

DECEMBER 11, 2000

IN THE OFFICE OF SCIENTIFIC AUTHORITY  
U.S. FISH AND WILDLIFE SERVICE  
UNITED STATES DEPARTMENT OF INTERIOR

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Natural Resources Defense Council; )  
Wildlife Conservation Society; )  
And SeaWeb, )  
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Petitioners. )  
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**A Petition to List Beluga Sturgeon (*Huso huso*)  
as an Endangered Species**

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<b>APPENDIX I: <i>ROE TO RUIN: THE DECLINE OF CASPIAN SEA STURGEON AND THE ROAD TO RECOVERY</i></b>	

The Natural Resources Defense Council, Wildlife Conservation Society, and SeaWeb hereby formally petition the Secretary of the United States Department of Interior (“Secretary”) to list the beluga sturgeon (*Huso huso*) as endangered pursuant to the Endangered Species Act, 16 U.S.C. §§ 1531, *et seq.* This petition is submitted pursuant to 5 U.S.C. § 553(e) and 50 C.F.R. § 424.14, which grants interested parties the right to petition for the issuance of a rule by the Secretary.

## **I. Executive Summary**

Beluga sturgeon is on the brink of extinction. As the Source of the world’s most prized caviar, beluga sturgeon in the Caspian Sea, the Black Sea, the Adriatic Sea, the Sea of Azov and their major tributaries have been decimated by overfishing and poaching to supply the caviar trade, an almost complete loss of spawning habitat, and severe pollution. Scientists believe there may no longer be any reproduction of beluga sturgeon in the wild in the Caspian Sea -- historically the site of greatest beluga abundance -- and broodstock to maintain hatchery production in the once prolific Volga River -- the most important river system in the world for beluga -- is reportedly no longer available.<sup>1</sup>

The United States was the destination of some 28,000 pounds of beluga caviar in 1999.<sup>2</sup> This roughly represents the production of approximately 1,600 female beluga sturgeon.<sup>3</sup> At a time when every fish matters, this level of importation poses a threat to

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<sup>1</sup> Khodorevskaya *et al.*, 1997, p. 210; Artyukhin, 1997, p. 9.

<sup>2</sup> USFWS, LEMMIN data, analyzed by Craig Hoover, TRAFFIC, November 6, 2000.

<sup>3</sup> This estimate is based on a beluga sturgeon gonadosomatic index of 0.07-0.15. The estimate is derived from the following calculation: (1) (pounds of caviar)/(GSI)=pounds of fish; (2) (pounds of fish)/(avg. weight spawning beluga) = the # beluga represented by the imported quantity of caviar. Using 28,000 lbs of caviar divided by the upper range of GSI (.15) results in 186,000 pounds of beluga; the lower range of GSI (.07) results in 400,000 pounds of beluga. Multiplying Khodorevskaya (2000)=s relative percentages for weight classes of spawning beluga in the Volga for 1999 (p.606) by TRAFFIC (2000, p. 90) and Raspopov’s (1993, p. 76) average weight by age class of female beluga, we determined that between 2,509 and 1,171 individuals were killed for the production of U.S. imports of caviar for 1999. 28,000 lbs of caviar divided by the median GSI (.11) results in 254,545 pounds of beluga. Using Khodorevskaya (2000)=s% for weight classes of spawning beluga (p. 606) and TRAFFIC (2000, p. 90) and Raspopov’s (1993, p. 76)

the continued existence of the species. Listing of beluga as endangered would result in a cessation of legal importation of beluga sturgeon and beluga caviar into the United States. This will help relieve the pressure on beluga sturgeon and contribute to the conservation of this highly endangered species. It will also set an important precedent for international action by other importing nations, and will send an important signal to the range states that the United States is serious about the conservation of beluga and other imperiled sturgeon.

## **II. Petitioners**

Petitioner Natural Resources Defense Council (“NRDC”) is a national, non-profit environmental organization with more than 400,000 members nationwide. NRDC is actively working to improve the management of the world’s ocean resources, including marine fish and other ocean wildlife. With the Wildlife Conservation Society (“WCS”) and SeaWeb, NRDC recently published an extensive analysis of beluga and other sturgeon in the Caspian Sea,<sup>4</sup> and is actively engaged in efforts to promote consumer awareness of, and government action to address, threats to these imperiled fish. Our members are concerned about the decline in beluga sturgeon numbers and the species’ risk of extinction. NRDC can be contacted in New York City at 40 West 20<sup>th</sup> Street, New York, New York 10011, phone number (212) 727-2700.

Petitioner Wildlife Conservation Society (“WCS”) is an international non-profit organization that works to save wildlife and wildlands through *in situ* research and conservation projects in Africa, Asia, Latin America, and North America. WCS’ goal is to protect a representative part of all the world’s forests, grasslands, deserts, marshes, coral reefs, rivers, and seas. WCS scientists are conducting wildlife research and

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weight by age of female beluga, we determined that 1,596 individuals were killed for the production of U.S. imports of caviar.

<sup>4</sup> This report has been attached as Appendix I to this petition.

conservation projects in Kazakhstan and the Russian Federation (two Caspian range states) and are developing a larger Central Asia Conservation Program. WCS currently runs thirteen field projects in the region with a full-time staff of 20 scientists. Several of these conservation programs work to improve management of areas used by sturgeon. WCS also runs a green sturgeon (*Acipenser*) research program in the northwestern United States. The 106,851 members of the Wildlife Conservation Society express their concern for wildlife conservation in the Caspian region, including that of sturgeon, through support of our programs and visits to the region. WCS can be contacted in New York City at 2300 Southern Boulevard, Bronx, New York, 10460, USA, phone number (718) 220-5100.

Petitioner SeaWeb is a national, non-profit organization dedicated to educating the public and consumers about the need for ocean conservation. Through its newsletter, SeaWeb reaches thousands of subscribers with information from ocean conservation scientists about ongoing activities in the ocean conservation community. SeaWeb also works directly with consumers to inform them of the scientific and policy issues regarding populations of popular seafood. These consumers are very concerned about the decline in beluga sturgeon leading to the potential extinction of the species. SeaWeb can be reached at 1731 Connecticut Ave NW 4<sup>th</sup> Floor, Washington, DC 20009, phone number (202) 483-9570.

