

Appendix A: Reprojection of Catch

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Section A-1: Catch Reprojection Methodology

This section documents the methodology that was used to reproject catch from within proposed closure areas, under the various alternatives and their options, to areas that would remain open either annually or following a trigger closure at some point in the year. This reprojection of catch is a retrospective analysis that is intended to be exemplary of where catch might have occurred had the closure been in place. This analysis utilized observed data as compiled in the VMS Enabled NOAA Fisheries Alaska Region Catch In Areas Database as developed by Steve Lewis of the Alaska Region Analytical Team. The Catch In Areas database was given favorable reviews by the Council's Scientific and Statistical Committee in February of 2009. This analysis utilized an algorithmic approach to reproject catch using the data, and assignment of that data to a spatial grid, contained within the Catch In Areas Database. The following maps show reprojection of historic catch that occurred within areas proposed for closure to areas that would remain open under the alternative in question. The reprojection is based on historic catch grouped by vessel, harvest sector, gear, and target. This representation is not intended to be interpreted as a predictive model of where fleets will redeploy when faced with a closure but rather is a reprojection of historical catch to locations where fishing occurred.

Catch reprojection was done within the Catch In Areas database by following a step-wise procedure of matching with proportional assignment to a fine spatial grid with aggregation to a coarse grid for display purposes. The procedures used are as follows:

Step 1: Vessel Based Match:

In the first step of the catch reprojection operation the catch of each vessel that operated in the area proposed for closure (the alternative areas) in each week of the season (using week ending date) is reprojected into grid cells (7km x 7km) occurring within 50 nautical miles of the closure boundary in the area outside of the closure area (the open area)¹. This assignment is proportional to the actual observed catch by that same vessel and within the same target fishery and gear type in each of the 7km square grids cells the vessel actually fished and in the same week of the season. In this way catch is matched first at the observed vessel level and based on that vessel's own proportion of weekly catch within a grid square. If a vessel fished in only one grid square outside the closure in a particular week when the closure would have been in place (either an annual or triggered closure) then all of the reprojected catch is assigned to that single grid square. If that vessel fished in two cells, with a 60-40 percent split then 60 percent and 40 percent of the reprojected catch is assigned to the cells respective of the proportion observed in each cell. In many cases this match reprojects most of the catch that could potentially be forgone; however, there are instances when a specific vessel fished within a closure area but not outside of it in a particular week. In such cases, a second matching step is applied to attempt to reproject vessel level unmatched catch to the open area.

Step 2: Vessel Type/Target/Gear Based Match

In the second step, a vessel's catch that occurred inside the closure area in a week when that vessel was not observed fishing within 50km outside of the closure boundary is reprojected proportional to the catch of vessels in its sector of the fleet that had recorded catch outside of the closure area using the same gear type, in the same species target fishery, and with the same vessel type (Catcher Processor (CP) or Catcher Vessels (CV)). In this way, catch is reprojected based on recorded catch in grid cells in the open area where the same vessel type, operating in the same target fishery, and with the same gear type, had

¹ Please note that this data is aggregated to 20km grids for reprojection in the maps in this appendix due largely to the extreme quantities of data, (in excess of 3 terabytes per process) processing time generated for each map, and also because the vertical catch bars overlap each other excessively in the smaller grid display.

recorded catch. This second step serves to reproject catch that could not be reprojected at the individual vessel and week level proportional to catch of similar vessels. However there are some instances, particularly with the limited number of CVs potentially affected by some alternatives, when a relaxation of the vessel type is necessary to match catch to grid cells outside of a closure area, and that relaxation of the vessel type match is undertaken in the next step.

Step 3: All Vessels/Target/Gear Match

In this third matching step, the vessel type matching constraint is relaxed and the match is made proportional to all vessels, CPs and CVs combined, in a target fishery with the same gear type. This third step gathers all remaining catch and reprojects it, where possible, to grid cells proportional to the catch of all vessels within target fishery, gear type, and week of the season recorded in those grid cells. However, there are instances when no effort occurs outside of the proposed closure area by any vessel type within target, gear type, and in the specific week in question. In such cases, a final step is used, which relaxes the week of the season constraint.

Step 4: All Vessels/Target/Gear/Month Match

The final step in the reprojection algorithm relaxes the constraint of trying to match catch within the same week of the season. In this step, remaining unmatched catch is reprojected proportional to catch by any vessel type, within same target, same gear type, and within the same month of the catch that occurred within the closure area. While this last step broadens the match criteria significantly, there are nonetheless some cases where a match still cannot be made. In a couple of particular cases, to be discussed in the accompanying RIR, even this step does not provide a match. The interpretation of this finding is that the closure area was essentially the only area that had recorded catch within the target and gear combination in question and serves to highlight the importance of that area to the potentially affected fleet.

Limitations of the Reprojection Analysis:

This reprojection is entirely based on recorded historic catch within and outside the closure areas in question. Reprojection of catch in this way makes the inherent assumption that this reprojection would occur with no impact on vessels that fished within the area to which catch is reprojected to occur, with no impact on localized availability of fish stocks, and with the same catch rates (tons/week in proportionality method) as observed in the areas reprojection is made. In some cases these assumptions may all be true; however, in others these assumptions are likely to fail, especially in cases when the reprojection into a cell is a relatively large proportion of the catch that is being reprojected and/or is larger quantity than originally caught within the cell to which reprojection occurs. Thus, this analysis is exemplary of where catch might be taken in the instance of a closure; however, the analysis is inherently static in that it does not account to the impact that such reprojection of effort, and catch, might have on fishing conditions within grid cells to which reprojection is estimated to potentially occur in this retrospective analysis.

Section A-2: Alternative 5 a, b, c, And-d Triggered Closure Maps

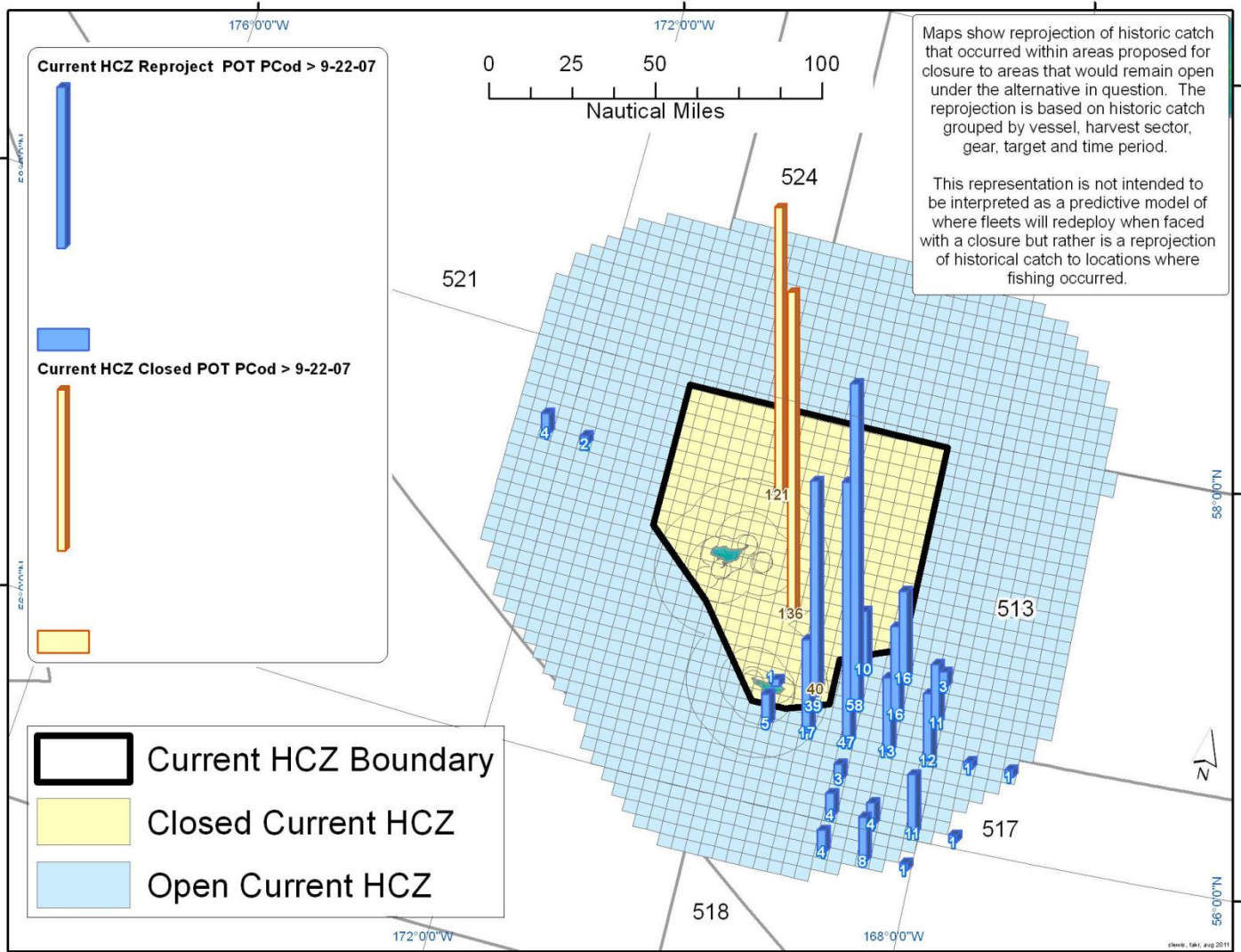


Figure A- 1: Alternative 5a: Reprojection Of Catch Due To Closure Of The Current Pribilof Islands Habitat Conservation Zone In The Pacific Cod Pot Fishery Beginning on September 22 of 2007.

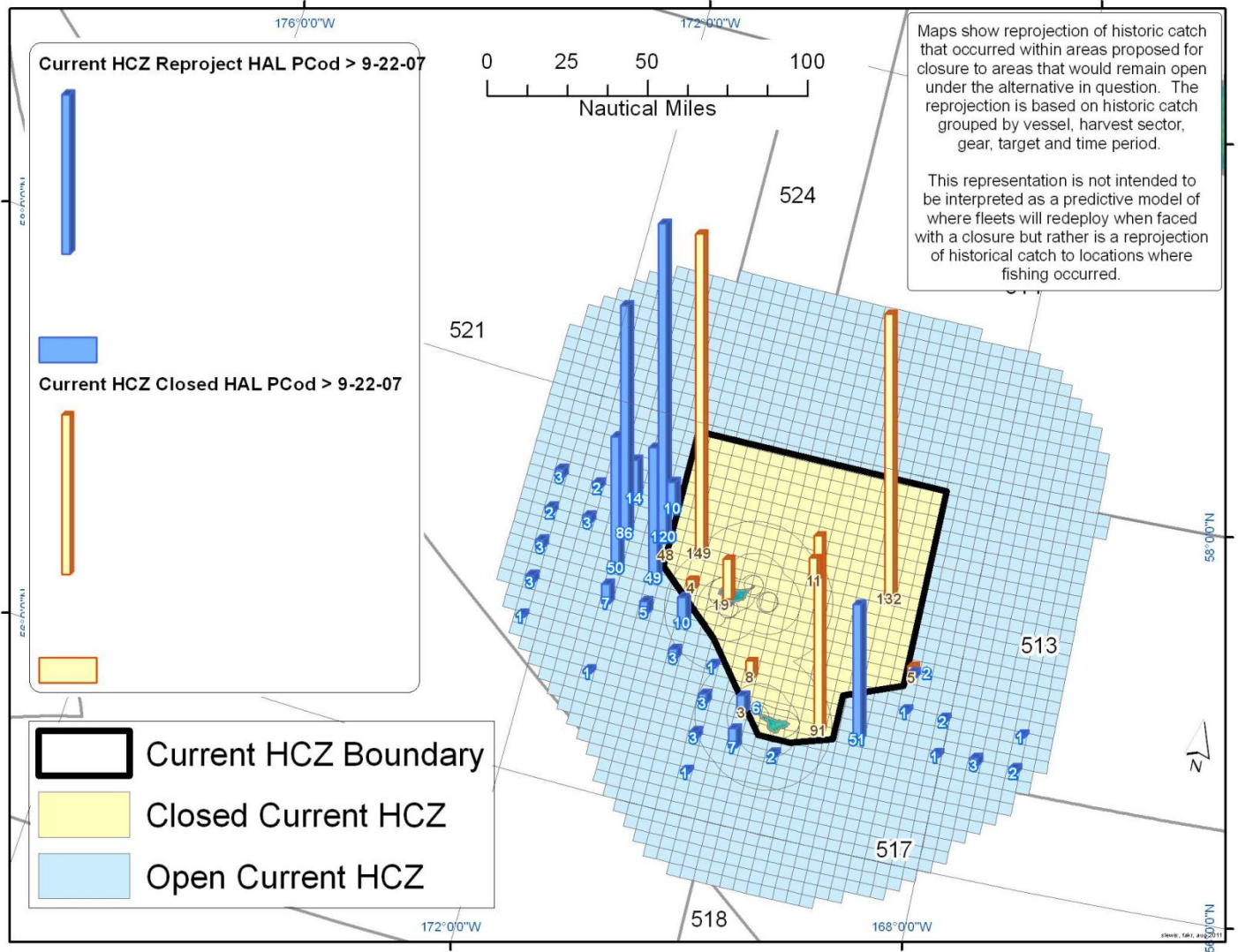


Figure A- 2: Alternative 5a: Reprojection Of Catch Due To Closure Of The Current Pribilof Islands Habitat Conservation Zone In The Pacific Cod Hook And Line Fishery Beginning on September 22 of 2007.

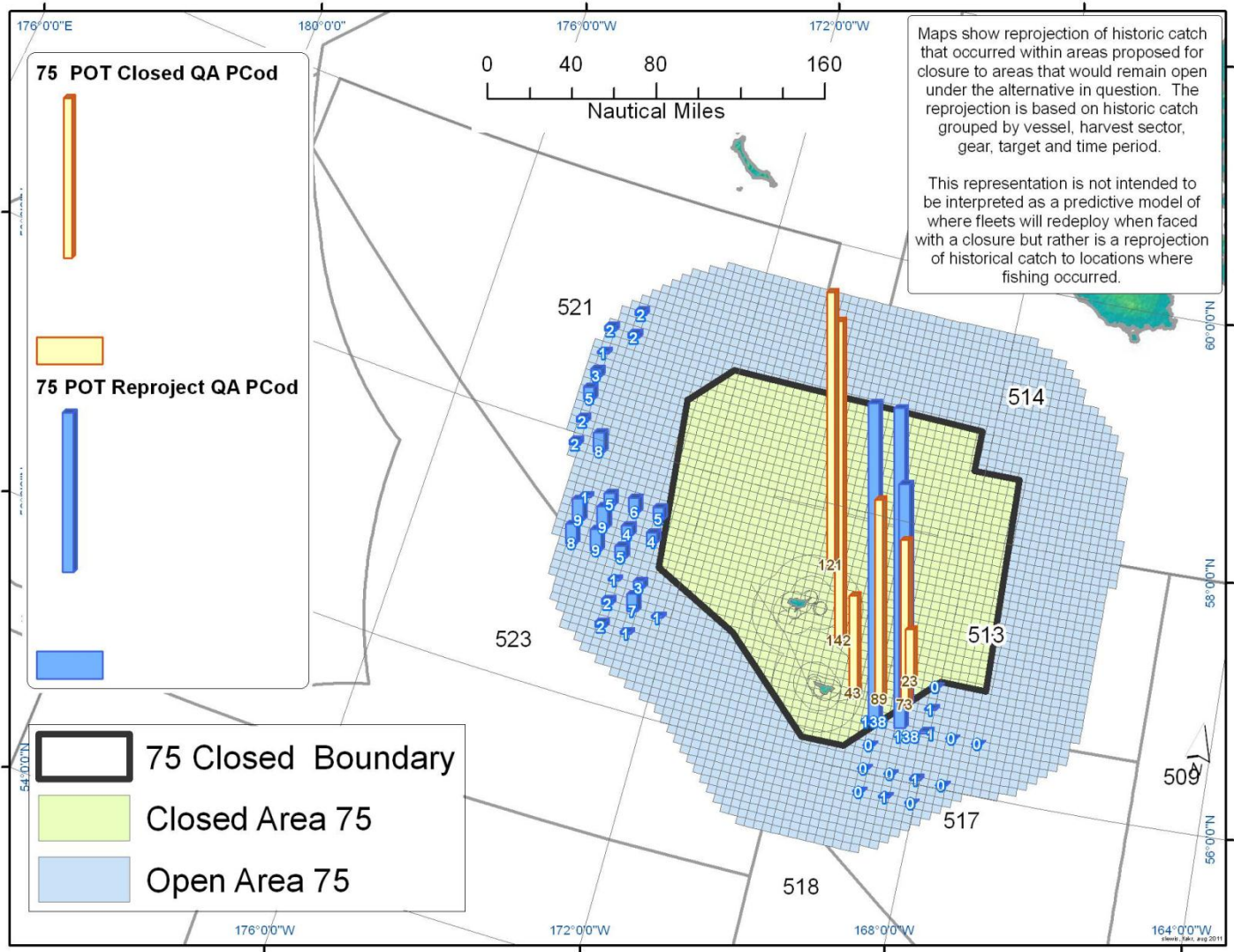


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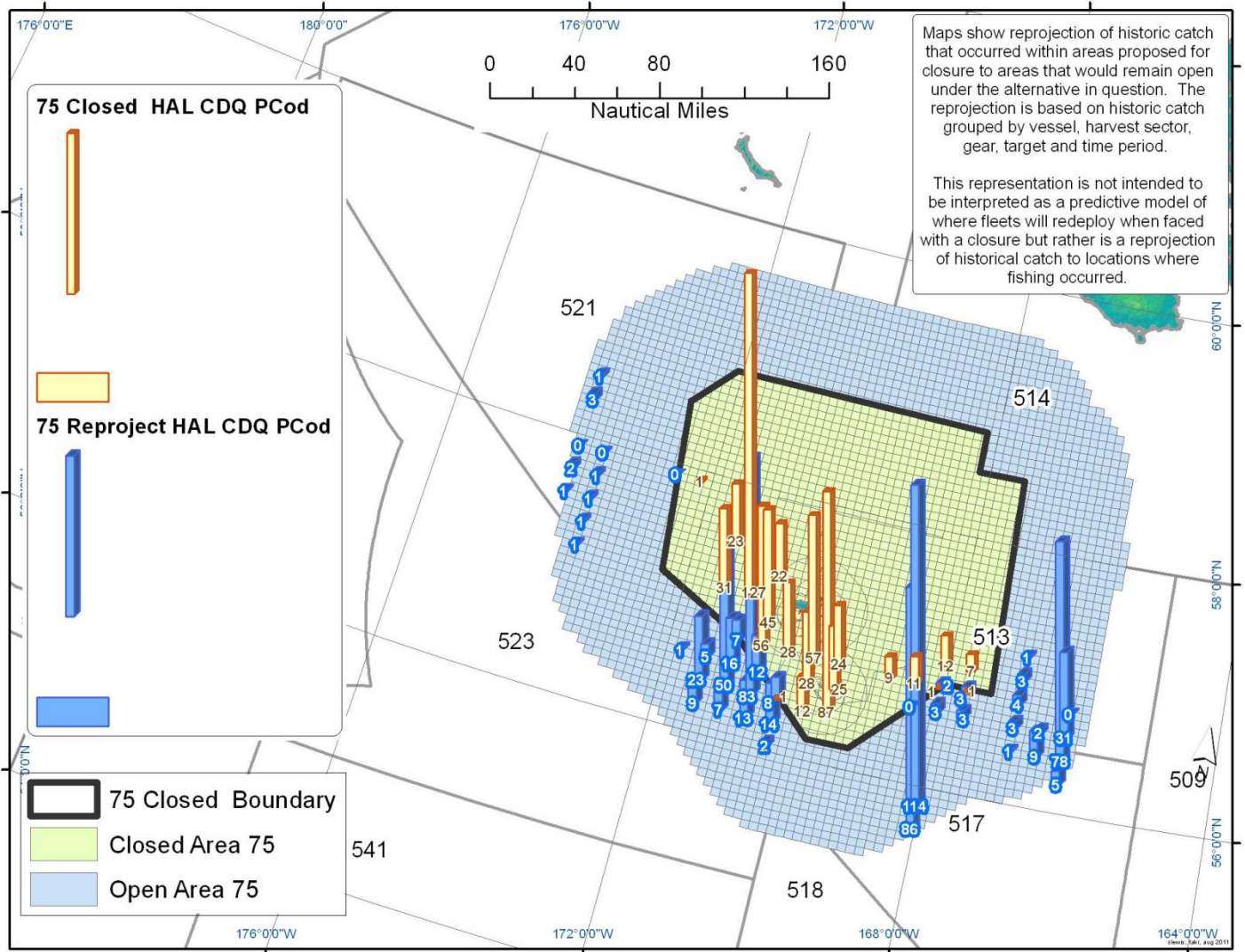


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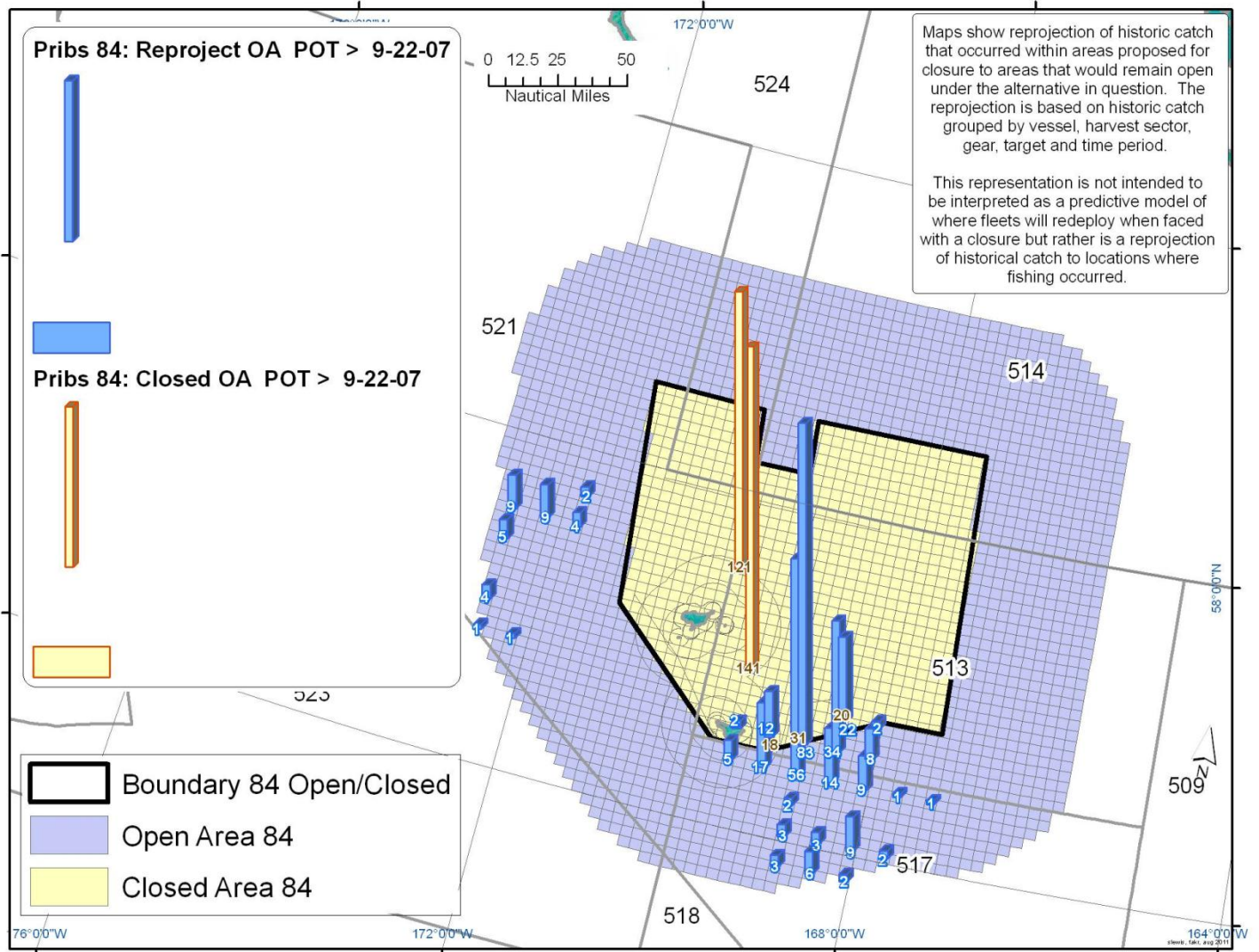


Figure A- 7: Alternative 5d: Reprojection Of Catch Due To Closure Of The PIBKC 1984-09 Area In The Pacific Cod Pot Open Access Fishery Beginning on September 22 of 2007.

