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NOAA FISHERIES
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Comité d'évaluation des ressources transfrontalières

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TRAC

Transboundary Resource Assessment Committee

Working Paper 2014/43

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An examination of the relationship between yellowtail flounder abundance and the abundance of potential predators and competitors.

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NEFSC

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Canada

Introduction

NEFSC spring and fall survey indices were calculated for 13 species using the same strata set (01130-01210) as for GB yellowtail flounder. The relationship between these indices and that of GB yellowtail flounder was examined to see if any species were having a negative impact on the yellowtail flounder stock. Of the 52 relationships, only 20 were negative (Table 1). Only three species had negative relationships for both seasons (spiny dogfish, winter skate, and silver hake). All four silver hake indices and winter skate and spiny dogfish fall indices have a very low r^2 value (below 0.1) while winter skate spring survey indices have a low value (below 0.15). The relationships between spiny dogfish spring abundance indices and yellowtail are stronger. However, spiny dogfish and yellowtail flounder generally found in different strata (spiny dogfish in 01170 and yellowtail in 01160). The negative relationship between haddock fall abundance and yellowtail is driven by the very large 2013 haddock index. If it is removed, the relationship changes to positive. The figures are presented with the regression line in the first figure followed by the fall and spring figures with the indices plotted together.

Table 1. The relationship between yellowtail flounder and 13 species survey indices on Georges Bank. The shaded cells represent a negative relationship.

	Fall Number		Fall Weight		Spring Number		Spring Weight	
	r^2	slope	r^2	slope	r^2	slope	r^2	slope
Spiny Dogfish	0.098	-3.32	0.088	-3.26	0.19	-4.15	0.053	-5.804
Barndoor Skate	0.17	0.02	0.19	0.16	0.06	0.04	0.02	0.23
Winter Skate	0.06	-0.12	0.08	-1.37	0.12	-0.26	0.10	-1.81
Little Skate	0.043	0.127	0.078	0.235	0.088	0.406	0.125	0.525
Silver Hake	0.057	-1.21	0.000459	-0.00456	0.021	-0.68	0.030	-0.208
Atlantic cod	0.0067	0.022	0.057	0.29	0.00508	-0.141	0.013	-1.15
Haddock	0.000121	-2.12	0.19	3.33	0.0007	0.201	0.0096	0.859
Red Hake	0.0074	0.164	0.061	0.141	0.038	0.215	0.019	0.058
Fourspot Flounder	0.060	-0.080	0.016	-0.016	0.087	0.036	0.023	0.025
Winter Flounder	0.018	-0.022	0.012	0.04	0.026	0.045	0.16	0.26
Longhorn Sculpin	0.033	0.033	0.024	0.089	0.061	0.89	0.347	0.26
Sea Raven	0.0015	-0.00289	0.0012	-0.00614	0.0015	0.00553	0.041	0.055
Goosefish	0.134	0.0076	0.095	0.0997	0.055	0.00289	0.010	0.0092

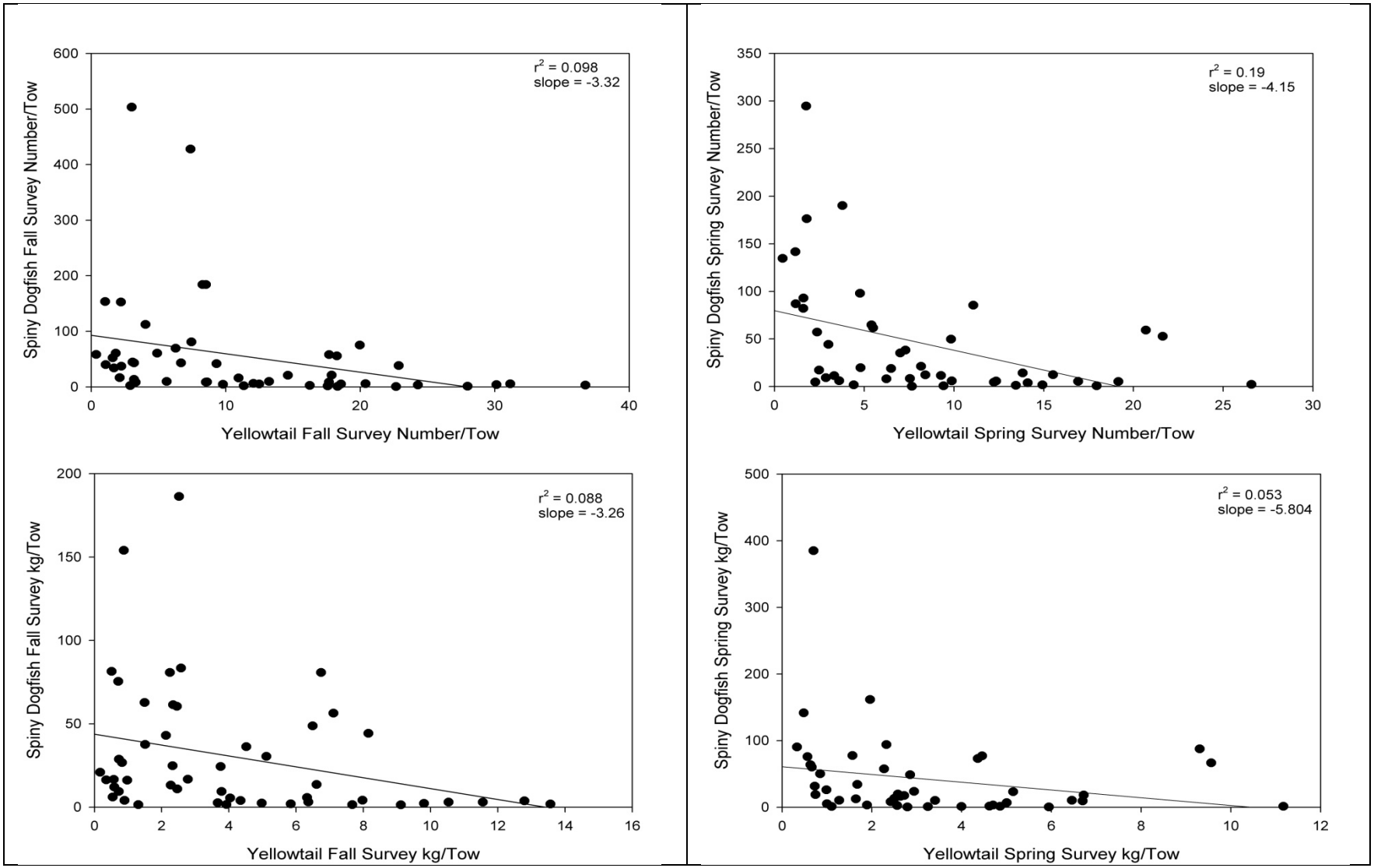

Figure 1. The relationship between yellowtail flounder and spiny dogfish abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

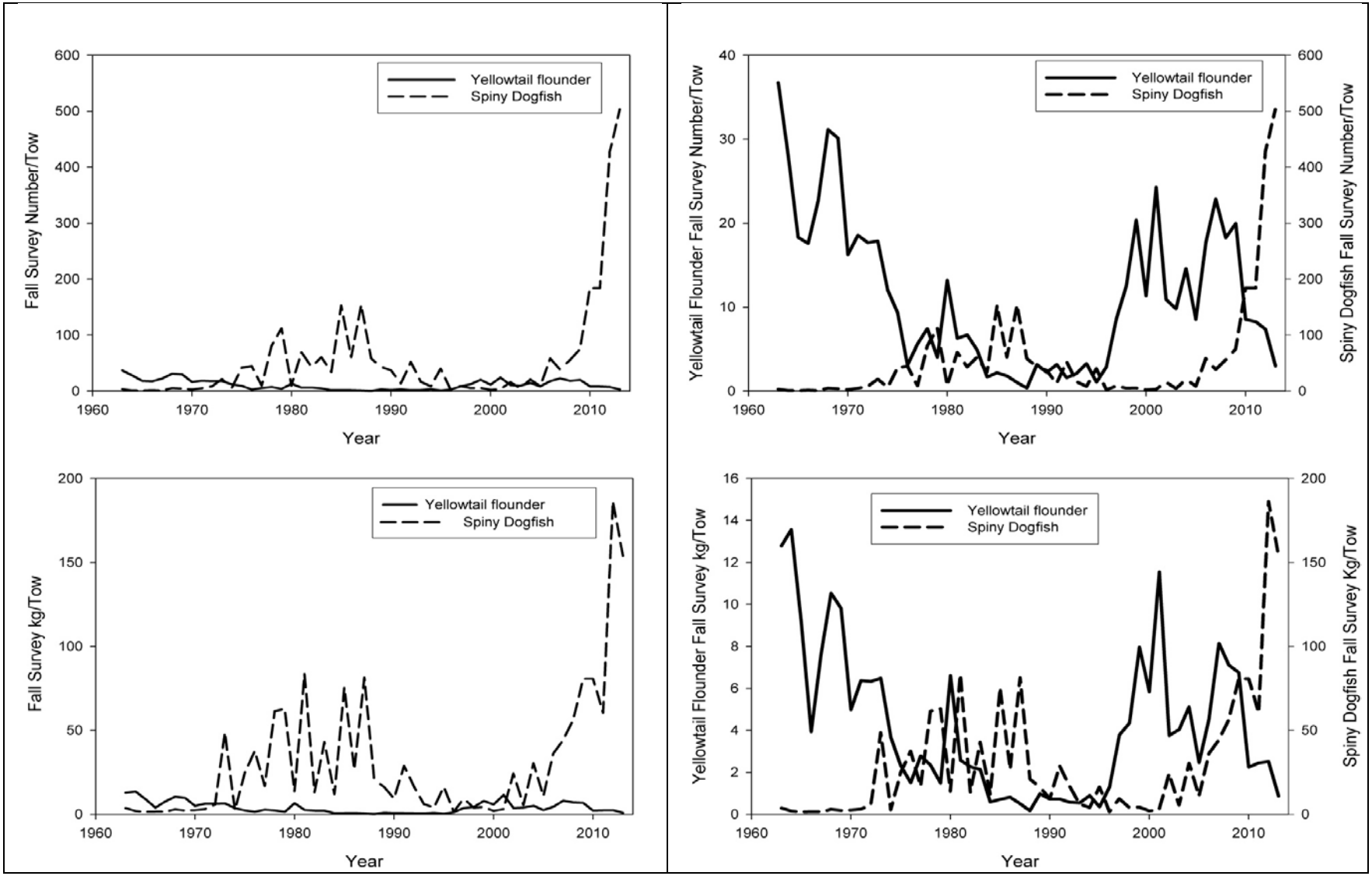

Figure 2. Spiny dogfish and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

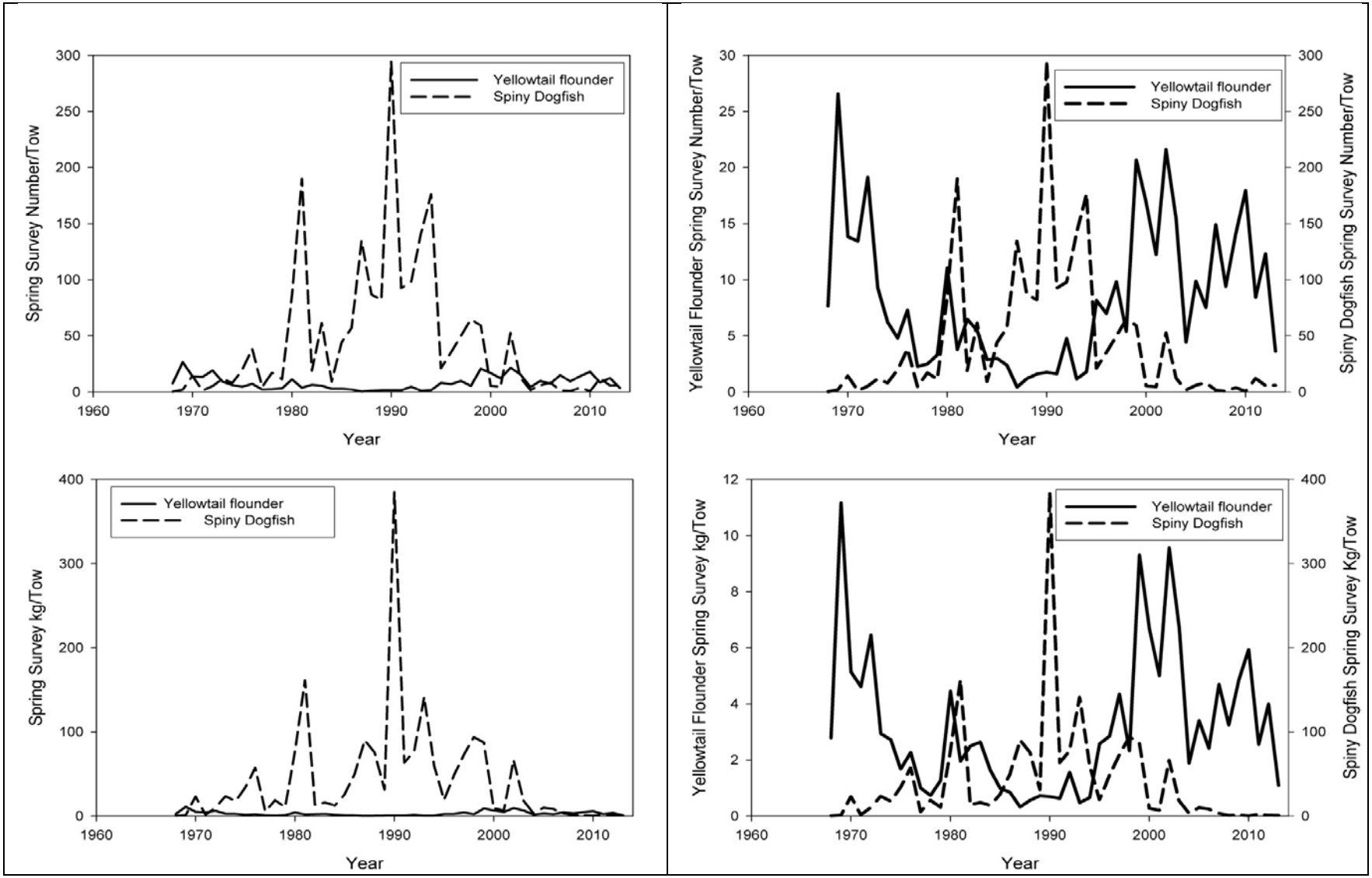

Figure 3. Spiny dogfish and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

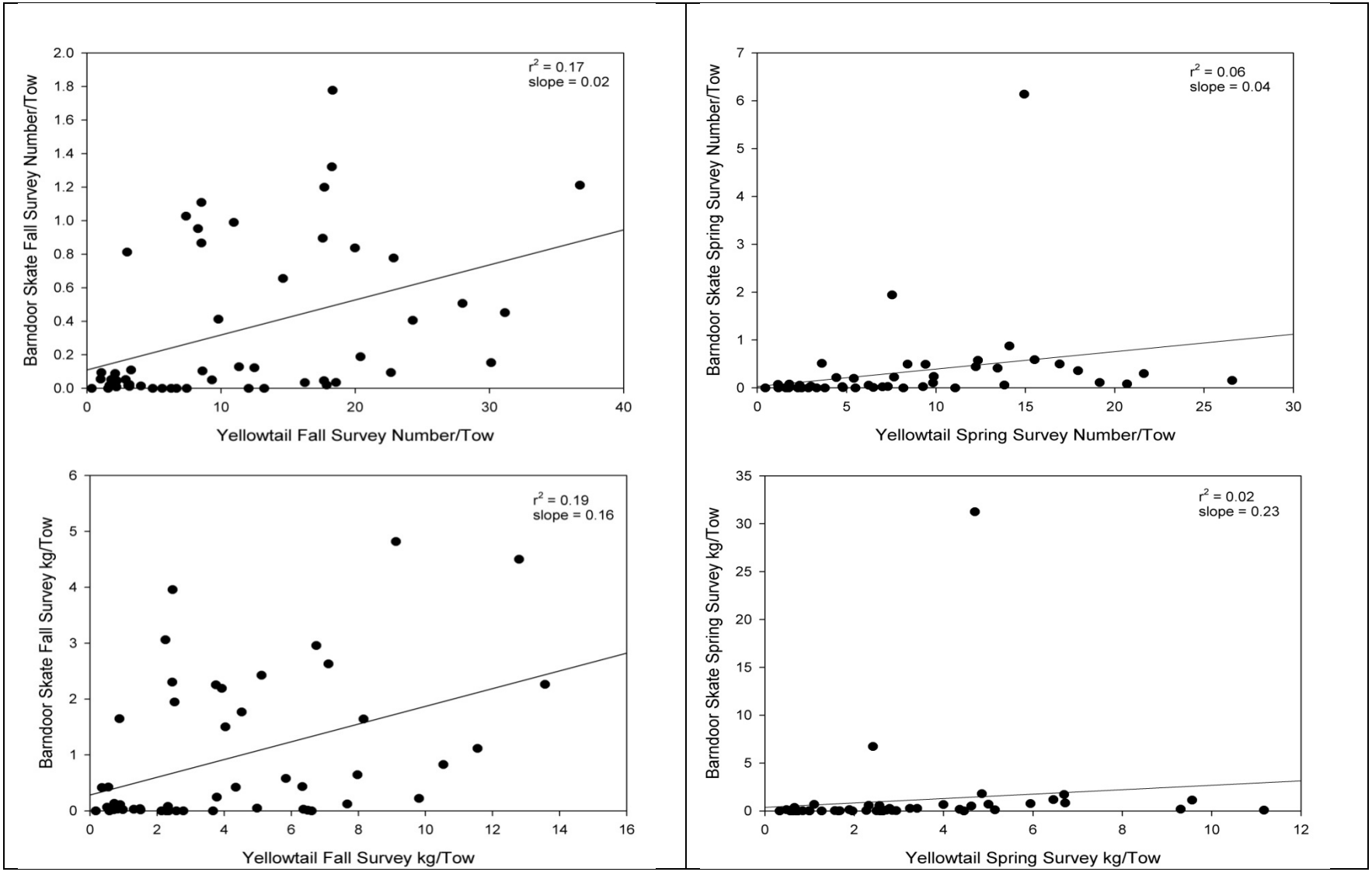

Figure 4. The relationship between yellowtail flounder and barndoor skate abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