### **III. Species Account**

#### *A. Taxonomy*

Beluga Sturgeon are part of the genus *Huso*, the family Acipenseridae, the order Acipenseriformes, the class Osteichthyes, the phylum Chordata, and the kingdom

Animalia.<sup>5</sup> There are two extant members of the genus *Huso*: beluga (*H. huso*) and kaluga (*H. dauricus*). *H. dauricus* is an estuarine, possibly anadromous, fish which is found in the Amur River. During the 19<sup>th</sup> century, *Huso* was often classified as a subgenus of *Acipenser*,<sup>6</sup> though the two species differ in the number of dorsal fin rays and the first dorsal scutes.<sup>7</sup>

Beluga sturgeon have a large, crescent-shaped mouth that is preceded by four barbells and a pointed, slightly upturned snout. The upper jaw does not articulate with the cranium. They exhibit five rows of bony scutes along their bodies: one dorsal (11-14 scutes); two lateral (41-52 scutes); and two ventral (9-11 scutes).<sup>8</sup> The caudal fin is heterocercal. Beluga sturgeon from different seas exhibit slightly different morphological and meristic characteristics,<sup>9</sup> as well as in the age of sexual maturation. Generally, males mature at age 10-16 and females mature at age 13-22,<sup>10</sup> though there are slight differences between populations.<sup>11</sup>

### B. *Life History*

Beluga sturgeon have life history characteristics that make them especially vulnerable to depletion. Long lived and slow to mature, beluga sturgeon generally do not

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<sup>5</sup> Bemis, W.E., E.K. Findeis, and L. Grande, 1997, p. 42.

<sup>6</sup> Bemis et al., 1997, p. 41.

<sup>7</sup> Iran Nature and Wildlife Magazine, vol. 2, Jan. 1999, Nature and Wildlife Museum of Iran, Tehran.

<sup>8</sup> Iran Nature and Wildlife Magazine, 1999.

<sup>9</sup> Berg, 1948, p. 60. All Acipenseridae share nine morphometric characteristics: (1) five scutes (bony plates) along the trunk; (2) presence of a pectoral fin spine; (3) presence of the antorbital bone on the postnasal wall between the orbit and olfactory bulb; (4) commissure of the occipital canals in the median extrascapular bone; (5) rostral canals that curve laterally around the outer pair of barbells, then converge toward the ventral midline of the rostrum; (6) supracleithrum tightly joined to dermal skull roof; (7) the opercular wall is formed by the cleithrum and clavicle; (8) the cardiac shield is formed by laminar extensions of the clavicle; and the cleithral process limits mobility of the pectoral fin spine (Findeis, 1997, p. 77-105).

<sup>10</sup> Iran Nature and Wildlife Magazine, 1999.

<sup>11</sup> Khodorevskaya et al, 2000, p. 606.

reach reproductive age until age 11-17<sup>12</sup> and are believed to reach reproductive readiness only every 4-8 years (females) and 4-7 years (males).<sup>13</sup> It is also among the longest living acipenserid species:<sup>14</sup> the oldest recorded beluga sturgeon was 118 years old,<sup>15</sup> and the largest known beluga had a length of 28 ft and weighed 2,860 pounds, making it the largest fish that uses freshwater in the world.<sup>16</sup> Khodorevskaya *et al.* report that 100 year old beluga were not uncommon in northern Caspian Sea catches in the early twentieth century.<sup>17</sup> Beluga sturgeon are anadromous fishes, spending most of their lives in salt water and returning to freshwater to breed.<sup>18</sup> With predictable migration patterns and feeding habits, sturgeon are relatively easy to catch by fishermen and poachers seeking caviar.

A 200-kg female's ovaries can weigh 50 kg, and contain 1.6 million eggs.<sup>19</sup> Beluga sturgeon eggs are adhesive and demersal. Beluga sturgeon have a pre-larval stage, the period that begins with the liberation of the embryo from the egg and terminates with its transition to an active feeding form.<sup>20</sup> Larvae hatch within days and are about one centimeter long.<sup>21</sup> In general, growth rate of beluga depends greatly on ecological conditions, food supply, and time that an individual has spent at sea.<sup>22</sup> Growth increments of beluga generally decrease with age, with the greatest rate of growth observed in first maturing fish.<sup>23</sup>

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<sup>12</sup> Khodorevskaya et al, 1997, p. 213.

<sup>13</sup> Raspopov, V.M., 1993, p. 80.

<sup>14</sup> Khodorevskaya et al, 2000, p. 602, p. 604; FishBase; Whitehead et al, 1984, p. 225.

<sup>15</sup> TRAFFIC, 2000, p. 89.

<sup>16</sup> DeMeulenaer and Raymakers, 1996, p. 8; Freedman, 1999.

<sup>17</sup> Khodorevskaya et al, 2000, p. 604.

<sup>18</sup> Bemis and Kynard, 1997, p. 177.

<sup>19</sup> Helfman et al., 1997, p. 212.

<sup>20</sup> Schmalhausen, 1991, p. 67.

<sup>21</sup> Bond, 1979, p. 143.

<sup>22</sup> Raspopov, 1993, p. 82.

<sup>23</sup> Raspopov, 1993, p. 78.

Beluga sturgeon are piscivorous,<sup>24</sup> even from the juvenile stage. Adult beluga sturgeon consume benthic and pelagic fishes, including gadoids, gobies, whiting, anchovies, and flatfish as well as invertebrates such as crustaceans and mollusks.<sup>25</sup> Juvenile beluga sturgeon consume smaller benthic fish and invertebrates.<sup>26</sup> Beluga feed in winter mainly on flounder, mullet and gobies in the Black Sea, and on roach, herring and gobies in the Caspian.<sup>27</sup> When fully grown, beluga sturgeon have few natural predators; the parasitic lamprey is one of the few organisms capable of attaching to an adult.<sup>28</sup>

## 2. *Caspian Sea*

For the Caspian population of *H. huso*, spawning historically occurred in the Volga, Ural, Kura, Terek, and Sulak Rivers.<sup>29</sup> Before dam construction in the 1960s, the Volga River had the most important spawning grounds for beluga sturgeon; today, it appears that beluga spawning in the Volga may have halted completely.<sup>30</sup> Beluga sturgeon also no longer use the Kura, Terek, and Sulak Rivers to spawn.<sup>31</sup> The Ural River is the only large river entering the northern part of the Caspian Sea in which natural reproduction of *H. huso* still occurs.<sup>32</sup> However, some believe that the spawning population of sturgeon in the Ural has been essentially destroyed by poachers, and the river suffers from significant industrial and pesticide pollution.<sup>33</sup>

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<sup>24</sup> Bemis et al, 1997, p. 41.

<sup>25</sup> Whitehead et al, 1984, p. 225; Bacalbasa-Dobrovici, 1997a, p. 205.

<sup>26</sup> Whitehead et al, 1984, p. 225.

