



JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF MARINE RESOURCES
21 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0021

PATRICK C. KELIHER
COMMISSIONER

February 18, 2021

National Marine Fisheries Service
Greater Atlantic Regional Fisheries Office
55 Great Republic Drive
Gloucester, Massachusetts 01930

To Whom It May Concern,

The Maine Department of Marine Resources (ME DMR) provides the following comments on the draft Biological Opinion (Bi-Op) for ten fishery management plans in the Greater Atlantic Region. Given the re-initiation of this consultation is largely based on the status of the North Atlantic Right Whale (NARW) population, our comments primarily focus on these sections of the draft Bi-Op.

Overall, ME DMR supports National Marine Fisheries Service's (NMFS) conclusion of a no-jeopardy finding in the draft Bi-Op. That said, ME DMR is deeply concerned that, while there are several sources of human caused NARW mortality, the draft Bi-Op places the overwhelming majority of the burden to reduce mortality/serious injury (M/SI) on US fisheries, and specifically the US trap/pot fishery. As discussed below, this is partly the result of the NMFS's assumptions, several of which are departures from trends seen in the entanglement database, to apportion unattributed mortalities almost exclusively to the US trap/pot fishery. As a result, the draft Bi-Op outlines a 98% risk reduction over 10 years in US federal fixed gear fisheries. To say this reduction will be devastating to the viability of Maine's fixed gear fisheries is an understatement. More distressing is that the draft Bi-Op finds even when risk in US federal fisheries is reduced to zero, the NARW population continues to be impacted by Canadian mortalities and vessel strikes. This underscores that US fisheries should not, and cannot, be the sole source of reductions in NARW M/SI. To ME DMR's alarm, it is quickly becoming clear that the actions taken to reduce NARW M/SI in Canada or as the result of vessel strikes will directly impact the level of risk reduction required in US fisheries and ultimately, the future survival of these fisheries.

Section 7.2.1 of the draft Bi-Op walks through a series of assumptions and calculations to apportion unattributed NARW M/SI to specific countries, causes, and fisheries. The first assumption is that, for entanglements where the country of origin is unknown, 50% are attributed to Canadian fisheries and 50% are attributed to US fisheries. The justification provided is that, while NARWs spend more time in US waters, there are greater protections in US fisheries. ME DMR contends this 50/50 split is not supported by the data outlined in the draft Bi-Op. As reported in Table 56, of what is known in the entanglement record, 18 entanglements have been confirmed to Canadian fisheries while 8 entanglements have been confirmed to US fisheries. Canadian entanglements also appear to be more deadly, with the draft Bi-Op reporting 9 of the 18 Canadian entanglements resulting in M/SI; only 2 US

entanglements resulted M/SI. The 2020 draft Stock Assessment Report also shows a higher portion of entanglements coming from Canadian waters with an annual average of 0.2 entanglements confirmed to US fisheries and an annual average of 1.55 entanglements confirmed to Canadian fisheries between 2014 and 2018.¹ This disparity between trends in the entanglement record and stock assessment report versus the assumption in the draft Bi-Op seems to indicate that NMFS does not believe the subset of known data is representative of broader entanglement trends. However, there is no specific justification in the draft Bi-Op addressing this point. NMFS staff have commented, in our working conversations during development of the proposed rule, that it may be easier to spot Canadian mortalities due to the increase in aerial surveys in Canada, and that this results in a higher percentage of entanglements observed in one country. However, this supposition is negated by the number of NARWs entangled in Canadian fishing gear which are first sighted in US waters, suggesting the existing monitoring system is not robust enough to significantly alter the rate at which entanglements are observed. Further, while the CIE Peer Review completed on the Decision Support Tool concluded the 50/50 split was a reasonable approach to apportion entanglements between countries, ME DMR notes this was not a unanimous view. One of the peer reviewers recommended NMFS reassess its methods so the apportionment of mortalities reflects changes in the NARW distribution.² Additionally, a CIE peer reviewer assessing the Linden (2020) projection model used in the draft Bi-Op stated the 50/50 split had no supporting documentation and recommended NMFS provide the analyses or studies which underpinned that assumption.³

Overall, ME DMR recommends the assignment of M/SI without a country of origin reflect actual data trends in the record. Using the known data on M/SI from the draft Bi-Op between 2010 and 2019 as the basis for assigning cases with no known cause or country of origin would result in the apportionment of 31% to the US and 69% to Canada. This would result in a decrease of M/SI cases attributed to US fisheries from 67.24 to 42.72. ME DMR highlights that elsewhere in the document, M/SIs of known cause (i.e. entanglement vs. vessel strike) are used to create a ratio to apportion mortalities of unknown cause. Therefore, it is incongruous to use data in the entanglement record as the basis of some calculations, and not as the basis of others.

