:1 to 2.75:1



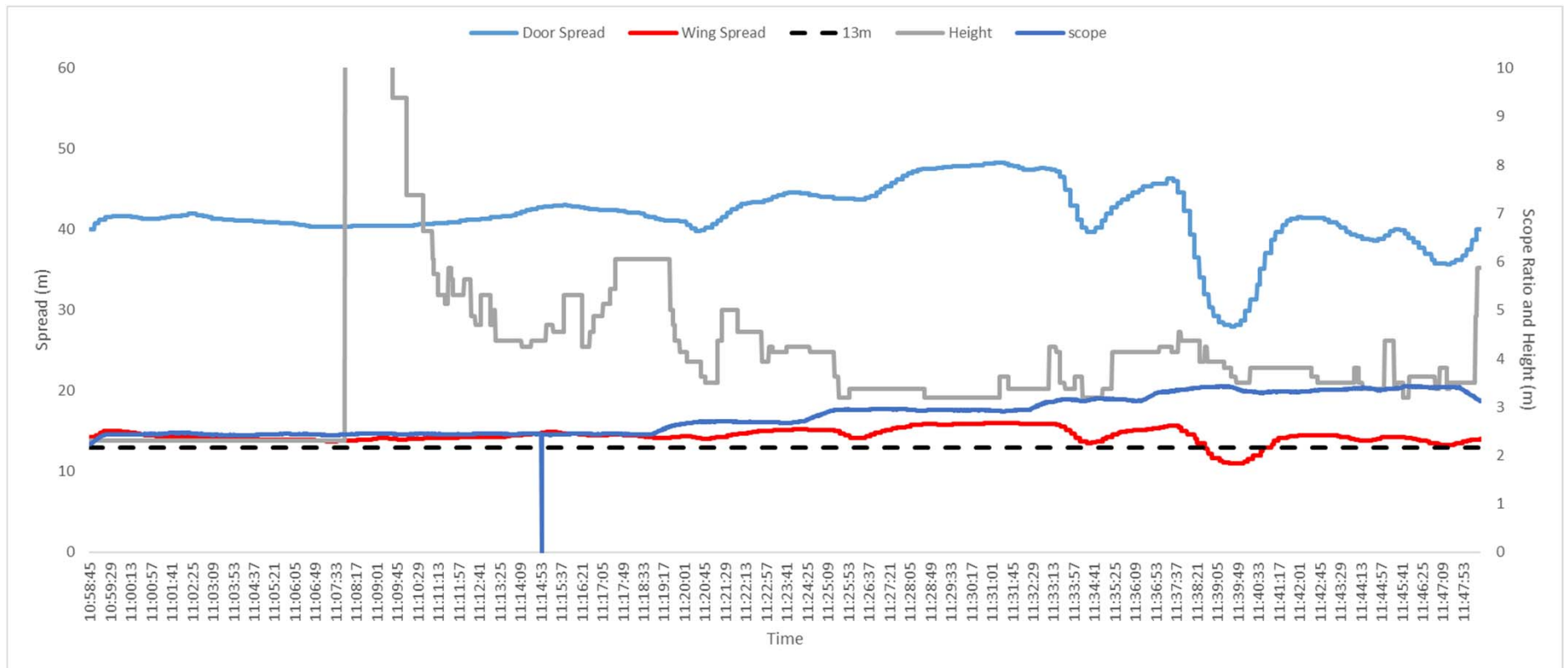
# Thyboron Type IV – 350m Depth

- Front Tow Chain: 3+5
- Top and Bottom Backstraps: Aft Hole
- Top Chain: Shortened (3 links hanging)
- Scope Ratio: Started at 2.75:1 and increased to 3:1



