Prey Field Analyses in Support of BiOp 2014 (AFSC)

Objectives

Scientists at the AFSC are providing support to the 2014 Biological Opinion in the area of characterization of critical prey resources for Steller sea lions (SSL) in the Aleutian Islands (AI). Existing data and published sources are used to support portions of the BiOp that 1) describe the base status of SSL critical habitat in terms of the distribution and abundance of groundfish prey, and 2) assess the possible effects of the proposed alternatives for commercial groundfish harvest on the conservation value of critical habitat in the AI. The primary data used are catch data from the AFSC summer bottom trawl survey of the AI and existing biomass estimated formed from that data. Materials from previously and recently published sources (Logerwell et al. 2005, McDermott et al 2005, Lowe et al 2004, Barbeaux 2013, McDermott et al. 2013) that describe groundfish distributions in the AI are also excerpted. The analyses focus on major SSL groundfish prey species and groups: Atka mackerel, Pacific cod, walleye pollock, sculpins (all species), and rockfish (all species).

Methods

Analyses are based on AFSC Aleutian Islands summer bottom trawl survey strata, which are divided into depth zones from 0-500m in 100 m increments and horizontal subareas of two to four degrees of latitude (Figure 1). There are generally two of these subareas on each side of the Aleutian chain within each management area (541,542,543); Petrel Bank in area 542 has its own subarea. A team of AFSC scientists met to examine the available data and determine if there was any basis for analysis or biomass estimation at smaller spatial scales; it was the strong consensus of these meetings that any spatial scale smaller than the survey strata would not have enough observations to support a reliable separate analysis. The survey strata and subareas are used as a common scale for several analyses:

GIS was used to calculate the amount of benthic habitat within each depth zone by management area, and to determine what percentage of that habitat lies within SSL critical habitat (defined as 20 nm from rookeries plus the SSL conservation area N of Seguam Pass).

Estimated biomass of major SSL prey species from the summer AI bottom trawl surveys in 1991-2012 was reviewed. The total biomass by year and survey subarea (with depth ranges added together) is tabulated; linear regression and nonparametric Mann-Kendall test are used to check for any gross time trends in biomass over the nine surveys. The biomass estimates are the same ones used in the stock assessments, just presented in slightly finer spatial detail.

There was much discussion among AFSC scientists about any possible use of fishery-dependent data to represent groundfish spatial and temporal distribution. Although observer data in the form of catch per distance towed are available, it was agreed that any use of these data to try and describe fish distribution or local abundance estimates would have serious problems, given the irregular spatial distribution of fishing effort; the variation in net width, roller gear, trawling speeds, and horsepower among the fleet; and the lack of mensuration of effective net width and bottom contact time for these tows. The only summarization of these data that will be used is the frequency of occurrence of SSL prey species in the observed tows, by survey subarea (all depths combined) and season (winter, Jan-April and summer, June-Sept). The number of observed tows (screened for compliance with confidentiality rules) will also summarized as a rough spatial index of fishing effort. (Summarization of total fishing removals for the BiOp will be conducted by NMFS Alaska Region).

Figures from previously published material and recently reported research are selected to convey the overall description of groundfish prey distribution in the AI as extremely irregular and spatially patchy, a result of the narrow and complex continental shelf, high vertical relief, and strong tidal currents through the passes of the AI. This includes recent AI trawl survey results (published in the stock assessment and on AFSC web site http://www.afsc.noaa.gov/RACE/groundfish/survey_data/default.htm) and figures from Logerwell et al. (2005) showing the cluster analysis of groundfish species groups and spatial maps of average survey CPUE for Atka mackerel, Pacific cod, walleye pollock, and Pacific Ocean perch. The extremely patchy nature of Atka mackerel catch in the AI will also be shown by a pie chart of CPUE from individual tows over several years of the AI survey, updated from a figure previously published in an appendix to the 2004 Atka mackerel stock assessment.

Results of a winter 2008 acoustic survey of the northern side of the AI chain from Seguam Pass to Tanaga Pass are presented (Barbeaux et al. 2013). A map of survey results shows the irregular and depth-associated distribution of pollock in this area in winter. The estimated biomass from this survey is tabulated by AI survey strata (see above) for comparison to summer bottom trawl estimates.

