EFH 5-year Review for 2010: Summary Report

Appendix 4 Scallop FMP species review

Weathervane scallop 1

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Weathervane Scallop Review

Worksheet – species-specific determinations on whether EFH needs to be changed

1. EFH Description Update

Does new information warrant change to the EFH text description?
Perhaps. Weathervane scallop EFH distribution should be updated to include those inner shelf habitats where scallops are generally distributed (which may include areas <50m).

EFH distribution maps by life stage?
Yes. Weathervane scallop EFH should be updated to include bays and inshore areas that are important scallop habitat, based on NMFS and ADF&G trawl survey data. These include, but may not be limited to, bays on the east side of Kodiak Island and south of the Alaska Peninsula between Chignik and Unimak Pass; also Kachemak Bay, and bays in Prince William Sound such as Orca Bay. The EFH distribution should also be reviewed against areas where scallops are no longer fished commercially, but may still constitute important scallop habitat (although any such changes should be based on reliable and fairly recent data).

Does the new description, and any associated information, change the level of information known for the species life stage (e.g., not-identified to Level 1; Level 1 to 2[*])?
No.

2. New Information

Is there any new information (published or other) that you have used in the review that is not listed in the revisions to the FMP text? If so, please reference it here.

Yes. There is a series of ADF&G trawl survey reports available through the ADF&G website. The most recent is:

> **Spalinger, K. 2009. Bottom trawl survey of crab and groundfish: Kodiak, Chignik, South Peninsula, and Eastern Aleutian Management Districts, 2008. Alaska Department of Fish and Game, Fishery Management Report No. 09-25, Anchorage.**

Scallop distribution map is figure 26 in this one. Also, scallops are caught and identified to species by NMFS trawl surveys in the GOA and Bering Sea, so a recent reference to a trawl survey report should be included.

> **LAUTH, R. R. 2010. Results of the 2009 eastern Bering Sea continental shelf bottom trawl survey of groundfish and invertebrate resources. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-204, 228 p**
>
> **http://www.afsc.noaa.gov/RACE/groundfish/survey_data/default.htm**

[*] EFH Information Levels: Level 1 - Distribution (general) data available; Level 2 - Habitat-related density data available; Level 3 - Growth, reproduction, or survival rates within habitats are available; Level 4 – Production rates by habitat are available. See FMP for EFH Level specifics by life stage.

If appropriate, please briefly list any relevant studies that are currently underway that may be useful for EFH reviews in the future.

ADF&G is collecting information on scallop habitat and benthic species associations in and around scallop fishing areas via the CamSled benthic imaging project (Rosenkranz et. al 2008). ADF&G CamSled is a towed, bottom tending system that features a machine vision camera, strobe lighting, and a fiber optic link between the vehicle and the towing vessel. Large amounts of high resolution image data of the bottom are obtained and stored in real time on computer hard drives. ADF&G staff are manually reviewing image data, developing a database of species information and metadata (position, depth, temperature), and developing tools to improve access to the information.

Rosenkranz, G.E., Gallager, S.M., Shepard, R.W., Blakeslee, M. 2008. Development of a high-speed, megapixel benthic imaging system for coastal fisheries research in Alaska. Fisheries Research 92:340–344

3. Research and Information Needs

Is research needed or do data gaps exist? Briefly explain and list in order of priority.
Yes. Research and better technological tools are needed to classify scallop distribution and bed areas. With this information, research will need better advances and tools to assess and disseminate the enormous influx of information expected.

4. Fishing Activities

Does new information, and any changes in the distribution of fishing intensity, suggest that the fishing effects analysis summarized in the FMP should be updated?
No. While there may be changes to the EFH distribution for scallop, the new areas that would be included are primarily nearshore, and not subject to intensive trawl fishing. Overall the intensity of trawl fishing has decreased since the 2005 evaluation, and the localized areas of increased intensity do not appear to be in areas that are important to scallop habitat.

5. Habitat Areas of Particular Concern (HAPC)

Are there specific ecologically significant, rare, or sensitive sites, relevant to your species, that are particularly vulnerable to human perturbation, which the Council might want to consider identifying as HAPC?
No.

