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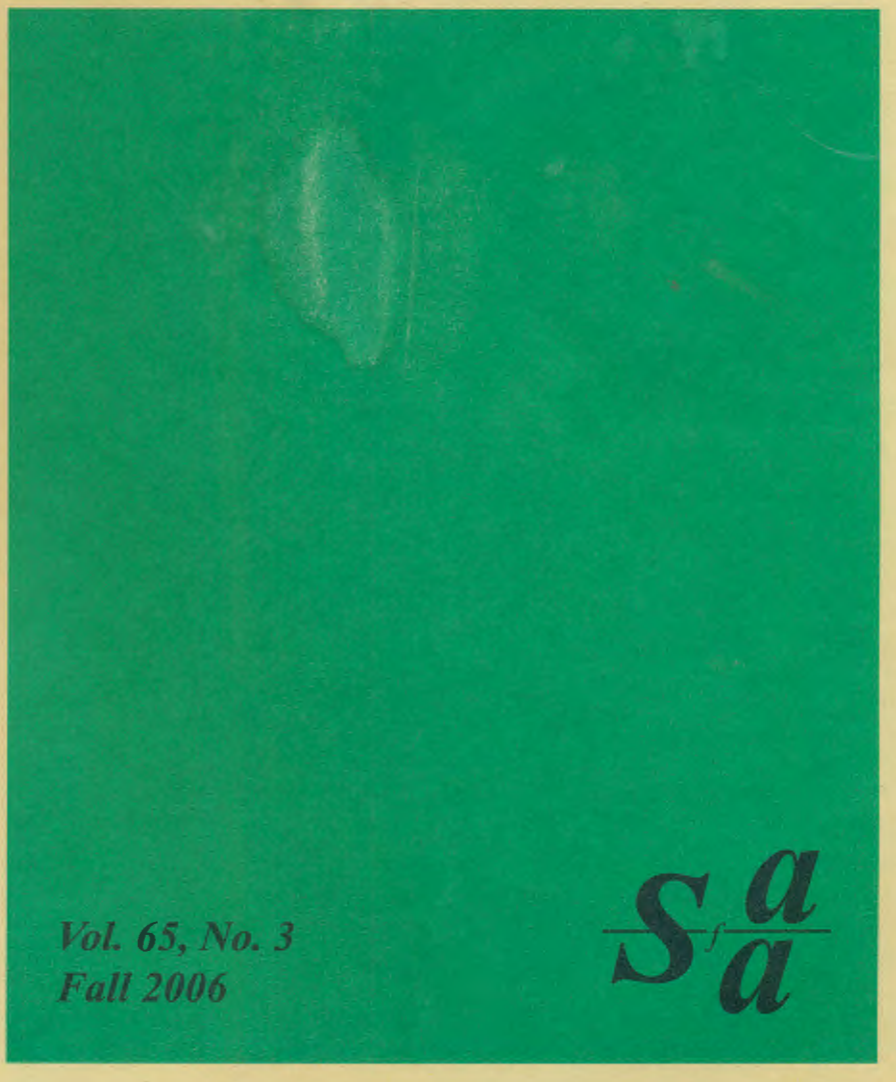

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Toward Mitigating Problems at the Fisheries-Oil Development Interface: The Case of the Salmon Drift Gillnet Fishery in Cook Inlet, Alaska

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Participants in the drift gillnet fishery in Cook Inlet, Alaska deploy long nets from small boats in treacherous rip zones where salmon tend to congregate. Cook Inlet is also rich in petroleum resources, and oil and natural gas firms active in the region may eventually be permitted to emplace drilling platforms in the fishing grounds to extract such resources. But fishermen express concerns about potential net "wrapping," disruptions to established patterns of navigation, oil spills, and protracted spill litigation. But fishing and oil and gas production have developed in tandem here, with many actors involved in or appreciative of both forms of enterprise. A model of clearly dichotomized or antagonistic relations between local fishing and global-corporate oil interests is confounded in this region. Moreover, fishery participants deal with a range of more immediately cogent challenges. Thus, while the potential for spatial conflict certainly exists, the social and economic context as described herein may ultimately enhance the potential for mitigation efforts to succeed, thereby allowing the two industries to continue to coexist in close proximity.

Key words: outer continental shelf, drift gillnetting, NEPA, key informants

Introduction

Commercial fishing is in many ways a highly challenging venture. With a fatality rate some 28 times higher than the national work-related death rate, it is one of the most dangerous occupations in the U.S. (National Institute of Occupational Safety and Health 1994, 2004). Long-term success is itself dependent in large part on the availability of a natural resource that is finite, and the natural abundance of which is cyclical and subject to changing environmental conditions. Further, marine ecosystems are increasingly subject to various anthropogenic stressors, and fish resources are pursued not only by commercial fleets, but also by sport anglers, guides, and subsistence users. Ecological problems and competition for limited resources have led governments to intervene with strategies intended to maximize catch for each group without jeopardizing the overall health of the resource and ecosystems. Such efforts invariably limit pursuit of the resource by any one group. Commercial fishing is therefore also constrained by formal limits on who can fish for profit when, where, and with what gear types. Finally, commercially-oriented participants operate in competitive markets that encourage intensive effort but often enable only minimal return on investment. Such operators are therefore further bounded by basic economic factors.

In certain regions of the world, fishers also share surface and sub-surface portions of the ocean and ocean floor with an industry that may additionally affect fisheries resources and constrain fishing operations—the offshore oil and gas industry. Constraints occur where established patterns of navigation and fishing are interrupted by drilling platforms; where industry boat traffic elevates competition for space on the water; and when spills or blowouts limit ability to fish, the health of the resource, the perceived health of the resource, and associated seafood market conditions.

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The threat and occurrence of problematic fishery-oil interactions have lead to resistive political mobilization on the part of fishery participants in oil- and gas-rich zones around the world. In North America, this has been the case for fleets operating in the Canadian Maritime Provinces (May 2004; Slade 2004), Alaska (Hanley 1984; Impact Assessment, Inc. 2004), California (Cormick and Knaster 1986; Cicin-Sain and Tiddens 1989; Fusaro 1991; Knaster, Fusaro, and Richards 1998), and states along the U.S. coastline of the Gulf of Mexico (Reggio and Kasprzak 1991). Significantly, the manner, intensity, and objectives of organized response to offshore oil and gas activity can vary depending on the historical relationship of the industries in the communities and regions of interest (Woodell, Forsyth, and Gramling 1996).