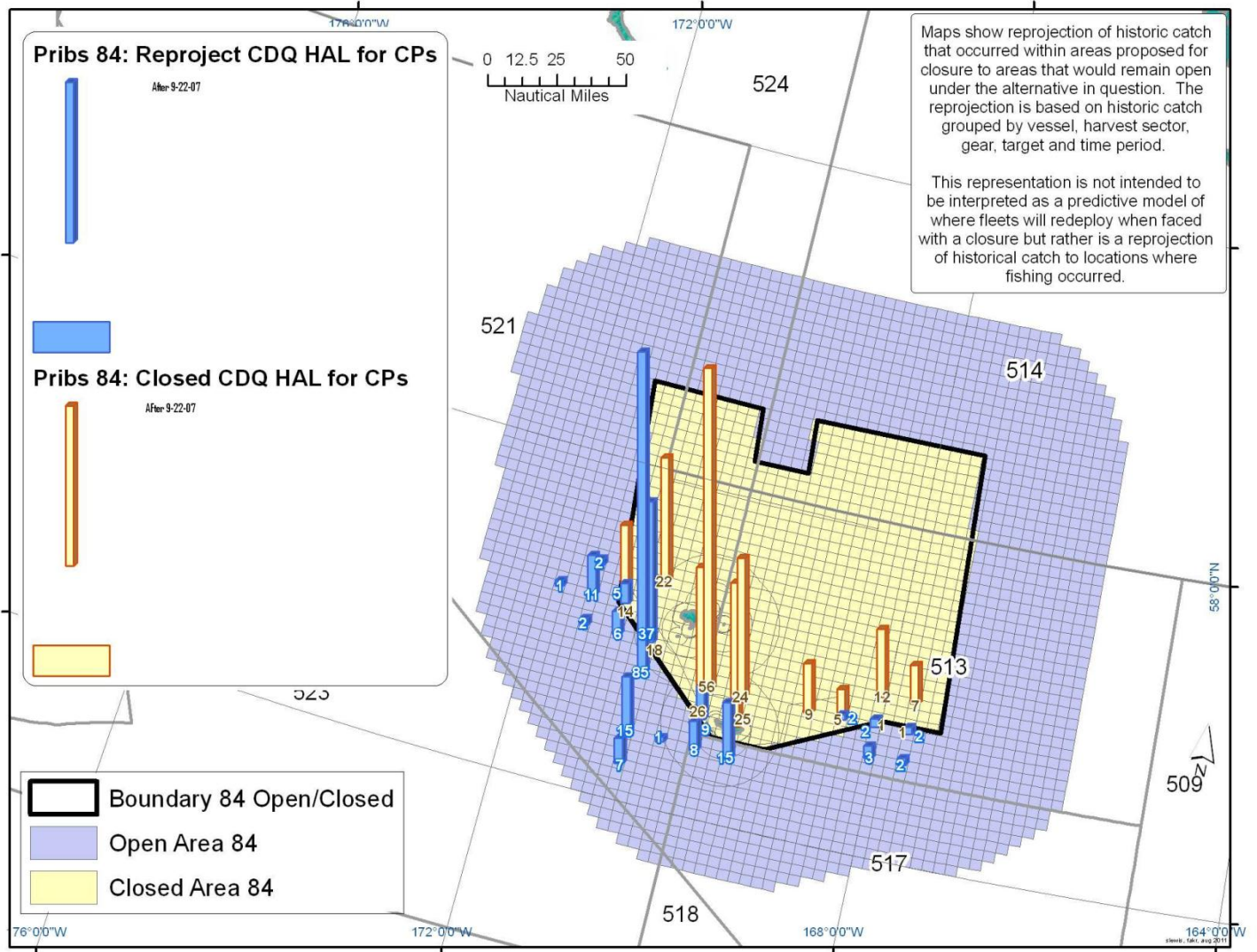


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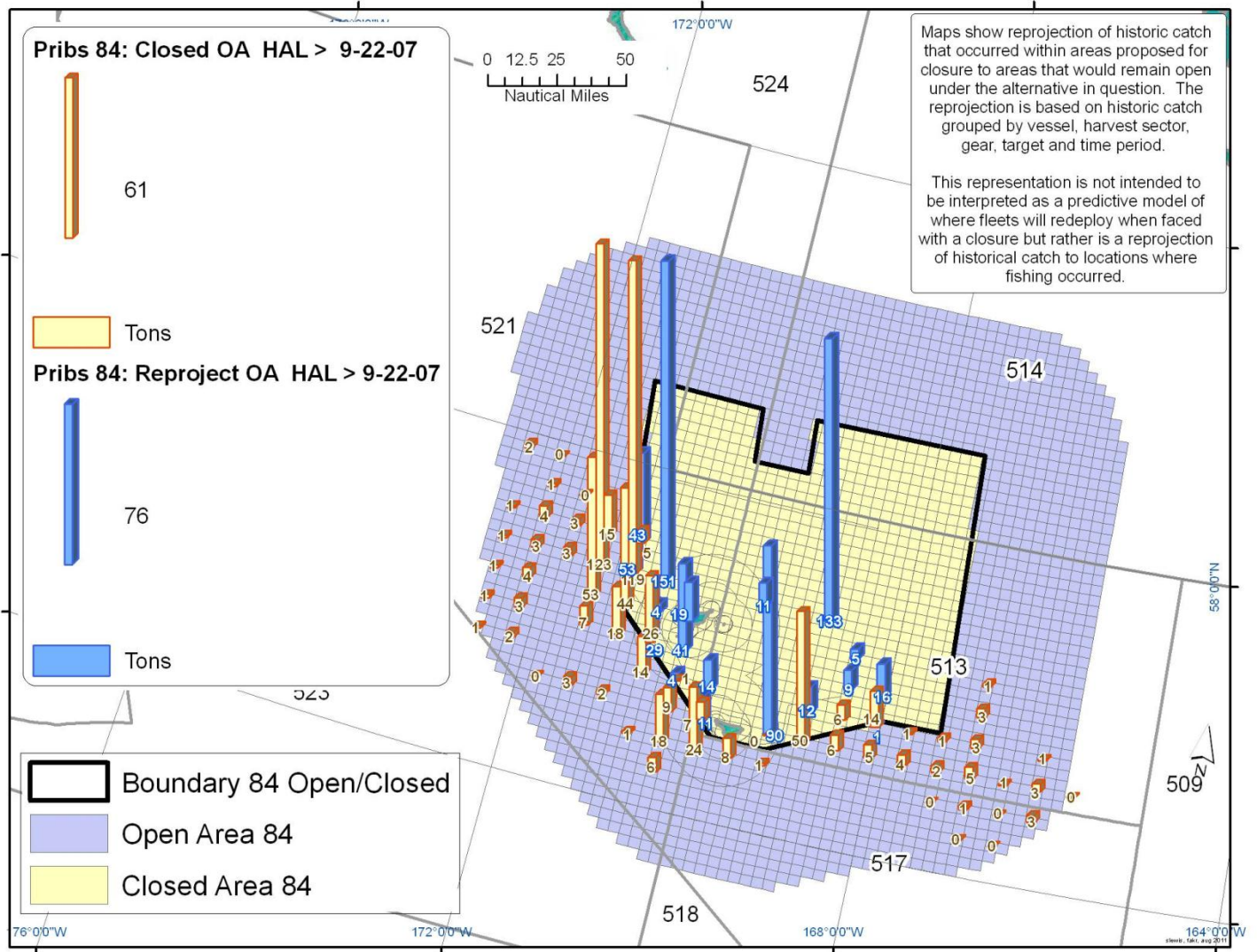
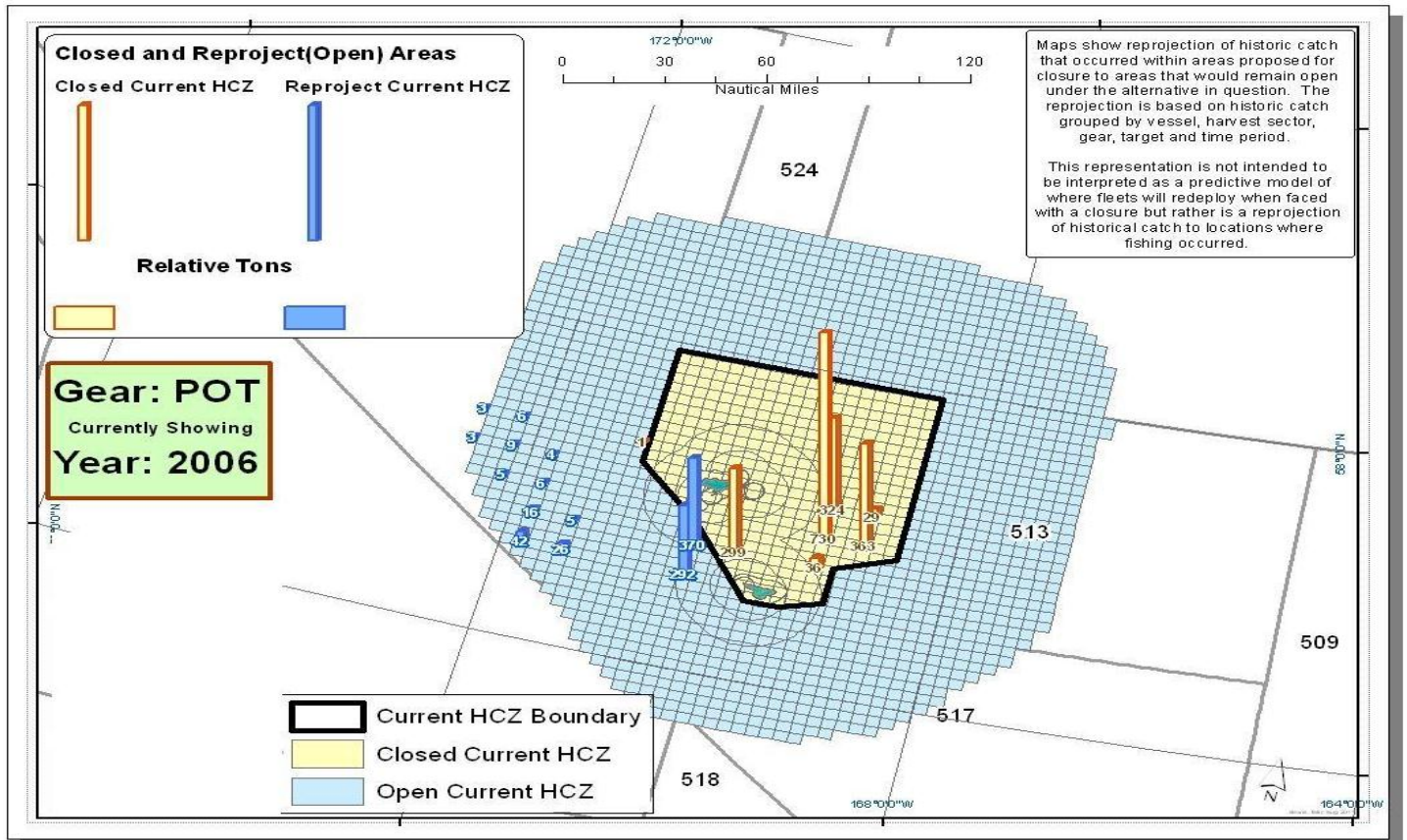
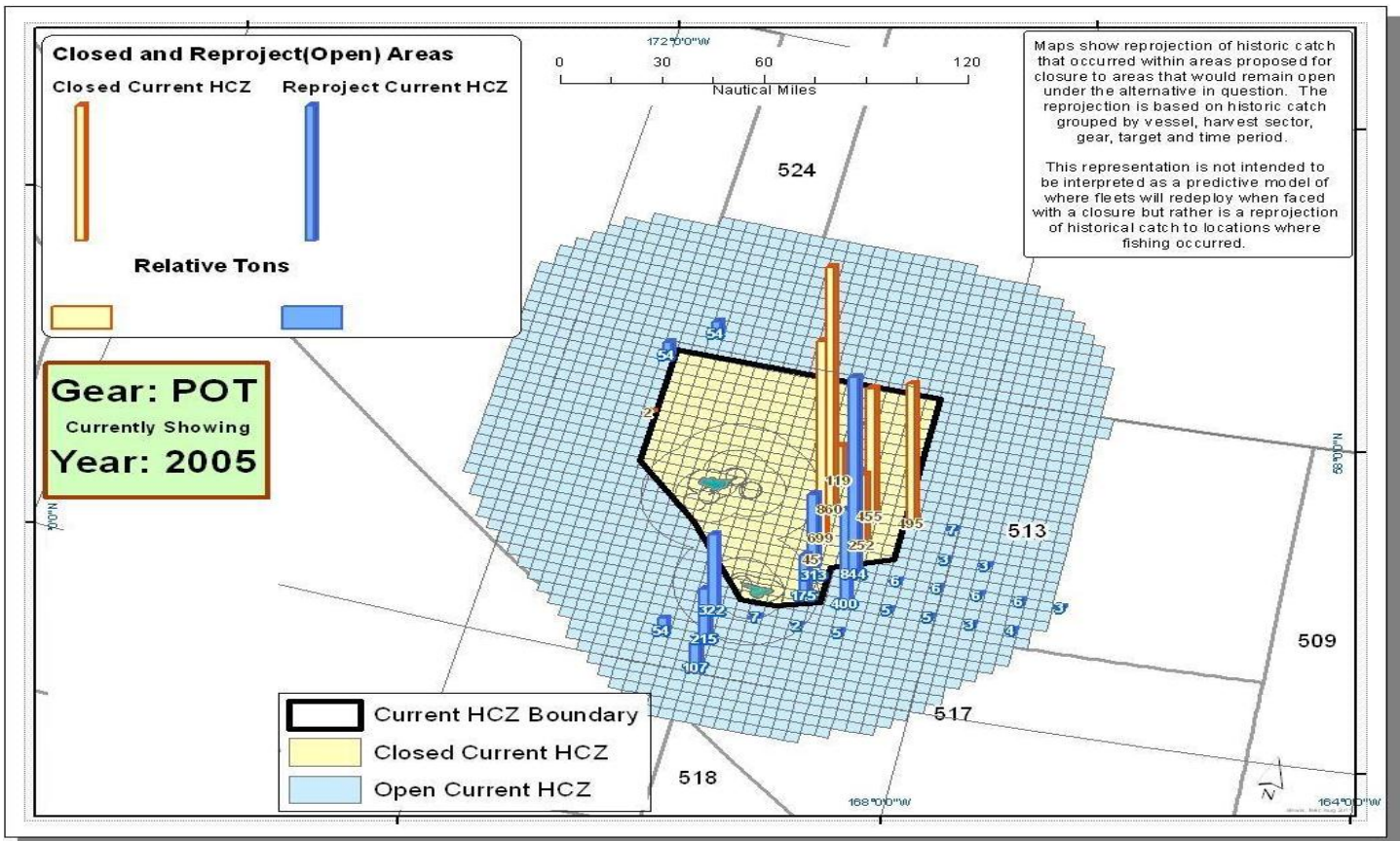
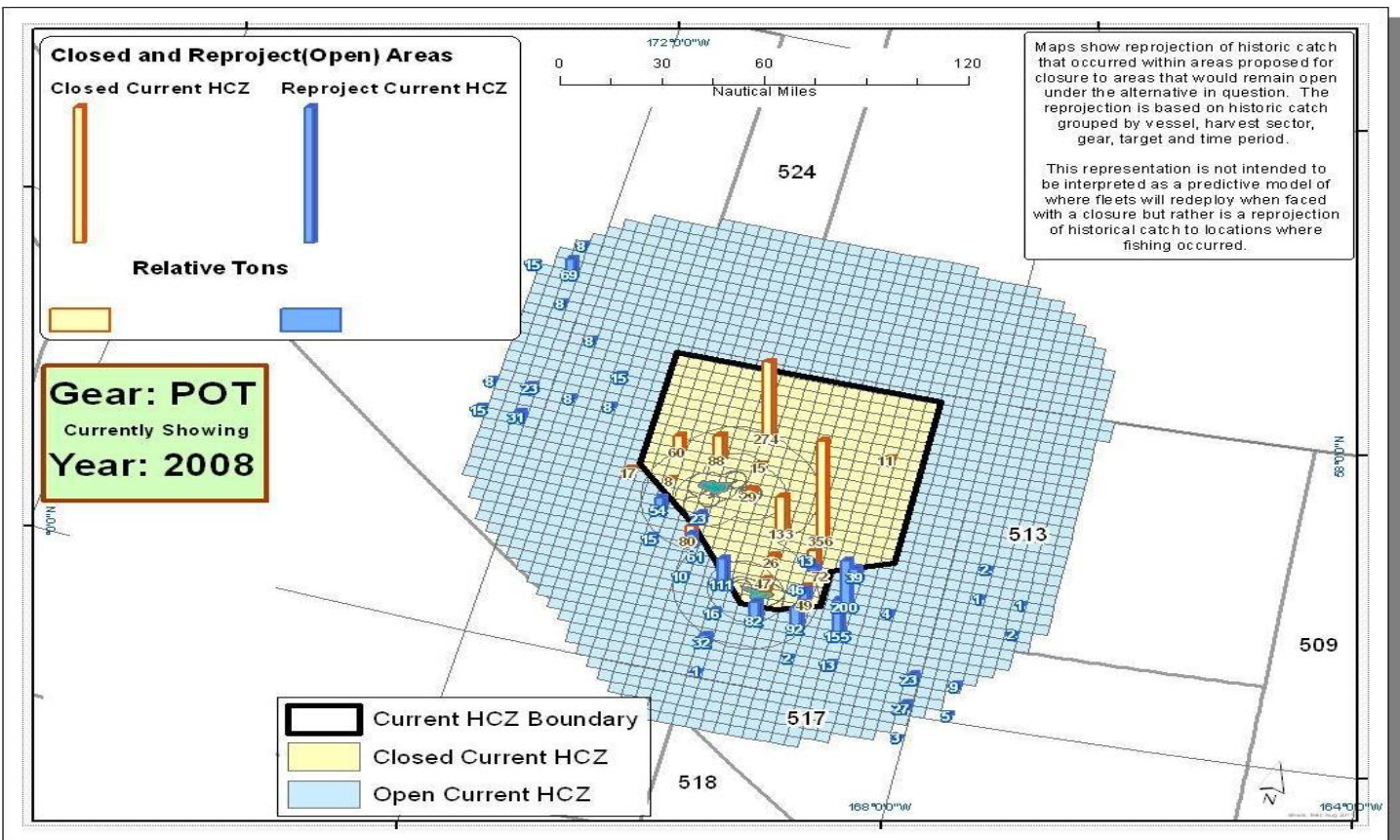
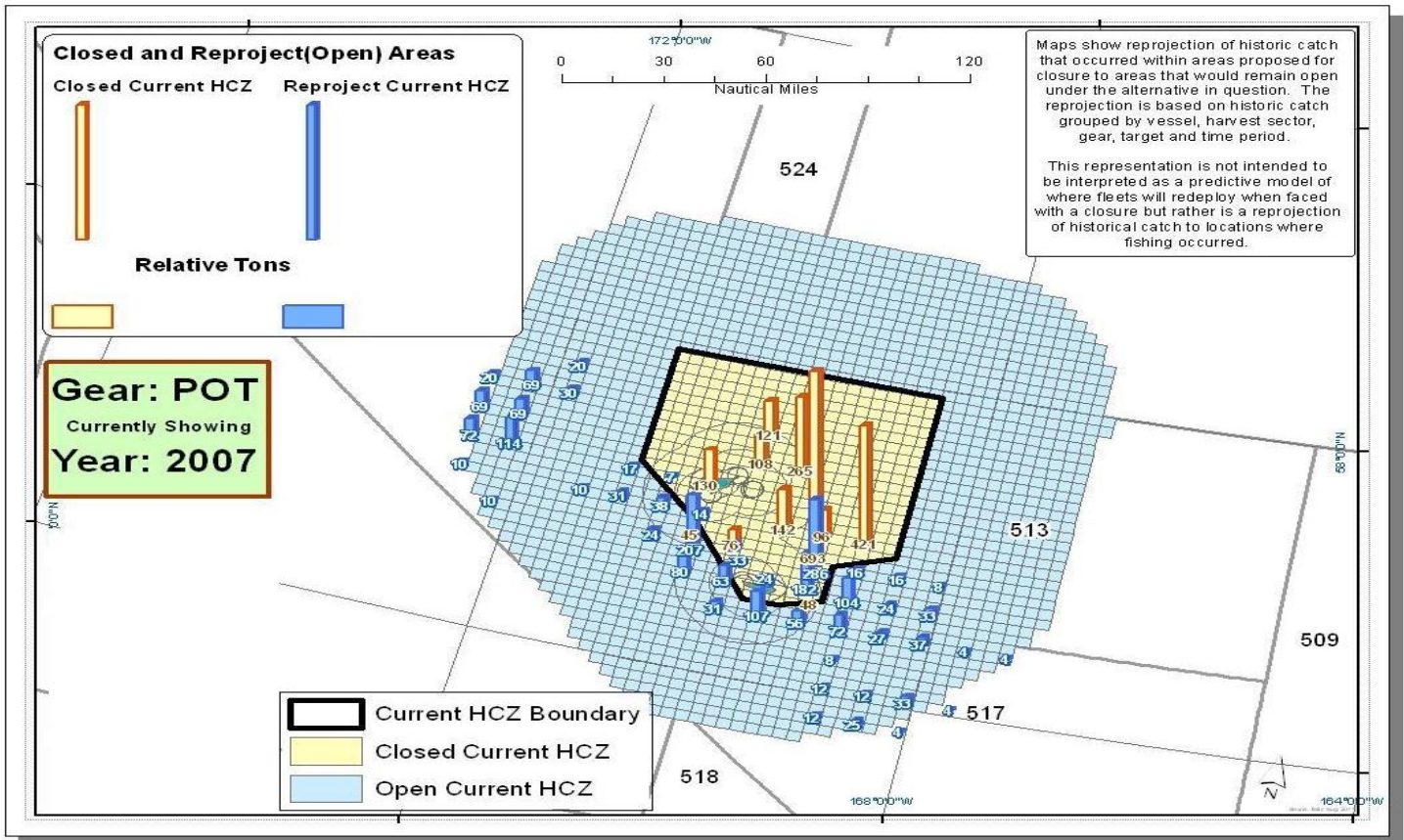


Figure A- 9: Alternative 5c: Reprojection Of Catch Due To Closure Of The PIBKC 1984-09 Area In The Pacific Cod Hook And Line Open Access Fishery Beginning on September 22 of 2007.





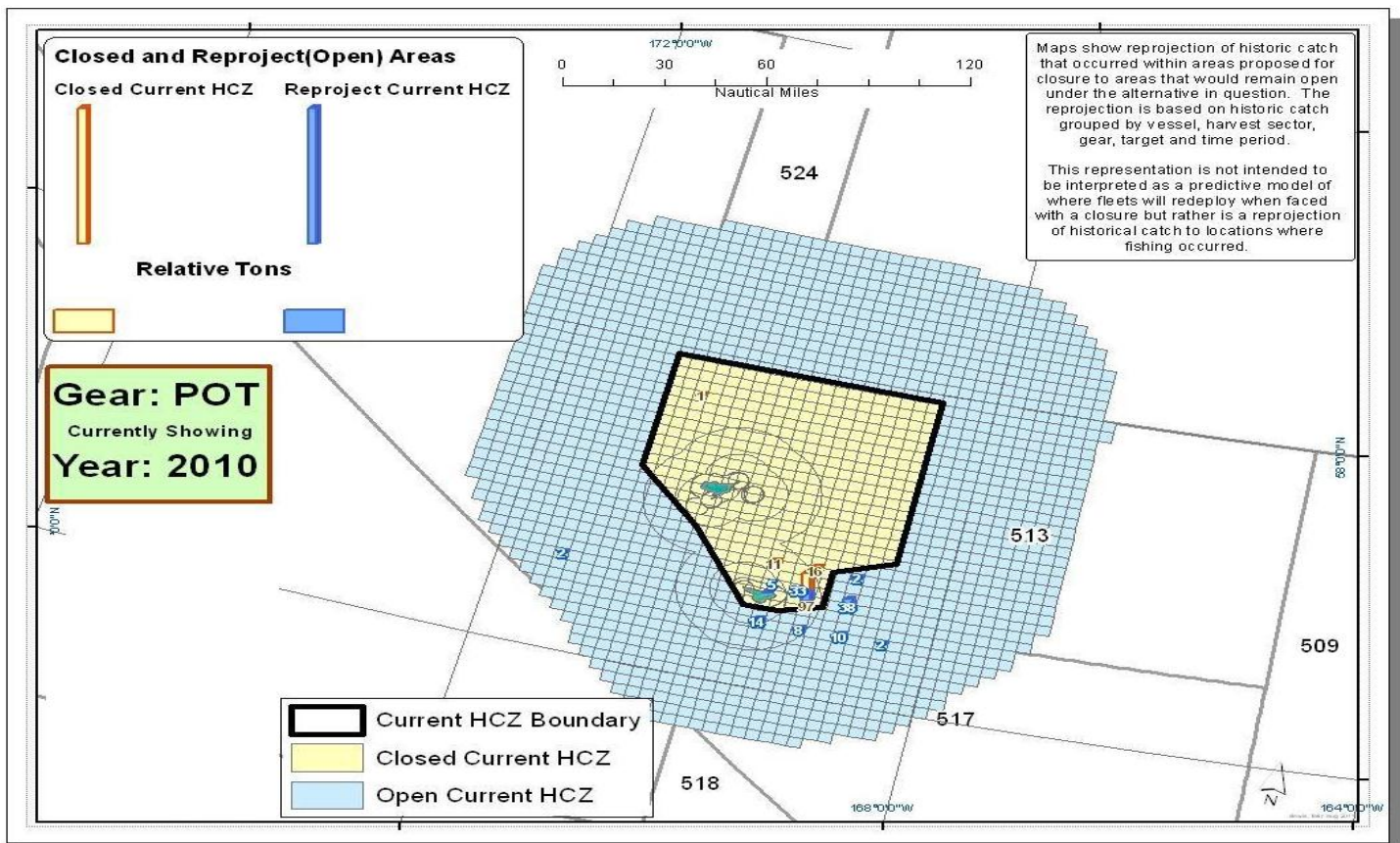
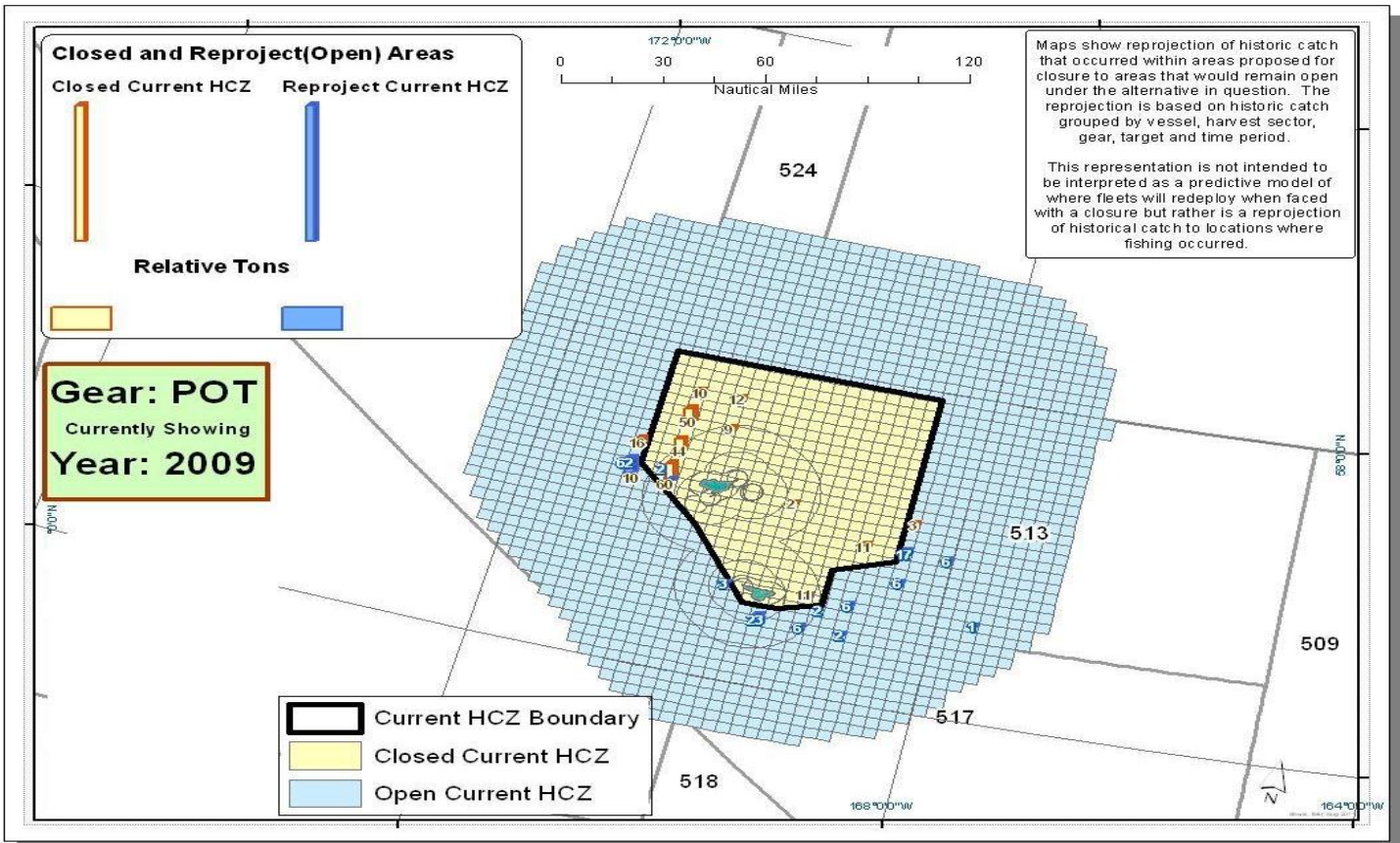
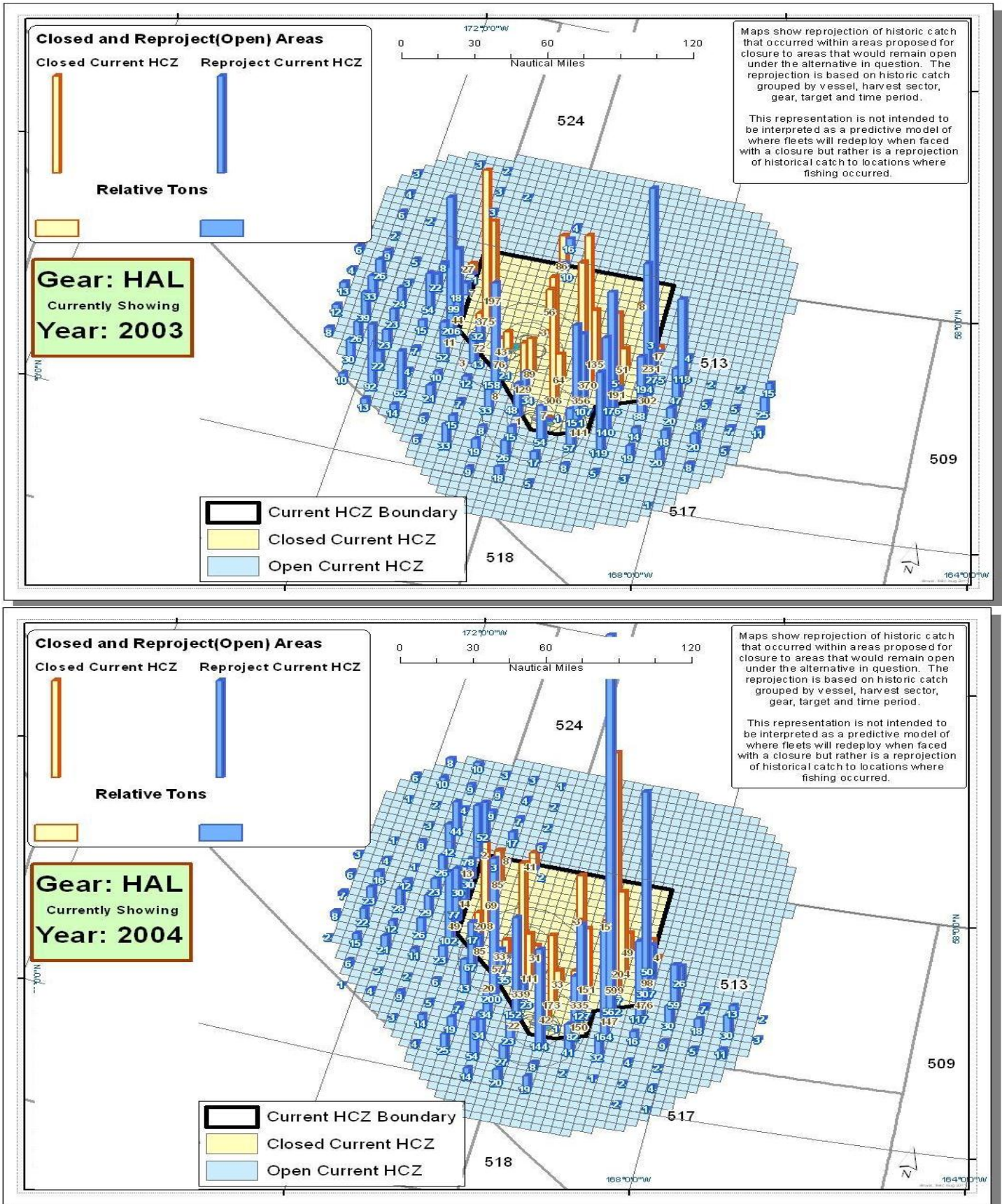
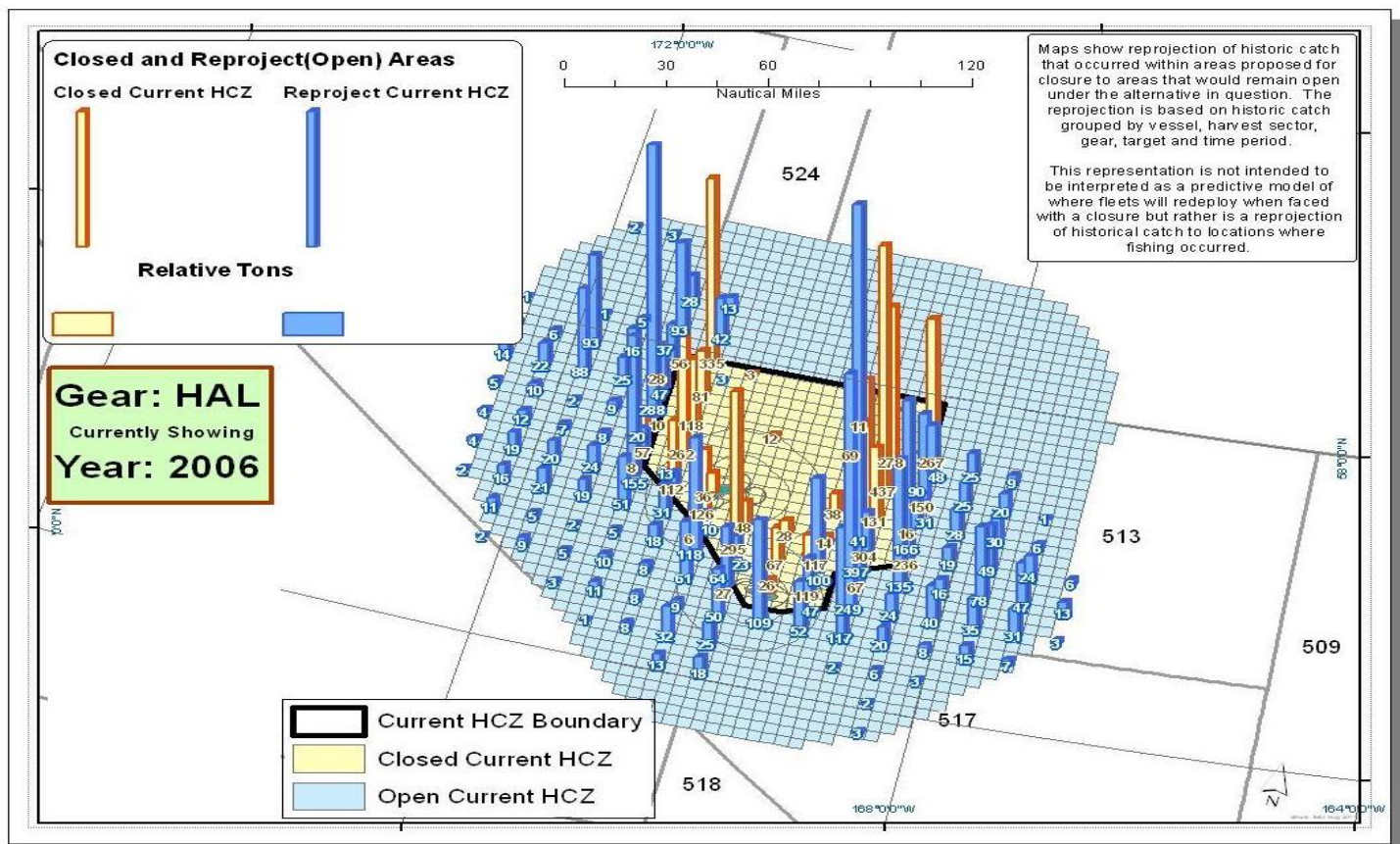
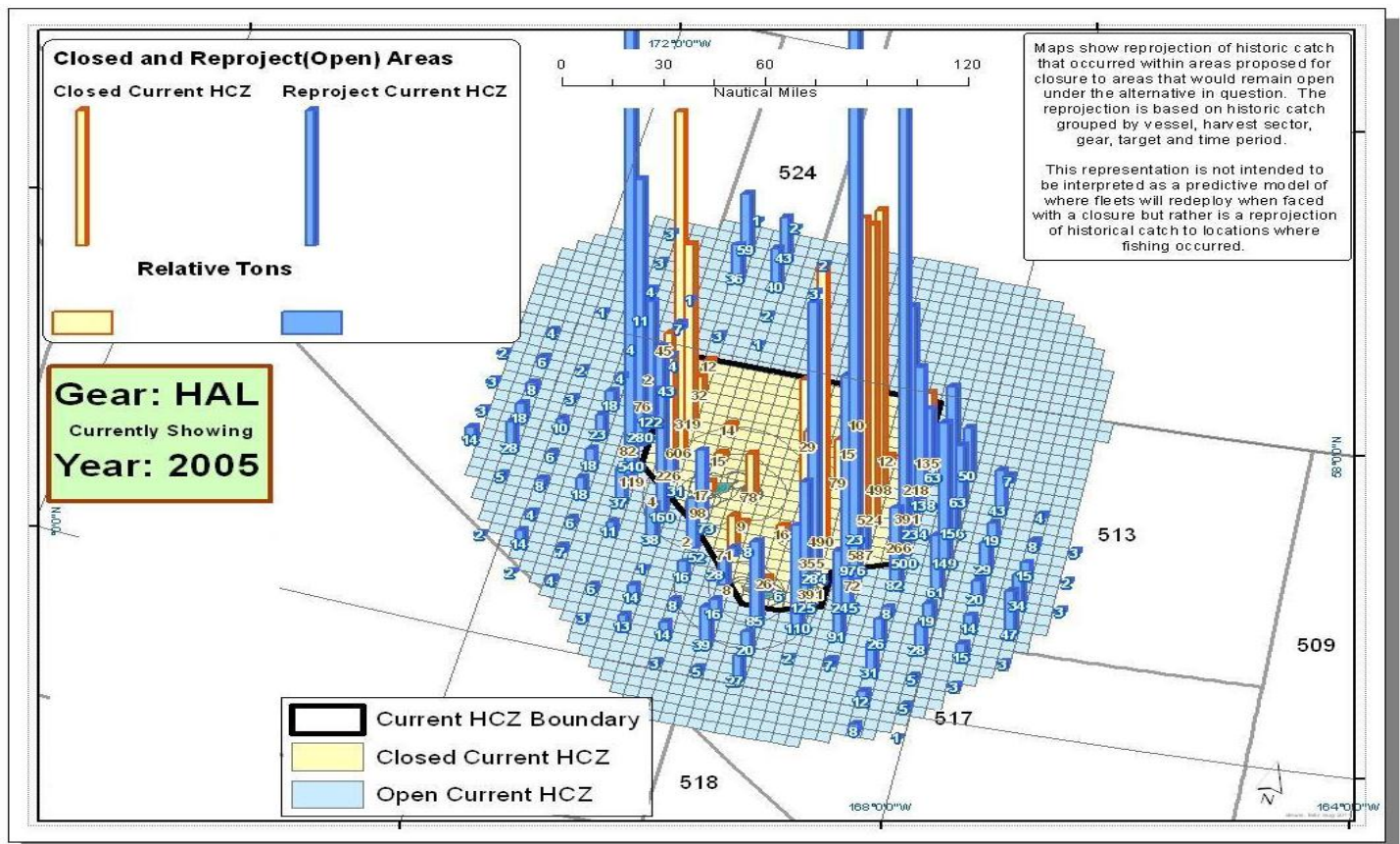
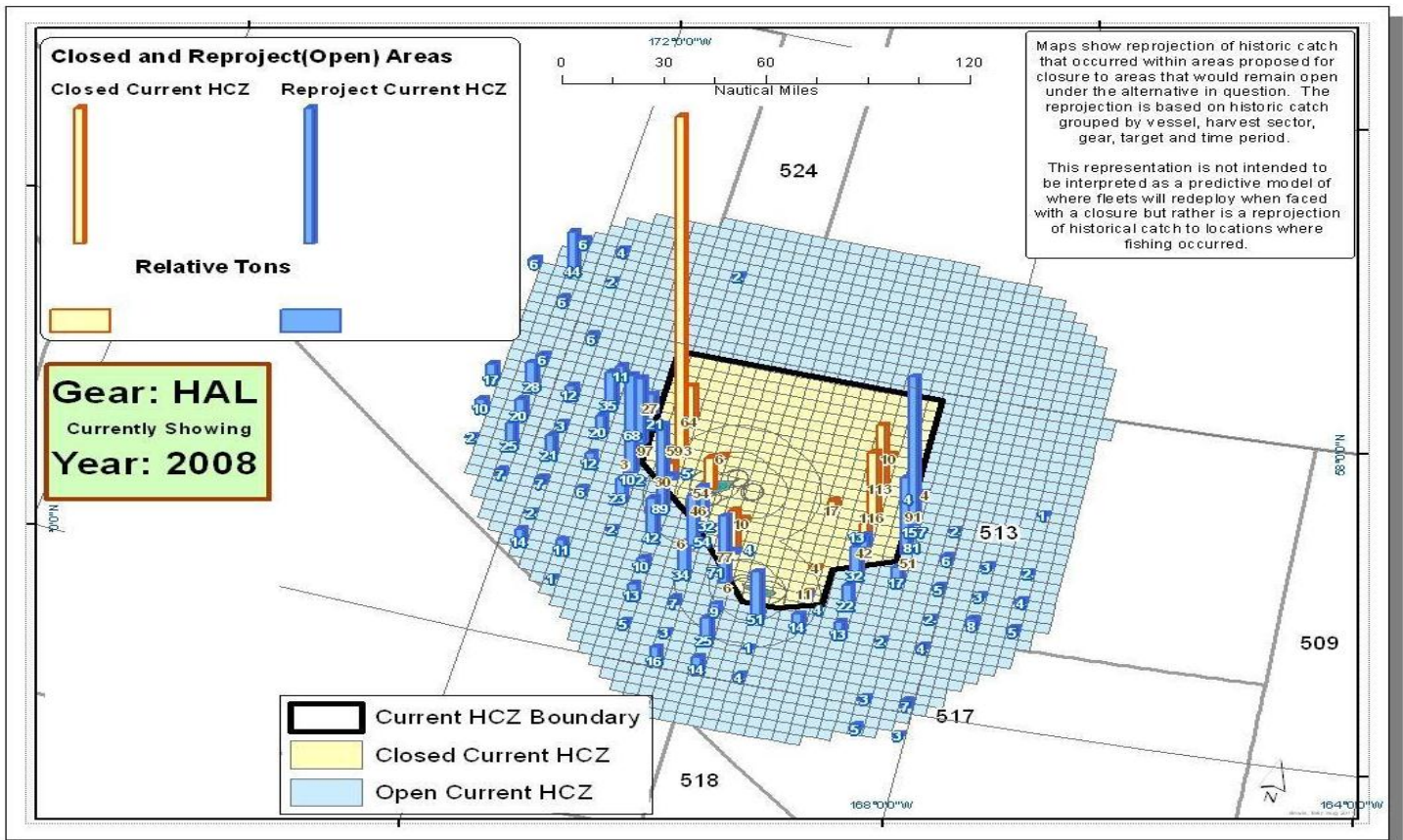
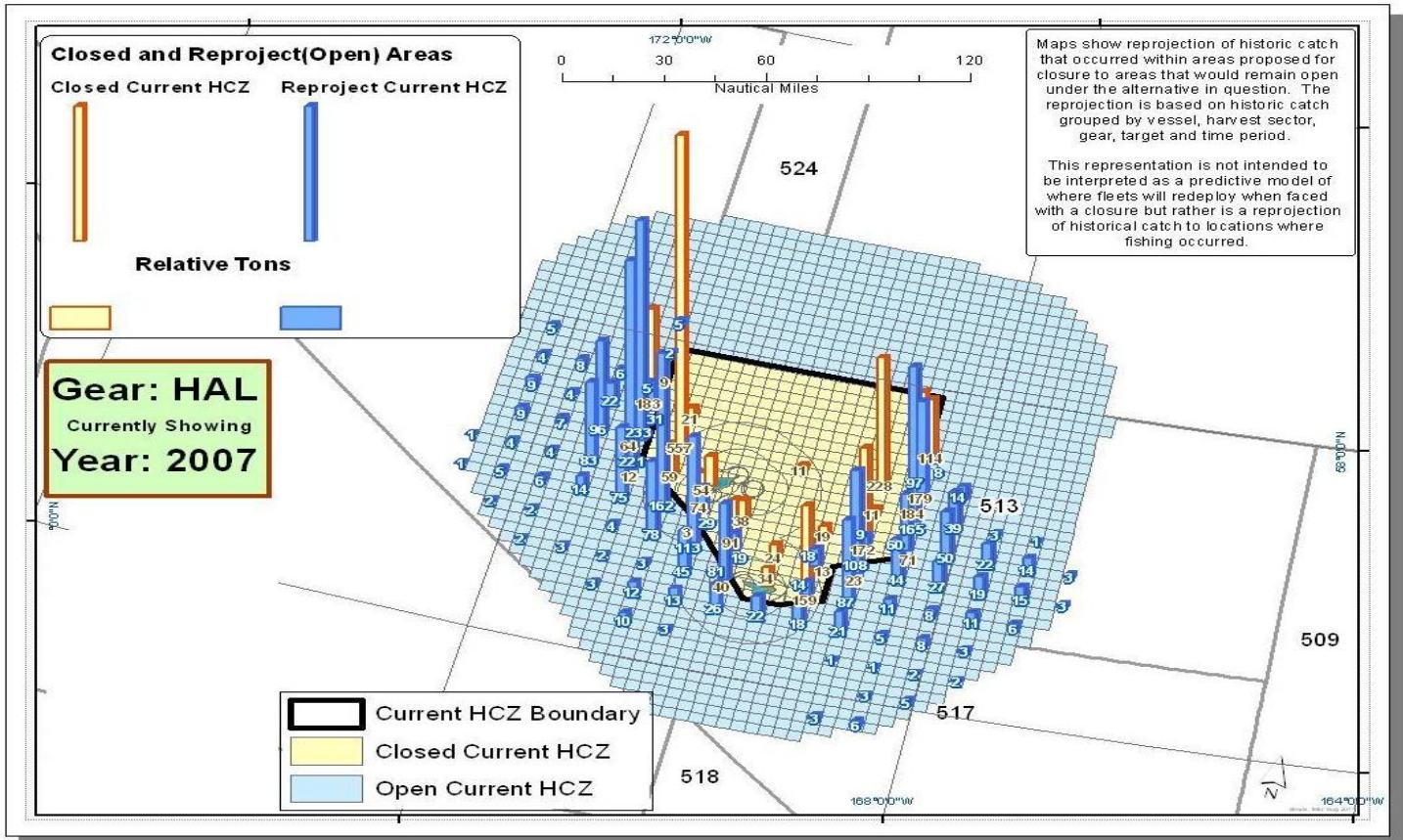
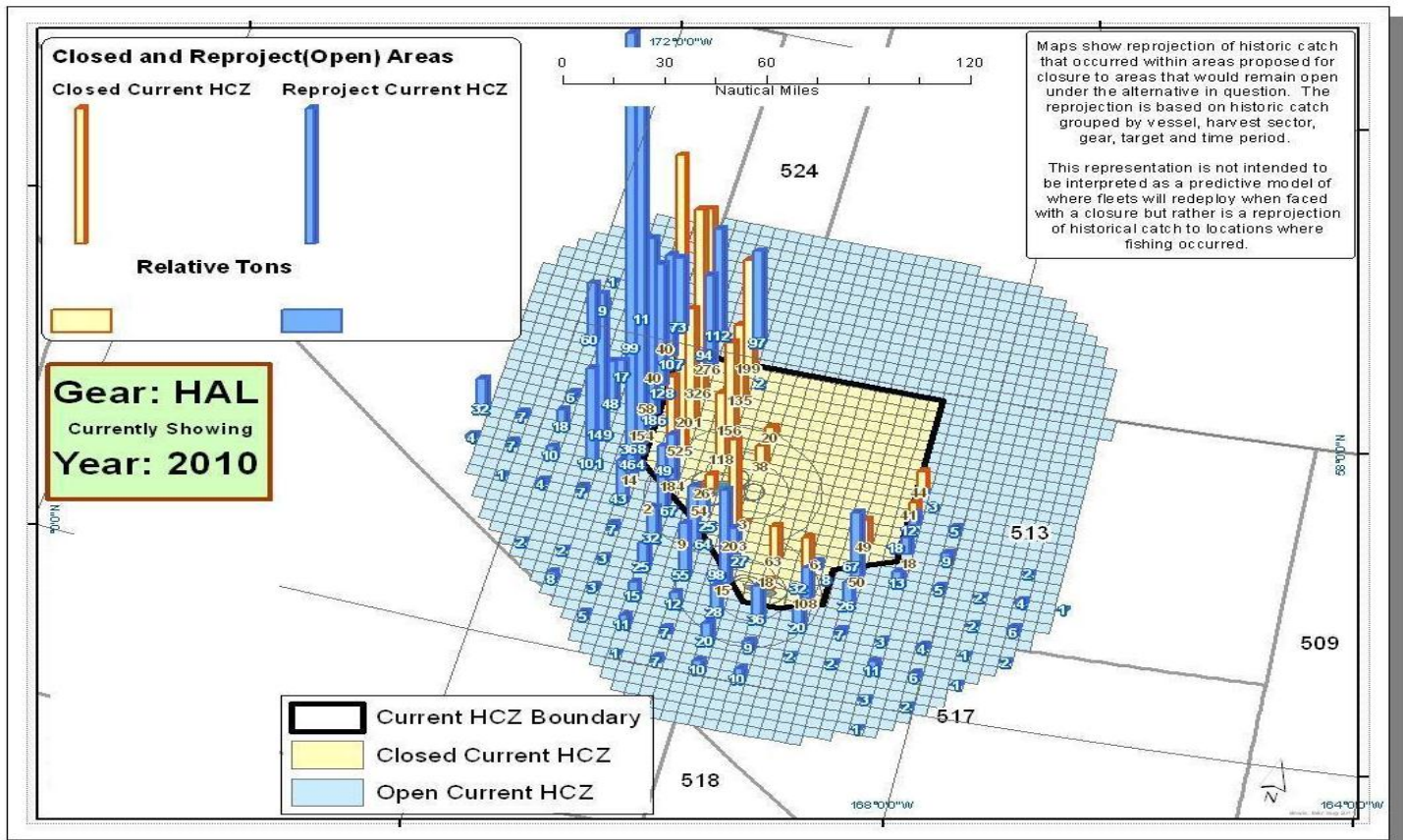
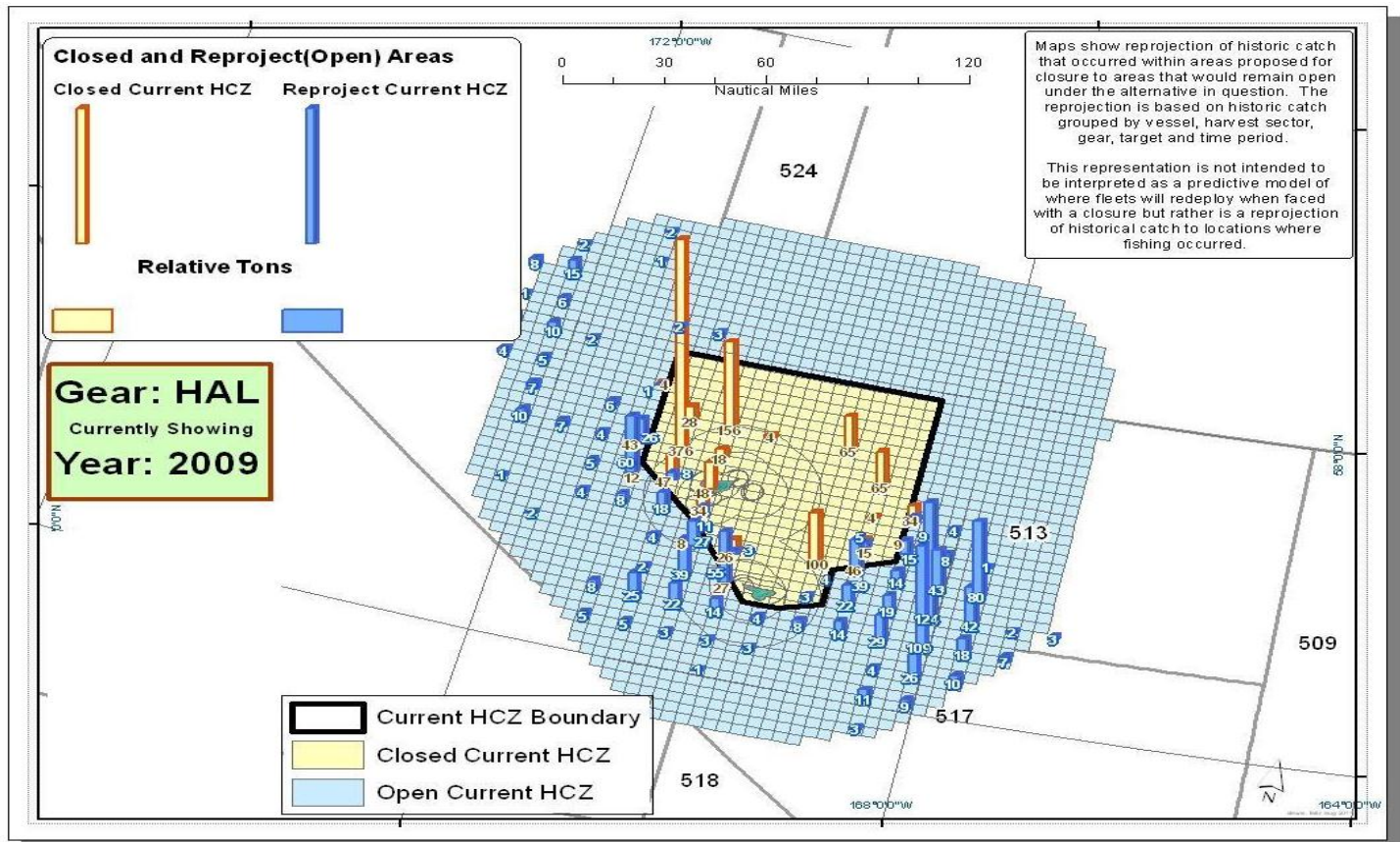