Recent and historical literature will be reviewed to compile a table of the seasonality of spawning (high prey energy density) for the groundfish species included in SSL diets in the AI.

In addition to previously published results of Atka mackerel tagging studies that are included in the existing BiOp, some more recent data (McDermott et al. 2013) shows the species composition of bottom trawls taken in different areas during tag recovery cruises and the relative abundance of prey species in three study areas in summer 2011 and spring 2012.

References Cited

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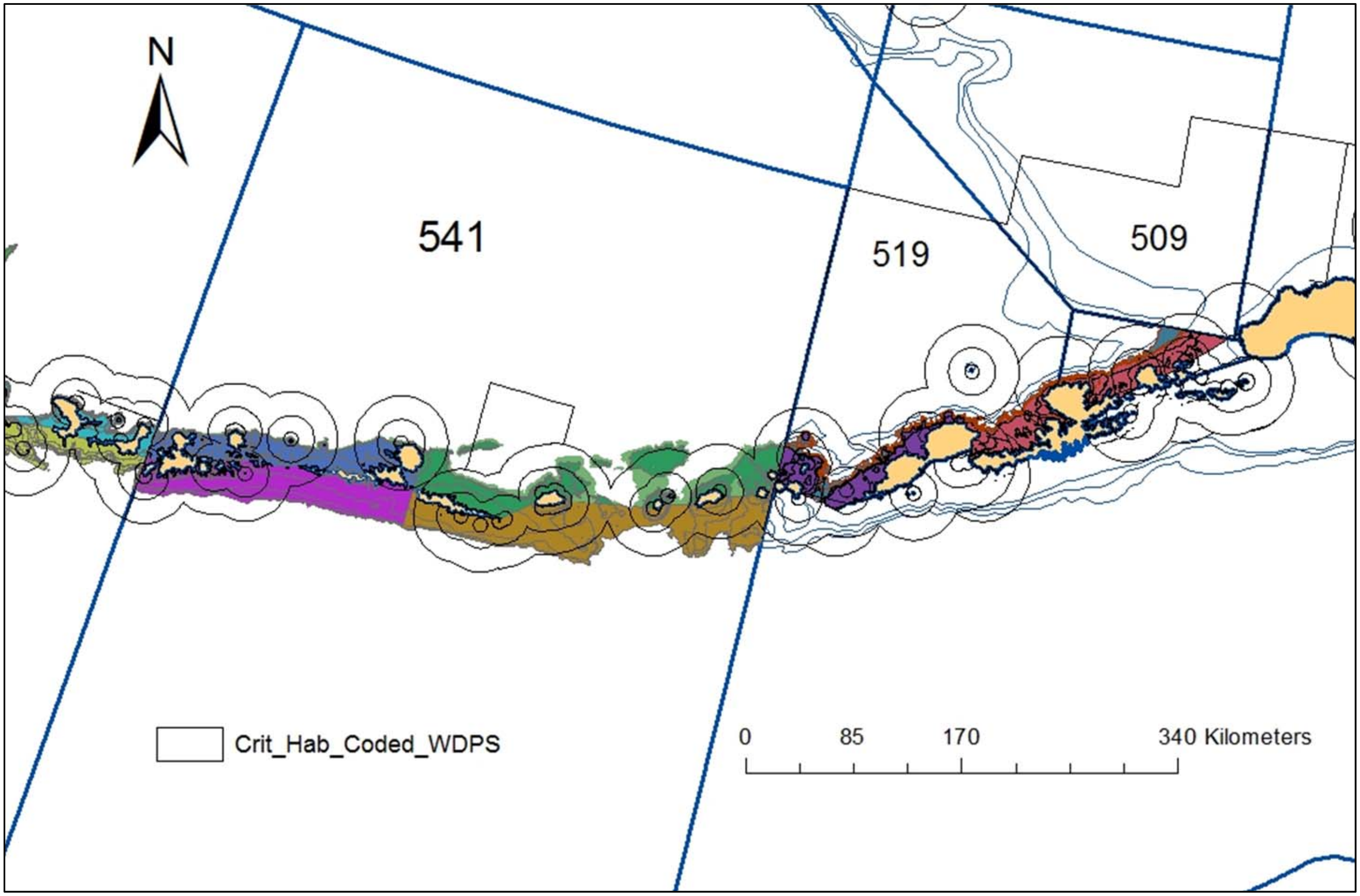

Figure 1a. Management areas (numbered), survey subareas (colored), and critical habitat zones for the eastern Aleutian Islands.