A subsequent assumption in the apportionment of entanglements concerns gear types. Specifically, for entanglements attributed to the US which do not have a fishery of origin, the draft Bi-Op apportions all M/SIs to the trap/pot fishery. Once again, this does not align with the known gear entanglement data presented in the draft Bi-Op which states that, of the 38 M/SI with no country of origin, 1 was the result of trap/pot gear and 2.5 were from either gillnets or netting. As a result, multiple gear types contribute to entanglements, and some perhaps at greater rates than trap/pot gear. By attributing unknown fishery entanglements only to trap/pot gear, NMFS again arbitrarily assumes that the known data is not representative of the unknown data. The draft Bi-Op tries to justify this approach on the basis that 99% of vertical lines are from the trap/pot fishery. However, this does not consider that

¹ 2020 Draft Marine Mammal Stock Assessment Reports. U.S. Atlantic and Gulf of Mexico Draft Marine Mammal Stock Assessment. Pg. 63. <https://s3.amazonaws.com/media.fisheries.noaa.gov/2020-12/Draft%202020%20Atlantic-Gulf-marine%20mammal%20stock%20assessment%20reports.pdf?null>

² How, Jason. 2019. Center for Independent Expert (CIE) Independent Peer Review of the North Atlantic Right Whale Decision Support Tool. https://www.st.nmfs.noaa.gov/Assets/Quality-Assurance/documents/peer-review-reports/2019/2019_12_How_North_Atlantic_right_whale_DST_review_report.pdf

³ Cryer, Martin. 2020. Center for Independent Expert (CIE) Independent Peer Review of North Atlantic Right Whale Model Projections. https://www.st.nmfs.noaa.gov/Assets/Quality-Assurance/documents/peer-review-reports/2020/2020_05%20Cryer%20NARW%20Pop%20Model%20Review%20Report.pdf

79% of trap/pot lines fall within areas which are exempt from the Atlantic Large Whale Take Reduction Plan.⁴

Further, the justification provided by NMFS incorrectly assumes all lines have an equal risk of entanglement. NMFS's own Vertical Line Model and Decision Support Tool shows that Maine's exempt waters contain 73% of vertical lines in the Maine lobster fishery but constitute only 3% of the calculated risk to right whales in Maine's portion of Lobster Management Area 1.⁵ Looking more broadly at the Northeast region, just 11% of vertical lines occur in federal waters but the draft Bi-Op notes this area represents 73% of the risk to NARWs.⁶ Thus, it is very clear that all lines do not carry the same risk and the location of the line is significant in determining how much risk it poses to a whale. Simply referring to the percentage of vertical lines in a fishery does not provide context for the amount of risk posed by those endlines and should not serve as the basis for assigning unknown gear entanglements exclusively to one gear type.

The calculations on M/SI ultimately lead to a ten-year conservation framework within the draft Bi-Op. The draft Bi-Op acknowledges the difficulty in calculating risk reduction from Canadian measures and to-date, there have been no additional regulatory actions to reduce vessel strikes in the US. As a result, the framework unfairly places the burden of reducing M/SI squarely on US federal fixed gear fisheries by assuming the rates of M/SI from other sources will remain constant. This assumption is made in the face of data which shows an increasing portion of M/SIs occur in Canadian waters. The result is a framework which anticipates, in total, a 98% risk reduction in US federal fisheries. It is unclear how these fisheries, and the supporting marine industries, will survive this reduction. From ME DMR's perspective, it appears the only way to achieve the collective 98% risk reduction in US federal fixed gear fisheries is to completely reinvent the fishery and convert to largely ropeless fishing. At present, this is an untenable solution. The technology is still under development and many important questions remain regarding how ropeless fishing will work within the broader marine environment.