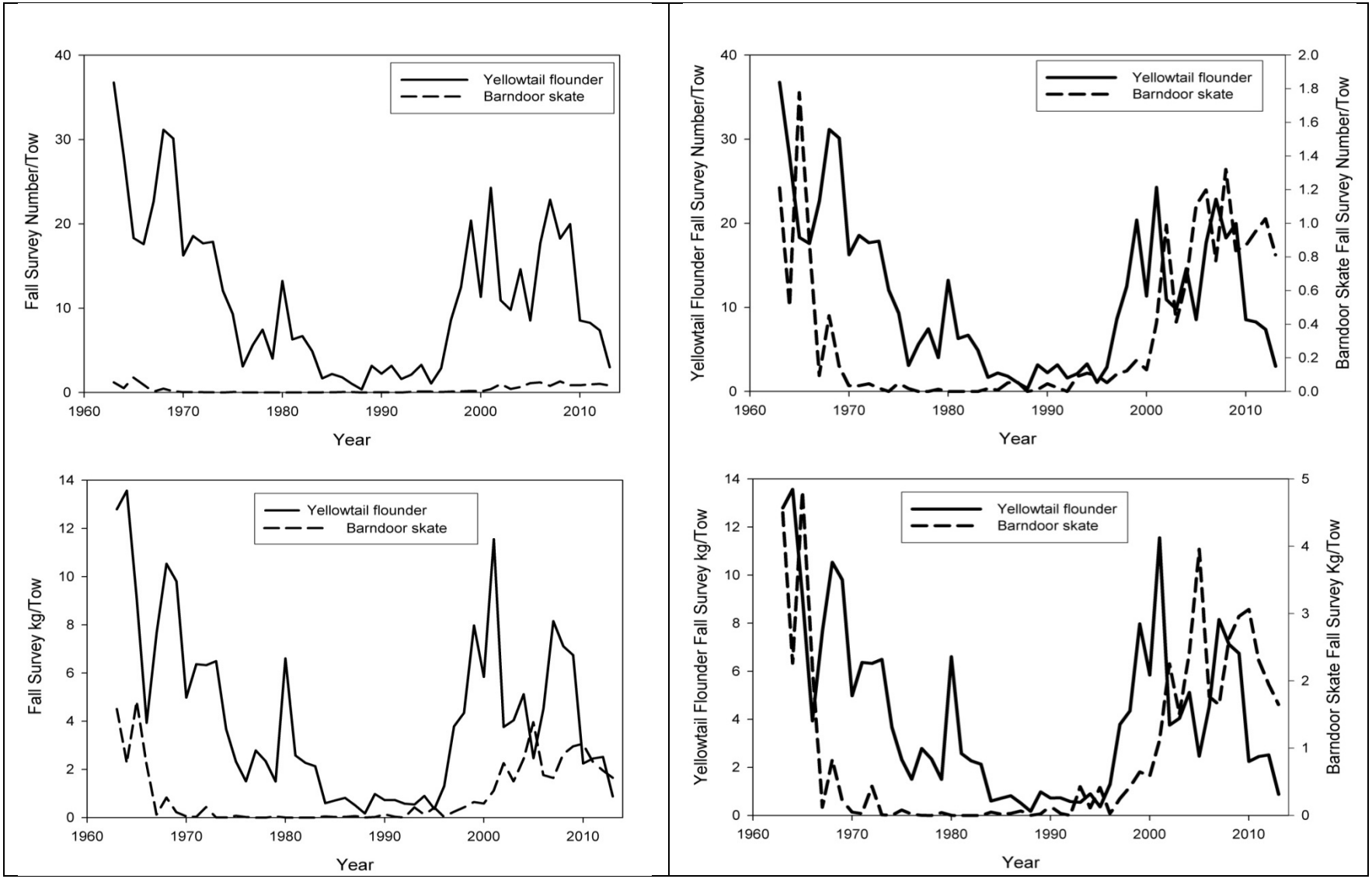

Figure 5. Barndoor skate and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

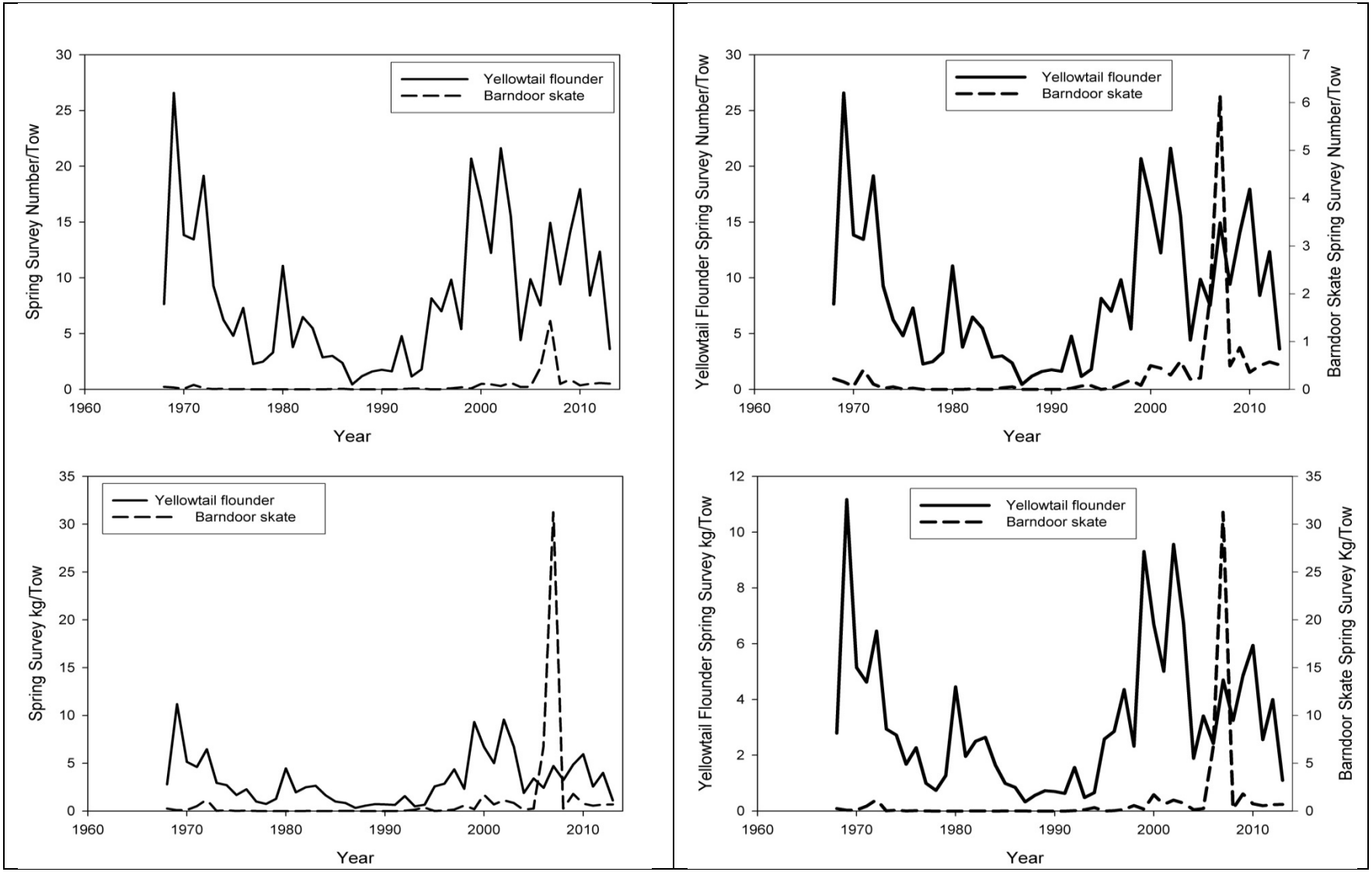

Figure 6. Barndoor skate and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

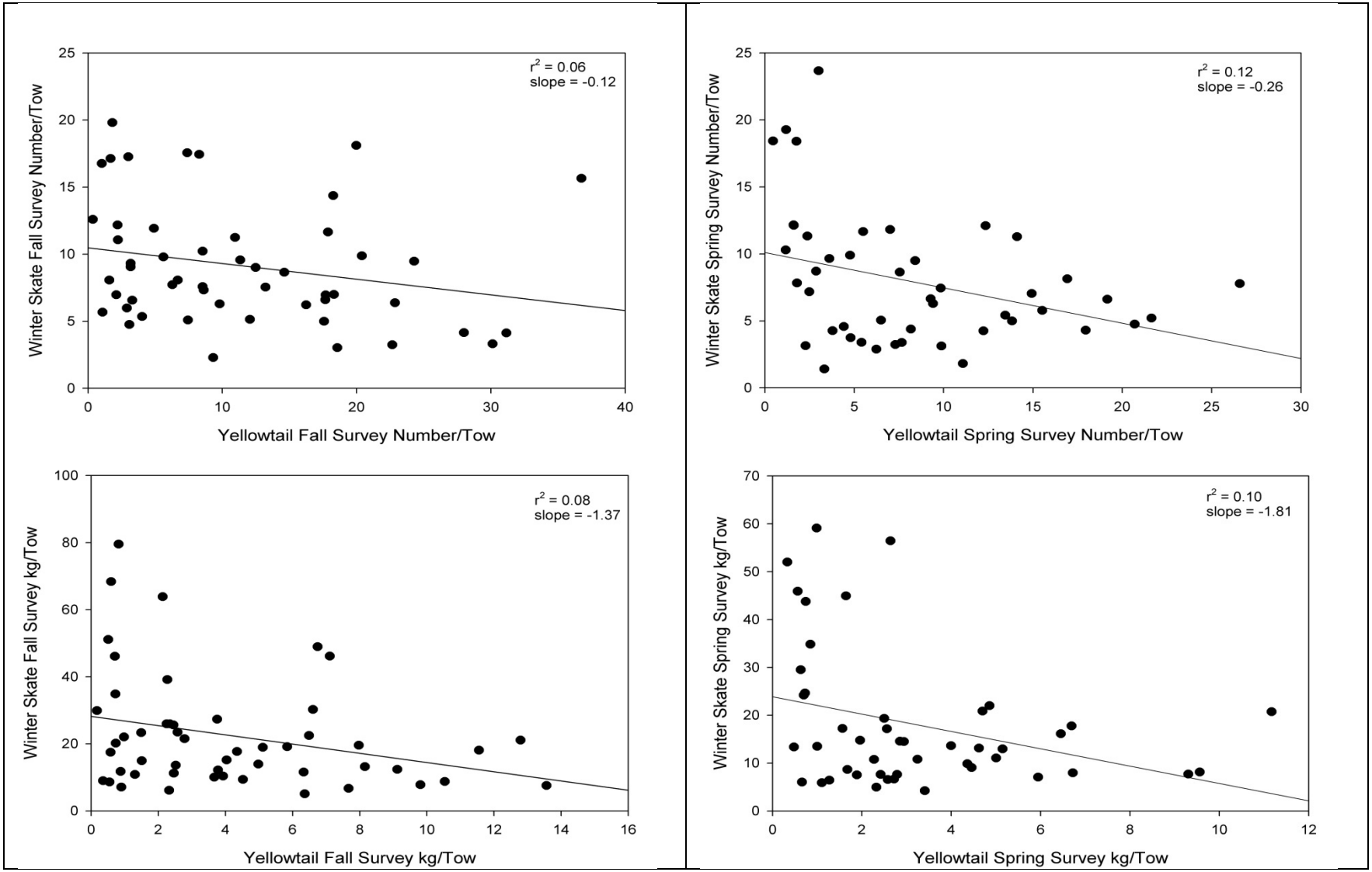

Figure 7. The relationship between yellowtail flounder and winter skate abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