Figure A- 11: Alternative 2: Reprojection Of Catch Due To Closure Of The PIHCZ Area In The Pacific Cod Open Access and CDQ Hook And Line Pot Fishery 2003-2010 In 4 Pages of Panels (2 years per panel) Below.









Section A-4: Alternative 3 ADF&G Area Catch Reprojection Maps

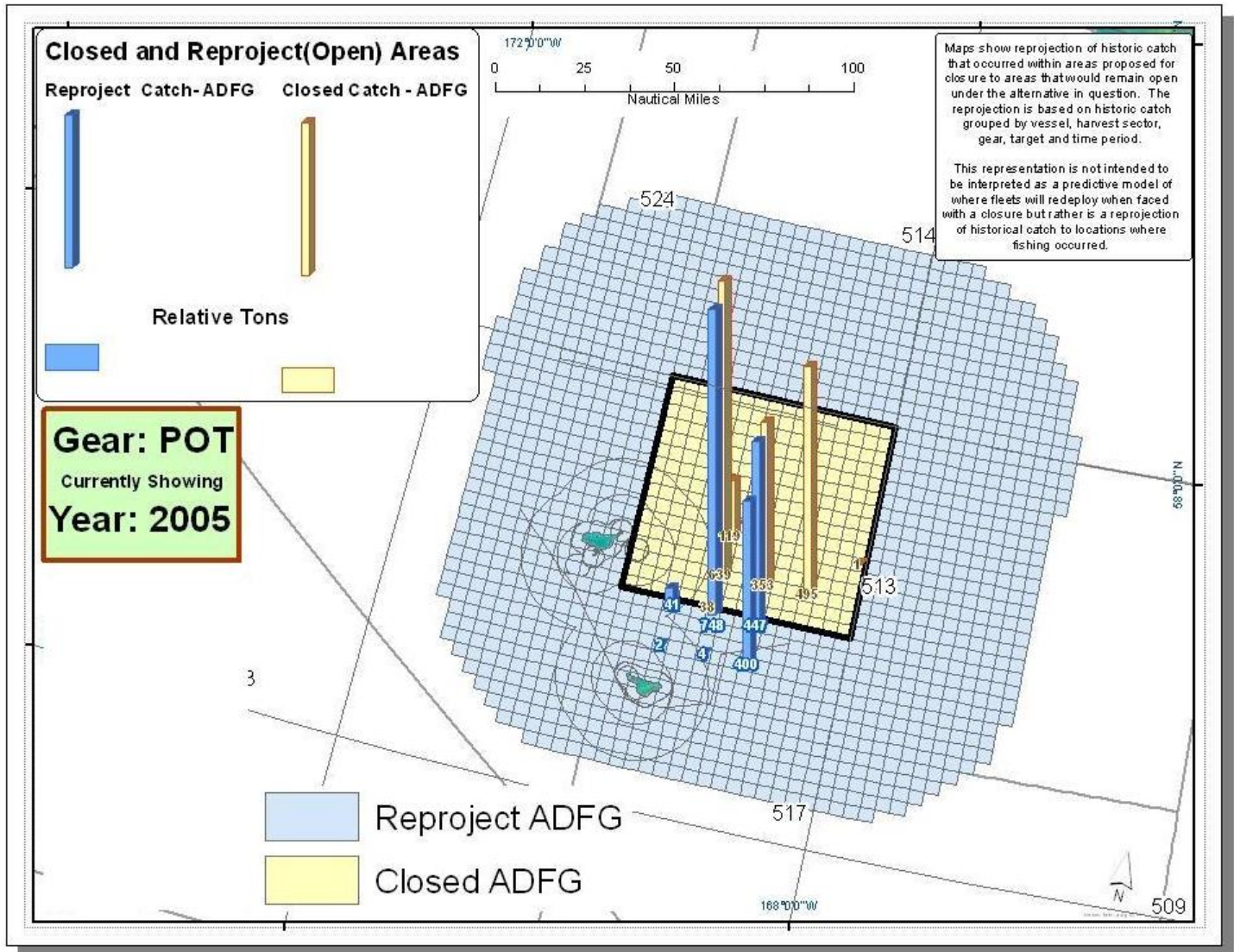
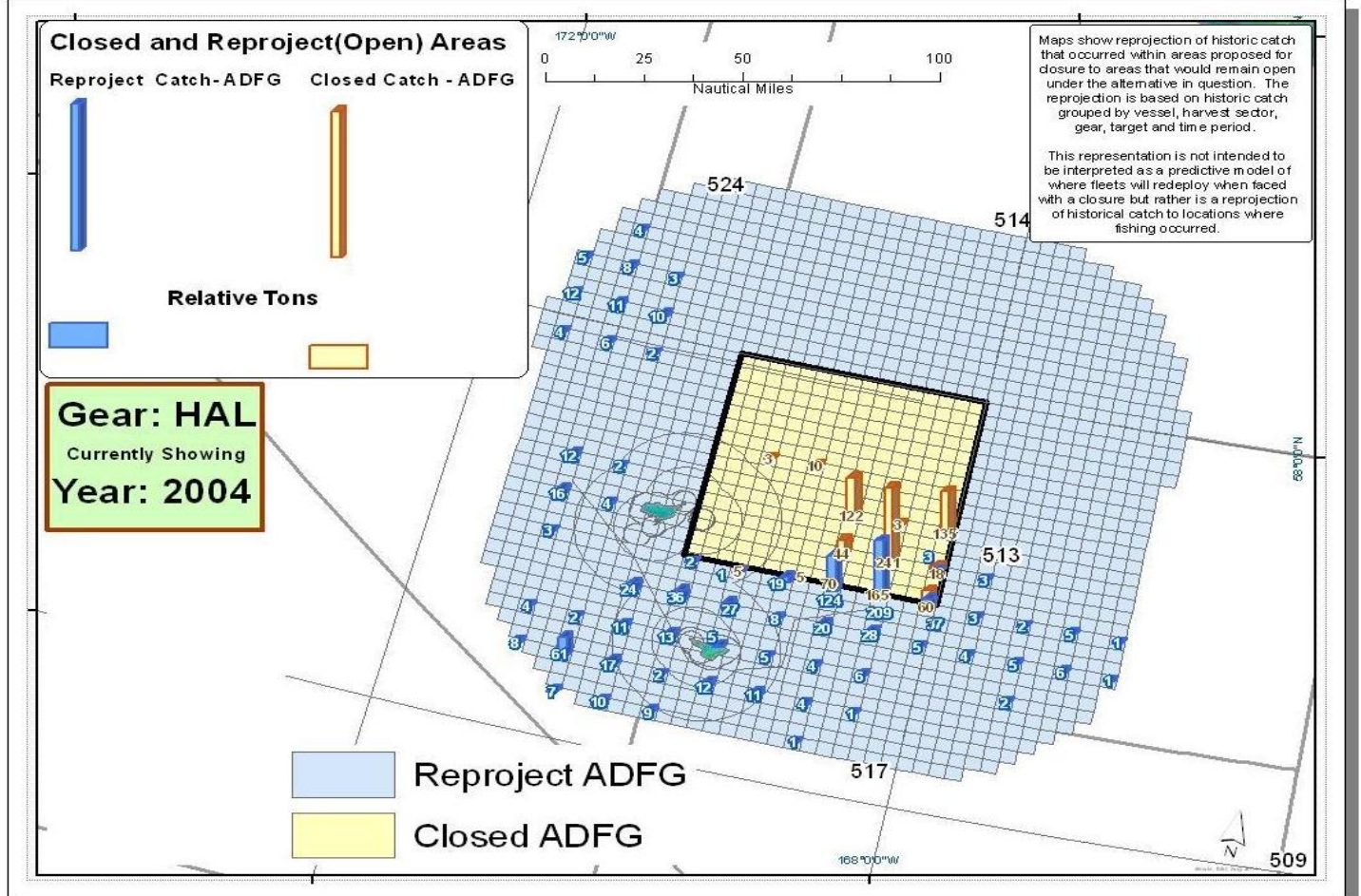
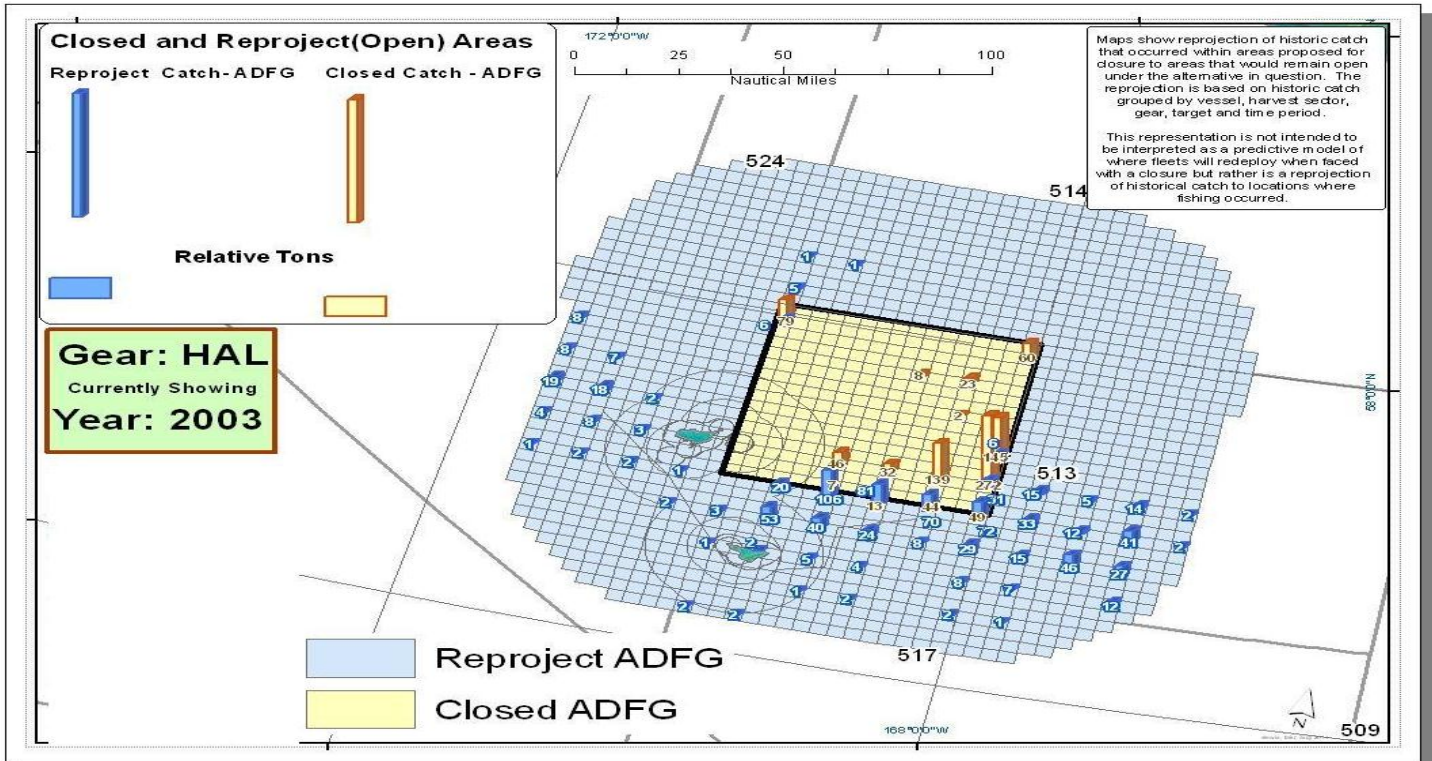
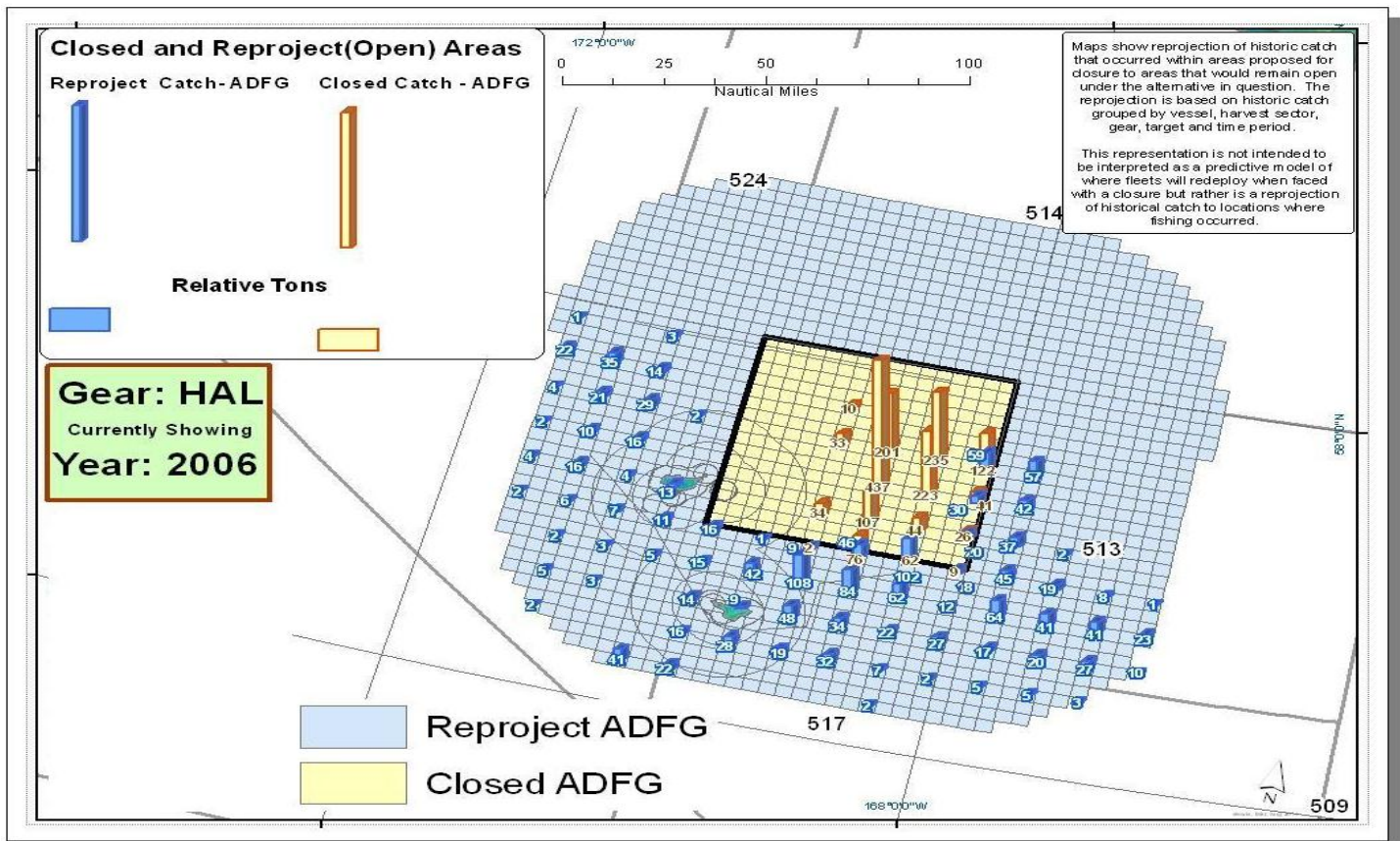
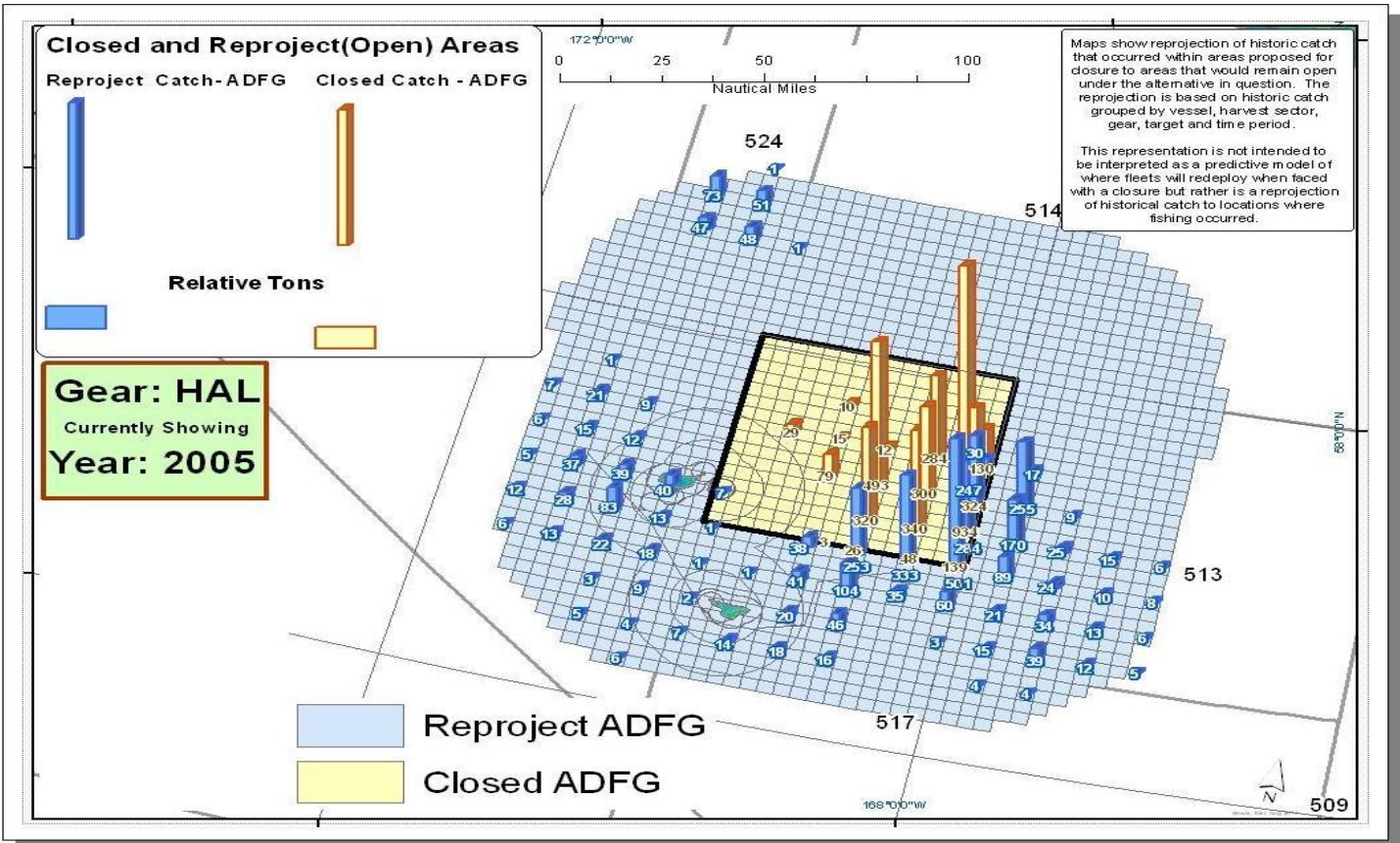
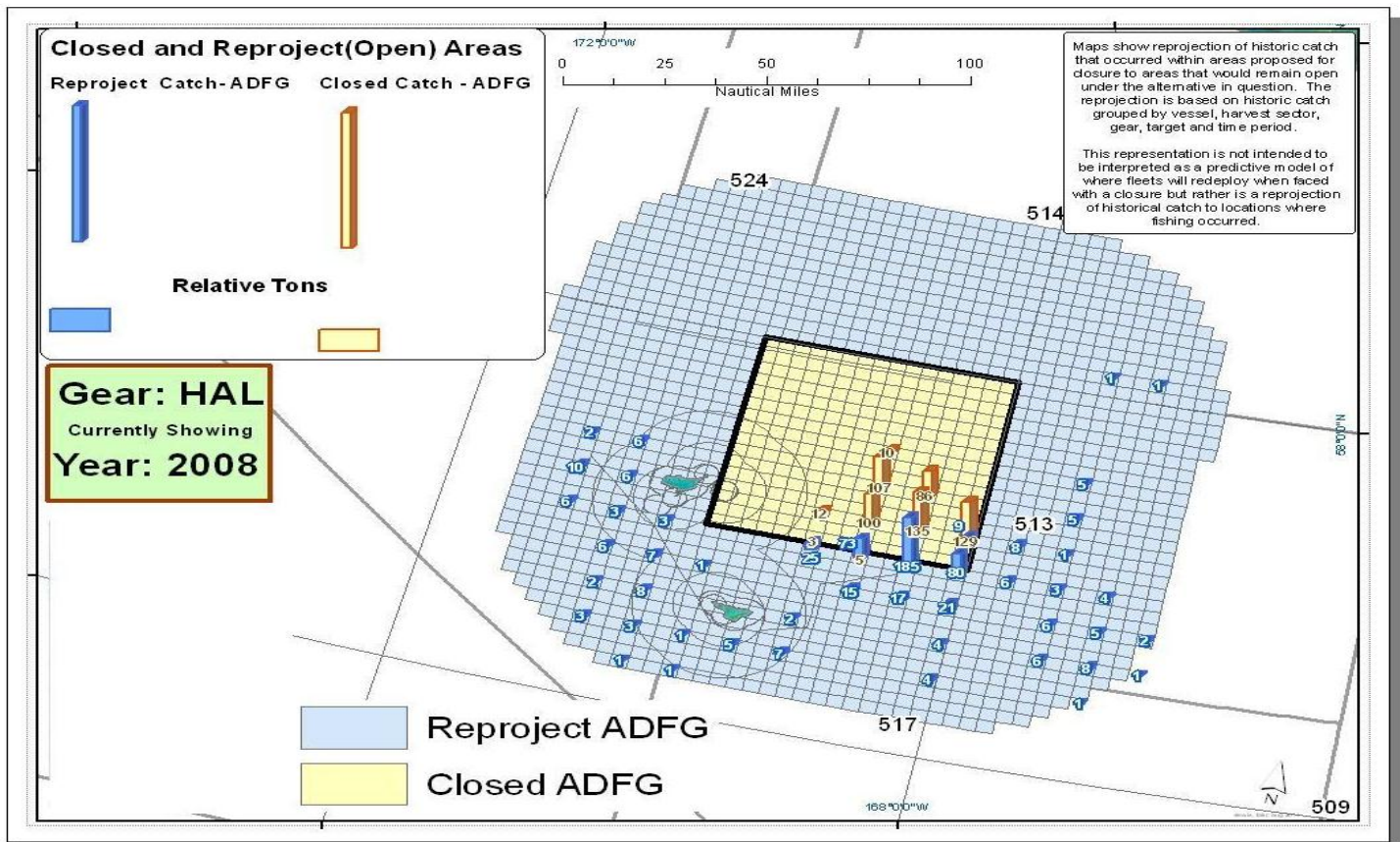
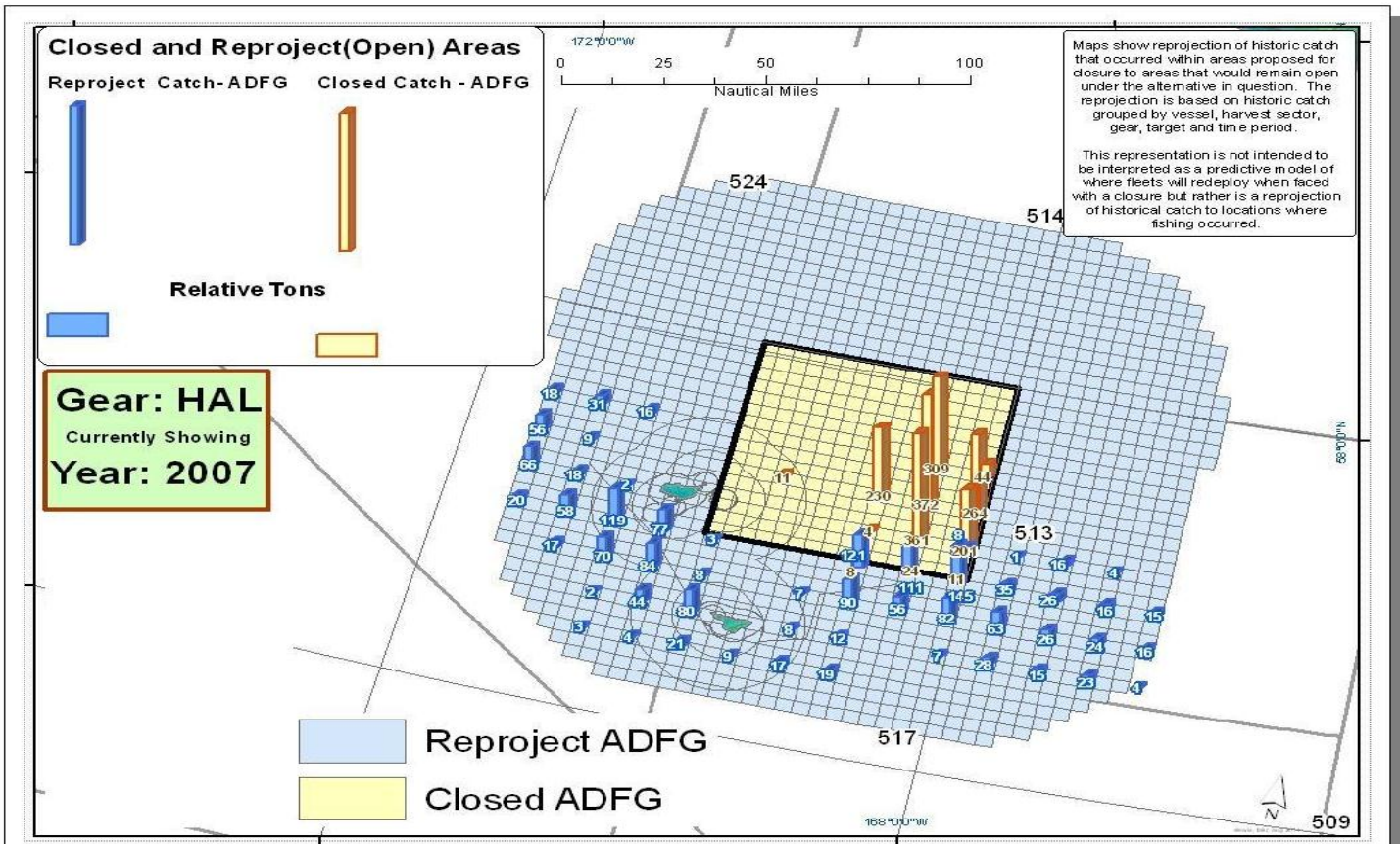


Figure A- 12: Alternative 3: Reprojection Of Catch Due To Closure Of The ADF&G Area In The Pacific Cod Open Access Pot Fishery 2005 (All other years are confidential).

Figure A- 13: Alternative 3: Reprojection Of Catch Due To Closure Of The ADF&G Area In The Pacific Cod CDQ and Open Access Hook And Line Fishery 2003 2010 In 4 Pages of Panels (2 years per panel) Below.







