Council to comment more quickly on proposed activities and projects, and enable the Council to work more effectively in addressing fish habitat and ecosystem issues in our region.

Special Accommodations

The meeting is physically accessible to people with disabilities. Requests for sign language interpretation or other auxiliary aid should be directed to M. Jan Saunders, (302) 526–5251, at least 5 days prior to the meeting date.

Dated: August 19, 2015.

Emily H. Menashes,

Deputy Director, Office of Sustainable Fisheries, National Marine Fisheries Service.

[FR Doc. 2015–20831 Filed 8–21–15; 8:45 am]

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[Docket No. 130718637–5699–02]

RIN 0648–XC775

Endangered and Threatened Wildlife and Plants; Notice of 12-Month Finding on a Petition To List the Orange Clownfish as Threatened or Endangered Under the Endangered Species Act

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of 12-month finding and availability of a status review report.

SUMMARY: We, NMFS, announce a 12-month finding and listing determination on a petition to list the orange clownfish (*Amphiprion percula*) as threatened or endangered under the Endangered Species Act (ESA). We have completed a comprehensive status review under the ESA for the orange clownfish and we determined that, based on the best scientific and commercial data available, the orange clownfish does not warrant listing under the ESA. We conclude that the orange clownfish is not currently in danger of extinction throughout all or a significant portion of its range and is not likely to become so within the foreseeable future.

DATES: The finding announced in this notice was made on August 24, 2015.

ADDRESSES: You can obtain the petition, status review report, 12-month finding, and the list of references electronically on our NMFS Web site at: *http://www.fpir.noaa.gov/PRD/prd_reef_fish.html.*

FOR FURTHER INFORMATION CONTACT: Krista Graham, NMFS, Pacific Islands Regional Office, (808) 725–5152; or Kimberly Maison, NMFS, Pacific Islands Regional Office, (808) 725–5143; or Chelsey Young, NMFS, Office of Protected Resources, (301) 427–8491.

SUPPLEMENTARY INFORMATION:

Background

On September 14, 2012, we received a petition from the Center for Biological Diversity (Center for Biological Diversity, 2012) to list eight species of pomacentrid reef fish as threatened or endangered under the ESA and to designate critical habitat for these species concurrent with the listing. The species are the orange clownfish (*Amphiprion percula*) and seven other damselfishes: The yellowtail damselfish (*Microspathodon chrysurus*), Hawaiian dascyllus (*Dascyllus albisella*), blue-eyed damselfish (*Plectroglyphidodon johnstonianus*), black-axil chromis (*Chromis atripectoralis*), blue-green damselfish (*Chromis viridis*), reticulated damselfish (*Dascyllus reticulatus*), and blackbar devil or Dick's damselfish (*Plectroglyphidodon dickii*). Given the geographic ranges of these species, we divided our initial response to the petition between our Pacific Islands Regional Office (PIRO) and Southeast Regional Office (SERO). PIRO led the response for the seven Indo-Pacific species. On September 3, 2014, PIRO published a positive 90-day finding (79 FR 52276) for the orange clownfish announcing that the petition presented substantial scientific or commercial information indicating the petitioned action of listing the orange clownfish may be warranted and explained the basis for that finding. We also announced a negative 90-day finding for the six Indo-Pacific damselfishes: The Hawaiian dascyllus, blue-eyed damselfish, black-axil chromis, blue-green damselfish, reticulated damselfish, and blackbar devil or Dick's damselfish. SERO led the response to the petition to list the yellowtail damselfish and, on February 18, 2015, announced a negative 90-day finding for that species (80 FR 8619).

In our positive 90-day finding for the orange clownfish, we also announced the initiation of a status review of the species, as required by section 4(b)(3)(A) of the ESA, and requested information to inform the agency's decision on whether the species warranted listing as endangered or threatened under the ESA.

We are responsible for determining whether species are threatened or endangered under the ESA (16 U.S.C. 1531 *et seq.*). To make this determination, we first consider whether a group of organisms constitutes a "species" under the ESA, then whether the status of the species qualifies it for listing as either threatened or endangered. Section 3 of the ESA defines "species" to include "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." On February 7, 1996, NMFS and the U.S. Fish and Wildlife Service (USFWS; together, the Services) adopted a policy describing what constitutes a distinct population segment (DPS) of a taxonomic species (the DPS Policy; 61 FR 4722). The DPS Policy identifies two elements that must be considered when identifying a DPS: (1) The discreteness of the population segment in relation to the remainder of the species (or subspecies) to which it belongs; and (2) the significance of the population segment to the remainder of the species (or subspecies) to which it belongs. As stated in the DPS Policy, Congress expressed its expectation that the Services would exercise authority with regard to DPSs sparingly and only when the biological evidence indicates such action is warranted. Based on the scientific information available, we determined that the orange clownfish (*Amphiprion percula*) is a "species" under the ESA. There is nothing in the scientific literature indicating that this species should be further divided into subspecies or DPSs.

Section 3 of the ESA defines an endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range" and a threatened species as one "which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." We interpret an "endangered species" to be one that is presently in danger of extinction. A "threatened species," on the other hand, is not presently at risk of extinction, but is likely to become so in the foreseeable future. In other words, the primary statutory difference between an endangered and threatened species is the timing of when a species may be in danger of extinction, either presently (endangered) or in the foreseeable future (threatened).

When we consider whether a species might qualify as threatened under the ESA, we must consider the meaning of the term "foreseeable future." It is appropriate to interpret "foreseeable future" as the horizon over which predictions about the conservation status of the species can be reasonably relied upon. The foreseeable future

considers the life history of the species, habitat characteristics, availability of data, particular threats, ability to predict threats, and the reliability to forecast the effects of these threats and future events on the status of the species under consideration. Because a species may be susceptible to a variety of threats for which different data are available, or which operate across different time scales, the foreseeable future is not necessarily reducible to a particular number of years. In determining an appropriate ''foreseeable future'' timeframe for the orange clownfish, we considered the generation length of the species and the estimated life span of the species. Generation length, which reflects turnover of breeding individuals and accounts for non-breeding older individuals, is greater than first age of breeding but lower than the oldest breeding individual (IUCN 2015) (*i.e.,* the age at which half of total reproductive output is achieved by an individual). For the orange clownfish, we estimated this to range between 6 and 15 years. We concluded that two to three generation lengths of the species comports with the estimated lifespan of approximately 30 years for the orange clownfish (Buston and Garcia, 2007). Therefore, we conservatively define the foreseeable future for the orange clownfish as approximately 30 years from the present.

On July 1, 2014, NMFS and USFWS published a policy to clarify the interpretation of the phrase ''significant portion of its range'' (SPR) in the ESA definitions of ''threatened'' and ''endangered'' (the SPR Policy; 79 FR 37578). Under this policy, the phrase ''significant portion of its range'' provides an independent basis for listing a species under the ESA. In other words, a species would qualify for listing if it is determined to be endangered or threatened throughout all of its range or if it is determined to be endangered or threatened throughout a significant portion of its range. The policy consists of the following four components:

(1) If a species is found to be endangered or threatened in only an SPR, the entire species is listed as endangered or threatened, respectively, and the ESA's protections apply across the species' entire range.

(2) A portion of the range of a species is ''significant'' if the species is not endangered or threatened throughout its range, and its contribution to the viability of the species is so important that, without the members in that portion, the species would be in danger of extinction or likely to become so in

the foreseeable future, throughout all of its range.

(3) The range of a species is considered to be the general geographical area within which that species can be found at the time USFWS or NMFS makes any particular status determination. This range includes those areas used throughout all or part of the species' life cycle, even if they are not used regularly (*e.g.,* seasonal habitats). Lost historical range is relevant to the analysis of the status of the species, but it cannot constitute an SPR.

(4) If a species is not endangered or threatened throughout all of its range but is endangered or threatened within an SPR, and the population in that significant portion is a valid DPS, we will list the DPS rather than the entire taxonomic species or subspecies.

We considered this policy in evaluating whether to list the orange clownfish as endangered or threatened under the ESA.

Section 4(a)(1) of the ESA requires us to determine whether any species is endangered or threatened due to any one of the following five threat factors: The present or threatened destruction, modification, or curtailment of its habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; disease or predation; the inadequacy of existing regulatory mechanisms; or other natural or manmade factors affecting its continued existence. We are also required to make listing determinations based solely on the best scientific and commercial data available, after conducting a review of the species' status and after taking into account efforts being made by any state or foreign nation to protect the species.

In assessing extinction risk of this species, we considered the demographic viability factors developed by McElhany *et al.* (2000) and the risk matrix approach developed by Wainwright and Kope (1999) to organize and summarize extinction risk considerations. The approach of considering demographic risk factors to help frame the consideration of extinction risk has been used in many of our status reviews (see *http://www.nmfs.noaa.gov/pr/species* for links to these reviews). In this approach, the collective condition of individual populations is considered at the species level according to four demographic viability factors: Abundance, growth rate/productivity, spatial structure/connectivity, and diversity. These viability factors reflect concepts that are well founded in conservation biology and that

individually and collectively provide strong indicators of extinction risk.

Scientific conclusions about the overall risk of extinction faced by the orange clownfish under present conditions and in the foreseeable future are based on our evaluation of the species' demographic risks and section 4(a)(1) threat factors. Our assessment of overall extinction risk considered the likelihood and contribution of each particular factor, synergies among contributing factors, and the cumulative effects of all demographic risks and threats to the species.