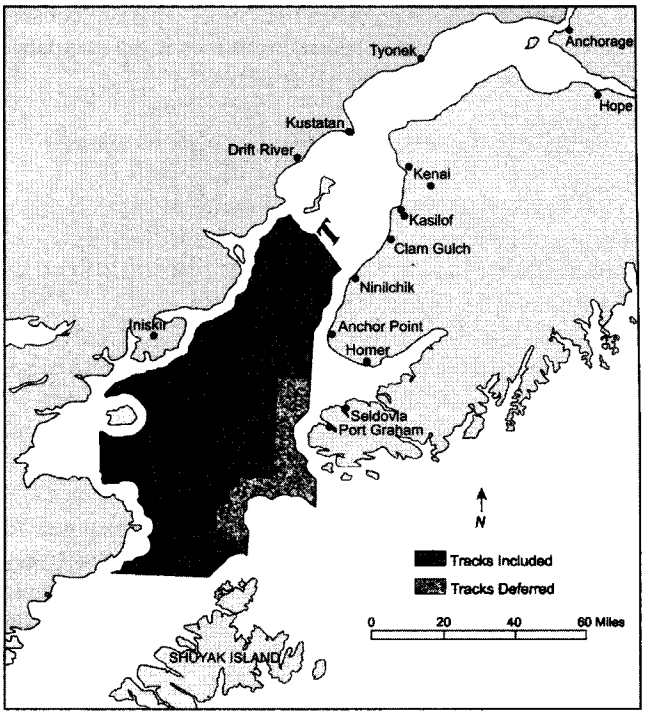
This article reviews the recent case of the commercial salmon drift gillnet fleet operating in the Cook Inlet region of Southcentral Alaska, referred to here as the "drift fleet." Its most useful lessons relate to resolution of conflict through identification of means for minimizing problematic aspects of offshore oil development for already challenged small boat operations in the U.S. and abroad.

Oil and gas development has thus far occurred only in the state jurisdiction waters of Cook Inlet. Opportunities for public comment on Lease Sale 149 (held in 1994) and then-prospective Lease Sales 191 and 199 (scheduled for 2004 and 2006 respectively)[1] each elicited concerns that development activity on portions of the federally-managed Outer Continental Shelf (OCS) of Cook Inlet (see Figure 1) could negatively affect the driftnet fishery, the principal commercial salmon fishery in the region. The concerns, expressed individually and through the regional drift gillnet association called United Cook Inlet Drift Association (UCIDA), have emphasized the following: (a) drift nets would be difficult to maneuver around drilling platforms in the swift currents of Cook Inlet, (b) offshore development activities would increase vessel traffic in the area, (c) drilling muds could pollute the area, and (d) oil spills would be more likely to occur here.

The oil spill concern is particularly sensitive since numerous drift fishery participants were affected by the *Glacier Bay* spill occurring in Cook Inlet in 1987, and the *Exxon Valdez* spill occurring in Prince William Sound in 1989. Some drift captains await settlement from the punitive phase of the latter spill, a situation that conditions support for prospective OCS development in Cook Inlet.

History and logic indicate that new offshore oil and gas production activities could cause problems for the Cook Inlet drift fleet. Indeed, these bear the potential to further threaten a small boat fishery that, like many around the nation and world, is already challenged in many ways (Glazier 2007; Griffith and Pizini 2002; McGoodwin 1990). It is therefore tempting to envision participants as potential victims of a much larger industry that derives extensive profits from corporate activities that are global in scope. This appears to be an accurate portrayal for fishing-oil industry relations in certain parts of the developing world where the interests of fishers have been suppressed or overlooked with little

Figure 1. Cook Inlet Planning Area Oil and Gas Lease Sales 191 and 199



opportunity for recourse or recovery. This was the case, for example, for the Eastern Khanty in Siberia (Wiget 1997) who encountered serious challenges as a result of burgeoning oil and gas industry activities in a high latitude oil-rich region similar to that of Alaska.

But such dichotomous portrayal is confounded where competing uses of the marine environment are balanced by law and/or government intervention, and enacted through freedoms enabled by democratic society. Concurrent use continues to typify oil and seafood-rich areas in the U.S. such as Louisiana and Alaska, where the oil and gas and fishing industries were developed in close proximity in challenging environments by similarly enterprising individuals. Although oil and gas firms active in such regions are now components of global corporations, with local production values that far surpass that of commercial fishing, both industries continue to operate locally through the labor of persons who often reside as neighbors in the same communities. As such, when viewed over the course of time, local opposition to oil and gas industry activity is tempered in such places by local awareness of its economic significance.

The benefits of coexisting industries notwithstanding, there are clear dangers here insofar as economic rationality suppresses due consideration of the status of the physical and human environments within which fishing and extraction of oil and gas resources occur. While Americans are free in relative terms to pursue various forms of livelihood, equitable

access to and conservation of such resources is challenged by the mechanics of competitive capitalist society. But under the parameters of existing marine policy in the U.S., and where industry actions occur in federal jurisdiction waters such as in portions of Cook Inlet, determination of equity in conservation, use, and access to natural resources is the mandated responsibility of the federal government.

Context, Goals, Objectives, and Methods

Oil and gas industry activities undertaken on the nation's submerged lands are administered by the U.S. Department of the Interior, Minerals Management Service (MMS) under stipulations in the Outer Continental Shelf Lands Act of 1953 (OCSLA). The Alaska Region of the MMS Offshore Program oversees development on the OCS throughout Alaska, including some 2.5 million acres in Cook Inlet. As part of its functions under OCSLA and the National Environmental Policy Act of 1969 (NEPA), the agency implements research to gauge the potential effects of industry activities on OCS environments (MMS 2002:1). As such, and in response to the concerns of drift fishery participants, MMS proactively sponsored research to identify ways to mitigate problems that could occur at the fisheries-oil/gas industry interface on Cook Inlet.

The sociopolitical environment surrounding the OCS lease sale process often is highly charged. Individuals and groups are encouraged to state concerns about offshore drilling, and these are considered or addressed through the federal Environmental Impact Assessment (EIS) process. But given fluctuating cost-benefit calculations and uncertainties about finding significant oil or gas reserves in any given lease sale area, there is no guarantee that offshore exploration will move forward. Thus, federal sponsorship of mitigation research is, in this case, part of a good faith effort to attend to OCSLA and NEPA mandates and to the interests of stakeholders, even in absence of knowledge about whether offshore development is imminent.

As the intent of the sponsored research to investigate mitigation strategies logically pre-supposes that oil and gas industry activities on the OCS *would* indeed disrupt the drift fleet, the research described herein was designed to treat that assertion as a working hypothesis, and to determine whether platform drilling and associated activities could actually cause problems. In the event such problems were objectively determined to be real and likely, appropriate means for mitigating the problems would be identified.

