

**Discussion paper on economic data collection
North Pacific Fishery Management Council
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As a part of its Bering Sea and Aleutian Island crab rationalization program, the Council developed an economic data collection program to provide information to analysts to assess the effects of the program and future amendments to the program. The Council developed a similar data collection program as a part of the cooperative program for the Bering Sea and Aleutian Islands non-pollock catcher processor fleet (i.e., the Amendment 80 fleet). A third data collection program - adopted by the Council, but yet to be implemented - will collect data from participants in the Bering Sea pollock fishery to assess the success of Chinook prohibited species catch (PSC) measures in that fishery. Since their implementation, several participants in the crab and Amendment 80 program fisheries subject to data collection have questioned the effectiveness of these data collection programs. Participants in these two programs assert that costs of submission are extraordinary and that data cannot be accurately and consistently reported across respondents, preventing their use for some of their intended purposes. In addition, participants assert that several relevant factors are unobservable, preventing the use of the data for analyses as intended.¹ At the same time, the Council has established a data collection committee to expand data collection to other fisheries. In response to these circumstances, the Council requested staff to prepare a discussion paper “reviewing the potential objectives for economic data collection and the structuring of data collection initiatives to achieve those objectives.” The Council requested that the paper address the potential for data collection to serve various analytical and research needs including:

- (1) relatively immediate, specific, and routine management questions and
- (2) less defined research initiatives that may have more indirect relevance to specific Council analyses and decisions.

The purpose of the paper is to assist the Council in revising existing data collection programs and developing future data collection programs drawing on recent experiences with data collection, including NOAA Fisheries and the Pacific Northwest Crab Industry Advisory Council’s data quality reviews of the Crab Economic Data Reports and the Chinook salmon bycatch data collection. The paper begins with a background section that briefly reviews the Council’s data collection experiences. The paper then goes on to generally examine the implications of those experiences on possible achievement of those analytical goals and the development of future data collection initiatives.

Background

For some time, analysts have expressed concerns that fishery economic data are lacking for assessing the effects of fishery management actions. These analysts suggest that policy makers’ understanding of their decisions could be improved, if more complete economic information were available for analyzing fisheries. Recognizing these shortcomings, the Council has pursued the collection of economic data from fleets in the North Pacific, primarily as a component of various rationalization (or limited access privilege) programs it has developed.

The trend of the Council collecting economic data as a part of actions rationalizing fisheries began with the crab rationalization program. Under that program, all participants in each fishery must submit annual revenue and cost information for that fishery, as well as certain annual cost data that are associated with all fishing operations. The program included the collection of historical data from years prior to implementation of the program. These historic data were intended to provide baseline, pre-program information that could be contrasted with post-implementation data to assess the effects of the program.

¹ One Amendment 80 participant included in a lawsuit a claim that the data collection under that program exceeds the Council’s authority and that the data collection, as implemented, is arbitrary and capricious. That suit is still pending.

As a part of Amendment 80, the Council adopted a data collection program for the Bering Sea and Aleutian Islands non-pollock catcher processor fleet. The relatively comprehensive program collects both revenue and cost data from catcher processors participating in the Amendment 80 fisheries. Although relatively comprehensive, the Amendment 80 data collection program sacrifices some specificity, collecting annual data on a vessel basis, without disaggregation across target fisheries (or management areas). As a consequence, any use of the data for fishery level analyses will require an analyst to develop a methodology for disaggregating the data. The feasibility of such a disaggregation is questioned by many stakeholders, as few vessels participate in these fisheries and conditions are known to change within and across years. Although this approach reduced the complexity of the reporting requirement, the reporting forms in this program were revised after they were finalized and initially distributed to respondents to address ambiguities. Even with these changes, many industry members question whether the data collected by the program provides useful information for management decision making.

The Council adopted a third economic data collection program immediately subsequent to the adoption of Amendment 91, which limits Chinook PSC in the Bering Sea pollock fishery. Compared with the crab and Amendment 80 programs, this program is very limited in scope, with a very specific focus on the effectiveness of the Chinook PSC reduction measures of Amendment 91. Under the program, NMFS will collect prices and quantities for Chinook PSC allowance transfers, quantities of pollock quota transfers among vessels, as well as average vessel fuel use and costs. The program also includes a qualitative survey intended to capture skippers' perception of conditions in the fishery and decision making, particularly with respect to Chinook PSC and the impact of the Amendment 91 measures on decisions. Three factors led to the limited scope of this data collection. First, the Council pursued a limited data collection to expedite implementation of the program; second, the Council elected to focus the data collection exclusively on the effectiveness of the Amendment 91 measures; and third, the Council developed the program subsequent to taking final action on the Chinook PSC amendment. Together, these factors led the Council to select a limited, focused data collection program

