SALMON LESSONS FOR THE DELTA SMELT: UNJUSTIFIED RELIANCE ON HATCHERIES IN THE USFWS OCTOBER 2019 BIOLOGICAL OPINION

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I. HATCHING A NEW CONSERVATION MODEL

Pursuant to the Endangered Species Act, in October 2019 the United States Fish and Wildlife Service (USFWS) of the Trump Administration issued a new Biological Opinion (BiOp) for coordinated operations of the Central Valley Project and the State Water Project (2019 USFWS BiOp).[1] The Central Valley Project is operated by the United States Bureau of Reclamation (Reclamation), and the State Water Project is operated by the California Department of Water Resources.[2]

The Central Valley Project and the State Water Project both divert freshwater from the Sacramento River and San Joaquin River watersheds, and

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1. U.S. FISH & WILDLIFE SERV., 08FBTS00-2019-F-0164, BIOLOGICAL OPINION – FOR THE REINITIATION OF CONSULTATION ON THE COORDINATED OPERATIONS OF THE CENTRAL VALLEY PROJECT AND THE STATE WATER PROJECT (Oct. 21, 2019) [hereafter 2019 USWFS BiOp].

2. Paul Stanton Kibel, *The Public Trust Navigates California's Bay Delta*, 51 NAT. RESOURCES J. 35, 58 (2011).

the reduced freshwater flow resulting from these diversions allows in additional ocean water, raising salinity levels.[3]

The 2019 USFWS BiOp issued by the Trump Administration found that anticipated water project operations would not jeopardize the survival of the endangered delta smelt, a fish species dependent on low-salinity conditions and found only in the brackish estuary where the freshwater of the Sacramento and San Joaquin Rivers mix with the seawater of the San Francisco Bay.[4] The "no jeopardy" determination in the 2019 USFWS BiOp contrasted with the previous 2008 USFWS BiOp, which found that anticipated water project operations would likely push the endangered delta smelt into extinction due to elevated salinity levels.[5]

In comparing the 2008 USFWS BiOp to the 2019 USFWS BiOp, two key differences stand out. The 2008 USFWS BiOp identified seawater intrusion and rising salinity as a primary driver of delta smelt decline and did not propose reliance on hatcheries to replace declining wild delta smelt populations.[6] In contrast, the 2019 USFWS BiOp downplayed seawater intrusion and rising salinity as a primary driver of delta smelt declines and instead focused on the potential role that delta smelt artificially propagated in hatcheries might play in increasing delta smelt populations.[7]

This shift to greater reliance on hatcheries to maintain delta smelt is revealed in the following text in the 2019 USFWS BiOp under the heading *Cultured Smelt Production from Fish Conservation and Culture Laboratory (FCCL)*:

> [T]he delta smelt faces a high risk of continued decline if the population is not supplemented. Reclamation proposes to fund a two-phase process that would lead to annual supplementation of the wild delta smelt population with propagated fish within 3-5 years from issuance of the biological opinion. The first step in this process will be the development of a supplementation strategy within one year of the issuance of the BiOp that will describe the capacity needed at the hatchery facilities to accommodate the delta smelt production needed to meet genetic and other hatchery considerations with a goal of increasing production to a number and the life stages necessary to effectively augment the population.
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3. *See generally* Memorandum from the U.S. Fish & Wildlife Serv., Formal Endangered Species Act Consultation on the Proposed Coordinated Operations of the Central Valley Project (CVP) and State Water Project (SWP) (issued on Dec. 15, 2008), *available at* https://www.fws.gov/sfbaydelta/Documents/SWP-CVP_OPs_BO_12-15_final_OCR.pdf [hereafter 2008 USFWS BiOp].

4. Paul Stanton Kibel, *Sea Level Rise, Saltwater Intrusion and Endangered Fisheries – Shifting Baselines for the Bay Delta Conservation Plan*, 38 ENVIRONS ENVTL. L. & POL'Y 259, 263–64 (2015).

5. 2008 USFWS BiOp, *supra* note 3, at 276–79.

6. 2008 USFWS BiOp, *supra* note 3, at 234, 276–79.