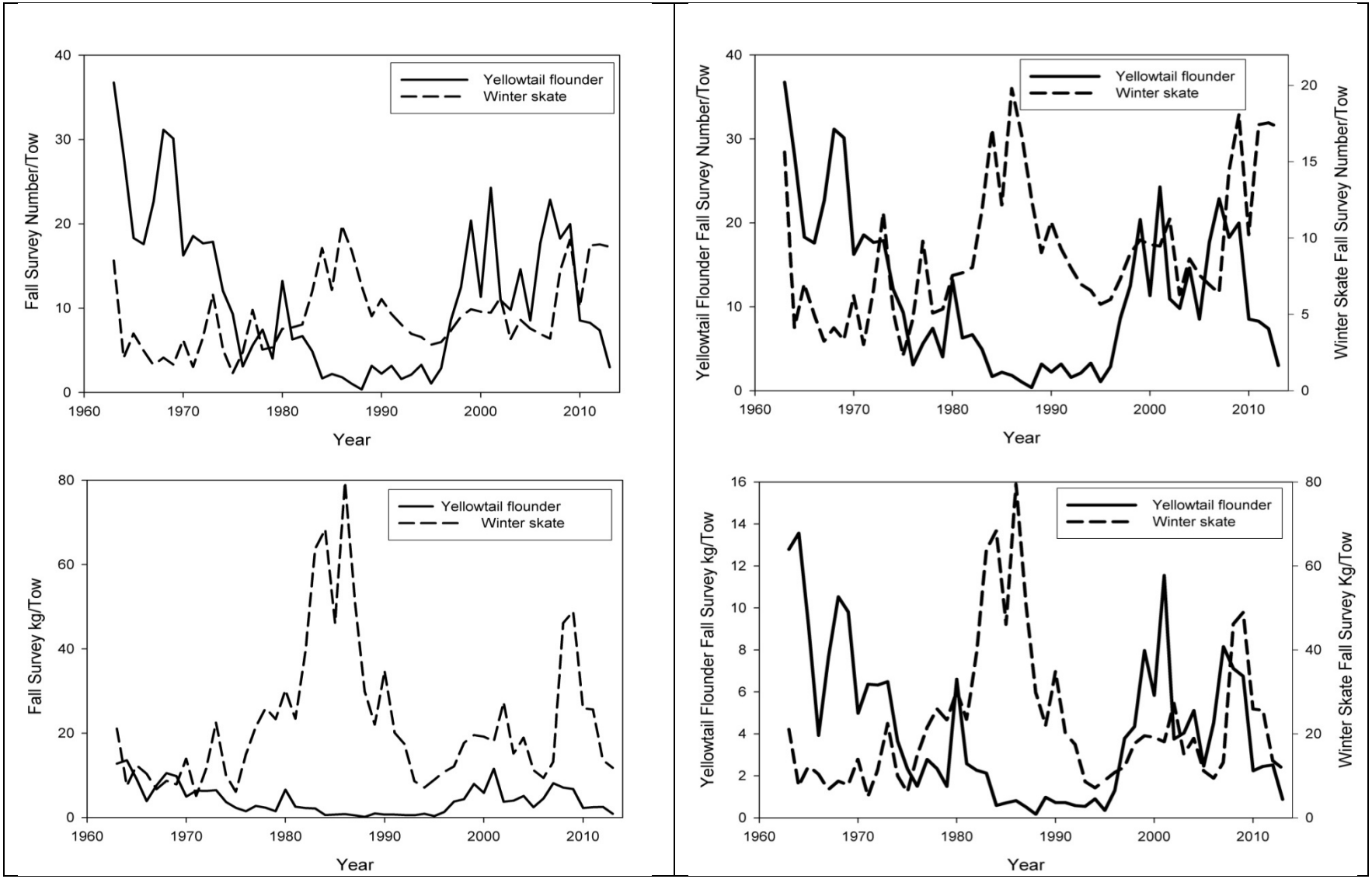

Figure 8. Winter skate and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

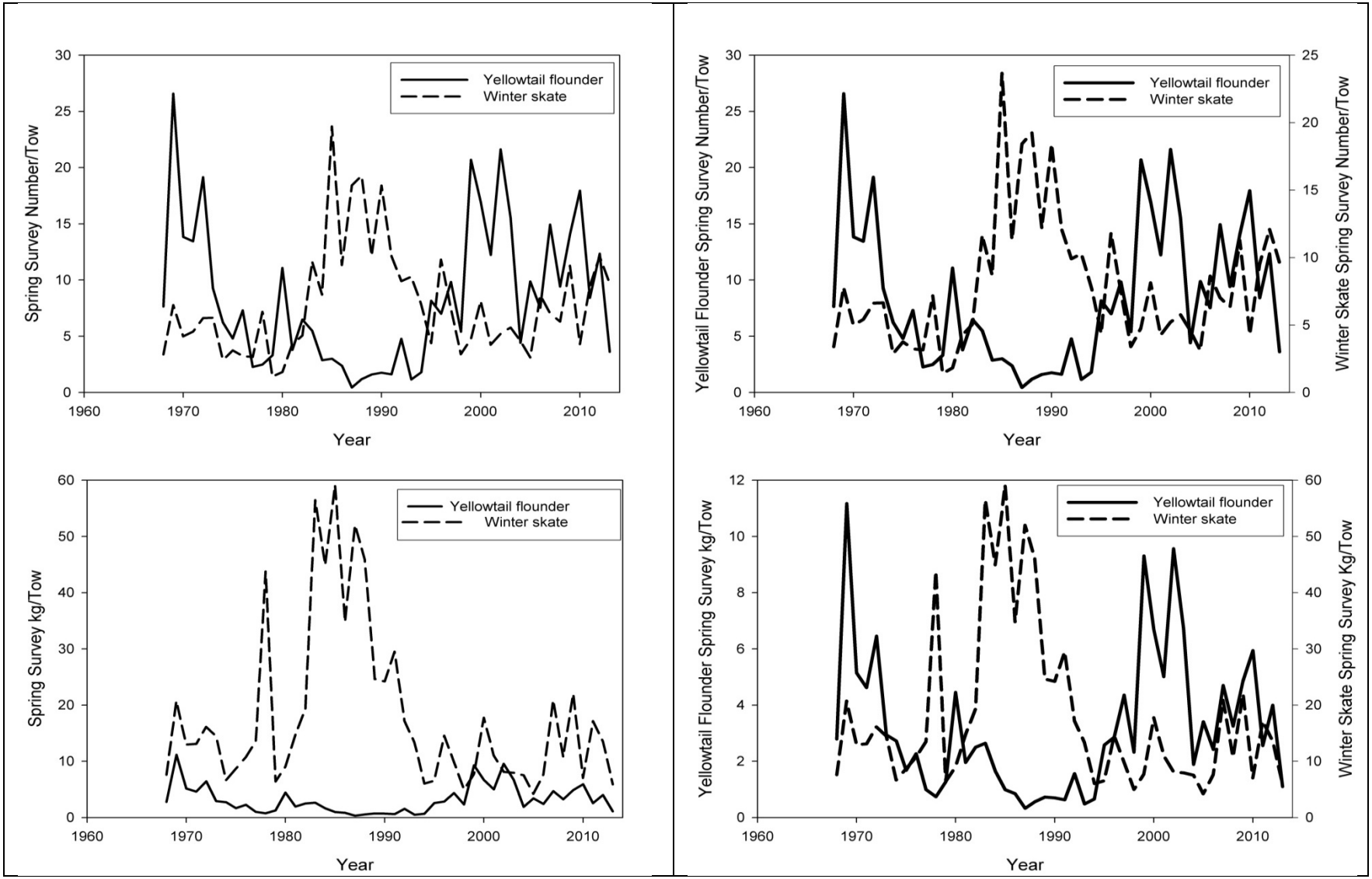

Figure 9. Winter skate and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

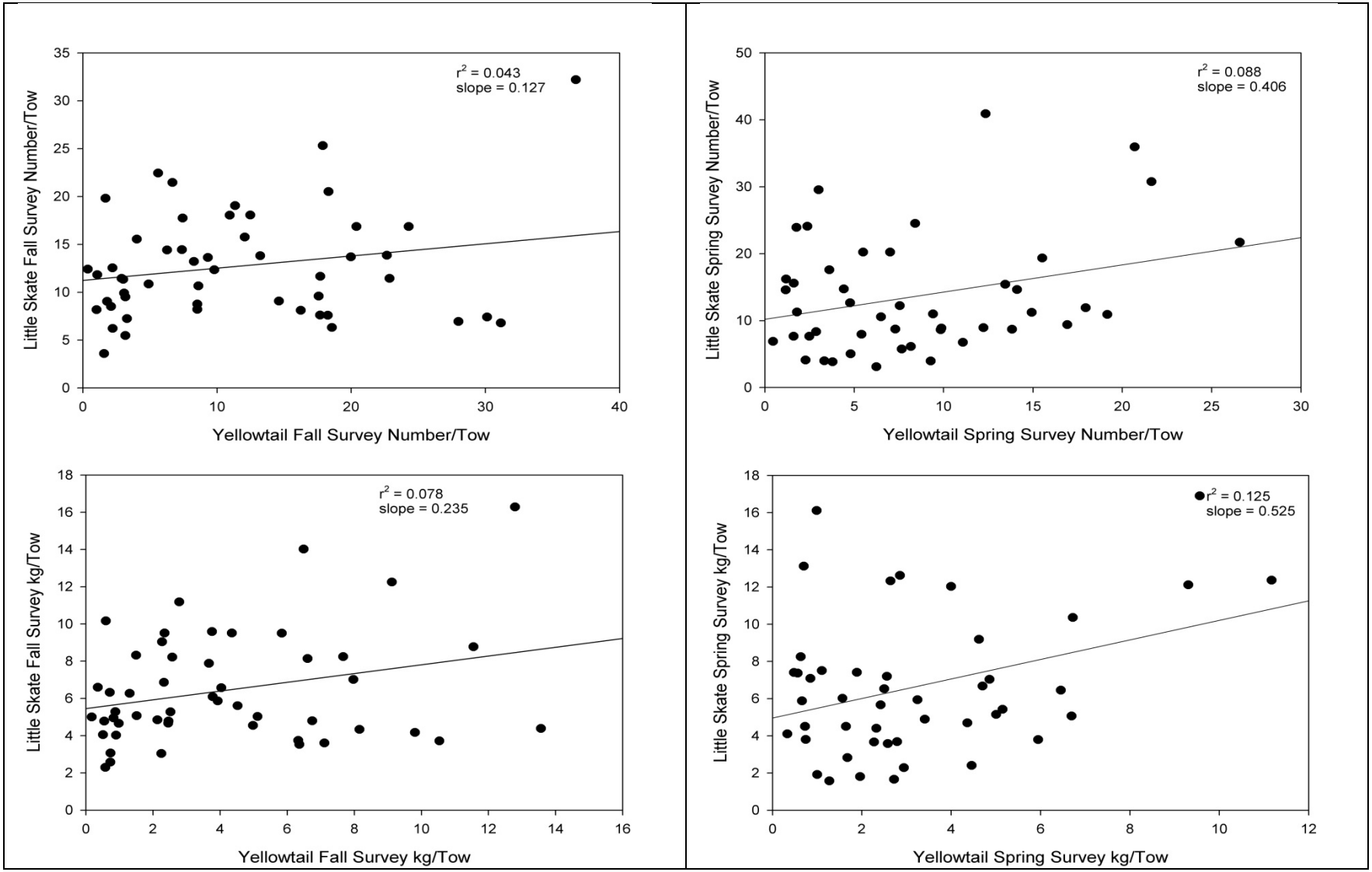

Figure 10. The relationship between yellowtail flounder and little skate abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

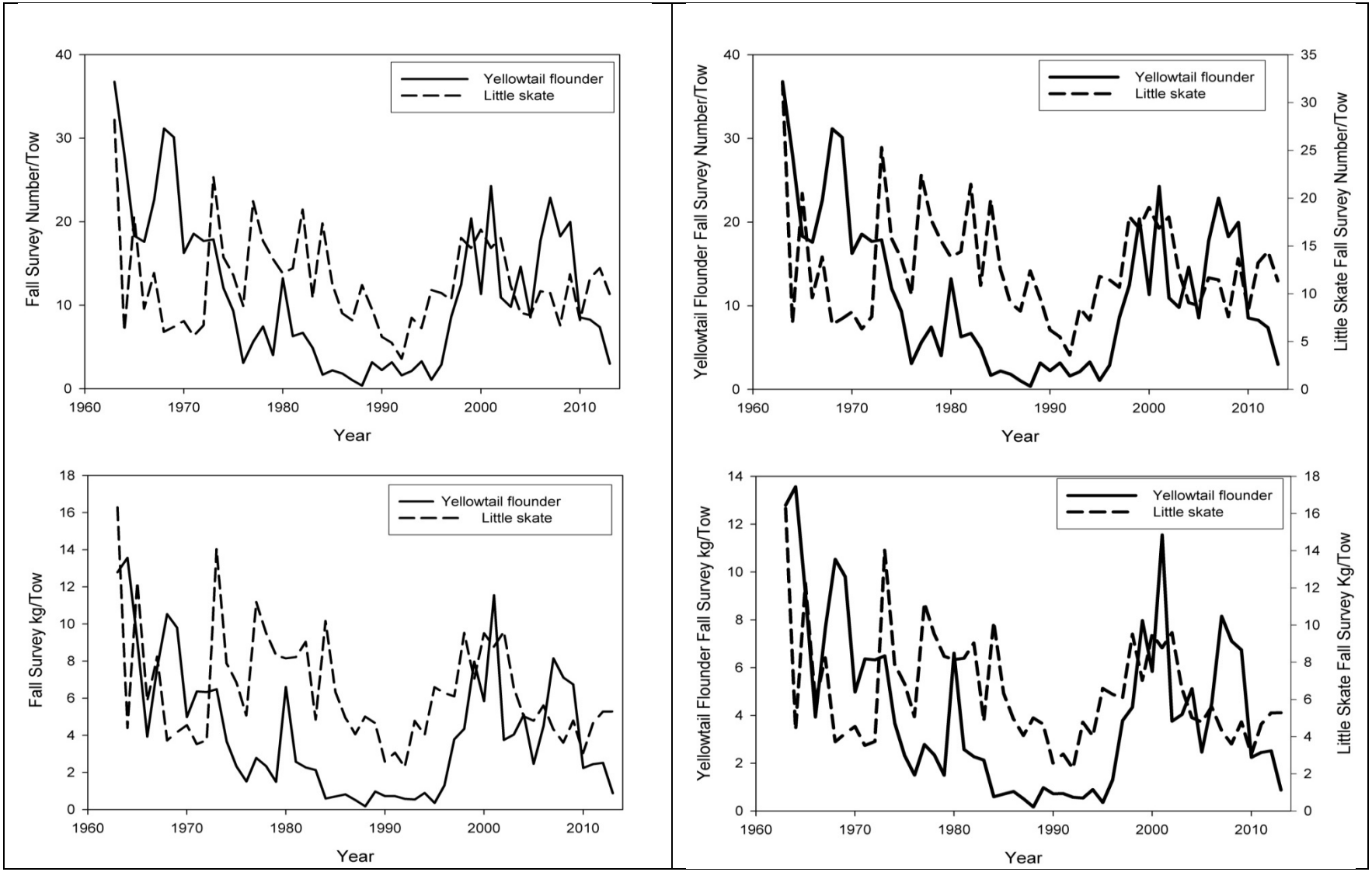

Figure 11. Little skate and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

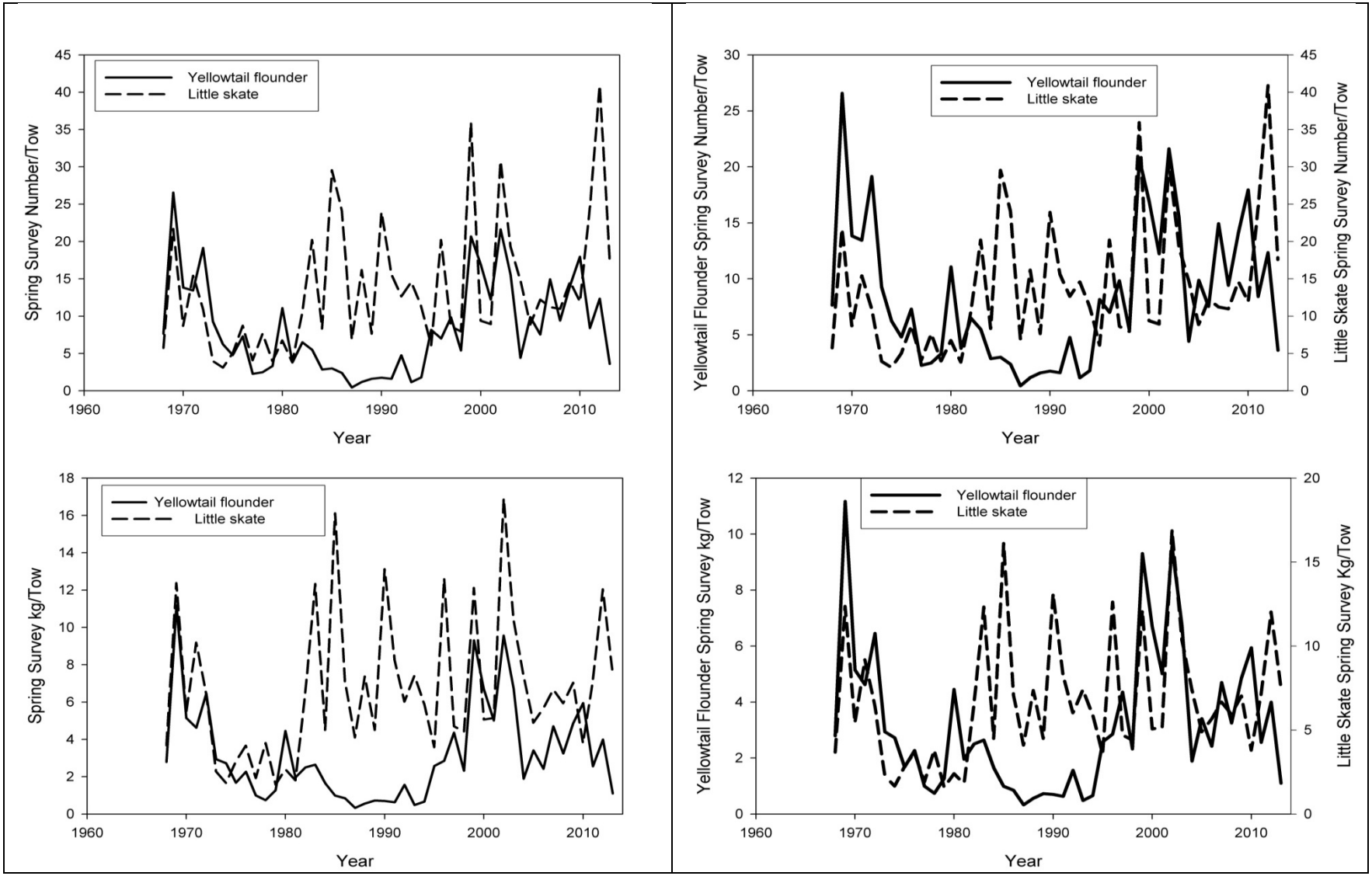

Figure 12. Little skate and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

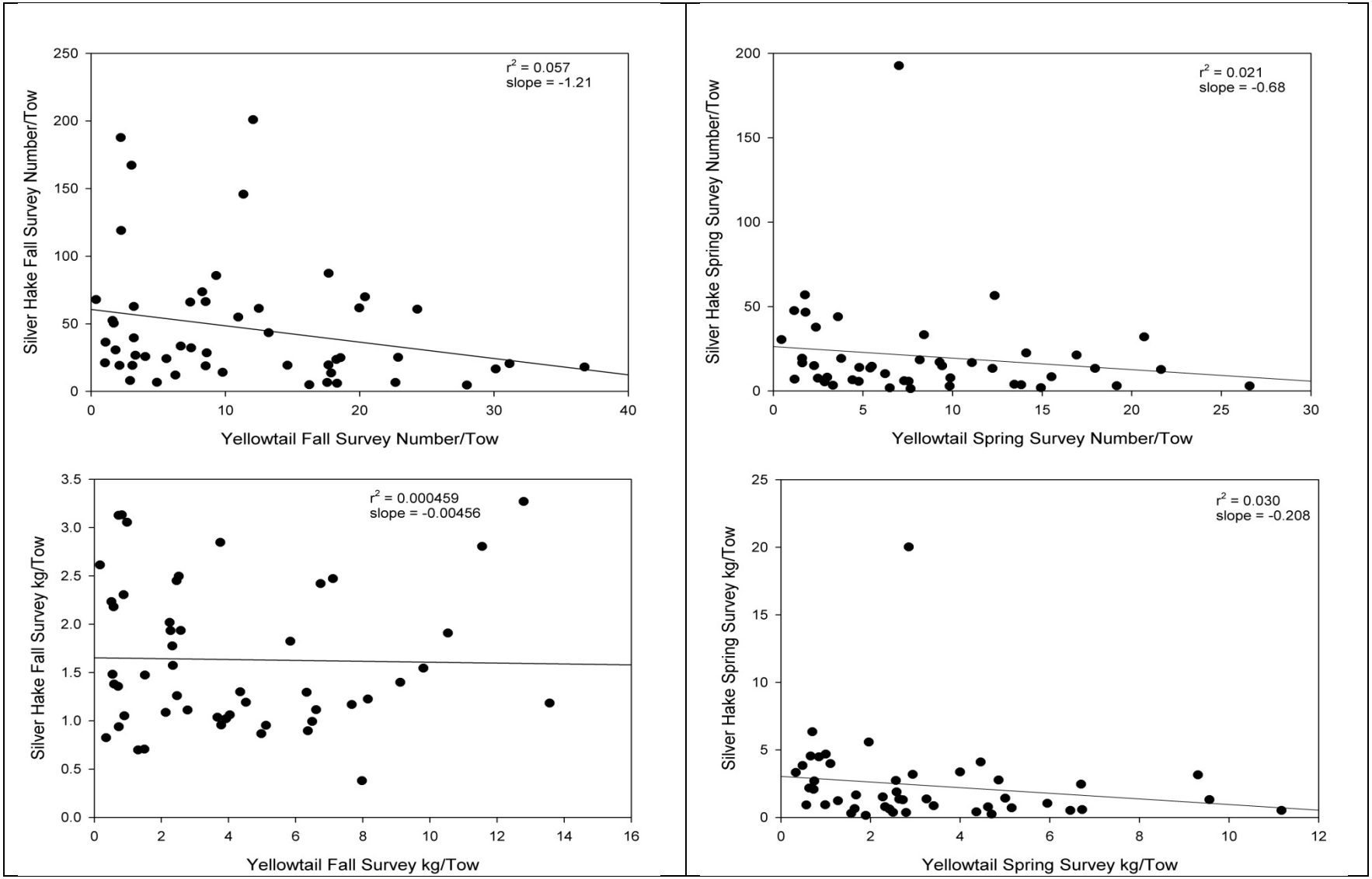

Figure 13. The relationship between yellowtail flounder and silver hake abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