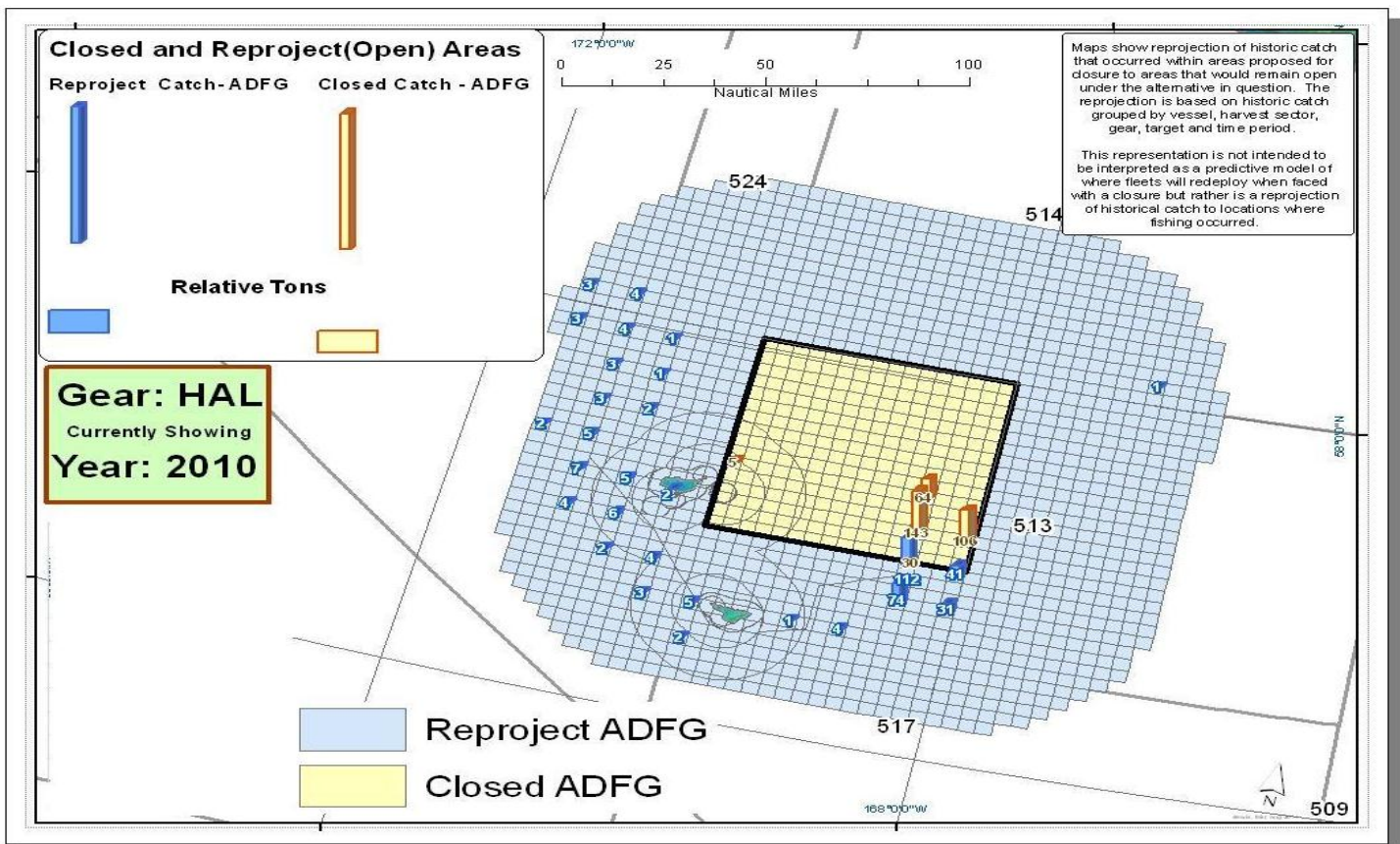
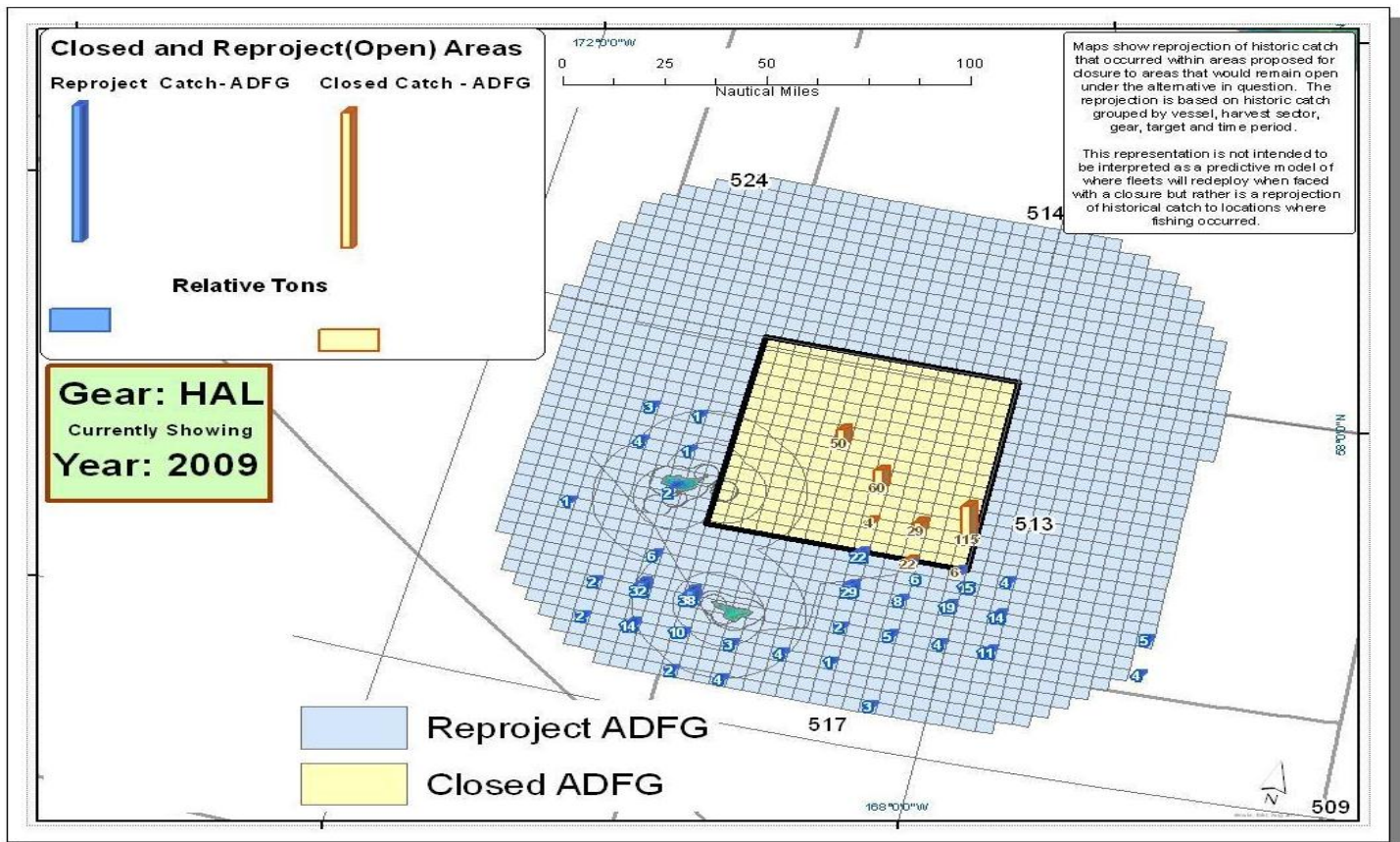
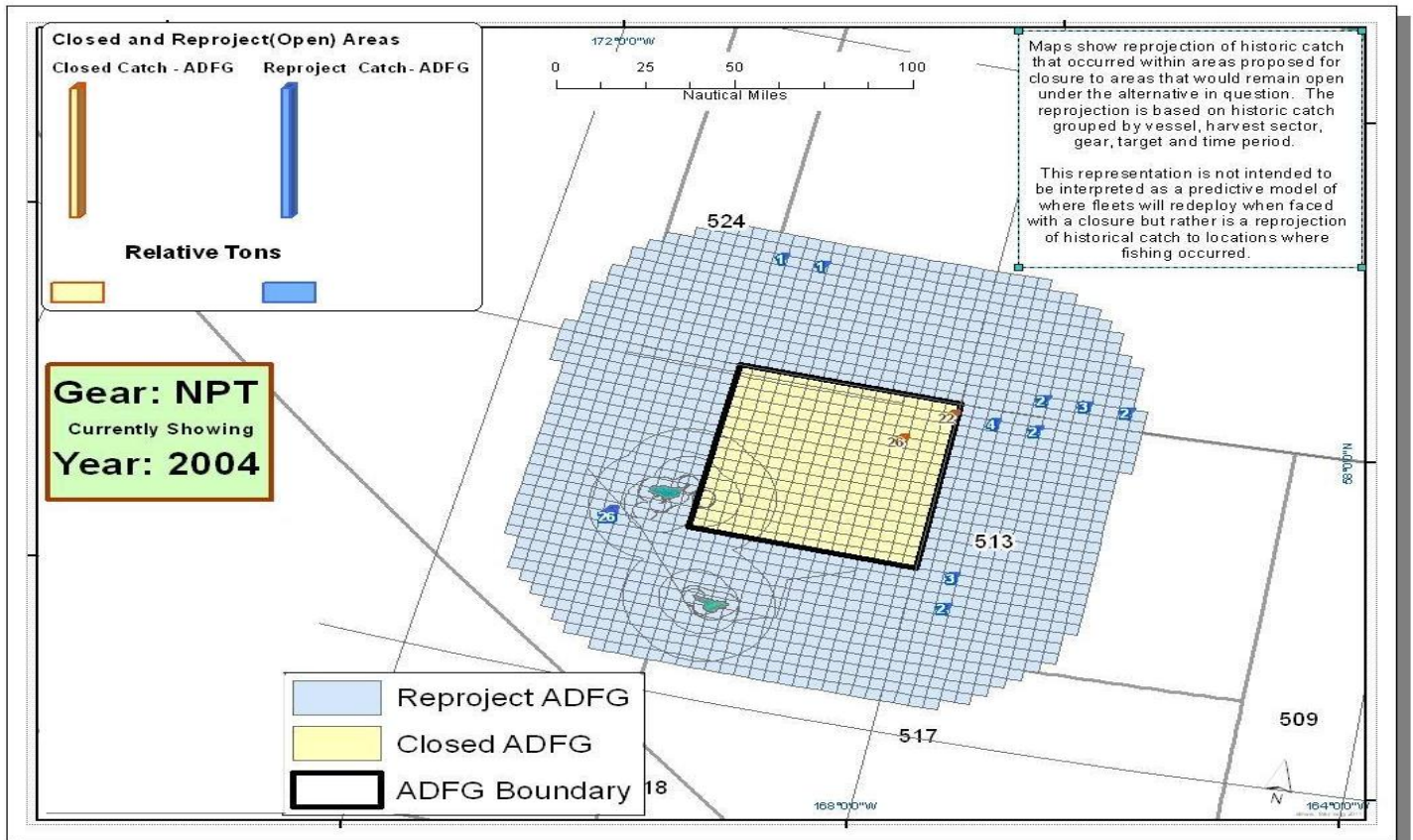
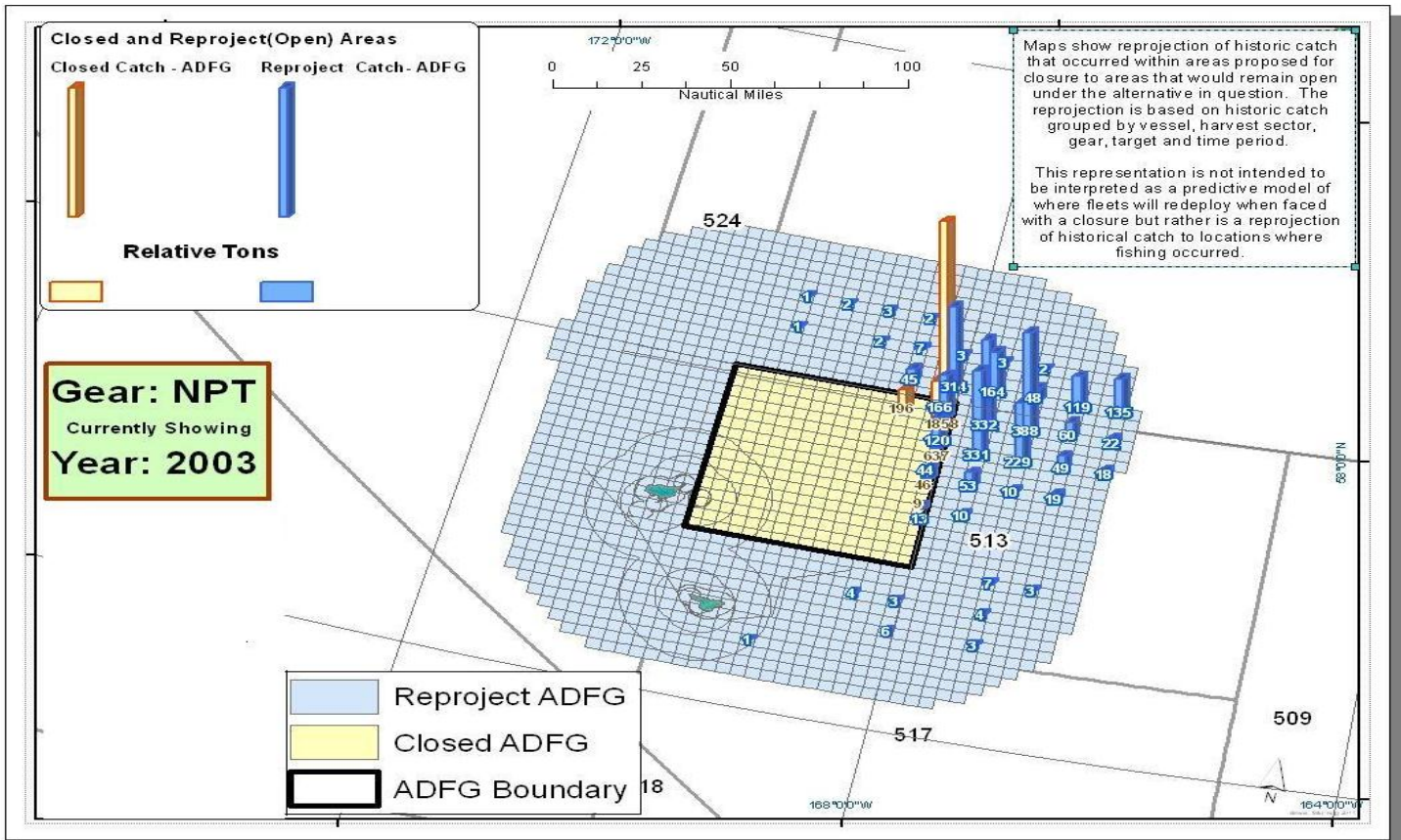
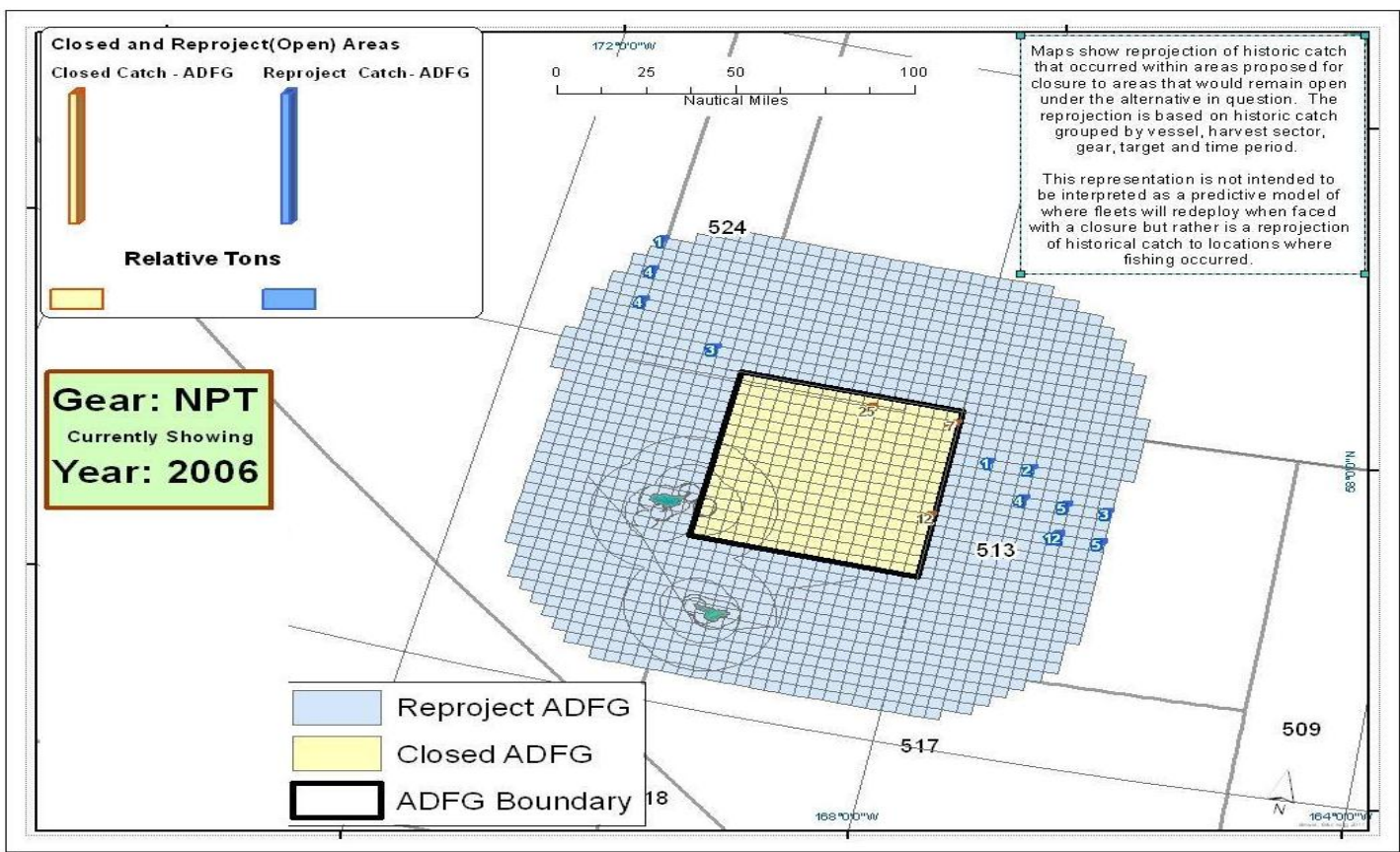
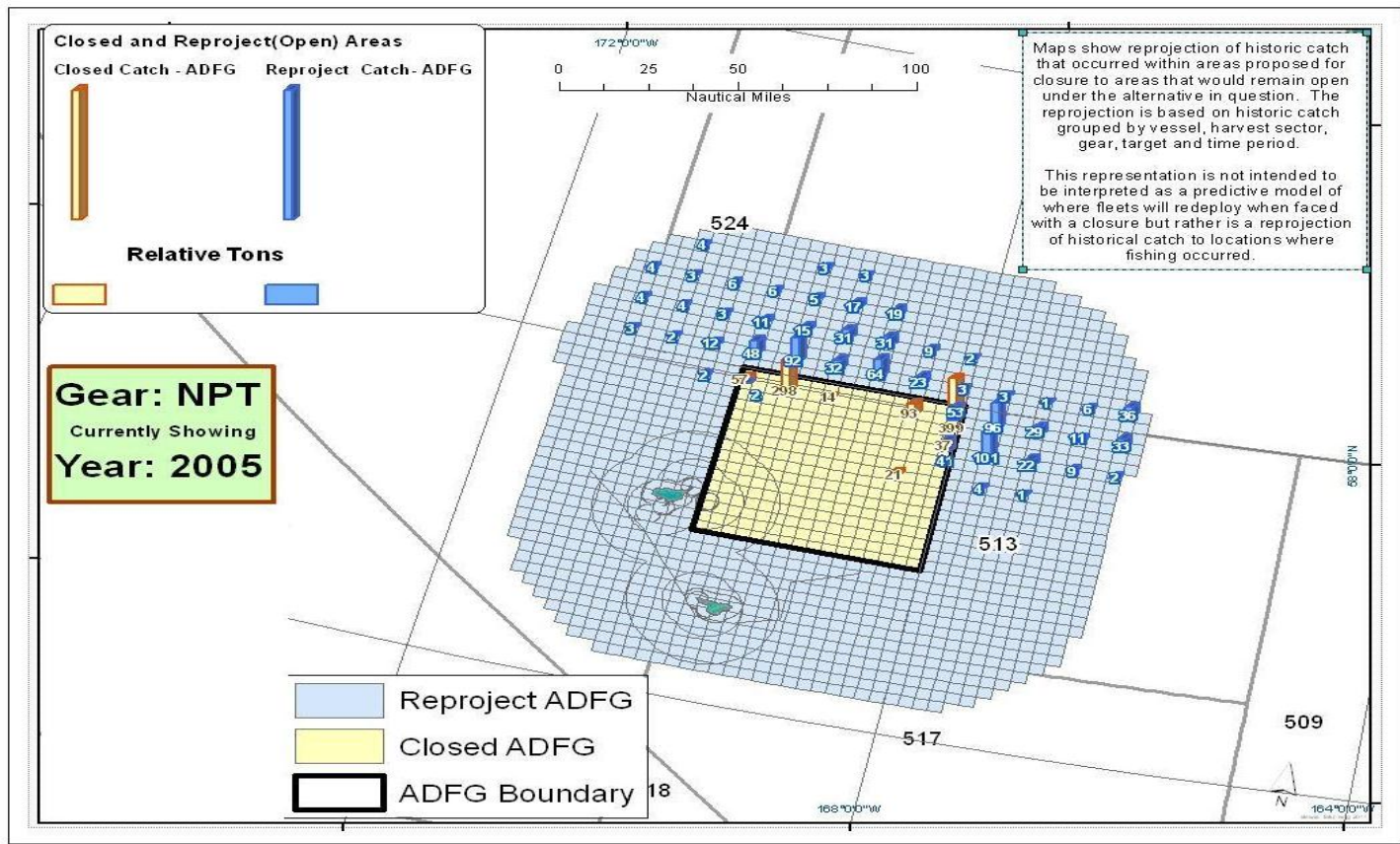
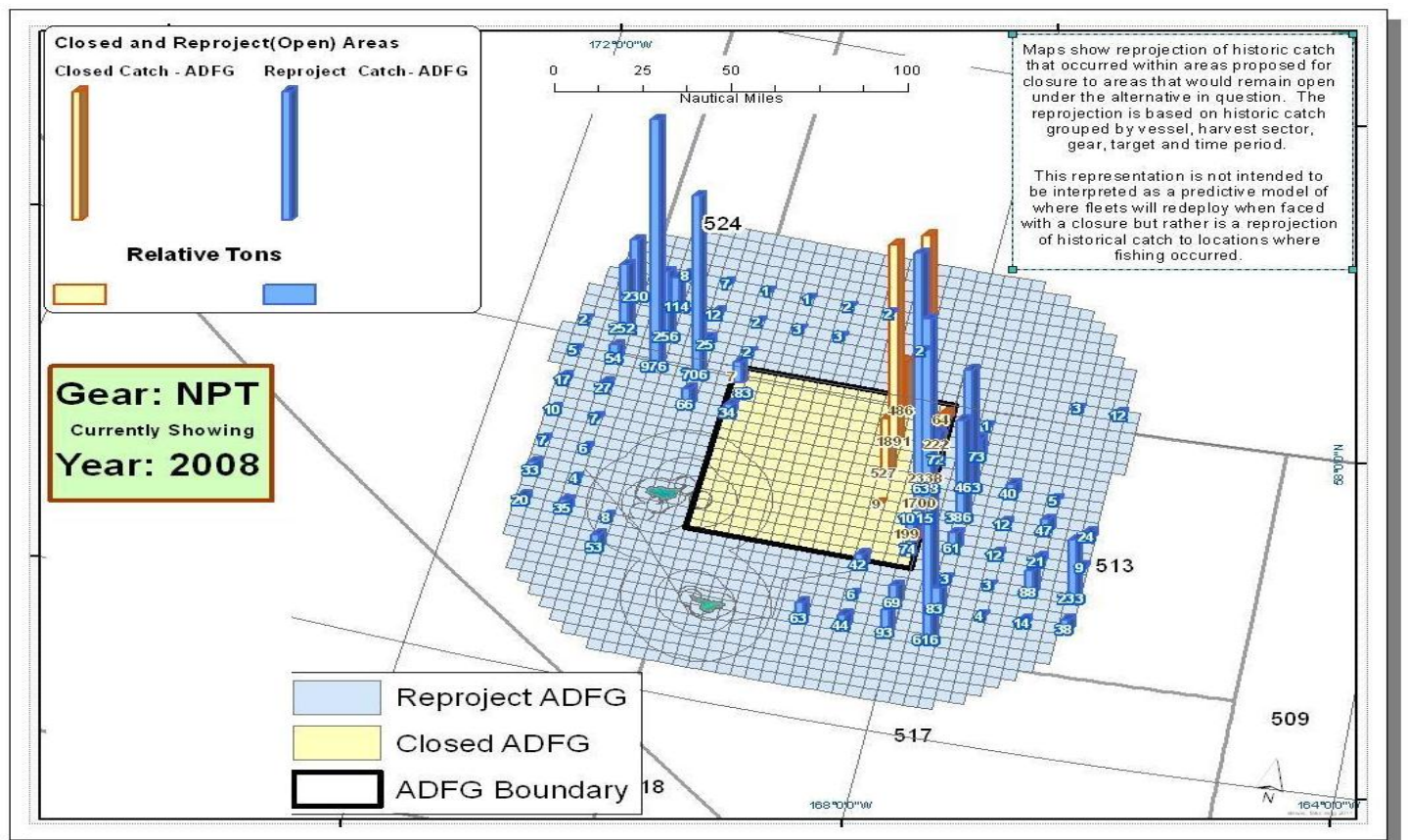
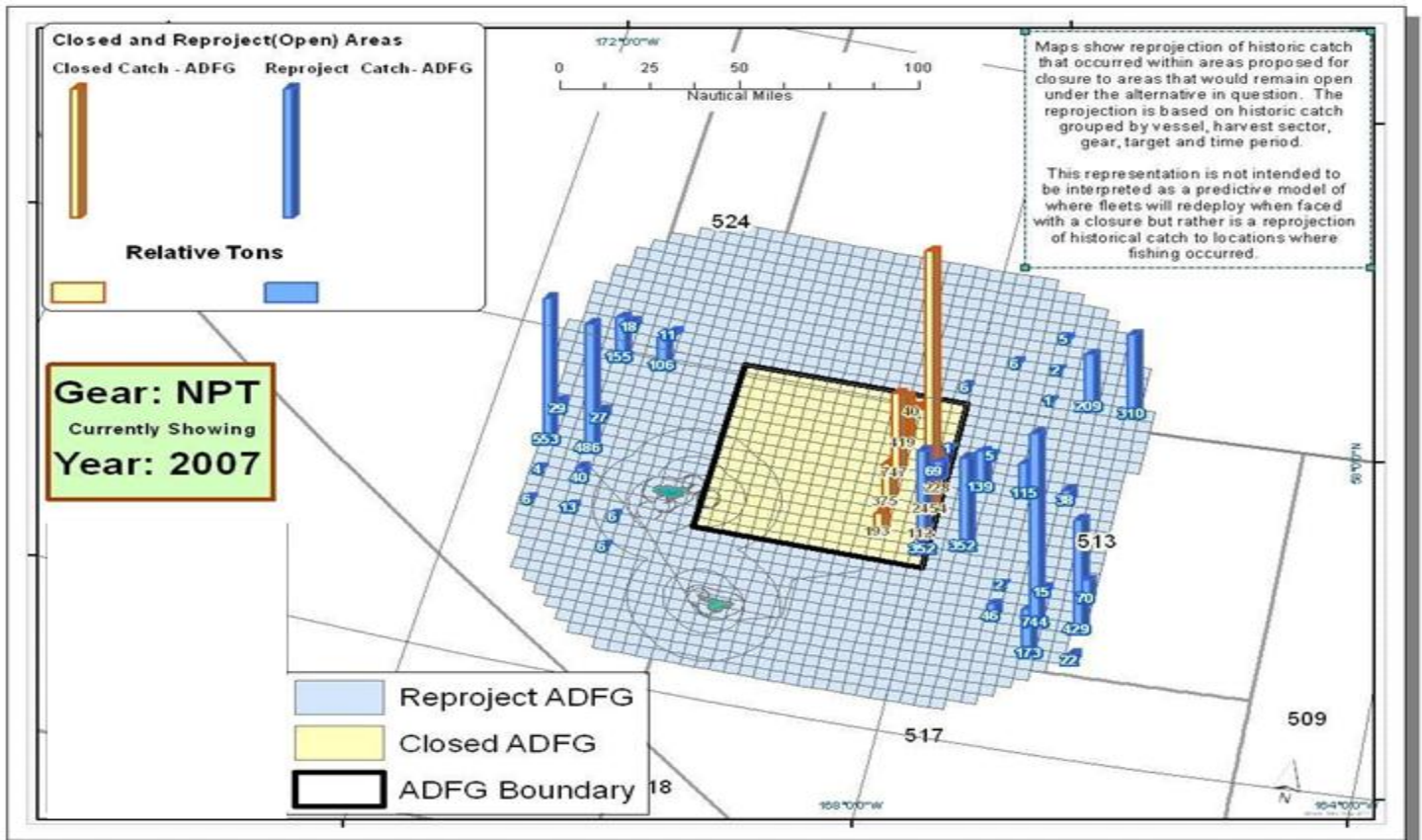
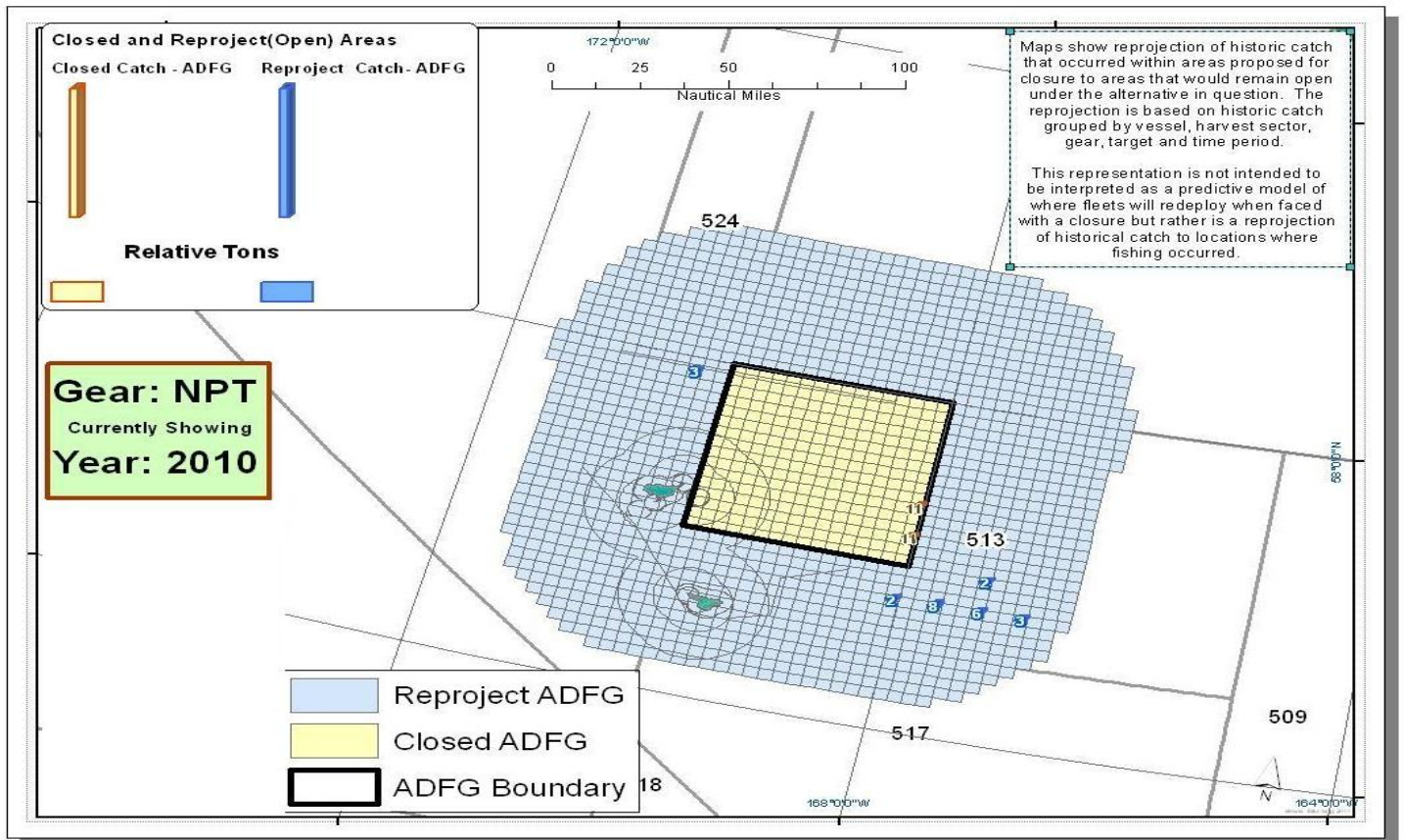
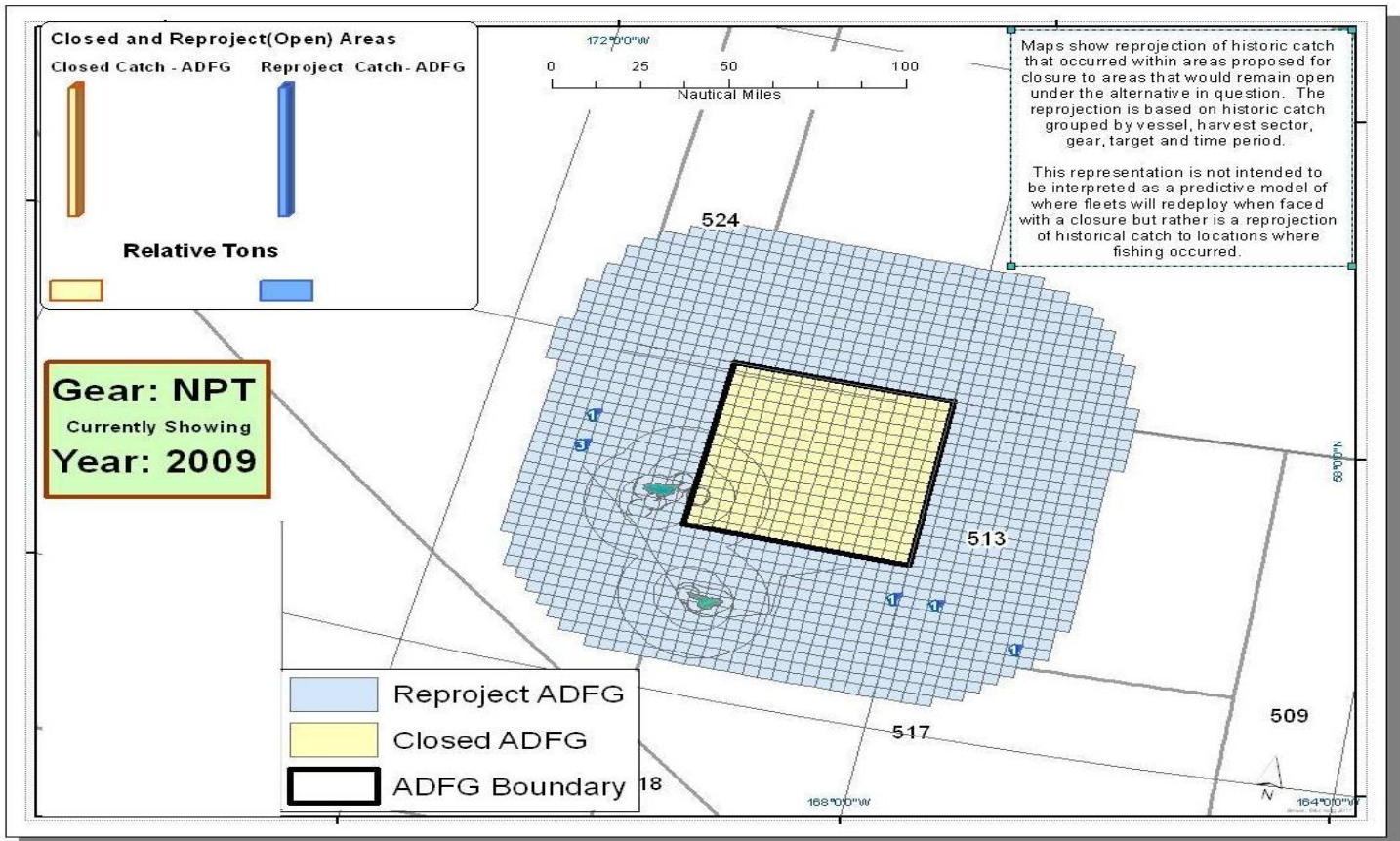


Figure A- 14: Alternative 3: Reprojection Of Catch Due To Closure Of The ADF&G Area In The Flatfish Non Pelagic Trawl CDQ and Open Access Fishery 2003 2010 In 4 Pages of Panels (2 years per panel) Below.