7. *Compare* 2008 USFWS BiOp, *supra* note 3, at 276–81, *with* 2019 USFWS BiOp, *supra* note 1, at 61–221.

> [USFWS] will work with partners to use this expanded delta smelt production at the FCCL to determine how a successful reintroduction program can be developed. This work will focus on production from FCCL in the near term, but [USFWS] recognizes that expansion of the refugial population and propagation of additional fish for supplementation will require a new facility. [USFWS], with support from Reclamation, has been pursuing and will continue to pursue a Delta Fish Technology Center, which could house the Delta Fish Species Conservation Hatchery discussed below, to address these needs.
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> Supplementation through the FCCL will increase the likelihood that the population of delta smelt will be sustained in the wild by achieving a robust, genetically diverse captive population.
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> The proposed increased production at FCCL and near-term population supplementation will help conserve diversity and increase resilience, and begin to augment the reproduction of delta smelt in the wild. Great numbers of successfully reproducing delta smelt will bolster the resilience of the population in poor recruitment years and allow the population to withstand conditions such as drought. Eventually, production and supplementation will be substantially increased through the Delta Fish Species Conservation Hatchery, providing additional benefits to delta smelt.[8]

For those of us that have studied the experience with reliance on hatcheries to try to maintain west coast salmon populations, the 2019 USFWS BiOp's proposal to refocus delta smelt conservation efforts on hatchery production has an eerily familiar ring and theme. The familiar ring and theme are what can be called the "replacement assumption"—the premise that serious efforts to maintain the natural habitat that wild fisheries require to survive are not needed because the wild fish can be replaced with fish artificially propagated in hatcheries.[9]

As discussed below, in the case of west coast salmon, the scientific evidence is clear that the replacement assumption has proven faulty as the total abundance of salmon declined at the same time the propagation and release of hatchery salmon has expanded. Given this experience, fishery biologists working on west coast salmon are now increasingly rejecting the replacement assumption and calling for conservation efforts to refocus on natural habitat to restore wild salmon population.[10]

Before embarking on the hatchery-reliant conservation strategy for delta smelt proposed in the 2019 USFWS BiOp, we would be wise to first more

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8. 2019 USFWS BiOp, *supra* note 1, at 171–72, 212.

9. Paul Stanton Kibel, Of Habitat and Hatcheries: Old and New Conservation Assumptions in the Pacific Salmon Treaty 11–15 (publication forthcoming in 2020) (on file with author).

10. *Id.* at 18.

carefully study the documented failures of the previous hatchery-reliant conservation strategy for west coast salmon.

II. THE REPLACEMENT ASSUMPTION AND WEST COAST SALMON

In the United States, many of the larger on-stream dams on the west coast were built in the period from 1930 to 1970.[11] At the time these on-stream dams were constructed, for both hydropower generation and water supply purposes, the proponents of such dams were aware that the structures would impede upstream and downstream migration of wild salmon runs.[12]

At the time, the strategy to mitigate the anticipated adverse impacts of dams on salmon stocks was to construct and operate salmon hatcheries below the dams.[13] Under this strategy, the hatcheries would release large volumes of juvenile salmon in the lower reaches of rivers and these salmon would then return to spawn in these lower reaches, thereby "replacing" the wild salmon runs lost due to the dams' blockage of traditional spawning grounds in the higher reaches of the watershed.[14]

In his 1999 book *Salmon Without Rivers: A History of the Pacific Salmon Crisis*, Jim Lichatowich (a fishery biologist with the USFWS) explains:

> Placing misguided confidence in technological solutions, salmon managers accepted the myth that controlling salmon production in hatcheries would ultimately lead to increased productivity. Despite the best of intentions, these hard-working people produced disaster because their efforts were based on false assumptions.[15]

In *Salmon Without Rivers*, Lichatowich continues:

> Today, as proof of their success, hatchery advocates note that artificially propagated salmon make up 80 percent or more of the total number of salmon on the Columbia [River Basin], but they fail to mention that the total run has crashed to less than 5 percent of its historical abundance. Measuring success by the percentage of hatchery fish in a shrinking production base not only was scientifically invalid but also insidiously enhanced the illusion of hatchery success. At the same time the percentage of hatchery fish in the run increased, hatcheries were contributing to the decline of wild salmon . . . .[16]

Lichatowich further observes:

> One of the most troubling consequences of this flawed vision was that it diverted salmon managers' attention from the root causes of the salmon's decline. As a result, significant problems such as habitat destruction . . .