6. Conservation recommendations

Do you have any EFH conservation recommendations that the Council may want to consider?
None.

[Information excerpted from Scallop FMP, Appendix D: Tables in 2.1, 2.2, 3.0, 3.1, 3.2, chapter 4, chapter 7] **WEATHERVANE**

2.0 LIFE HISTORY FEATURES AND HABITAT REQUIREMENTS

This section describes habitat requirements and life histories of the scallops managed by this FMP. Information contained in this appendix details life history information for federally managed scallop species. Each species or species group is described individually; however, summary tables that denote habitat associations (Table 2), reproductive traits (Table 3), and predator and prey associations (Table 4) are also provided. In each section, a species-specific table summarizes habitat requirements.

The following abbreviations are used in the habitat tables to specify location, position in the water column, bottom type, and other oceanographic features.

Abbreviations used in the EFH Reports

Location: WC = water courses, rivers, streams, sloughs; LK = lakes, ponds (some are temporary); BCH = beach (intertidal); EST = estuarine, intermediate salinity, nearshore bays with inlet watercourses, eelgrass and kelp beds; ICS = inner continental shelf (1-50 m deep); MCS = middle continental shelf (1-100 m deep); OCS = outer continental shelf (1-200 m); BAY = nearshore bays (e.g., fjords); IP = island passes (areas of high current).

Water Column: P = pelagic (found off bottom, not necessarily associated with a particular bottom type); N = neustonic (found near surface).

Bottom Type: G = gravel; K = kelp; SAV = subaquatic vegetation (e.g., eelgrass).

Oceanographic/Riverine Features: UP = upwelling; G = gyres; F = fronts; CL = thermo- or pycnocline; E = edges.

General: U = Unknown; NA = not applicable

Location

ICS =	inner continental shelf (1-50 m)	USP =	upper slope (200-1000 m)
MCS =	middle continental shelf (50-100 m)	LSP =	lower slope (1000-3000 m)
OCS =	outer continental shelf (100-200 m)	BSN=	basin (>3000 m)

BCH = beach (intertidal)
BAY = nearshore bays, give depth if appropriate (e.g., fjords)
IP = island passes (areas of high current), give depth if appropriate

Water column
D = demersal (found on bottom)
SD/SP =semi-demersal or semi-pelagic if slightly greater or less than 50% on or off bottom
P = pelagic (found off bottom, not necessarily associated with a particular bottom type)
N = neustonic (found near surface)

Bottom Type

M = mud	S = sand	R = rock
SM = sandy mud	CB = cobble	C = coral
MS = muddy sand	G = gravel	K = kelp

SAV = subaquatic vegetation (e.g., eelgrass, not kelp)

Oceanographic Features
UP = upwelling G = gyres F = fronts E = edges
CL = thermocline or pycnocline

General
U = Unknown N/A = not applicable

[Information excerpted from Scallop FMP, Appendix D: Tables in 2.1, 2.2, 3.0, 3.1, 3.2, chapter 4, chapter 7]

WEATHERVANE

Table 2 Summary of habitat associations for scallops.

Scallop		Nearshore				Shelf			Slope						Stratum Reference							Location						
						Inner	Middle	Outer	Upper		Inter-mediate		Lower	Basin											Pelagic		
Species	Life Stage	Freshwater	Estuarine	Intertidal	Subtidal	1-50m	51-100m	101-200m	201-300m	301-500m	501-700m	701-1000m	1001-3000m	>3000m	Shallows	Island Pass	Bay/Fjord	Bank	Flat	Edge	Gully	Surafce	Near surface	Semi-demersal	Demersal	1-200m (epi)	201-1000m (meso)	>1000m (bathy)
Weathervane scallop	M					x	x	x																	x			
	J					x	x	x																	x			
	L					x	x	x																		x		
	E					x	x	x																	x			