<sup>27</sup> M. Burton & R. Burton, 1975, p. 216.

<sup>28</sup> Helfman et al, 1997, p. 212.

<sup>29</sup> Khodorevskaya et al, 1997, p. 209.

<sup>30</sup> Khodorevskaya et al, 1997, p. 210.

<sup>31</sup> Khodorevskaya et al, 1997, p. 210.

<sup>32</sup> Khodorevskaya et al, 1997, p. 209.

<sup>33</sup> DeMeulenaer and Raymakers, 1996, p. 23.

There are two annual spawning migrations of *H. huso* in the Caspian Sea, a winter run and a summer run.<sup>34</sup> Beluga sturgeon spawn at water temperatures between 48.2 and 51.8°F.<sup>35</sup> The average size at first spawning is 6.6 feet and 110 pounds.<sup>36</sup> For the Volga and Ural Rivers, migrations begin in December, peaking between February and March, with the greatest spawning activity in May. Beluga sturgeon do not feed in the river during the spawning phase.<sup>37</sup> After spawning, beluga migrate downstream to the Caspian Sea between June and September, usually commencing this journey in the second half of May or first half of June.<sup>38</sup> By the end of June, beluga juveniles of 2.4-4.3 inches in length appear on feeding grounds in the northwestern part of the Caspian in waters 9-16 feet deep.<sup>39</sup> Unlike other Caspian sturgeon species, beluga sturgeon do not congregate on summer and winter feeding grounds; they remain widely dispersed.<sup>40</sup> A second segment of the population, the winter run, enters the river between August and October, hibernates, and spawns the following spring.<sup>41</sup> Approximately 70% of the reproductive part of the Volga River spawning population follows this winter migratory pattern.<sup>42</sup>

### 3. *Black Sea/Danube River*

Historically in the Black Sea, there were two annual sturgeon spawning migrations, a spring run and a winter run. Although migrations of beluga continued throughout the year, there were regular observed peaks in October or November (having commenced in August) and April (having commenced in January). As in the Caspian,

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<sup>34</sup> Levin, 1997, p. 15.

<sup>35</sup> Levin, 1997, p. 15.

<sup>36</sup> TRAFFIC, 2000, p.89.

<sup>37</sup> Raspopov, 1993, p.79.

<sup>38</sup> Levin, 1997, p. 16.

<sup>39</sup> Levin, 1997, p.16.

<sup>40</sup> Khodorevskaya et al, 1997, p. 211; Levin, 1997, p. 17.

<sup>41</sup> Levin, 1997, p. 15.

<sup>42</sup> Raspopov and Novikova, 1997, p. 166.

the winter run overwintered in the river and spawned the following spring.<sup>43</sup> Historically, beluga sturgeon migrated to the middle and upper Danube, though today they are extirpated in the upper Danube and considered “critically endangered” in the middle Danube.<sup>44</sup>

Sturgeon migrating into the Danube River spend the juvenile phase in the shallow northwestern shelf of the Black Sea, and adults migrate back to that area following spawning.<sup>45</sup> The southeast coast of the Black Sea is an important feeding and wintering area for *H. huso*.<sup>46</sup>

### *C. Present and Historic Range*

The beluga sturgeon (*Huso huso*) historically inhabited the Caspian Sea (main population), Black, Azov, and Adriatic Seas and rivers entering them.<sup>47</sup> The Adriatic population of beluga sturgeon is extirpated.<sup>48</sup> The most recent record of beluga in the Sea of Azov is from the mid-1980s,<sup>49</sup> and any populations there are maintained solely by artificial propagation.<sup>50</sup> Remaining naturally occurring populations are thus limited to the Black and Caspian Seas and their rivers and tributaries.

For the Black Sea population, the Danube River has been the most important spawning ground for beluga sturgeon; in the Caspian, the Volga River has been the major spawning river for beluga. Spawning runs of beluga historically exceeded 1550 miles in

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<sup>43</sup> Hensel and Holcik, 1997, p. 189.

<sup>44</sup> Hensel and Holcik, 1997, p. 191.

<sup>45</sup> Bacalbasa-Dobrovici, 1997a, p. 205.

<sup>46</sup> TRAFFIC, 2000, p. 88.

<sup>47</sup> Birstein et al, 1993, p. 778.

<sup>48</sup> Birstein et al, 1997, p. 432; IUCN Red List, 1996.

<sup>49</sup> TRAFFIC, 2000, p. 88.

<sup>50</sup> Birstein, 1993, p. 781; TRAFFIC 2000, p. 90, citing Volovik *et al.*

the Danube and Volga basins,<sup>51</sup> yet damming of these rivers has greatly truncated the spawning run of beluga and decreased the availability of spawning habitat.<sup>52</sup>

The species occurs in Azerbaijan, Bulgaria, Georgia, Iran, Kazakhstan, Romania, the Russian Federation, Turkey, Turkmenistan, Ukraine, and Serbia. It has been extirpated from Italy, Germany, Croatia, Slovakia, Slovenia, the Czech Republic, and Hungary.<sup>53</sup> Beluga sturgeon has not been reported for two decades in Moldova.

### 1. *The Caspian Sea*

In the Caspian Sea, beluga sturgeon may no longer spawn in four of their five historic spawning rivers.<sup>54</sup> Prior to dam construction on the Volga River in the 1950s, beluga sturgeon spawned up to river km 3000, using the mainstem of the river and its large tributaries. Dam construction limited beluga sturgeon spawning runs to 400 river km. Before construction of dams on the Volga River, the total areal extent of beluga spawning grounds was estimated to be 3390 ha. Today, including artificial reefs, approximately 372 ha, or 11%, of the beluga's spawning grounds remain.<sup>55</sup> The amount of spawning area is further reduced to 341 ha in years of medium water flow (which is regulated by dam discharges) and 311 ha during years of low water flow.<sup>56</sup>

### 2. *The Black Sea*

In the Black Sea, beluga are found along the northeastern and southern coasts.<sup>57</sup> Historically, beluga sturgeon ran up the Danube River, Dnieper River, the Dniester River, and the Bug River, though by 1948 they were a rarity in the Dniester and their use of the

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<sup>51</sup> Bemis et al, 1997, p. 61.

<sup>52</sup> Khodorevskaya et al, 1997, p. 211.

<sup>53</sup> TRAFFIC, 2000, p. 88-89; Freedman 1999.

<sup>54</sup> Khodorevskaya et al, 1997, p. 209.

<sup>55</sup> Secor et al, 2000, p. 30.

<sup>56</sup> Novikova, 1994, p. 69.