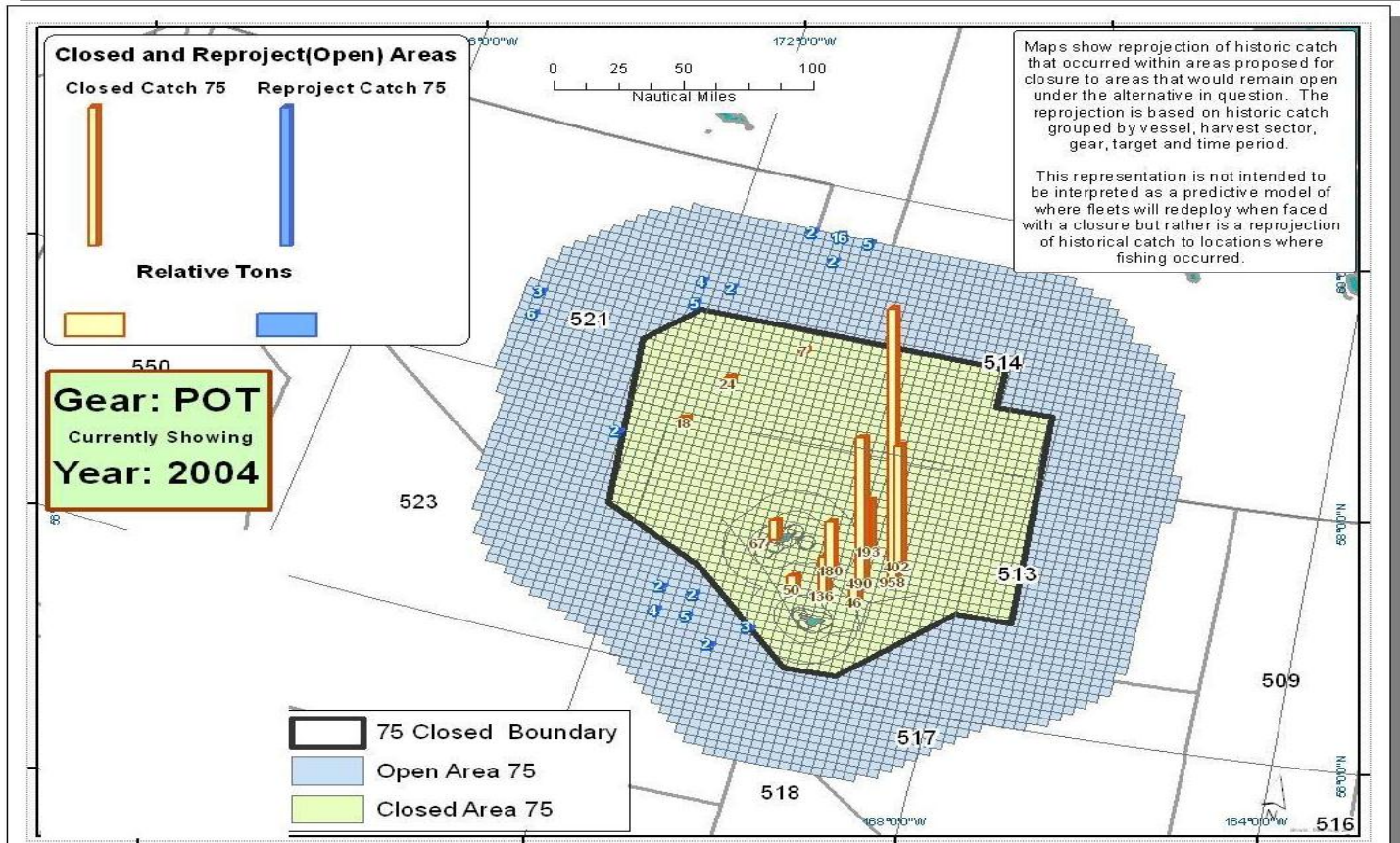
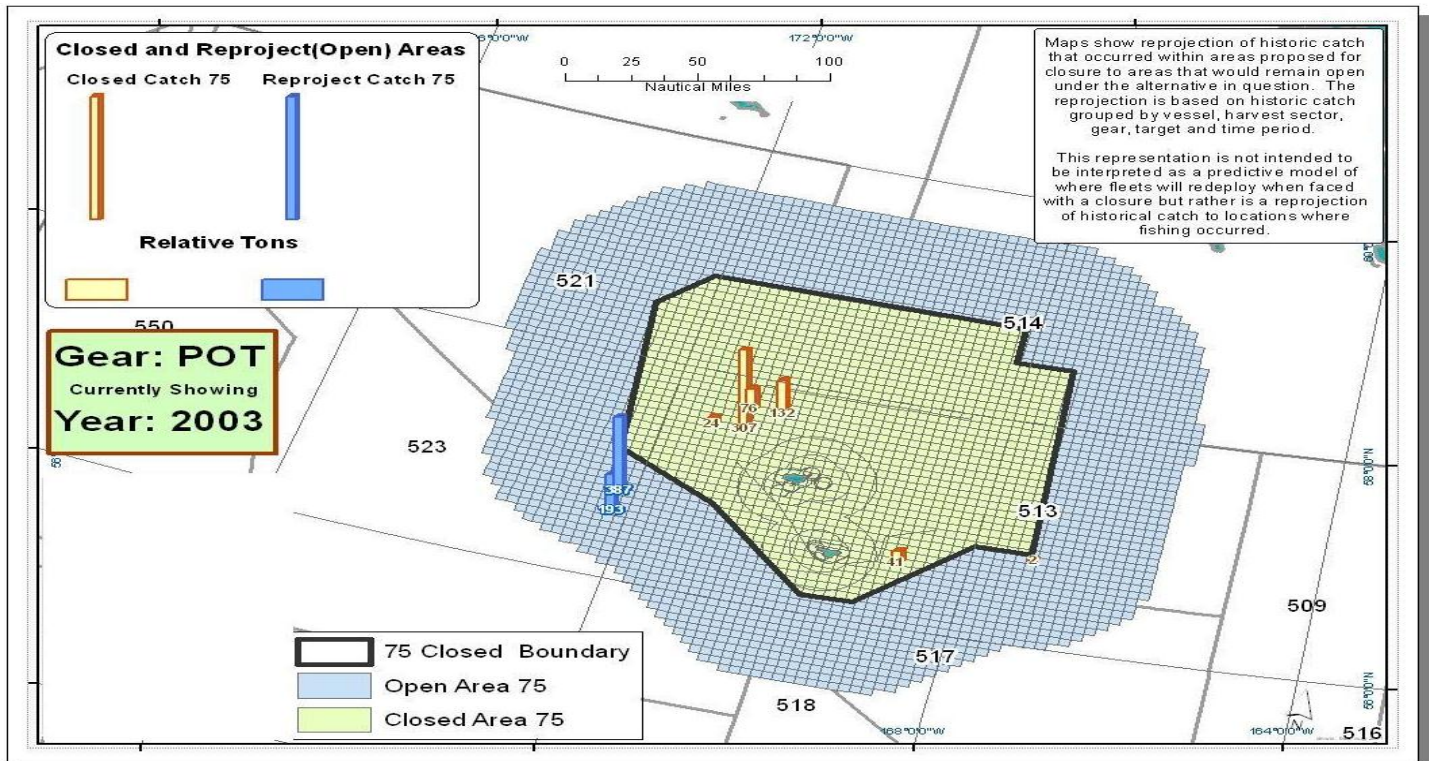


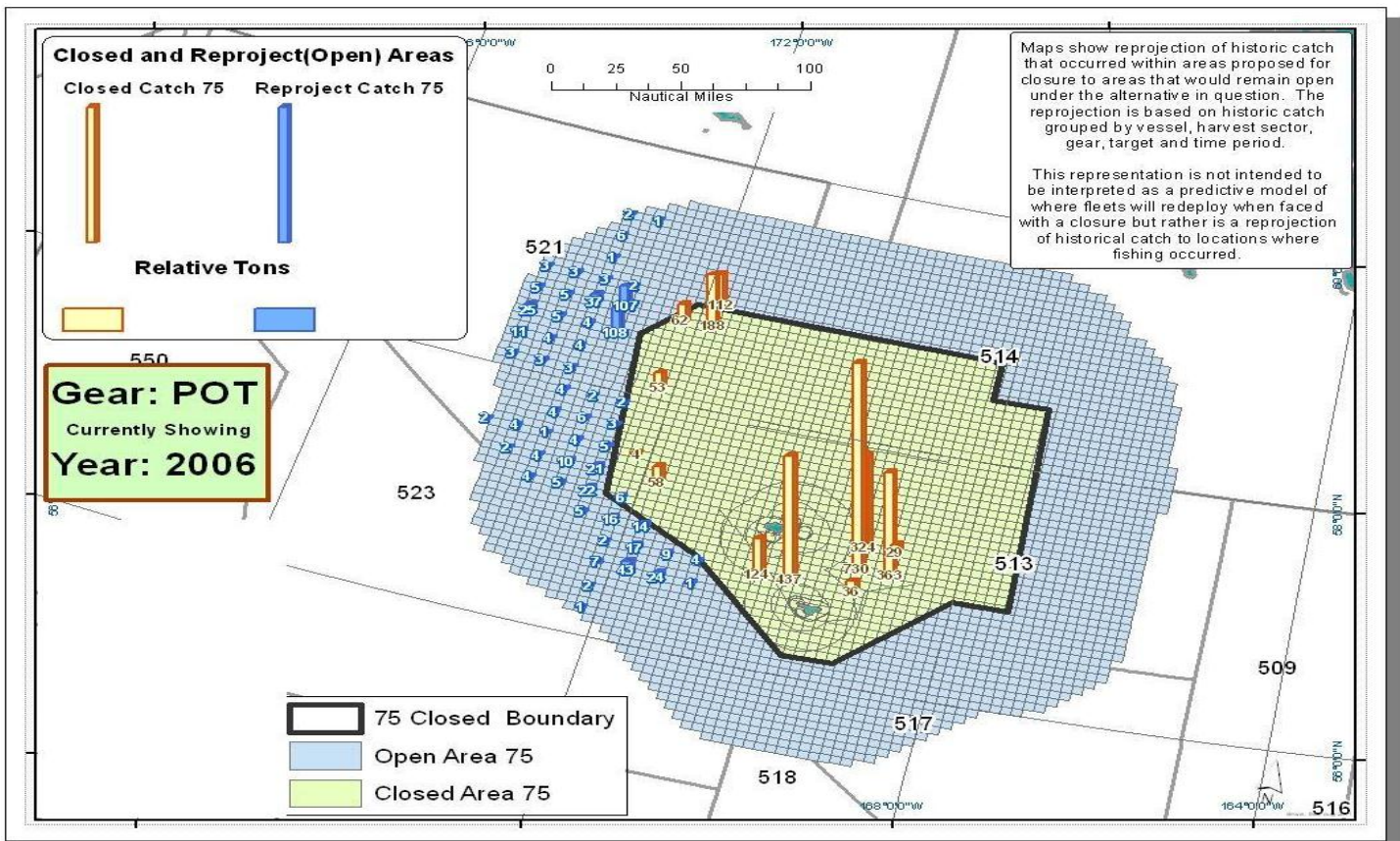
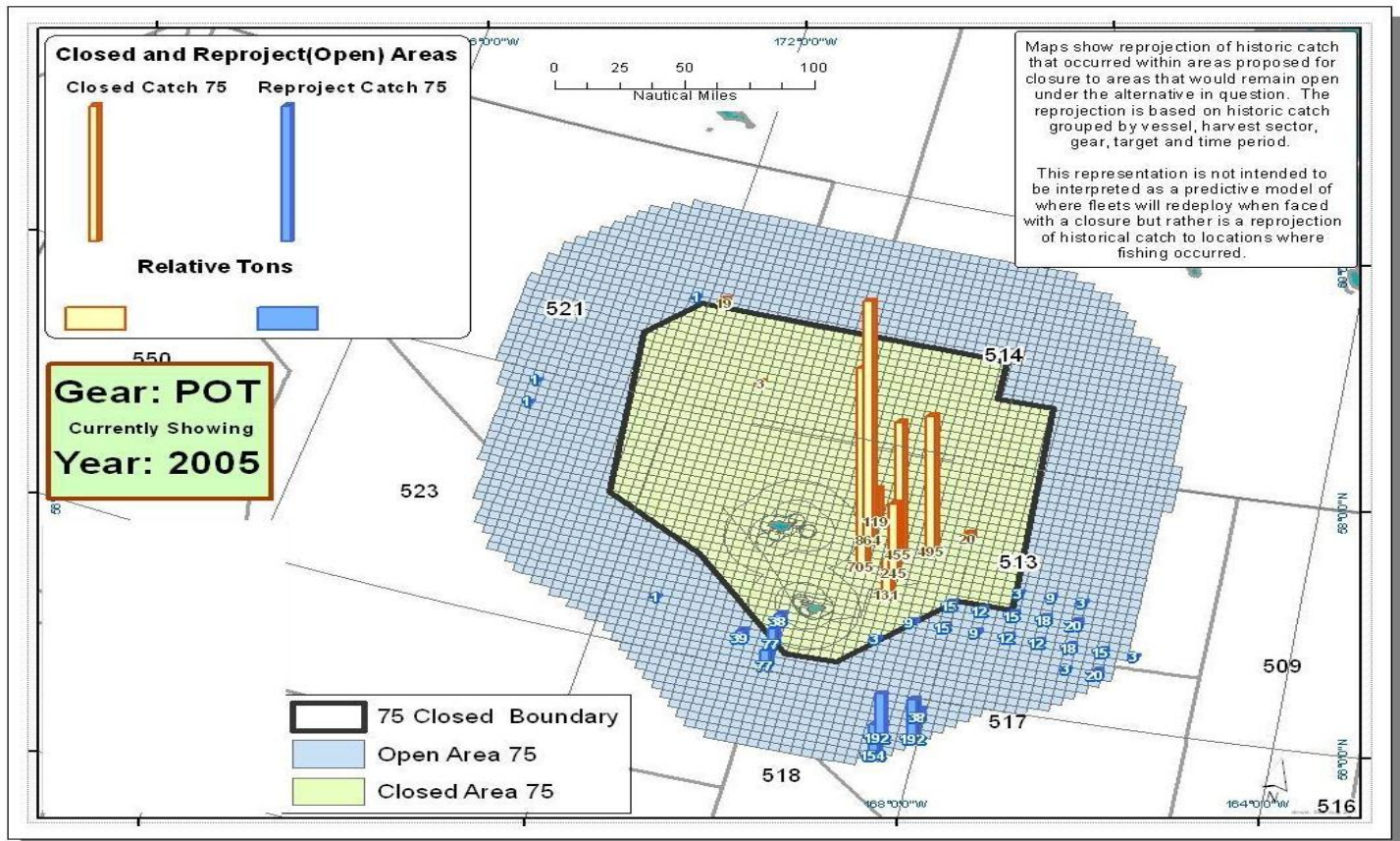


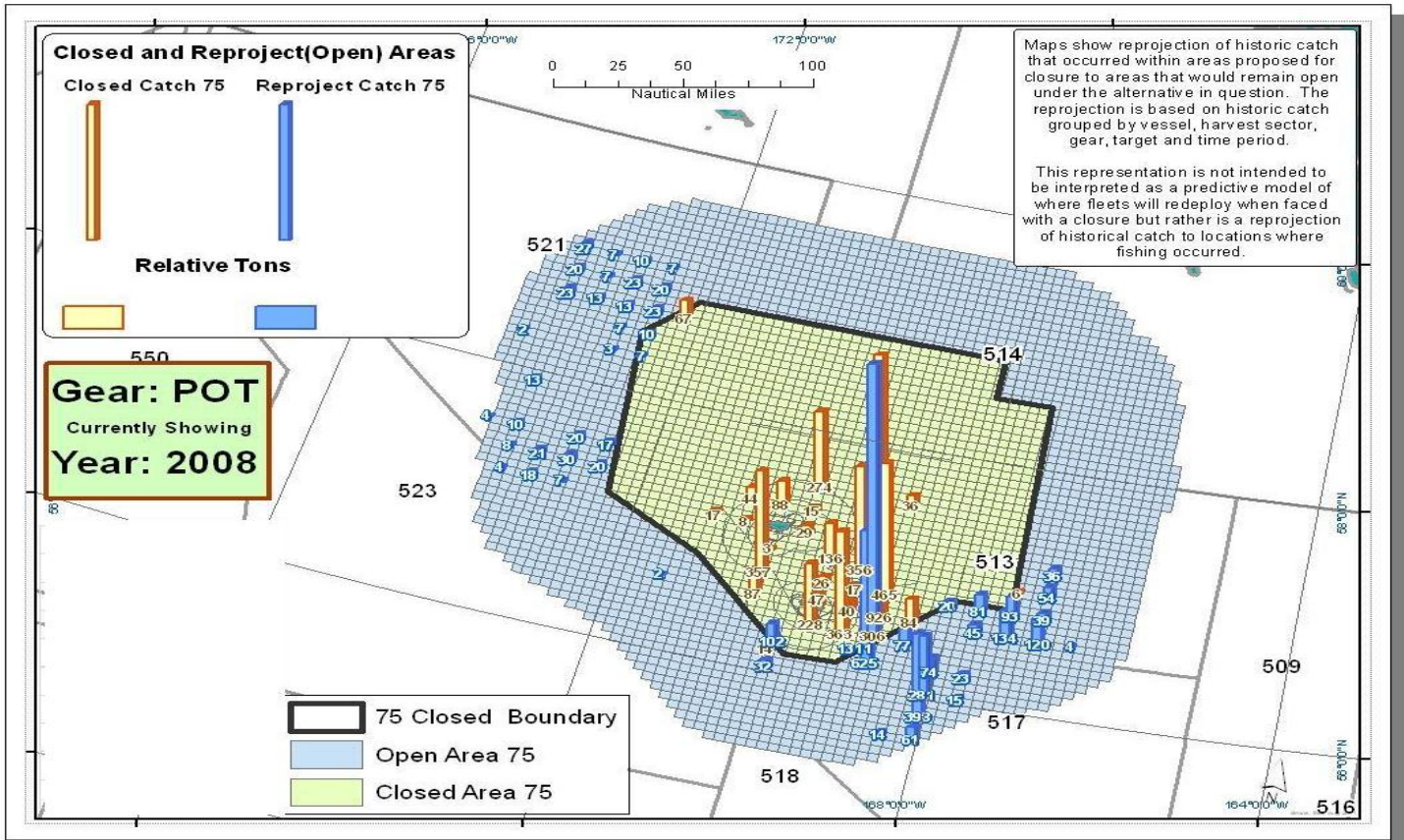
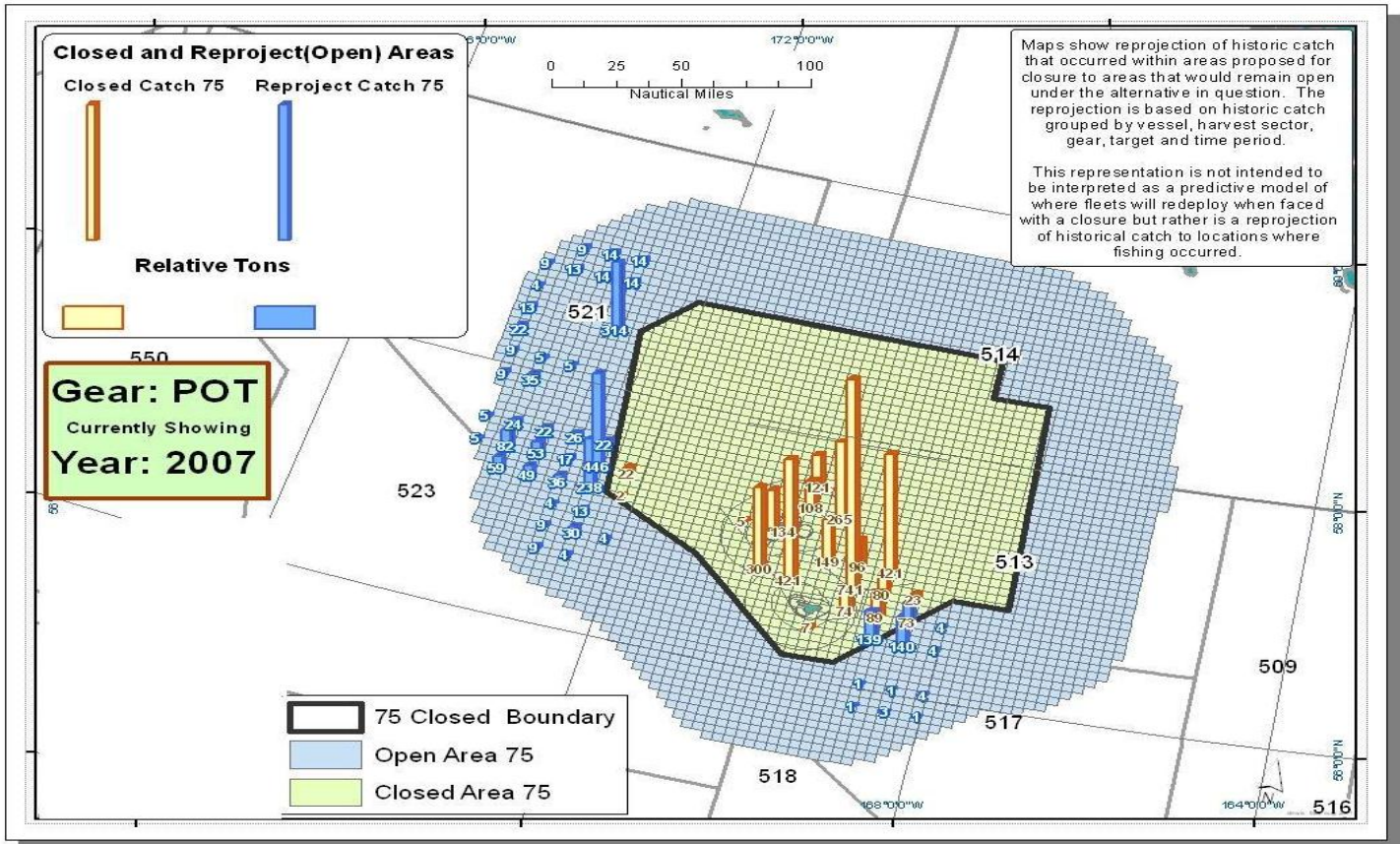


Section A-5: Alternative 4, Option 1, PIBKC 1975-09 Area Catch Reprojection Maps

Figure A- 15: Alternative 4, Option 1: Reprojection Of Catch Due To Closure Of The PIBKC 1975-09 Area In The Pacific Cod Pot Open Access Fishery 2003 2010 In 4 Pages of Panels (2 years per panel) Below.