The completion of the Amendment 91 package had several notable effects on the development of the data collection package. With the Amendment 91 package finalized, the Council had already identified its objectives for Amendment 91 and considered the analysis of Amendment 91 with respect to achieving those defined objectives. Consequently, the Council was well-positioned to develop a data collection to contribute to future assessments of whether Amendment 91 was achieving its objectives. Completion of the Amendment 91 package also affected industry's input into the development of the data collection program. In prior data collection programs, particularly the program applied to the Amendment 80 fleet, industry participants provided little input during program development.² Two factors likely influenced the reluctance of industry to provide more useful input in the development of these programs. First, most industry members were subsumed by the development of the primary management program itself. It should come as no surprise that industry attention is focused on the management program, as the impact of a new management program greatly overshadows the impact of a data collection program. Second, industry members with legitimate concerns about the data collection program may have been reluctant to comment, as any criticism might be perceived as resistance to the data collection program. With the terms of the Amendment 80 management program itself in doubt, industry members did not want to appear resistant to data collection, especially after the Council signaled that a data collection component would be included in the new management program.

As a part of the Chinook PSC data collection program, the Council's requested that all reporting forms be subject to Council review prior to being finalized and submitted as a part of the regulatory package. In addition, the Council request that all future changes be subject to Council review. This policy will ensure that industry has ample opportunity to comment on reporting forms prior to their use. Although

² Although agency staff held workshops to receive industry input, industry provided little input at those workshops.

controversy may still develop, as data collection is a contentious topic, this practice should reduce debate over whether ample opportunity has been provided for public comment and whether the data collection is consistent with the Council's intent.

To date, only data collected in the crab fisheries has been available for analyses. Yet, these data have seen limited use, in part, due to data quality issues. These concerns came to light shortly after the collection of the first year's data. Since that time, both staff and industry have devoted substantial efforts to understanding the quality of the data and the effects of any shortcomings on the use of the data. These data quality concerns have contributed to tension between fishery participants required to complete annual reports and analysts who support broad scale data collection as necessary to provide more complete and informative analyses. All agree that the Council should revisit its objectives for the data collection program to examine the extent to which the original goals of that program are attainable, and to the extent that those goals are not attainable, scale back the data collection to ensure that collected data support achievable analytical needs. Yet, the approach to and scope of changes remains at issue. Some analysts believe that concerns can be addressed through a variety of measures including some scaling back of the data collection, as well as revisions to instructions to improve data quality and making judicious use of (and adding caveats to results when using) data of questionable quality. Fishery participants largely support a more comprehensive revision of the data collection program. These industry members have expressed concerns that their costs (including agency administrative costs captured through the cost recovery program) greatly exceed estimates provided at the time the Council developed the program. These critics believe that a scaled back program that collects only high quality data elements will be more informative and cost effective than the current program that includes elements of questionable quality.

Discussion

In the development of each of its data collection programs, the Council has advanced a purpose and need statement, intended to guide the development of the collection. These purpose and need statements generally identify informing management decision making as the primary motivation for undertaking data collection, with emphasis on a specific management action, which is either a rationalization program or the Chinook bycatch action. In requesting this paper, the Council identified two types of analyses that could be facilitated by these data: 1) the routine analyses typically undertaken by Council and agency staff as a part of a specific management action, and 2) research analyses undertaken to examine less specific management or policy objectives. Although the Council's request suggests a dichotomy between these types of analyses, it is not clear either that data needs differ or that these two types of analyses should (or do) serve separate purposes. For example, any analysis of a fishery management action that potentially affects operational costs should draw on any reliable, available cost data. Likewise, any research examining operational cost effects of management changes should draw on the same data sources. Although Council actions are typically undertaken based on analyses of summary statistics from a fishery that can be generated in a timely manner, those analyses are informed by accepted theoretical and statistical research, when available. Given these overlapping purposes and data needs, drawing a distinction in types of analyses may not aid in the development of data collection programs.

In general, the Council has advanced its economic data collection programs to collect data to inform their management decisions, with a particular management decision as the focus. In two cases, the action establishing the data collection has accompanied the identified management action. This practice likely has caused a few deficiencies in the data collection programs. As noted above, industry participants may not provide their best input, when the data collection is developed simultaneously with the main action. In addition, the specific management measures (and at times the purpose and need statement) used to define the management action may be uncertain until the time of the Council's final action. To the extent that a collection is being structured to focus on data to examine that specific action, it may be misplaced to finalize both actions simultaneously, which may not allow time to reflect on possible ways to fashion a data collection program focused on the specific Council action.

