

*Session SSL-3B: Steller Sea Lion: Factors Currently Affecting the Population  
Environmental Change*

**Inverse production regimes and inverse population dynamics of three high trophic-level consumers in the North Pacific**

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Evidence suggests that Coho salmon (SAL), Steller's sea lion (SSL) and tufted puffin (TUPU) populations in northern (Gulf of Alaska, Aleutians) and southern (CA, OR, WA, BC) regions exhibit inverse population trends: When northern populations increase, southern populations decrease, and vice versa. This effect may be moderated in transitional areas (SE Alaska or BC) and there are some local exceptions (e.g., SSL populations in s. CA). One hypothesis for this large-scale geographic pattern is that overall ocean productivity reflects climate forcing of primary production in the Subarctic and Subtropical Gyres - which respond in opposite directions to changes in strength of the Aleutian Low pressure system. An assumption is that ocean productivity exerts significant bottom-up control over the productivity of higher trophic level consumers such as SAL, TUPU and SSL. If so, and since these species have broadly overlapping distributions, centers of abundance and diets, we should not be surprised that they all exhibit similar inverse patterns among regions. Curiously, however, they also exhibit inverse trends within regions: While SSL declined dramatically during the 1980s and 1990s in most of Alaska, TUPU and SAL increased dramatically (there is a strong negative correlation between TUPU and SSL population trends throughout their range). Several hypotheses can be advanced to explain the inverse pattern among species: 1) All species are subject to over-riding anthropogenic effects which generate artificial 'pattern'; 2) Population trends are driven mostly by juvenile, adult survival in wintering areas (n. central Pacific for TUPU, SAL; continental shelf for SSL); 3) Dramatic decline of SSL has resulted in surplus food for TUPU in breeding areas (density dependent, competitive interaction); 4) Ocean conditions favor different prey bases for TUPU and SSL— small differences adequate to favor one species over another. We will consider evidence for and against these different hypotheses.

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## Abstracts



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