Genomics Activity Plan
GOAL: Population genetics of all AFSC managed stocks by 2030

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Guidelines for determination of spatial management units for exploited populations in Alaskan groundfish fishery management plans

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Stock structure template

Fishing mortality, spatial concentration of fishery relative to abundance, population trends, generation time, physical limitations (sessile organism), growth differences, age/size structure differences, spawning time differences, maturity at age differences, morphometrics, meristics, spawning site fidelity, mark-recapture data, natural tags (otolith microchemistry), genetics.

HARVEST AND TRENDS	
Factor and criterion	Justification
Fishing mortality (5-year average percent of F_{abc} or F_{ofl})	If this value is low, then conservation concern is low
Spatial concentration of fishery relative to abundance (Fishing is focused in areas << management areas)	If fishing is focused on very small areas due to patchiness or convenience, localized depletion could be a problem.
Population trends (Different areas show different trend directions)	Differing population trends reflect demographic independence that could be caused by different productivities, adaptive selection, differing fishing pressure, or better recruitment conditions
Barriers and phenotypic characters	
Generation time (e.g., >10 years)	If generation time is long, the population recovery from overharvest will be increased.
Physical limitations (Clear physical inhibitors to movement)	Sessile organism; physical barriers to dispersal such as strong oceanographic currents or fjord stocks
Growth differences (Significantly different LAA, WAA, or LW parameters)	Temporally stable differences in growth could be a result of either short term genetic selection from fishing, local environmental influences, or longer-term adaptive genetic change.
Age/size-structure (Significantly different size/age compositions)	Differing recruitment by area could manifest in different age/size compositions. This could be caused by different spawning times, local conditions, or a phenotypic response to genetic adaptation.
Spawning time differences (Significantly different mean time of spawning)	Differences in spawning time could be a result of local environmental conditions, but indicate isolated spawning stocks.
Maturity-at-age/length differences (Significantly different mean maturity-at-age/ length)	Temporally stable differences in maturity-at-age could be a result of fishing mortality, environmental conditions, or adaptive genetic change.
Morphometrics (Field identifiable characters)	Identifiable physical attributes may indicate underlying genotypic variation or adaptive selection. Mixed stocks w/ different reproductive timing would need to be field identified to quantify abundance and catch

Meristics (Minimally overlapping differences in counts)	Differences in counts such as gillrakers suggest different environments during early life stages.
Behavior & movement	
Spawning site fidelity (Spawning individuals occur in same location consistently)	Primary indicator of limited dispersal or homing
Mark-recapture data (Tagging data may show limited movement)	If tag returns indicate large movements and spawning of fish among spawning grounds, this would suggest panmixia
Natural tags (Acquired tags may show movement smaller than management areas)	Otolith microchemistry and parasites can indicate natal origins, showing amount of dispersal
Genetics	
Isolation by distance (Significant regression)	Indicator of limited dispersal within a continuous population
Dispersal distance (<<Management areas)	Genetic data can be used to corroborate or refute movement from tagging data. If conflicting, resolution between sources is needed.
Pairwise genetic differences (Significant differences between geographically distinct collections)	Indicates reproductive isolation.

Stock structure template work plan

Stock Structure work plan										
# of BSAI left	13									
# of GOA left	15								Proposed	
Complete	Stock	Lead Author		2010	2011	2012	2013	2014	2015	2016
	Bering Sea-Aleutian Islands									
Yes	Eastern Bering Sea pollock	Ianelli							X	
No	Bogoslof Island Pollock	Ianelli								
Yes	Aleutian Islands pollock	Barbeaux					X			
No	AI Pacific cod	Thompson								
Yes	BS Pacific cod	Thompson		X						
No	Sablefish	Hanselman								
Yes	Yellowfin sole	Wilderbuer				X				
No	Greenland Turbot	Barbeaux								
Yes	Arrowtooth flounder	Spies						X		
No	Kamchatka flounder	Wilderbuer								
No	Northern Rock sole	Wilderbuer								
Yes	Flathead sole	McGilliard							X	
No	Alaska plaice	Wilderbuer								
No	Other flatfish	Wilderbuer								
No	Pacific ocean perch	Spencer								

Genomics AP

Prioritization of genetic stock structure (year of initiation listed):

- Pacific cod, walleye pollock (currently underway).
- 2020: Sleeper shark, blackspotted rockfish.
- 2021: Red king crab, greenland turbot, shortspine thornyhead.
- 2022: arrowtooth flounder, yellowfin sole.

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- Pollock: JISAO Post-doc, cooperative research.
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