Designing data collection prior to implementation of a program can also leave out critical elements, if changes brought on by the change in management are not anticipated. One complication in the development of the crab data collection arose with the collection of quota transfer data. As structured, the data collection anticipates the development of a lease market for quota, under which a vessel would acquire another person's IFQ for harvest. Since the program's implementation, a variety of arrangements have been entered to harvest cooperative managed allocations, including vessels harvesting IFQ for a fee. These arrangements may not be captured by the data collection form that only requests that the vessel operator report a lease fee. In hopes of avoiding a similar circumstance, the Council's Chinook PSC data collection program includes a flexible reporting requirement under which Incentive Plan Agreements and cooperatives are to provide a report summarizing the distribution and transfer of both Chinook PSC allowances and pollock quota, without a specific form. The downside of this collection is that some specificity could be sacrificed, but given the flexibility of participants to restructure Incentive Plan Agreements over time, a less specific reporting requirement may be the most informative, feasible collection. Again, this experience does not suggest that data collection should not be pursued, but that developing data collection simultaneously with a substantial restructuring of the fishery may not be as effective (or cost effective) as anticipated.

A second issue with developing a data collection program simultaneously with a management change is that baseline data cannot be collected. While some stakeholders have an expectation that the data will support analysis of the simultaneous change, to provide information concerning the effects of a specific Council action, it is important to have data from before and after the action.³ To date, NOAA General Counsel has suggested that the Council is without authority to collect data retrospectively. This timing problem suggests that any urgency in establishing a data collection simultaneously with an action is misplaced. Obviously, the best course is to initiate the data collection prior to an action, preferably before action is even anticipated, as participants are known to change behaviors in a fishery in anticipation of an action. For example, it is thought that many crab vessel owners, who might otherwise have dropped out of the crab fisheries, elected to continue to participate in the fisheries in anticipation of the rationalization program. Alternatively, the Council could consider developing data collection as a follow up to a management measure. This delay may be useful to ensure that the data collection action receives adequate attention from the Council, stakeholders, and staff, who might otherwise be preoccupied by the primary action.

In addition, the development of a trend toward instituting data collection only as an accompaniment to an action establishing an allocation (such as an IFQ program) also should be cause for concern. First, making data collection a condition of such a program may create stakeholder resistance to otherwise acceptable (and beneficial) management changes. In addition, this tendency to associate data collection with only certain management programs suggests that somehow analytical needs are not as relevant to other forms of management. This association seems to have no basis.⁴ Lastly, as already suggested, this approach will only ensure that pre-program data are not available for fully assessing the effects of these allocation programs.

In developing data collection programs, the Council should also be cognizant of several factors. Data accuracy should receive considerable attention. Great efforts have been undertaken in the crab data collection program to assess the quality of data collected. Annually, a portion of submissions are audited

³ While some changes may not be specifically attributable to the action, without pre-action data, the effects of the action cannot be directly analyzed with the data.

⁴ It should be noted that the MSA requires that as a part of any limited access privilege program, data be collected as needed to assess whether any share holder is engaged in anticompetitive behavior. That specific collection requirement is beyond the scope of discussion, as the purpose of data collection at issue here is the analysis of management actions.

for accuracy. These audits have provided substantial information concerning both the quality of data collected and the ability of respondents to provide the data requested accurately. These audit findings have been reinforced through a series of meetings with respondents and industry representatives over the course of several years. The product of this process is metadata summarizing the data and its quality, intended to guide the use of the data by analysts. The data quality summaries report that approximately one-third of the data collected are of high quality, one-third of the data have ‘significant data quality limitations’ that require analysts to make ‘adjustments to analytical methods or interpretation’ of results, and one-third are not reliable.⁵ Given this experience, data quality should be a very high priority in the development of any future collection.

The audits, together with information gathered from industry workgroups have shed some light on sources of inaccuracy. Retrospective data were often very difficult to verify, suggesting marginal accuracy in those instances. These inaccuracies likely arise because data submitters needed to revisit dated records, reconstructing past years’ expenditures to formulate responses. These efforts proved to be both more costly (for both respondents and auditors) and less accurate.