A series of interrelated objectives and methods were implemented to satisfy these primary goals. Initial extensive review and synthesis of pertinent literature and data was followed by a series of in-depth interviews with regional resource managers, leading participants in the fish processing and distribution sectors, and others widely know to possess extensive knowledge of the industries and key actors therein. At the end of each interview, the informants were asked to identify seasoned participants in the harvest sector of the drift fishery. Persons so identified were subsequently contacted and asked to nominate yet other seasoned participants. The process resulted in identification of a network of 145 experienced drift netters (Figure 2).[2] The rationale here was to identify a group of highly knowledgeable and experienced fishermen with whom to work to develop a valid understanding of the fishery and historic and potential future interactions with drilling platforms, vessel traffic, and other elements and aspects of the oil and gas industry in the Cook Inlet region. Protocol-guided in-depth interviews and mapping exercises were subsequently conducted with 31 of the most frequently nominated drift captains. At-sea participant observation was conducted with five of those captains and on one of the drilling platforms in the state jurisdiction waters of Cook Inlet. Finally, group discussions focusing on identification of viable mitigation options were held with a core group of fishery participants of particularly high status in the fishery, and with four platform operators residing in the study area. A total of 85 in-depth interviews were conducted during the course of the project, along with a similar number of less focused interviews about a range of relevant topics. Fieldwork was initiated during the summer 2003 drift fishery season, and interviews and interaction with the fishery participants continued until the project was completed during late spring of 2004.

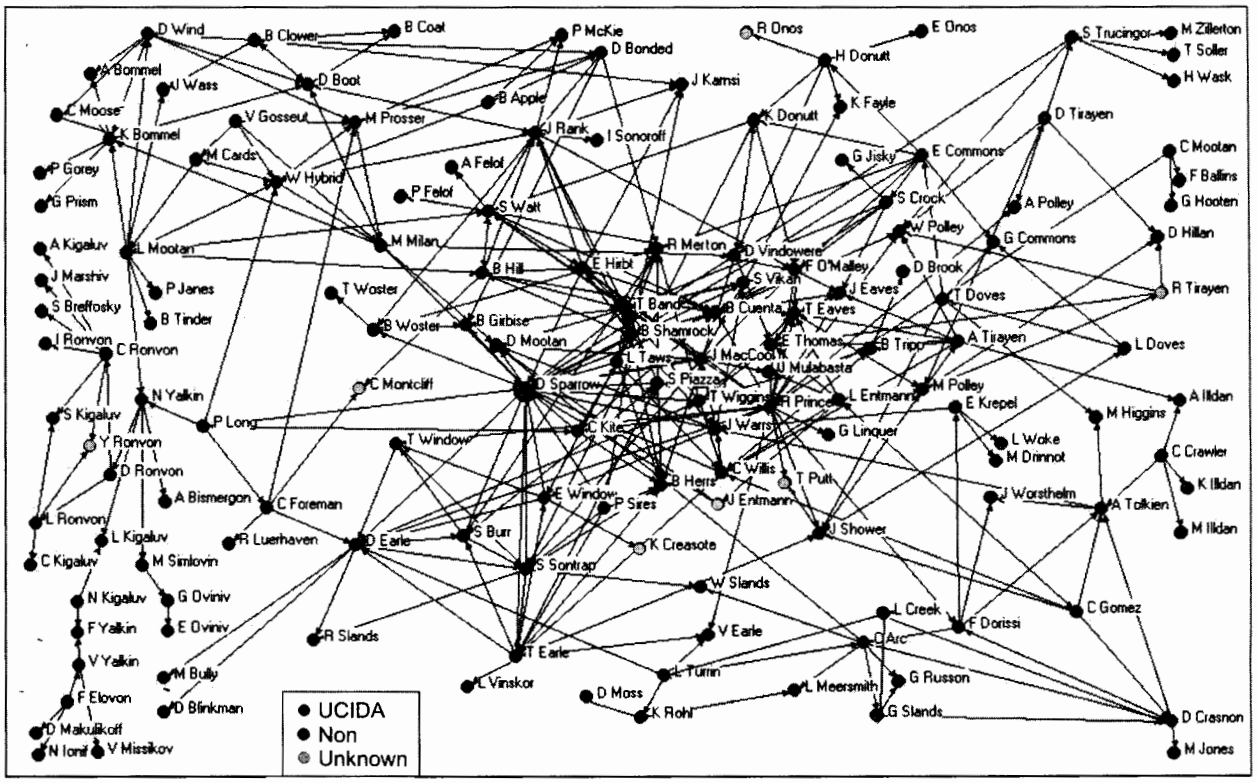
Cook Inlet and the Salmon Drift Fishery

The watershed associated with Cook Inlet is immense, encompassing some 39,000 square miles of Southcentral Alaska. Large runs of Sockeye salmon (*Oncorhynchus nerka*; "reds") return to their native streams along Cook Inlet each summer, typically ending the migration in late August. Coho salmon (*Oncorhynchus kisutch*; "silvers"), continue spawning in the Kenai River well into October. There are numerous adjacent fisheries with which participants in the drift gillnet fishery interact (and in some cases participate): (1) purse seine and set net salmon fisheries, (2) sport, charter, and commercial fisheries for halibut; (3) herring fisheries; (4) various subsistence fisheries; and (5) sport and charter fisheries for salmon (Herrmann et al. 2001).

Drift fishing involves the laying out of long gill nets at preferred and allowable times and areas. The vessel drifts in the vicinity of the net prior to retrieval. Reds are the primary target given relatively high market value, although value has decreased dramatically over the last decade. Chinook salmon (*Oncorhynchus tshawytscha*; "kings") are also valuable, but relatively less abundant than reds or silvers (Alaska Department of Fish and Game 2003). Each of Alaska's other salmon species are also taken incidentally (and on occasion by intent) by drift gillnet methods in the region, depending on the timing and location of coincidental runs and the market value of the moment.

Drift boats are typically between 28 and 44 feet in length. Many experienced captains set their nets in turbulent rip tide zones where salmon congregate. Participants encounter some

Figure 2. Drift Gillnet Fishery Social Network by Affiliation



of the most challenging conditions of any Alaska fishery. Cook Inlet has one of the world's largest tidal ranges, sometimes reaching 35 feet. Currents can reach seven and eight knots, and wind waves are characteristically steep. Water depth in the fishing zone is typically in the range of 25 to 50 fathoms. Local weather and winds are affected by orthographic flow associated with terminal end of the glaciated Alaska Range on the western shoreline of the Inlet.

Drift fishing productivity has varied over time in the region. Total harvest in 1975, the first year documented by the Alaska Department of Fish and Game (ADF&G), was 9.5 million pounds, with fleet-wide gross earnings totaling $4.5 million. Production peaked in 1992 at 45.3 million pounds, with earnings totaling $66.4 million. There were 580 active permits that year. Decline in activity has been precipitous, averaging 12.2 million pounds between 1994 and 2001, across an average of 539 active permits. Production in 2002 was 12.6 million pounds, with fleet-wide gross earnings totaling $5.7 million across only 409 permits (ADF&G 2004; Alaska Commercial Fisheries Entry Commission 2004).