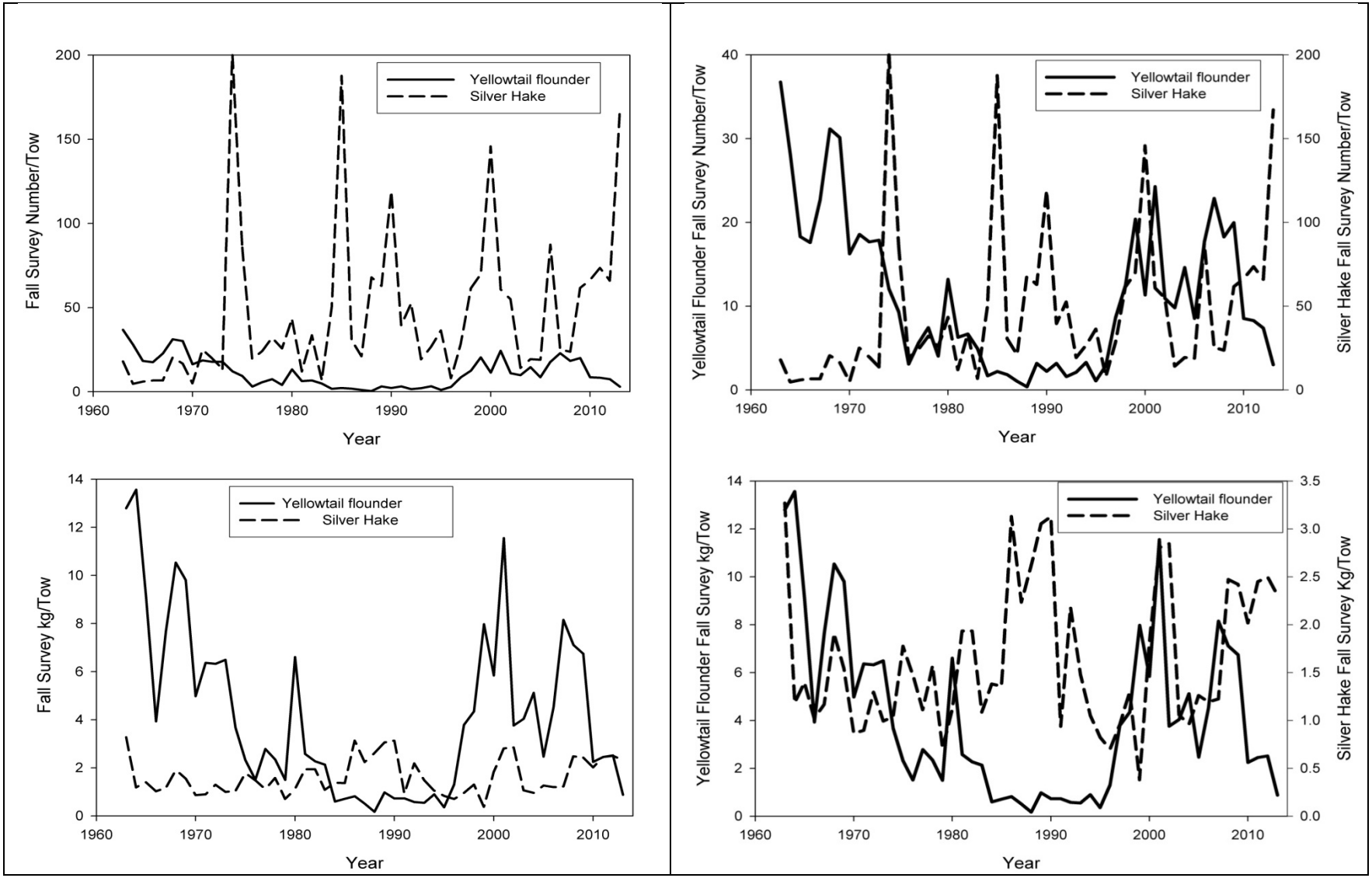

Figure 14. Silver hake and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

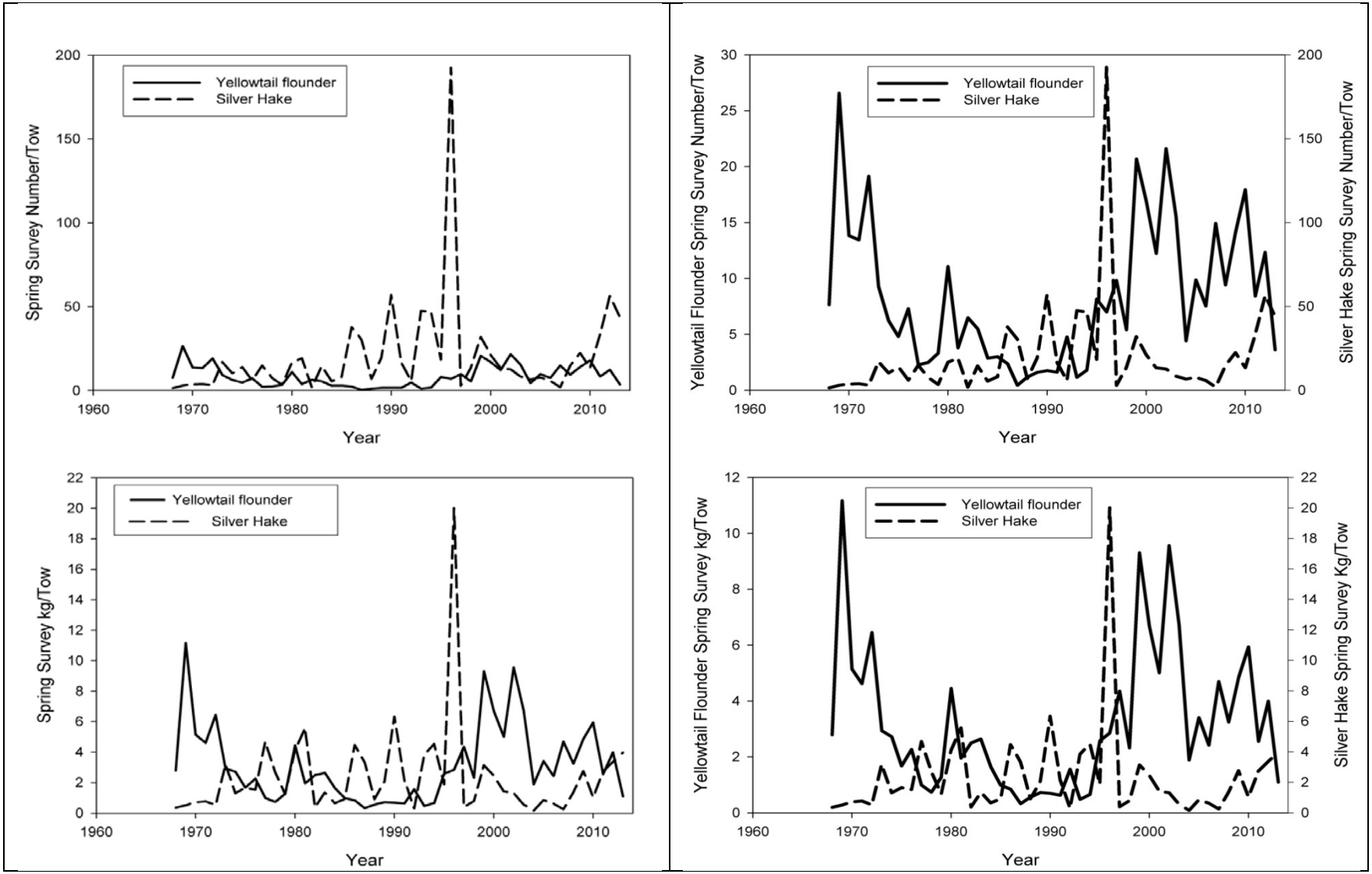

Figure 15. Silver hake and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

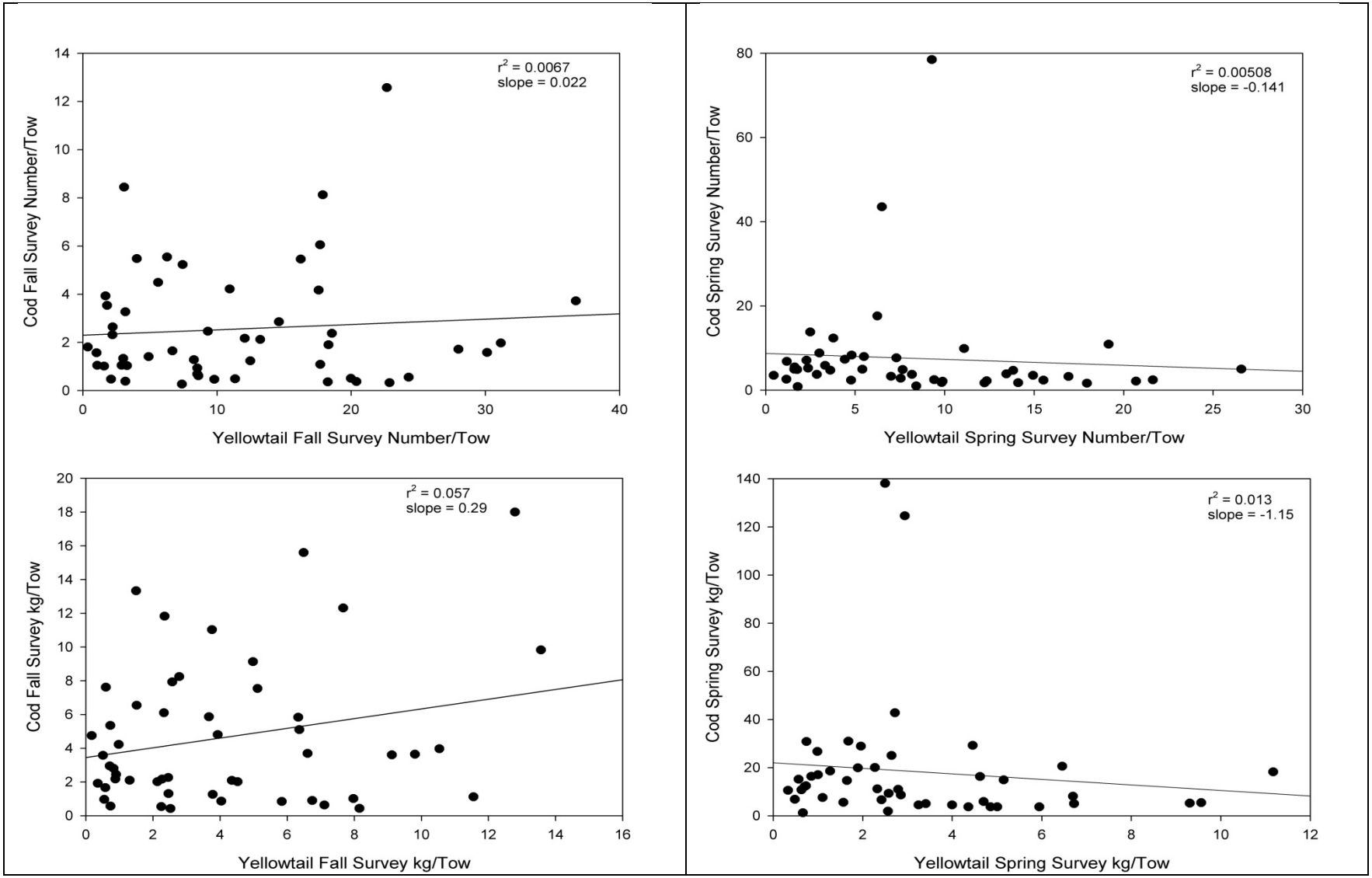

Figure 16. The relationship between yellowtail flounder and Atlantic cod abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

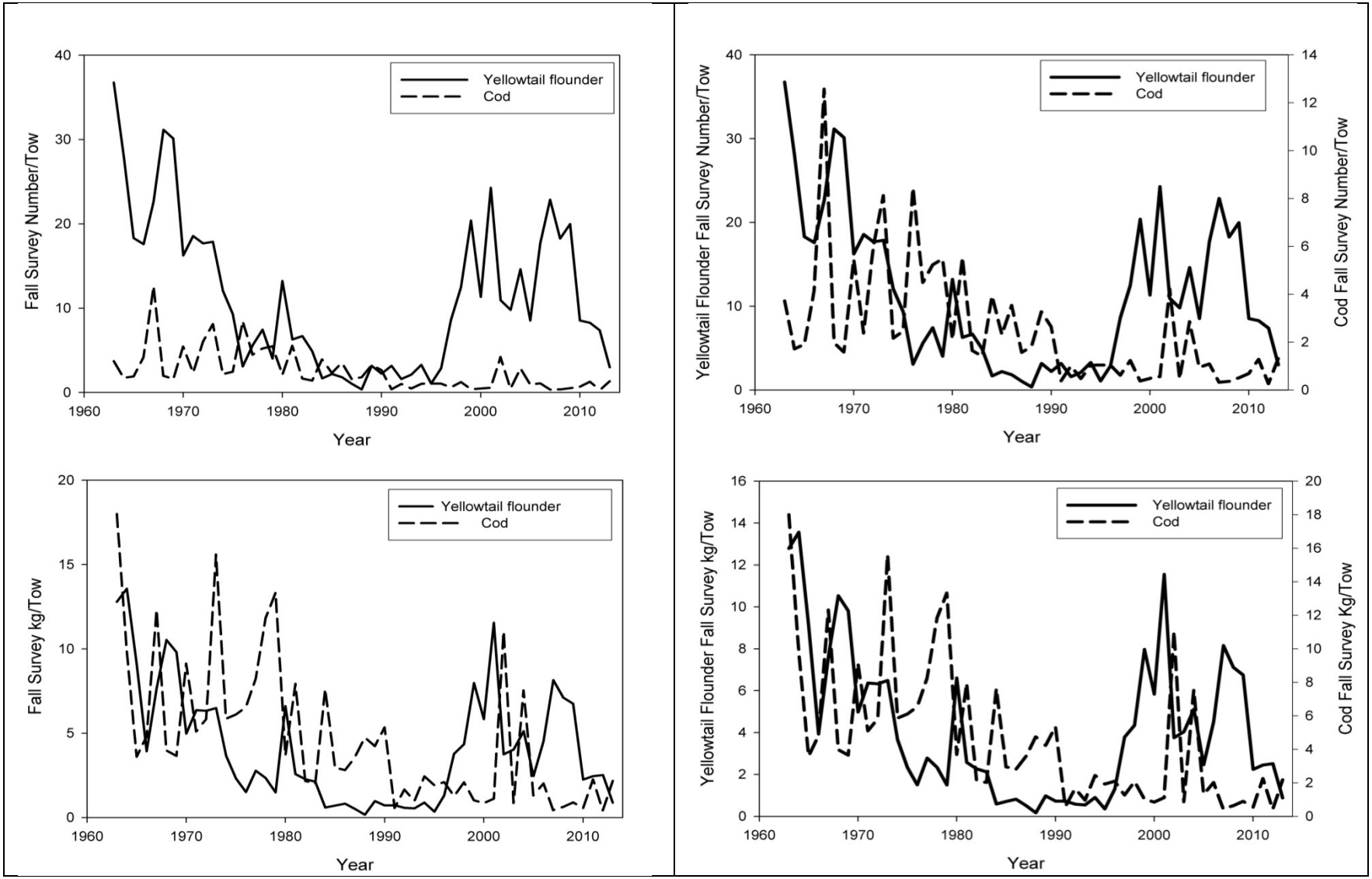

Figure 17. Atlantic cod and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

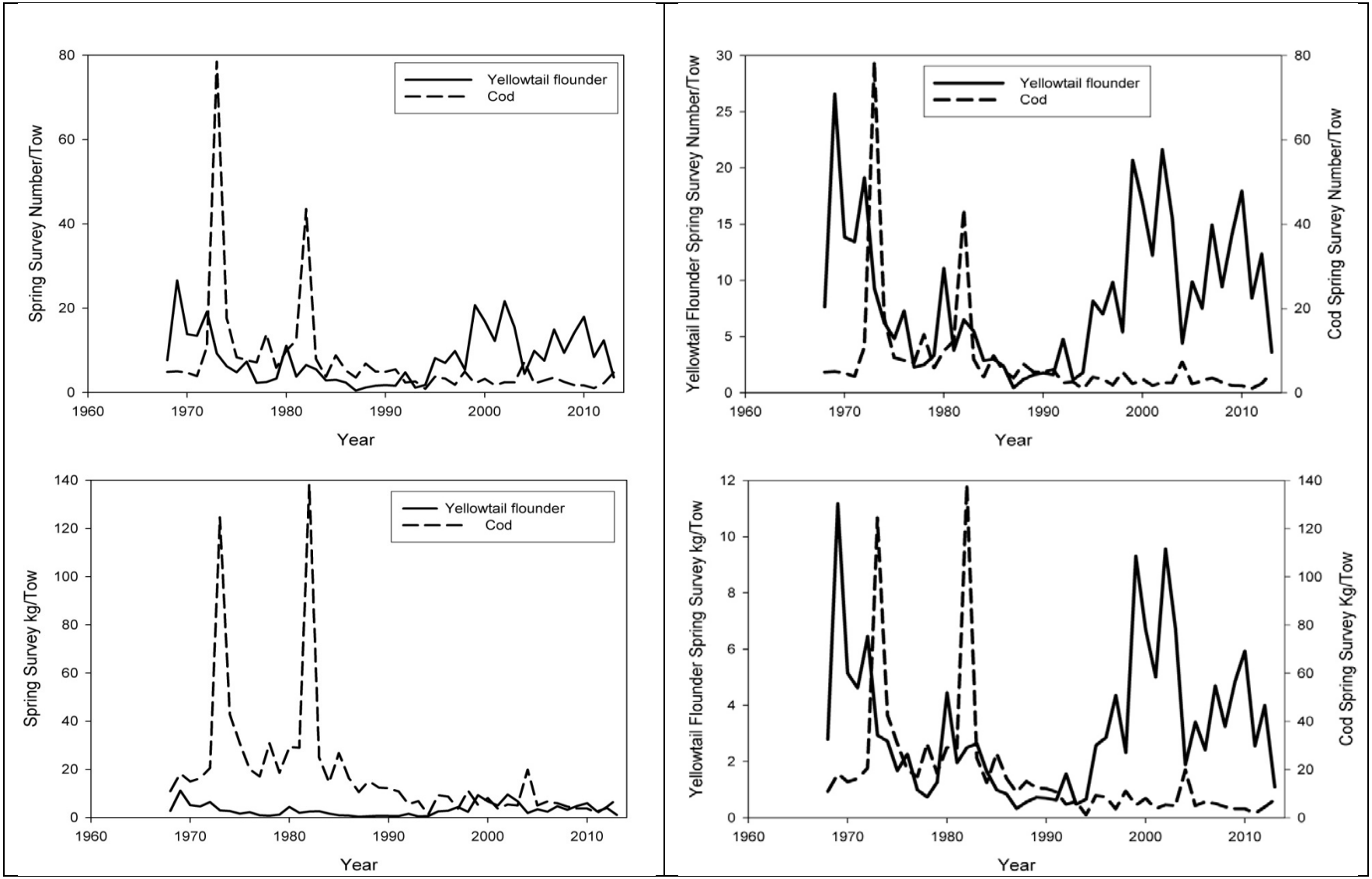

Figure 18. Atlantic cod and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

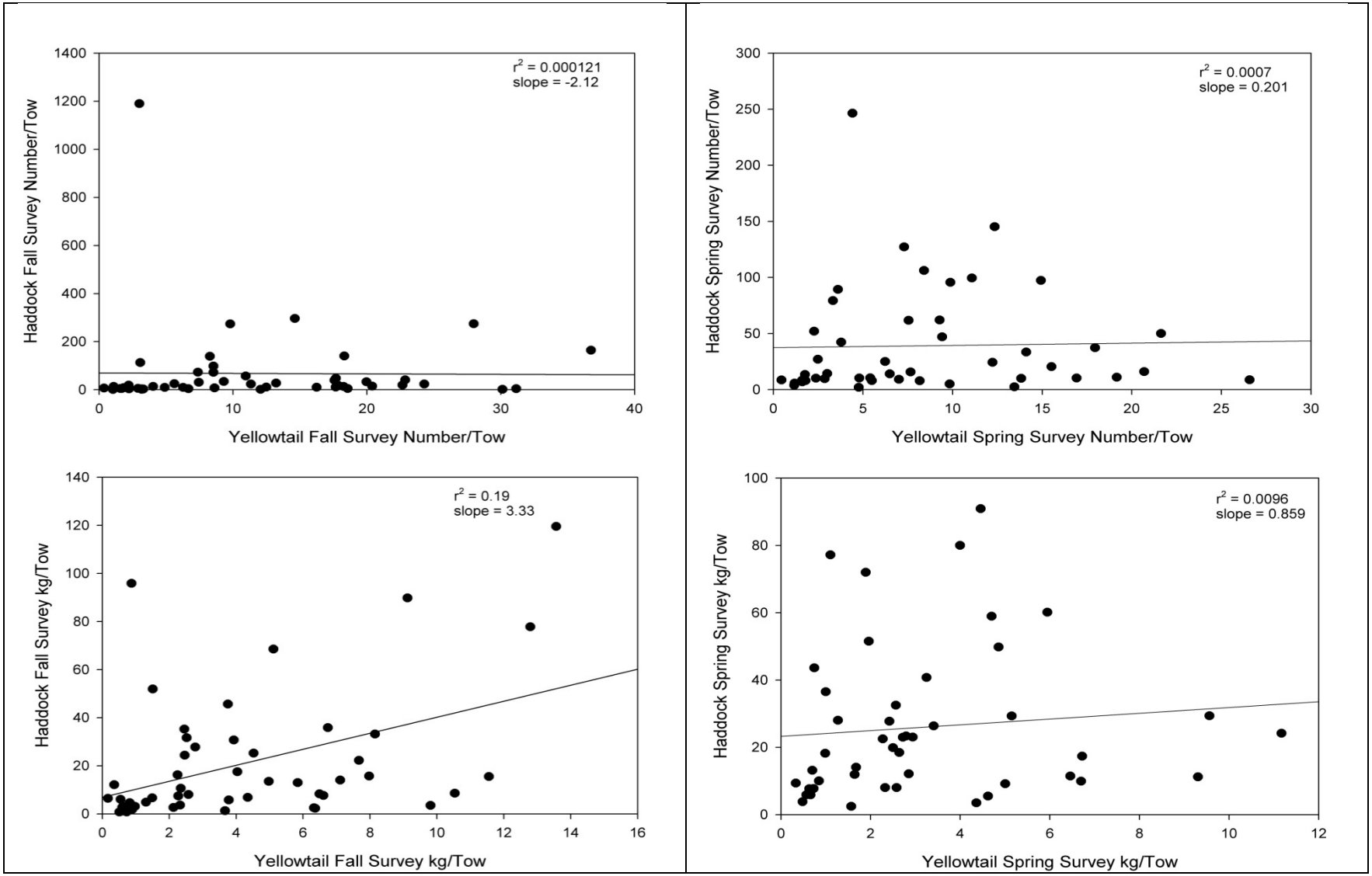

Figure 19. The relationship between yellowtail flounder and haddock abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