<sup>57</sup> Berg, 1948, p. 57.

Dnieper was curtailed.<sup>58</sup> Today, the Danube River contains the only spawning population of beluga sturgeon in the Black Sea system.<sup>59</sup>

In the Danube River and its upper tributaries, the beluga sturgeon historically migrated up to 2500 km.<sup>60</sup> Construction of the Iron Gates I (Djerdap I) and Iron Gates II (Djerdap II) dams in 1970 and 1984, respectively, reduced the possible migration distance to 862 km upriver.<sup>61</sup> Beluga are now extirpated from the upper Danube River (above river km 1880), and their populations are characterized as “critically endangered” in the middle Danube (river km 955-1880) and “vulnerable” in the lower Danube.<sup>62</sup> Beluga sturgeon are entirely absent from large portions of their former range in the Danube, and appear infrequently in other parts of their former range.<sup>63</sup> The entire Black Sea population is considered “endangered” by the International Union for the Conservation of Nature (IUCN).<sup>64</sup>

### 3. *The Sea of Azov*

Historically, spawning beluga sturgeon ascended the Don River, though by 1948 had become very rare.<sup>65</sup> When natural reproduction still occurred in the Sea of Azov population, beluga sturgeon had two migrations up the Don each year, a spring and a winter run.<sup>66</sup>

## IV. **Population Trends**

Estimates of total population size for beluga sturgeon are not available.<sup>67</sup> However, historic catch levels of *H. huso* have been an order of magnitude higher in the

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<sup>58</sup> Berg, 1948, p. 58.

<sup>59</sup> TRAFFIC, 2000, p. 90.

<sup>60</sup> Bemis et al, 1997, p. 61.

<sup>61</sup> Bacalbasa-Dobrovici, 1997a, p. 204.

<sup>62</sup> Hensel and Holcik, 1997, p. 191.

<sup>63</sup> Hensel and Holcik, 1997, p. 187.

<sup>64</sup> Birstein et al, 1997, p. 432.

<sup>65</sup> Berg, 1948, p. 57.

<sup>66</sup> Berg, 1948, p. 57.

<sup>67</sup> TRAFFIC, 2000, p. 88.

Caspian Sea than in the Black Sea,<sup>68</sup> and the Caspian Sea countries accounted for 90% of total beluga caviar exports in 1998.<sup>69</sup> Assuming that catch and caviar exports are a rough indicator of abundance, the Caspian Sea appears to be the most important region for beluga sturgeon.

### 1. *The Caspian Sea*

Historically, the Caspian Sea has been home to the world's largest abundance of sturgeons,<sup>70</sup> and until recently, 90% of the world's total supply of caviar originated there.<sup>71</sup>

In the late 19<sup>th</sup> century and early 20<sup>th</sup> century, sturgeon harvests often exceeded 20,000 tons of fish.<sup>72</sup> By the late 1990's, however, the catch had declined to roughly 1000 tons per year.<sup>73</sup> The Russian State Committee for Fisheries projects that catch for the 2000 fishing year will be 400 metric tons;<sup>74</sup> just half the quota established by Russia. Indeed, fishermen have been unable to find enough fish to meet their quotas. Russia expects to produce 40 tons of caviar for export, a drop from 110 tons during 1999<sup>75</sup> and from 1200 tons in 1985.<sup>76</sup> Similarly, while Iran was authorized to export 90 tons of caviar in 2000, it reduced that amount to 70 tons for conservation purposes.<sup>77</sup>

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<sup>68</sup> The catch of beluga in the northern Caspian was approximately 2,800 tons in 1970; the average catch of beluga in the Danube from 1985 to 1989 was 41.1 tons (English units) per year (Hensel and Holcik, 1997, p. 191).

<sup>69</sup> Data from April-December. TRAFFIC, 2000, p. 94.

<sup>70</sup> Secor *et al.*, 2000, p. 217.

<sup>71</sup> Khodorevskaya, Dovgopol, Zhuravleva and Vlasenko, 1997. Present status of commercial stocks of sturgeons in the Caspian Sea Basin. *Environmental Biology of Fishes* 48:209-219, 1997, p. 209.

<sup>72</sup> Secor *et al.*, 2000, p. 217.

<sup>73</sup> TRAFFIC. 1999. Estimation of the stock and population conditions of sturgeons in Russia and monitoring of domestic trade in sturgeon products. TRAFFIC/Europe-Russia, December 1999.

<sup>74</sup> BBC/Interfax, 9/22/00, "Sturgeon season in Caspian to be extended."

<sup>75</sup> AP, "Black caviar exports cut in half," 10/11/99.

<sup>76</sup> Tyler, P.E. 2000. "Poacking May Kill Fish that Lay the Golden Eggs." New York Times, Section A, September 24, 2000.

<sup>77</sup> Fabricant, F. 2000. "The Dearest Eggs Since Faberge, Iranian Caviar Returns." New York Times, Section F, Page 3. October 4, 2000.

Catch figures and population estimates for beluga have followed a similar trajectory. The total catch of beluga dropped from 2,800 tons in 1970 to less than 300 tons in 1994.<sup>78</sup> The number of beluga sturgeon entering the Volga to Spawn dropped from 26,000 in the period 1961-65 to 7,000 in the 1991-95 period.<sup>79</sup> Currently, beluga sturgeon of the Caspian Sea are thought to be so depleted that there may no longer be any reproduction in the wild.<sup>80</sup> Survival of the population may be entirely dependent on hatcheries, though some spawning in the Ural River may occur.<sup>81</sup>

Even hatchery production now appears threatened. In 1995, the number of female beluga sturgeon caught in the Volga River delta was insufficient to support artificial breeding; therefore, in 1995 there was thought to be no natural or artificial reproduction of beluga sturgeon in the Volga.<sup>82</sup> Additionally, in 1995 only 85 female beluga were legally taken in the entire northern area of the Caspian Sea.<sup>83</sup> This year, local fishermen and Russian fisheries officials have complained that there are almost no large beluga available to supply broodstock to the hatcheries,<sup>84</sup> suggesting that the situation continues to worsen for beluga sturgeon in the Caspian Sea.

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<sup>78</sup> TRAFFIC, 2000, p. 88.

<sup>79</sup> Khodorevskaya et al, 2000, p. 604.

<sup>80</sup> Khodorevskaya, R., *et al.*, 1997.

<sup>81</sup> Khodorevskaya et al, 1997, p. 210.

<sup>82</sup> Birstein et al, 1997, p. 429.