Scallop		Physical Oceanography					Substrate												
Species	Life Stage	Upwelling areas	Gyres	Thermo/pycnocline	Fronts	Edges (ice, bath)	Organic Debris	Mud	Sand	Gravel	Mud & sand	Mud & gravel	Sand & mud	Gravel & mud	Gravel & sand	Gravel & sand & mud	Gravel & mud & sand	Cobble	Rock
Weathervane scallop	M	x						x	x	x	x	x	x	x	x	x	x		
	J							x	x	x	x	x	x	x	x	x	x		
	L																		
	E																		

[Information excerpted from Scallop FMP, Appendix D: Tables in 2.1, 2.2, 3.0, 3.1, 3.2, chapter 4, chapter 7]

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Scallop		Structure										Community Associations												Oceanographic Properties		
Species	Life Stage	Bars	Sinks	Slumps\Rockfalls\Debris	Channels	Ledges	Pinnacles	Seamounts	Reefs	Vertical Walls	Man-made	Algal Cover	Anenomes	Enchinoderms	Soft Coral	Hard Coral	Mollusca	Drift Algae\Kelp	Kelp	Polychaetes	Sea Grasses	Sea Onions	Tunicates	Temperature (Celsius)	Salinity (ppt)	Oxygen Conc (ppm)
Weathervane scallop	M																									
	J																									
	L																									
	E																									

Table 3 Summary of biological associations for scallops.

Scallop		Reproductive Traits																									
		Age at Maturity				Fertilization/Egg Development					Spawning Behavior						Spawning Season										
		Female		Male																							
Species	Life Stage	50%	100%	50%	100%	External	Internal	Oviparous	Ovoviviparous	Viviparous	Batch Spawner	Broadcast Spawner	Egg Case Deposition	Nest Builder	Egg/Young Guarder	Egg/Young Bearer	January	February	March	April	May	June	July	August	September	October	November	December
Weathervane scallop	M					x						x									x	x	x					
	LJ																											
	EJ																											
	L																											
	E																											

[Information excerpted from Scallop FMP, Appendix D: Tables in 2.1, 2.2, 3.0, 3.1, 3.2, chapter 4, chapter 7]

WEATHERVANE

Table 4 Summary of predator and prey associations for scallops

Scallop		Predator to																												
Species	**Life Stage**	**Algae**	**Plants**	**Plankton**	**Zooplankton**	**Diatoms**	**Sponges**	**Eusphausiid**	**Hydroids**	**Amphipoda**	**Copepods**	**Starfish**	**Polychaetes**	**Squid**	**Philodae (gunnels)**	**Bi-valves**	**Mollusks**	**Crustaceans**	**Ophiuroids (brittle stars)**	**Shrimps, mysidacae**	**Sand lance**	**Osmerid (eulachon)**	**Herring**	**Myctophid (lantern fishes)**	**Cottidae (sculpins)**	**Arrowtooth**	**Rockfish**	**Salmon**	**Pacific cod**	**Pollock**	**Halibut**
weathervane scallop	M			x																											
	LJ																														
	EJ																														
	L																														
	E																														

Scallop		Prey of																												
Species		**Jellyfish**	**Starfish**	**Chaetognaths (arrowworms)**	**Crab**	**Herring**	**Salmon**	**Pollock**	**Pacific cod**	**Ling cod**	**Rockfish**	**Rock Sole**	**Flathead Sole**	**Yellowfin sole**	**Arrowtooth flounder**	**Hailbut**	**Salmon Shark**	**Northern Fur Seal**	**Harbor Seal**	**Steller sea lion**	**Dalls Porpoise**	**Beluga whale**	**Killer Whale**	**Minke whale**	**Eagles**	**Murres**	**Puffin**	**Kittiwake**	**Gull**	**Terrerstrial Mammals**
weathervane scallop	M		x																											
	LJ		x																											
	EJ		x																											
	L																													
	E																													