Similarly, audits also revealed that variables collected that are not routinely maintained by respondents, effectively required that respondents construct data from existing records, which may have contributed to data error. For example, most operators do not maintain fuel usage on a fishery basis. So, data requests for fuel usage on a fishery basis require most respondents to estimate fuel usage.⁶ Audits cannot reveal the accuracy of these estimates, but can only discern whether the estimates are within a feasible range, given a vessel’s overall fuel usage. In addition, the methodology used to develop estimates is said to have varied across respondents, creating uncertainty concerning the consistency of these submissions. In these circumstances, an audit can reveal whether a submitter’s underlying (aggregated) data are accurate and whether the submitter used some reasonable methodology for deriving an estimate. The audit cannot reveal the accuracy of the estimate or discern the varying effects of different methods of estimating across submitters. In short, by having respondents compute estimates by their own methodology, the data have an unknown degree of error, despite auditors having verified the submissions.

A few lessons may be drawn from these experiences. Accurate, consistent, verifiable submissions are most likely when data collection efforts are focused on data that are routinely maintained by respondents. In these cases, when responding to a reporting requirement, an operator can quickly access business records to verify inputs and expenditures. The operator can also take steps to prepare for a possible audit, when developing responses, by setting aside these supporting records. Auditors can then efficiently examine those records and assess the extent to which they support the response.

This is not to suggest that data that are not currently maintained by operators cannot (or should not) be collected in the future. Analytical needs may extend to data beyond those records normally maintained by an operator. Yet, any effort to collect those data should be carefully structured to ensure that data are accurate, uniform, consistent, and revealing. Any collection should consider that in the absence of clear direction concerning how responses should be developed are likely to introduce error that may lead to unreliable and unrevealing data. For example, some crab fishermen developed fuel usage estimates by

⁵ Considering that some of the accurate data elements are collected by other programs (such as fish tickets and Commercial Operator Annual Reports), the quality of data collected by the program is even more suspect. While some redundancy with other collection programs can be beneficial, as it will facilitate cross checking of responses, some respondents believe the redundancies in this program are excessive.

⁶ Some vessels estimate fuel use on a fishery basis for crew deductions. Even these operators are uncertain of the accuracy of these estimates. They generally reach an acceptable agreement with crews, but do not have specific knowledge concerning the accuracy of their estimates. Since many crews work on a vessel throughout its entire year, less precision in these negotiated settlements may be acceptable to both vessel operators and their crews. Other operations do not deduct fuel use when computing crew payments and make no such estimate.

prorating all fuel costs based on days at sea in a fishery (including groundfish fisheries). One often heard hypothesis is that rationalization of a fishery should allow a vessel operator to save on fuel costs by slowing any race for fish. Fuel estimates for fisheries generated by prorating days at sea in this manner would lead to overestimation of fuel use in rationalized fisheries and underestimates in derby fisheries, if the hypothesis is correct.⁷ As shown by this example, careful instructions must be given if data are to be collected that are not routinely maintained.

Even data that are routinely maintained may be subject to some variation across respondents. In the first few years of the crab program, operators had considerable uncertainty concerning which items should be deducted prior to reporting crew payments. For example, some respondents deducted personal purchases (such as personal electronics purchased by the vessel owner for a crewmember as an advance) from crew pay when reporting. Others chose not to deduct these items. Similarly, some operators buy airline tickets to Alaska for crews. In some instances these charges were deducted prior to reporting crew pay, in others they were not. Although all operators routinely maintain crew payment data, the ambiguity of the reporting requirements have created some discrepancies across respondents. Although audits may reveal these discrepancies, in the absence of clear direction concerning the appropriate response, consistency is not maintained. This experience suggests that despite attempts to involve industry in the development of forms and making forms available for industry review, ambiguities remained.

Fuel data collection experiences also provide an example of a second issue with existing data collections that should not be ignored. Often stakeholders question the ability of analysts to derive certain information from the data collected. These critics fear that inappropriate analytical uses of data will support detrimental management changes. For example, in response to the discovery of potential inaccuracies in fishery level fuel use estimates in the crab fisheries, the Amendment 80 data collection program elected to collect annual fuel use and cost data (aggregated across all fisheries). While the first year's reports have yet to be processed, some concerns have been expressed concerning potential uses of these data. At the heart of the issue is a suggestion that analysts will disaggregate these data by fishery, assigning portions of each vessel's fuel cost to a fishery. While it is premature to judge such an effort, it is questionable whether such a disaggregation would be fruitful. The fewer than 30 vessels in the program are quite diverse, ranging from less than 100 feet in length to over 275 feet in length. They participate in ten target area/species fisheries in the Bering Sea and Aleutian Islands (two of which are seasonally apportioned) and at least 10 target area/species fisheries in the Gulf of Alaska. A further complicating factor is that different vessels are known to target different species on different grounds, and move among targets at different times, which may affect catch rates and operational costs (most importantly associated fuel costs). In addition, at times vessels transit outside of the grounds for shipyard work or other reasons during the year, while in most cases vessels make a single trip from the grounds each year. Although these factors do not mean that disaggregation is impossible, they do suggest several challenges associated with any attempted disaggregation.