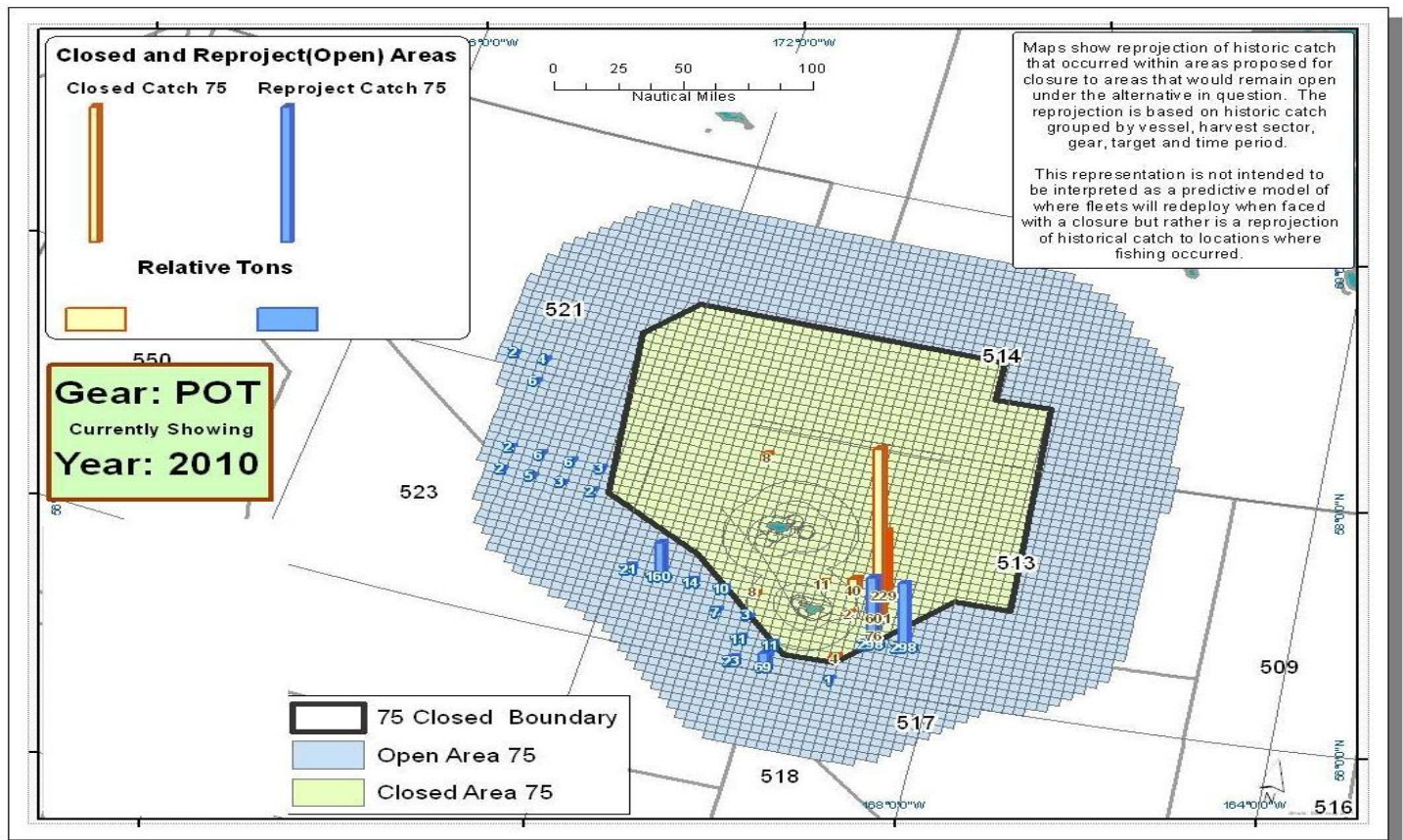
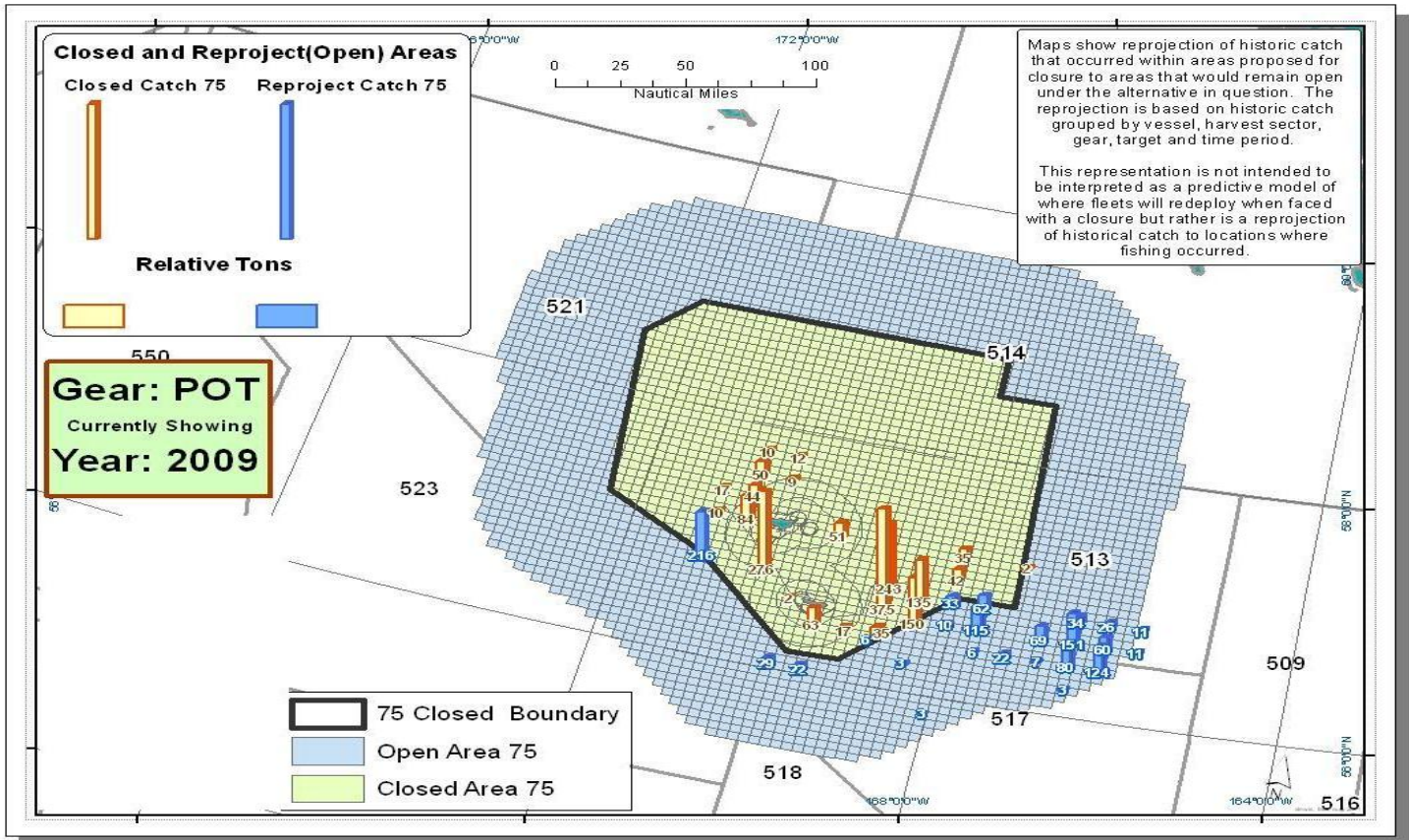
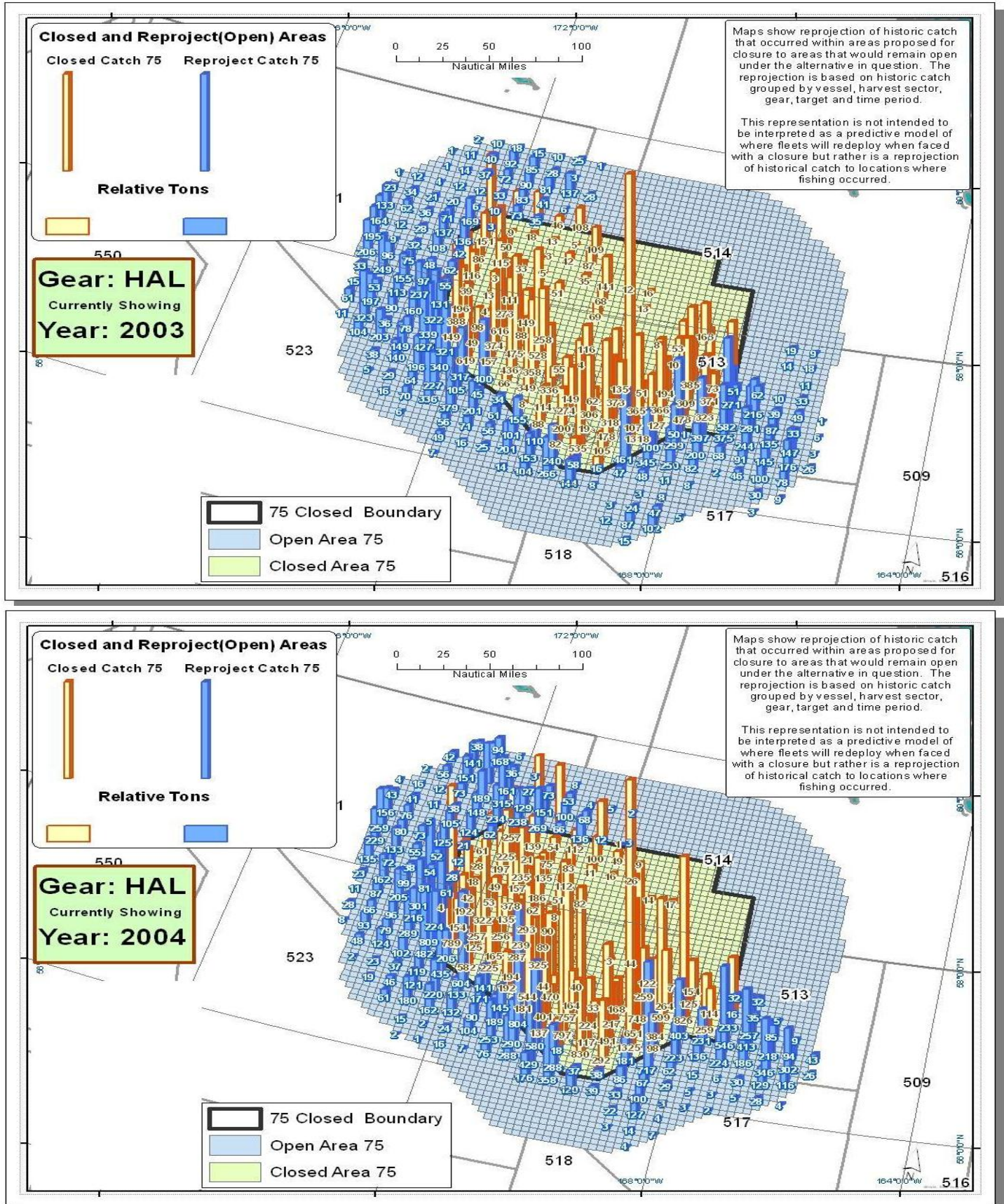
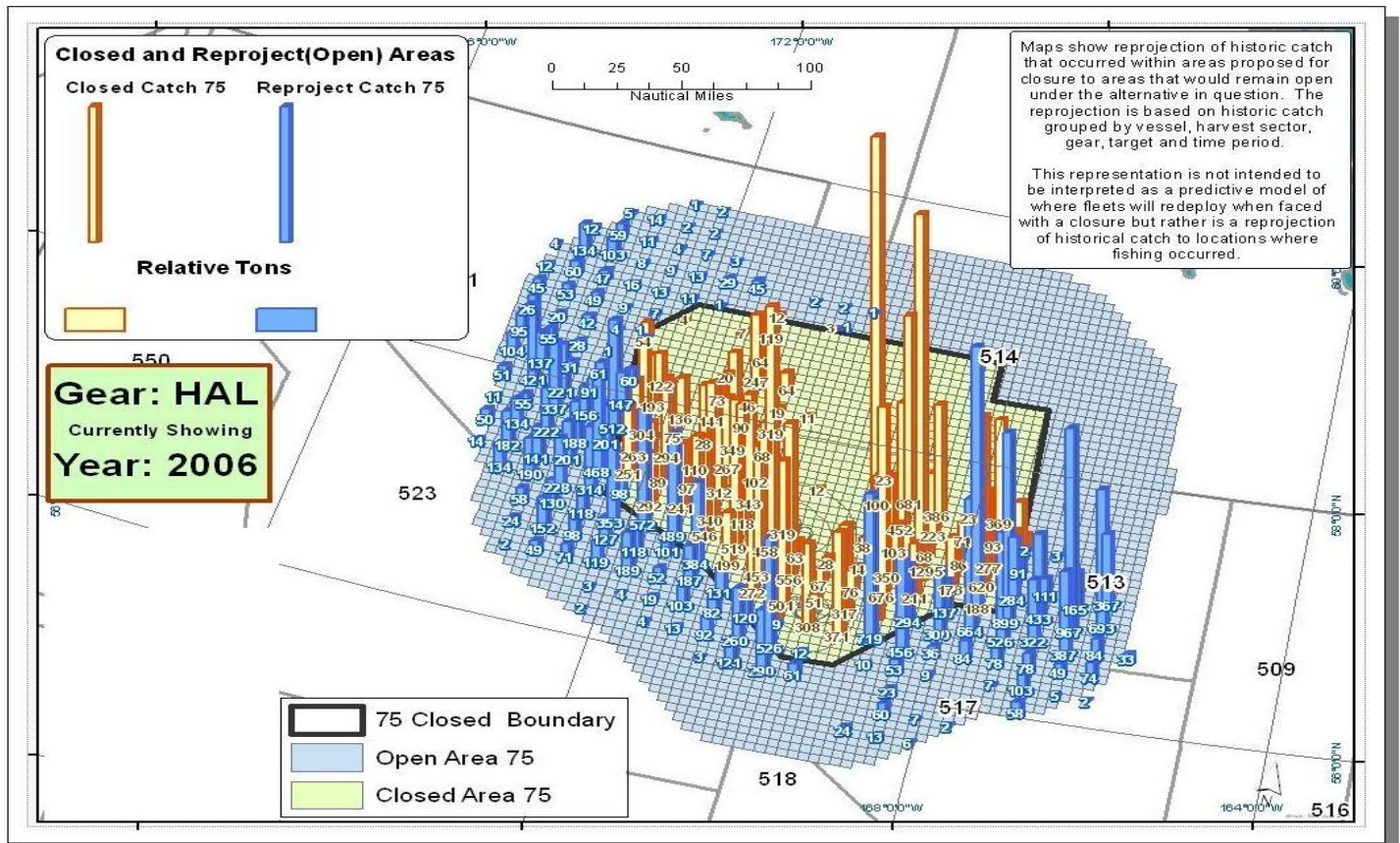
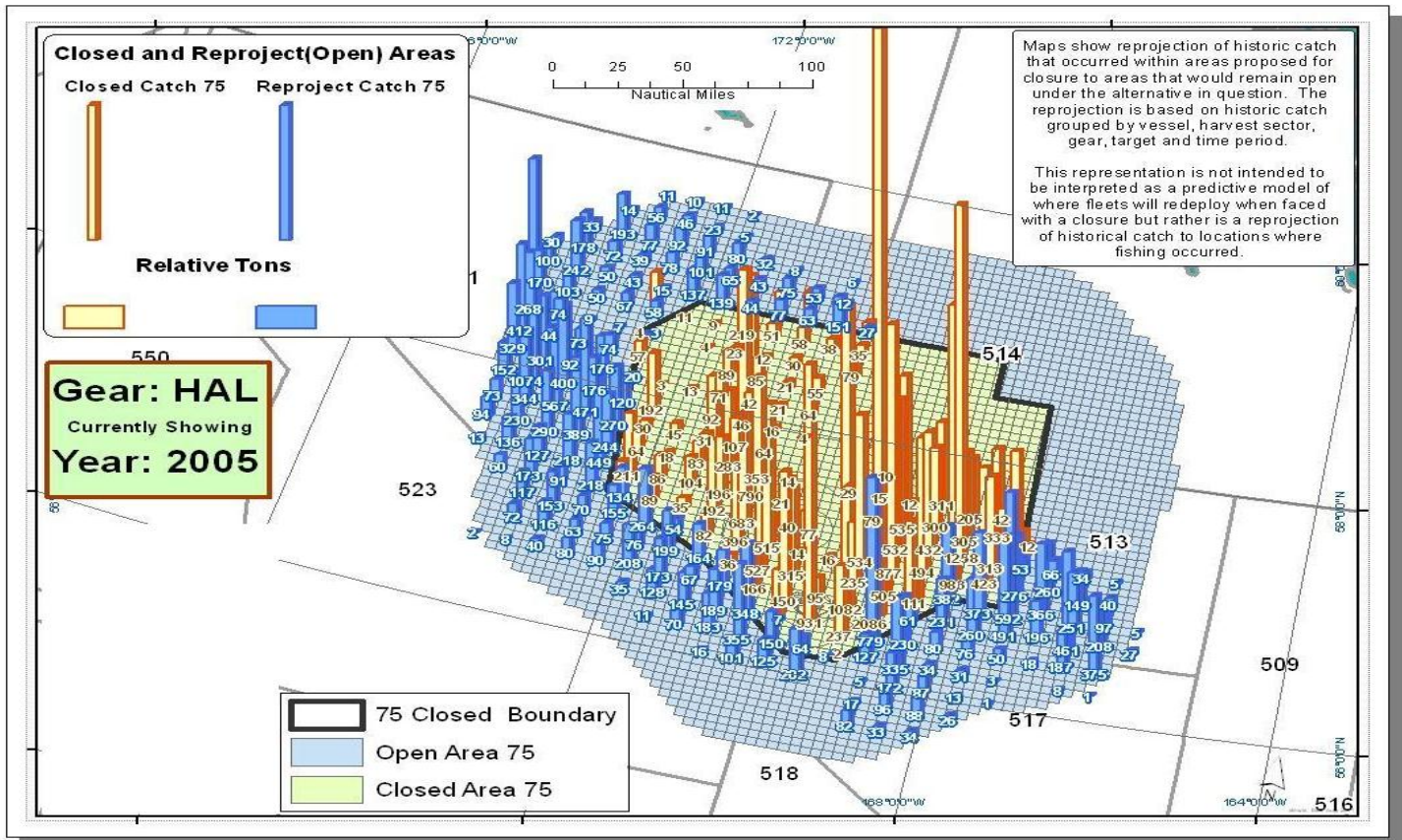
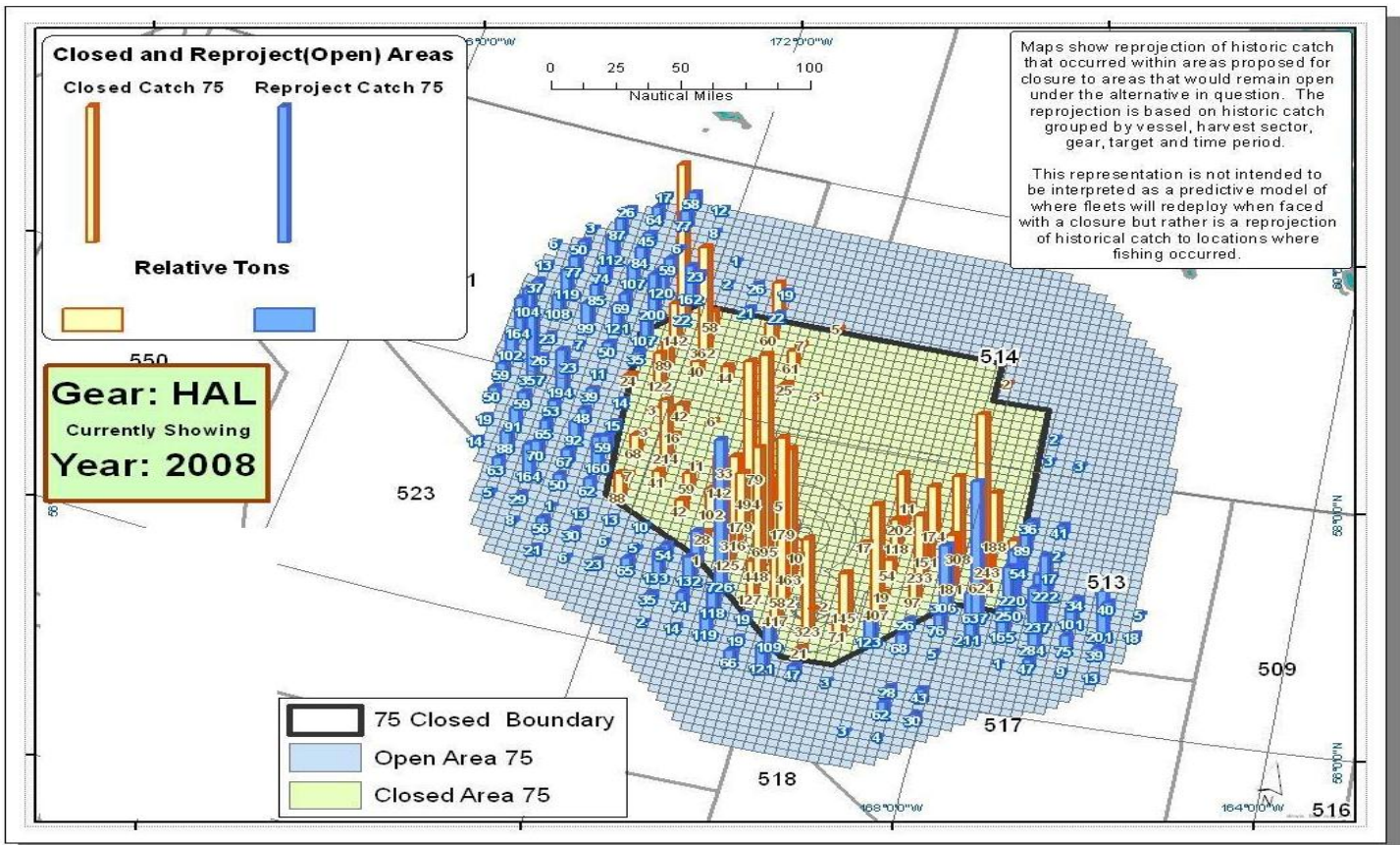
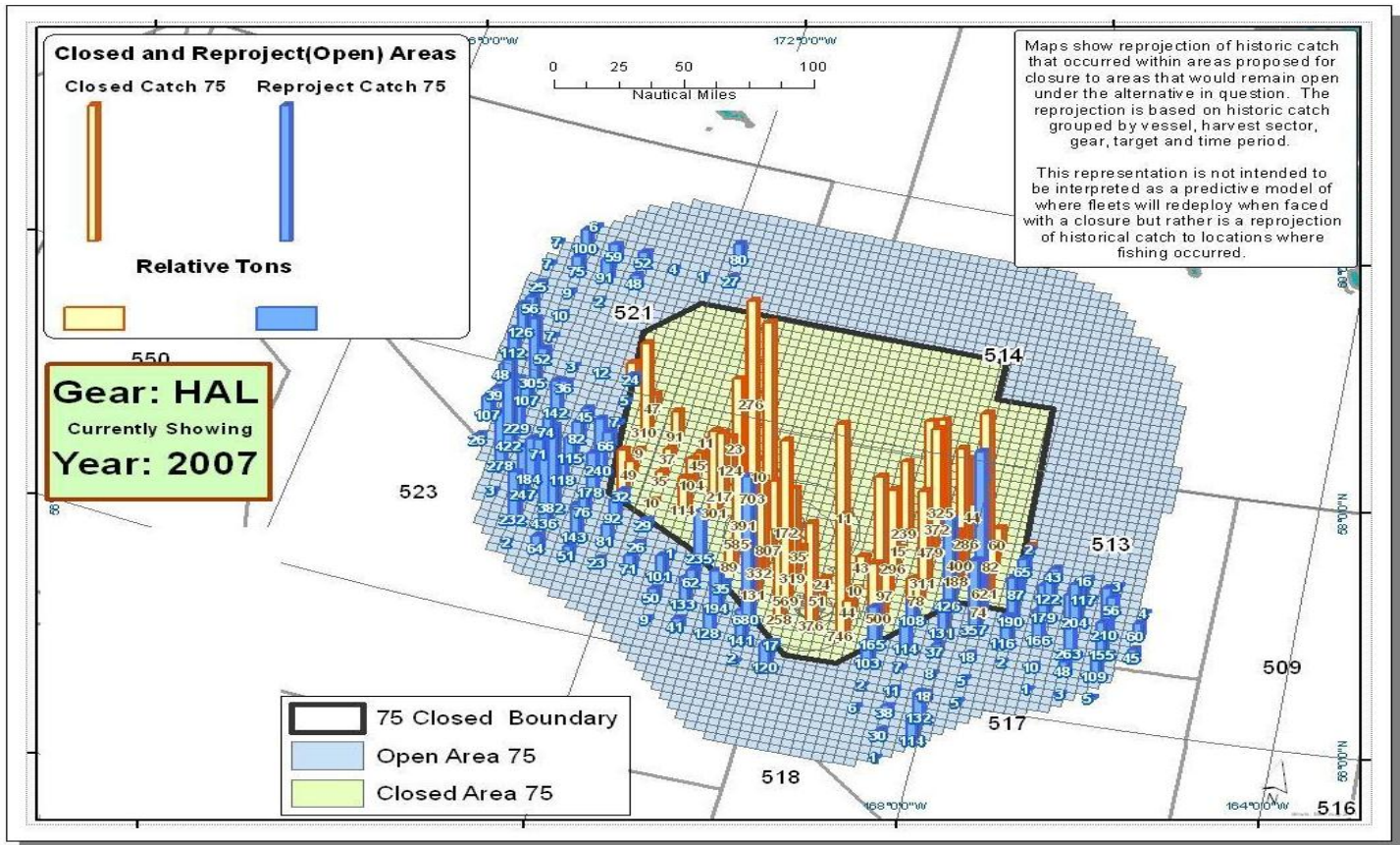


Figure A- 16: Alternative 4, Option 1: Reprojection Of Catch Due To Closure Of The PIBKC 1975-09 Area Pacific Cod Hook and Line CDQ and Open Access Fishery 2003 2010 In 4 Pages of Panels (2 years per panel) Below.







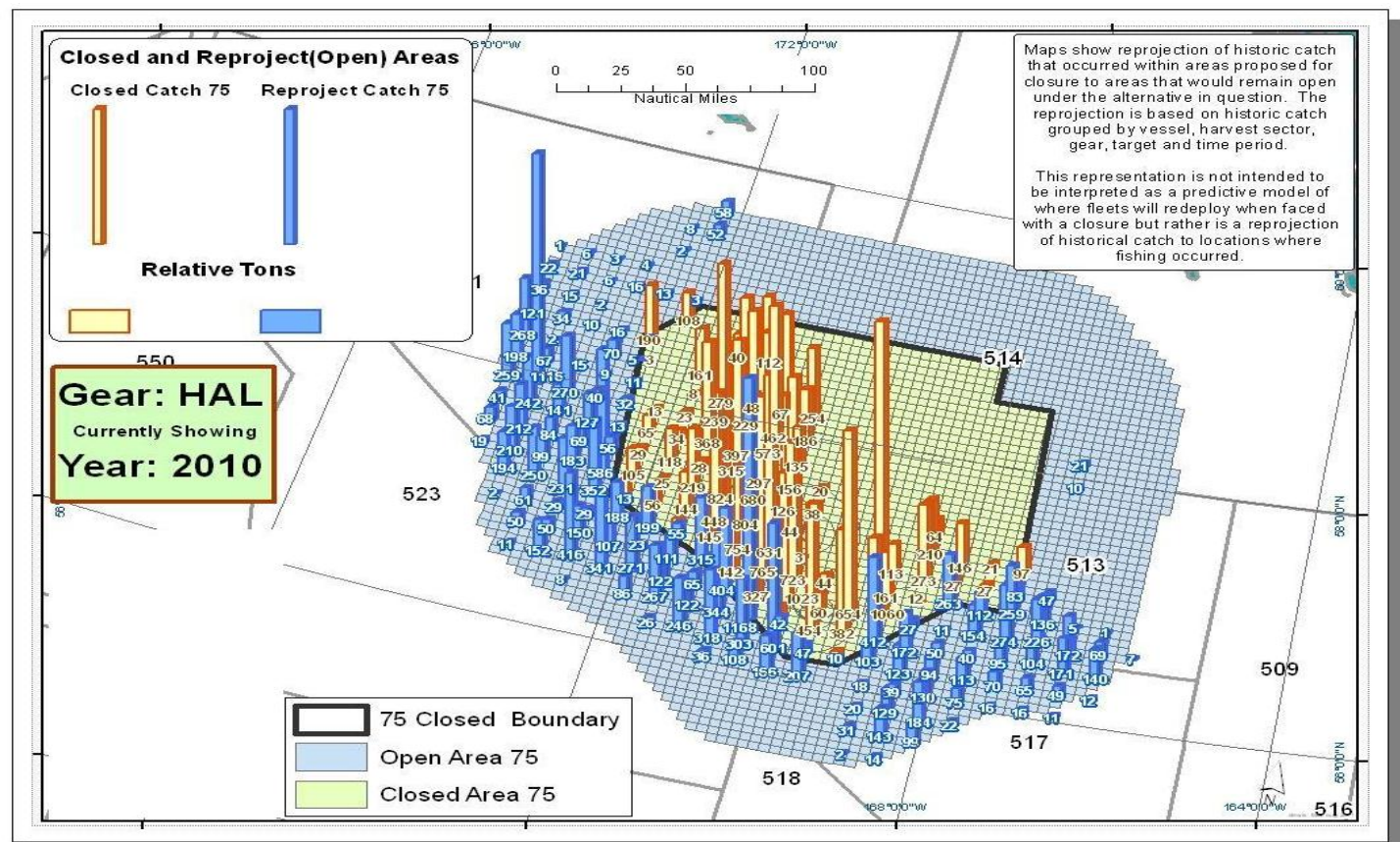
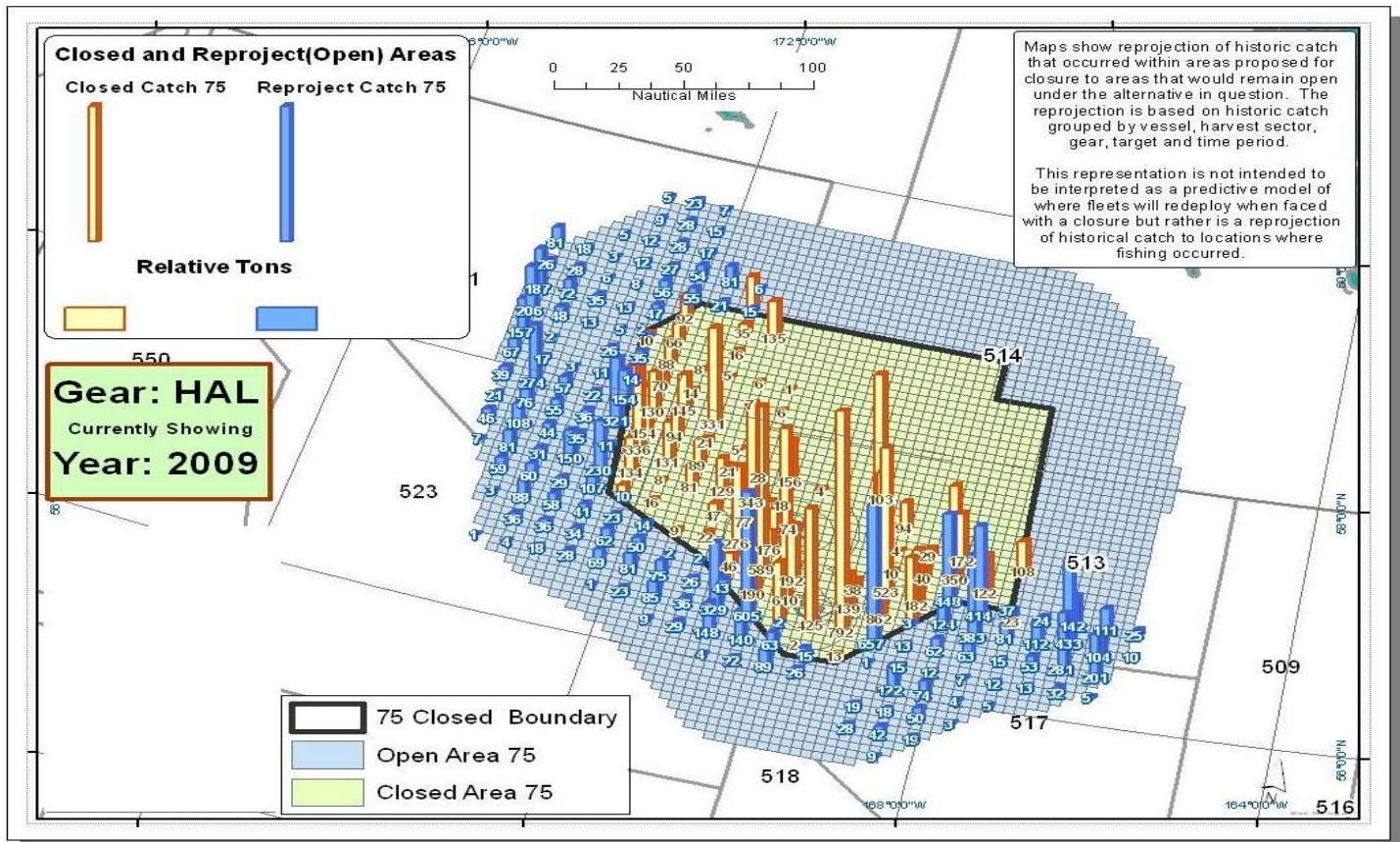
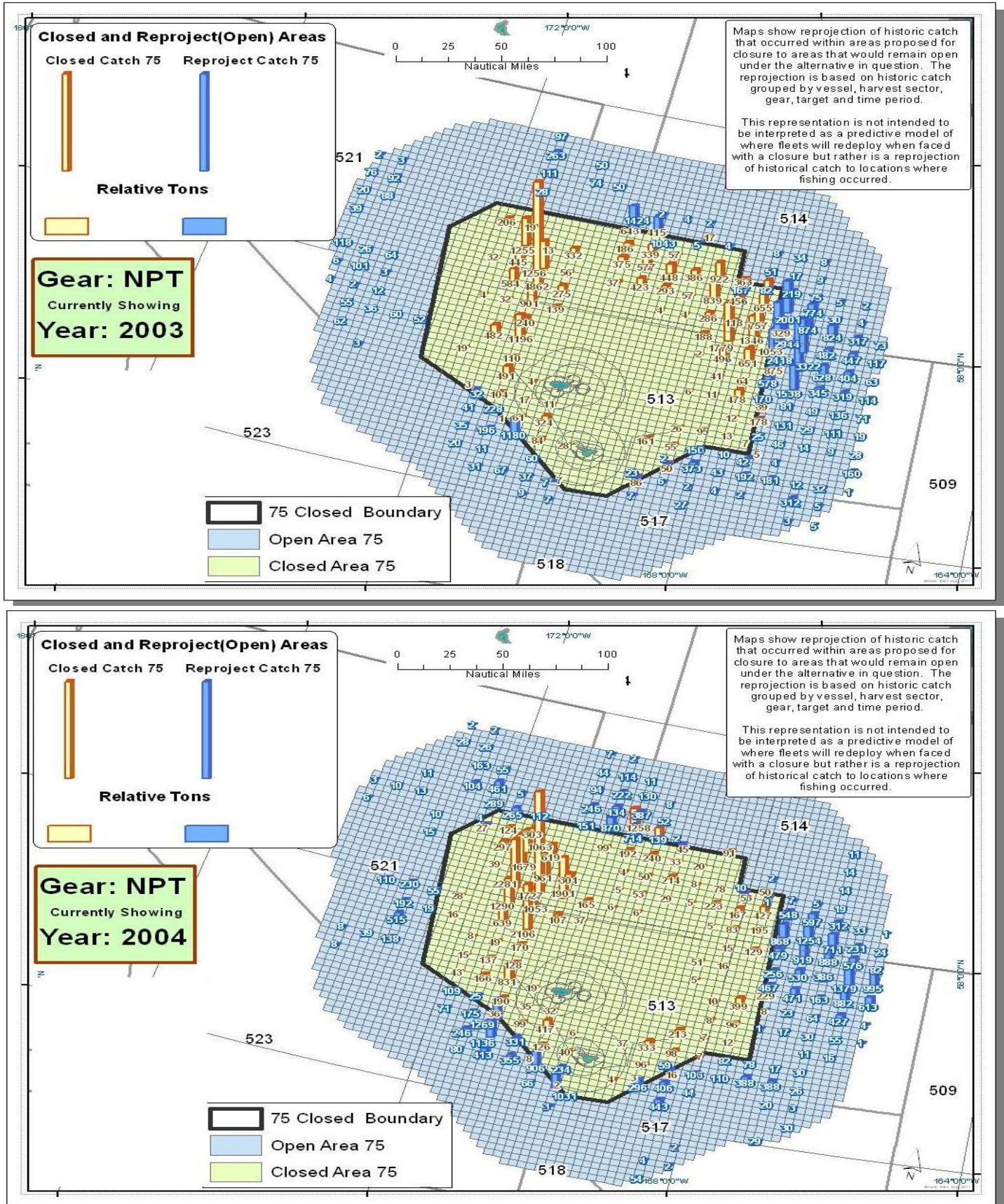
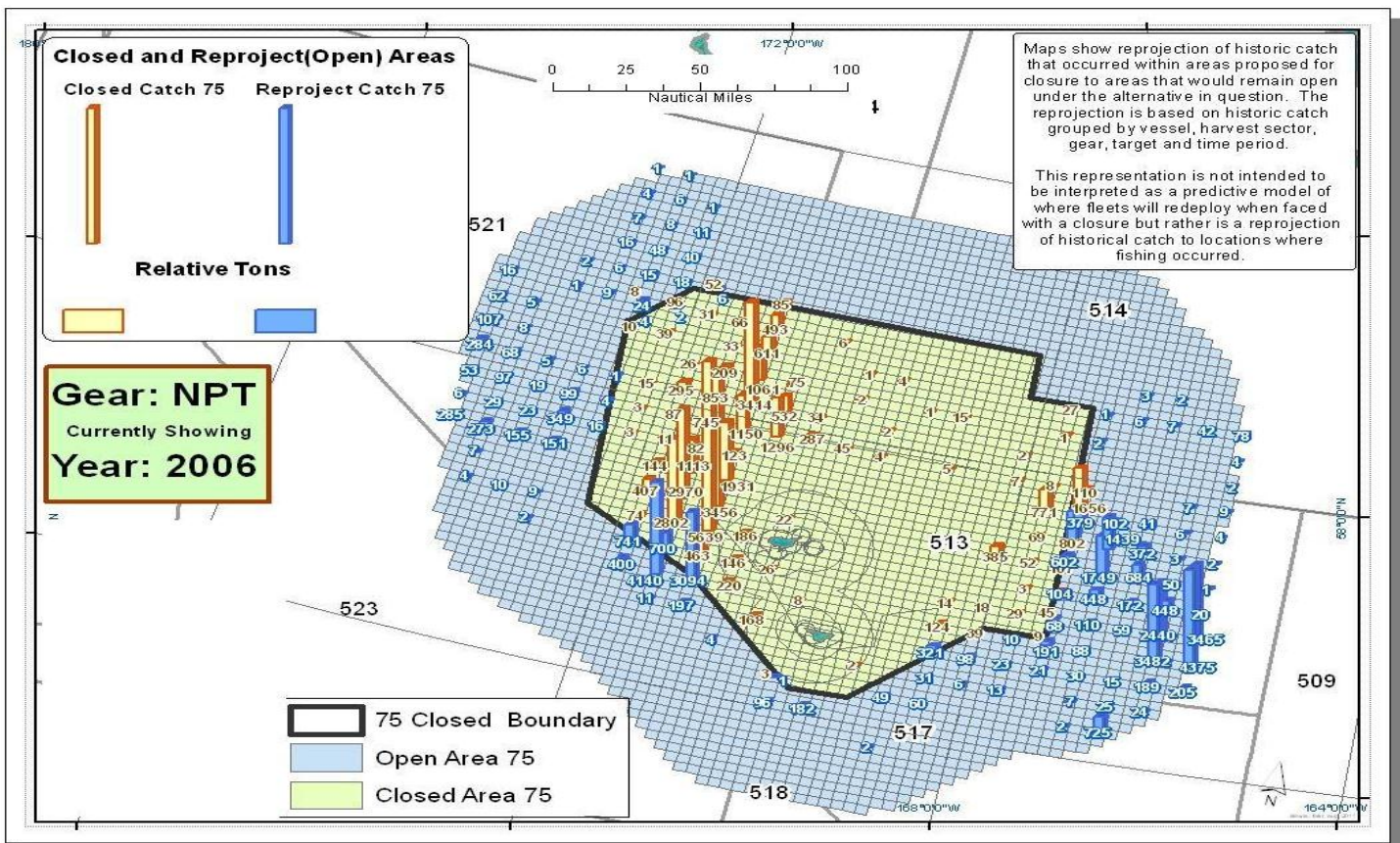
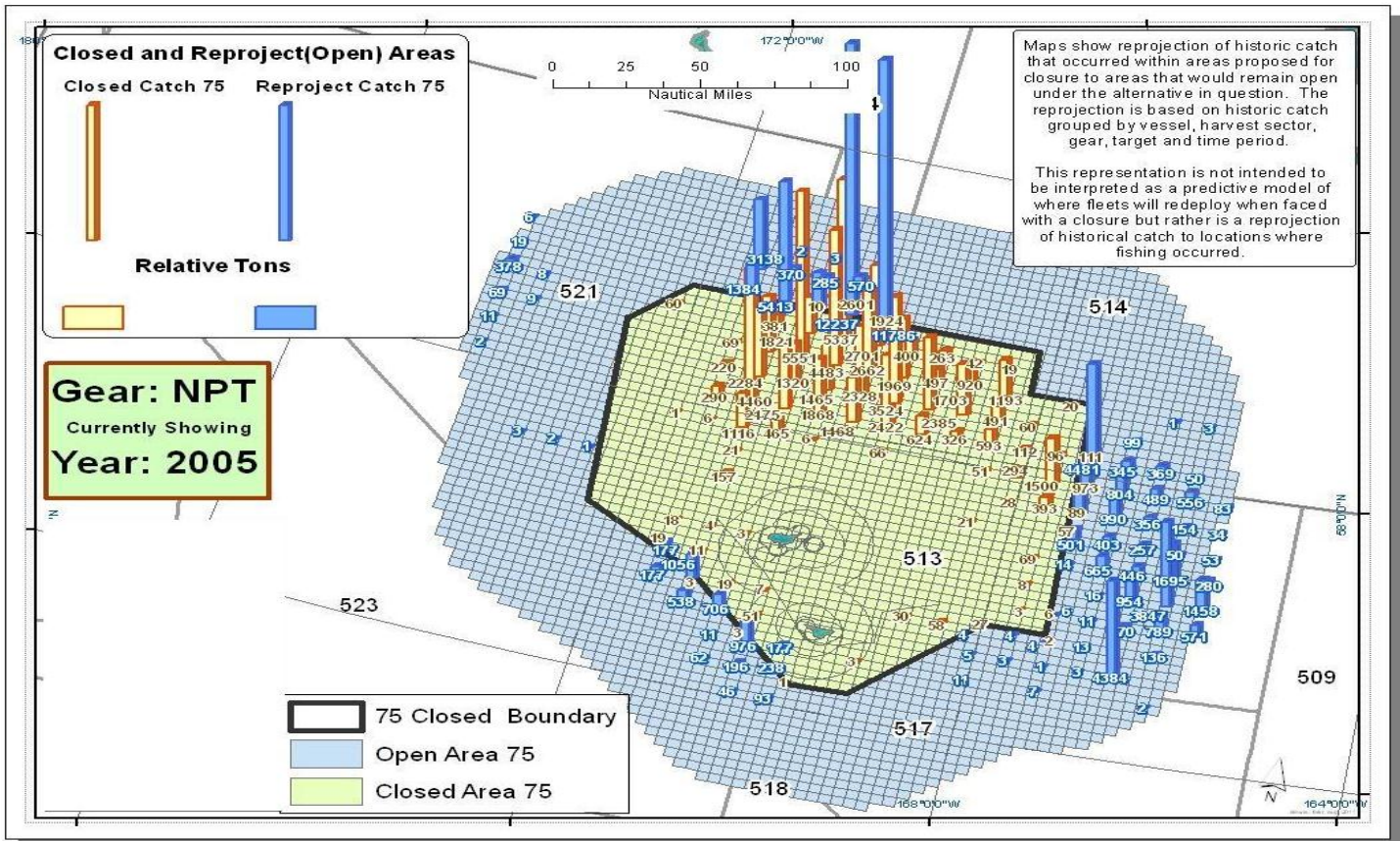
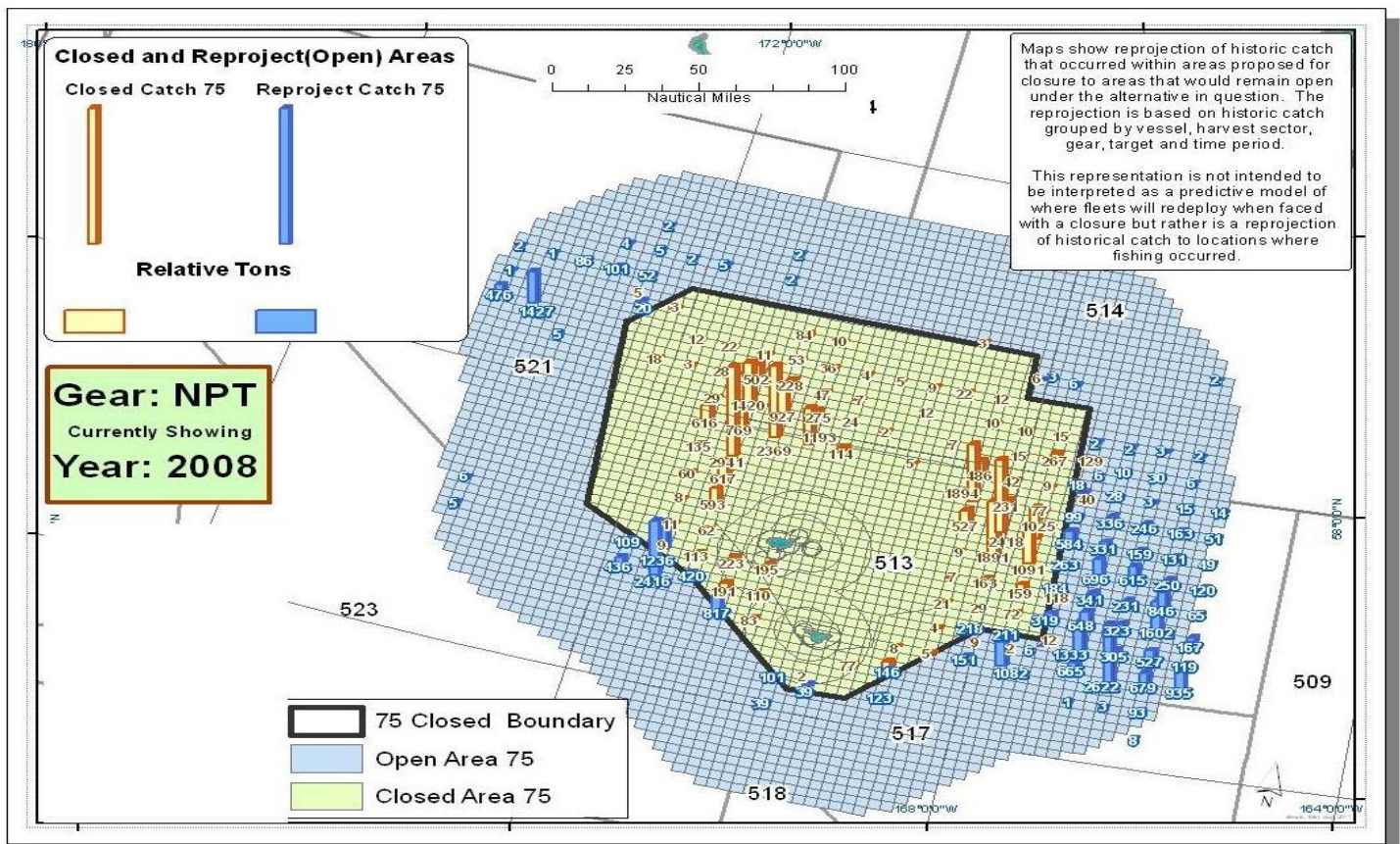
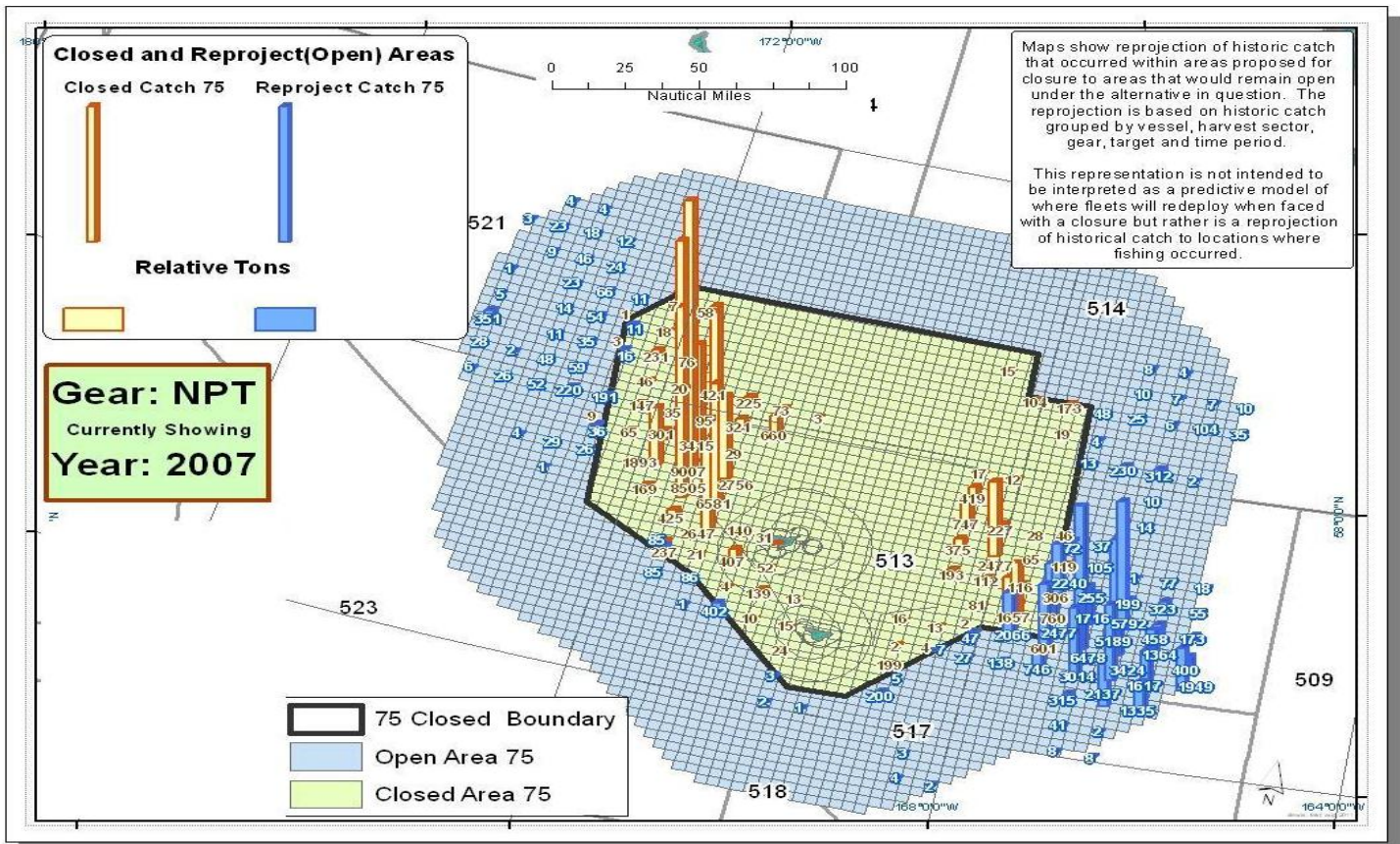
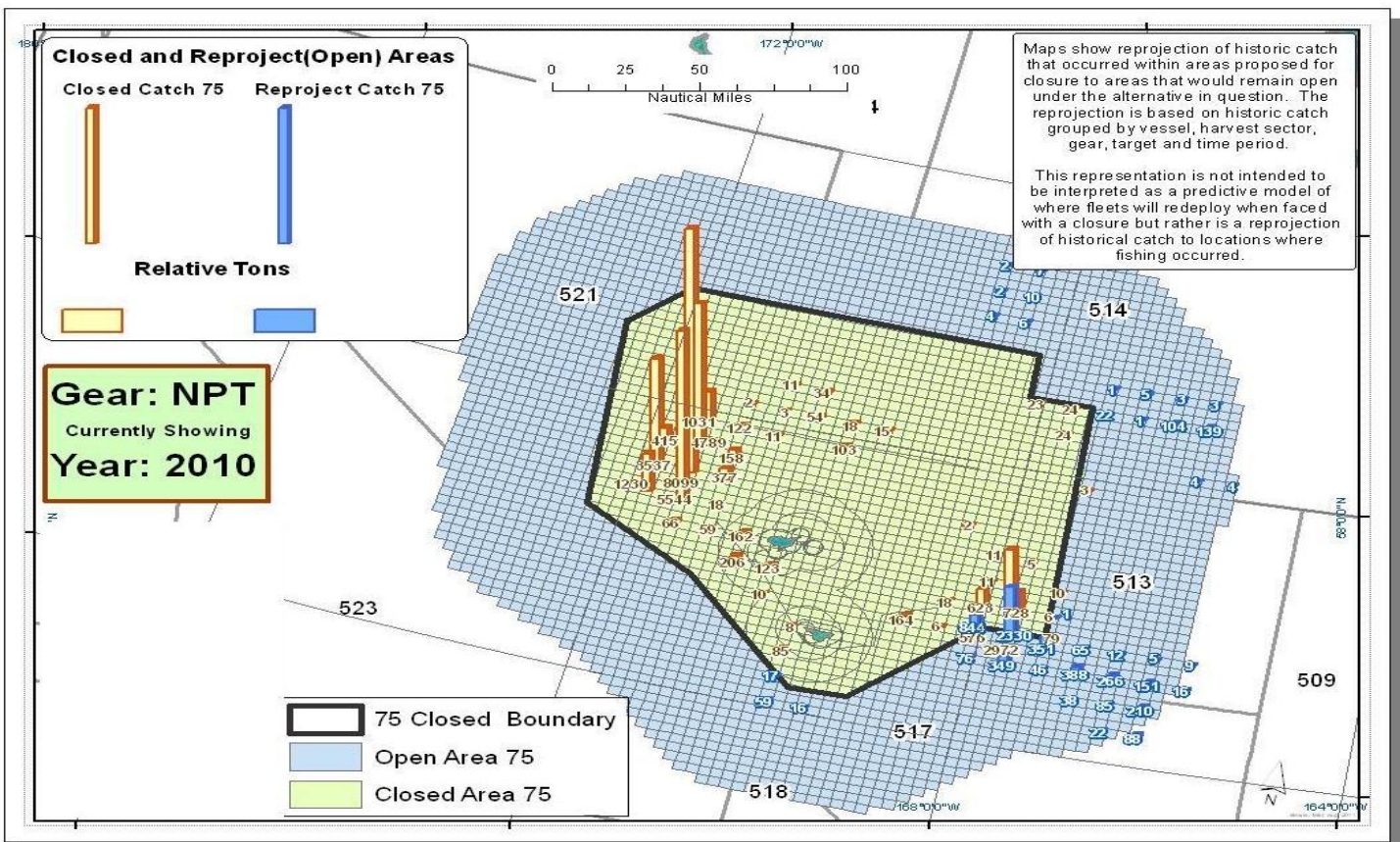
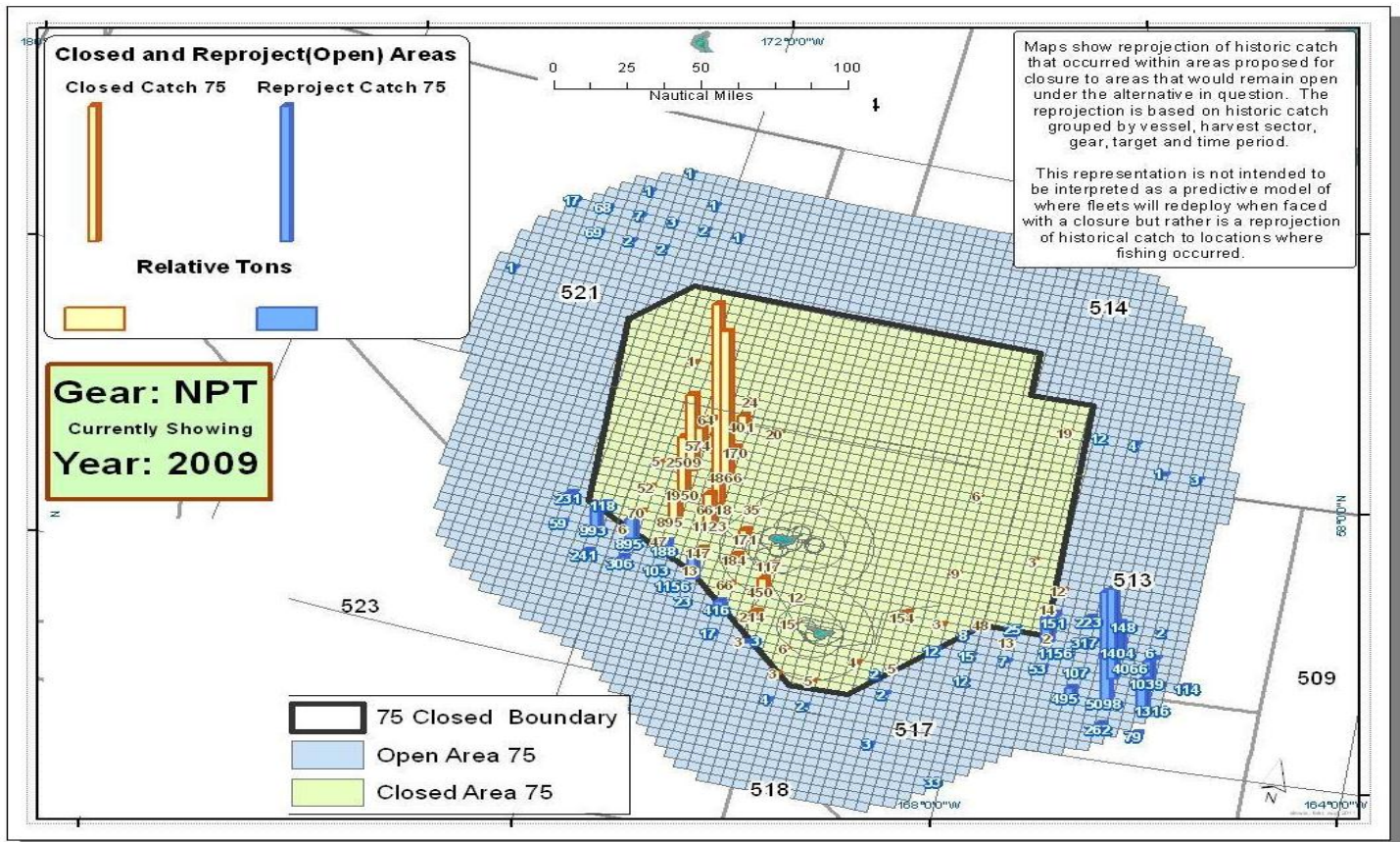