<sup>83</sup> Khodorevskaya, R., *et al.*, 1997

<sup>84</sup> BBC, 2000. "Russia set to stop exporting caviar as sturgeon dwindle." See also TRAFFIC, 2000, p. 99 and DeMeulenaer and Raymakers, 1996, p. 57.

**Table 1: Numbers of spawners in sturgeon populations in the Volga River (thousands)**

Years	Beluga Sturgeon	Russian Sturgeon	Stellate Sturgeon
1961-1965	26.0	860.3	535.4
1966-1970	26.0	1569.9	538.7
1971-1975	20.7	1983.3	490.0
1976-1980	16.6	2743.0	572.2
1981-1985	14.6	1072.0	626.3
1986-1990	12.7	717.7	683.1
1991-1995	7.0	354.8	289.2
1996-1997	1.8	102.0	132.0

Source: Khodorevskaya, R., *et al.*, 1997.

In addition to declines in abundance, the population structure of beluga sturgeon in the Caspian Sea has shifted. Shorter migration distances for juveniles have contributed to smaller average size of juveniles in the Volga,<sup>85</sup> younger average age of adult beluga,<sup>86</sup> and a shift in the predominant age of spawners away from older fish (>26 years) to younger, first-time spawners (11-17 years old).<sup>87</sup> Unstable hydrologic conditions in the period 1972-1980 contributed to lower growth rates for beluga sturgeon of the Volga River.<sup>88</sup>

The population structure of spawners has changed as well, with the relative percentage of larger and older fish (>26 years old) dropping from 16.9% in 1966-70 to 3.7% in 1991-95.<sup>89</sup> The older fish were largely replaced by hatchery produced fish, and today 96.3% of beluga sturgeon in the Volga River are hatchery propagated fish.<sup>90</sup>

## 2. *The Black Sea*

<sup>85</sup> Khodorevskaya, et al, 1997, p. 212.

<sup>86</sup> Khodorevskaya, et al, 2000, p. 602.

<sup>87</sup> Khodorevskaya, et al, 2000, p. 606.

<sup>88</sup> Raspopov, 1993, p. 82.

<sup>89</sup> Khodorevskaya et al, 2000, p. 606.

<sup>90</sup> Khodorevskaya et al, 1997, p. 212.

The Black Sea population of *H. huso* occurs in the waters of Romania, Bulgaria, Georgia, the Russian Federation, Turkey, and Ukraine. It is likely extinct in the waters of Hungary, Slovakia, and Moldova.<sup>91</sup> Commercial exploitation of sturgeon in the Danube River delta has occurred for more than 2000 years and in the early 20<sup>th</sup> century Romanian caviar was exported to Europe and the United States.<sup>92</sup> As early as the 16<sup>th</sup> century, catches of this valuable and intensively harvested fish started to decline in the middle Danube (river km 955-1880).<sup>93</sup> Beluga catches in the middle and upper Danube declined precipitously by the mid-19<sup>th</sup> century and only 16 beluga were taken in the Slovakian-Hungarian stretch of the river between 1857 and 1957.<sup>94</sup> Construction of the Iron Gates I (Djerdap I) and Iron Gates II (Djerdap II) dams in the late 20<sup>th</sup> century added further stress to the middle and upper river populations. Though landings of beluga and Russian sturgeon combined spiked briefly after construction of the Iron Gates I dam to 128 tons per year (25 tons per year higher than the preceding 5-year average), they dropped to 41 tons per year by 1985 and remained at that level for that portion of the river through the 1980s.<sup>95</sup>

In the lower Danube and its delta there were reports of declines in beluga sturgeon landings by 1835, and by the early 20<sup>th</sup> century sturgeon landings in the lower Danube dropped dramatically.<sup>96</sup> By the 1960s catch in the lower Danube had fallen to 220 tons per year and had fallen again to 12.7 tons per year by 1994.<sup>97</sup> By 1995, Romania

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<sup>91</sup> TRAFFIC, 2000, p. 89-90.

<sup>92</sup> Bacalbasa-Dobrovici, 1997a, p. 202; Bacalbasa-Dobrovici, n.d., p. 1.

<sup>93</sup> Hensel and Holcik, 1997, p. 189.

<sup>94</sup> Hensel and Holcik, 1997, p. 191.

<sup>95</sup> Hensel and Holcik, 1997, p. 191; The brief spike in landings is attributed to the ease of catching migrating sturgeon that congregated in pools directly below the dam. These numbers are reported differently in the TRAFFIC, 2000 report (p. 91). The TRAFFIC estimates appear to differ from the original report by Hensel and Holcik (1997).

<sup>96</sup> Bacalbasa-Dobrovici, 1997a, p. 203.

<sup>97</sup> Bacalbasa-Dobrovici, 1997a, p. 203.

reported total beluga sturgeon landings from the Danube and Black Sea of just 7 tons per year.<sup>98</sup> During the 1990s, the average annual catch of beluga by Romania was 7.6 tons.<sup>99</sup> Bulgaria landed an average of 36.4 tons per year of beluga sturgeon for the period 1995-1999. Bulgaria now surpasses Romania as an exporter of beluga caviar to world markets, exporting the third highest amount of beluga caviar in 1999. Bulgarian exports of *H. huso* caviar total just 19% of that of the Russian Federation and 21% of that of Kazakhstan, the world's largest beluga caviar exporters.<sup>100</sup>

As noted above, Beluga sturgeon are considered vulnerable in the lower Danube, critically endangered in the middle Danube, and extirpated from the upper Danube.<sup>101</sup> The average size of beluga sturgeon caught in Romanian waters is smaller than in the past<sup>102</sup> and the entire Black Sea population is classified as “endangered” by the IUCN.<sup>103</sup>

### 3. *The Sea of Azov*

Historically, spawning populations of beluga sturgeon used the Don River for two annual spawning migrations. In 1934 in the delta of the Don, 1,977 male and 66 female beluga sturgeon were caught.<sup>104</sup> In the mid-1980s, the total biomass of *H. huso* in the Sea of Azov was estimated to be around 1770 tons, however a mass die-off of sturgeon following that time may have further depleted their numbers.<sup>105</sup>

## V. **Factors Contributing to Decline**

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<sup>98</sup> TRAFFIC, 2000, p. 93 (catches converted from metric to English units).

<sup>99</sup> TRAFFIC, 2000, p. 93 (catches converted from metric to English units).

<sup>100</sup> TRAFFIC, 2000, p. 94.

<sup>101</sup> Hensel and Holcik, 1997, p. 191.

<sup>102</sup> Bacalbasa-Dobrovici, p. 3.

<sup>103</sup> Birstein et al, 1997, p. 432.