If a disaggregation is developed, it might be useful to under take that disaggregation in close consultation with industry. Three benefits could arise out of this approach. First, and most obviously, industry members have the best working knowledge of their operations and factors that affect fuel use, which should be considered for incorporation into any model used to disaggregate fuel use data. Second, industry assistance could be useful to ground truth results. Although industry may not have disaggregated fuel data, it is possible that some industry members may generate internal estimates of fuel use that could be used to assess the accuracy of any disaggregation. A third benefit is that working with industry is likely to lead to greater acceptance of the results of any disaggregation. Although stakeholder acceptance is not guaranteed by this approach, it is more likely that stakeholder concerns will be addressed, if those

⁷ In other circumstances, analysts could use tests of data to reveal whether these estimates introduced error. In this case, analysts are without knowledge of the method used by a respondent to generate fuel cost estimates or actual fuel use, so the extent of any error cannot be known.

stakeholders have a better understanding of the analytical approach used and its supporting rationale. While it is very likely that data contain more information than most industry members perceive, the broad acceptance of analytical results are important to any public process and should not be neglected. In addition, all analysts have limited familiarity with integral aspects of the industry that may aid in developing deriving realistic interpretations through their analyses. Clearly, interaction with industry is critical to developing informative data collection programs and deriving information from data. Other data collection initiatives, such as the observer program, have used pilot programs (or experiments) to assess the accuracy of data collected prior to wide sweeping initiatives. For example, experiments with the use of video cameras to monitor catch have been conducted to determine whether videos can be used for species identification. To the extent that it might be uncertain whether the collection of quality of information may be possible (or may vary under different means of collection), a pilot program (or experiment) may be useful to assess results.

Additional attention should be given to existing data sources, both to avoid potential redundancies and to assess the potential to gain additional insights from expanded data collection. For example, currently data collected from the crab fisheries includes annual pot purchases (in numbers of pots and price paid). Existing data includes vessel level pre-fishery pot registration and pot lifts. The additional pot purchase data are collected to assess changes in gear costs arising under the rationalization program. Several factors, however, affect the utility of these data. A pot's useful life is approximately 20 years, but webbing typically needs to be replaced every 5 to 10 years. Purchase prices for pots can vary greatly with the condition and age of both the pot and its webbing. Without further information, it cannot be determined whether price changes are an indicator of a general change in pot prices or other factors. In addition, some pots are used for several fisheries, including groundfish, and no inventory of pot holdings exists. So, attributing the pot cost as a crab fishing expense may not be appropriate. Also, a lease market has developed for pots that is overlooked by the current data collection. Each of these factors raises questions concerning the information contained in the data collection and the extent to which these data are an improvement on the data existing at the time the program was implemented. In approaching any new data collection program it should be considered whether the collection will be informative and the extent of additional, useful information provided by the collection.

A broader concern worthy of attention in all Council actions, including data collection programs, is making the program cost effective. Clearly, data collection programs can be costly. The crab rationalization program is often held up as a model of excessive administrative cost and complexity in fishery management. Yet, it is the data collection component that is the most costly, ongoing administrative aspect of the crab rationalization program, exceeding the annual management costs incurred by Sustainable Fisheries and Restricted Access Management combined. Industry members also assert that private costs of responding are as much as 5 times the estimates presented as a part of the analysis of the program. While these costs alone should not deter the Council from development of data collection programs, both private and administrative costs should be carefully assessed throughout the development of any future program and weighed against the potential benefits of data. Specifically, the potential for more informative analyses to guide policy makers should be carefully balanced against those costs. In making any such assessment, it is important that the Council take a long term view of benefits to accommodate the time needed for the development of both data collection and reliable analytical techniques. Yet, the Council, stakeholders, and analysts should also consider the potential for inaccuracies to limit the usefulness of any data collected.