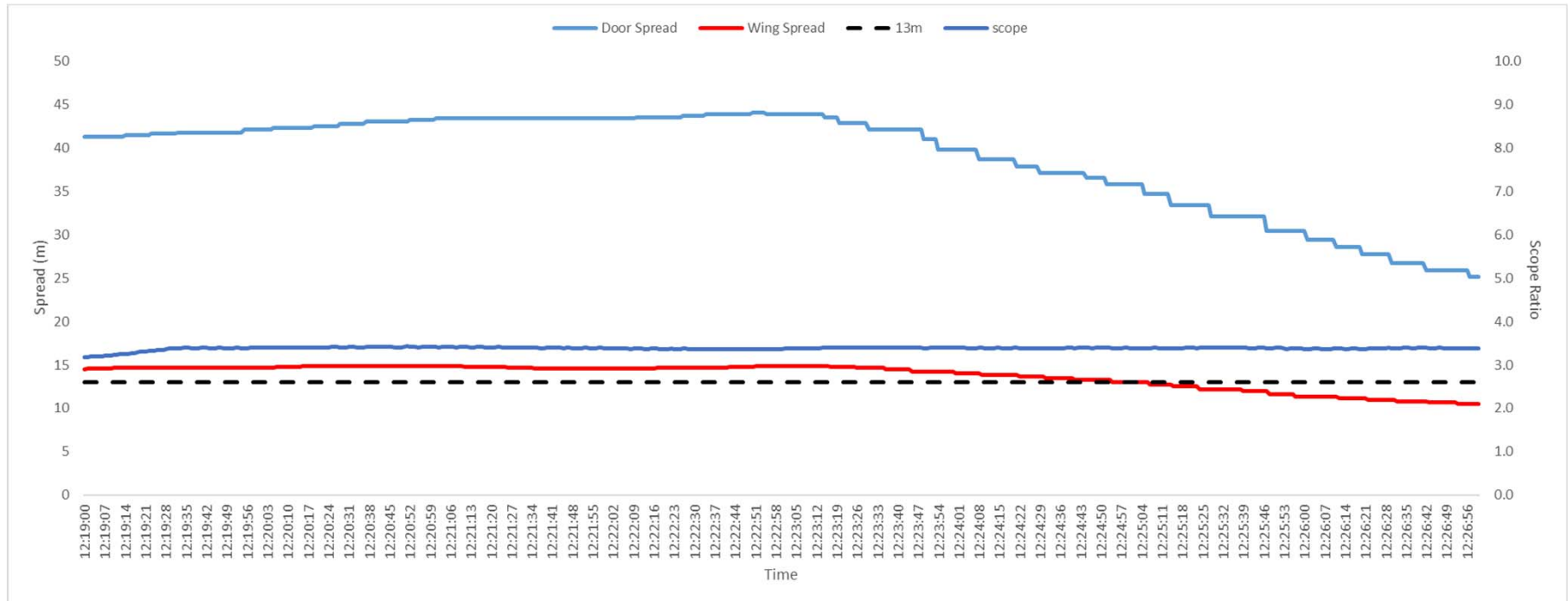
# Thyboron Type IV – 200m Depth

- Front Tow Chain: 3+5
- Top and Bottom Backstraps: Aft Hole
- Top Chain: Shortened (3 links hanging)
- Scope Ratio: Started at 2.5:1 and increased to 3.5:1