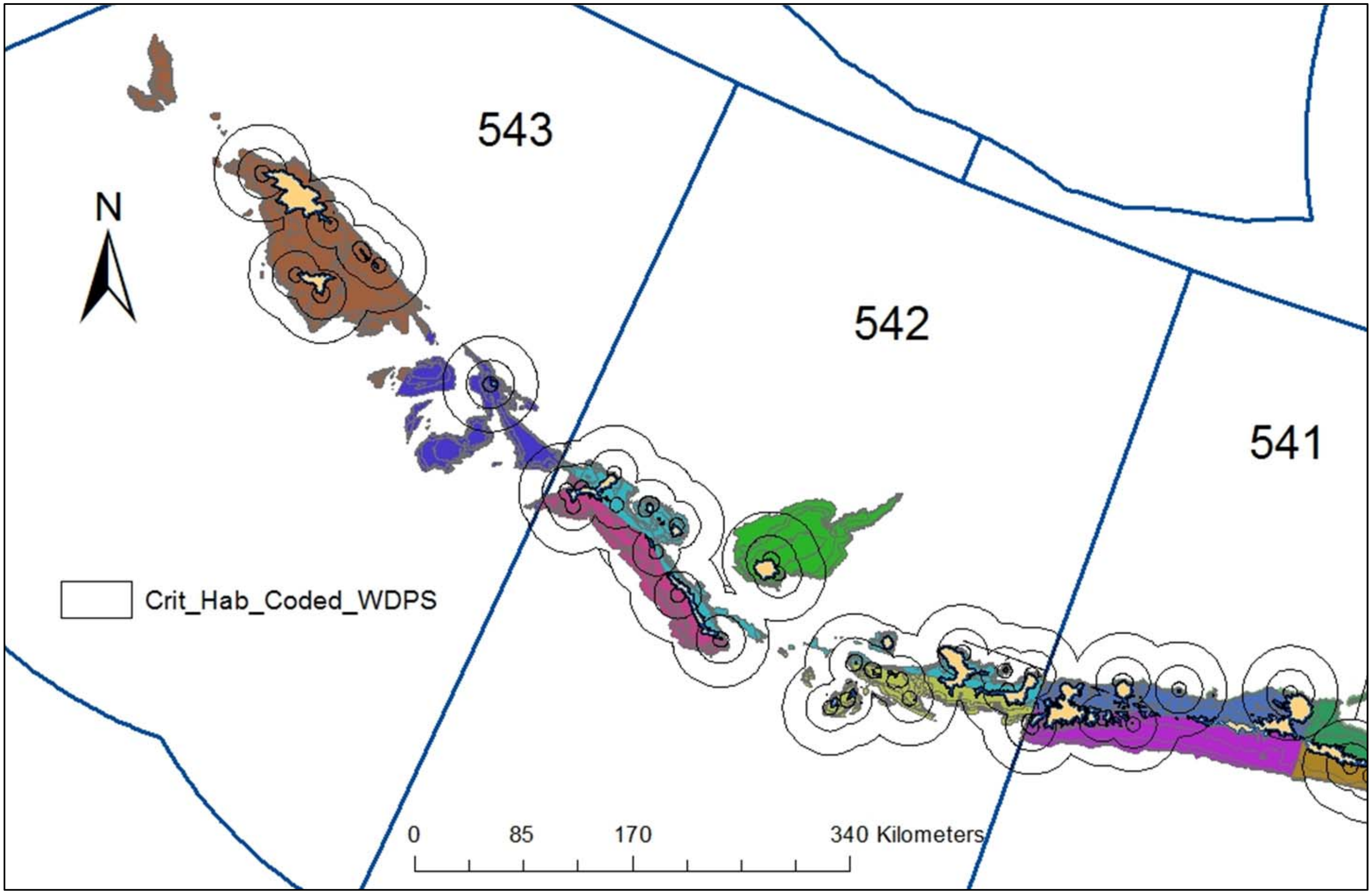

Figure 1b. Management areas (numbered), survey subareas (colored), and critical habitat zones for the central and western Aleutian Islands.