11. JIM LICHATOWICH, SALMON WITHOUT RIVERS: A HISTORY OF THE PACIFIC SALMON CRISIS 76 (1999).
12. *Id*. at 131–35.
13. *Id*.
14. *Id.*
15. *Id.* at 8.
16. *Id.* at 198.

> were consistently ignored. Agency budgets and staff energy were devoted to artificial propagation instead of habitat protection.[17]

The analysis and conclusions of Lichatowich have been confirmed and echoed by other studies that have assessed the effect of salmon hatcheries on wild salmon stocks and overall salmon abundancy.

For example, in 2014, the Hatchery Scientific Review Group submitted a report to the United States Congress titled *On the Science of Hatcheries: An Updated Perspective on the Role of Hatcheries in Salmon and Steelhead Management in the Pacific Northwest*.[18] The Hatchery Scientific Review Group was created as part of the Hatchery Reform Project established by the United States Congress in 2000.[19] In its 2014 report *On the Science of Hatcheries*, the Hatcheries Scientific Review Group found:

> [T]he traditional mitigation policy of replacing wild populations with hatchery fish is not consistent with today's conservation goals, environmental values, and scientific theories. Hatcheries cannot replace lost habitat and the natural populations that rely on it. It is now clear that the widespread use of traditional hatchery programs has actually contributed to the overall decline of wild populations.[20]

Similarly, in its report *The Effects of Hatchery Production on Wild Salmon and Trout*, the group Wild Fish Conservancy determined the following in terms of the survival and reproduction rates of hatchery salmon: "[the d]omestication selection by hatchery practices derails the 'survival of the fittest' concept. Those with the greatest fitness in a captive environment produce offspring that perform the worst in the wild."[21] In its report, Wild Fish Conservancy went on to find that after more than a century of hatchery production, "management continues to rely on hatchery production to mitigate for losses of wild fish abundance and habitat . . . ," despite clear evidence that "[a]rtificial propagation contributes to declines in the survival and reproductive capacity of endangered wild fish[.]"[22]

These studies all document the ways that the replacement assumption has failed west coast salmon. Yet, notwithstanding the failure of hatchery-reliant management for west coast salmon, the 2019 USFWS BiOp now proposes hatchery-reliant management for the delta smelt.

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17. *Id.* at 130.

18. HATCHERY SCIENTIFIC REVIEW GROUP, ON THE SCIENCE OF HATCHERIES: AN UPDATED PERSPECTIVE ON THE ROLE OF HATCHERIES IN SALMON AND STEELHEAD MANAGEMENT IN THE PACIFIC NORTHWEST 1 (2014).

19. *Id.*

20. *Id.*

21. *The Effects of Hatchery Production on Wild Salmon and Trout*, WILD FISH CONSERVANCY NORTHWEST (last visited Feb. 10, 2020), http://wildfishconservancy.org/what-we-do/advocacy/steelhead-hatchery-reform/the-effects-of-hatchery-production-on-wild-salmon-and-trout.

22. *Id.*

III. FINDINGS OF FISHERY BIOLOGISTS AT FCCL DELTA SMELT HATCHERY

As discussed above, the 2019 USFWS BiOp issued by the Trump Administration proposes to increase artificial propagation of delta smelt at the FCCL, which is operated by the University of California at Davis. As set forth in the 2019 USFWS BiOp, the plan is to then release the FCCL hatchery delta smelt into the wild, where it is claimed these hatchery-produced fish will help supplement wild delta smelt populations.