NMFS PIRO staff conducted the status review for the orange clownfish. In order to complete the status review, we compiled information on the species' biology, demography, ecology, life history, threats, and conservation status from information contained in the petition, our files, a comprehensive literature search, and consultation with experts. We also considered information submitted by the public in response to our petition findings. A draft status review report was then submitted to three independent peer reviewers; comments and information received from peer reviewers were addressed and incorporated as appropriate before finalizing the draft report. The orange clownfish status review report is available on our Web site (see **ADDRESSES** section). Below we summarize information from this report and the status of the species.

Status Review

Species Description

The orange clownfish, *A. percula,* is a member of the Family Pomacentridae. Two genera within the Family contain 28 species of clownfish (also known as anemonefish). The number of recognized clownfish species has evolved over time due to inconsistent recognition of natural hybrids and geographic color variants of previously described species as separate species in the literature (Allen, 1991; Fautin and Allen, 1992, 1997; Buston and Garcia, 2007; Ollerton *et al.,* 2007; Allen *et al.,* 2008; Thornhill, 2012; Litsios *et al.,* 2014; and Tao *et al.,* 2014). All clownfish have a mutualistic relationship with sea anemones and this relationship has facilitated the adaptive radiation and accelerated speciation of clownfish species (Litsios *et al.,* 2012).

Amphiprion percula is known by many common English names. These names include orange clownfish, clown anemonefish, percula clownfish, percula anemonefish, orange anemonefish, true percula clownfish, blackfinned clownfish, eastern

clownfish, eastern clown anemonefish, and orange-clown anemonefish.

The orange clownfish is bright orange with three thick white vertical bars. The anterior bar occurs just behind the eye, the middle bar bisects the fish and has a forward-projecting bulge, and the posterior bar occurs near the caudal fin. The white bars have a black border that varies in width. Although this describes the type specimen, some polymorphism, or occurrence of more than one form or morph, does occur with diverse geographic regional and local color forms, mostly in the form of variation in the width of the black margin along the white bars (Timm *et al.,* 2008; Militz, 2015). While there is no difference in color pattern between sexes, dimorphic variation, or differentiation between males and females of the same species, is present in size as females are larger than males (Fautin and Allen, 1992, 1997; Florida Museum of Natural History, 2005). Maximum length for this species is approximately 80 millimeters (mm) (Fautin and Allen, 1992, 1997), but individuals up to 110 mm in length have been reported (Florida Museum of Natural History, 2005). Standard length is reported as 46 mm for females and 36 mm for males (Florida Museum of Natural History, 2005). However, size alone cannot be used to identify the sex of an individual because individuals in different groups will vary in maximum and minimum size. The total length of a fish has been correlated with the diameter of its host anemone (Fautin, 1992), with larger anemones hosting larger clownfish.

The orange clownfish very closely resembles the false percula clownfish (*A. ocellaris*), and the two are considered sibling species. There are several morphological differences that may allow an observer, upon closer examination, to distinguish between the two species. While the orange clownfish has 9–10 dorsal spines, the false percula clownfish has 10–11 dorsal spines (Timm *et al.,* 2008), and the anterior part of the orange clownfish's dorsal fin is shorter than that of the false percula clownfish. In addition, the orange clownfish has a thick black margin around its white bars whereas the false percula clownfish often has a thin or even non-existent black margin, though this is not always the case. The orange clownfish has been described as more brilliant in color, and its orange iris gives the appearance of very small eyes while the iris of false percula clownfish is grayish-orange, thus giving the appearance of slightly larger eyes (Florida Museum of Natural History, 2005). Ecologically, both species prefer the same primary host anemone species

(*Heteractis magnifica; Stichodactyla gigantean; S. mertensii*) (Fautin and Allen, 1992, 1997), though the orange clownfish prefers shallower waters than those of false percula clownfish (Timm *et al.,* 2008).

The orange clownfish and the false percula clownfish have an allopatric distribution, meaning their distributions do not overlap. The orange clownfish is found in the Indo-Pacific region of northern Queensland (Australia) and Melanesia; the false percula is found in the Andaman and Nicobar Islands in the Andaman Sea (east of India), Indo-Malayan Archipelago, Philippines, northwestern Australia, and the coast of Southeast Asia northwards to the Ryukyu Islands in the East China Sea (Fautin and Allen, 1992, 1997; Timm *et al.,* 2008). Genetically, the two species appear to have diverged between 1.9 and 5 million years ago (Nelson *et al.,* 2000; Timm *et al.,* 2008; Litsios *et al.,* 2012).

In the aquarium trade, the false percula clownfish is the most popular anemonefish and the orange clownfish is the second most popular (Animal-World, 2015). The two species are often mistaken for one another and misidentified in the aquarium trade. They are also often reported as a species complex (*i.e.,* reported as *A. ocellaris/ percula*) in trade documentation and scientific research due to the difficulty in visually distinguishing between the two species.

Habitat

The orange clownfish is described as a habitat specialist due to its symbiotic association primarily with three species of anemone: *Heteractis crispa, H. magnifica,* and *Stichodactyla gigantea* (Fautin and Allen, 1992, 1997; Elliott and Mariscal, 1997a; Ollerton *et al.,* 2007), although the species has also been reported as associating with the anemones *S. mertensii* (Elliott and Mariscal, 2001) and *S. haddoni* (Planes *et al.,* 2009). The distribution of these suitable host anemone species essentially dictates the distribution of the orange clownfish within its habitat (Elliott and Mariscal, 2001). Anemone habitat for the orange clownfish, and thus the range of the orange clownfish, is spread throughout northern Queensland (Australia), the northern coast of West Papua (Indonesia), northern Papua New Guinea (including New Britain), the Solomon Islands, and Vanuatu (Rosenberg and Cruz, 1988; Fautin and Allen, 1992, 1997; De Brauwer, 2014).

Anemones and their symbiotic anemonefish inhabit coral reefs and nearby habitats such as lagoons and

seagrass beds. Although Fautin and Allen (1992, 1997) estimate that as many anemone hosts and symbiotic fish live on sand flats or other substrate surrounding reefs as live on the reef itself, the symbiotic pairs are thought of as reef dwellers because most diving and observations occur on reefs. Both symbionts reside in shallow coastal waters primarily in depths of 1–12 meters (m) (though the anemones can be found in depths up to 50 m) and water temperatures ranging from 25–28 °C (77–82 °F) (Fautin and Allen, 1992, 1997; Randall *et al.* 1997).

Although anemonefishes have been the subject of considerable scientific research, less is known about the population dynamics or biology of the anemones that serve as their hosts. There are over 1,000 anemone species but only 10 of them are known to be associated with anemonefish. Anemones are able to reproduce both sexually and asexually, but it is unknown which form of reproduction is more common. Anemones are likely slow growing and very long lived, living decades to several centuries (Fautin, 1991; Fautin and Allen, 1992, 1997). To be a viable host for anemonefish, an anemone must be of a sufficient size to provide shelter and protection from predators.

Clownfishes, including the orange clownfish, are a unique group of fishes that can live unharmed among the stinging tentacles of anemones. A thick mucus layer cloaks the fish from detection and response by anemone tentacles (Rosenberg and Cruz, 1988; Elliott and Mariscal, 1997a, 1997b). The symbiosis between the orange clownfish and its host anemones serves as an effective anti-predation measure for both symbionts. Predators of both anemones and anemonefish are deterred by the anemone's stinging tentacles and by the presence of territorial clownfish. In return, anemonefish swim through, and create fresh water circulation for, the stationary anemone, allowing it to access more oxygenated water, speed up its metabolism, and grow faster (Szczebak *et al.,* 2013). Anemonefish also fertilize host anemones with their ammonia-rich waste (Roopin and Chadwick, 2009; Cleveland *et al.,* 2011), leading to increases in anemone growth and asexual reproduction (Holbrook and Schmitt, 2005).

Typically only one species of anemonefish occupies a single anemone at any given time due to niche differentiation, although this is not always the case. The orange clownfish is a highly territorial species, likely due to intense competition for limited resources, with niche differentiation

caused by the distribution, abundance, and recruitment patterns of competing species (Fautin and Allen, 1992, 1997; Elliott and Mariscal, 1997a, 2001; Randall *et al.,* 1997). Once anemonefishes settle into a host, they are unlikely to migrate between anemones (Mariscal, 1970; Elliott *et al.,* 1995).

Diet, Feeding, and Growth

Anemonefishes are omnivorous and feed on a variety of prey items consisting of planktonic algae and zooplankton, such as copepods and larval tunicates (Fautin and Allen, 1992, 1997). The orange clownfish also feeds on prey remnants left over from its host anemone's feeding activity as well as dead tentacles from its host (Fautin and Allen, 1992, 1997; Florida Museum of Natural History, 2005).

An anemone will typically host a female and male breeding pair and up to four other subordinate, non-breeding and non-related *A. percula* males (Buston, 2003a; Buston and Garcia, 2007; Buston *et al.,* 2007). Individuals rarely stray beyond the periphery of their anemone's tentacles to feed (Buston, 2003c). A size-based hierarchy develops within each group; the female is the largest (rank 1), the dominant male second largest (rank 2), and the non-breeding subordinate males get progressively smaller as you descend the hierarchy (ranks 3–6) (Allen, 1991). Subordinates tend to be 80 percent of the size of their immediate dominant in the hierarchy (Buston, 2003b; Buston and Cant, 2006). Subordinates likely regulate their growth to avoid coming into conflict with their immediate dominant, and thereby avoid eviction from the social group (Buston, 2003b; Buston and Wong, 2014). When a fish is removed from the hierarchical social group structure (due to mortality or collection), all smaller members grow rapidly, filling in the size gap, to the point that they are once again 80 percent the size of their immediate dominant (Fautin and Allen, 1992, 1997; Buston, 2003b).