<sup>104</sup> Berg, 1948, p. 57.

<sup>105</sup> TRAFFIC, 2000, p. 88.

Section 3 of the Endangered Species Act (“ESA”) defines a species as “endangered” when it “is in danger of extinction throughout all or a significant portion of its range.” 16 U.S.C. § 1532(6). Section 4 of the ESA requires FWS to determine if a species is endangered based on one or more of the following factors: (a) the present or threatened destruction, modification, or curtailment of habitat or range; (b) overutilization for commercial, recreational, scientific, or educational purposes; (c) disease or predation; (d) inadequacy of existing regulatory mechanisms; or (e) other natural or manmade factors affecting its continued existence. 16 U.S.C. § 1533(a). Additionally, FWS must give special consideration to species identified by any foreign nation or international agreement as requiring protection or as being in danger of extinction. 16 U.S.C. § 1533(b)(1).

As is clearly demonstrated by its severe and continuing population decline, and failure to reproduce without benefit of hatcheries in the Volga, Terek, Sulak, and Kura rivers<sup>106</sup> and Sea of Azov,<sup>107</sup> beluga sturgeon is in danger of becoming extinct throughout its range. As will be discussed below, this population decline has been caused by overutilization, habitat destruction, disease and pollution, and the inadequacy of existing regulatory mechanisms. Accordingly, and based upon the best scientific evidence available, FWS must list beluga sturgeon as an endangered species under the ESA.

A. *Overutilization*

1. *The Caspian Sea*

Overutilization – specifically, overfishing and poaching fueled by the lucrative caviar market – is perhaps the single most important factor that is endangering beluga sturgeon with extinction. With the dissolution of the Soviet Union, regulation of northern

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<sup>106</sup> Khodorevskaya et al, 1997, p. 210.

<sup>107</sup> Birstein, 1993, p. 781; TRAFFIC, 2000, p. 90.

Caspian Sea fisheries, at one time strong and effective, has largely collapsed.<sup>108</sup> With the exception of Iran, Caspian Sea fishing nations have not developed effective sturgeon management programs, and enforcement of laws against poaching is sporadic or absent.<sup>109</sup>

As a result, the level of poaching in the Caspian Sea and Volga River has been estimated to be 6-10 times greater than the legal harvest, and not more than 15-20% of the actual sturgeon harvest is thought to be registered in official reports.<sup>110</sup> By 1998, the U.S. Fish and Wildlife Service estimated that over 50% of the worldwide trade in caviar is illegal.<sup>111</sup> While the adoption of international trade requirements in 1998 has helped to reduce the illegal trade, as long as one sturgeon can provide the equivalent of a month's salary in the economically depressed region,<sup>112</sup> poaching is likely to continue.

## 2. *The Black Sea*

Like the Caspian range states, major beluga fishing nations of the Black Sea have experienced similar political and economic upheaval over the past decade. Romania, once the second largest source of the world's caviar,<sup>113</sup> is no longer one of the top five exporting nations of beluga caviar.<sup>114</sup> Catches in the lower Danube have dwindled from historical highs of tens of thousands of fish per year to just hundreds of per year at present.<sup>115</sup>

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<sup>108</sup> Secor, *et al.*, 2000, p. 211.

<sup>109</sup> Secor, *et al.*, 2000, p. 9.

<sup>110</sup> TRAFFIC, 1999.

<sup>111</sup> USFWS, 1998.

<sup>112</sup> Horvath, John. 1999. Cousteau Society Warns that the Caspian Sea is Dying. Jan. 7, 1999. (<http://www.heise.de/tp/english/inhalt/co/5029/1.html>).

<sup>113</sup> Bacalbasa-Dobrovici, 1997b, p. 1.

<sup>114</sup> TRAFFIC, 2000, p. 94.

<sup>115</sup> Bacalbasa-Dobrovici, 1997a, p. 202; TRAFFIC, 2000 p. 92-93 (estimate of hundreds of fish based on 1999 total catch of 47.1 tons (English) by Romania and Bulgaria. Assuming an average weight of fish of 120 pounds, the 1999 yield would be 785 fish).

Bulgaria reported in 2000 that prolonged unregulated fishing pressure has disrupted the age composition of the beluga populations.<sup>116</sup> A Turkish caviar processor located on the Black Sea reports that his annual caviar production has dropped from 44 tons per year in the 1940s to 0.2 tons per year by 1989.<sup>117</sup> In 2000, TRAFFIC reported that trawlers operating illegally off the Turkish coast in the Black Sea caught beluga sturgeon as bycatch.<sup>118</sup> Georgia also reports an increase in illegal fishing in recent years.<sup>119</sup> Declining catch rates, declining export totals, and reported illegal fishing point to overutilization of the Black Sea population of *H. huso*.

B. *The Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range.*

Currently, beluga sturgeon are thought to be so depleted that reproduction in the wild is limited to a small and highly compromised portion of the species' historical spawning habitat.<sup>120</sup>

1. *The Caspian Sea*

Beluga sturgeon are in danger of becoming extinct in part due to the loss of a very large portion of their spawning habitat. By preventing sturgeons from reaching their main spawning grounds, dams have dramatically reduced the amount of spawning habitat available to sturgeon in the Caspian Basin. As noted above, historically, Caspian sturgeon populations spawned in the Volga, Ural, Kura, Terek and Sulak rivers;<sup>121</sup> now, the Ural River is the only river where sturgeons continue to reproduce naturally, without

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<sup>116</sup> TRAFFIC, 2000, p. 92.

<sup>117</sup> TRAFFIC, 2000, p. 94.

<sup>118</sup> TRAFFIC, 2000, p. 94.

<sup>119</sup> TRAFFIC, 2000, p. 92.

<sup>120</sup> Khodorevskaya, R., *et al.*, 1997; TRAFFIC, 2000, p. 89; Birstein et al, 1993, p. 781.