The data collection program adopted to examine the effectiveness of Chinook PSC measures took a slightly different approach from prior Council data collection initiatives, addressing some of the issues that arose in the two preceding data collection initiatives. Although the starting point for the Chinook PSC data collection included comprehensive cost and revenue data, the Council elected to pursue a scaled back program concentrating on aspects of the Chinook PSC measures. A few areas of the data collection stand

out it this regard. In the collection of allowance trading information, the Council showed judicious restraint in two respects. First, rather than collecting ledgers for all transfers of allowances, the Council elected to have Incentive Plan Agreement and cooperative administrators submit detailed summaries of all transfer activity. These summaries may sacrifice some details that would be reported on ledgers, but should be much more accessible, as they will remove the need for analysts to reconstruct transfers through intermediaries, rebuilding the transfer structure by piecing together individual ledger entries. The Council also showed restraint in the collection of information on the value of Chinook PSC transfers. After deciding to limit its price information collection to Chinook PSC allowances⁸, the Council chose to collect only financial remuneration, having participants in the transaction indicate whether other forms of compensation were included in the exchange. Although one's initial impression may be that the omission of other forms of compensation may leave analysts with incomplete information concerning transactions, the overriding consideration in making this determination was whether collecting the information concerning other forms of compensation would provide meaningful information at an acceptable cost. Since a variety of compensation is possible, much of which is complicated to report and difficult to value, its omission from the data collection likely has little effect on analysts understanding of the value of transactions and saves substantial administrative costs, as some forms of compensation may be difficult to report in a complete and meaningful manner. For example, exchanges that include future undefined consideration are very likely as cooperative members fish not only pollock quota subject to constraining PSC allowance, but also sideboard fisheries in several management areas. Valuation of allowing a vessel to harvest a portion of another vessel's share of a sideboard would require full information concerning all vessels operations in that sideboard fishery. Given these complications (and the associated industry and administrative costs of submitting and processing these data), the Council elected to forgo the collection of all compensation exchanged for Chinook PSC and limited its collection to monetary compensation.

The Council showed similar discretion in choosing to collect estimate average hourly fuel use for each vessel, rather than requiring vessels to estimate fuel use for specific vessel moves (i.e., moves that were made to avoid Chinook PSC), as was proposed by one alternative. In making this decision, the Council acknowledged that the accuracy of any estimates of fuel use would be unknown. Specifically, some participants in the fishery spoke to the inconsistency between fuel flow meter estimates and actual fuel use, suggesting that even the most precise estimates in the fishery may have substantial error. While average hourly fuel use may be a less precise estimate of a vessel's fuel use at any given time, participants in the fishery believe that these averages can be provided with a reasonable degree of accuracy and provide good general analytical information concerning fuel use in the fishery. To the extent that the Council believes that more precise fuel use estimates may be important to its decision making, a prudent approach might be to develop a small scale pilot program or experiment to examine the accuracy of estimates. Such a program could be conducted on a few vessels examining the accuracy of estimates generated using a few different methods in comparison to actual fuel use. While such a program may not be simple to design, it could prove useful for understanding whether a particular method of estimating fuel use has a degree of accuracy that is acceptable. Similar programs could be used to assess other variables that might contain an unknown degree of error.

Recommendations

Through the Council's data collection efforts, a variety of lessons have been learned that can be applied to existing programs and new programs that might be proposed in the future. This section enumerates a number of recommendations that could be considered as the Council continues its efforts to collect data to inform its management decision making. In addition, several of these recommendations could be adapted to address pending issues with the crab data collection program. At the end of this section a brief discussion of these adaptations is provided.

⁸ Some analysts may dispute the Council decision to collect only PSC allowance price information, as the interaction of these allowances with pollock quota in the market could be important to understanding the value of PSC allowances.

Data collection should be implemented as a stand alone action, prior to and independent of important major management changes. Experiences in data collection, to date, suggest that data collection should be implemented separately from any major action, to ensure that collection receives adequate and forthright attention from stakeholders, analysts, and the Council. When incorporated into actions to implement major management changes, stakeholders may give inadequate attention to the data collection program and may choose not to voice legitimate concerns for fear of ramifications in the development of the management program. Implementing collection prior to management programs is preferable, as it will provide baseline information that can be used to examine the effects of the management change. If needed, the program can be adapted to any management change after final action.⁹

Data collection programs should prioritize, and be limited to, the collection of data that inform management decisions and can be accurately and cost effectively collected and do not duplicate other data collections. A main point of contention in the crab data collection is that a large majority of the data has been deemed not reliable or of limited accuracy. Some of these data elements (while not irrelevant) are of minor significance to policy making determinations (such as insurance deductibles).¹⁰ Others are unlikely to be captured completely by a data collection that is significantly revised from the current collection. For example, any bait cost collection is incomplete without development of a mechanism for understanding the inputs of vessels that harvest cod for their own use as bait. While data elements, such as bait purchases, are important to understanding fishery performance, the incompleteness of the data collected leave analysts with data of little utility.