2.2 Habitat Description for Weathervane Scallops *(Patinopecten caurinus*

Life History and General Distribution

Weathervane scallops are distributed from Point Reyes, California, to the Pribilof Islands, Alaska. The highest known densities in Alaska have been found to occur in the BS, off Kodiak Island, and along the eastern gulf coast from Cape Spencer to Cape St. Elias. Weathervane scallops are found from intertidal waters to depths of 300 m, but abundance tends to be greatest between depths of 40 to 130 m on beds of mud, clay, sand, and gravel. Beds tend to be elongated along the direction of current flow. A combination of large-scale (overall spawning population size and oceanographic conditions) and small-scale (site suitability for settlement) processes influence recruitment of scallops to these beds. Sexes are separate and mature male and female scallops are distinguishable based on gonad color. Although spawning time varies with latitude and depth, weathervane scallops in Alaska spawn in May to July depending on location. Eggs and spermatozoa are released into the water, where the eggs become fertilized. After a few days, eggs hatch, and larvae rise into the water column and drift with ocean currents. Larvae are pelagic and drift for about one month until metamorphosis to the juvenile stage when they settle to the bottom.

Several other species of scallops found in the EEZ off Alaska have commercial potential. These scallops grow to smaller sizes than weathervanes, and thus have not been extensively exploited in Alaska. Pink scallops, *Chlamys rubida*, range from California to the Pribilof Islands. Pink scallops are found in deep waters (to 200 m) in areas with soft bottom, whereas spiny scallop occur in shallower (to 150 m) areas characterized by hard bottom and strong currents. Pink scallops mature at age 2 and spawn in the winter (January to March). Maximum age for this species is 6 years. Spiny scallops, *Chlamys hastata*, are found in coastal regions from California to the GOA. Spiny scallops grow to slightly larger sizes (75 mm) than pink scallops (60 mm). Spiny scallops also mature at age 2 (35 mm) and spawn in the autumn (August to October). Rock scallops, *Crassadoma gigantea*, range from Mexico to Unalaska Island. Rock scallops are found in relatively shallower water (0 to 80 m) with strong currents. Apparently, distribution of these animals is discontinuous, and the abundance in most areas is low. These scallops attach themselves to rocks, attain a large size (to 250 mm), and exhibit fast growth rates. Rock scallops are thought to spawn during two distinct periods, one in the autumn (October to January), and one in the spring-summer (March to August).

Fishery

The weathervane scallop resource consists of multiple, discrete, self sustaining populations that are managed as separate stock units. Scallop stocks in Alaska have been managed under a federal fishery management plan (FMP) since 1995. The FMP controls the fishery through permits, registration areas and districts, seasons, closed waters, gear restrictions, efficiency limits, crab bycatch limits, scallop catch limits, inseason adjustments, and observer monitoring. Most of these regulations were developed by the State prior to 1995. Dredge size is limited to a maximum width of 15 feet, and only two dredges may be used at any one time. In the Kamishak District of Cook Inlet, only one dredge with a 6-foot maximum width is allowed. Dredges are required to have rings with a 4-inch minimum inside diameter. To reduce incentives to harvest small scallops, crew size on scallop vessels is limited to 12 persons, and all scallops must be manually shucked. Dredging is prohibited in areas designated as crab habitat protection areas, similar to the groundfish FMPs.

Since 1967, when the first landings were made, fishing effort and total scallop harvest (weight of shucked meats) have varied annually. Total commercial harvest of weathervane scallops has fluctuated from a high of 157 landings totaling 1,850,187 pounds of shucked meats by 19 vessels in 1969 to no landings in

1978. Prices and demand for scallops have remained high since fishery inception. Prior to 1990, about two-thirds of the scallop harvest has been taken off Kodiak Island, and about one-third has come from the Yakutat area; other areas had made minor contributions to overall landings. Harvests in 1990 and 1991 were the highest on record since the early 1970s. The 1992 scallop harvest was even higher at 1,810,788 pounds. The increased harvests in the 1990s occurred with new exploitation in the BS.

Relevant Trophic Information

Scallop predators have not been well studied. Scallops are likely prey to various fish and invertebrates during the early part of their life cycle. Flounders are known to prey on juvenile weathervane scallops, and seastars may also be important predators.