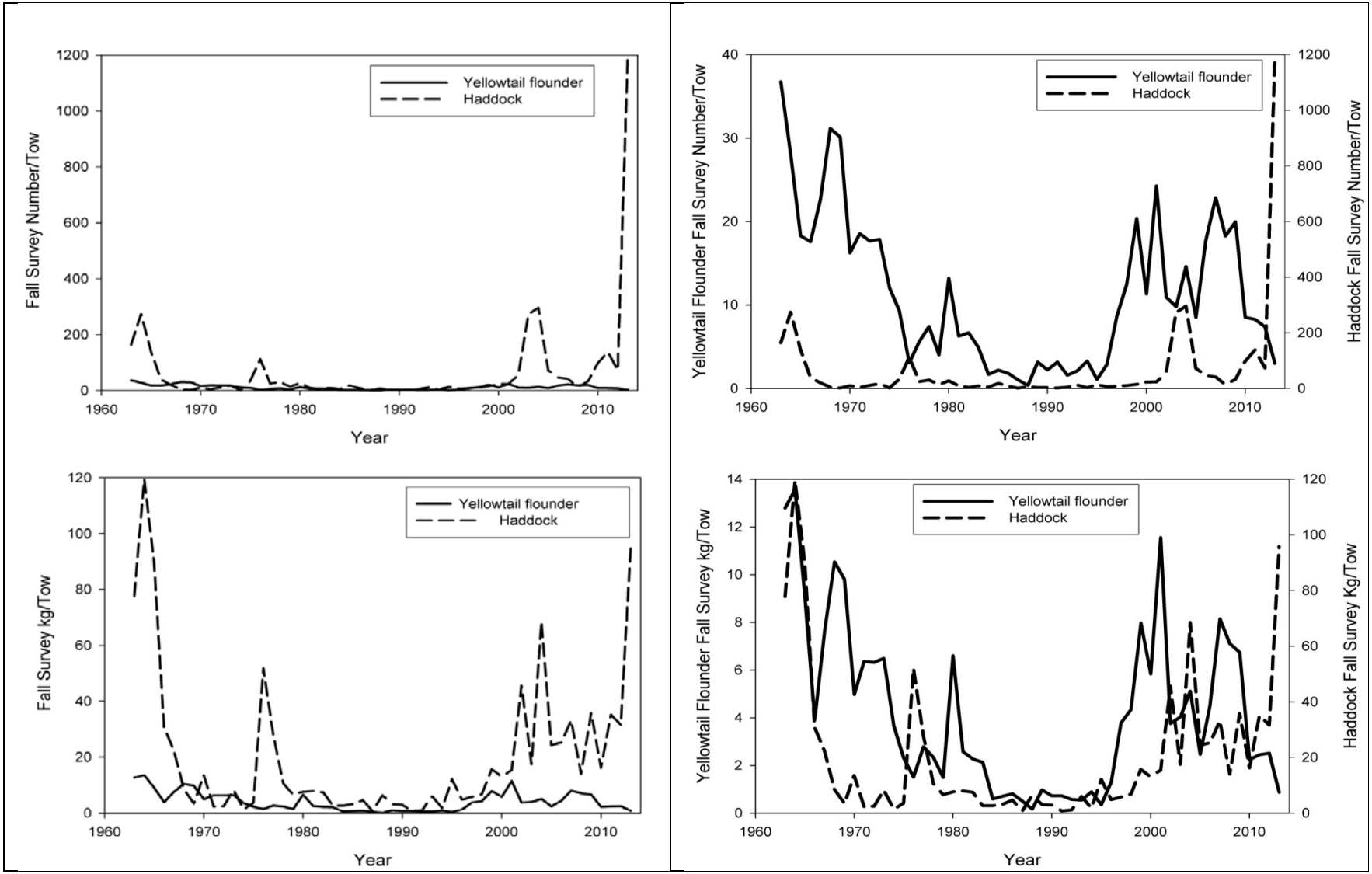

Figure 20. Haddock and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

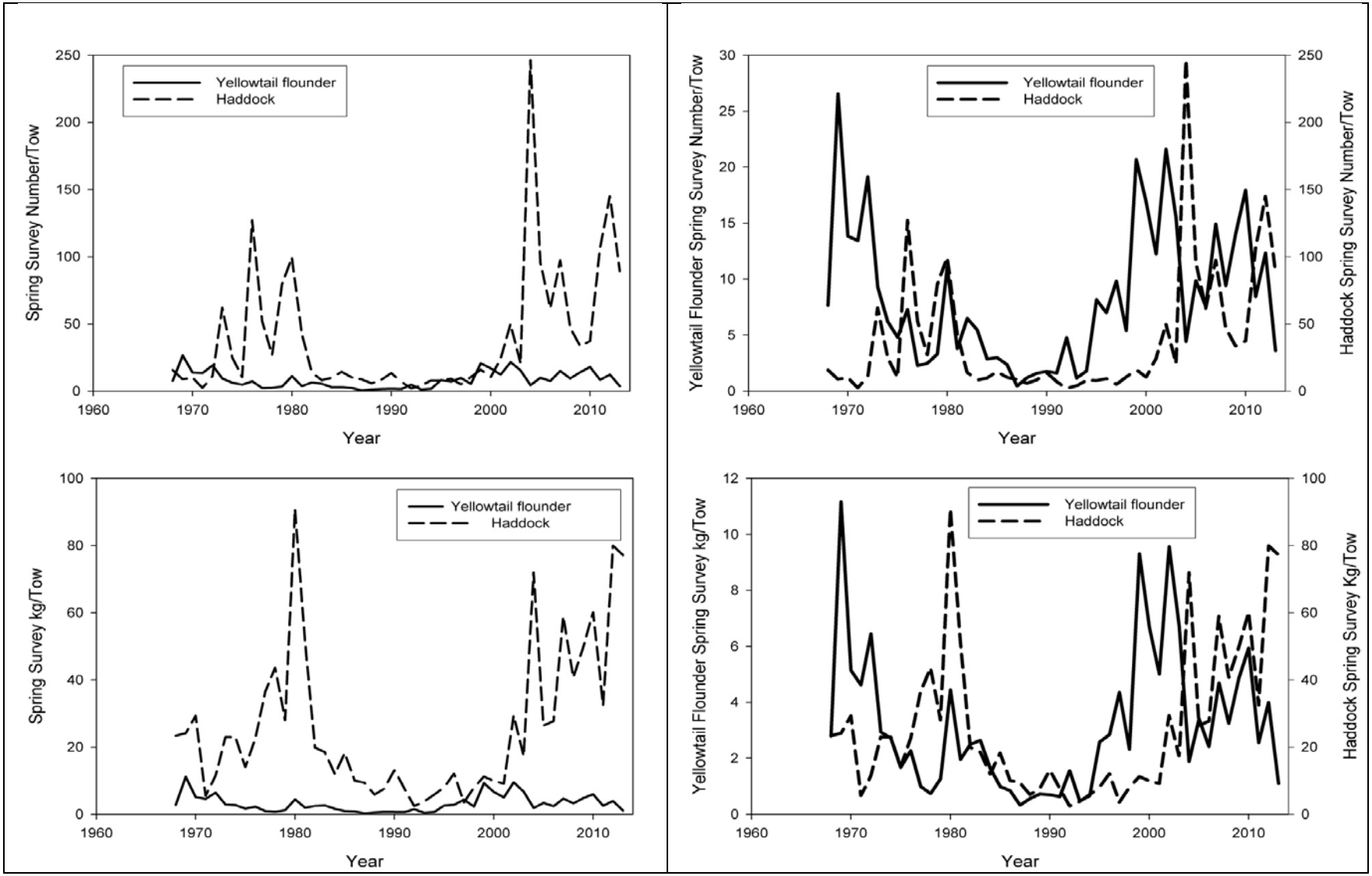

Figure 21. Haddock and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

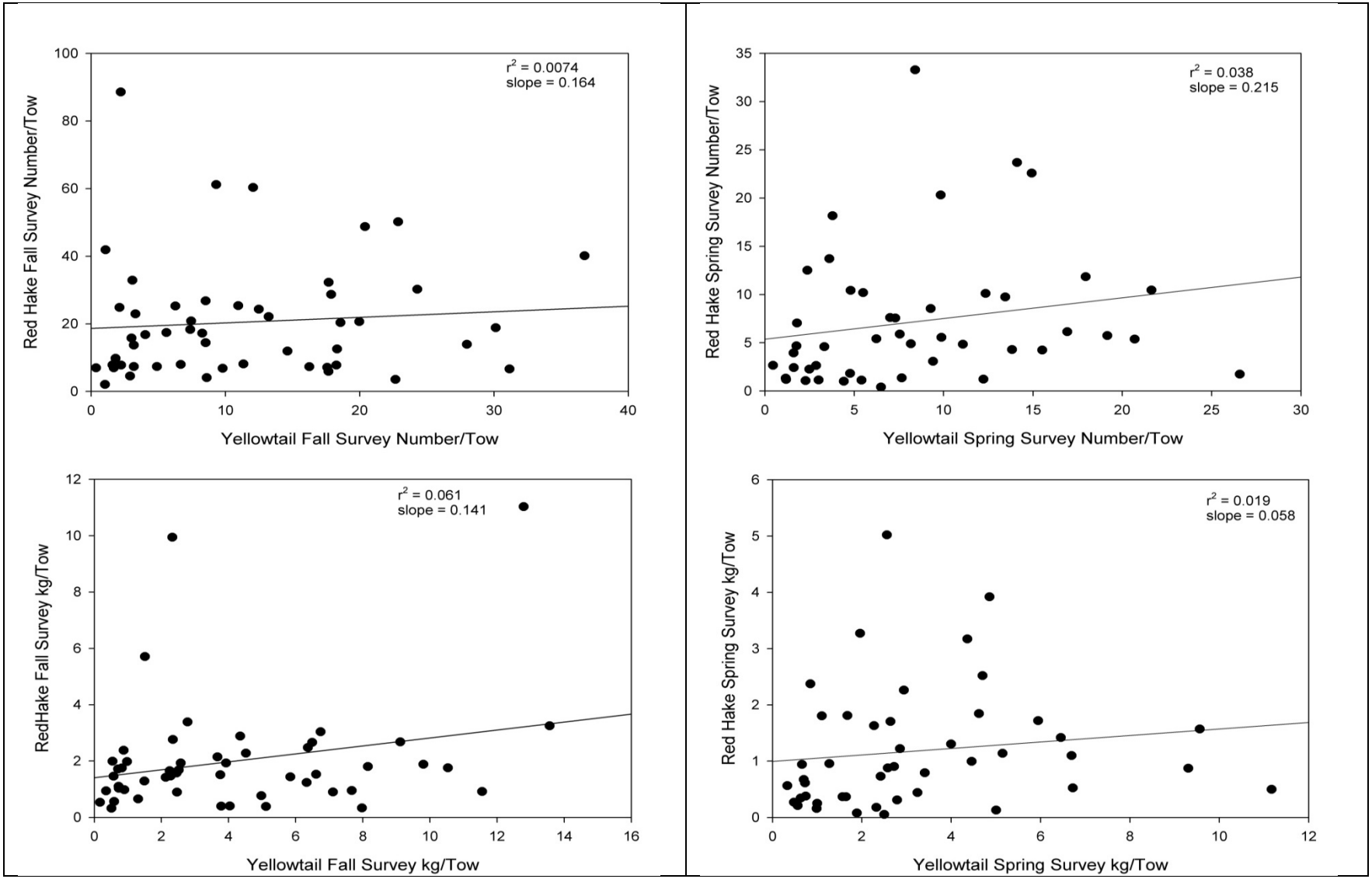

Figure 22. The relationship between yellowtail flounder and red hake abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

