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Legacy Resource Management Program

Long-tailed Salamander; Picture by Chris Petersen

Salamander Chytrid Fungus Risk Assessment on Department of Defense Installations

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Introduction

The fungal pathogen *Batrachochytrium salamandrivorans*, otherwise known as *Bsal* or salamander chytrid fungus, has caused die-offs of salamanders in Europe. Although it has not yet been documented in the United States (U.S)., experts believe *Bsal* poses a serious threat to native salamanders and represents one of the most significant potential disease threats to U.S. wildlife (Gray et al. 2015). Although not fully assessed, the pathogen may be lethal to dozens of salamander species in the U.S. (Martel et al. 2014) and threaten North American salamander biodiversity (Yap et al. 2015; Richgels et al. 2016). The Southeastern United States has some of the greatest diversity of salamanders in the world.

The United States Department of Defense Partners in Amphibian and Reptile Conservation (DoD PARC) network and the U.S. Geological Survey (USGS) National Wildlife Health Center developed this report to serve as an informational tool to assess which U.S. military installations may be at risk to *Bsal* introduction, improve the potential response to an outbreak, and help prioritize relevant actions on their respective installations if this fungal pathogen were to be introduced into the U.S. Since 2015, DoD PARC has been directly involved in identifying research, monitoring, and management strategies for *Bsal* (Grant et al. 2015). The military installations included in this assessment were those documented to have confirmed presence of salamander species as determined by a 2017 inventory of herpetofauna of military lands (*Amphibian and Reptile Biodiversity on United States Department of Defense Installations*).

What is Bsal?

Bsal is a pathogenic fungus that infects the skin of certain amphibian species. It is thought to have originated in Asia (Martel et al. 2013; Laking et al. 2017), is believed to have spread through Europe via the pet trade (Martel et al. 2013, 2014; Nguyen et al. 2017), and is transmitted via direct contact between amphibians or via motile aquatic zoospores. The fungus is closely related to *B. dendrobatidis* (*Bd*), which has contributed to global population declines of more than 200 species of amphibians (primarily frogs and toads; Olson et al. 2013; Olson and Ronnenberg 2014), which also appears to have an Asian origin (Laking et al. 2017; O'Hanlon et al. 2018). Salamanders infected by *Bsal* may display severe lethargy, as well as large open skin lesions (Martel et al. 2013, 2014). *Bsal* disrupts metabolic pathways on the skin that, if severe enough, can result in morbidity or mortality. In the Netherlands the pathogen wiped out over 96 percent of the resident population of fire salamanders (*Salamandra salamandra*) in a few years (Spitzen-van der Sluijs et al. 2013). Similar rapid declines of fire salamander populations have been reported in Germany and Belgium (Spitzen-van der Sluijs et al. 2016).

Although little is known about how *Bsal* spreads, there is concern that it will be accidently introduced into the U.S. through the amphibian pet trade. According to Yap et al. (2015), almost 99% of salamander imports to the U.S. pass through or come from Asia. If an infected individual were to be released into the wild, the fungus could spread to native amphibians, especially salamanders, which could result in population declines and die-offs. This is the scenario that appears to have played out in Europe. Salamander declines in North America could result in more species being listed as at-risk under state laws, or under the federal Endangered Species Act (ESA), which could increase military mission-related restrictions.

What is Being Done to Prevent the Introduction of Bsal?

In 2015, A formal working group of international experts and stakeholders was held in Fort Collins, Colorado, U.S., to identify crucial *Bsal* research and monitoring needs that could inform conservation and management strategies for salamanders in the United States. The outcomes and findings of this workshop catalyzed research, monitoring, and management actions needed to identify, respond, and mitigate *Bsal* in the U.S. (Grant et al., 2015).

In 2016, as a precautionary measure to help avoid introduction of *Bsal*, the U.S. Fish and Wildlife Service placed an interim import ban on 201 salamander species thought to be potential vectors of *Bsal*. These species were listed as "injurious" to native U.S. wildlife under the Lacey Act, restricting their importation because congeners were susceptible to *Bsal* infection. Additionally, the pet industry called for a voluntary moratorium on the import of Paddletail and Firebelly newts (*Paramesotriton* spp. and *Cynops* spp., two genera known to be carriers of *Bsal*; Martel et al. 2014) as a preventative measure.

Surveys and monitoring of wild populations of salamanders at a continental scale is being conducted by U.S. federal and state agencies, academic scientists, zoos, and conservation programs. The results of these events indicate that *Bsal* is not yet established in any native populations in the U.S. or Canada (e.g., Gluesenkamp et al. 2018; Glorioso et al. 2017; Govindarajulu et al. 2017; Guthrie et al. 2017; Iwanowicz et al. 2017).

The Partners in Amphibian and Reptile Conservation (PARC) Disease Task Team (DTT) created the Herpetofauna Disease Alert System (HDAS) to facilitate communication with the relevant authorities in North America. The HDAS involves submitting a report of a disease event (including *Bsal*) to the DTT, at which point the appropriate authorities will be notified in the

appropriate jurisdiction. For more information on the PARC DTT and the HDAS, visit http://parcplace.org/resources/parc-disease-task-team/?id=287:herpetofaunal-disease-resources.