Approximate Upper Size Limit of Juvenile Scallops (in cm): Weathervane scallops begin to mature by age 3 at about 7.6 cm (3 inches) in shell height (SH), and virtually all scallops are mature by age 4. Growth, maximum size, and size at maturity vary significantly within and between beds and geographic areas. Weathervane scallops are long-lived; individuals may live 28 years or more. The natural mortality rate is thought to be about 15% annually (M = 0.16).

Habitat and Biological Associations

Scallops are found from intertidal waters and to 300 m. Abundance tends to be greatest between 45 and 130 m on beds of mud, clay, sand, and gravel (Hennick 1973). Weathervane scallops are associated with other benthic species, such as red king crabs, Tanner crabs, shrimps, octopi, flatfishes, Pacific cod, and other species of benthic invertebrates and fishes.

SPECIES: Weathervane Scallops off Alaska

Stage - EFH Level	Duration or Age	Diet/Prey	Season/Time	Location	Water Column	Bottom Type	Oceano-graphic Features	Other
Eggs	several days	None	May-July	MCS, ICS	D		N/A	
Larvae	2-3 weeks		May-August	ICS, MCS, OCS	P		N/A	
Juveniles	Age 0 to Age 3		August +	MCS	D	CL, M, S, G	N/A	
Adults	Age 3 - 28		Spawning May-July	MCS	D	CL, M, S, G	UNK	

3.0 ESSENTIAL FISH HABITAT

Essential Fish Habitat (EFH) means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat: “waters” includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means the habitat required to support a sustainable fishery and a healthy ecosystem; and

"spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

EFH is the general distribution of a species described by life stage. General distribution is a subset of a species population and is 95% of the population for a particular life stage, if life history data are available for the species. Where information is insufficient and a suitable proxy cannot be inferred, EFH is not described. General distribution is used to describe EFH for all stock conditions whether or not higher levels of information exist, because the available higher level data are not sufficiently comprehensive to account for changes in stock distribution (and thus habitat use) over time.

EFH is described for FMP-managed species by life stage as general distribution using new guidance from the EFH Final Rule (67 FR 2343), such as the updated EFH Level of Information definitions. New analytical tools are used and recent scientific information is incorporated for each life history stage from updated scientific habitat assessment reports. EFH descriptions include both text (see section 3.1) and a map (see section 3.2), if information is available for a species' particular life stage. These descriptions are risk averse, supported by scientific rationale, and account for changing oceanographic conditions. The methodology and data sources for the EFH descriptions are described in Appendix D to the EFH EIS (NMFS 2005).

3.1 Description of Essential Fish Habitat

EFH descriptions are based on the best available scientific information. In support of this information, a thorough review of FMP species is contained in this Appendix and in the EFH EIS (NMFS 2005). A summary of the habitat information levels for each species, as described in the EFH regulations at 50 CFR 600.815(a)(1)(iii), is listed in the table below.

EFH Information Levels for Alaska Scallops

Scallop Species	Eggs	Larvae	Early Juvenile	Late Juvenile	Adult	
Weathervane scallop	x	x	x	1	1	

x - No information available.

EFH Description for Weathervane Scallops

Eggs—No EFH Description Determined
Insufficient information is available.

Larvae—No EFH Description Determined
Insufficient information is available.

Early Juveniles—No EFH Description Determined
Insufficient information is available.

Late Juveniles
EFH for late juvenile weathervane scallops is the general distribution area for this life stage, located in the sea floor along the middle (50 to 100 m), and outer (100 to 200 m) shelf in concentrated areas of the GOA

and BSAI where there are substrates of clay, mud, sand, and gravel that are generally elongated in the direction of current flow, as depicted in Figure 3.

Comment [DE1]: Depth distribution may need to be updated to reflect inshore areas

Adults

EFH for adult weathervane scallops is the general distribution area for this life stage, located in the sea floor along the middle (50 to 100 m) and outer (100 to 200 m) shelf in concentrated areas of the GOA and BSAI where there are substrates of clay, mud, sand, and gravel that are generally elongated in the direction of current flow, as depicted in Figure 3.

Comment [DE2]: As above

EFH Description for Other Species of Scallops

Information is insufficient or lacking to describe EFH for any life stage of pink, spiny, and rock scallops.