<sup>121</sup> Khodorevskaya, R., *et al.*, 1997.

the benefits of hatcheries,<sup>122</sup> and some believe that the spawning stock of sturgeons in the Ural have been essentially destroyed by poachers.<sup>123</sup>

On the Volga River (accounting for 75% of the Caspian catch),<sup>124</sup> dams have eliminated virtually all of the beluga spawning grounds.<sup>125</sup>

## 2. *The Black Sea*

Dam construction on the Danube has greatly decreased spawning habitat available to beluga sturgeon, contributing to the severe depletion of the population in the middle and upper river.<sup>126</sup> Dam construction on the Yesilirmak and the Kizilirmak Rivers in Turkey has also limited upstream migration for beluga.<sup>127</sup>

### C. *Disease and Pollution.*

#### 1. *The Caspian Sea*

Population growth and industrial development in the Caspian region have generated an immense pollution problem. The World Bank estimates that one million cubic meters of untreated industrial wastewater is discharged into the Caspian annually.<sup>128</sup> Soviet oil extraction left behind polluted soil and water, rusty equipment, and well fires that burned for years.<sup>129</sup> The long history of oil contamination combined with untreated sewage from towns along the Volga River, industrial discharges and agricultural runoff have significantly degraded the Caspian Sea.<sup>130</sup> Meanwhile, the five countries surrounding the sea are rushing to exploit still untapped oil deposits. Pollutants

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<sup>122</sup> DeMeulenaer and Raymakers, 1996, p. 15.

<sup>123</sup> DeMeulenaer and Raymakers, 1996, p. 23.

<sup>124</sup> Khodorevskaya, R., *et al.*, 1997, p. 210.

<sup>125</sup> Birstein, 1997.

<sup>126</sup> Hensel and Holcik, 1997.

<sup>127</sup> TRAFFIC, 2000, p. 94.

<sup>128</sup> U.S. Department of Energy, 2000, p. 19.

<sup>129</sup> U.S. Department of Energy, 2000, p. 18.

<sup>130</sup> U.S. Department of Energy, 2000, p. 18.

from urban and agricultural runoff and industrial discharges have been associated with reproductive and other abnormalities in sturgeon, as well as large fish kills.<sup>131</sup>

Diseases due to pollution have been recorded in all populations of Caspian Sea sturgeon.<sup>132</sup> In 1987, muscle degeneration was noticed on a massive scale among Caspian Sea sturgeon.<sup>133</sup> It has been suggested that this muscular atrophy was caused by toxosis resulting from increasing pollution levels in the Caspian Sea.<sup>134</sup>

Accumulation of heavy metals and pesticides in major organs and muscles of Caspian Sea sturgeon was recently discovered.<sup>135</sup> Since the late 1980s, tumors and other abnormalities have been found in beluga, Russian, and stellate species.<sup>136</sup> In 1990, 100% of eggs taken in the Volga River from beluga, Russian, and stellate sturgeon females showed abnormalities and 100% of the embryos were nonviable.<sup>137</sup>

## 2. *The Black Sea*

The Black Sea ecosystem has also been seriously compromised as sturgeon habitat during the last century. Romania, Bulgaria, and the Czech Republic have experienced widespread deforestation, increasing water turbidity in sturgeon spawning areas and increasing pollution loads of pesticides and fertilizers to the Black Sea.<sup>138</sup> Pollution of the Dniester River threatens any *H. huso* populations that occur there.<sup>139</sup> Approximately 85% of the Danube River delta has been diked and 300 reservoirs in the Danube Basin have been formed by damming, and sturgeon spawning habitat has been

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<sup>131</sup> Debus, L., 1997, p. 63. *See also* Birstein, V. Concluding Remarks, same volume, p. 81, and Altufiev, Y., Morphofunctional abnormalities in the organs and tissues of the Caspian sea sturgeon caused by ecological changes, same volume.

<sup>132</sup> Khodorevskaya et al., 1997, p. 215.

<sup>133</sup> Khodorevskaya et al., 1997, p. 215.

<sup>134</sup> Khodorevskaya et al., 1997, p. 215.

<sup>135</sup> Khodorevskaya et al., 1997, p. 215.

<sup>136</sup> Khodorevskaya et al., 1997, p. 216.

<sup>137</sup> Khodorevskaya et al., 1997, p. 216.

<sup>138</sup> Bacalbasa-Dobrovici, 1997a, p. 203-204.

<sup>139</sup> TRAFFIC, 2000, p. 93.

lost to sand and gravel dredging.<sup>140</sup> These nearshore waters have also been subject to eutrophication and associated phytoplankton blooms, diminished water clarity, and replacement of native crustaceans and fishes with alien jellyfish (*Aurellia aurita*).<sup>141</sup> Pollution in the Black Sea is from tens to hundreds of times higher than in the Atlantic or Pacific Oceans and is more than five times higher than in the Mediterranean Sea.<sup>142</sup>

D. *Inadequacy of Existing Regulatory Mechanisms.*

1. *Regulation by the Caspian Sea States*

Countless commentators have noted the complete failure of regulatory oversight in the Caspian Sea.<sup>143</sup> With the exception of Iran, Caspian Sea fishing nations have not enforced effective sturgeon management programs. The dramatic decline of the three commercial species of sturgeon testifies to this failure.

Despite the severe decline in sturgeon populations, the allowable catch in Russia remains much higher than it should be to allow populations to rejuvenate.<sup>144</sup> While the allowable catch for 1999 was over 1,020 tons, the Caspian Fishery Institute believed that the catch could not sustainably exceed 710 tons, and TRAFFIC suggested that the catch should not exceed 690 tons.<sup>145</sup>

In the 1950's, the Russians initiated artificial reproduction and stock enhancement programs for beluga, Russian and stellate sturgeons in hatcheries along the Volga River.<sup>146</sup> While there are a number of environmental problems associated with, it is clear that they have been essential to maintaining beluga.<sup>147</sup> To supply these hatcheries,

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<sup>140</sup> Bacalbasa-Dobrovici, 1997a, p. 204.

<sup>141</sup> Bacalbasa-Dobrovici, 1997a, p. 205.

<sup>142</sup> Bacalbasa-Dobrovici, 1997a, p. 205.

<sup>143</sup> Khodorevskaya et al., 2000; TRAFFIC Europe-Russia, 1999; Lauck, 1999.

<sup>144</sup> TRAFFIC Europe-Russia, 1999.

<sup>145</sup> TRAFFIC Europe-Russia, 1999.

<sup>146</sup> DeMeulenaer and Raymakers, 1996, p. 17.

<sup>147</sup> Secor, *et al.*, in press, p. 212.

mature fish are captured each year. (The same spawners are generally not kept and used again owing to various technical and biological limitations.<sup>148</sup>) These hatcheries have helped maintain the populations of the three Caspian Sea species, but because beluga spawners have become increasingly difficult to find, there is concern that the hatcheries will no longer be able to sustain beluga in the Caspian Sea.<sup>149</sup>

## 2. *Regulation by the Black Sea countries*

Bulgaria closes the fishery at the peak of the breeding season, and prohibits the use of poison, bottom trawling and dragging, and has a minimum size limit. Due to budgetary constraints, Bulgaria has not recently monitored the wild sturgeon population or the success of its restocking program.<sup>150</sup> Ukraine prohibits possession of *H. huso*.<sup>151</sup> These and other regulations controlling the fishery for beluga have not been sufficient to arrest the decline of beluga in the Black Sea.