This experience, together with the relatively high industry and administrative costs associated with broad scale data collection, suggest that data collection should be developed incrementally, using a more systematic approach to prioritizing data elements for collection. Data elements that are most informative should be prioritized. Although specific criteria should be adapted to the action, in general, data elements that are most likely to be affected by (or change with) management changes, along with elements that most effectively show fishery effects, should be prioritized. For example, fuel use (and costs) and quota transfers and values may be prioritized because they may change with management actions and reflect important fishery inputs. Crew participation and compensation data may be prioritized, as they are useful for understanding both fishery operations and the effects of the fishery on important stakeholders. In each case, the Council should prioritize data elements reflective of issues of most concern.

In prioritizing data, the Council should also consider whether data can be collected with an acceptable degree of accuracy. While many variables collected in the crab data collection program would be useful for understanding the fishery and the effects of management actions, the accuracy of many of these data is inadequate. Although substantial efforts were undertaken prior to implementation of both the crab data

⁹ It should not be overlooked that management changes may require substantial changes to a data collection program. For example, the collection of quota information may be desirable when introducing an IFQ program (and may make license transfer data collection obsolete). Even these program specific data collection changes can benefit from independent development after formulation of the management program, as some critical program aspects may be uncertain until final action. If the Council is considering alternatives that include cooperative structures and IFQ structures, it may be preferable to postpone development of specific data reporting requirements until the preferred structure is identified. Given the breadth of program alternatives typically considered with major management changes, efficient use of Council and staff resources should dictate that the data collection program be developed only after selection of the preferred alternative.

¹⁰ While the scope of the data collection was intended to allow for the estimation of changes in net benefits in the fisheries, the quality issues that have arisen suggest that substantial developments of our understanding of the fisheries and the collection of data will be needed prior to enabling us to make those estimates. For example, the crab data collection, which is among the most detailed and comprehensive collection attempted to date, leaves out most fixed costs, as well as much of the industry management and administrative costs.

and the Amendment 80 data collection programs to ensure reporting forms were clear and would provide consistent and accurate data, substantial deficiencies in those forms were found for both programs. The most obvious insight arising from these experiences is that data collection programs should be limited to elements that can be accurately and consistently collected; however, given the efforts undertaken in the development of these programs, the process to achieve that end is not as obvious.

As a part of the development of any collection program, actual future respondents must complete reporting forms and describe the sources (and computations) used to complete the forms. Any test forms should also include a description of the specific information intended to be elicited by each response. One shortcoming in the development of programs, to date, may be that the review of reporting forms prior to implementation has been inadequate. In all cases, industry members were provided draft reporting forms for review as a part of the program development. Forms were adapted to address comments from these reviews. In a few cases, crab fishery participants completed hypothetical forms (without using actual records for responses). None of the Amendment 80 fishery participants are believed to have attempted to complete the forms as a part of their review. While industry reviewers made good faith efforts to provide constructive comments, many of the reviewers were not the persons who ultimately complete the forms. Until actual respondents attempt to complete the reporting requirement (with actual records), it is unlikely that all of the reporting anomalies will be discovered.

In addition, to understanding the nature of the data reported (and whether it is consistent across respondents), it is critical that the source of responses (and any calculations used to generate those responses) be understood. Informing test respondents of the general nature of the information that is intended to be elicited by each question also provides the respondents with information needed to assist in the development of reporting forms. This input may be critical to the development of an informative reporting program. For example, the Amendment 80 reporting forms intended to elicit vessel processing throughput capacity were revised, only after discussions with industry members identified freezing capacity as a potential constraint on throughput. These types of modifications would not have been gleaned had the respondents not known the purpose of questions that related to maximum processing rates.

For any variable that must be calculated or estimated, the method of calculation or estimation should be specified. One of the more common inconsistencies in data collected arises from each respondent developing his or her own method of calculating or estimating responses. As noted earlier, some vessel operators estimated fuel use in a fishery by prorating total fuel costs using days at sea. In another instance, a respondent prorated costs across fisheries based on fishery revenues. Not only do these different methods create inconsistencies across the data set, they also bias data in a manner that limits their utility. To avoid introducing unknown and inconsistent biases, specific instructions should be provided for any element that must be calculated or estimated.