Reproduction and Development

Spawning for orange clownfish can occur year-round due to perpetually warm waters within the species' range (Fautin and Allen, 1992, 1997). Spawning is also strongly correlated with the lunar cycle, with most nesting occurring when the moon is full or nearly so (Fautin and Allen, 1992, 1997).

Like all anemonefishes, all orange clownfish are born as males (Fautin and Allen, 1992, 1997). Females develop through protandrous hermaphroditism,

or sex change from male to female. This occurs when the female and largest member of the group dies (or is otherwise removed) and the next largest male changes sex to become the dominant breeding female. The second largest male subsequently becomes the dominant male (Rosenberg and Cruz, 1988; Fautin and Allen 1992, 1997). Only the dominant pair contributes to the reproductive output of a group within an anemone. Non-breeders within the social group do not have an effect on the reproductive success of mating pairs (Buston, 2004; Buston and Elith, 2011).

Adult male and female orange clownfish form strong monogamous pair-bonds. Once eggs are laid, the male follows closely behind and fertilizes them externally. Clutch sizes vary widely between 100 to over 1000 eggs laid (Fautin and Allen, 1992, 1997; Dhaneesh *et al.,* 2009), with an average of 324 eggs ± 153 (mean ± one standard deviation) recorded in Madang Lagoon, Papua New Guinea (Buston and Elith, 2011), depending on fish size and previous experience. Larger and more experienced mating pairs will produce more eggs per clutch (Fautin and Allen, 1992, 1997; Buston and Elith, 2011; Animal-World, 2015), and can produce up to three clutches per lunar cycle (Gordon and Hecht, 2002; Buston and Elith, 2011).

After egg deposition and fertilization have finished, a 6–8 day incubation period begins, with developmental rate varying with temperature and oxygen content of the water (Dhaneesh *et al.,* 2009). Average hatch success recorded in Madang Lagoon, Papua New Guinea, was estimated at 87 percent (Buston and Elith, 2011). Upon hatching, larvae enter a pelagic phase and are likely engaged in active swimming and orientation, and also transported by ocean currents (Fautin and Allen, 1992, 1997; Leis *et al.,* 2011). The larval stage of the species ends when the larval anemonefish settles into a host anemone approximately 8–12 days after hatching (Fautin and Allen, 1992, 1997; Almany *et al.,* 2007; Buston *et al.,* 2007).

Anemonefish search for and settle into a suitable host anemone using a variety of cues. Embryos and newly hatched juveniles may learn cues from the host anemone where they hatched and respond to these imprinted cues when searching for suitable settlement locations (Fautin and Allen, 1992, 1997; Arvedlund *et al.,* 2000; Dixson *et al.,* 2014; Miyagawa-Kohshima, 2014; Paris *et al.,* 2013). Dixson *et al.* (2008, 2014) and Munday *et al.* (2009a) found that orange clownfish are responsive to olfactory cues such as leaf litter and

tropical trees, a means of locating island reef habitats, when searching for a settlement site. Innate recognition is also used and refers to the ability of anemonefish to locate a suitable host without prior experience (Fautin and Allen, 1992, 1997; Miyagawa-Kohshima, 2014). Studies indicate that imprinting on anemone olfactory cues complements innate recognition, leading to rigid species-specific host recognition (Miyagawa-Kohshima, 2014).

Fish acclimation to a host anemone lasts anywhere from a few minutes to a few hours (Fautin and Allen, 1992, 1997; Arvedlund *et al.,* 2000) as a protective mucus coating develops on the anemonefish as a result of interaction with the host anemone tentacles (Davenport and Norris, 1958; Elliott and Mariscal, 1997a). Once acclimated, the mucus protection may disappear upon extended separation between host and fish. Continued contact with tentacles appears to reactivate the mucus coat (Arvedlund *et al.,* 2000). Coloration of anemonefish usually also begins during this anemone acclimation process (Elliott and Mariscal, 2001). Upon settlement, the entire metamorphosis from larva to juvenile takes about a day (Fautin and Allen, 1992, 1997).

Longevity and Resilience

Buston and Garcia (2007) studied a wild population of orange clownfish in Papua New Guinea and their results suggest that females can live up to 30 years in the wild. Although this life expectancy estimate has not been empirically proven through otolith examination, it is notably two times greater than the longevity estimated for any other coral reef damselfish and six times greater than the longevity expected for a fish that size (Buston and Garcia, 2007). Their results are consistent with the idea that organisms subjected to low levels of extrinsic mortality, like anemonefish, experience delayed senescence and increased longevity (Buston and Garcia, 2007).

Using a methodology designed to determine resilience to fishing impacts, Fishbase.org rates the orange clownfish as highly resilient, with an estimated minimum population doubling time of less than 15 months. Another analysis, using the Cheung *et al.* (2005) ''fuzzy logic'' method for estimating fish vulnerability to fishing pressure, assigned the species a low vulnerability score, with a level of 23 out of 100 (Fishbase.org, 2015).

Population Distribution, Abundance, and Structure

Clownfish first appeared and diversified in the Indo-Australian Archipelago (Litsios *et al.,* 2014). As previously mentioned, the orange clownfish is native to the Indo-Pacific region and range countries include northern Queensland (Australia), northern coast of West Papua (Indonesia), northern Papua New Guinea (including New Britain), the Solomon Islands, and Vanuatu (Rosenberg and Cruz, 1988; Fautin and Allen, 1992, 1997; De Brauwer, 2014).

The distribution of suitable host anemone species dictates the distribution of orange clownfish within its habitat (Elliott and Mariscal, 2001). The anemones *Heteractis crispa, H. magnifica,* and *S. gigantea* range throughout and beyond the orange clownfish's geographic extent. *Stichodactyla haddoni* occurs in Australia and Papua New Guinea, but has not yet officially been recorded in Vanuatu or the Solomon Islands, and *S. mertensii* officially has been recorded only from Australia within the orange clownfish's range (Fautin and Allen, 1992, 1997; Fautin, 2013). However, two recent observations extended the known distribution of *S. haddoni,* both northward and southward, indicating they have the ability to expand in range and facilitate the expanded occurrence of commensal species (Hobbs *et al.,* 2014; Scott *et al.,* 2014). Anecdotally, there are photo images and video footage of *S. haddoni* and *S. mertensii* in the Solomon Islands, Vanuatu, and Papua New Guinea (*e.g.,* Shutterstock, National Geographic, and Getty Images). Species experts, however, have not officially confirmed these reports.

Although geographically widespread, anemone species differ in their preferred habitat (*e.g.,* reef zonation, substrate, depth (Fautin, 1981)). Hattori (2006) found that *H. crispa* individuals were larger along reef edges and smaller in shallow inner reef flats. The larger anemones on reef edges experienced higher growth, probably because deeper (up to 4 m) reef edges provide more prey and lower levels of physiological stress. The author speculates that habitat and depth ideal for high anemone growth will vary by study site and occur at depths where there is a balance between available sunlight to allow for photosynthesis and low physiological stress, both of which are dependent on site-specific environmental conditions.

It is difficult to generalize the likely distribution, abundance, and trends of anemone hosts throughout *A. percula's* range; these parameters are likely highly variable across the species' range. In an assessment done throughout the Great Barrier Reef, Australia, anemones, including those that host the orange clownfish, were quantified as "common" (Roelofs and Silcock, 2008). On the other hand, Jones *et al.* (2008) and De Brauwer *et al.* (in prep) note that anemones occur in relatively low densities throughout the Indo-Pacific. Because it is difficult to generalize the likely distribution, abundance, and trends of anemones, it is therefore difficult to generalize these same parameters for *A. percula* in coral reef environments throughout its range; it is likely to be variable and dependent on local environmental conditions.

We found no information on historical abundance or recent population trends for the orange clownfish throughout all or part of its range. We also found no estimate of the current species abundance. With no existing estimate of global abundance for the orange clownfish, we estimated, based on the best available information, a total of 13–18 million individuals for the species throughout its range. This estimate is derived from De Brauwer (2014) who determined an average density for the orange clownfish within its range from 658 surveys across 205 sites throughout the species' range (northern Papua New Guinea, Solomon Islands, Vanuatu, and northern Australia). He calculated the global estimated mean density at 0.09 fish per 250 m², or 360 fish per km². In order to extrapolate this average density to estimate abundance, we used two different estimates of coral reef area within the species' range. De Brauwer (2014) estimated 36,000 km² of coral reef area within the species' range based on Fautin and Allen (1992, 1997) and Spalding *et al.* (2001). We also used newer coral reef mapping data from Burke *et al.* (2011) resulting in an estimate of approximately 50,000 km² of coral reef area within the orange clownfish's range. We used both values to determine a range of estimated abundance (13–18 million) to reflect uncertainty. It is important to note that this may be an underestimate because it is based on coral reef area, which likely does not account for most of the non-reef area where the species occurs throughout its range.