Yet, in 2018, fishery biologists working at the FCCL published a scientific paper indicating that the release of hatchery delta smelt into the wild could adversely impact and actually reduce wild delta smelt populations. In their 2018 article titled "A Conservation Hatchery Population of Delta Smelt Shows Evidence of Genetic Adaptation to Captivity After 9 Generations," published in the *Journal of Heredity*, these FCCL fishery biologists reported:

> Selective pressures at the FCCL and in the wild differ considerably: the FCCL is a tightly controlled, predator-free environment with *ad libidum* food availability, whereas the Delta is an estuary with tidal changes in turbidity and temperature, and with larger seasonal and annual changes in temperature and salinity. Adaptation to captivity could cause rapid phenotypic and genetic divergence between wild and hatchery stocks . . . . [H]atcheries might induce epigenetic reprogramming, which may lower the fitness of hatchery-origin fish in the wild.
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> [I]t is questionable whether the release of [hatchery] fish would result in an overall benefit to the wild delta smelt population given that selection pressures between the field and hatchery differ substantially . . . . To date, there is no research on survival of FCCL-produced delta smelt in the wild because no fish have been released, as the release of FCCL delta smelt is not permitted.[23]

Similar concerns were identified in a 2018 article in the journal *San Francisco Estuary & Watershed Science*, titled "Considerations for the Use of Captive-Reared Delta Smelt for Species Recovery and Research."[24] The article reported:

> Concerns have been raised about the potential risk to the wild Delta Smelt population from releasing hatchery-adapted fish that could introgress (interbreed) with the wild population. Such risks include reduced genetic diversity of the species, reduced fitness of the wild population, and/or unintentionally spreading pathogens from hatcheries.[25]

The 2018 article in *San Francisco Estuary & Watershed Science* further found:

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23. Finger et al., *A Conservation Hatchery Population of Delta Smelt Shows Evidence of Genetic Adaptation to Captivity After 9 Generations*, 109 J. OF HEREDITY 689, 696–98 (2018).

24. Joanna Lessard et al., *Considerations for the Use of Captive-Reared Delta Smelt for Species Recovery and Research*, 16 SAN FRANCISCO ESTUARY & WATERSHED SCI. 1, 1 (2018).

25. *Id.* at 7.

> [E]ven with strong consensus on the dire status of wild Delta Smelt, experts still have significant concerns about supplementation. These concerns are primarily based on two, somewhat related issues: (1) supplementation will not be a useful action if the stressors that cause decline are not resolved, and so could lead to increased stress on the wild population; and (2) supplementation will be expensive and time-intensive, potentially reducing resources available for large-scale habitat restoration.[26]

The findings by FCCL fishery biologists, echoed in the article in *San Francisco Estuary & Watershed Science*, are difficult if not impossible to reconcile with the wishful claims in the 2019 USFWS BiOp issued by the Trump Administration. The fishery biologists confirm that genetic adaptations among delta smelt raised in the FCCL may lower the survival of such hatchery fish in the wild, and that the crossing of hatchery delta smelt and wild delta smelt may reduce the overall populations of delta smelt in the wild.[27] The 2018 article by the FCCL fishery biologists confirms that at present there is no research on how FCCL-produced delta smelt survive in the wild, because the release of such FCCL delta smelt into the wild is not now allowed (because of concerns about how the release of FCCL smelt into the wild might lead to further declines in wild delta smelt abundance).[28]

More to the point, the 2018 article by FCCL fishery biologists and the 2018 article in *San Francisco Estuary & Watershed Science* reveal that there is in fact no data or research to support the claims in the 2019 USFWS BiOp that "[s]upplementation through the FCCL will increase the likelihood that the population of delta smelt will be sustained in the wild"[29] or that "[t]he proposed increased production at FCCL and near-term population supplementation will help to offset adverse effects from operations and begin to augment the numbers of delta smelt in the wild."[30]

Lastly, it should be noted that the 2019 USFWS BiOp fails to explain why hatchery delta smelt will be able to survive in conditions that are unsuitable for wild delta smelt. The habitat analysis in the 2019 USFWS BiOp admits that the current habitat conditions for wild delta smelt are so degraded that it is difficult for delta smelt to survive in such conditions. The degraded quality of such delta smelt habitat would be particularly acute in drought years, the same years that the 2019 USFWS BiOp suggests that hatchery-produced delta smelt could be released into the wild to supplement declining wild stocks. But why would hatchery delta smelt produced at the FCCL fare any better than wild delta smelt once they are released into this degraded habitat? The 2019 USWFW BiOp prepared by the Trump Administration offers no explanation for this disconnect.