Market conditions underlie a significant decline in drift fishing in recent years. Prices paid by processors for reds have fallen from as high as $3.00 per pound to as low as $.50 per pound in a little over a decade. Despite a productive year in terms of landings, the going market price for reds in 2004 was about $.60 per pound. Overall profit margins for drift operations have in many instances fallen by as much as 90 percent since the peak in the early 1990s. Permit and boat values have likewise diminished. Many Cook Inlet drift operators have chosen not to fish their permits, opting to wait until prices improve. Part of the problem relates to saturation of the domestic seafood market with pen-reared salmon from domestic and foreign sources, and some drift captains believe public concerns about farmed salmon may be beneficial if marketing strategies can capitalize on the attractive attributes of wild salmon caught in Alaska.

Diminishing economic incentives to participate in the drift fishery have led many participants to de-emphasize drift fishing as a principal form of income. Indeed, for most, drift fishing and commercial fishing in general have become secondary forms of work. While the situation speaks to the adaptive capacities of fishermen in Alaska, it is also indicative of what have become chronic economic problems associated with a way of life that was formerly quite profitable.

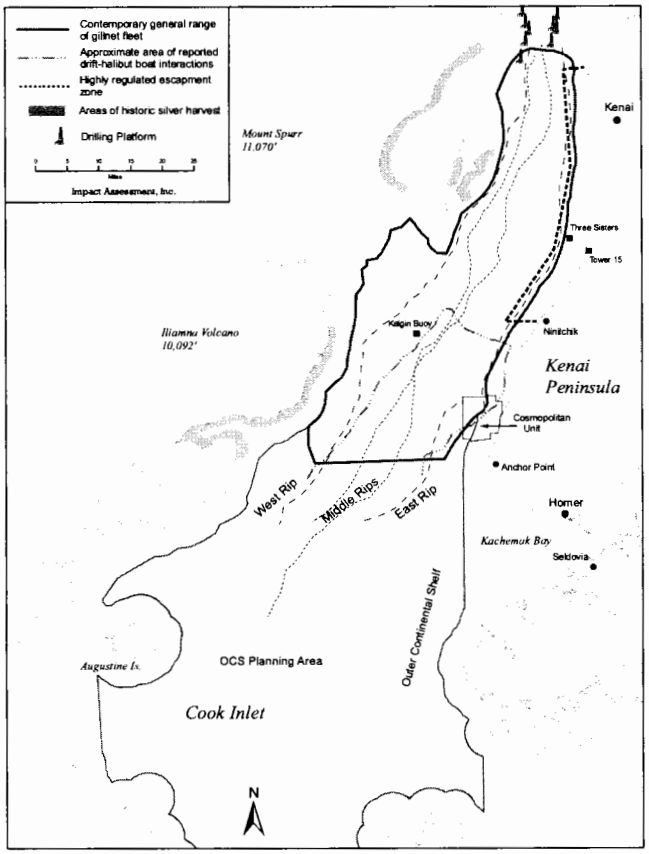
Regulatory measures established to manage a complex set of resources present various challenges to drift operators. Drift fishing is allowed only on select days and times, with a typical season lasting from mid-June through the end of July. This is vastly different from the situation decades ago, when drift fishing was largely unregulated. Numerous of our more seasoned informants were participating in the drift fishery prior to its extensive regulation.

The issue of "escapement" is critical to regulation of salmon fisheries in Alaska. The term refers to the number of fish that are allowed to swim to their spawning grounds without being caught by anglers, subsistence practitioners, or commercial participants. ADF&G seeks to set escapement levels so that a maximum number of fish are available for harvest in each fishery, with sufficient numbers spawning to sustain maximum sustainable yield in the future. Prescribed escapement numbers are perennially contested by a range of parties.

The drift fishery is highly regulated in spatial terms, based in part on escapement-based management. Figure 3 derives from the input of seasoned drift fishery participants, and depicts both the regulatory boundaries of the fishery, and the range of the drift fleet. As noted in the legend, the thick black line indicates the parameters of contemporary drift activity. The dotted line west of the eastern shore of the Inlet from south of Point Nikiski to just north of Ninilchik and three miles offshore is the ADF&G regulatory boundary known as "the corridor," a highly regulated area of escapement managed via periodic openings and closures. The western boundary of the corridor is sometimes crowded with captains and crew fishing immediately east of the regulatory line. The northernmost area of drift activity necessarily coincides with the ADF&G northern regulatory boundary. The allowable fishing zone follows the bottom contours around Kalgin Island to the Kalgin Island Buoy (the Kalgin "can"), itself a favored location for many captains. The western limit of the fleet is effectively delimited by shallows along western Cook Inlet. Much of the southwestern range approximates the three-mile federal statutory limit and thus the OCS Planning Area boundary.

Of particular note on the map is the location of the east, middle, and west rip zones. While the location of these zones of interest to the drift fleet shifts somewhat with water volume and to a lesser degree with changes in bathymetry, the symbols indicate their approximate locations over time. These areas are highly favored for drift fishing.

Figure 3. Drift Fishery



Oil and Gas Industry Interest in the Cook Inlet OCS

The offshore oil and gas industry has been central to the economies of the Cook Inlet region and to Alaska itself since offshore production was initiated in 1967. Although production in Cook Inlet peaked in the 1970s, the number of persons employed in the industry has been consistent or growing. Industry representatives reported taxable properties approaching $500 million in the 1990s, a major source of municipal revenue (Alaska Division of Oil and Gas 1999; Kenai Peninsula Borough, 2003; Terry, Scoles, and Larson 1980:374-386). Given the importance of oil and gas production to the region and State of Alaska, and ongoing demand for petroleum products and by-products, drilling interests are likely to remain active in the region for some time to come. Thus, the potential for future interaction with the region's drift gillnet fleet is equally likely.

Oil and natural gas yield potential in Cook Inlet is relatively well-understood. Thick sediment and source rock here are correlated with enhanced potential for oil and gas (Alaska Division of Oil and Gas 1999). There is a large submerged acreage of particular interest in this regard on the OCS in the southerly portions of Upper Cook Inlet. Industry activities may occur in other Cook Inlet OCS areas in future years, but current attention is focused particularly on the northeast OCS (Craig 2004).