To date, the testing of ropeless fishing technology has occurred almost exclusively with traps, and in areas which have minimal interaction with other gear. Here in Maine, the size of the Maine lobster fishery results in traps set close to one another, and sometimes over one another, as lobstermen compete to target hard and dynamic bottom substrate. Maine also has an active groundfish fishery which will need to be able to identify the location of lobster traps to avoid gear conflicts when operating bottom-tending mobile gear. So far, these impacts to the mobile gear fleet have been largely ignored in the testing of ropeless fishing technology and are completely absent from the NMFS's Draft Environmental Impact Statement (DEIS) on amendments to the Atlantic Large Whale Take Reduction Plan. Testing has also almost exclusively focused on trap/pot gear, with little information available on how ropeless fishing may be used in gillnet operations.

Enforcement of fisheries using ropeless gear also represents a significant hurdle to the operationalization of this technology, with many questions yet to be answered. Currently, no marine enforcement vessels in Maine are equipped with the technology needed to retrieve ropeless fishing devices and appropriately set back the gear. Without adequate resources to properly equip law

⁴ Industrial Economics Vertical Line Model 2017 Baseline. Version dated 10/23/2019

⁵ Industrial Economics Vertical Line Model 2017 Baseline. Version dated 10/23/2019; NMFS Decision Support Tool. Data pulled August 2019.

⁶ Industrial Economics Vertical Line Model 2017 Baseline. Version dated 10/23/2019

enforcement vessels and train officers on the use of that equipment, expedited adoption of ropeless fishing could result in a period of inadequate or ineffective enforcement of lobster resource management measures. Further, one could anticipate that multiple ropeless fishing technologies may ultimately be deployed in Maine's fisheries in order to provide flexibility and cost competitiveness in the market. If this were to occur, the task of enforcement is likely to be even more complicated and costly. Overall, ME DMR is adamant that before ropeless fishing can be considered a viable alternative for broad implementation, further development and testing of the gear is needed to resolve these issues.

The transition to ropeless gear also comes at a high social and economic cost to the fishing industry. Ropeless technology costs are significantly higher than those of existing operations, with an individual EdgeTech unit estimated to cost \$3,750.⁷ Introducing these costs will upend the business models of Maine fishermen, the large majority of whom are both owners and operators. Fishermen will be unable to absorb the increased operations costs associated with ropeless fishing which, for a lobsterman fishing a full allocation of traps in eight trap trawls, could amount to \$375,000. Multiplied by the approximately 1,350 federal lobster permit holders in Maine, the cost could easily exceed half a billion dollars for conversion of the entire fleet. In fact, this value is likely a significant underestimate given it does not include costs to other fixed gear or mobile gear fleets. Nor does it consider the loss of business to associated marine service and supply industries. Further, questions about the long-term costs of ropeless technology compound the economic uncertainties, including the need to retrofit or replace vessels to ensure sufficient deck space, the frequency with which ropeless fishing units will need to be replaced, and costs associated with gear loss. If ropeless fishing technology fails to deploy, this could not only augment costs for fishermen but also result in significant ghost gear on the ocean floor.

Of any jurisdiction, Maine will be the hardest hit by these economic impacts given 82% of US lobster is landed in Maine, with ex-vessel revenues of approximately \$500 million annually and an additional \$1 billion in indirect economic impact to the state.⁸ In many rural coastal communities, there are limited career alternatives, making the fishing industry, and more specifically the lobster fishery, the backbone of Maine's coastal economy. Ironically, the state which will suffer the largest economic impact is also the state which is likely having a diminishing impact on the NARW population. Since 2010, NARW occurrence in the Gulf of Maine has declined.⁹ This is hypothesized to be the result of large-scale changes in the copepod *Calanus finmarchicus* due to warming ocean temperatures in the Gulf of Maine.¹⁰ While the draft Bi-Op considers federal fisheries on a broad spatial scale and sets future risk

⁷ Molyneau, P. (April 1, 2020). "Pop-up pots and the search for 'whale-safe' gear," *National Fishermen*. <https://www.nationalfisherman.com/boats-gear/pop-up-pots-and-the-search-for-whale-safe-gear>

⁸ National Marine Fisheries Service (2020) Fisheries of the United States, 2018. U.S. Department of Commerce, NOAA Current Fishery Statistics No. 2018 Available at: <https://www.fisheries.noaa.gov/national/commercial-fishing/fisheries-united-states-2018>; Lobsters to Dollars: The Economic Impact of the Lobster Distribution Supply Chain in Maine by Michael Donihue, Colby College. June 2018.