3.2 Maps of Essential Fish Habitat

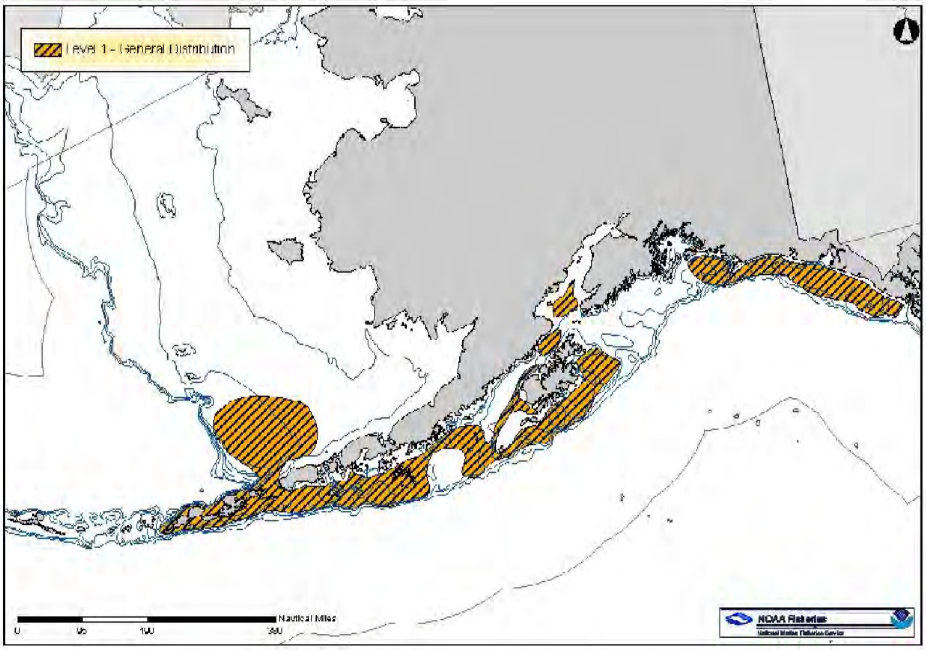

Figure 3 EFH Distribution for Late Juveniles/Adult Weathervane Scallop

Comment [DE3]: Update map to include important nearshore bays that are important for scallop habitat. These include, but may not be limited to: bays on the east side of Kodiak Island, south of Alaksa Peninsula between Chignik and Unimak Pass, Kachemak Bay, bays in Prince William Sound such as Orca Bay.

Should reevaluate sources of data used to create map – there may be some areas that are important scallop habitat, but are no longer fished commercially, that should be considered EFH also.

4.0 EFFECTS OF FISHING ON ESSENTIAL FISH HABITAT

This evaluation assesses whether fishing adversely affects EFH in a manner that is more than minimal and not temporary in nature (50 CFR 600.815(a)(2)(ii)). This standard determines whether Councils are required to act to prevent, mitigate, or minimize any adverse effects from fishing, to the extent practicable.

Much of the material supporting this evaluation is located in the following sections of the EFH EIS (NMFS 2005). These include:

- Descriptions of fishing activities (including gear, intensity, extent and frequency of effort) - Sections 3.4.1 and 3.4.2.
- Effects of fishing activities on fish habitat - Section 3.4.3.
- Past management actions that minimize potential adverse effects on EFH - Sections 2.2 and 4.3.
- Habitat requirements of managed species - Sections 3.2.1, 3.2.2, and Appendices D and F.
- Features of the habitat - Sections 3.1, 3.2.4 and 3.3.
- HAPCs - 2.2.2.7, 2.2.2.8, 2.3.2, and 4.2
- Cumulative effects of multiple fishing activities on EFH - Section 4.4.