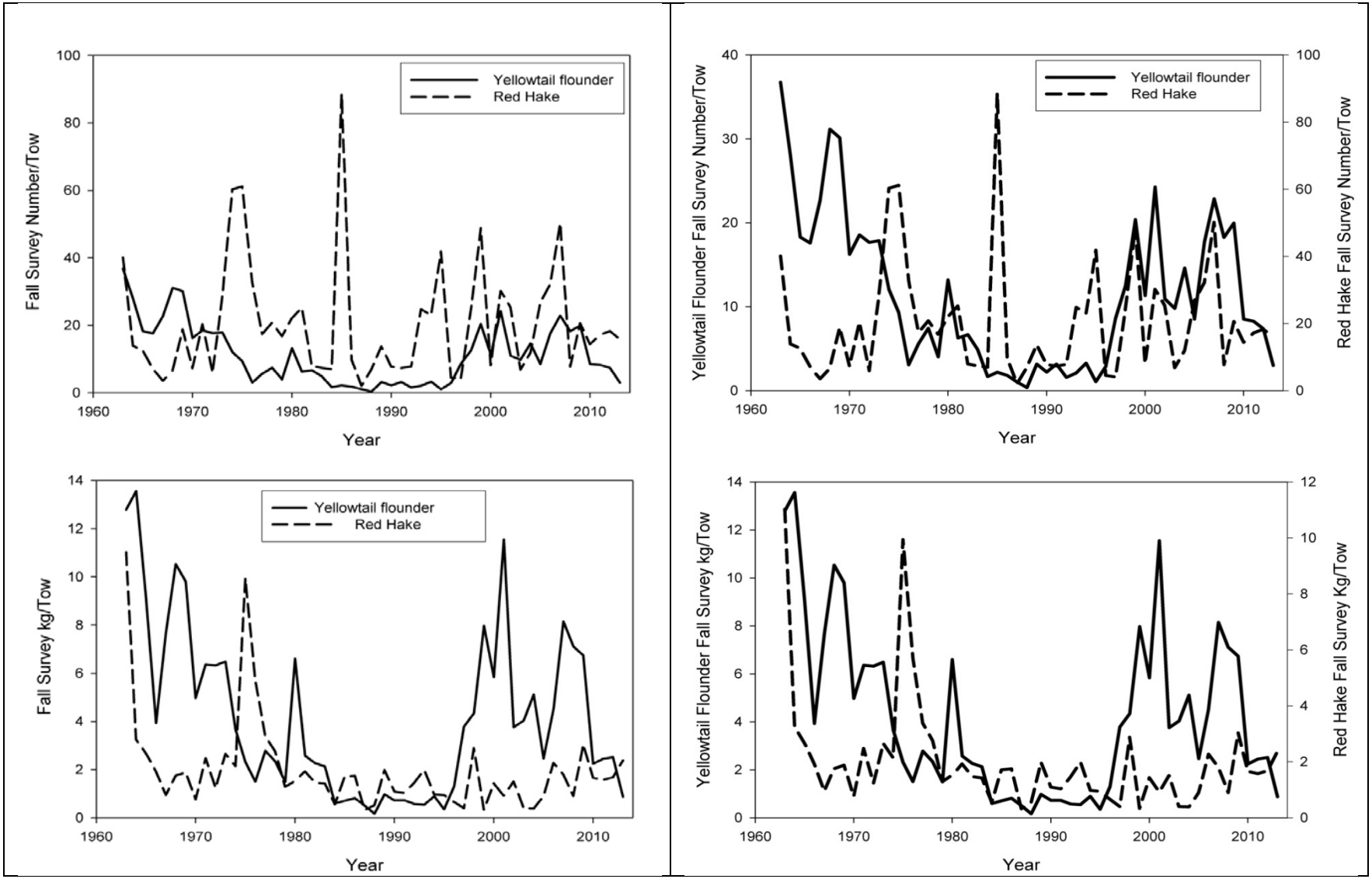

Figure 23. Red hake and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

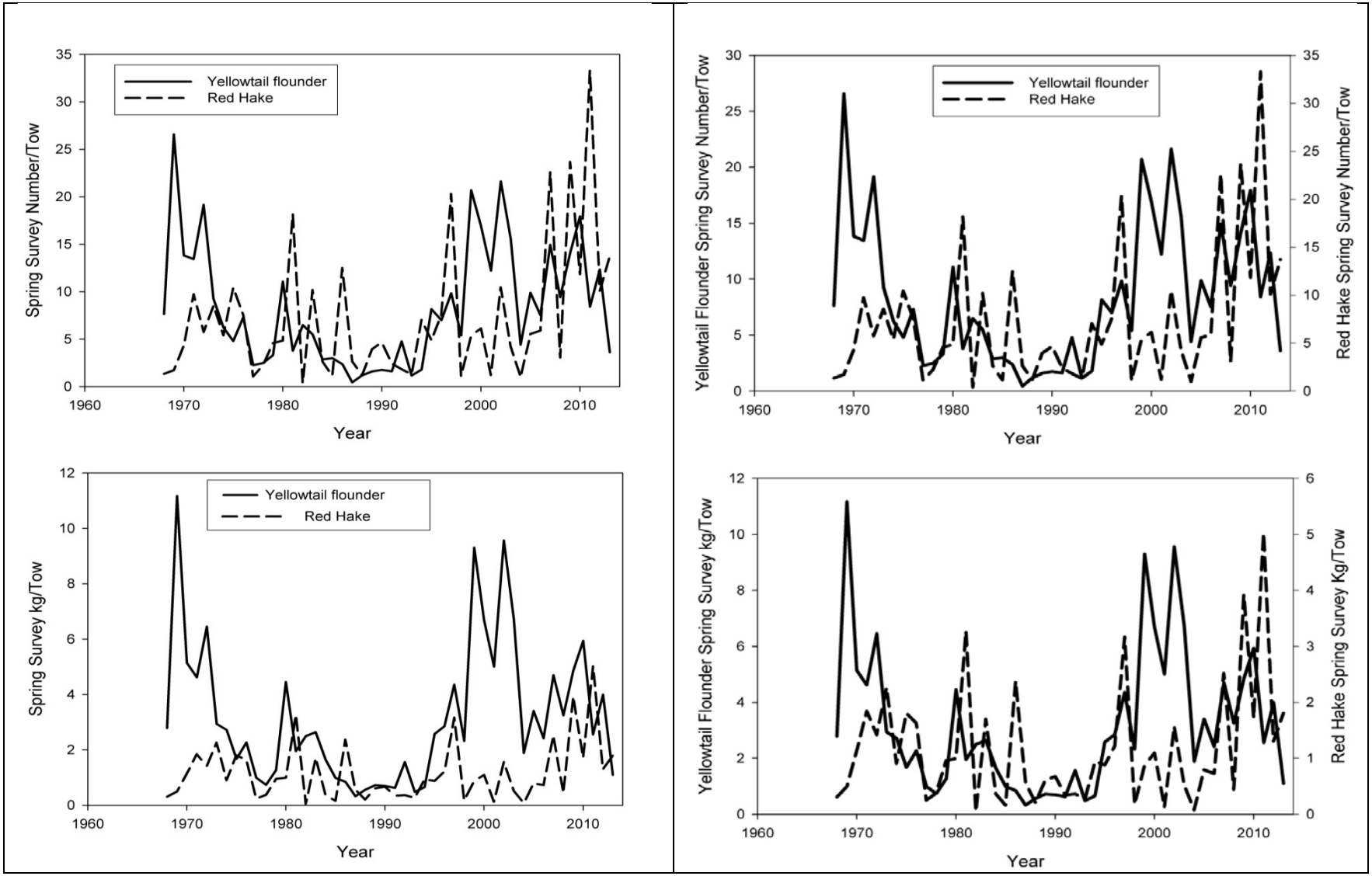

Figure 24. Red hake and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

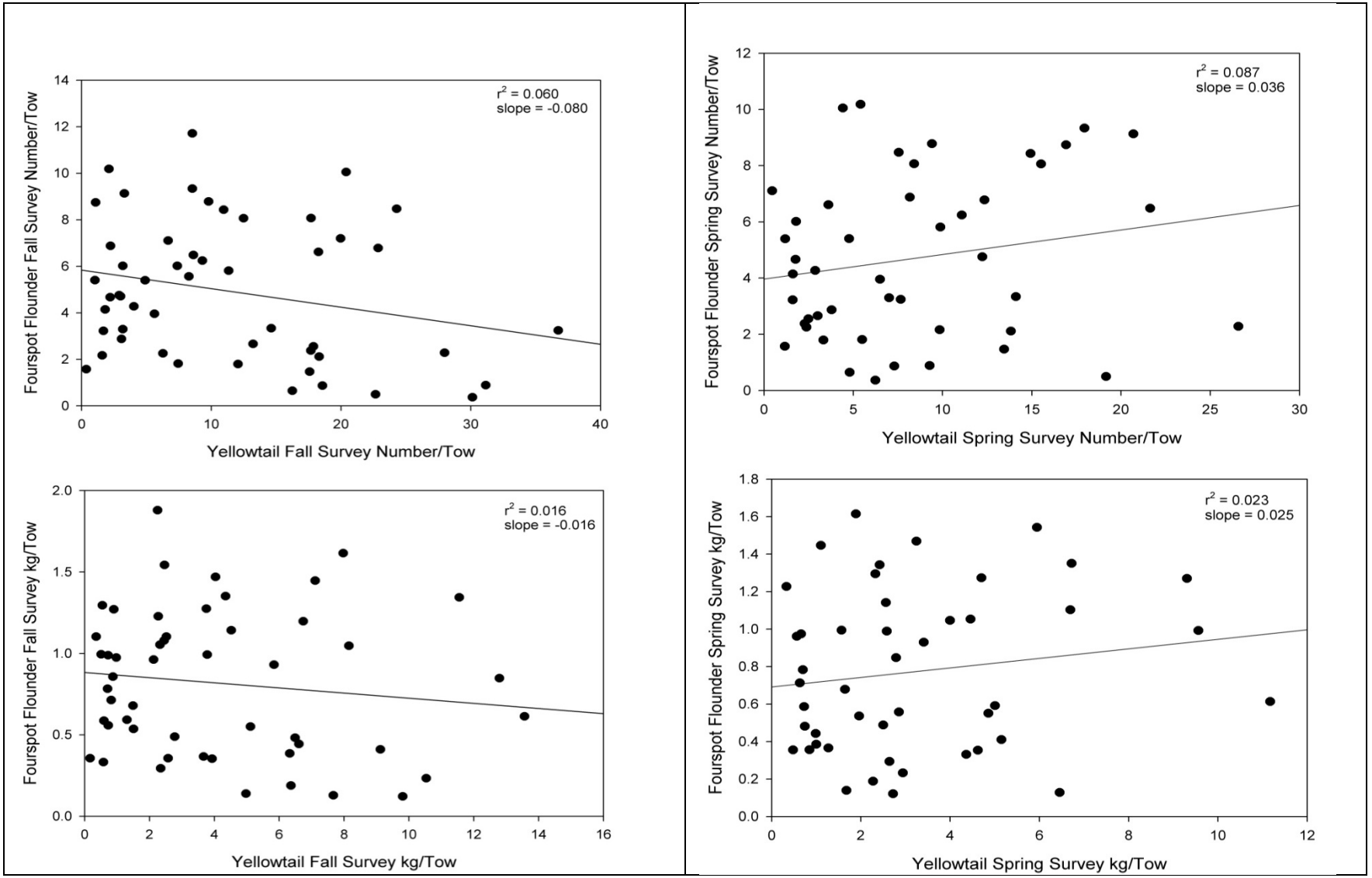

Figure 25. The relationship between yellowtail flounder and fourspot flounder abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

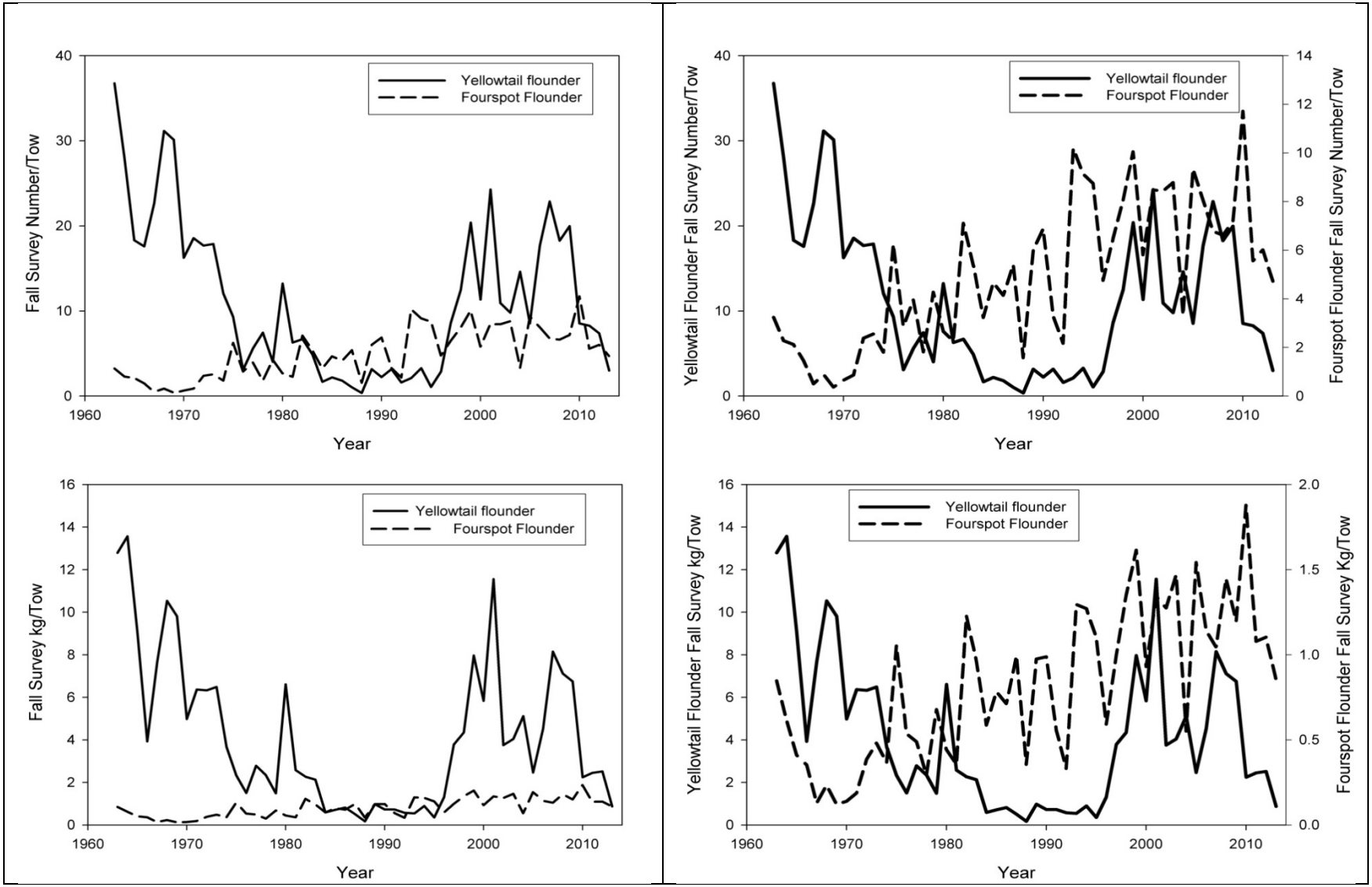

Figure 26. Fourspot flounder and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

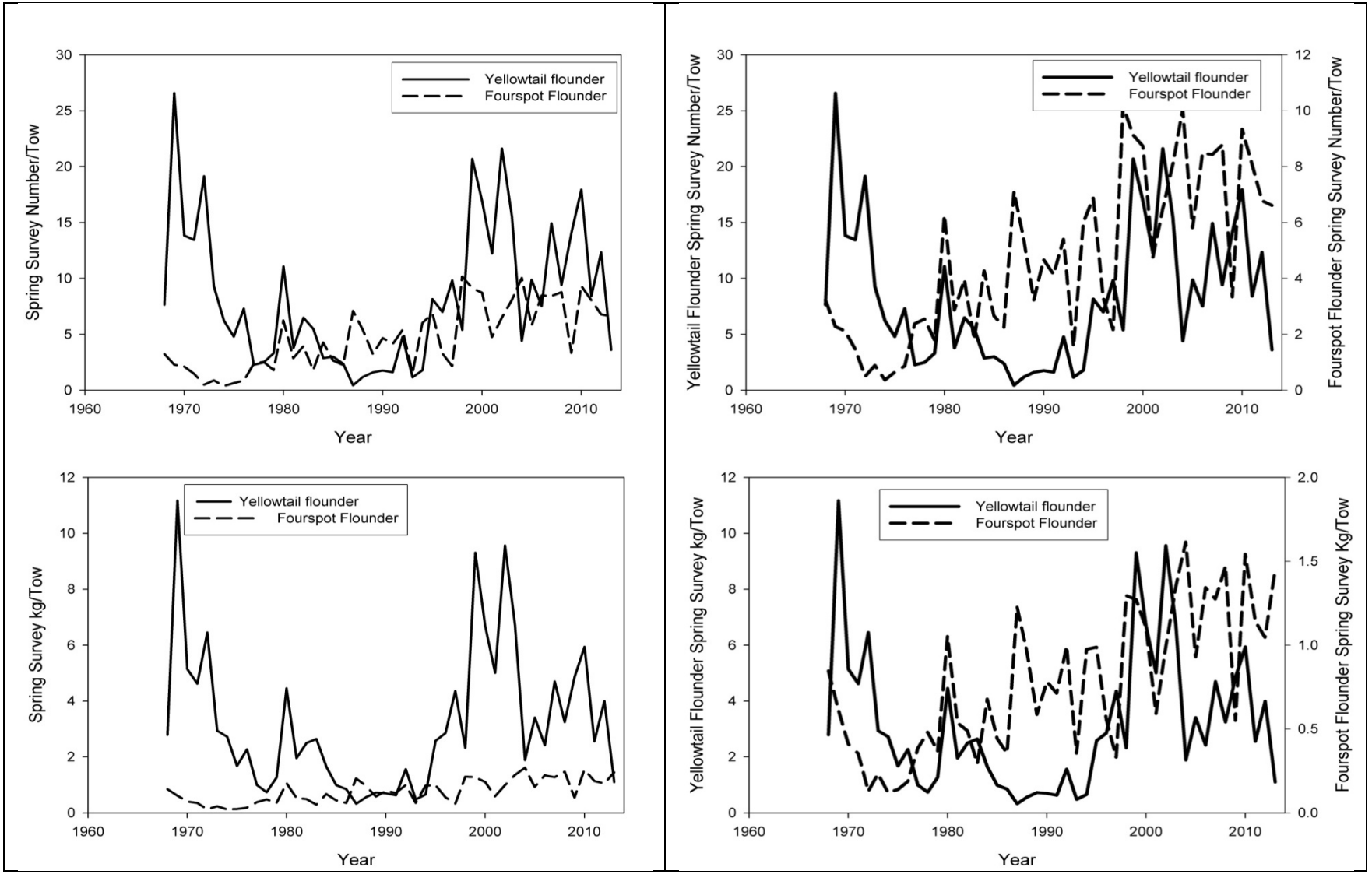

Figure 27. Fourspot flounder and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

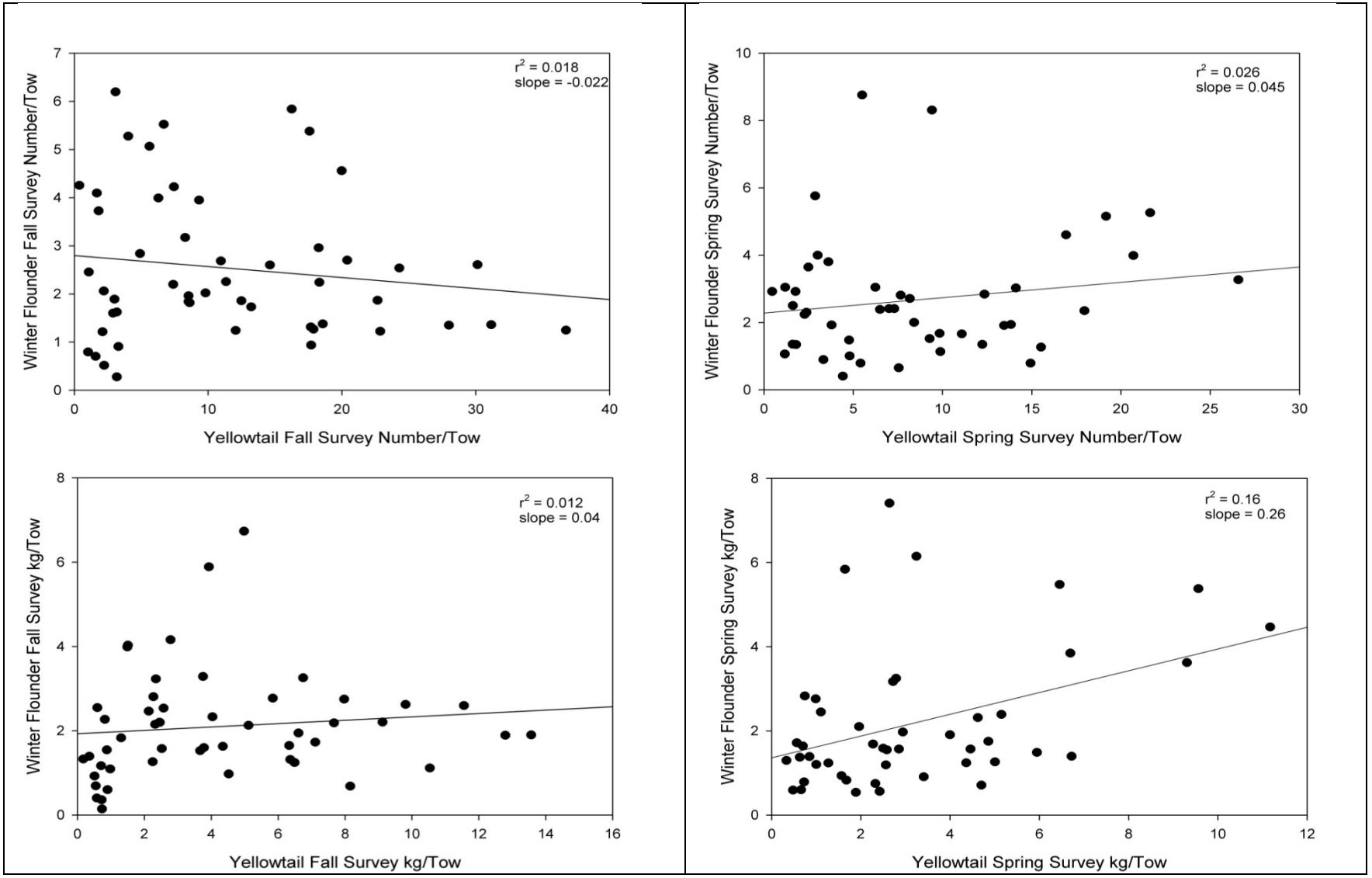

Figure 28. The relationship between yellowtail flounder and winter flounder abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

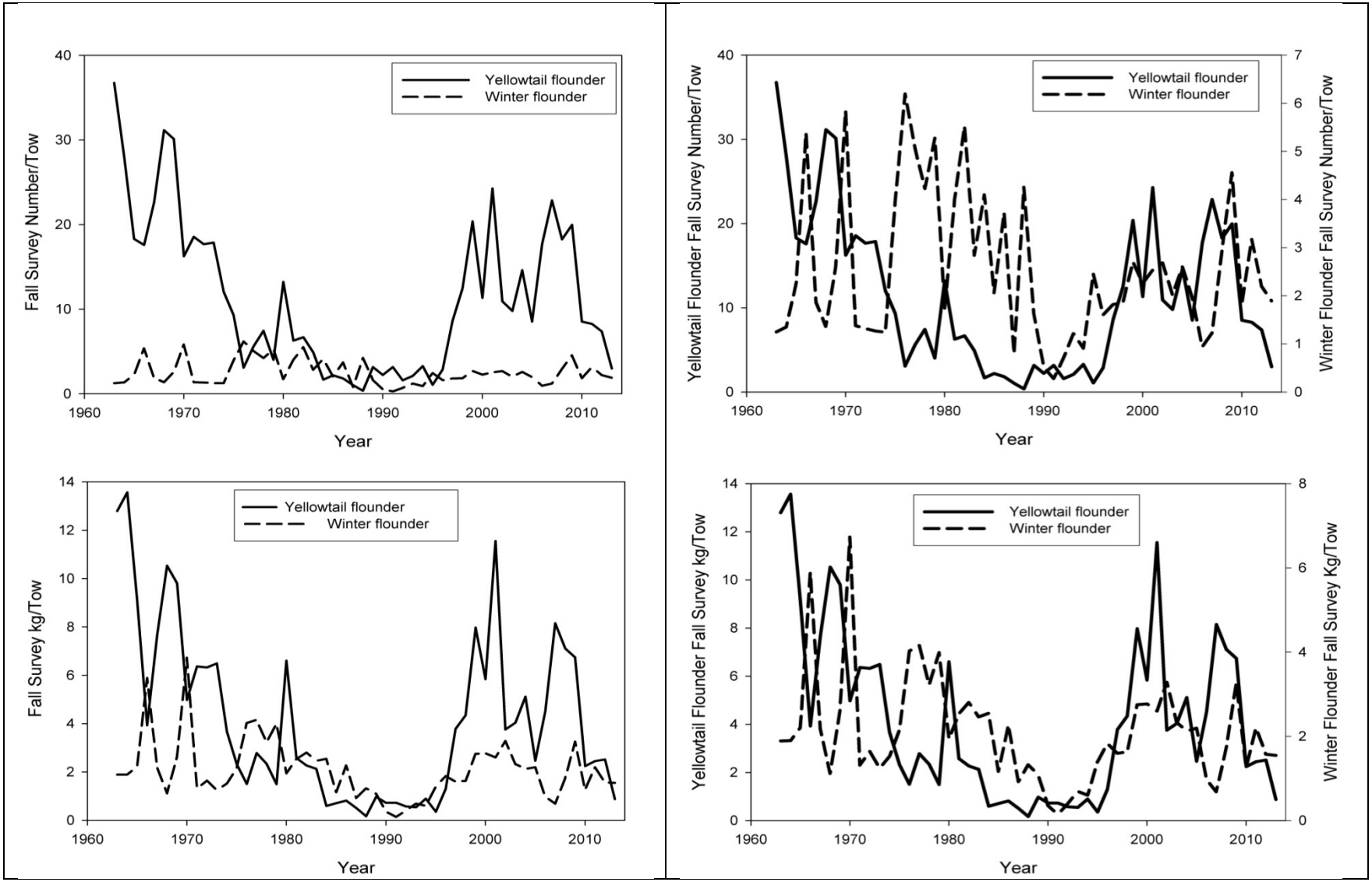

Figure 29. Winter flounder and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