⁹ Davis, G. E., Baumgartner, M. F., Bonnell, J. M., Bell, J., Berchok, C., Thorton, J. B., Brault, S., Buchanan, G., Charif, R. A., Cholewiak, D., Clark, C. W., Cockeron, P., Delarue, J., Dudzinski, K., Hatch, L., Hildebrand, J., Hodge, L., Klinck, H., Kraus, S., Martin, B., Mellinger, D. K., Moors-Murphy, H., Nieukirk, S., Nowacek, D. P., Parks, S., Read, A. J., Rice, A. N., Risch, D., Sirovic, A., Soldevilla, M., Stafford, K., Stanistreet, J. E., Summers, E., Todd, S., Warde, A., and S. M. Van Parijs. 2017. Long-term passive acoustic recordings track the changing distribution of North Atlantic right whales (*Eubalaena glacialis*) from 2004 to 2014. *Scientific Reports*. 7:13460 (1-12).

¹⁰ Record, N., Runge, J. A., Pendleton, D. E., Balch, W. M., Davies, K. T. A., Pershing, A. J., Johnson, C. L., Stamieszkin, K., Ji, R., Feng, Z., Kraus, S. D., Kenney, R. D., Hudak, C. A., Mayo, C. A., Chen, C., Salisbury, J. E., and C. R. S. Thompson. 2019. Rapid Climate-Driven Circulation Changes Threaten Conservation of Endangered North Atlantic Right Whales. *Oceanography*, 32, 2: 162-169.

reduction goals accordingly, changes in NARW distribution at the regional scale means the risk to NARWs is not uniform across space, as discussed previously. If NARWs have a declining presence in the Gulf of Maine, Maine fisheries will experience great economic hardship to protect NARWs, yet the measures will have decreasing impact over time if the occurrence of NARWs continues to decline. This will result in diminishing risk reduction benefits to NARWs while causing unnecessarily high economic dislocation in Maine fisheries. Thus, by the draft Bi-Op setting risk reduction targets for federal fisheries at-large, it ignores the regional dynamics in NARW distribution, causing areas of reduced NARW occurrence to pay a high socio-economic price with lower returns to NARWs.

Within the conservation framework, the only source of relief for US fisheries appears to be two evaluation periods proposed by NMFS to consider progress towards conservation goals. ME DMR is supportive of these evaluation periods because the intent is to assess reductions in M/SI from other human sources, including those originating in Canada, ahead of subsequent reductions in the US federal fisheries. That said, it appears there will only be an update of information in the Linden projection model during one of these evaluation periods (2025-2026), and therefore only one opportunity in the framework's timeline to re-calculate future risk reduction in US federal fisheries. In the absence of the Linden projection model, ME DMR is unsure how Canadian measures, or US measures to reduce vessel strikes, will be assessed in the 2023-2024 evaluation or how the risk reduction prescribed in Phase 3 of the conservation framework will be reevaluated. Given the draft Bi-Op's conclusion that Canada's actions are critical to the survival of this species, ME DMR recommends both evaluation periods include updates to the Linden projection model and, once complete, incorporates use of the Population Evaluation Tool (PET) being developed by a subgroup of the Northeast Implementation Team (NEIT). This will allow for reductions in other sources of human-caused NARW mortality to be incorporated into the stock trajectory and inform targets, before additional risk reduction measures are required in US fisheries. Likewise, alternative apportionments of unknown M/SI between Canada and the US should be incorporated into the evaluation periods. If, as the conservation framework outlines, the US takes significant action in the coming years to reduce risk to NARWs, the apportionment of unknown mortalities between countries will change, particularly if Canada fails to achieve consistent risk reduction through comparable measures.