As for spatial structure and connectivity, based on the best available information, we conclude that the species is likely to have highly variable small-scale connectivity among and between meta-populations, but unknown large-scale genetic structure across its entire range. In the absence of a broad-scale phylogeographic study for *A. percula,* we are left with small-scale meta-population connectivity studies as the best available information. Results from studies in Kimbe Bay, Papua New Guinea, an area known for its high diversity of anemones and anemonefish, indicate that *A. percula* larvae have the ability to disperse at least up to 35 km away from natal areas (Planes *et al.,* 2009). In addition, there is evidence that rates of self-recruitment are likely to be linked with not only pelagic larval duration, but also geographical isolation (Jones *et al.,* 2009; Pinsky *et al.,* 2012). Because of the size and distribution of *A. percula's* range, there are likely areas of higher and lower connectivity throughout, linked with the variability in geographic isolation across locations, creating significant spatial structure. This is, however, speculative because no large-scale connectivity study has been conducted for this species.

Summary of Factors Affecting the Orange Clownfish

Available information regarding current, historical, and potential future threats to the orange clownfish was thoroughly reviewed in the status review report for the species (Maison and Graham, 2015). We summarize information regarding the 12 identified threats below according to the five factors specified in section 4(a)(1) of the ESA. See Maison and Graham (2015) for additional discussion of all ESA section 4(a)(1) threat categories.

Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Among the habitat threats affecting the orange clownfish, we analyzed anemone bleaching, anemone collection, and sedimentation and nutrient enrichment effects. We found the threats of anemone bleaching and anemone collection each to have a low likelihood of contributing significantly to extinction risk for the species now or in the foreseeable future. We found the threat of sedimentation and nutrient enrichment to have a low-to-medium likelihood, meaning it is possible but not necessarily probable, that this threat contributes or will contribute significantly to extinction risk for the species.

Evidence, while limited, indicates that thermally-induced bleaching can have negative effects on orange clownfish host anemones, which may lead to localized effects of unknown magnitude on the fish itself. Evidence thus far indicates high variability in the response of both anemones and anemonefish to localized bleaching events. Susceptibility to thermal stress

varies between different species of the same taxon and is often variable within individual species; as a result of habitat heterogeneity across a species' range, individuals of the same species may develop in very different environmental conditions. Hobbs *et al.* (2013) compiled datasets that were collected between 2005 and 2012 across 276 sites at 19 locations in the Pacific Ocean, Indian Ocean, and Red Sea to examine taxonomic, spatial, and temporal patterns of anemone bleaching. Their results confirm that bleaching has been observed in 7 of the 10 anemone species that host anemonefish (including 4 of the 5 orange clownfish host species), with anecdotal reports of bleaching in the remaining 3 host anemone species. In addition, they report anemone bleaching at 10 of 19 survey locations that are geographically widespread. Importantly, the authors report considerable spatial and inter-specific variation in bleaching susceptibility across multiple major bleaching events (Hobbs *et al.,* 2013). Over the entire timeframe and across all study areas, 3.5 percent of all anemones observed were bleached, although during major bleaching events, the percentage at a given study area ranged from 19–100 percent. At sites within the same study area, bleaching ranged between as much as 0 and 94 percent during a single bleaching event. To further highlight the variability and uncertainty associated with anemone bleaching susceptibility, Hobbs *et al.* (2013) report opposite patterns of susceptibility for the same two species at the same site during two different bleaching events. Additionally, the study reports decreased bleaching with increased depth in most of the major bleaching events, indicating that depth, in some cases as shallow as 7 m, offers a refuge from bleaching (Hobbs *et al.,* 2013). Some anemone species have even been reported from mesophotic depths, including one *A. percula* host species (*H. crispa*) (Bridge *et al.,* 2012). These depths likely serve as refugia from thermal stress. Although the capacity for acclimation or adaptation in anemones is unknown, evidence from one site indicated that prior bleaching history might influence subsequent likelihood of an anemone bleaching, as previously bleached individuals were less likely to bleach a second time (Hobbs *et al.,* 2013). It is also of note that, similar to corals, bleaching does not automatically lead to mortality for anemones. Hobbs *et al.* (2013) report variable consequences as a result of bleaching between and among species and locations in their assessment of bleaching for all anemone species that

host anemonefish (including those that host orange clownfish); some species decreased in abundance and/or size after bleaching events, while others showed no effect and recovered fully.

When considering the effect of anemone bleaching into the foreseeable future, we evaluated the best available information on future projections of warming-induced bleaching events, but also considered the existing information on the effects of previous bleaching events on anemones. Evidence suggests that bleaching events will continue to occur and become more severe and more frequent over the next few decades (van Hooidonk, 2013). However, newer multivariate modeling approaches indicate that traditional temperature threshold models may not give an accurate picture of the likely outcomes of climate change for coral reefs, and effects and responses will be highly nuanced and heterogeneous across space and time (McClanahan *et al.,* 2015). Although observed anemone bleaching has thus far been highly variable during localized events, the overall effect of bleaching events on anemones globally (*i.e.,* overall proportion of observed anemones that have shown ill effects) has been of low magnitude at sites across their ranges, as only 3.5 percent of the nearly 14,000 observed anemones were recorded as bleached across 19 study sites and multiple major bleaching events (Hobbs *et al.,* 2013). In summary, there are a number of factors that, in combination, indicate that the orange clownfish is likely resilient to bleaching effects that may affect their hosts both now and in the foreseeable future. These factors include the low overall effect of anemone bleaching thus far; the high amount of variability in anemone susceptibility; the existence of depth refugia for anemones; the evidence of potential acclimation in some species; and the fact that the orange clownfish has been observed in the wild to associate with at least five different species of anemone, all of which have shown different levels of susceptibility to bleaching in different locations and over time. As such, we conclude that the threat of habitat loss due to anemone bleaching has a low likelihood of contributing significantly to extinction risk for the orange clownfish now or in the foreseeable future.

With regard to anemone collection, there is little information available on this threat to the orange clownfish globally. Thus far, there has been limited successful aquaculture of anemones for aquaria. Moe (2003) reports the results from a survey of hobbyists, scientists, and commercial

breeders indicating several species have been successfully propagated (typically via asexual reproduction), but anemones typically thwart both scientific and hobbyist attempts at captive culture, especially on a large scale. This is primarily due to their slow growth and infrequent reproduction. While asexual propagation has been successful in some cases, no study has yet addressed the optimization of this practice (*e.g.,* determining the minimum size at which an anemone can be successfully propagated, the best attachment technique, etc.) (Olivotto *et al.* 2011). As such, the vast majority of anemone specimens in the trade are currently from wild collection. In the Queensland marine aquarium fishery, Roelofs and Silcock (2008) found that all anemone species had low vulnerability due to collection. While there was no information on anemone collection available from the Solomon Islands, Vanuatu, or Papua New Guinea (likely because these countries tend to focus on exporting fish vs. invertebrates), our assessment reveals that collection and export of aquarium reef species, including anemones, in these three countries is relatively small-scale at just a few sites scattered throughout large archipelagos. The industry appears limited by freight costs and other financial burdens (Kinch, 2008). As such, it seems unlikely that collection would expand to other areas within the species' range. There is no information to indicate that demand for wild harvested anemones will increase over the next few decades within the range of the orange clownfish. Several studies have provided valuable biological data on the reproductive biology (Scott and Harrison 2007a, 2009), embryonic and larval development (Scott and Harrison 2007b), and settlement and juvenile grow-out (Scott and Harrison 2008). Although speculative, scientists and hobbyists are likely to use this information to continue to engage in attempts to propagate anemones in captivity, which may lead to lower demand for wild capture if successful. While little information is available on the threat of anemone collection to *A. percula* globally, the aquarium trade collection information from countries within the species' range indicates that fisheries in general are relatively small scale, and tend to focus on fish rather than invertebrates for export. Because there is some uncertainty and a lack of specific information associated with this threat to the orange clownfish, we conclude that the threat of habitat loss from anemone collection poses a low (instead of very low) likelihood of

contributing significantly to the extinction risk for the orange clownfish, both now and in the foreseeable future.

Regarding the threat of sedimentation and nutrient enrichment to *A. percula's* habitat, organisms in coral reef ecosystems, including clownfish, are likely to experience continuing effects from anthropogenic sources of this threat at some level as economies continue to grow. Indeed, exposure of host anemones is likely to be variable across the range of *A. percula,* with effects being more acute in areas of high coastal development. There is very little information available regarding the susceptibility and exposure of anemones to sedimentation and nutrients. In the absence of this information, we consider it reasonable to assume that the susceptibility of corals as a direct result of their association with symbiotic algae (described above) is an indicator of the potential susceptibility of anemones, since they share a similar association with microscopic algal symbionts and because anemones are in the same phylum (Cnidaria) as corals and thus are biologically related. While information for anemones is sparse, we know that some coral species can tolerate complete burial in sediment for several days; however, those that are unsuccessful at removing sediment may be smothered, resulting in mortality (Nugues and Roberts, 2003). Sediment can also induce sub-lethal effects in corals, such as reductions in tissue thickness, polyp swelling, zooxanthellae loss, and excess mucus production (Rogers, 1990). In addition, suspended sediment can reduce the amount of light in the water column, making less energy available for photosynthesis (of symbiotic zooxanthellae) and growth. Again for corals, sedimentation and nutrient enrichment can have interactive effects with other stressors including disease and climate factors such as bleaching susceptibility and reduced calcification (Ateweberhan *et al.,* 2013; Suggett *et al.,* 2013).

In addition to the potential effects from sedimentation and nutrient enrichment to host anemones, there could be potential effects to *A. percula.* Wenger *et al.* (2014) found in a controlled experiment that suspended sediment increased pelagic larval duration for *A. percula.* A longer pelagic larval duration may reduce the number of larvae that make it to the settlement stage because of the high rate of mortality in the pelagic larval phase. Conversely, in this study longer pelagic larval durations led to larvae that were larger with better body condition, traits that may confer advantages during the

first few days of settlement when mortality is still high for those that do recruit to settlement habitat. As such, the overall effect of increased sedimentation at the population level is hard to predict.