MMS analysts estimate some 140 million barrels of oil and 190 billion cubic feet of natural gas may be recoverable from development potentially resulting from lease sales on the Cook Inlet OCS (MMS 2003a:ES-I). Various companies continue to show interest in State lease areas in the vicinity of the northeastern OCS, such as the Cosmopolitan Unit. Both traditional offshore platform and evolving shore-side directional drilling technologies are being considered for use in the area of particular interest. However, because extensive exploration has yet to occur in this part of the Inlet, it is not possible to accurately estimate where drilling might occur, nor precisely where drift fleet operations could be affected.

Fisheries and Oil/Gas Industry Interactions in Cook Inlet

Field research and analysis enabled ground-truthing of concerns voiced by drift fishery participants about the potential effects of exploration and development activities on the Cook Inlet OCS. Two of the concerns appear largely unwarranted. That is, concern about release of drilling materials appears unwarranted given that: (a) such materials typically are injected into disposal wells, brought to shore for disposal, or briefly released in limited areas under established federal pollution standards, and (b) such activities could be timed to miss smolt out-migration each spring. Seismic surveys for oil/gas reserves are also thought to present little potential for effect on drift fishing. MMS reports that such testing would likely occur within a 62-square mile area for a total of between 14 and 35 days sometime between 2006 and 2010, and with proper timing, would also be readily mitigable (MMS 2003b: Table II.B:1-3). Analysis suggests the remaining concerns are valid, as discussed below.

Platforms and Nets

One unqualified finding is that drift captains have difficulty accepting the possibility that a drilling platform could eventually be emplaced in areas favored for drift fishing, especially in the rip zones. Expression of resistance to the possibility is immediate and common, and assessment clearly indicates that platform emplacement could indeed present problems for the fleet.

There is history of problem interactions between drift operations and oil/gas infrastructure in the state jurisdiction waters of Cook Inlet. By the mid-1970s, offshore oil/gas production was occurring in close proximity to captains and crew pursuing Pink salmon (*Oncorhynchus gorbuscha;* "humpies" or "pinks"), and Chum salmon (*Onchorynchus keta*; "chums" or "dogs") in the northerly reaches of the Inlet. Participants of the day report that migration patterns and favorable prices had lead some vessels to drift for pinks near the existing platforms. While there is now little market incentive to fish in those areas and hence little interaction between the vessels and existing industry infrastructure, our best informants report having had problems in years past.

The nature of the drift gillnet fishery is such that the vessels often drift downstream at a rapid pace. Unobstructed waters are ideal both for navigational safety and unhindered harvest. Because drift captains typically avoid the shallows, submerged obstructions generally are not a problem for the fleet. But downstream surface obstructions, such as anchored vessels, require drift captains to adjust course. This can be difficult and time-consuming when towing long nets and more so when the net is full or partially full of fish and attention is focused on dealing with the catch. Moreover, the ability to navigate is compromised by extensive lateral current movement. One drift captain explained the challenging nature of navigating on the Inlet, and the problem of introducing a stationary object into the fluid mix:

> [Anything stable] situated in the middle of Cook Inlet would be similar to a concrete block dropped in the middle of the road—cars swerve to avoid it, but it is a matter of time before a car hits the block or collides with another vehicle while trying to avoid it.

It was just these sorts of challenges that led one seasoned captain to wrap his net around a platform in the 1970s. In explaining the accident, the captain pointed out that under conditions of four-knot flow, a conservative current speed for Cook Inlet, a drift boat will travel about one mile in 15 minutes. Because it takes a minimum of 15 minutes to retrieve an *empty* net from the water, captains must keep their vessels and nets at least one mile from any stationary object, with adjustments based on whether there are fish in the net. Sea surface conditions and wind may work with or against the vessel and are considered in one's navigational strategy. Control can be enhanced when traveling into wind and/or current, though at times these can be at odds and make for truly chaotic conditions.

Captain Sparrow (pseudonym) reported that surface conditions were ideal on the day he wrapped his net. He was working south of a platform on a rising tide with no significant wind or sea state, and had come into some "nice action." The fish were picked from the net as the vessel continued drifting north with the tide. While the waters ahead are always on the drift captain's mind, it is naturally the case that picking fish and attending to other tasks onboard detract from complete attention to "the road." In this sense, the highway and block analogy are not completely accurate since the drifter can operate without continual focus as long as periodic visual checks are made on the course ahead.

But on this day, the captain looked up to realize that the platform was not far ahead and directly off the bow of the vessel. He sought to correct course but realized it was too late and was forced to cut the towline. The net subsequently wrapped the platform legs. Upon release, the boat spun away in time to avoid collision. But as the captain passed north of the platform and turned back into the current to assess the disposition of the net, his engine stalled. Since he was down-current, he was no longer in immediate danger. But the situation called for quick repair of a distributor. Once under power, he motored back to wait for slack water and eventually peeled the net from the rig. Part of the catch was recovered, but the net was in poor shape and had to be replaced.

The highly experienced drift captains with whom we worked most closely universally asserted that there is much danger in the potential interface between vessels and gear, and oil and gas industry infrastructure. Some say that experienced captains can avoid the dangers, but also that one cannot rely on the less experienced to perform as well, and that unforeseen conditions can complicate navigation for both beginners and experts. These perspectives are supported by our participant observation work with captains out on the Inlet, where each trip brought new insight into navigating and fishing in different locations and during different stages of tide.

Vessel Traffic Problems

The cement-block-in-the-highway analogy is useful though incomplete when conceptualizing the effect of stationary objects while navigating on flowing water. Vehicles on a highway travel on a static surface. A block dropped in the center lane would disrupt the flow of moving traffic. Slowing vehicles are potentially subjected both to the force of other vehicles still moving at faster speeds, and to that of potential impact with the stationary block itself. In the case of navigating on water, however, the "highway" itself is moving, and the speed and direction of a vessel is conditioned by the speed and direction of flow. Moving water introduces another dimension of complexity. Although the seasoned navigator is capable of negotiating minor and even moderate changes in speed and direction of flow, non-uniform flow, and/or extensive lateral movement, can also disrupt uniformity in motion and challenge effective maneuvering. As such, the relativity-in-motion model presented by the drift captains is simplistic given the full dynamics of the setting.

The concept of relative motion is central to the larger picture of navigational and safety issues in Cook Inlet. When a drift vessel as long as 40 feet tows or drifts with an attached net that is typically 900 feet in length, it is possible for such a vessel to present a total profile of nearly 1,000 feet. Meanwhile, vessels with much larger profile and more considerable momentum ply the Inlet on a daily basis. Various supply vessels, barges, ships, tankers, and ferries regularly use the shipping channels in Cook Inlet. Moreover, MMS (2003b: Table II.B-1) estimates that between 912 and 1,825 supply boat trips may be made in conjunction with exploration on the OCS, and between 730 and 1,460 during development and production phases.