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26. *Id.* at 3.
27. Finger et al., *supra* note 23, at 690.
28. *Id.* at 697–98.
29. 2019 USFWS BiOp, *supra* note 1, at 172.
30. *Id.* at 212.

IV. HATCHERIES AND THE NO JEOPARDY DETERMINATION

Given the low numbers of delta smelt in the wild, there may be sound scientific reasons for the FCCL laboratory to capture and study delta smelt. The better we understand the biology of delta smelt, perhaps the better we will be able to ensure that we maintain the habitat conditions so that wild delta smelt can recover and improve.

However, as the 2018 article by the FCCL biologists makes plain, current science does not support the claim that the release of FCCL-produced delta smelt into the wild would supplement wild delta smelt stocks (in fact the science indicates such releases are likely to damage such wild stocks). The 2019 USFWS BiOp states that USFWS will work with partners "to determine how a successful reintroduction program can be developed," but the findings of the FCCL biologists indicate the likelihood that there is no safe way to introduce hatchery delta smelt into the wild. This means that it is unlikely such reintroduction will in fact occur.

This means that, in reality, the FCCL (and the new Delta Fish Technology Center/Delta Fish Species Conservation Hatchery proposed in the 2019 USFWS BiOp) will likely continue to operate as closed captive breeding facilities. Such closed captive breeding facilities may serve an independent scientific research purpose, but they will not contribute to sustaining or restoring delta smelt populations in the wild as the 2019 USFWS BiOp claims. Rather, such closed captive breeding facilities will simply be laboratories to preserve genetic specimens of a delta smelt population that we allowed to go extinct by our failing to maintain the habitat conditions the species needed to survive in the wild.

This approach to dealing with endangered species—by preserving species in laboratories rather than maintaining the habitat such species need to survive—is antithetical to the basic structure and purpose of the Endangered Species Act.[31] More specifically, the Endangered Species Act provides for the designation and protection of "critical habitat" to maintain and restore all listed species.[32] The focus on "critical habitat" evidences that the Endangered Species Act is concerned first and foremost with preserving species in the wild. The concept of "critical habitat" becomes nonsensical when applied to a species that only exists in a laboratory.

In sum, as we evaluate the credibility and coherence of the hatchery-dependent strategy for delta smelt conservation set forth in the 2019 USFWS BiOp prepared by the Trump Administration, and whether (from a legal standpoint) there is substantial evidence to justify reliance on this strategy, there are two key considerations and questions to keep in mind.

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31. *Critical Habit: What Is It?*, U.S. FISH AND WILDLIFE SERV. (Mar. 2017), https://www.fws.gov/endangered/esa-library/pdf/critical_habitat.pdf.

32. *Id.*

First, if reliance on hatcheries to replace and supplement wild stocks has proven such a failure in regard to west coast salmon, why is the 2019 USFWS BiOp justified in its claims that such hatcheries will be effective in replacing and supplementing wild delta smelt stocks?

Second, if the focus of the Endangered Species Act is on maintaining habitat conditions for species to survive in the wild, rather than preserving specimens of species in laboratories, and if the FCCL fishery biologists are correct that there is little chance hatchery delta smelt will ever be released into the wild, then how do the hatchery-focused components of the 2019 USFWS BiOp support the no jeopardy determination in regard to the impacts of water project operations on the delta smelt?