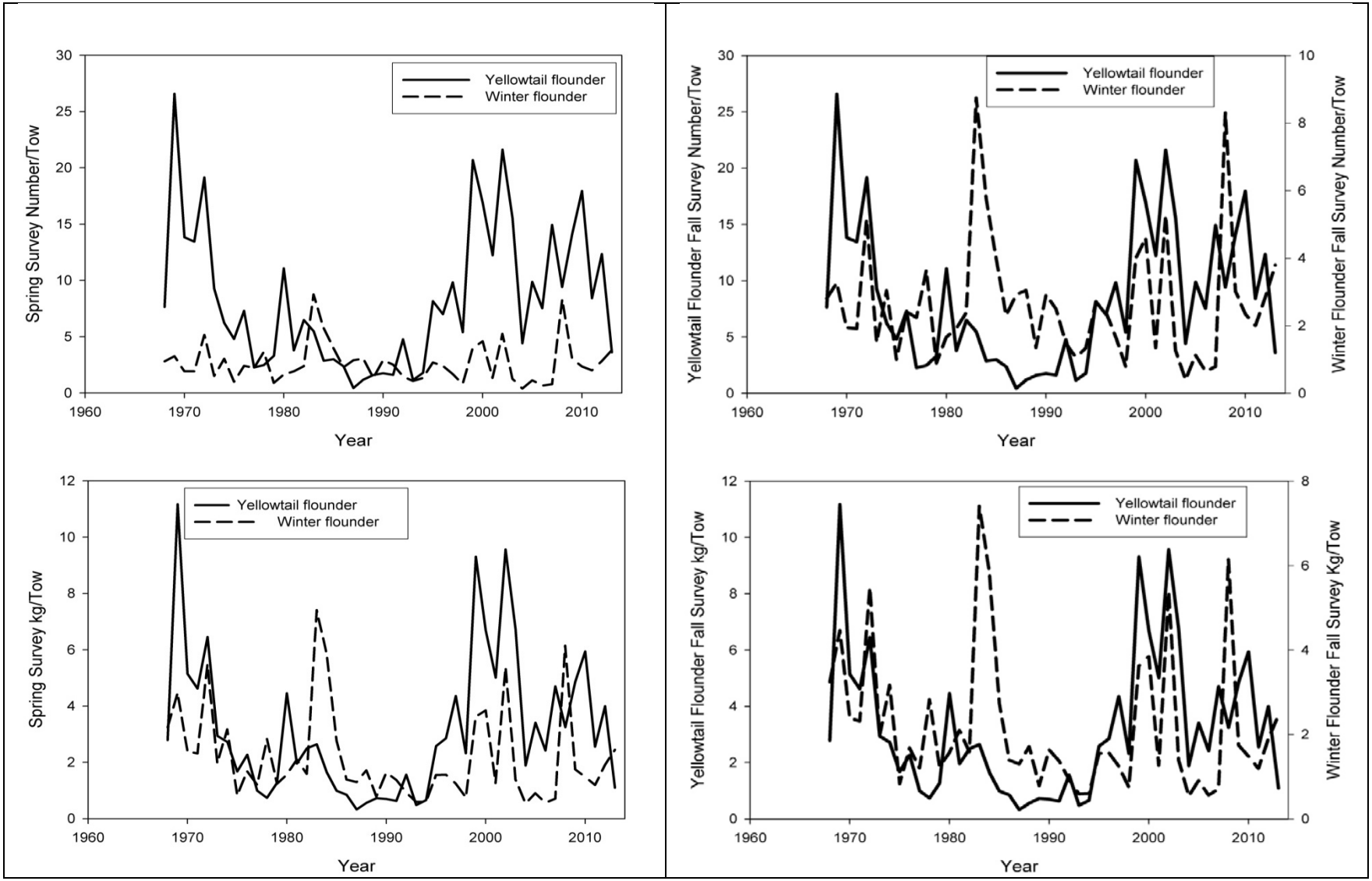

Figure 30. Winter flounder and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

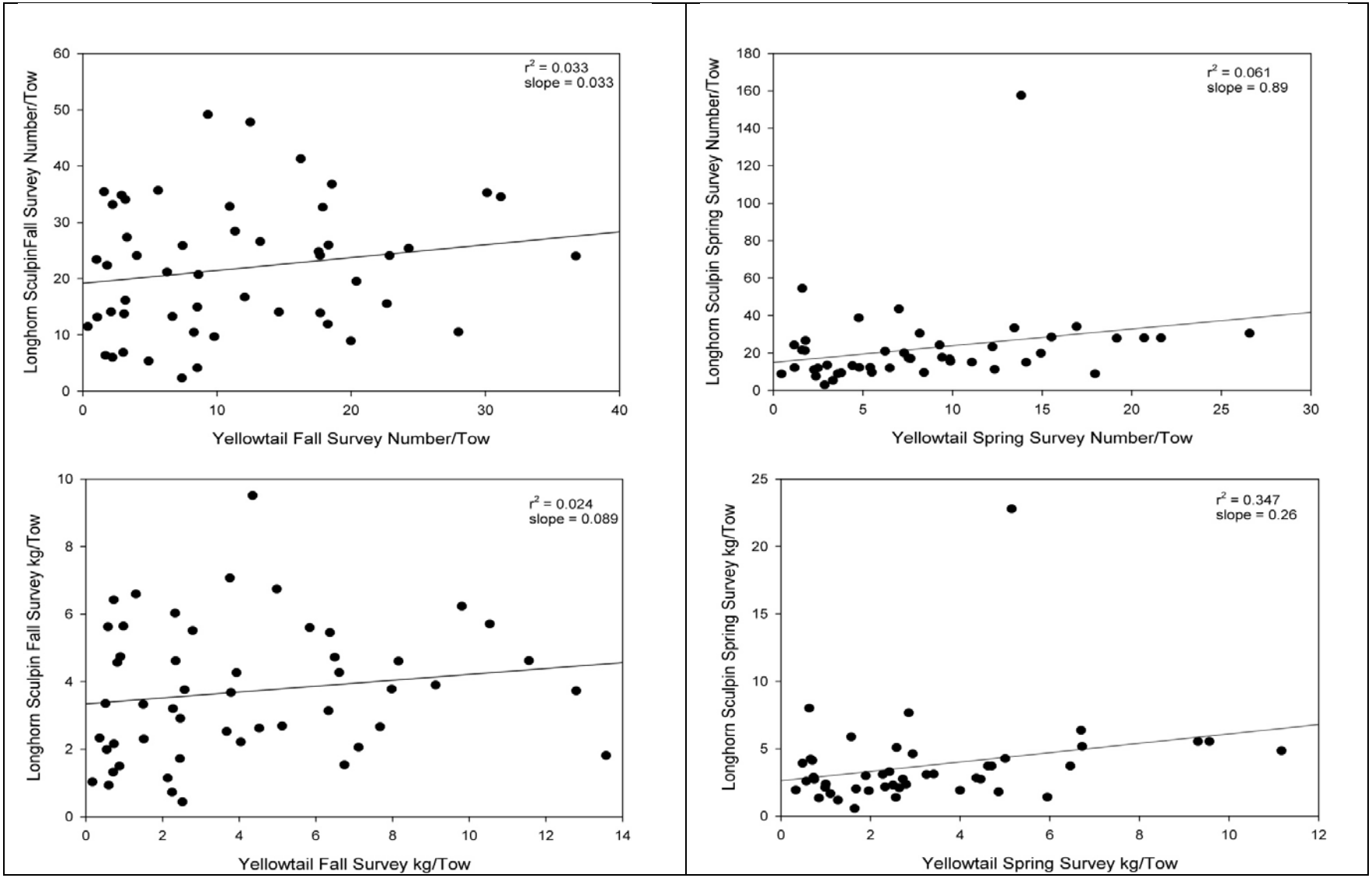

Figure 31. The relationship between yellowtail flounder and longhorn sculpin abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

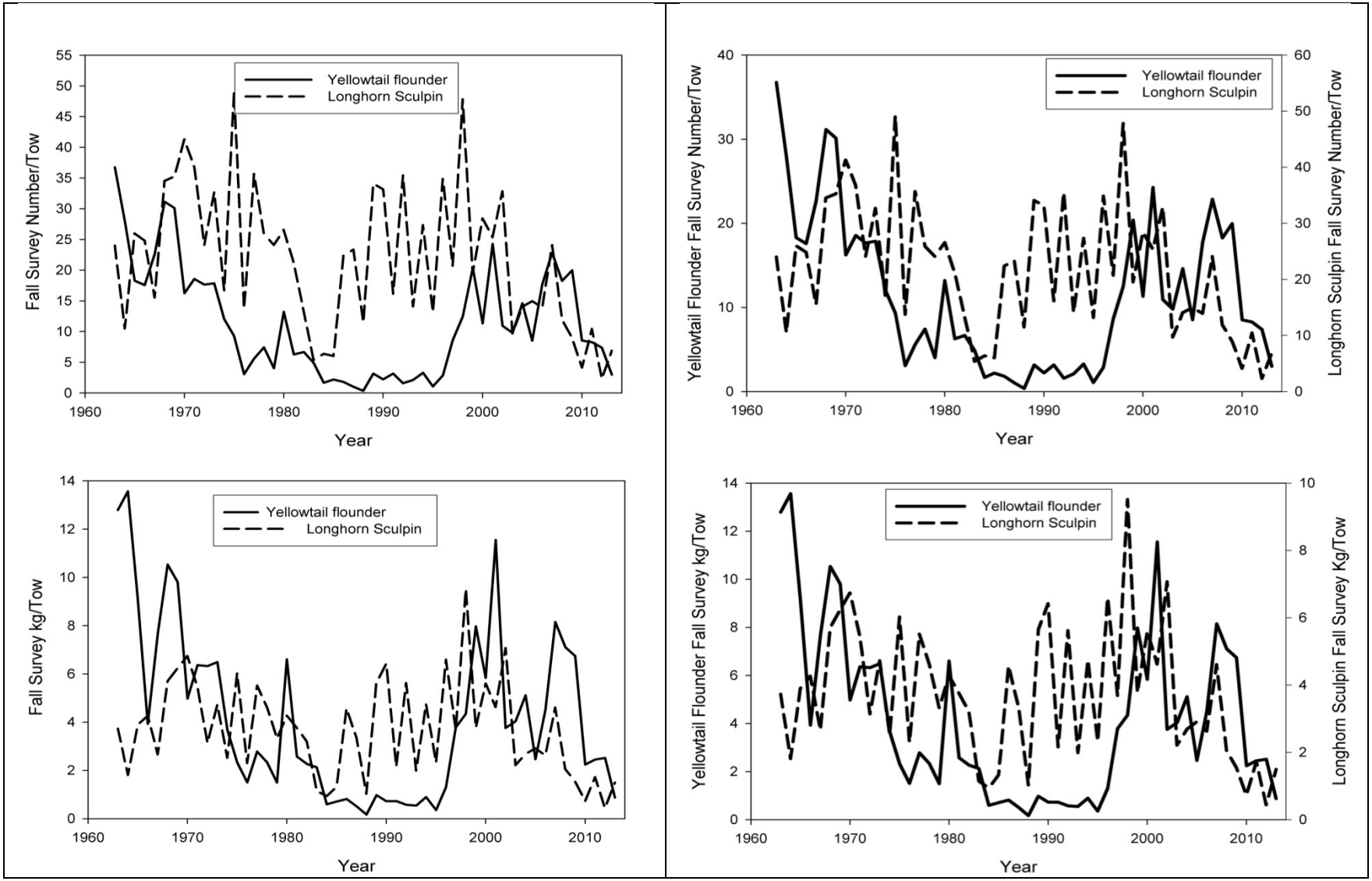

Figure 32. Longhorn sculpin and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

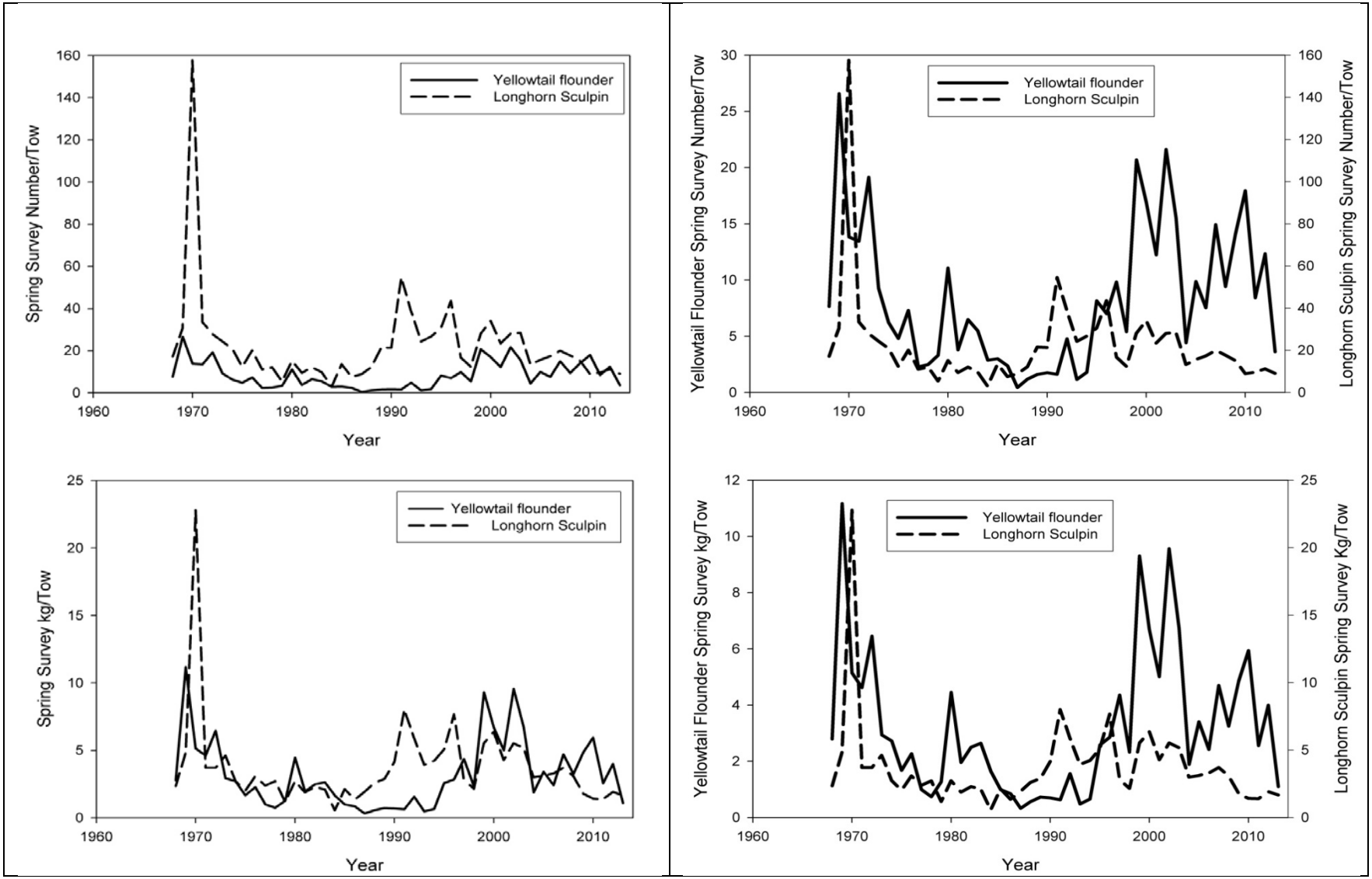

Figure 33. Longhorn sculpin and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

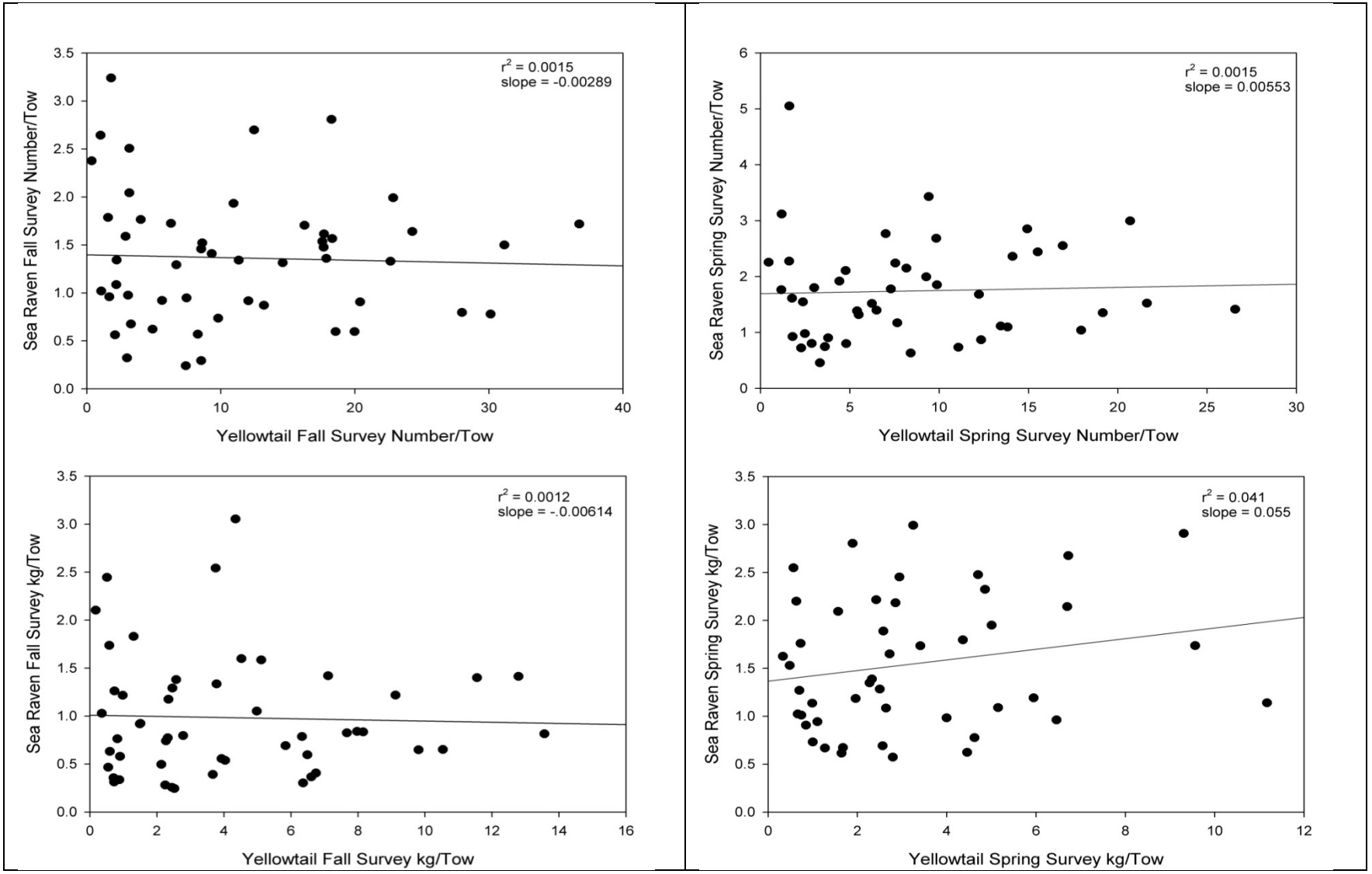

Figure 34. The relationship between yellowtail flounder and sea raven abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