Navigation patterns among the range of vessels active in Cook Inlet may be characterized as a functioning system. There is awareness among drift and other fishing vessel operators about the presence and movement of each other, about the presence and movement of other, larger vessels, and about the location of stationary objects such as navigational buoys and platforms. While the ultimate effects of adding a new stationary object into the OCS portion of this zone and system remain uncertain, it is clear that adjustments would have to be made by drift captains active in any new (prospective) platform area. The zone of interaction has to be seen as not entirely linear given lateral flow, and not entirely predictable given the dynamic nature of changing tidal flow and corresponding changes in rip currents and other features in the water column. Additionally, any buffer zones associated with navigating in the vicinity of platforms or tankers passing through the OCS would further enlarge the zone of adjustment.

Given the nature of the drift operation—its actual profile of exposure amidst other vessel traffic, its presence in areas of significant flow and current movements, its unique navigational challenges, its economic constraints, and its spatial-regulatory limitations—operational adjustments potentially necessitated by the presence of a new platform on the OCS cannot be seen as linear and straightforward. Rather, those adjustments have to be seen as occurring within a complex system of interaction between: (a) the drift captain and the marine environment within which he or she operates the vessel and gear, (b) the captain, crew, and other adjacent drift operators, (c) the drift operator and the full range of other fishing, work, freight, and tanker vessel operators active in and operating through their own venues in the area, and (d) the drift operator and the economic system within which he or she operates.

Oil Spills

Oil spills were consistently mentioned as a point of concern among drift gillnet fishery participants asked to assess the potential effects of new oil and gas industry activities on the OCS in Cook Inlet. Informants active in the drift gillnet fishery in the late-1980s reported that oil from the *Glacier Bay* spill tended to collect in the rip tide zones in the more southerly reaches of the allowable fishing zone, and that it lingered in the area for some time after the fishery was closed. The discussions tended to be unhappy in that the season had been a particularly productive and profitable one prior to the spill and closure.

Scientific study and analysis (and history) make clear that large oil spills *do* pose obvious threats to fishing operations in Cook Inlet. The 1995 MMS EIS for prospective activities in Lower Cook Inlet notes that large spills are the "greatest threat to commercial fishing, with both gear and catch at risk" (MMS 1995:IV.B1-72). The MMS Final EIS for Cook Inlet Lease Sales 191 and 199 also indicates the oil spill threat, and this reportedly led drift association leaders to re-think general support for oil and gas activity on the Cook Inlet OCS.

Group positions and individually stated concerns about the potential effects of offshore industry activity are conditioned by a complex combination of cognitive models about those effects, various political motivations, and actual experience (Glazier 1991). The research described in this article indicates that some concerns are real and salient. Indeed, when considered in light of the tenuous economics that characterize salmon fishing in Alaska, and the likelihood that aspects of oil industry activity on the OCS bear the potential for further challenges, concerns about navigational hazards and spills in particular should not be taken lightly. Hence, the MMS rationale for investigating the reality of the concerns, and means for mitigating them, is highly responsive under the intent and mandates of OCSLA and NEPA.

Toward Mitigating the Problems

There is clear and obvious potential for participants in the Cook Inlet drift fleet to experience problems associated with oil and gas activities on the OCS. But there is also precedent for mitigating such problems. For instance, Cormick and Knaster (1986), Fusaro (1991), and Knaster, Fusaro, and

Richards (1998), describe a *Fisheries/Oil Committee and Liaison Office* established to address the concerns of fishery participants and oil and gas industry firms active on and around the California OCS west of Santa Barbara County and Ventura County. The work of the *Faroe Islands Hydrocarbon Planning Commission* (1997), and the newly commissioned Canadian group, *One Ocean*, are also highly relevant. For example, *One Ocean* was established to function as a liaison organization between the fishing and petroleum industries of Newfoundland and Labrador. The group has three principal organizational elements: a joint Industry Board, an independent Chair, and an independent Secretariat. Board members include prominent representatives of both the fishing and oil and gas industries who meet to discuss problems on a regular basis. The Secretariat facilitates this forum, relays practical information about fishing and petroleum industry operations between the respective parties, and interacts with the Chair to examine and improve industry relations.

Participation-Based Mitigation

We emphasize the importance of such participation-based solutions to challenges at the fisheries-oil/gas interface on Cook Inlet. These offer the possibility of mitigating a range of potential problems and are considered by our core group of seasoned drift captains to constitute an ideal means through which their knowledge and expertise could contribute to OCS-related decision-making and planning. In fact, there was more agreement about the viability of this option than any other. UCIDA representatives also strongly advocate this option and envision a joint oil-fisheries council that would involve their own participation in decision-making associated with the OCS, in conjunction with that of MMS, ADF&G, oil/gas industry representatives, and persons representing the interests of other fisheries in the region. Of note, literature addressing the involvement of user group representatives in formalized natural resource management decisions makes clear that in some cases such participation can enhance the local acceptability and legitimacy of the process and its outcomes (e.g., Mascia 2000).

While a policy framework for such a council in Alaska would need to be established, the possibilities warrant consideration. As envisioned, such could contribute to solving problems in various ways. These include: (a) providing consultation about whether planned offshore actions would coincide with fishing activities and how; (b) providing information about the kinds of fishing activity oil and gas operators are likely to encounter and where; (c) recommending measures to avoid conflicts, including rescheduling industry operations to avoid intensive fishing periods and places; (d) mediating negotiation with affected drift captains and ADF&G officials to identify potential ways to reduce regulatory constraints, (e) establishing means for radio communication between operators of large vessels and drift vessels; and (f) developing a program for expediently compensating drift captains for loss of gear, fishing time, or spatial range.

Mitigating Interactions with Specific Actions and Policies

Previous sections have demonstrated how drift fishing on a highly dynamic body of water renders placement of drilling platforms in popular fishing areas on the Cook Inlet OCS a valid point of concern. If platform-based exploration or production drilling scenarios are to move forward, the essential mitigation issues would relate to deferral of portions of the fishing grounds from drilling areas, seasonal restrictions on drilling and associated vessel traffic in the fishing grounds, and/or appropriate siting of the prospective platform(s). While seasonal restrictions are both logical and feasible, deferral of specific areas from lease sales is difficult to assess given the proprietary nature of information about where oil/gas firms may ultimately conduct exploratory drilling operations.