Land-based sources of pollution are of primary concern for nearshore marine habitats in areas where human populations live in coastal areas and engage in any or all of the following: Intensive farming and aquaculture, urbanization and industrialization, greater shipping traffic and fishing effort, and deforestation and nearshore development, all of which are growing in Southeast Asia (Todd *et al.,* 2010; Schneider *et al.,* 2015) and the Indo-Pacific (Edinger *et al.,* 1998; Edinger *et al.,* 2000). The range of *A. percula* is largely outside of areas that are experiencing the most rapid growth and industrialization, such as Indonesia and the Philippines. Throughout the range of *A. percula,* there are thousands of islands, many of which are uninhabited or have small, sparse human populations leading traditional lifestyles. These remote locations are unlikely to suffer from much exposure to increased sedimentation or nutrients. However, there is evidence that some of these remote and otherwise pristine areas in countries like Papua New Guinea and the Solomon Islands are targeted for intense or illegal logging and mining operations which may be causing degradation of the nearshore environment, even in remote and uninhabited areas (Seed, 1986; Kabutaulaka, 2005).

Efforts to specifically examine the direct and indirect effects of nutrients and sedimentation to the orange clownfish and its habitat throughout its range are lacking. Land-based sources of pollution on reefs act at primarily local and sometimes regional levels, with direct linkages to human population and land-use within adjacent areas. Orange clownfish occur mostly in shallow reef areas and rarely migrate between anemone habitats as adults; these are traits that may make this species more susceptible to land-based sources of pollution in populated areas than other, more migratory or deeper-ranging reef fish. To account for the uncertainty associated with the magnitude of this threat, and consider the species' traits that may increase its susceptibility and exposure, we conservatively conclude that there is a low-to-medium likelihood that the threat of sedimentation and nutrient enrichment is currently or will significantly contribute to extinction risk for the orange clownfish. Spanning the low and medium categories

indicates that the threat is likely to affect the species negatively and may have visible consequences at the species level either now and/or in the future, but we do not have enough confidence in the available information to determine the negative effect is of a sufficient magnitude to significantly increase extinction risk.

Overutilization for Commercial, Recreational, Scientific or Educational Purposes

For the ESA factor of overutilization for commercial, recreational, scientific or educational purposes, we analyzed the threat of collection for the aquarium trade. We conclude that this threat has a low likelihood of having a significant effect on the species' risk of extinction now or in the foreseeable future.

It is estimated that 1.5–2 million people worldwide keep marine aquaria, including 600,000 households in the United States (U.S.) alone (Wabnitz *et al.,* 2003). Estimates place the value of the marine aquarium trade at approximately U.S. $200–330 million per year (Wabnitz *et al.,* 2003). The largest importers of coral reef fish, corals, and invertebrates for display in aquaria are the U.S., followed by the European Union, Japan, and China. The U.S. accounted for an average of 61 percent of global imports of marine aquarium species from 2000–2010 (Wood *et al.,* 2012). A tremendous diversity and volume of species are involved in the marine aquarium trade (Rhyne *et al.,* 2012). It is estimated that every year, approximately 14–30 million fish, 1.5 million live stony corals, and 9–10 million other invertebrates are removed from coral reef ecosystems across the world (Wood, 2001a,b; Wabnitz *et al.,* 2003; Tsounis *et al.,* 2010) although Rhyne *et al.* (2012) assert that the volume of marine fish has been overestimated. These include the trade in at least 1,802 species of fish, more than 140 species of corals, and more than 500 species of non-coral invertebrates (Wabnitz *et al.,* 2003; Rhyne *et al.,* 2012). Clownfish, specifically *A. ocellaris* and *A. percula,* are among the top five most imported and exported species of marine aquarium fish in the aquarium trade (Wabnitz *et al.,* 2003; Rhyne *et al.,* 2012).

Rhyne *et al.* (2012) reported a total of 400,000 individuals of the species complex *A. ocellaris/percula* were imported into the U.S. in 2005. Of note is that data for the two species were combined and reported for the species complex in this report due to common misidentification leading to the inability to separate them out in the import

records. More recently, the author provided NMFS with updated estimates based on newer data from 2008–2011, which indicate the number of *A. percula* alone imported into the U.S. was less than 50,000 per year (Szczebak and Rhyne, unpublished). Notably, this estimate does not distinguish between wild-caught and captively-propagated individuals from foreign sources. The Philippines and Indonesia account for 80 percent of *A. percula* imports into the United States according to the new species-specific information from Szczebak and Rhyne (unpublished data); however, these countries are outside the geographic range of *A. percula,* indicating that 80 percent or more of the imported individuals were likely propagated in captivity and not collected from the wild, or misidentified. Similarly, according to Tissot *et al.* (2010), the U.S. imports 50–70 percent of aquarium reef fish in the global trade. If we extrapolate the U.S. import estimate to infer global wild harvest for the aquarium trade, the number of globally traded wild *A. percula* in 2011 was likely closer to approximately 70,000–100,000 individuals, with as much as 80 percent potentially originating from aquaculture operations and not actually harvested from the wild (or misidentified if U.S. imports are considered representative of the global trade). If we conservatively assume that 100,000 orange clownfish are harvested from the wild annually (likely a vast over-estimate), this represents 0.0076 percent of our conservatively estimated wild global population size of 13–18 million individual *A. percula.*

Orange clownfish are currently collected at varying levels in three out of the four countries in which the species occurs. Papua New Guinea had a fishery for this species, but does not currently export for the aquarium trade. There is a small local aquarium industry, but collection for this purpose is likely minimal (Colette Wabnitz, pers. comm. 2015). Collection from the wild appears relatively limited in Vanuatu, the Solomon Islands, and Australia, according to U.S. import information. While *A. percula* are targeted in these aquarium fisheries, they are not the most sought after species in most cases.

Additionally, anemonefish were among the first coral reef fish raised in captivity throughout their entire life cycle and now represent one of the most well-known and well-developed captive breeding programs for marine fish (Dawes, 2003). While quantitative information is not currently available to estimate the number of *A. percula* that are propagated in captivity, clownfish

are widely described among the industry as an easily cultured aquarium species. A survey of marine aquarium hobbyists in 2003 revealed that only 16 percent of respondents had no concern over whether they purchased wild vs. cultured organisms; the majority of respondents indicated a preference for purchasing captive bred specimens (Moe, 2003). A more recent study reports that 76 percent of respondents to the same question indicated they would preferentially purchase cultured animals and an additional 21 percent said it would depend on the price difference (Murray and Watson, 2014).

Considering the estimated proportion of the population harvested annually, the principles of fisheries management and population growth, the ease and popularity of captive propagation of the species, and the apparent consumer preference for captively-reared fish for home aquaria, we have determined that overutilization due to collection for the aquarium trade has a low likelihood of contributing significantly to the extinction risk of the orange clownfish now or in the foreseeable future.

Disease or Predation

We analyzed the threat of both disease and predation to the orange clownfish. We conclude that disease has a very low likelihood of having a significant effect on the species' risk of extinction now or in the foreseeable future. We conclude that predation has a low likelihood of having a significant effect on the species' risk of extinction now or in the foreseeable future.

The available information on disease in *A. percula* indicates that the spread of some diseases is of concern in captive culture facilities (Ganeshamurthy *et al.,* 2014; Siva *et al.,* 2014); however, there is no information available indicating that disease may be a concern in wild populations. Because this is a well-studied species in at least parts of its range, we find this compelling evidence that disease does not currently pose a significant threat to the species. We therefore conclude that the threat of disease has a very low likelihood of having a significant effect on the species' risk of extinction now or in the foreseeable future.

Orange clownfish, like many reef fish species, are most susceptible to natural predation during the egg, pelagic larvae, and settlement life stages. Natural mortality for juveniles and adults is low, ranging from 2 percent (Elliott and Mariscal, 2001) to ~7 percent for ranks 1–3 (dominant breeding pair and first subordinate male) and ~30 percent for ranks 4–6 (subsequent subordinate males) (Buston, 2003a). Shelter and

protection from predators is one of the primary benefits conferred to post-settlement juvenile and adult orange clownfish by their symbiotic relationship with host anemones. We found no information to indicate elevated predation levels due to invasive species or other outside influences in any part of the species' range is a cause for concern. Moreover, we did not find any information to indicate that natural predation rates for the species are of a magnitude that would cause concern for their extinction risk now or in the foreseeable future.

There is some scientific evidence that indicates future levels of ocean acidification have the potential to negatively affect predator avoidance behavior for orange clownfish. However, it is unclear if or how those effects may manifest themselves in the wild over the expected timeframes of increasing acidification, and there is evidence that trans-generational acclimation will play a role in allowing populations to adapt over time. While the future effects of acidification are still unclear, we allow for the potential for effects to predator avoidance behavior from ocean acidification by concluding that the likelihood of predation significantly contributing to the extinction risk for the orange clownfish now or in the foreseeable future is low (instead of very low).

Inadequacy of Existing Regulatory Mechanisms

Because the only threat that has a low-to-medium likelihood (higher relative to all other threats which are low or very low) of significantly contributing to extinction risk for the orange clownfish is sedimentation and nutrient enrichment, we need only address the inadequacy of regulatory mechanisms that could alleviate this threat. A discussion of the adequacy of regulatory mechanisms for all other threats can be found in the Status Review Report for the Orange Clownfish (Maison and Graham 2015).