Figure A- 17: Alternative 4, Option 1: Reprojection Of Catch Due To Closure Of The PIBKC 1975-09 Area Flatfish Trawl CDQ and Open Access Non Pelagic Trawl Fishery 2003 2010 In 4 Pages of Panels (2 years per panel) Below.



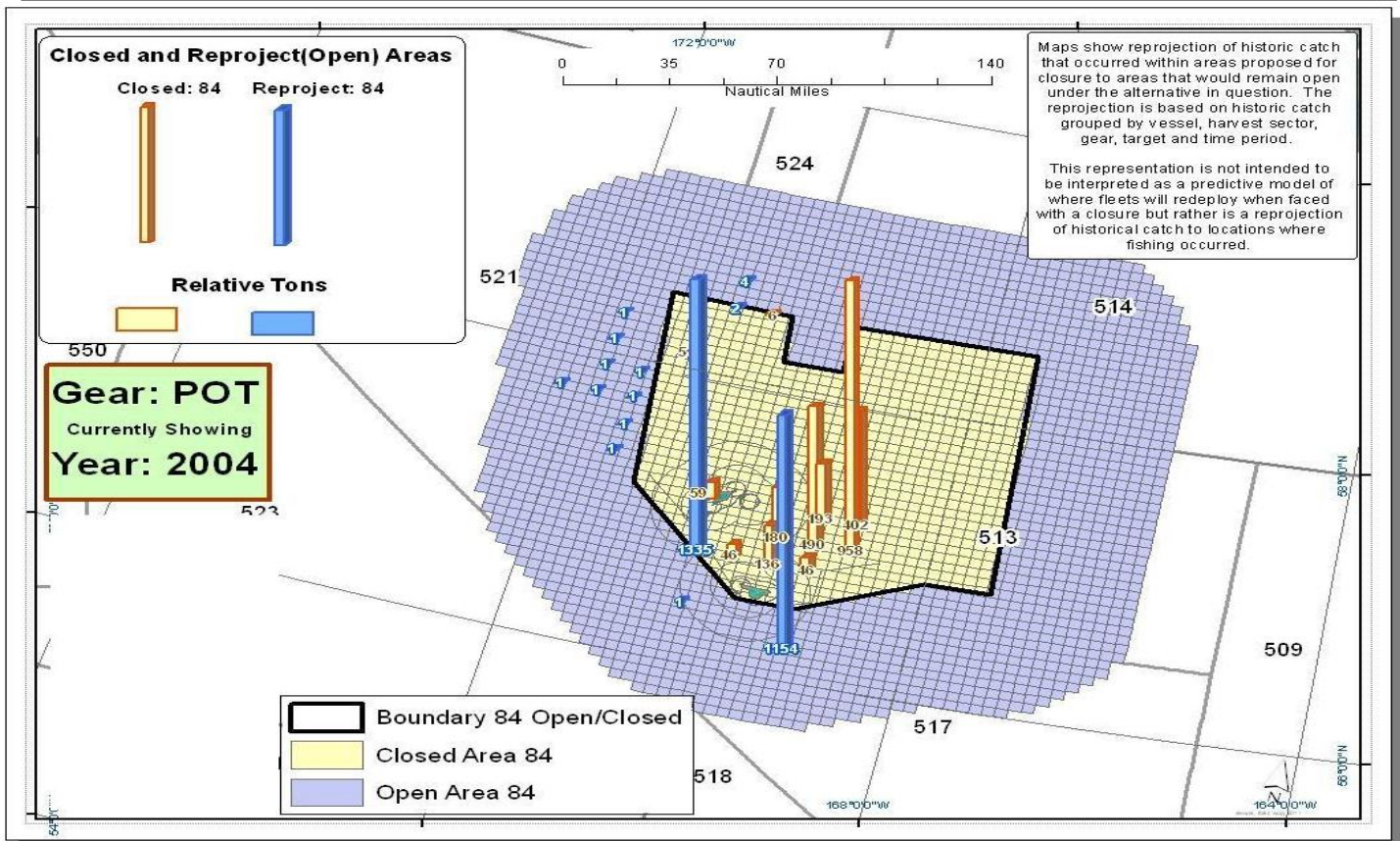
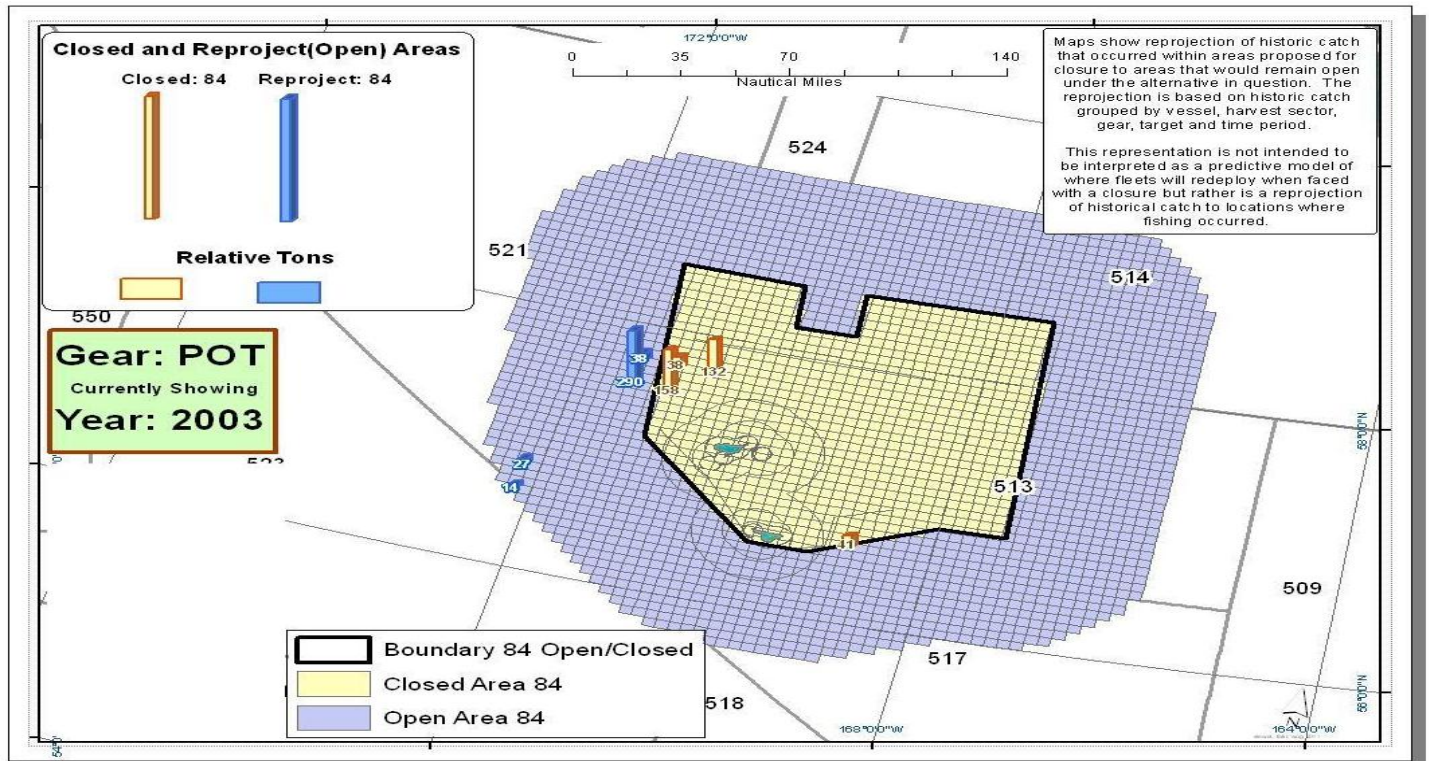


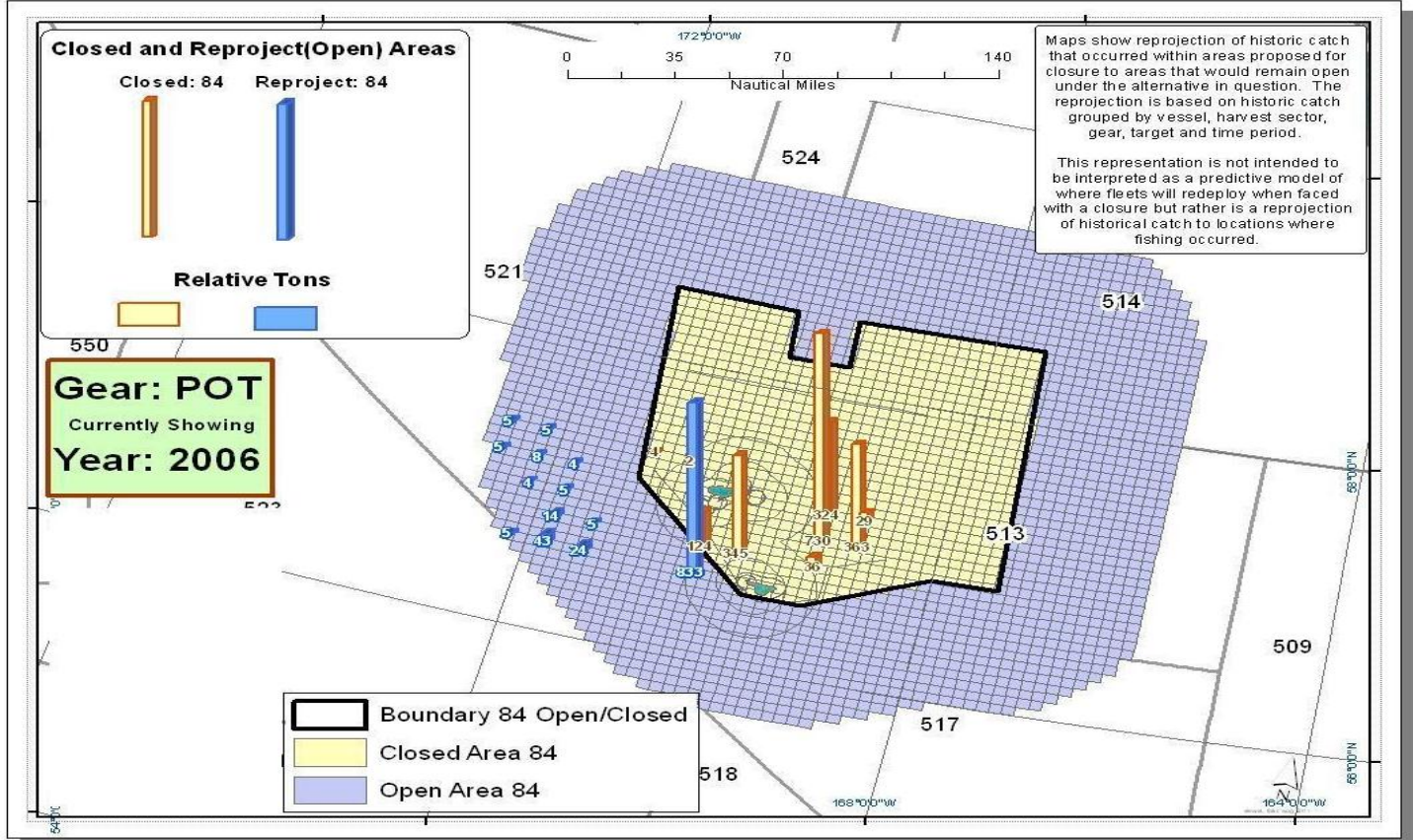
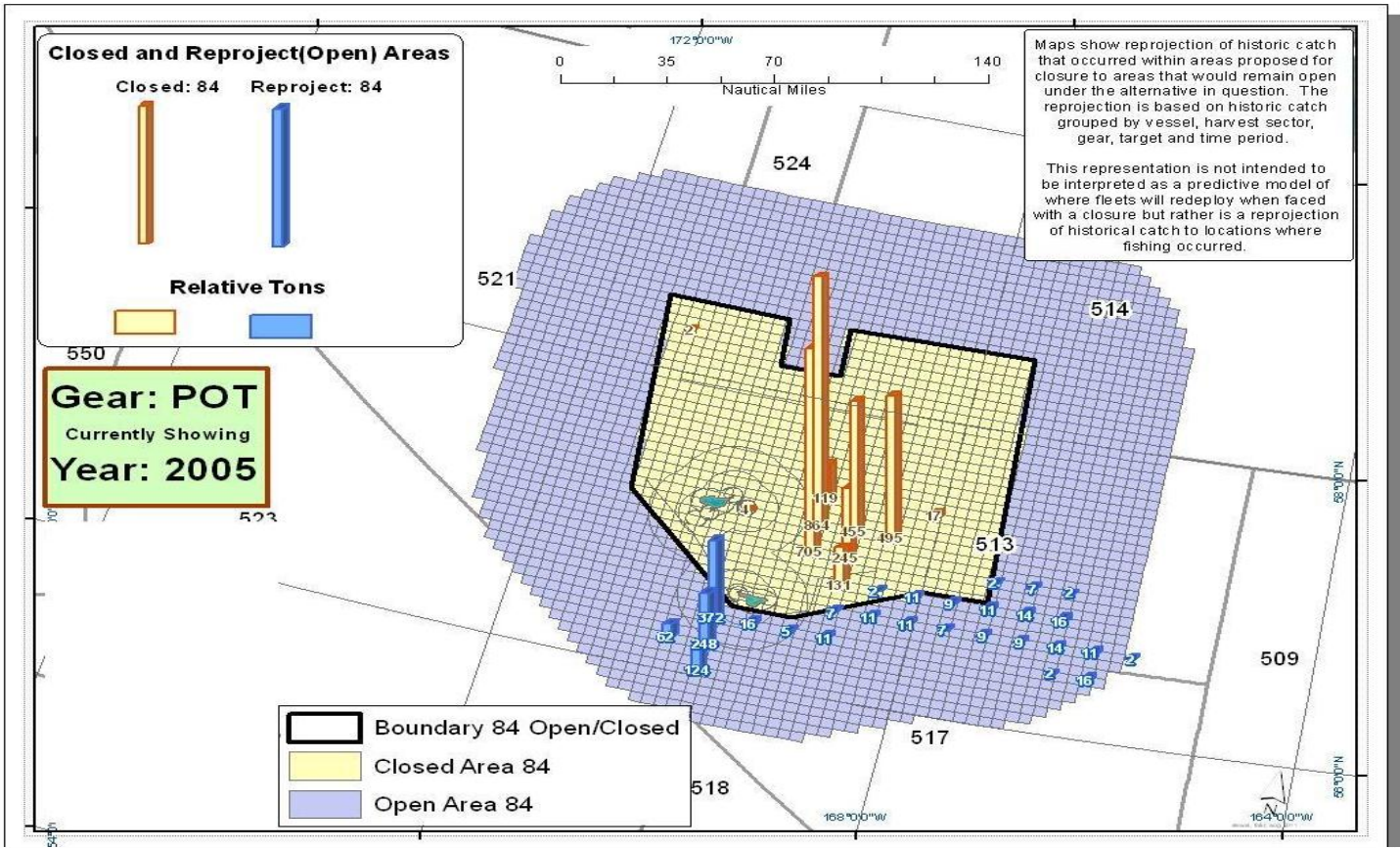


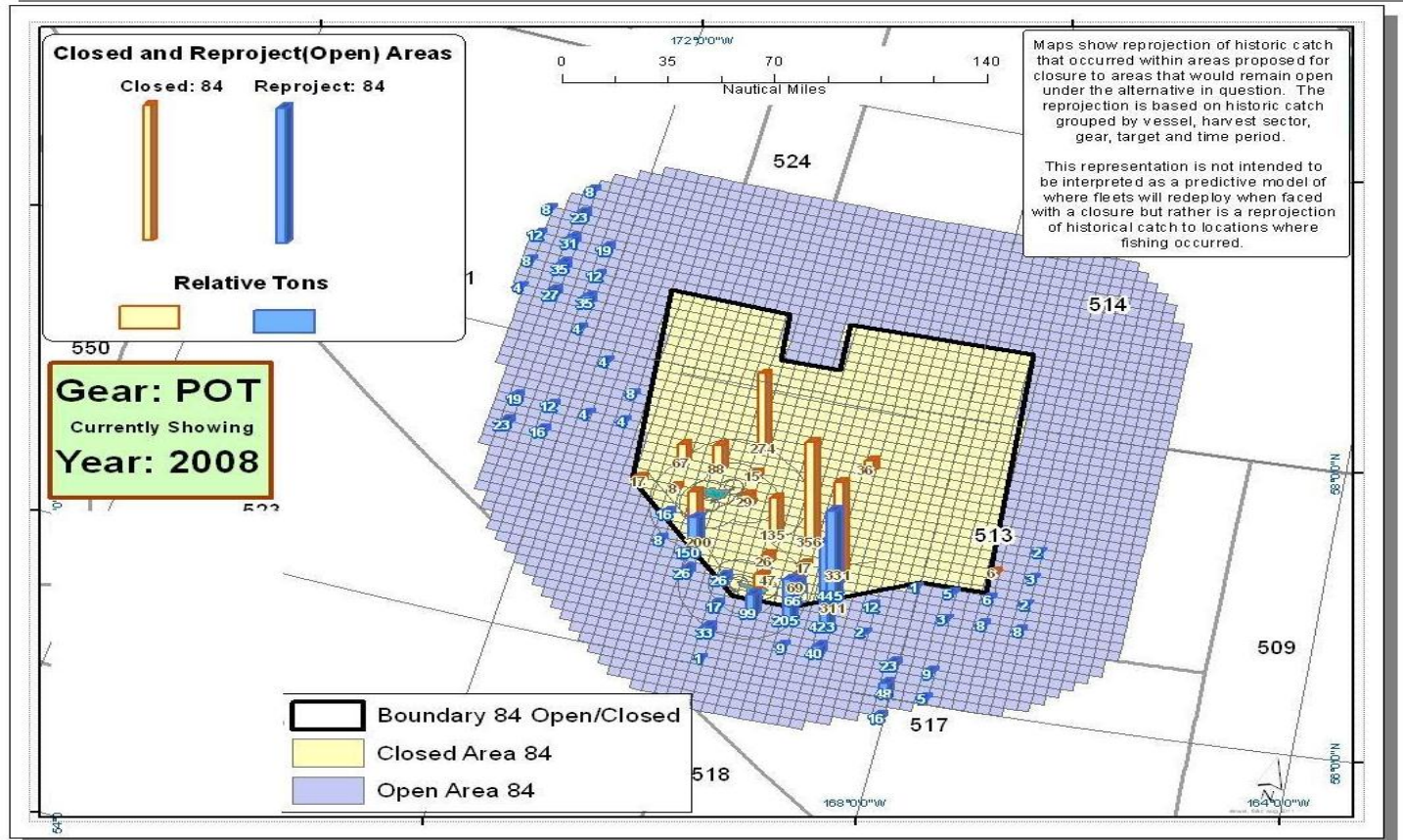
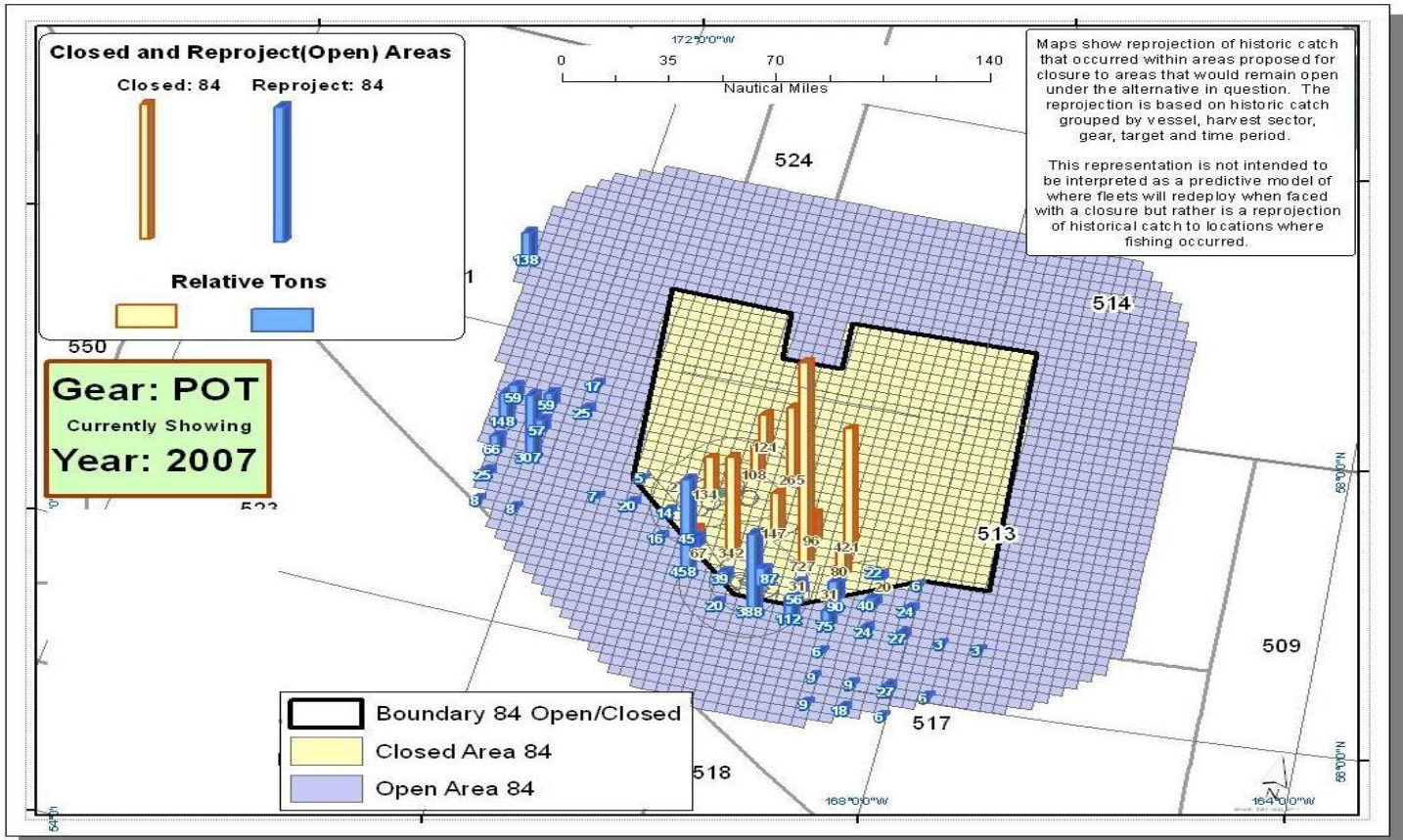


Section A-6: Alternative 4, Option 2, PIBKC 1984-09 Area Catch Reprojection Maps

Figure A-18: Alternative 4, Option 2: Reprojection Of Catch Due To Closure Of The PIBKC 1984-09 Area Pacific Cod Pot Open Access Fishery 2003 2010 In 4 Pages of Panels (2 years per panel) Below.