ME DMR also supports reviewing the assumptions underlying the Linden projection model during each evaluation period, and moving to the use of the PET subgroup model once complete. Appendix 3 of the draft Bi-Op shows the Linden projection model is highly sensitive to assumed calving rates. This is highlighted in a CIE Peer Review on the Linden projection model, where it is stated that a "key assumption of the approach is that the demographic information from 2010-2018 is appropriate for making inferences about what will happen in the next 50 years".¹¹ More specifically, when calving rates from 1990-2018 are used, the female NARW population grows even under low risk reduction scenarios. In contrast, when calving rates from 2010-2018 are used, the female NARW population declines even under high risk reduction scenarios in US fisheries. The sensitivity of the model to this parameter means any changes will have a large impact on future risk reductions required in US fisheries. Thus, the Conservation Framework within the Bi-Op should include more than one scenario of potential calving rates and discuss the sensitivity of the risk reduction required by the fisheries to those scenarios. Additionally, the evaluation periods provide important opportunities to reassess the current assumption

¹¹ New, Leslie. 2020. Center for Independent Experts (CIE) External Independent Peer Review for "Predictive Modeling of North Atlantic Right Whale Population". https://www.st.nmfs.noaa.gov/Assets/Quality-Assurance/documents/peer-review-reports/2020/2020_05%20New%20NARW%20Pop%20Model%20Review%20Report.pdf

on the appropriate calving rates used in the projections. If, as the draft Bi-Op suggests on page 339, calving rates are expected to improve following the implementation of risk reduction measures, the use of calving rates between 2010 and 2018 will become inappropriate, rendering the model overly pessimistic.

The draft Bi-Op poorly documents the Linden projection model's sensitivity and uncertainty. While the draft Bi-Op shows the influence of calving rate assumptions, there is no sensitivity analysis regarding the assumed apportionment of unknown mortalities between Canada and the US. This is acknowledged as an important assumption in the documentation but its influence is not explored. Further, the draft Bi-Op lacks a discussion about the model's uncertainty. Figures in Appendix 3 show significant variability between the projection runs for a specific reduction scenario; however, this range is never reported. Also missing is a discussion on how uncertainty increases with the length of the modeled timeframe given the use of a 50-year projection. Additionally, uncertainty in the underlying Pace et al. (2017) state-space mark-recapture model, and how this uncertainty is propagated through the Linden projection model, is not discussed. This could be potentially significant given, as shown on the February 11th Atlantic Scientific Review Group webinar, the addition of 2019 sightings data has a large impact on the stock trajectory. Overall, understanding the performance of the model is critical to future decision making as a high level of model uncertainty could have significant implications for US fisheries.

While the conservation framework causes great concern, the results of the population model are alarming. As the draft Bi-Op states, "even with a very high level of risk reduction in the United States, the population trajectory will not increase if NARW mortalities continue to occur at current levels in Canadian waters."¹² This is troubling for several reasons. First, it underscores the high level of mortality in Canadian waters. Second, it highlights the fact that actions taken outside of US waters will have tremendous influence on the future of US fixed gear fisheries. Even as US fisheries work to reduce their risk of entanglement to NARWs, it is likely that, as a result of M/SI in Canada, potential biological removal will continue to decline and the actions needed to maintain a no jeopardy finding will become more severe; this will hold US fisheries to an increasingly strict standard that will become progressively difficult to meet. This is particularly concerning given Canada's dynamic management measures to-date have proven incredibly variable in reducing M/SI with years of low documented deaths bookended by years of significant mortality events. Ultimately, the success (or failure) of Canada to implement quantifiable measures with consistent outcomes will determine the survival of the US fixed gear fisheries over the next ten years.

In light of these potential consequences, ME DMR implores NMFS to share these findings with Canadian officials and use the tools at NMFS's disposal to promote the implementation of measures in Canada which are effective and quantifiable in their risk reduction. If, as the draft Bi-Op suggests, NMFS cannot calculate the level of risk reduction from recent Canadian measures, it suggests the measures are not strong enough. ME DMR notes NMFS recently delayed the implementation of the Marine Mammal Protection Act's Fish and Fish Product Import Provisions, a rule which will require foreign fisheries to have standards of comparable efficacy to US protections for marine mammals in order to import seafood products. Given the Import Rule is one of the few tools the US has to increase marine mammal protections worldwide, further delay of this rule would be highly inappropriate. Furthermore, ME DMR encourages NMFS to take a liberal interpretation of the Import Rule so that

¹² NMFS. 2021. Endangered Species Act Section 7 Consultation Biological Opinion – Draft. pg 340

fisheries of like gear type are considered when comparing international fisheries to US marine mammal protection measures. As NMFS broadly considers the trap/pot fishery in US waters throughout the draft Bi-Op, NMFS should likewise broadly consider trap/pot fisheries in Canada when applying the Import Rule.