These issues and considerations may soon be addressed by the courts in two pending lawsuits. On December 2, 2019, the 2019 USFWS BiOp was challenged in a lawsuit filed in federal district court by the Pacific Coast Federation of Fishermen's Associations, the Institute for Fisheries Resources, Gold State Salmon Association, Natural Resources Defense Council, Defenders of Wildlife, and the Bay Institute.[33] The initial complaint filed in this lawsuit did not make specific reference to the hatchery components of the 2019 USFWS BiOp, but did allege the following:

> By increasing diversions and exports, the proposed plan will allow salt water to intrude further upstream into the Delta, infiltrating the Delta Smelt's habitat. Upstream movement of the low salinity zone is likely to constrict and degrade the habitat of Delta Smelt, reduce survival and geographic distribution, and increase the risk of extinction.
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> The Fish and Wildlife Service Biological Opinion improperly relied on uncertain future mitigation measures without adequate evidence that the mitigation measures are reasonably certain to occur and will be effective to address the adverse impacts that have already been identified to ensure protection of the Delta Smelt and its critical habitat. In relying on these uncertain mitigation measures, the Fish and Wildlife Service Biological Opinion violates Section 7(a)(2) of the Endangered Species Act and is arbitrary, capricious, an abuse of discretion, and not in accordance with law, in violation of the Administrative Procedure Act, 5 U.S.C. §706(2).[34]

The "uncertain mitigation measures" challenged in the lawsuit filed by conservation and fishing groups may well include the hatchery components of the 2019 USFWS BiOp. This litigation may therefore provide an opportunity for the federal courts to rule on the question of whether or not there is substantial evidence to support the Trump Administration's reliance on hatcheries to prevent the endangered delta smelt from going extinct.

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33. Complaint at 1, Pacific Coast Federation of Fishermen's Ass'ns v. U.S. Fish & Wildlife Serv., No. 19-7897 (N.D. Cal. Dec. 2, 2019).

34. *Id.* at 33, 45.

On February 20, 2020, the State of California also filed a complaint in federal district court challenging the USFWS's October 2019 BiOp for the delta smelt.[35] In its complaint, the State of California took aim at the analysis in the Environmental Impact Statement ("EIS") prepared pursuant to the National Environmental Policy Act to support the USFWS October 2019 BiOp, alleging:

> [R]eclamation's Final EIS improperly credits reductions in the Proposed Action's impacts to infeasible conservation measures while failing to account for the reasonably foreseeable negative impacts that will result from waivers of conservation measures. For example, the EIS's assessment of Alternative 1's impacts on Delta smelt includes the potential benefit from the Fish Conservation and Culture Laboratory's reintroduction of hatchery-grown smelt that is part of the Proposed Action. As noted by commenters including CDFW, however, the Fish Conservation and Culture Laboratory's reintroduction program is unlikely to be able to capture sufficient numbers of wild Delta smelt to support the genetic diversity needed for a supplementation program, and may not be able to produce smelt in sufficient numbers soon enough to serve the mitigation effect attributed to it by Reclamation. The Final EIS's characterization of the reintroduction efforts for Delta smelt as a beneficial measure with appreciable positive effects without acknowledging the uncertain efficacy of the measure is arbitrary and capricious.[36]

The initial hatchery-related allegations in the State of California complaint do not focus specifically on the potential for hatchery-produced delta smelt to damage wild delta smelt stocks, or whether hatchery-produced delta smelt are likely to survive in already degraded habitat conditions. However, these allegations do indicate that the USFWS October 2019 BiOp's claims regarding how the proposed FCCL hatchery and reintroduction program would benefit delta smelt stocks will likely be challenged in this lawsuit.

As a result of these two pending lawsuits, the question of USFWS reliance on hatcheries to restore dwindling delta smelt stocks may be framed as a more legalistic inquiry. Reduced to its essence, this inquiry may ask whether there is presently substantial evidence to support USFWS's claim regarding how the proposed hatchery and reintroduction strategy will benefit wild delta smelt populations, and whether there is substantial evidence to support USFWS's claim that this proposed hatchery and reintroduction program is likely to be implemented.

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35. *See generally* Complaint, State of California v. Wilbur Ross, No. 3:20-CV-01299 (N.D. Cal. Feb. 20, 2020) (California is seeking declaratory and injunctive relief for violations under the Administrative Procedure Act, Endangered Species Act, and the National Environmental Policy Act).

36. *Id.* at ¶ 118.