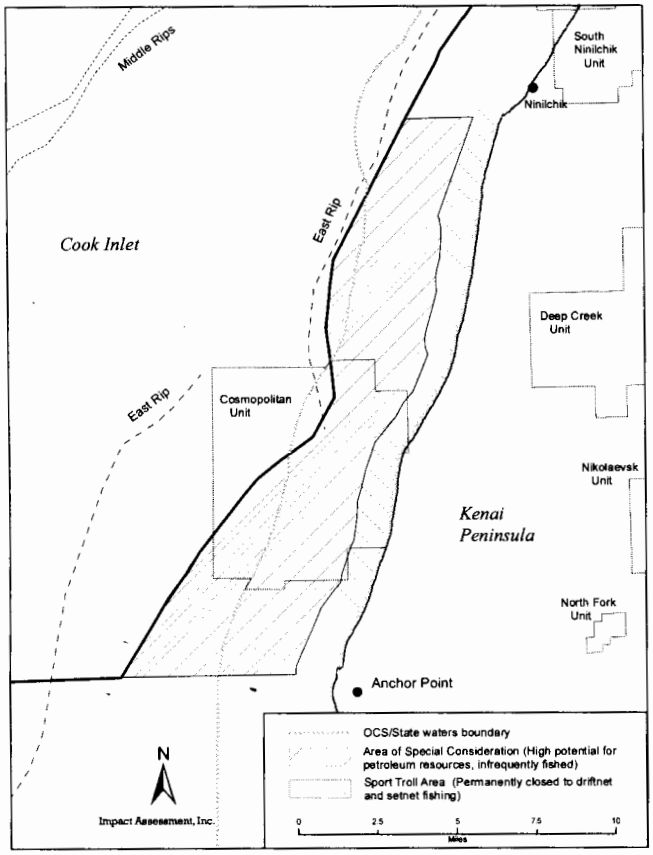
Despite the fact that some captains reject the possibility of OCS drilling entirely, and despite extensive variation in reports about which areas are fished most frequently, in-depth research revealed that certain areas in the allowable drift gillnet zone are not as important to the fleet as others. Of practical significance in this regard is an area east of the 18-fathom curve in the southeastern portion of the allowable drift zone. Early work with informants indicated this part of the Inlet is rarely fished. Given that this area is located near areas of known interest to the oil and gas industry, a series of additional interviews and mapping exercises were conducted to refine understanding of its attributes. While the geographic parameters of the zone are necessarily "loose" and reflective of the tendency of fishers to fish opportunistically rather than rigidly, the effort did serve to verify an offshore area that is relatively infrequently fished, termed here a "Special Area of Consideration." This is depicted in Figure 4.

As noted on the map, the first offshore mile from Anchor Point north to Ninilchik River is permanently off-limits to the drift fleet, and managed for sport fishing. But the remainder of the area—from one to about six miles offshore Anchor Point northeastward to a point about three or four miles offshore Ninilchik—is fished only occasionally. Fishing reportedly occurs here primarily when strong southwesterly winds push salmon to the east, and at certain times during the early season when a few drift netters "prospect" for northbound fish east of the eastermost rip zone. But most often, most of the fleet will fish further out in the Inlet west of the east and middle rip zones.

Our spatial research may eventually prove significant, but we note that it is general in nature. What is obviously missing is a more accurate understanding of specifically where drilling would likely occur on the OCS. A more specific scenario would enable more specific assessment of the potential reaction of the fleet and formulation of valid spatial mitigation alternatives.

Most seasoned drift captains asserterd that extended reach drilling would be an attractive alternative to drilling from a platform directly above the drift fishing grounds. Drilling directionally from the shoreline, or from a point offshore

Figure 4. Special Area of Consideration



that is not used for fishing were advocated as means for satisfying interests of both user groups. But the viability of directional drilling for mitigating potential conflicts between drift gillnetters and oil and gas industry operations is dependent on a number of factors, some of which are unknown. Given the distance, costs, and technological limitations associated with directional drilling, reaching potentially productive areas of the OCS from the shoreline is highly unlikely. But significantly, when considered in conjunction with distance from shoreline potentially achieved by emplacing a platform on the western margins of the "Area of Special Consideration" described above, extended reach technology may hypothetically enable access to oil and/or gas fields some reasonable distance into the Cook Inlet OCS. The identified area is thus a significant project finding.

Mitigation through Local Knowledge and Expertise

As recommended by numerous seasoned drift captains, one potentially effective means of mitigating potential oil spills would involve their expertise in oil spill response contingency plans and programs. Local drift captains also indicated their capability and interest in effectively operating response vessels during emergency situations such as net wrappings and spill events. Utilizing the knowledge and skills of fishery participants is one element of *One Ocean* in Canada (May 2004; Slade 2004). There is precedent in this regard in Alaska as well in that commercial harvesters began participating in oil spill response programs subsequent to the *Exxon Valdez* oil spill. A program would need to be established to make this a viable public-sector option for mitigating problems in Cook Inlet. It could potentially be established in association with the Oil Pollution Act of 1990, which requires operators of offshore facilities to maintain the capacity to meet liabilities associated with a spill or other oil pollution event.

Mitigation through Compensation and Fisheries Enhancement

There is also precedent in the United States for funding replacement of fishing gear that has been lost due to interaction with oil and gas industry infrastructure on the OCS. This has been the role of the Fishermen's Contingency Fund (FCF), established as Title IV of the OCSLA in 1978. Most FCF claimants are Louisiana-based shrimp trawl captains who operate in close proximity to drilling platforms and other industry infrastructure, often in relatively shallow water. The FCF is relevant to the Cook Inlet case in that it provides a model for how reimbursement for lost gear might be administered by the federal government through a claims process in which the burden of proof rests largely on the fishing captain. Unfortunately, the Fund does not reimburse for gear lost or entangled on surface obstructions such as drilling platforms—the key issue in the current case. We suggest, however, that the unique environmental conditions in Cook Inlet (especially current speed and lateral drift), and the operational aspects of drift gillnet fishing on this body of water as described above, may warrant reconsideration of FCF criteria to include a special class of claims for the unique drift fishery.

Many drift captains assert that any limitations resulting from emplacement of an oil platform in the fishing grounds could involve a "trade" for a longer fishing season and/or more openings, and/or expansion of allowable fishing grounds. This would require collaboration with state policy decision makers and development of inter-agency resource management arrangements. Given the complexities of managing the region's salmon fishery, the political challenges are obvious.

But there is precedent for the industries to interact successfully both with each other and with resource management agencies in adjacent jurisdictions. The Joint-Fisheries Council (JFC) and Liaison Office (LO) established in the mid-1980s (Fusaro 1991) initiated tradeoff programs through which government agencies in California would enhance fisheries in exchange for potential problems at the commercial fishing-oil industry interface. Extensive negotiation and persistence on the part of the JFC and LO led to development of various

mitigation-compensation programs funded through state and federal revenue sharing pursuant to provisions in the OCSLA (Fusaro 1991:20). The County of Santa Barbara continues to fund a range of enhancement projects through fees assessed by its offshore oil and gas industry permitting process. Its mitigation strategies have included stock enhancement projects and purchase of new commercial fishing infrastructure at local harbors—with reported success (County of Santa Barbara, Planning and Development, Energy Division 2004).