Based on the reasoning provided below, we conclude that the inadequacy of regulatory mechanisms addressing sedimentation and nutrient enrichment also has a low-to-medium likelihood of contributing to extinction risk, meaning that it is possible but not necessarily probable, that it contributes or will contribute significantly to extinction risk for the species. Spanning the low and medium categories indicates that the threat is likely to affect the species negatively and may have visible consequences at the species level either now and/or in the future, but we do not have enough confidence in the available

information to determine the negative effect is of a sufficient magnitude to significantly increase extinction risk.

Regulatory mechanisms for the four countries within *A. percula's* range that address land based-sources of pollution like sedimentation and nutrient enrichment are described in greater detail in the NMFS coral management report (NMFS, 2012b), but we summarize them here. In Papua New Guinea, most legislation does not specifically refer to marine systems, which has generated some uncertainty as to how it should be applied to coral reefs. Also, laws relevant to different sectors (*e.g.,* fisheries, mining, environmental protection) are not fully integrated, which has led to confusion over which laws have priority, who is responsible for management, and the rights of the various interest groups. In the Solomon Islands, the Fisheries Act of 1998 states that marine biodiversity, coastal and aquatic environments of the Solomon Islands shall be protected and managed in a sustainable manner and calls for the application of the precautionary approach to the conservation, management, and exploitation of fisheries resources in order to protect fisheries resources and preserve the marine environment (Aqorau, 2005). In Vanuatu, each cultural group has its own traditional approaches to management, which may include the establishment of MPAs, initiating taboo sites, or periodic closures. These traditional management schemes have been supplemented by various legislative initiatives, including the Foreshore Development Act, which regulates coastal development (Naviti and Aston, 2000). In Australia, *A. percula* occurs mostly, if not entirely, within the Great Barrier Reef Marine Park. In addition to the park, the Australian government has developed a National Cooperative Approach to Integrated Coastal Zone Management (Natural Resource Management Ministerial Council, 2006). In response to recent reports showing declining water quality within the marine park, the State of Queensland recently developed and published a Reef Water Quality Protection Plan, outlining actions to secure the health and resilience of the Great Barrier Reef and adjacent catchments (State of Queensland, 2013).

Under the discussion of ''Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range'' above, we evaluated the threat of sedimentation and nutrient enrichment on *A. percula* and determined that it has a low-to-medium likelihood of significantly contributing to extinction

risk for the species now and in the foreseeable future. While some regulations exist to address land-based sources of pollution throughout *A. percula's* range, overall, there is little information available on the enforcement or effectiveness of these regulations. As such, it is difficult to determine the overall likelihood of the inadequacy of regulatory mechanisms contributing significantly to the extinction risk for this species. In analyzing whether regulatory mechanisms addressing this threat are adequate, we conclude, from what little information we could find, that although regulations do exist, there are varying levels of efficacy and enforcement, and this is an ongoing threat that is likely to increase as economies within the species' range continue to grow.

Marine protected areas are often categorized as conservation efforts but because they are almost always regulatory in nature (establishment and enforcement via regulations), in the context of an ESA listing determination we evaluate them here in the ''Inadequacy of Existing Regulatory Mechanisms'' section. Although we cannot determine the overall benefit to the species from the network of protected areas throughout its entire range, the existence and enforcement of a large number of MPAs throughout the species' range is likely to confer at least some benefit and is unlikely to contribute significantly to the extinction risk for the orange clownfish now or in the foreseeable future. There is a significant number of (MPAs) of varying degrees of size, management, and success that exist throughout *A. percula's* range, including at least 22 MPAs in Papua New Guinea, MPAs in all 9 provinces of the Solomon Islands, and over 55 MPAs in Vanuatu, and nearly all of *A. percula's* range in Australia is found within the Great Barrier Reef Marine National Park. While there are relatively little empirical data on the effectiveness of these particular MPAs other than for Australia, the general consensus is that these MPAs do provide some conservation benefits for marine species (Day, 2002; McClanahan *et al.,* 2006; McCook *et al.,* 2010). In Vanuatu, Hickey and Johannes (2002) report success of locally managed MPAs due to a variety of reasons, including enforcement. The authors report that there is an increasing use of state police to informally support decisions made by the village chiefs. Individuals who break these village taboos, including taboos relating to marine resource management

activities, may be turned over to the police. More specifically regarding orange clownfish, findings suggest that the MPA network in Kimbe Bay, Papua New Guinea, might function to sustain resident orange clownfish populations both by local replenishment and through larval dispersal from other reserves (Almany *et al.,* 2007; Green *et al.,* 2009; Planes *et al.,* 2009; Berumen *et al.,* 2012).

Other Natural or Manmade Factors Affecting Continued Existence

Among the other natural or human factors affecting the orange clownfish, we analyzed the potential future physiological and behavioral effects of ocean acidification and ocean warming. The orange clownfish, along with several other pomacentrid species, has been the subject of several laboratory-based studies on both ocean acidification and ocean warming. The field of study is relatively new, but we conclude that the threats of physiological or behavioral effects from ocean acidification and ocean warming each have a low likelihood of having a significant effect on the species' risk of extinction now or in the foreseeable future.

Research thus far has focused on the effects of acidification on two aspects of physiology for *A. percula:* (1) Growth and development, and (2) sensory capabilities that affect behavior. In one study, increased acidification at levels expected to occur circa 2100 had no detectable effect on embryonic duration, egg survival, or size at hatching and, in fact, increased larval growth rate in *A. percula* (Munday *et al.,* 2009a). Similarly, there was no effect on otolith size, shape, symmetry, or elemental chemistry when *A. percula* larvae were reared at CO_2 levels predicted by the year 2100 (Munday *et al.,* 2011b).

When it comes to behavioral impairment, laboratory research has shown more consequential results regarding the potential effects of future ocean acidification. An elevated CO_2 environment can affect auditory sensory capabilities for juvenile *A. percula,* even in the absence of effects on otolith growth. This indicates other possible mechanisms for this interference, such as deterioration of neural transmitters or compromised processing of sensory information (Simpson *et al.,* 2011). Auditory sensory capabilities guide larval fish during settlement as nocturnal reef sounds promote settlement and daytime predator-rich noises discourage settlement (Simpson *et al.,* 2011).

Increased CO_2 levels may affect olfactory cues used by larval clownfish

to identify anemones and avoid predators. Larval clownfish use olfactory cues, such as odors from anemones, to locate suitable reef habitat for settlement (Munday *et al.,* 2009b). Larval *A. percula* reared at CO_2 levels comparable to those predicted by the end of this century showed no observable response to olfactory cues of different habitat types, whereas those reared in the control environment showed a strong preference for anemone olfactory cues over other habitat olfactory cues (Munday *et al.,* 2009b). Newly hatched *A. percula* larvae also innately detect predators using olfactory cues, and they retain this ability through settlement (Dixson *et al.,* 2010). When tested for behavioral responses to olfactory cues from predators, *A. percula* larvae raised in both the control environment (390 parts per million (ppm) CO_2) and the lower of the two intermediate environments tested (550 ppm CO_2) showed strong avoidance of predator cues. However, larvae reared at 700 ppm CO_2 showed variation in their responses, with half showing avoidance of predator cues and the other half showing preference for predator cues (Munday *et al.,* 2010). In this same study, larvae reared at 850 ppm showed strong preference for predator cues, indicating that 700 ppm may be a threshold at which adaptation is possible or natural selection will take effect because of the mixed responses to olfactory cues (Munday *et al.,* 2010). Additionally, Dixson *et al.* (2010) report that CO_2 exposure at the egg stage does not appear to affect olfactory sensory capabilities of hatched larvae, but these capabilities are affected when settlement stage larvae are exposed to elevated CO_2.

The results discussed above indicate that ocean acidification associated with climate change has the potential to affect behavioral responses of *A. percula* to certain cues during critical life stages. However, if or how these effects will manifest themselves at the population level in the natural environment requires an understanding of additional factors. All of the aforementioned authors acknowledge that the potential for acclimation or adaptation was not factored into their studies because it is generally unknown or hard to predict. Murray *et al.* (2014) assert that there is mounting evidence of an important but understudied link between parent and offspring generations, known as parental conditioning or trans-generational plasticity, which may comprise a short-term adaptation mechanism to environmental acidification. This type of plasticity describes the ability of the parental environment prior to fertilization to influence offspring reaction norms without requiring changes in DNA sequence (Salinas and Munch, 2012). Trans-generational plasticity in CO_2 resistance as a potential adaptation for coping with highly variable aquatic CO_2 environments may be common (Salinas and Munch, 2012; Dupont *et al.,* 2013). One recent study found that the effects associated with rearing larval clownfish (*A. melanopus*) at high CO_2 levels, including smaller length and mass of fish and higher resting metabolic rates, were absent or reversed when both parents and offspring were reared in elevated CO_2 levels (Miller *et al.,* 2012). These results show that non-genetic parental effects can have a significant influence on the performance of juveniles exposed to high CO_2 levels with the potential to fully compensate for the observed effects caused by acute (within generation) exposure to increased CO_2 levels (Miller *et al.,* 2012).