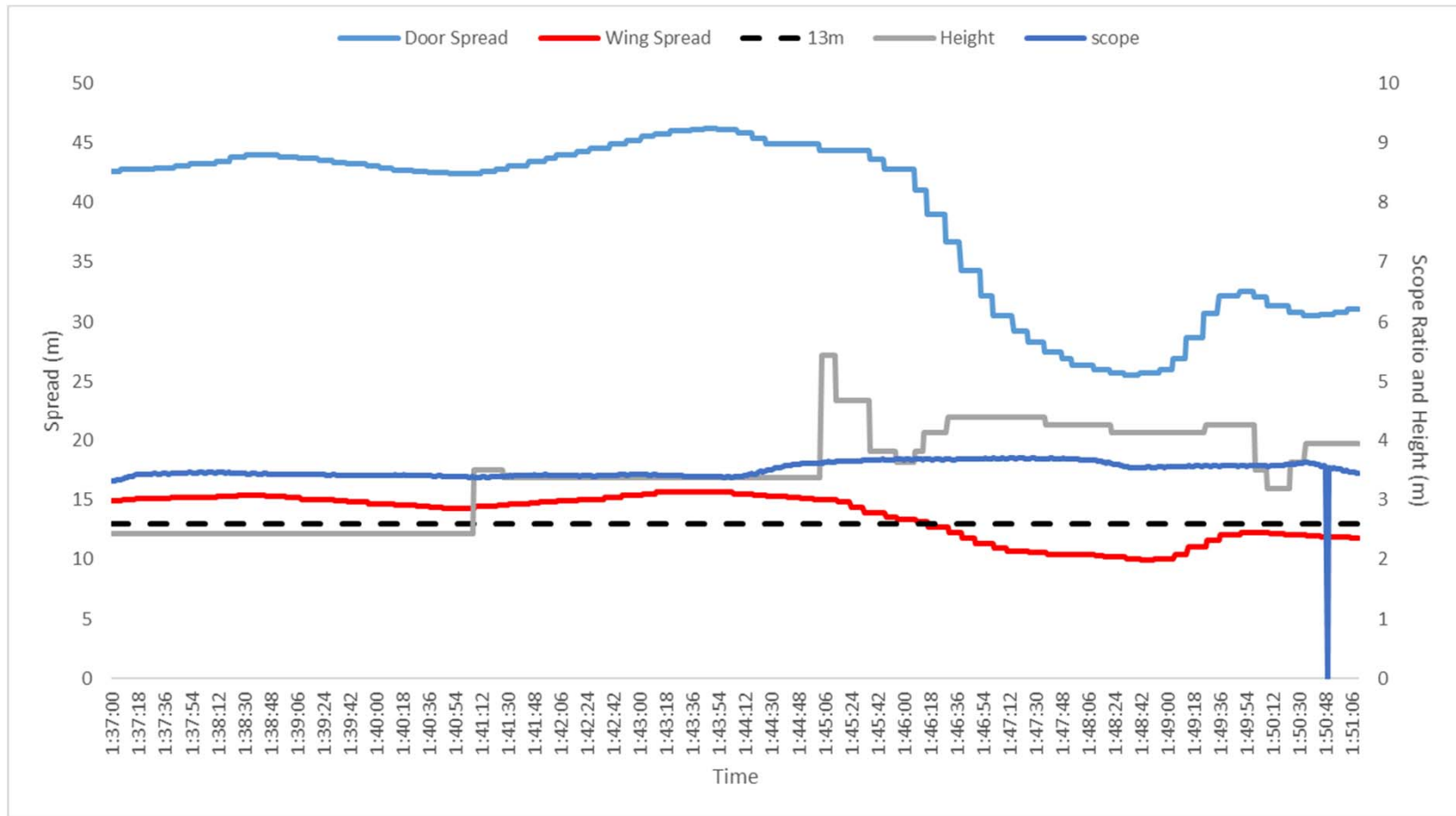
# Thyboron Type IV – 200m Depth

- Front Tow Chain: 3+5
- Top and Bottom Backstraps: Aft Hole
- Top Chain: Shortened (3 links hanging)
- Scope Ratio: 3.5:1