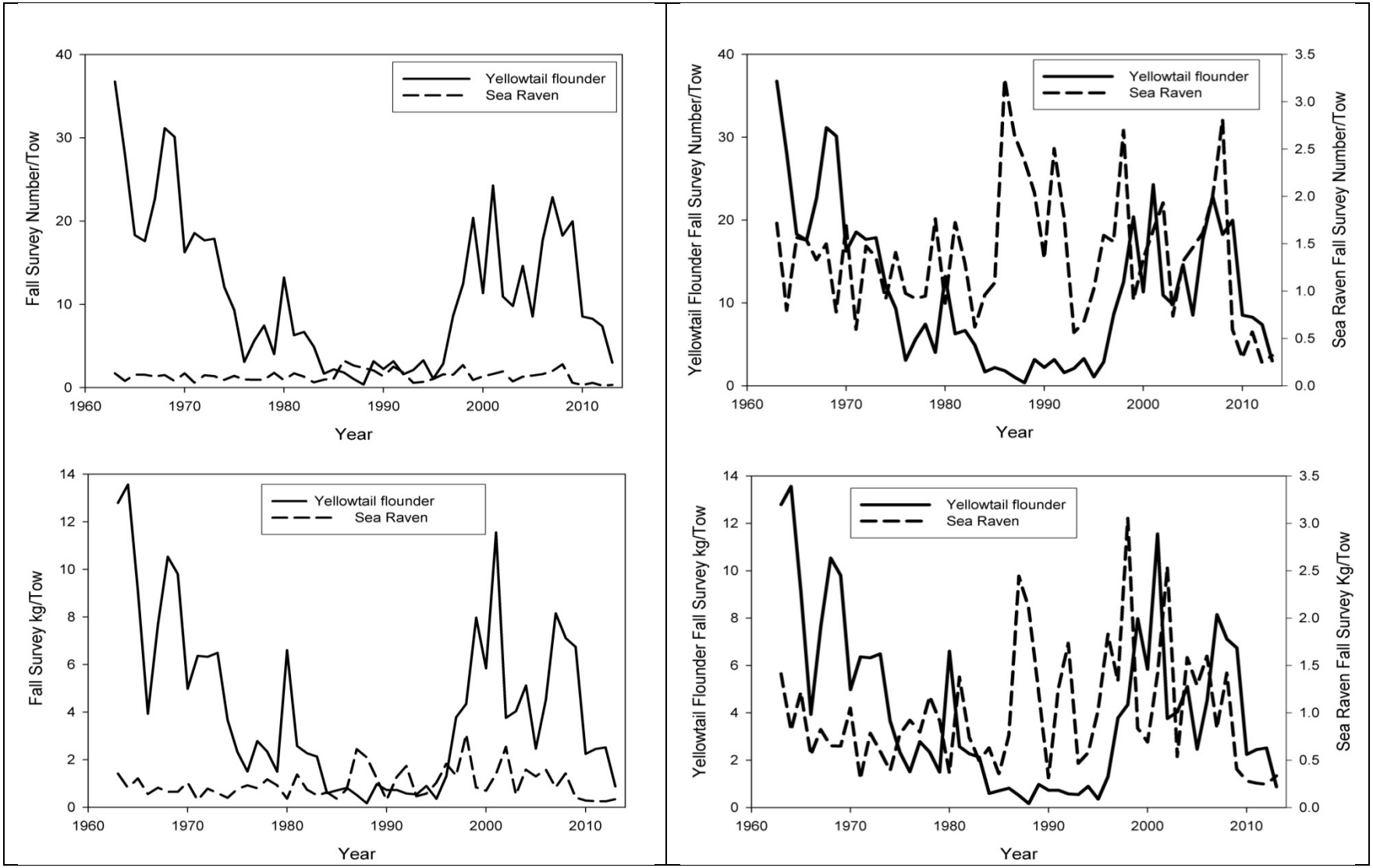

Figure 35. Sea raven and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

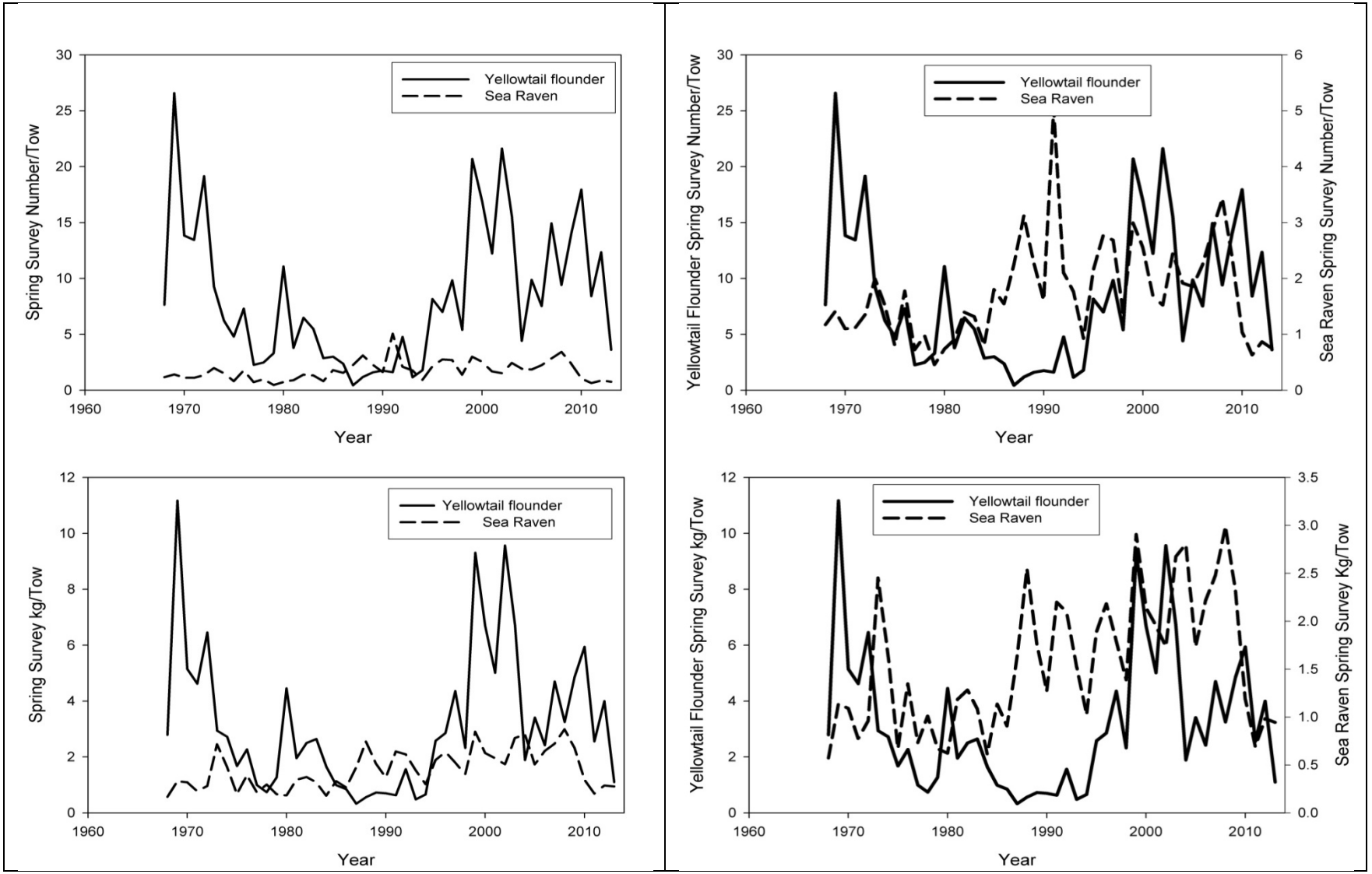

Figure 36. Sea raven and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

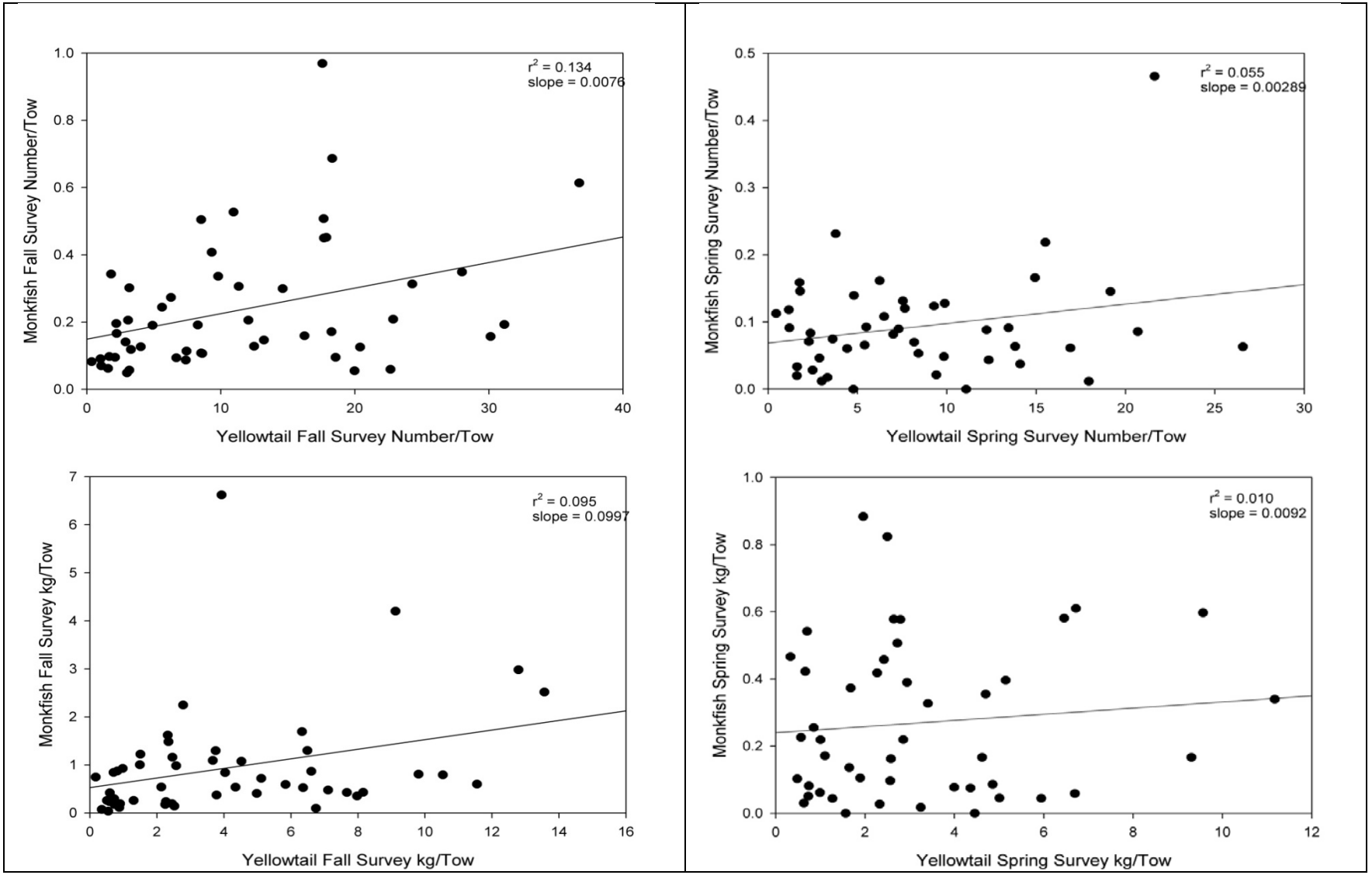

Figure 37. The relationship between yellowtail flounder and goosefish abundance and biomass indices in strata 01130-01210 on Georges Bank. Left panels are the fall survey while the right panels are the spring. Numbers/tow indices are in the top panels and weight/tow in the bottom.

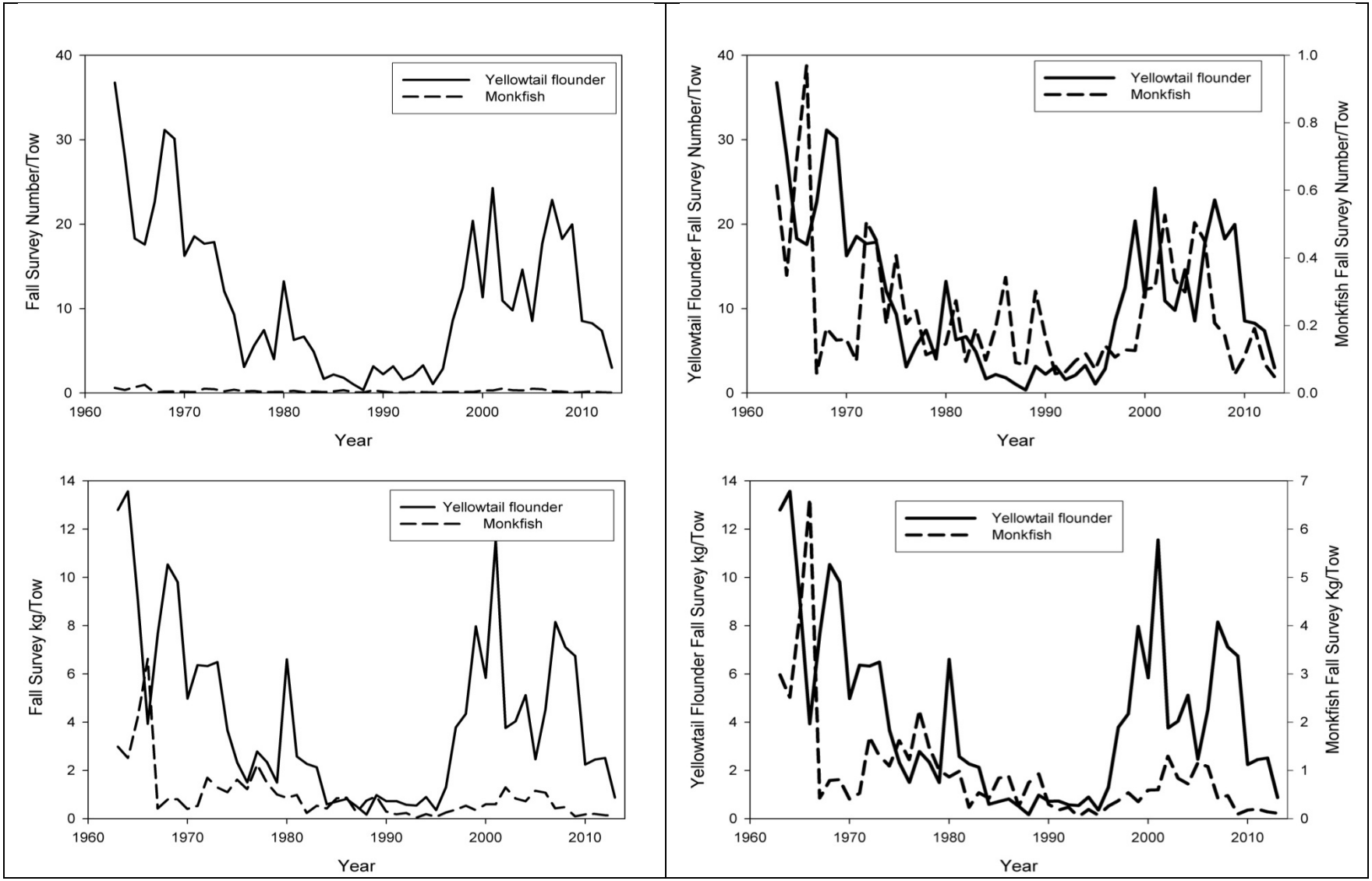

Figure 38. Goosefish and yellowtail flounder indices for Georges Bank (01130-01210) for the fall. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.

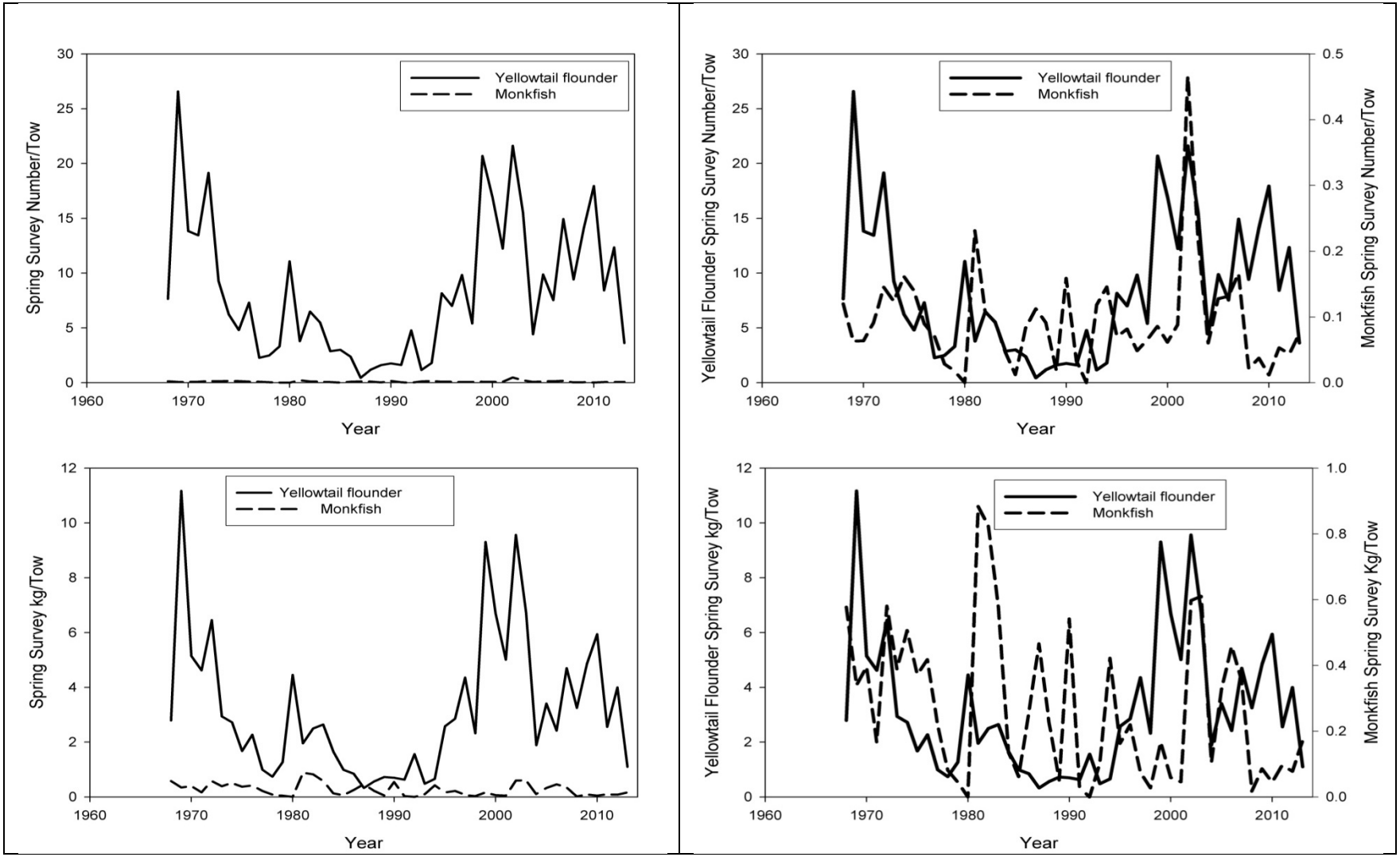

Figure 39. Goosefish and yellowtail flounder indices for Georges Bank (01130-01210) for the spring. Top panel is in numbers/tow while the bottom is in weight/tow. The left hand panels are both species on the same scale and the right hand has each species plotted on a separate scale.