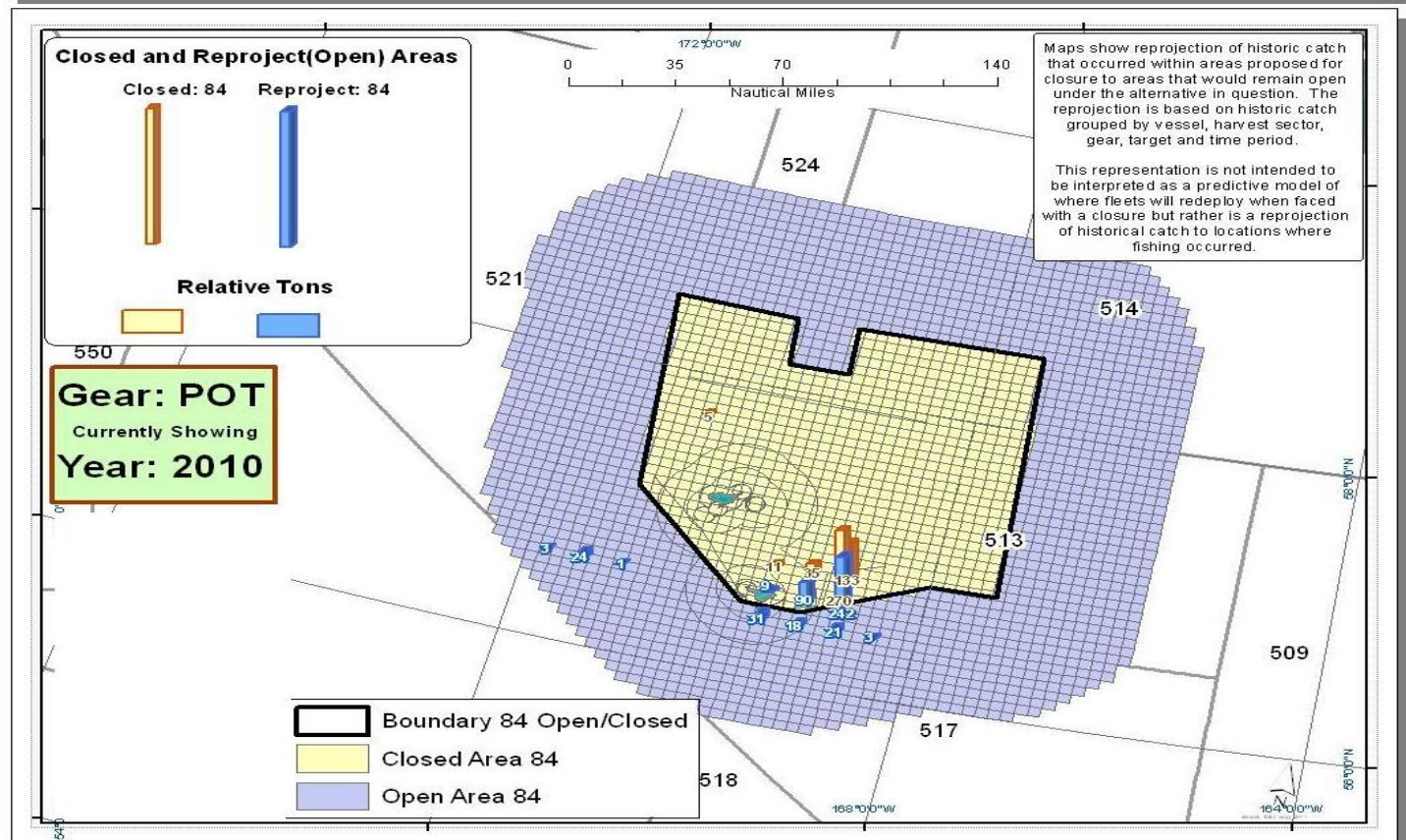
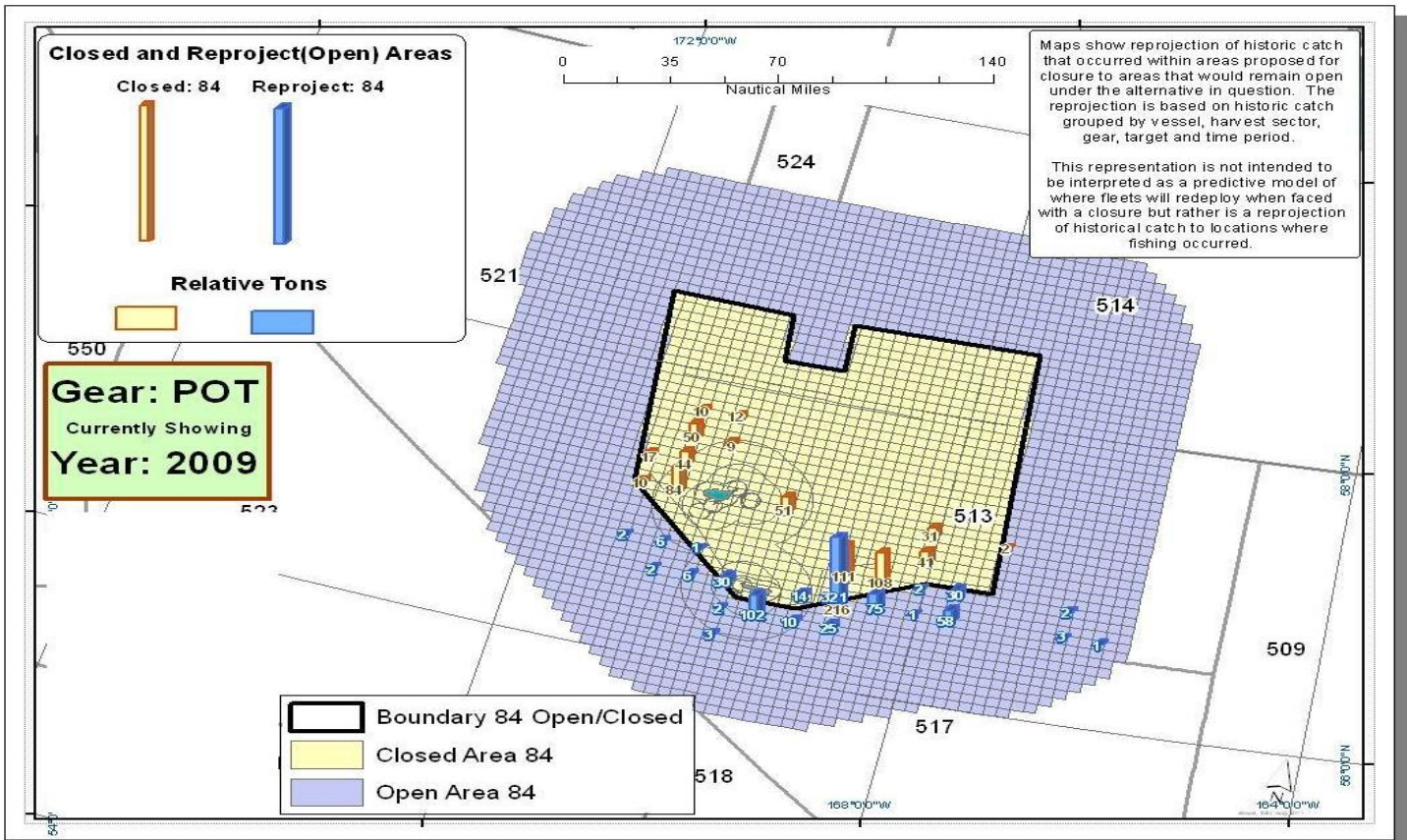
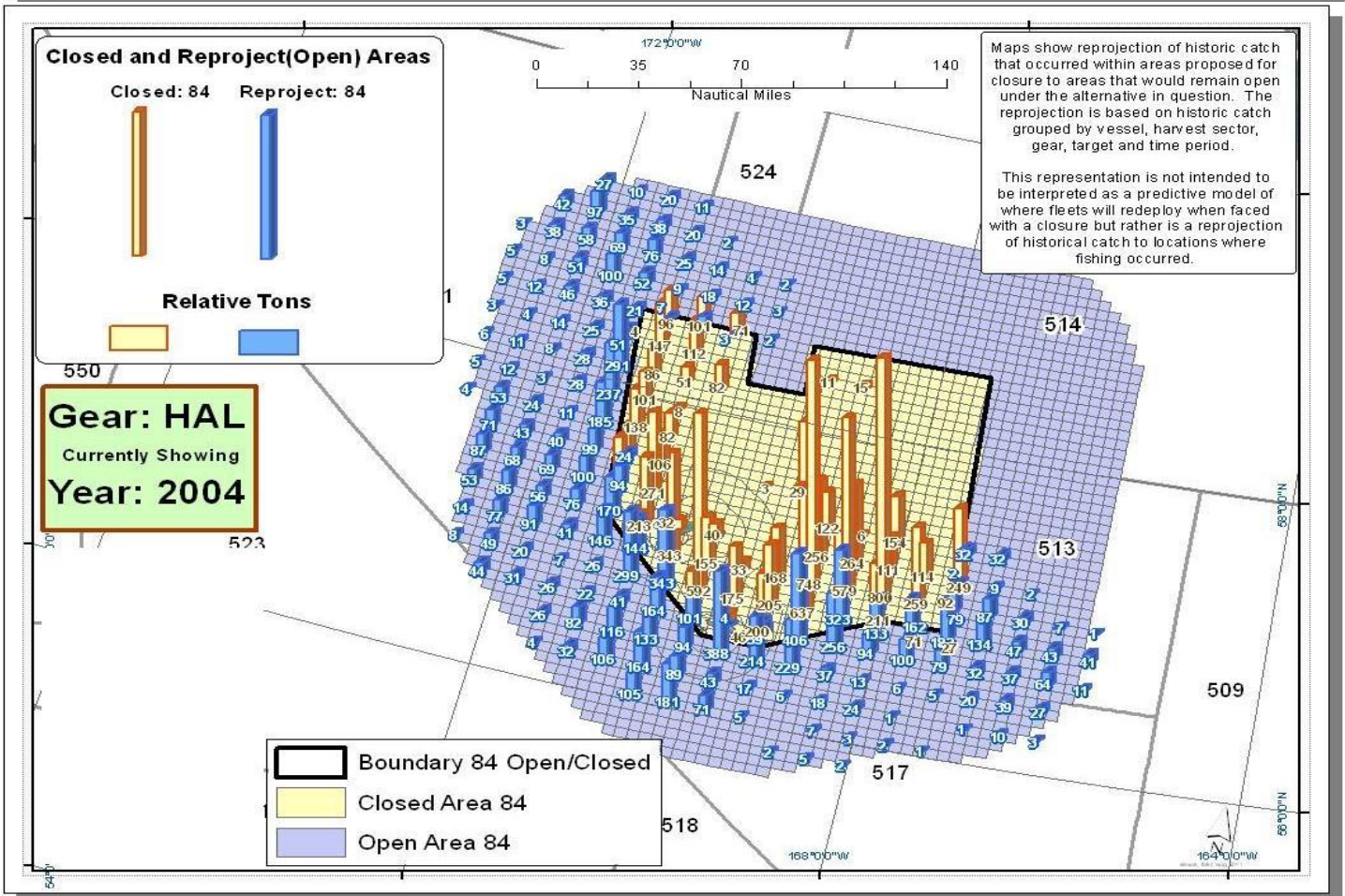
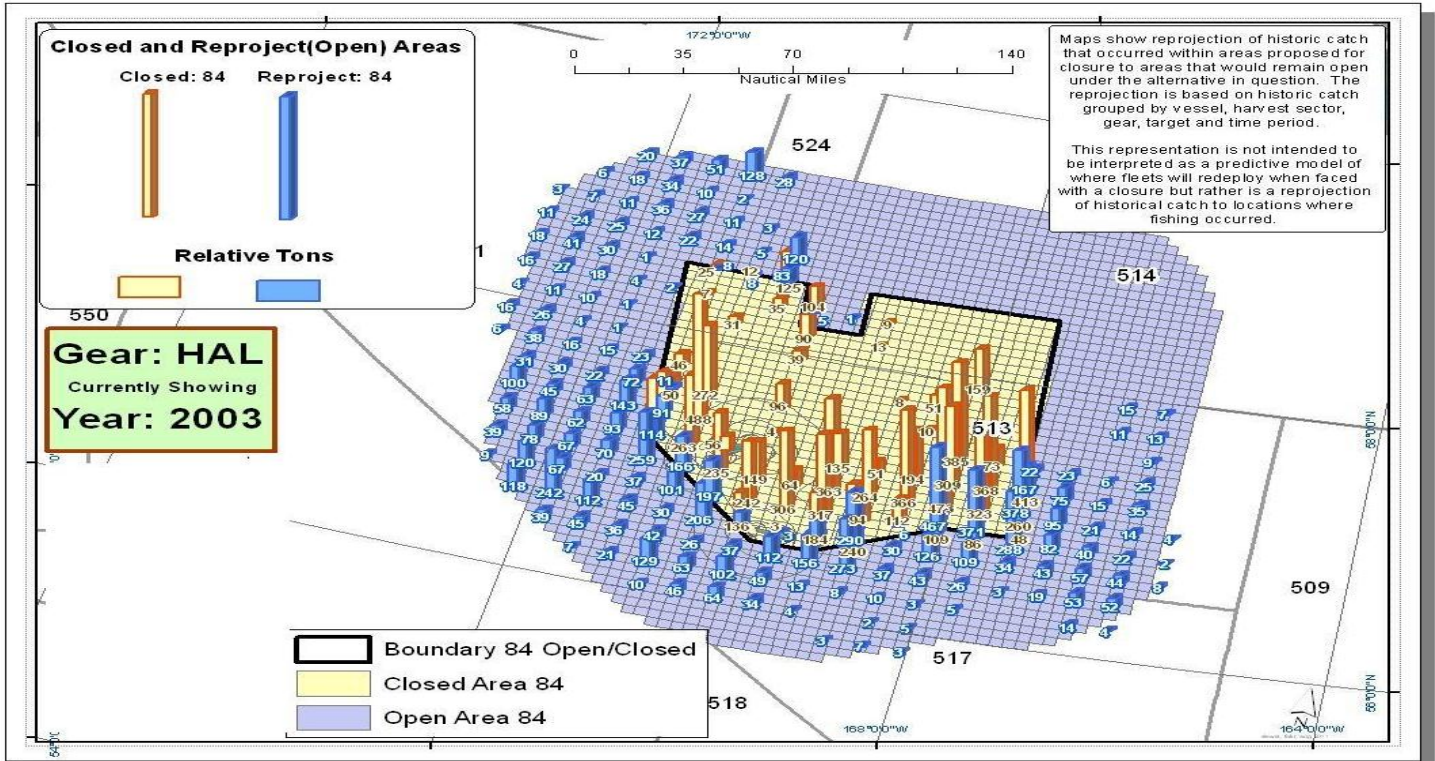
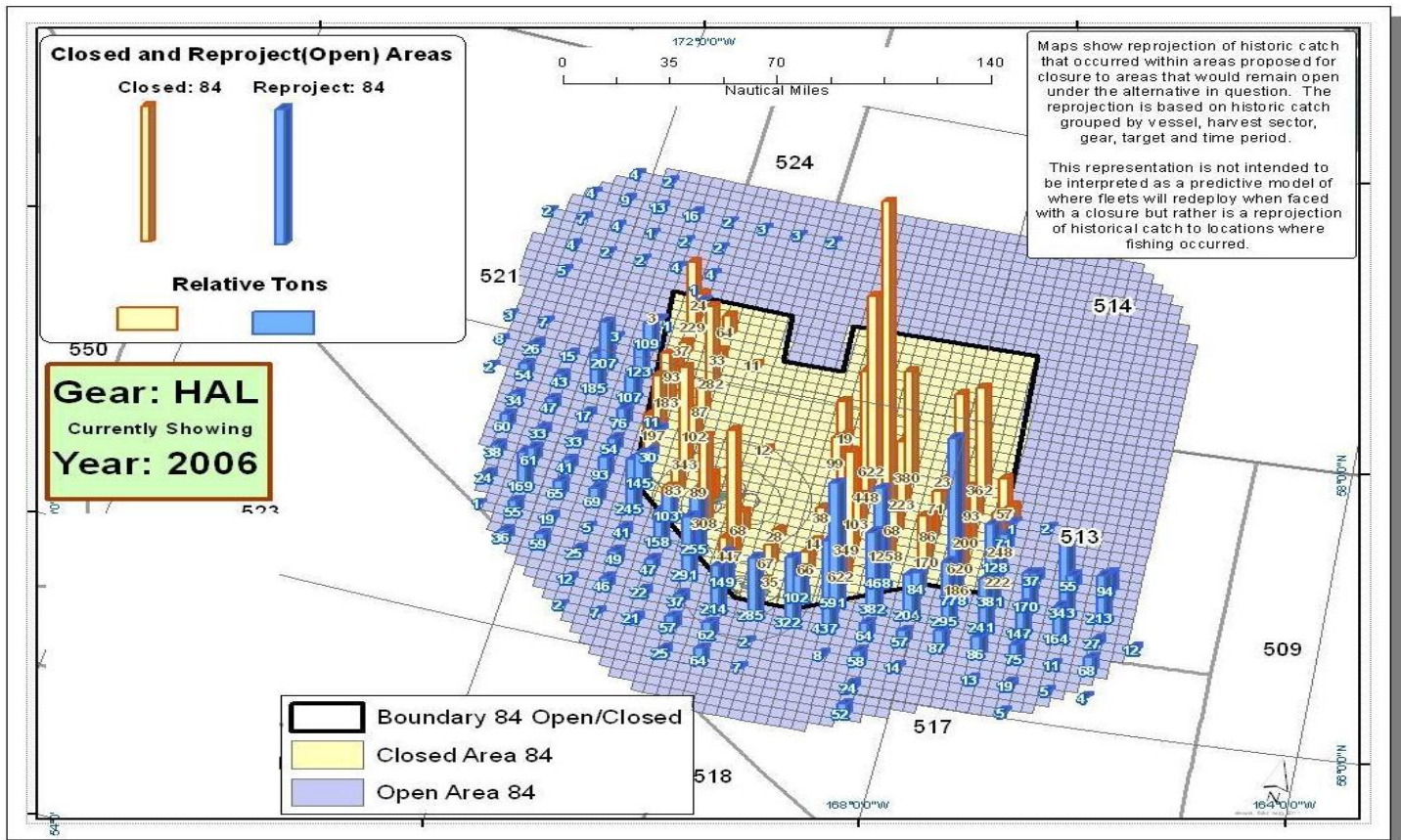
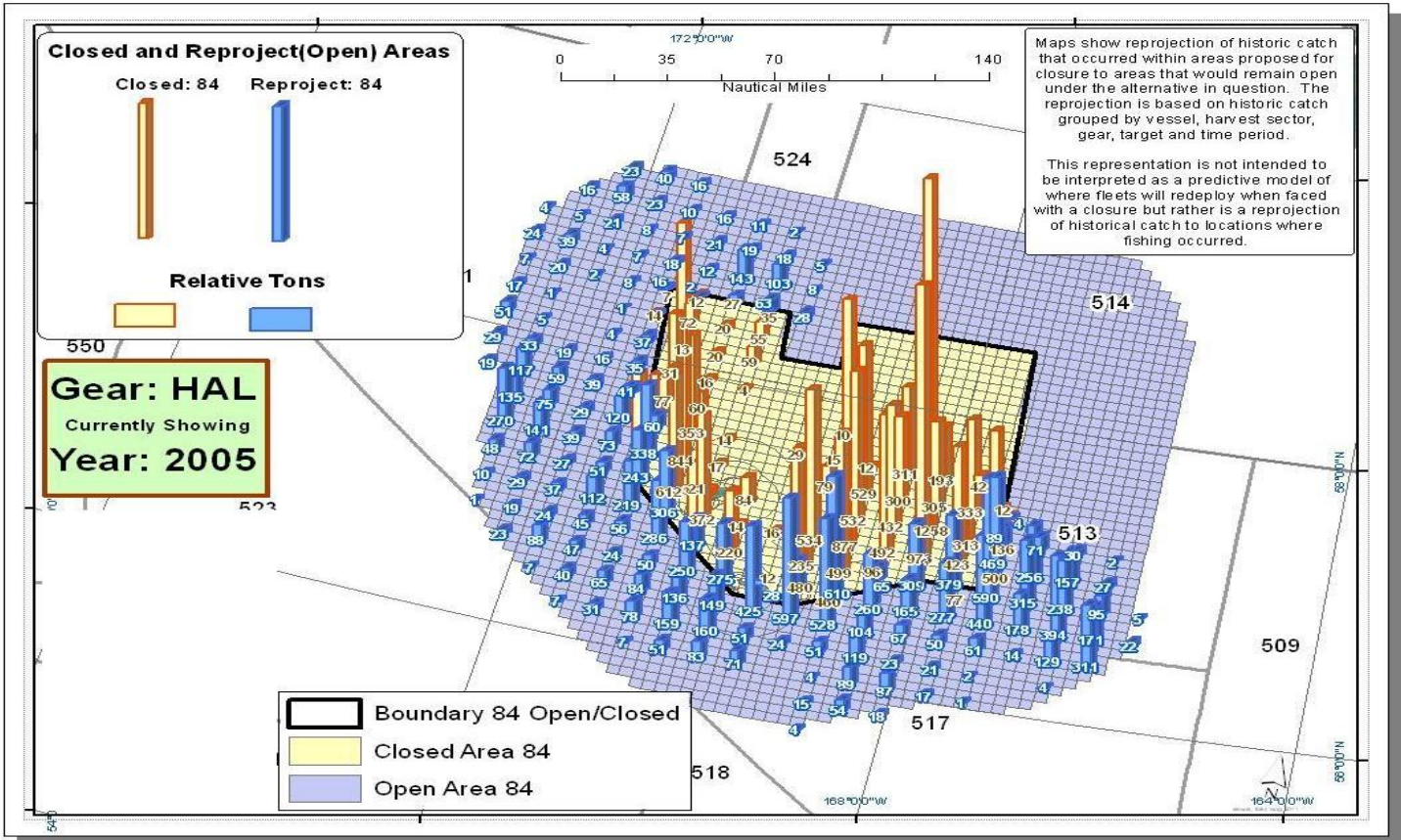
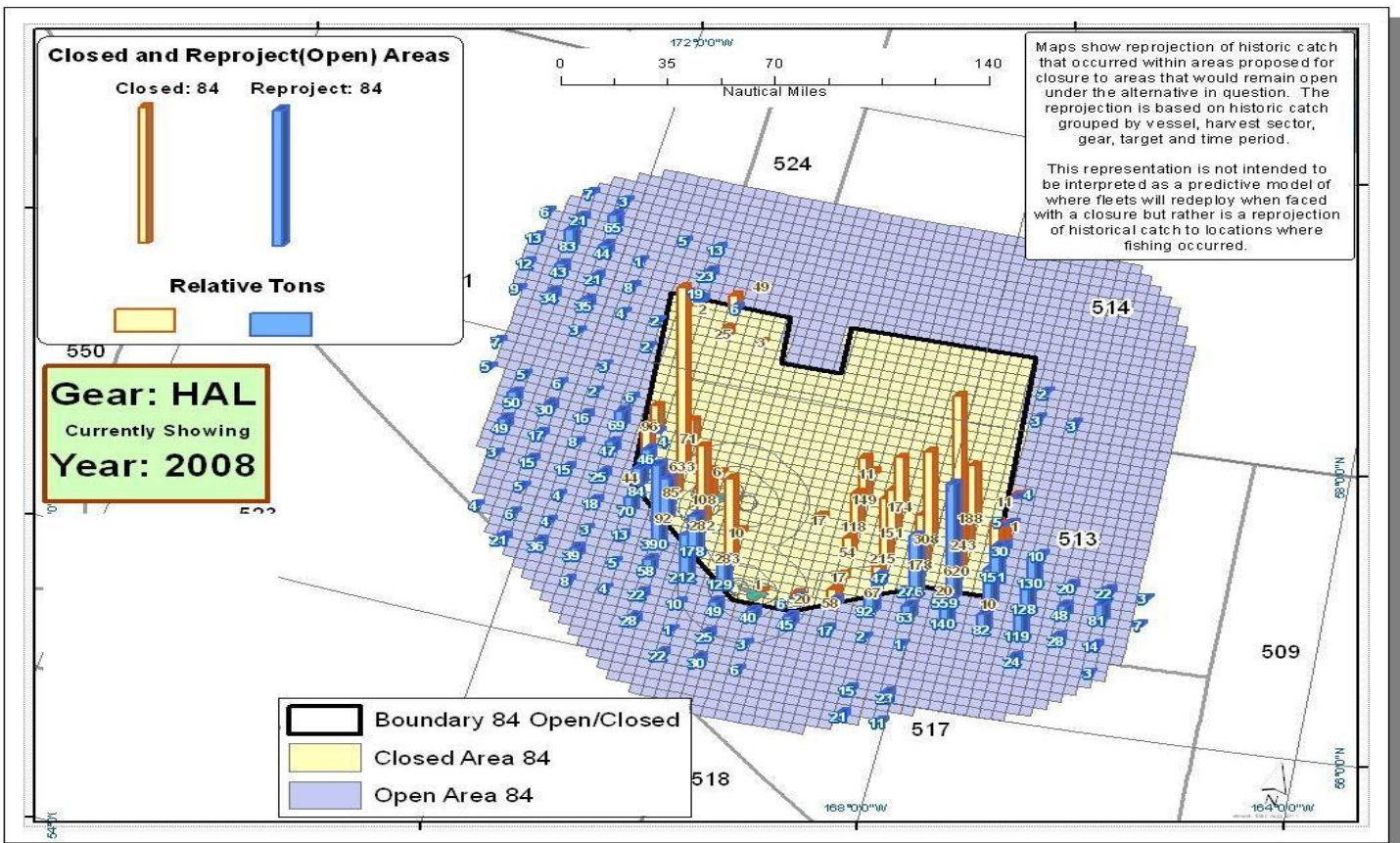
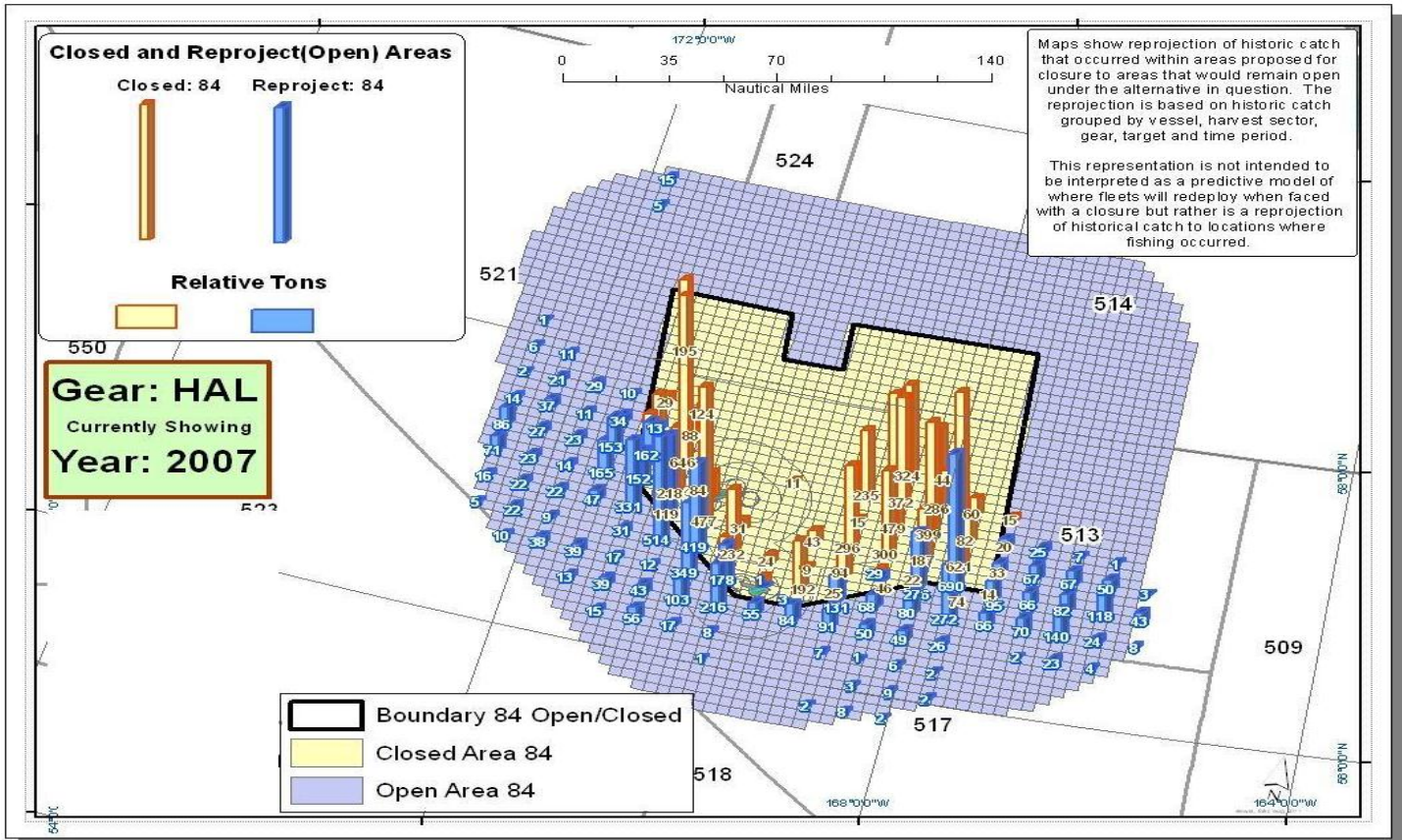


Figure A- 19: Alternative 4, Option 2: Reprojection Of Catch Due To Closure Of The PIBKC 1984-09 Area Pacific Cod Hook And Line CDQ And Open Access Fishery 2003 2010 In 4 Pages of Panels (2 years per panel) Below.







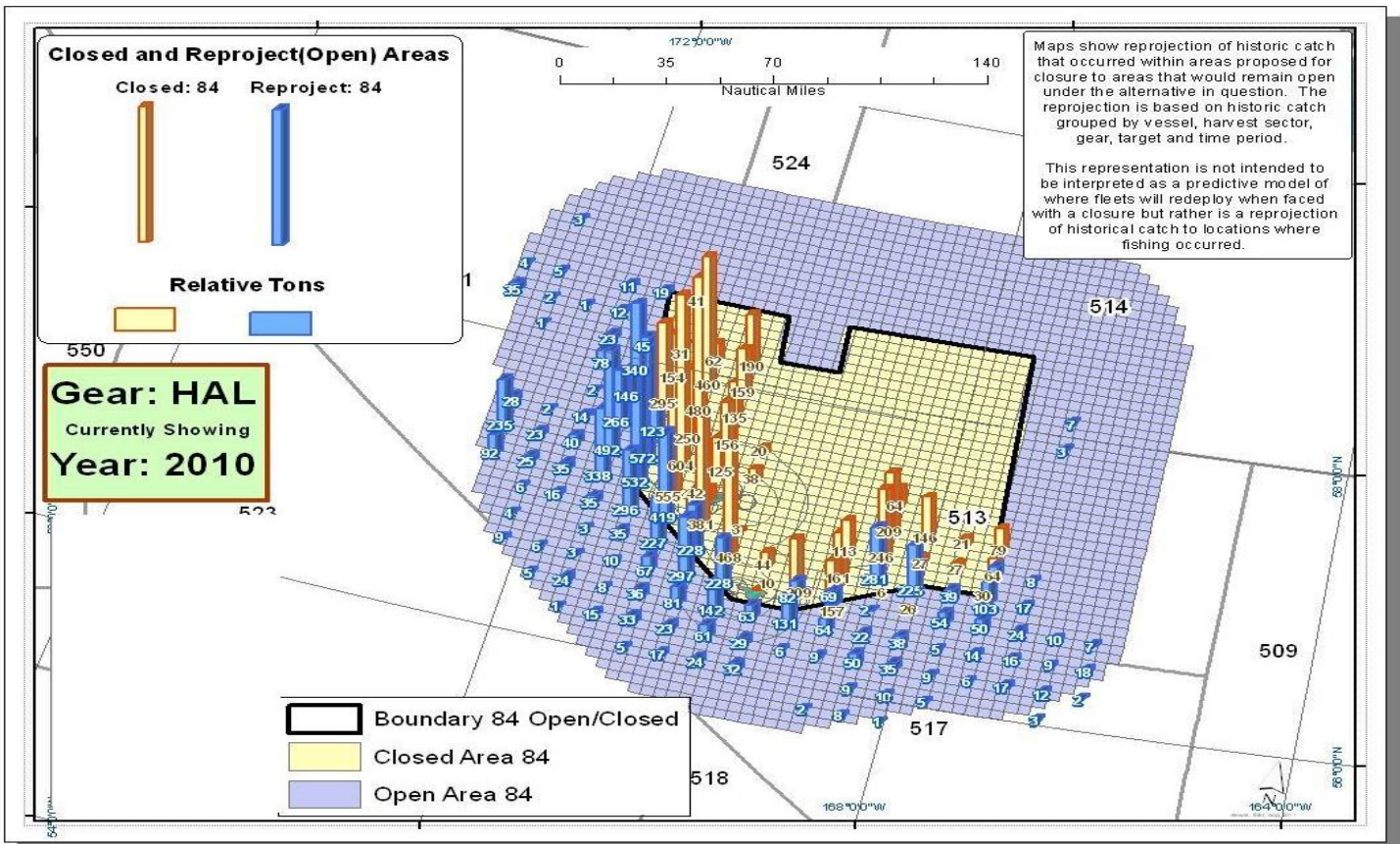
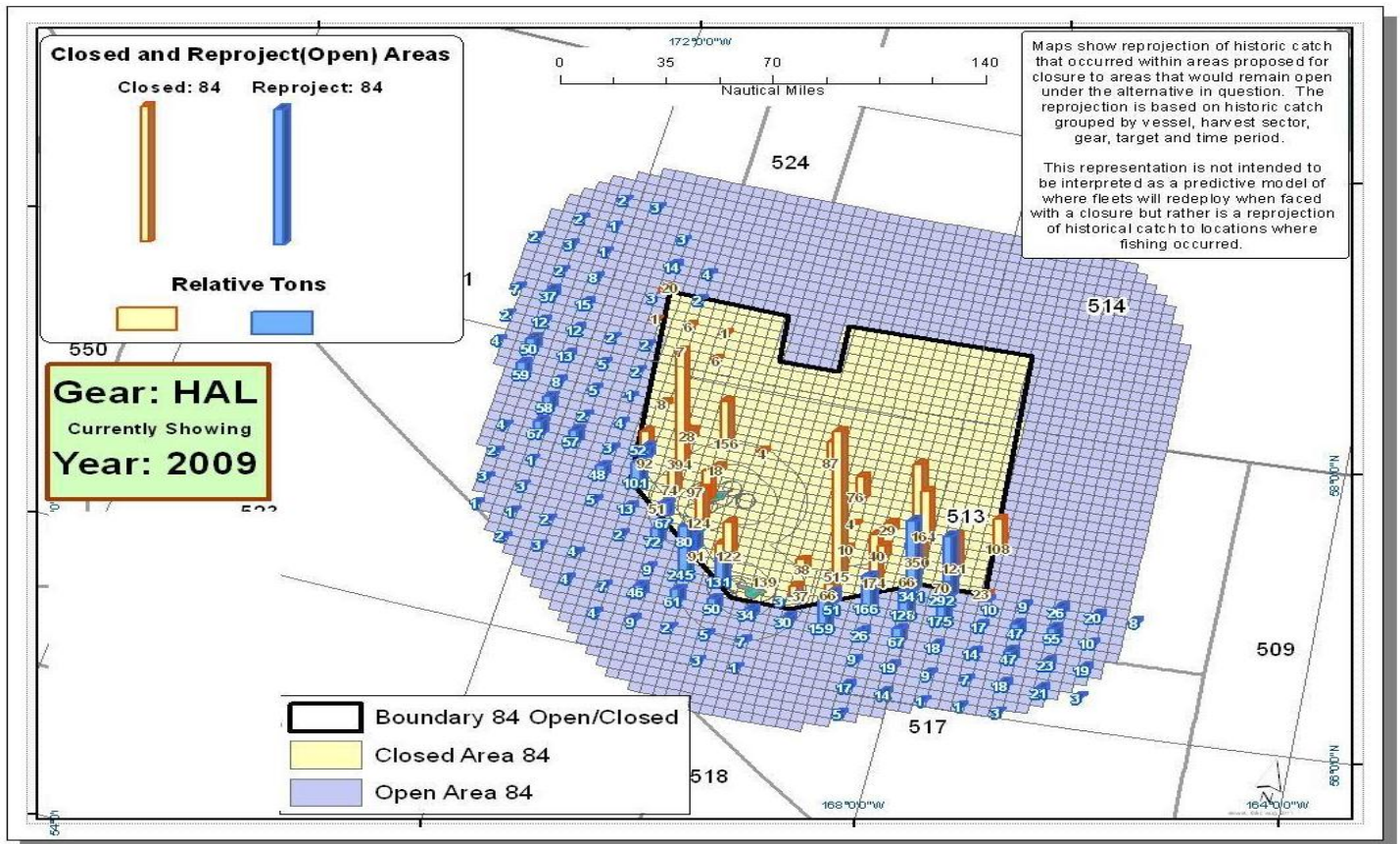


Figure A- 20: Alternative 4, Option 2: Reprojection Of Catch Due To Closure Of The PIBKC 1984-09 Area Flatfish Trawl CDQ And Open Access Fishery 2003 2010 In 4 Pages of Panels (2 years per panel) Below.