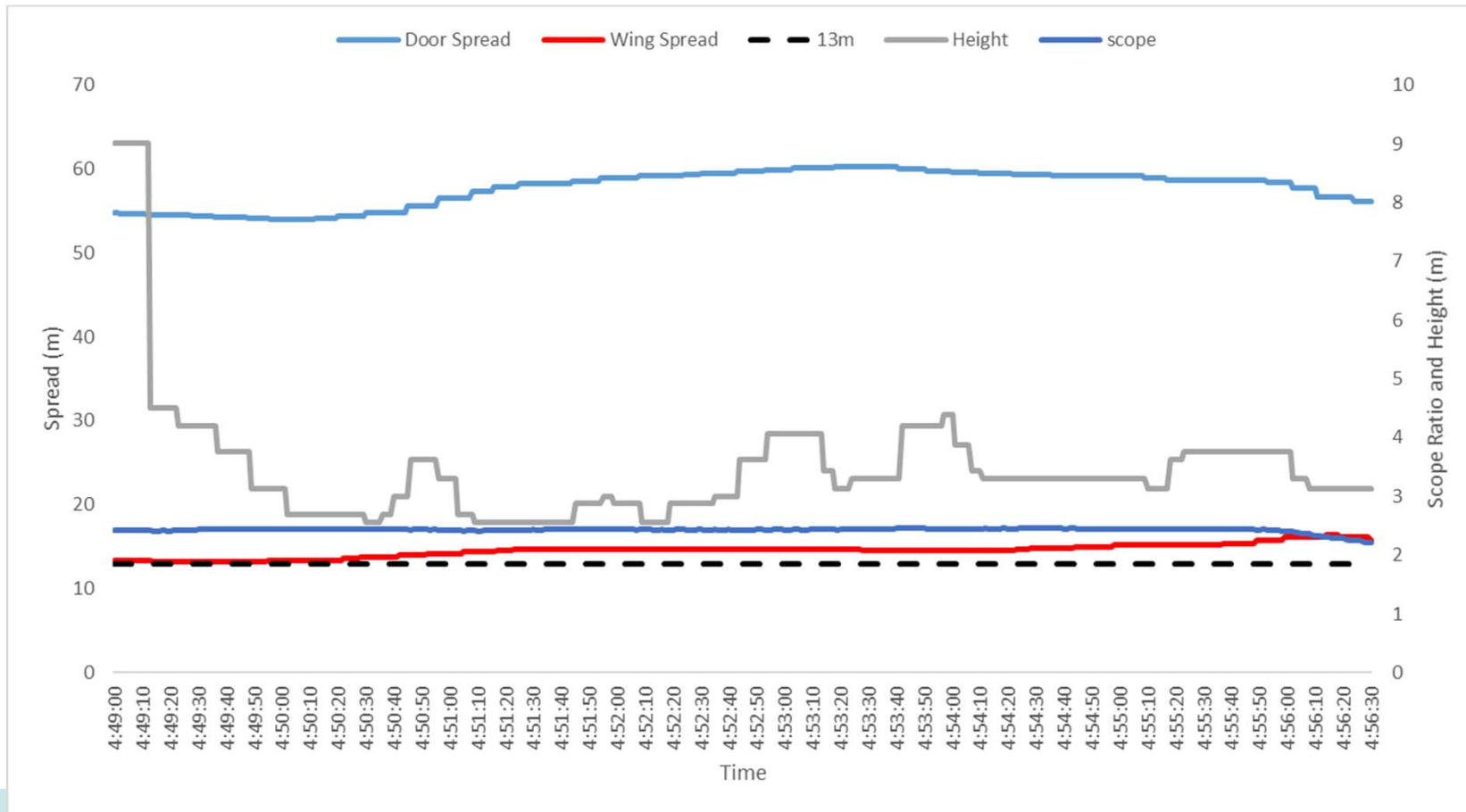
# Thyboron Type IV – 200m Depth

- Removed Tow Chain: Towing wire in forward hole
- Top and Bottom Backstraps: Aft Hole
- Top Chain: Shortened (3 links hanging)
- Scope Ratio: 3.5:1 increased to 3.75:1