An additional factor that should be considered in identifying variables for collection is the cost of that collection (to both administrators and industry respondents). As with assessments of data accuracy, having future respondents complete draft forms should improve estimates of industry costs of providing data. In addition, the nature of the data and its source should be considered. Some information is already kept (or can be easily maintained) in respondents' records. Other data would require respondents to undertake potentially costly efforts to collect data for reporting. For example, as a part of the Chinook PSC data collection program, the Council considered collecting estimated fuel use for any movement of a vessel to new grounds to avoid Chinook PSC. Depending on its implementation, this reporting could be interpreted as requiring vessel operators to install fuel flow meters and monitor fuel use any time a vessel makes a qualifying move. In addition to industry costs, administrative costs are an important component

that should not be neglected.¹¹ Often administrative costs will parallel industry costs, as easily reportable data is also likely to be easily audited. In addition, data that are of questionable quality also drive up administrative costs, as analysts must expend efforts to first understand the nature of the inaccuracies and then may need to modify analyses and qualify conclusions derived using those data. In addition, analyses using these data are more susceptible to criticism, which could unfairly limit their effectiveness.

Experience suggests that the Council proceed deliberately and incrementally with data collection efforts. A process of incrementally building data collection programs, as an alternative to wholesale adoption of broad scope, comprehensive data collection would provide more reliable analyses, while reducing the controversy that has surrounded the costly, larger data collection efforts that extend to data of less certain utility. This approach would allow the Council to obtain the benefits of the most critical, reliable, cost efficient data expeditiously.¹² Industry can adapt to providing additional data over time, which may reduce both costs and controversy, as industry gains experience with the submission of data reports. Over time, these programs could be expanded to include additional variables, as insights are gained into methods of collecting those variables in an accurate, consistent, and cost effective manner. Using this process, staff will develop experience managing data submissions, which may also contain costs that could be exaggerated by staff being overwhelmed when implementing a broad scale data collection program from the start.

As a part of this incremental expansion of data collection programs, the Council should consider the use of focused studies (i.e., pilot or experimental collections) to determine whether expansion of a data collection program to include certain important, but problematic, variables will yield reliable data. These studies could also compare the accuracy of data produced using different methods of estimation. Experimental programs could be conducted for a subset of potential respondents to test data accuracy. For example, if the Council prioritizes the collection of fuel use by fishery, estimates could be generated using a variety of methods (including various means of proration) and the use of flow meters. Estimates can be compared with overall fuel use, periodic purchases, and fuel measurements to assess the accuracy of various methodologies. These experiments could avoid costly collection of variables that may have questionable analytical value because of inaccuracies or biases. In addition, low cost methods of providing an acceptable estimate of a variable may be revealed, that can avoid more costly estimation that would yield only minimally better data. Using this approach should reduce uncertainties concerning not only data quality, but also program costs (to both administrators and industry).

Although these recommendations do not directly respond to the current situation with the crab data collection program, the recommendations could easily be adapted to revisions to that program. First, the Council could revisit its purpose for establishing that data collection program. As framed by that purpose, and based on the written assessments of the existing collection by agency staff and industry, a summary could be developed evaluating each variable's informative value, accuracy, and collection cost. Using the assessment, as a starting point, the Council could develop an amendment package to modify the data collection program. If any variables are dropped from collection, based on accuracy or cost considerations, efforts could be undertaken to develop a more accurate or cost effective means of collection in the future.

¹¹ While these costs are of primary interest to agency staff, stakeholders may be directly accountable for administrative costs as a part of any cost recovery program. Whether cost recovery should be applied to data collection might be debated, as the connection of data collection to a specific management program may be questionable (and may vary across data elements). For example, fuel cost data likely have no specific relationship to a limited access privilege program action. Quota exchange information, on the other hand, are very specific to limited access privilege program. Since the crab data collection program authorized by legislation, it may be argued that the extension of the cost recovery to that data collection program was intended by statute.

¹² Smaller scale efforts are likely to also save on administrative costs, as large scale collection has required costly, time consuming efforts to develop data warehousing.

Conclusions

By their nature, data collection initiatives are complex and controversial. Inaccuracies, excessive costs, and the extension of programs to data less central to management decisions has contributed to both the complexity and controversy of the Council's existing programs. A more gradual, targeted approach to collection would improve accuracy and reduce costs and controversy. These, in turn, may lead to stronger analyses that provide better, more accepted guidance to policy makers.