Any meaningful analysis of mitigation in the Cook Inlet context must address an option with potentially far-reaching benefits for the fleet; that is, undertaking efforts to improve the market value and/or distribution opportunities for sockeye and other species of salmon. Although salmon market economics are highly complex and related to a host of factors including issues of national and global scale, providing some form of external marketing assistance to improve the economic situation for the drift gillnet fleet may be the best form of compensation that could be offered in return for problems associated with new oil and gas industry activities on the OCS. Efforts to improve economic conditions by marketing Cook Inlet salmon as "Kenai Wild" have been initiated by processors and harvesters in the region. The results of that effort have not yet been assessed in full. But an important motivation for encouraging external assistance is the fact that the harvesters are typically too involved in fishing itself and in other forms of employment to fully engage in the marketing end of the equation. Given the vast resources and capital available to the oil and gas industry, even nominal contribution to this end may help mitigate problems experienced by the neighboring drift fleet.

Conclusions

Analysis indicates that oil and gas industry activities occurring on that portion of the OCS that is used for drift fishing operations clearly could cause problems for the fleet. It is also clear that the challenges to navigation and fishing that are presented by platforms, increased vessel traffic, or related factors will not of themselves terminate the fishery. Cook Inlet drift captains have in years past proven themselves capable of adapting to the presence of platforms and associated offshore industry activities, if only in learning how best to avoid them.

But as this study has also determined, the Cook Inlet drift fishery is conducted within a system of relationships. The system is a complex and dynamic aggregate of physical-environmental, social, and economic variables. Altering the nature of the way the fishery can be conducted in a given area would have spatial effects throughout the system. As when flowing waters are separated upon meeting an object, and increase force of flow elsewhere, so would fishing pressure increase in other areas of a spatially limited system if a portion was rendered unusable though emplacement of a stationary drilling rig. The width of that unusable zone may be narrow at its terminus, but variable lateral forces in flow coupled with (a) the profile of drift vessel with net in tow, (b) the presence of other vessels including large tankers, and (c) difficult- to-predict factors such as a vessel drifting without power, increase the potential width of that zone considerably. In terms of upstream considerations, the zone of reaction time to a stationary object depends on a host of factors inherent in the navigational system at any given time. Thus, while emplacement of a platform is not in itself fatal to the fishery, it does have the potential to change the dynamics of the existing arrangement of spatial relationships on the Inlet. Given increasing vessel traffic and growing interest in offshore windmills (Moore 2006), this finding has implications for other regions as well.

An oil spill on the OCS could also detrimentally affect the Cook Inlet drift fishery. For those already adapting to what are said to be cumbersome regulations, and to declining market conditions, introduction of a new constraint or condition in an already challenging environment may lead to diminished interest or capacity to continue, potentially resulting in further attrition to an aging fishery.

Mitigating potential constraining or damaging effects of new factors introduced into the existing system may serve to encourage ongoing participation in the Cook Inlet drift fishery. Effective mitigation plans and efforts may also enhance industry efforts to move toward exploration and development of as-yet untapped resources on the Cook Inlet OCS.

The oil and gas industry contributes extensively to the study region—in terms of employment, economic output, and tax revenue. This is well-known to residents of the region, fishery participants included. But given the geologic and oceanographic challenges of Cook Inlet, it is possible that, in the end, the projected costs of exploration and production will lead the industry to search for oil and gas in other areas. Many steps remain to be taken prior to exploration and production on the Cook Inlet OCS, and the challenges are extensive.

The drift captain also seeks to harvest and market a valuable product. The scale of production is quite different, but the fishery is also very important to the region. In this case, the concerns of drift captains would be diminished if the value of Cook Inlet salmon could be enhanced and the spatial and economic tension of the fishery's system of operation could be reduced.

In short, the potential utility of mitigation possibilities in this case lay not in denying either the fishing fleet or the offshore oil and gas industry full opportunity to produce, but rather in seeking an arrangement that would move each along toward the end goal of productive and responsibly-managed enterprise. This perspective was espoused decades ago by Young (1965:521), who envisioned a balanced approach in addressing international law intended to mitigate potential fishing-oil conflicts in the North Sea:

> More complex are the criteria to be applied for the equitable resolution of competing uses. In most cases an absolute choice should not be necessary between, say, exploitation and fishing or between exploitation and navigation. The problem will likely be one of fair accommodation: how

> to permit useful exploitation without undue trespass on other interests.... The process of developing and applying such criteria may be carried on both through joint study and negotiation in advance of any dispute and as part of the arbitral or judicial settlement of such disputes when they do arise.

Collaborative and communication-based efforts may indeed be the best way to proceed. The oil and gas industry in the Cook Inlet region offers considerable potential for contributing to solutions of problems being encountered by its neighboring drift fleet. Widespread recognition of the importance of the oil and gas industry to the region indicates willingness on the part of fishery participants to seek out and support a balanced approach to offshore exploration and production in the spatial context of the fishery. Moreover, the drift captains are highly knowledgeable of the Cook Inlet environment and its challenges to navigation—perhaps more so than any other experts in the region. Transfer of information both about the fishery and about local conditions and challenges would likely benefit the offshore oil and gas industry in numerous ways. Because UCIDA, the regional drift fishery interest group, serves an important coalescing and representative function in and for the fishery, it could play an important role in an oil-fisheries communication venue to ensure that the knowledge and concerns of its constituency are fully incorporated into OCS-related decision-making processes.

Whether the fishing constituency ultimately influences the course of oil and gas industry activities on the Cook Inlet OCS may in large part depend on the nature of communication between government, industry, and drift fishery representatives as the industry moves through the many steps needed to actually explore for, and produce oil and/or natural gas. As this article makes clear, a venue for inter-industry communication could enable meaningful negotiation of a wide range of issues of importance to participants in the Cook Inlet drift fishery. The possibility that such a venue could succeed is enhanced in that the fishing and oil and gas industries in this region have historically been and continue to be related components in a regional economy and ethos. Communication-based policies and programs that would seek ongoing balance in such relations may be the most effective means for preventing problematic fishing and oil industry interactions here and in other seafood and oil-rich zones around the world.

Notes

[1]Industry decisions to participate in federal lease sales involve an ever-evolving complex of practical considerations about the costs and benefits of exploration and development. Although the recent Cook Inlet lease sales were ultimately cancelled, future oil and gas industry activity here remains a clear possibility, as it does elsewhere along other portions of the coastal zones of Alaska and the United States.

[2]Measures of centrality indicated a network of loosely connected subgroups and a few highly respected and well-integrated actors (pseudonyms are presented in the graphic). With few exceptions, those key actors are residents of the northern part of the Kenai Peninsula and members of UCIDA, the regional drift fishery association.

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