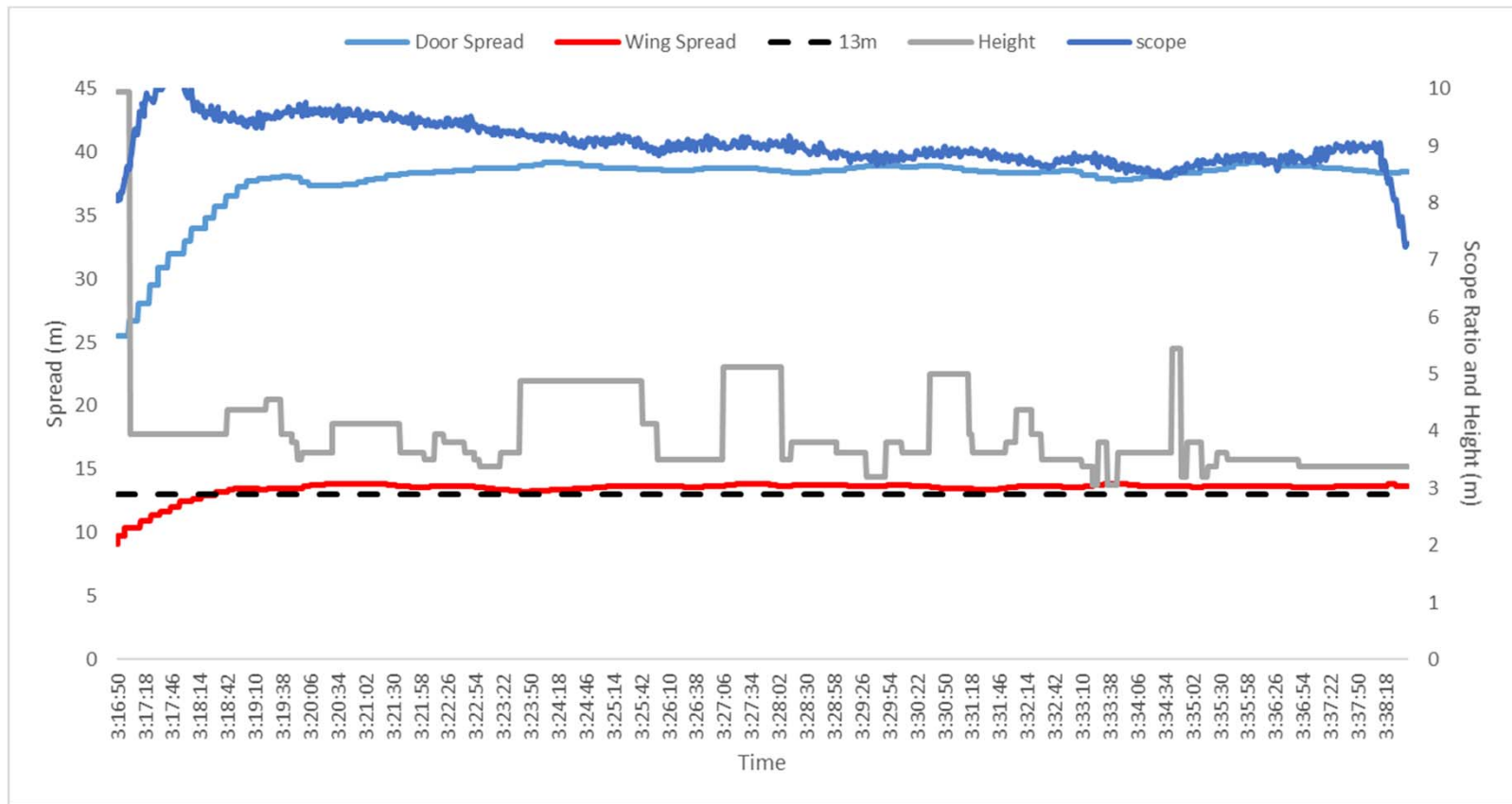
# Thyboron Type IV – 200m Depth

- Removed Tow Chain: Towing wire in forward hole
- Top and Bottom Backstraps: Aft Hole
- Top Chain: Shortened (3 links hanging)
- Scope Ratio: 2.5:1
- Added 20fm ground cable



# Thyboron Type IV – 20m Depth

- Front Tow Chain: 6+8
- Top and Bottom Backstraps: Middle Hole
- Top Chain: 1 link hanging (11 links)
- Middle Back Chain: 1 link hanging
- Scope Ratio: 9:1



---

## Thyboron Type IV – Results

- Overspread in deep water (200m and 350m)
  - Lost bottom contact when scope ratio reduced to 2.25:1
  - Unstable with increased wire and did not achieve desired spread
- Adding ground cable increased door spread and net remained overspread
- Achieved stable target spread in shallow water





## Discussion

- Both the Bison 9 and Thyboron Type IV doors achieved stable target spread in shallow water.
- Thyboron Type 21 flipper doors were generally unstable at all depths and were underspread shallow and overspread deep.
- Both the Bison 9 and Thyboron Type IV doors overspread in deep water.
  - Reducing scope ratio to 2.25:1 resulted in loss of bottom contact.
  - Increasing scope ratio resulted in more spread until the doors became unstable and fell inward.
- Currently, no door has achieved the target spread in deep water with consistent, stable performance.
- Terry Alexander has loaned us a set of Bison 8's for testing.