In addition to the potential for acclimation and trans-generational plasticity, it is difficult to interpret the results of laboratory studies of acute exposure in terms of what is likely to happen in the foreseeable future in the wild or to predict potential population level effects for a species. The acute nature of the exposure and acclimation in the studies above is noteworthy because most species will not experience changes in acidification so acutely in their natural habitats. Rather, they are likely to experience a gradual increase in average CO_2 levels over several generations, and therefore parental effects could be highly effective in moderating overall effects. Moreover, there is ample evidence that coral reef ecosystems naturally experience wide fluctuations in pH on a diurnal basis (Gagliano *et al.,* 2010; Gray *et al.,* 2012; Price *et al.,* 2012). Price *et al.* (2012) found that reefs experienced substantial diel fluctuations in temperature and pH similar to the magnitudes of warming and acidification expected over the next century. The pH of ocean surface water has decreased from an average of 8.2 to 8.1 since the beginning of the industrial era (IPCC, 2013). The pH of reef water can vary substantially throughout the day, sometimes reaching levels below 8.0 in the early morning due to accumulated respiration of reef organisms in shallow water overnight (Ohde and van Woesik, 1999; Kuffner *et al.,* 2007). Primary producers, including zooxanthellae in corals, uptake dissolved CO_2 and produce O_2 and organic matter during the day, while at night respiration invokes net CO_2 release into the surrounding sea water. In fact, Ohde and van Woesik (1999) found one site that fluctuated between pH 8.7 and 7.9 over the course of a single day.

Studies clearly show that in a controlled setting, an increased CO_2 environment can impair larval sensory capabilities that are required to make important decisions during critical life stages. However, a disconnect exists between these experimental results and what can be expected to occur in the wild over time, or even what is currently experienced on a daily basis on natural reefs. There is uncertainty associated with *A. percula's* likely level of exposure to this threat in the foreseeable future given the uncertainty in future ocean acidification rates and the heterogeneity of the species' habitat and current environmental conditions across its range. There is also evidence that susceptibility to acute changes in ocean pH may decrease or disappear over several generations. Even though projections for future levels of acidification go out to the year 2100, we do not consider the effects of this potential threat to be foreseeable over that timeframe due to the variable and uncertain nature of effects shown in laboratory studies versus what the species is likely to experience in nature over several generations. The best available information does not indicate that ocean acidification is currently creating an extinction risk for the species in the wild through effects to fitness of a significant magnitude. We therefore conclude that the threat of physiological effects from ocean acidification has a low likelihood of having a significant effect on the species' risk of extinction now or in the foreseeable future.

Regarding the threat of physiological and behavioral effects from ocean warming, the best available information does not indicate that ocean warming is currently creating an extinction risk for the orange clownfish in the wild through effects to fitness of a significant magnitude. In other words, the current magnitude of impact from ocean warming is likely not affecting the ability of the orange clownfish to survive to reproductive age, successfully find a mate, and produce offspring. While it has yet to be studied specifically for the orange clownfish, researchers have begun to explore the potential effect of increasing temperature on the physiology of other pomacentrid reef fish species. *Dascyllus reticulatus* adults exposed to a high temperature (32°C) environment in a laboratory setting displayed

significantly reduced swimming and metabolic performance (Johansen and Jones, 2011). Other results include reduced breeding success of *Acanthochromis polyacanthus* (Donelson *et al.,* 2010) and increased mortality rates among juvenile *Dascyllus aruanus* (Pini *et al.,* 2011) in response to increased water temperatures that may be experienced later this century. However, multiple references on the subject state that the effects of temperature changes appear to be species-specific (Nilsson *et al.,* 2009; Lo-Yat *et al.,* 2010; Johansen and Jones, 2011); therefore, these results are not easily applied to orange clownfish. With regard to ocean warming effects to respiratory and metabolic processes, Nilsson *et al.* (2009) and Johansen and Jones (2011) compared results of exposure to increased temperatures across multiple families or genera and species of reef fish. Both studies reported negative responses, but the magnitude of the effect varied greatly among closely related species and genera. As such, it is difficult to draw analogies to unstudied species like orange clownfish. As with acidification, Price *et al.* (2012) found that reefs currently already experience substantial diel fluctuations in temperature similar to the magnitude of warming expected over the next century. In addition, trans-generational plasticity in temperature-dependent growth was recently documented for two fish species, where offspring performed better at higher temperatures if the parents had experienced these temperatures as well (Donelson *et al.,* 2011; Salinas and Munch, 2012).

There is epistemic uncertainty associated with the threat of future ocean warming to orange clownfish. Susceptibility of reef fish that have been studied varies widely, but there is evidence that trans-generational plasticity may play a role in acclimation over time, at least for some species (Donelson *et al.,* 2011; Salinas and Munch, 2012). In addition, we cannot predict the exposure of the species to this threat over time given the uncertainty in future temperature predictions and the heterogeneity of the species' habitat and current environmental conditions across its range. Further, we do not have sufficient information to suggest future ocean warming will significantly affect the extinction risk for orange clownfish in the foreseeable future. Therefore, acknowledging these uncertainties, we conclude that the threat of ocean warming has a low likelihood of significantly contributing to extinction

risk for *A. percula* now, or in the foreseeable future.

Extinction Risk Assessment

In assessing four demographic risks for the orange clownfish—abundance, growth rate/productivity, spatial structure/connectivity, and diversity— we determined that the likelihood of three of these risks individually contributing significantly to the extinction risk for the species both now and in the foreseeable future is low (abundance, growth rate/productivity, diversity), and unknown for the fourth (spatial structure/connectivity). On a local scale, spatial structure/connectivity does not appear to be a cause for concern for this species but, because global genetic structure is unknown, we cannot assign a likelihood that this factor is contributing significantly to extinction risk for *A. percula.*

We acknowledge that uncertainties exist regarding how these demographic risks may affect the species on an individual and population level. However, we conclude that the species' estimated wild abundance of 13–18 million individuals is at a level sufficient to withstand demographic stochasticity. Moreover, productivity appears to be at or above replacement levels, rates of dispersal and recruitment at the local scale appear sufficient to sustain meta-population structure (although global genetic structure is unknown), and species diversity may allow for trans-generational adaptation to long term, global environmental change. As such, even with acknowledgement of uncertainties, we conclude that these demographic risks have a low or unknown likelihood of contributing in a significant way to the extinction risk of the orange clownfish.

We also assessed 12 current and predicted threats to the species and determined that the likelihood of these individual threats contributing to the extinction risk of the species throughout its range vary between very low and low-to-medium (one threat was very low; nine threats were low; and two threats were low-to-medium). We again acknowledge uncertainties in predicting the breadth of the threats and the extent of the species' exposure and response, but we can assume that these threats are reasonably certain to occur at some magnitude. For some threats, such as anemone bleaching, evidence indicates these events will become more severe and more frequent over the next few decades (van Hooidonk *et al.,* 2013). However, anemone susceptibility and response is variable, and *A. percula* is known to associate with five anemone

hosts, indicating that the species may be resilient to this threat. Additionally, the species may exhibit resiliency and adaptation to threats such as ocean acidification and ocean warming via trans-generational plasticity. While it is unknown how much adaptation the species will undergo, we anticipate such threats to occur gradually over space and time rather than acutely.

Of the 12 identified current and predicted threats, our two greatest concerns relate to the species' susceptibility and exposure to sedimentation and nutrients, as well as the inadequacy of regulatory mechanisms to address this threat, especially since juveniles and adults occur in shallow water and are non-migratory once they have settled into a host anemone. Therefore, we conservatively assigned a low-to-medium likelihood that both this threat and the inadequate regulatory mechanisms to address this threat may contribute significantly to the extinction risk for the orange clownfish.

Considering the demographic risks analysis (three low, one unknown) and the current and predicted threats assessment (one very low, nine low, two low-to-medium), we have determined that overall extinction risk for the orange clownfish is low, both now and in the foreseeable future. We recognize that some of the demographic risks and threats to the species may work in combination to produce cumulative effects. For example, increased ocean acidification may affect the olfactory and auditory sensory capabilities of the species and potentially affect predation rates; ocean warming may affect the aerobic capacity of the species or the rates of disease; and harvest of sea anemones may eliminate habitat that is essential for the species and potentially increase the likelihood of predation; and therefore, interactions within and among these threats may affect individuals of the species. However, despite our acknowledged uncertainties, even these synergistic effects that can be reasonably expected to occur from multiple threats and/or demographic risks are expected to be limited to cumulative effects on a local scale at most and not anticipated to rise to the level of significantly affecting the extinction risk for this species. While individuals may be affected, we do not anticipate the overlap of these threats to be widespread throughout the species' range at any given time because all threats are occurring and will continue to occur with significant variability over space and time. Therefore, we do not expect the species to respond to cumulative threats in a way that may

cause measurable effects at the population level.

Based on the species' exposure and response to threats, resilient life history characteristics, potential for trans-generational adaptive capabilities, and estimated global wild abundance of 13–18 million individuals, it is unlikely that these threats will contribute significantly to the extinction risk of the orange clownfish. Therefore, we conclude that the species is not endangered or threatened throughout its range.

Significant Portion of Its Range

Though we find that the orange clownfish is not in danger of extinction now or in the foreseeable future throughout its range, under the SPR Policy, we must go on to evaluate whether the species in in danger of extinction, or likely to become so in the foreseeable future, in a "significant portion of its range" (79 FR 37578; July 1, 2014).

The SPR Policy explains that it is necessary to fully evaluate a particular portion for potential listing under the "significant portion of its range" authority only if substantial information indicates that the members of the species in a particular area are likely *both* to meet the test for biological significance *and* to be currently endangered or threatened in that area. Making this preliminary determination triggers a need for further review, but does not prejudge whether the portion actually meets these standards such that the species should be listed. To identify only those portions that warrant further consideration, we will determine whether there is substantial information indicating that (1) the portions may be significant and (2) the species may be in danger of extinction in those portions or likely to become so within the foreseeable future. We emphasize that answering these questions in the affirmative is not a determination that the species is endangered or threatened throughout a significant portion of its range—rather, it is a step in determining whether a more detailed analysis of the issue is required (79 FR 37578, at 37586; July 1, 2014).