## 3. *International Regulations*

In its 1996 assessment, IUCN listed beluga sturgeon as endangered (IUCN Red List, 2000). According to TRAFFIC, the 1999 state of Russian sturgeon populations is “catastrophic.”<sup>152</sup> Increasing concern about the status of Caspian Sea sturgeon led to international action in 1998 to begin regulating trade in caviar by listing all sturgeon species under Appendix II of the Convention on the International Trade in Endangered Species, known as CITES.<sup>153</sup> As the result of the listing, caviar exports must be

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<sup>148</sup> DeMeulenaer and Raymakers, 1996, p. 57.

<sup>149</sup> Secor, 2000, p. 10.

<sup>150</sup> TRAFFIC, 2000, p. 96. Measures for the other Black Sea nations are also described.

<sup>151</sup> TRAFFIC, 2000, p. 96.

<sup>152</sup> TRAFFIC Europe-Russia, 1999, p. 16.

<sup>153</sup> Prior to the 1997 listing of all sturgeon and paddlefish species on CITES Appendix I or II, two sturgeon species, shortnose (*Acipenser brevirostrum*) and Baltic (*Acipenser sturio*), were listed under CITES Appendix I and two species, Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and American paddlefish (*Polyodon spathula*), were listed under CITES Appendix II.

accompanied by a CITES export permit issued by a designated management agency in the country of export.<sup>154</sup> A separate “Scientific Authority” in the exporting country must determine that commercial trade is not detrimental to the survival of the species in the wild. Currently all but one (Turkmenistan) of the nations bordering the Caspian Sea are parties to the CITES convention.

Starting in 2001, exported caviar must carry a non-reusable label that includes identification of the grade (beluga, sevruga, osetra), the country of origin, the year of harvest, and an identifying number. Such labels are required only for the initial export of caviar, not the re-export. How effective these labeling restrictions will prove in stemming illegal caviar imports, however, remains questionable because the labels are required only for the initial export of caviar, not the re-export.

Our organizations strongly support existing CITES trade restrictions on caviar, which are thought to have helped reduce the export of illegally produced caviar from Russia.<sup>155</sup> However, given the extremely precarious state of beluga sturgeon, it is unlikely that these requirements are sufficient to halt this species’ downward spiral.<sup>156</sup> Part of the reason for this lies in the fact that a significant portion of the international caviar trade is illegal, conducted outside the confines of CITES requirements. Another part, however, is due to the pressure put on beluga sturgeon by the legal trade.

The legal trade permitted under existing CITES rules is very significant when viewed against the exceedingly grim statistics for beluga. According to 1998 CITES data

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<sup>154</sup> Products that are re-exported (after repackaging) must also be accompanied by a permit issued by the re-exporting country. These re-export permits can only be granted when the issuing Management Authority is satisfied that the shipments were imported into the country in accordance with the provisions of CITES.

<sup>155</sup> TRAFFIC, 1999. Estimation of the stock and population conditions of sturgeons in Russia and monitoring of domestic trade in sturgeon products. TRAFFIC/Europe-Russia, December 1999.

<sup>156</sup> Secor, *et al.*, 2000, p. 213; Khodorevskaya *et al.*, 2000, p. 608.

for the last 9 months of 1998, gross exports of *H. huso* caviar from range States totaled 21.3 metric tons, or more than 45,000 pounds. This roughly represents the loss of approximately 2,500 female beluga sturgeon,<sup>157</sup> and countless other non-gravid females as well as males caught and discarded in the fishery.

As noted above, the number of spawners in the Volga – the most important river in the world for beluga sturgeon – was estimated at only 1,800 fish in 1995, and by all accounts the population has declined since then. The CITES authorized exports essentially permit the mortality of nearly twice this number. It is difficult to see how trade at this level – indeed any level – can be viewed as non-detrimental to the survival of the species.

## **VI. Benefits of Listing**

Listing beluga caviar as an endangered species will mean that imports of beluga caviar into the United States will be prohibited. This will make an important contribution to the conservation of these fish because imports of beluga caviar into the United States are a significant part of the total international trade. Such imports in the last 9 months of 1998 totaled roughly 19,000 pounds (the equivalent of almost 40% of the total gross exports from the range states) and totaled roughly 28,000 pounds in 1999. This latter

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<sup>157</sup> This estimate is based on a beluga sturgeon gonadosomatic index of 0.07-0.15. The estimate is derived from the following calculation: (1) (pounds of caviar)/(GSI)=pounds of fish; (2) (pounds of fish)/(avg. weight spawning beluga) = the # beluga represented by the imported quantity of caviar. Using 45,000 lbs of caviar divided by the upper range of GSI (.15) results in 300,000 pounds of beluga, or the lower range of GSI (.07) results in 642,857 pounds of beluga. Multiplying Khodorevskaya (2000)'s relative percentages for weight classes of spawning beluga in the Volga for 1999 (p. 606) by TRAFFIC (2000, p. 90) and Raspopov's (1993, p. 76) average weight by age class of female beluga, we determined that between 1881 and 4033 individuals were killed to produce 45,000 pounds of caviar. 45,000 lbs of caviar divided by the median GSI (.11) results in 409,090 pounds of beluga. Using Khodorevskaya (2000)'s % for weight classes of spawning beluga (p. 606) and TRAFFIC (2000, p. 90) and Raspopov's (1993, p. 76) weight by age of female beluga, we determined that 2566 individuals were killed for the production of 45,000 pounds of caviar.

number represents the loss of almost 1,600 female fish,<sup>158</sup> again a significant number in such a depleted population.

Even assuming that some of beluga caviar currently imported into the United States is diverted to the black market under a U.S. trade ban, a prohibition on trade to the U.S. is still important. This is because we are at the stage, regrettably, where every fish counts.

Combined with other actions to improve enforcement and crack down on poaching, eliminating the trade in beluga caviar to the United States will help conserve these fish. It will also set an important precedent for international action by other importing nations, and will send an important signal to the range states that the United States is serious about the conservation of beluga and other imperiled sturgeon.

## **VII. Conclusion**

Beluga sturgeon in the Caspian Sea region is on the brink of extinction, and dramatic action is necessary if this species is to be preserved. FWS must move quickly to designate beluga sturgeon as endangered, and implement the resulting ban on importation of beluga sturgeon and caviar.

Dated: December 11, 2000

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<sup>158</sup> See footnote 3 *infra*.

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