Two conclusions are necessary for this evaluation: (1) the definition of EFH draws a distinction between the amount of habitat necessary for a species to "support a sustainable fishery and the managed species' contribution to a healthy ecosystem" (50 CFR 600.10) and all habitat features used by any individuals of a species; (2) this distinction applies to both the designation of EFH and the evaluation of fishing effects on EFH. The "more than minimal" standard relates to impacts that potentially affect the ability of the species to fulfill its fishery and ecosystem roles, not just impacts on a local scale. The analysis indicated substantial effects to some habitat features in some locations, many of which are within the spatial boundaries of the EFH for scallops. These habitat changes may or may not affect the welfare of scallops (a term used to represent "the ability of a species to support a sustainable fishery and its role in a healthy ecosystem"). The evaluation method is detailed in Section B.3.1 of Appendix B of the EFH EIS (NMFS 2005).

4.1 Habitat Connections

Weathervane scallops are found from shallow intertidal waters to depths of 300 m, but abundance tends to be greatest between depths of 40 to 130 m on beds of mud, clay, sand, and gravel (Hennick 1973, Turk 2000). Scallop beds tend to be elongated along the direction of current flow. A combination of large-scale processes (overall spawning population size and oceanographic conditions) and small-scale processes (site suitability for settlement) influence the recruitment of scallops to beds.

Spawning/Breeding—Successful scallop recruitment depends upon high egg-fertilization rate, transport of spat to nursery areas, environmental conditions, and survival to the adult stage. Scallop gametes are broadcast into the water and rely on currents to mix sperm and eggs. If males and females are not close together, the dilution of sperm can limit fertilization. Thus, spatial distribution is thought to be a critical component of the spawning/breeding success of scallops (Stokesbury 2000, ADF&G 2000). Indicators of potential effects on spatial distribution are changes in population biomass and fishing mortality.

Feeding—Scallops are filter feeders. Successful feeding depends on the concentration and quality of suspended food particles, particularly phytoplankton. Prey availability depends on localized plankton blooms. Fishing activity can impact feeding of scallops through introduction of particles low in nutrient quality or organic content, thus diluting the naturally occurring nutritional particles (MacDonald 2000). More fishing activity by trawl or dredge gear could potentially introduce additional inorganic particulate matter that could negatively affect scallop feeding success, or conversely, introduce organic matter that could be beneficial to scallops.

Growth to Maturity—Growth to maturity is measured in terms of survival to maturity (which occurs at sizes smaller than those commercially harvested). The consequences of fishing activities on scallop survival depend upon habitat alteration and gear-induced damage and mortality (Grant 2000). The effects of habitat alternation may depend primarily on sediment resuspension and the potential for siltation, which would increase mortality.

4.2 Evaluation of Effects

Issue	Evaluation
Spawning/breeding	MT (Minimal or temporary effect)
Feeding	U (Unknown effect)
Growth to maturity	MT (Minimal or temporary effect)

Summary of Effects—Because scallops have limited mobility, scallop settlement generally occurs on substrates and in locations where adults are already found (Turk 2000). Thus, the nursery areas are the same areas occupied by adults. These are also the areas where the directed scallop fisheries occur. However, there is no evidence that scallop recruitment has decreased with the current level of scallop fishing effort.

The overall footprint (area effected annually) of the scallop fishery was small (149 square nm), equating to about 0.1% of the total available amount of those habitat types (sand, mud, and gravel) (Witherell 2002). Although the effects of scallop dredge gear on the bottom are thought to be higher than other gear types, the fishery occurs in areas and habitat types that have relatively fast recovery rates. Thus, the effects of the fishery are concentrated in a relatively small proportion of benthic habitats. The effects on spawning and breeding of scallops are considered minimal and temporary in nature.

Sediment resuspension by dredges can have positive or negative effects on scallop feeding. The current fishing effort intensity of the Alaska scallop fishery does not appear to affect scallop growth, so one may surmise that feeding is not disturbed. However, there is not enough information to evaluate this issue.

The weathervane scallop resource is considered to be at sustainable biomass levels and has maintained relatively high recruitment in most areas over the past 10 years (Barnhart, J., ADF&G, personal communication). This species does not depend upon any habitat feature vulnerable to fishing activities. Based on the overlap of fisheries with juvenile and adult scallop stock distribution, there appear to be minimal effects on the weathervane scallop habitat.