ME DMR also requests, again, that the State be included in any future bilateral discussions with Canada regarding NARW protections. The substantial economic impact of these future risk reductions warrants ME DMR's seat at the table. Not only is Maine a neighbor with Canada, but Maine also has a border which overlaps with Canada's claimed boarder (i.e. the Gray Zone). This is an appropriate request considering magnitude of impact which Canada's action will have on US fisheries. This impact cannot be overstated and is highlighted by the draft Bi-Op's admission that, even in the absence of US federal fisheries, the NARW population is expected to decline, primarily due to continued mortalities in Canada.

The draft Bi-Op concludes by outlining a series of Reasonable and Prudent Measures which are necessary to minimize impacts on protected species. One of these conditions requires NMFS to develop a 'Roadmap to Ropeless Fishing' within one year. As stated above, there are still significant challenges to the widespread adoption of ropeless fishing. As a result, ME DMR strongly recommends state agencies, law enforcement, and fishermen utilizing a range of gear types are consulted as a part of developing the Roadmap to Ropeless Fishing. Further, in addition to responding to the specific challenges regarding ropeless fishing, the Roadmap should also identify benchmarks to indicate when these challenges have been resolved. Another Reasonable and Prudent Measure identified in the draft Bi-Op is the continued support of ecological studies to identify future areas where modifications to fishing gear can be made to reduce interactions. ME DMR cautions that areas identified for increased co-occurrence may warrant increased monitoring but should not trigger new risk reduction measures, such as area closures, until the forecasts of co-occurrence can be confirmed. This is particularly true given the changing distribution of NARWs. To facilitate this, NMFS should increase its monitoring and surveillance of NARWs, particularly in any areas considered for future closures. NMFS should also include as a Reasonable and Prudent Measure expedited completion of the PET model being developed by a subgroup of the NEIT. This model is significantly more complex than the Linden projection model and should be prioritized to replace the existing model in the draft Bi-Op ahead of the 2023-2024 evaluation period.

In addition to the comments above, ME DMR has several questions regarding the draft Bi-Op. First, when describing the calculation for NARW cryptic mortality, the draft Bi-Op references 25 M/SI of unknown cause (page 225). It is unclear where this value came from. ME DMR counts one M/SI from the US without a known cause and 12 M/SI with no known cause or country. However, this adds up to 13, not 25. Second, it is unclear why some of the values presented in Tables 68 and 74 differ. Both tables show anticipated sea turtle interactions and mortalities in the ten fisheries over a five-year time period. But some values, such as the number of leatherback mortalities in the trap/pot fishery appear to differ between the two tables. Third, page 260 of the draft Bi-Op anticipates 75 leatherback interactions in trap/pot gear and uses this value to calculate mortality totals. ME DMR is not able to trace the original calculation of 75 leatherback interactions. We note pages 253-254 of the draft Bi-Op outline four annual entanglements in the federal lobster and Jonah crab fishery, four annual entanglements in the federal black sea bass fishery, and one annual entanglement in the red crab fishery. However, no apparent combination of these numbers results in 75 interactions over 5 years.

In summary, ME DMR is concerned the draft Bi-Op places the overwhelming majority of the burden to reduce NARW M/SI on US federal fixed gear fisheries. Further, given the changing distribution of NARWs and their declining occurrence in the Gulf of Maine, Maine's future risk reduction comes at a reduced conservation value for NARWs but at a tremendously high cost to industry. The Maine lobster fishery has worked diligently over the last 20 years, alongside their colleagues on the Atlantic Large Whale Take Reduction Team, to provide increased protections to right whales. It is distressing that as a result of climate change, the gains made over the last twenty years as a result of fishermen's efforts have largely been lost. Now Canada has become a substantial source of M/SI for NARWs. It is imperative that NMFS use every tool at its disposal to encourage additional protections for right whales in Canada as future mortality outside of US waters will directly impact the survival of US fisheries.

Sincerely,

A handwritten signature in black ink, appearing to read 'PK', with a long horizontal flourish extending to the right.

Commissioner Patrick Keliher