Thus, the preliminary determination that a portion may be both significant and endangered or threatened merely requires NMFS to engage in a more detailed analysis to determine whether the standards are actually met (79 FR 37578, at 37587). Unless both standards are met, listing is not warranted. The policy further explains that, depending on the particular facts of each situation, NMFS may find it is more efficient to address the significance issue first, but

in other cases it will make more sense to examine the status of the species in the potentially significant portions first. Whichever question is asked first, an affirmative answer is required to proceed to the second question. *Id.* "[I]f we determine that a portion of the range is not 'significant,' we will not need to determine whether the species is endangered or threatened there; if we determine that the species is not endangered or threatened in a portion of its range, we will not need to determine if that portion is 'significant' " (79 FR 37578, at 37587). Thus, if the answer to the first question is negative—whether that regards the significance question or the status question—then the analysis concludes and listing is not warranted.

Applying the policy to the orange clownfish, we first evaluated whether there is substantial information indicating that any particular portion of the species' range is "significant." We considered the best available information on abundance, productivity, spatial distribution, and diversity in portions of the species' range in the Indo-Pacific Ocean. We did not find information indicating that any of these four factors show any type of spatial pattern that would allow for delineation of portions of the species' range in order to evaluate biological significance. The range of the species is somewhat restricted to the eastern-most portion of the coral triangle and northern Australia. Abundance and density of *A. percula* are highly variable throughout the species' range and are likely highest in Papua New Guinea. However, we do not have information on abundance and density in other portions of the species' range and were only able to estimate an overall global population size of 13–18 million (based on De Brauwer, 2014). We do not have information on historical abundance or recent population trends for the orange clownfish, nor can we estimate population growth rates in any particular portions of the species' range. The best available information on spatial distribution indicates that the orange clownfish likely has variable connectivity between and within meta-populations throughout its range. We do not have information on the global phylogeography of orange clownfish and cannot delineate any particular portion of the species' range that may be significant because of its spatial distribution or connectivity characteristics. Multiple reports of geographic color variations at sites in Papua New Guinea indicate there is genetic diversity at those sites. Levels of phenotypic and genetic diversity in

other portions of the species' range are largely unknown. Based on their pelagic dispersal and variable levels of self-recruitment, orange clownfish are likely arranged in meta-population structures like the ones studied in Kimbe Bay, Papua New Guinea, throughout their geographic range, thus providing opportunity for genetic mixing.

After a review of the best available information, and because of the scale at which most of the information exists, there is no supportable way to evaluate demographic factors for any portions smaller than the entire population. We are unable to identify any particular portion of the species' range where its contribution to the viability of the species is so important that, without the members in the portion, the species would be at risk of extinction, or likely to become so in the foreseeable future, throughout all of its range. We find that there is no portion of the species' range that qualifies as "significant" under the SPR Policy, and thus our SPR analysis ends.

Determination

Based on our consideration of the best available information, as summarized here and in Maison and Graham (2015), we determine that the orange clownfish, *Amphiprion percula,* faces a low risk of extinction throughout its range both now and in the foreseeable future, and that there is no portion of the orange clownfish's range that qualifies as "significant" under the SPR Policy. We therefore conclude that listing this species as threatened or endangered under the ESA is not warranted. This is a final action, and, therefore, we do not solicit comments on it.

References

A complete list of all references cited herein is available at our Web site (see **ADDRESSES**).

Classification

National Environmental Policy Act

The 1982 amendments to the ESA, in section 4(b)(1)(A), restrict the information that may be considered when assessing species for listing. Based on this limitation of criteria for a listing decision and the opinion in *Pacific Legal Foundation* v. *Andrus,* 675 F. 2d 825 (6th Cir. 1981), NMFS has concluded that ESA listing actions are not subject to the environmental assessment requirements of the National Environmental Policy Act (See NOAA Administrative Order 216–6).

Authority

The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: August 18, 2015.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

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DEPARTMENT OF DEFENSE

Office of the Secretary

[Docket ID: DoD–2015–OS–0032]

Notice of Availability for a Finding of No Significant Impact for the Environmental Assessment Addressing the Upgrade and Storage of Beryllium at the DLA Strategic Materials Depot in Hammond, IN

AGENCY: Defense Logistics Agency (DLA), DoD.

ACTION: Notice of Availability (NOA) for a Finding of No Significant Impact (FONSI) for the Environmental Assessment (EA) Addressing the Upgrade and Storage of Beryllium at the DLA Strategic Materials Depot in Hammond, IN.

SUMMARY: On April 10, 2015, DLA published a NOA in the **Federal Register** (80 FR 19290) announcing the publication of the EA Addressing the Upgrade and Storage of Beryllium at the DLA Strategic Materials Depot in Hammond, IN. The EA was available for a 30-day public comment period that ended May 11, 2015. The EA was prepared as required under the National Environmental Policy Act (NEPA) of 1969. In addition, the EA complied with DLA Regulation 1000.22. No comments were received during the public comment period. This FONSI documents the decision of DLA to proceed with the Upgrade and Storage of Beryllium at the DLA Strategic Materials Depot in Hammond, IN. DLA has determined that the Proposed Action is not a major Federal action significantly affecting the quality of the human environment within the context of NEPA and that no significant impacts on the human environment are associated with this decision.

FOR FURTHER INFORMATION CONTACT: Ira Silverberg at 703–767–0705 during normal business hours Monday through Friday, from 8:00 a.m. to 4:30 p.m. (EST) or by email: *ira.silverberg@dla.mil.*

SUPPLEMENTARY INFORMATION: DLA completed an EA to address the potential environmental consequences associated with the proposed upgrade and storage of beryllium at the DLA Strategic Materials Depot in Hammond, IN. This FONSI incorporates the EA by reference and summarizes the results of the analyses in the EA.

Purpose and Need for Action: The purpose of the Proposed Action is to upgrade and store a portion of the existing U.S. National Defense Stockpile (NDS) of beryllium. DLA Strategic Materials has determined that a portion of the existing beryllium billets are not in forms readily useable by the U.S. Department of Defense (DoD) or its subcontractors in times of national emergency. The proposed upgrade would convert the existing beryllium billets into one or more final products that would meet current specifications for many modern DoD applications. The upgraded and converted beryllium is also expected to be applicable to these same manufacturing processes for the foreseeable future.

Proposed Action and Alternatives: Under the proposed action, the DLA Strategic Materials would have up to 20 tons (18,140 kg) of the existing NDS beryllium billets upgraded and converted at one or more off-site commercial facilities and then will return the converted beryllium to the Hammond Depot for continued safe and environmentally sound long-term storage.

Each crate containing a single beryllium billet would be removed from its storage location at the Hammond Depot by forklift and loaded onto a truck located adjacent to the storage structure. The truck would then transport the crate/billet to an off-site commercial facility where the upgrade and conversion process would occur. All such upgrade and conversion activities would be conducted at the off-site facilities in compliance with all applicable state, local and federal laws, regulations, requirements and permits. The upgraded billet would then be returned and received for storage at the Hammond Depot. DLA Strategic Materials expects to complete the beryllium upgrade and conversion portion of the Proposed Action within a five-year period and before the end of calendar year 2020.

Under the Proposed Action, long-term storage of the upgraded and converted forms of beryllium at the Hammond Depot would then continue after that date. A minimally intrusive inspection methodology would be employed by DLA Strategic Materials for the periodic, on-going quality surveillance of the upgraded and converted beryllium and to verify the continued integrity of the storage containers, the internal inert atmosphere status, and the product quality for the duration of the long-term storage period.

The proposed beryllium upgrade and conversion would result in the creation of forms of beryllium that are highly compatible with the inputs required for current and future manufacturing processes. The Proposed Action is also required to ensure that the installation is able to meet its current and future mission requirements.

Description of the No Action Alternative: Under the No Action Alternative, DLA would not upgrade the beryllium. The NDS beryllium stockpile would continue to be stored at the Hammond Depot in its current billet form. In the event the beryllium was needed to satisfy future critical U.S. security, military or aerospace uses, it would not be available in the forms required as input to current manufacturing processes, and the billets would likely require conversion at that time. DLA Strategic Materials has obtained estimates that it takes about 10 weeks to turn beryllium billets into powder. Hence, the usefulness of the beryllium in billet form would be questionable for any such future U.S. critical needs. The No Action Alternative would not meet the purpose of and need for the Proposed Action.

Potential Environmental Impacts: No significant effects on environmental resources would be expected from the Proposed Action. Potential insignificant, adverse effects on transportation, land use, water resources, and ecological resources, air quality, and waste management could be expected. No effects on environmental justice, cultural resources, noise, recreation, socioeconomics, or aesthetics would be expected. Details of the environmental consequences are discussed in the EA, which is hereby incorporated by reference.

Determination: Based on the analysis of the Proposed Action's potential impacts to the human environment from routine operations, it was concluded that the Proposed Action would produce no significant adverse impacts. Human environment was interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. No significant cumulative effects were identified. Implementation of the Proposed Action will not violate any Federal, state, or local laws. Based on the results of the analyses performed during preparation of the EA, Ms. Mary D. Miller, Director, DLA Installation