Standardization of commercial catch per unit effort of hogfish (*Lachnolaimus maximus*) from North Carolina Trip Ticket landings

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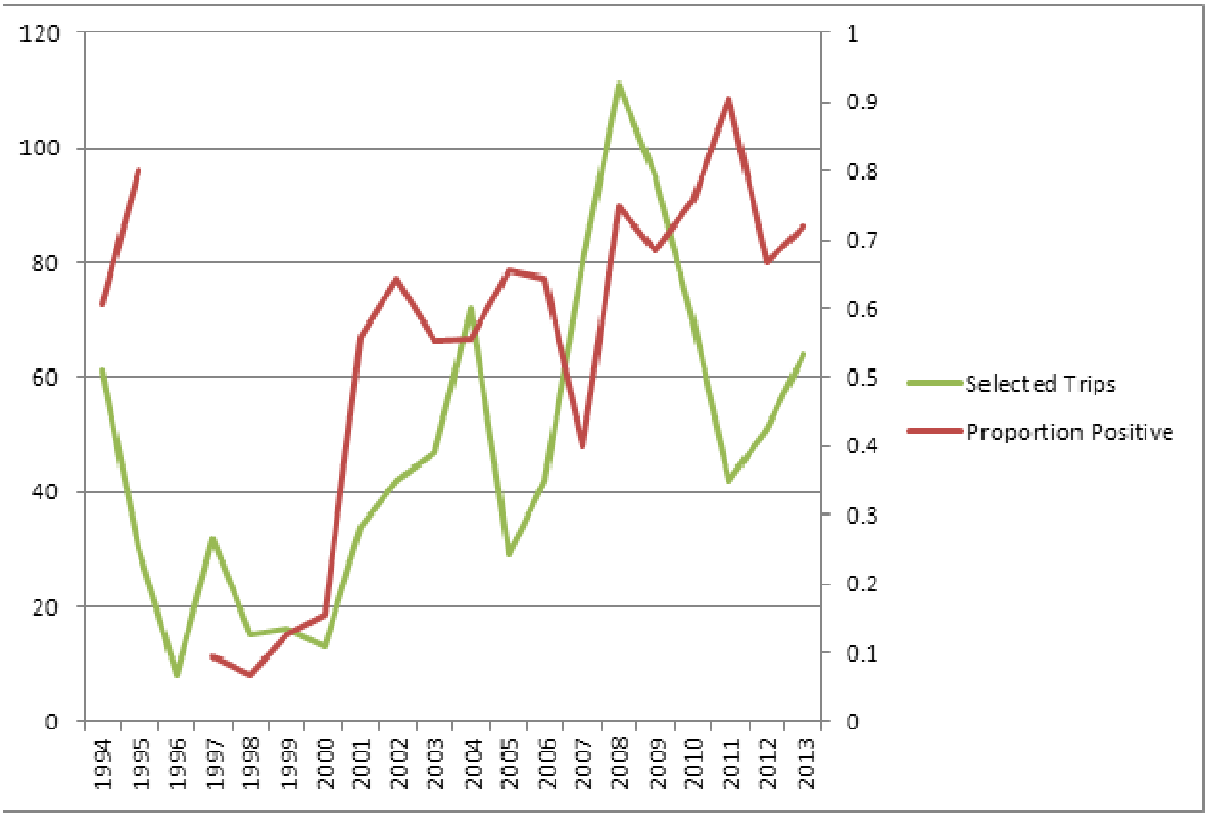
[Below are excerpts from an email provided by Chip Collier to Wade Cooper on 6/12/2014]

I know you are curious how hogfish landings appear and if there are any trends. Below I have two graphs based on some non-reviewed analysis. The first plot is the average weight per trip for commercial divers which is a non-standardized index and then a standardized cpue which was developed with year and month as factor and distribution with a negative binomial (dispersion is significant in the sas model). The trips that were included in the commercial dive model included all trips that had landings of gag, red, and scamp grouper as well as trips with hogfish. This was based on cluster analysis of commercial diving trip tickets. Overall there were only 954 trips included from 1994 to 2013. In this model, 1996 was removed due to low number of trips and having 0 hogfish landings. The proportion positive and the index are highly correlated. Either fishermen have been increasing the targeting of hogfish or there has been an increase in hogfish over the past 10 years. I know the price and desirability has increased in North Carolina over that time period so it could be a combination.

Please also consider that this information is too late to add into Florida's assessment and is highly uncertain with a strong potential for bias. We need to start to think about a method to track hogfish abundance. The best choice would be SEFIS/SERFS which could potentially be supplemented with other information.

If you have any questions, please let me know.


200
180
160
140
120
100
80
60
40
20
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Average of Hogfish
Standarized


120
100
80
60
40
20
0
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Selected Trips
Proportion Positive

Year	Mean	Standard Error of Mean	Lower Mean	Upper Mean	Pr > |z|	z Value	Avg	Count of Trips	Positive Trips	proportion positive
1994	73.1014	20.1882	42.5452	125.6	<.0001	15.54	69.40574	61	37	0.606557
1995	83.9746	32.8425	39.016	180.74	<.0001	11.33	87.79167	30	24	0.8
1996								8	0	
1997	1.7451	0.702	0.7932	3.8392	0.1664	1.38	1.914063	32	3	0.09375
1998	4.2396	2.4537	1.3636	13.1814	0.0126	2.5	5.333333	15	1	0.066667
1999	5.5392	3.0272	1.8979	16.1672	0.0017	3.13	5.195625	16	2	0.125
2000	5.433	3.2889	1.6587	17.796	0.0052	2.8	5.192308	13	2	0.153846
2001	50.2834	18.4704	24.4769	103.3	<.0001	10.67	49.54647	34	19	0.558824
2002	68.2634	22.7279	35.5455	131.1	<.0001	12.68	73.6531	42	27	0.642857
2003	60.7664	18.9915	32.9332	112.12	<.0001	13.14	59.65447	47	26	0.553191
2004	75.6326	19.2386	45.9398	124.52	<.0001	17.01	71.69611	72	40	0.555556
2005	55.5944	22.102	25.5052	121.18	<.0001	10.11	57.06931	29	19	0.655172
2006	32.3648	10.7061	16.9238	61.8935	<.0001	10.51	33.12548	42	27	0.642857
2007	24.2813	5.8284	15.1689	38.8679	<.0001	13.29	24.83488	80	32	0.4
2008	75.3867	15.3162	50.6241	112.26	<.0001	21.28	75.05369	111	83	0.747748
2009	67.8219	14.9258	44.0599	104.4	<.0001	19.16	70.36	95	65	0.684211
2010	133.16	34.0215	80.7027	219.71	<.0001	19.15	133.2663	70	53	0.757143
2011	168.68	55.8505	88.1535	322.78	<.0001	15.49	178.2462	42	38	0.904762
2012	108.46	32.4696	60.3171	195.03	<.0001	15.65	109.0792	51	34	0.666667
2013	99.4623	26.9282	58.5068	169.09	<.0001	16.99	93.905	64	46	0.71875