A *Bsal* Rapid Response Plan Template, developed in a collaborative effort between the Association of Fish and Wildlife Agencies (Amphibian and Reptile Conservation Committee) and the *Bsal* Task Force, provides proactive tools for biologists to facilitate preparation in the event of an outbreak in both wild and captive amphibian species. This plan provides resources and potential actions that can be taken to minimize impact and maximize the chance of containing the disease. Furthermore, Hopkins et al. (2018) conducted a scenario exercise of *Bsal* detection in the U.S. which provides additional response considerations.

Salamander Diversity on Continental U.S. DoD Installations

Although *Bsal* may infect some anuran amphibians (Stegen et al. 2017; Nguyen et al. 2017), our focus was to assess *Bsal* risk to salamanders due to their apparent vulnerability to *Bsal* chytridiomycosis, the disease that can cause mass mortality in certain taxa. Our assessment of the DoD PARC Herpetofauna Inventory Database revealed there are 83 species of salamanders confirmed present on 207 DoD properties in the continental U.S. (Appendix A). Fort Stewart, located in Georgia, has the greatest number of salamander species confirmed present on its property (20 species); however, Fort Bragg (North Carolina), Fort Campbell (Kentucky-Tennessee) and Fort Knox (Kentucky) also have high salamander species diversity (15 species each; Appendix B). The five most common salamander species on military lands are the Eastern Newt (*Notophthalmus viridescens*), Spotted Salamander (*Ambystoma maculatum*), Marbled Salamander (*Ambystoma opacum*), Eastern Red-backed Salamander (*Plethodon cinereus*) and Southern Two-lined Salamander (*Eurycea cirrigera*). It has been shown in laboratory exposure

trials that the Eastern Newt experiences lethal responses to *Bsal* (Martel et al. 2013). Eastern Newts were detected on 39% (80 of 207) of DoD properties. Of these most-common taxa, both Eastern Newts and Eastern Red-backed Salamanders are on the Lacey Act list of those banned for import due to likely *Bsal* infectivity from initial test results (Martel et al. 2014; https://www.fws.gov/injuriouswildlife/pdf_files/List-of-Salamander-Species.pdf; accessed 5 November 2018)

Five federally-listed salamanders were confirmed to be present on continental U.S. military lands. These include the: California Tiger Salamander (*Ambystoma californiense*); Frosted Flatwoods Salamander (*Ambystoma cingulatum*); Reticulated Flatwoods Salamander (*Ambystoma bishopi*); Sonoran Tiger Salamander (*Ambystoma mavortium stebbinsi*); and Striped Newt (*Notophthalmus perstriatus*). Nine state-listed salamander species that were confirmed present were the: California Tiger Salamander (*Ambystoma californiense*); Cascade Caverns Salamander (*Eurycea latitans*); Eastern Tiger Salamander (*Ambystoma tigrinum*); Frosted Flatwoods Salamander (*Ambystoma cingulatum*); Hellbender (*Cryptobranchus alleganiensis*); Lesser Siren (*Siren intermedia*); Mabee's Salamander (*Ambystoma mabeei*); Reticulated Flatwoods Salamander (*Ambystoma bishopi*); and Striped Newt (*Notophthalmus perstriatus*). Of these salamanders, due to likelihood of *Bsal* infectivity from initial testing (Martel et al. 2014), the Lacey Act prohibits import of the Striped Newt.

In addition to the confirmed species listed above, our assessment of the DoD PARC Herpetofaunal Inventory Database also verifies there are 25 salamander species that are unconfirmed and potentially present on military sites because these species have been documented in the same county as a particular military installation, but a specimen has not been confirmed within the boundaries of the installation. Some of these unconfirmed species are

federally and/or state endangered or threatened. Future inventories on military lands will assist with determining the presence or likely absence of these species.

Herein, we further analyze the risk of *Bsal* invasion to continental U.S. DoD installations. We apply the Richgels et al. (2016) *Bsal* risk model to these lands to categorize risk level per property, and assess consequent *Bsal* surveillance priorities. Our results address management implications for biosecurity of these public lands in support of military readiness and held in trust for the American people.

Methods

Our assessment is an extension of a *Bsal* risk assessment analysis conducted by Richgels et al. (2016). In that analysis, characteristics of *Bsal* ecology, spatial data on imports and pet trade establishments, and salamander species diversity were used to identify high-risk areas with both a high likelihood of introduction and severe consequences for local salamanders. The total risk to native amphibian populations from *Bsal* in the U.S. was the combination of two events: (1) where introductions are likely to occur (i.e., introduction assessment); and (2) if introduced, where environmental suitable habitat for *Bsal* and high species diversity overlap occur (i.e., consequences assessment; Fig. 1). The analysis was conducted using Geographical Information System (GIS) software (ArcGIS v. 10.1), and *Bsal* total risk is reported at the county level for the continental U.S. (Fig. 2).

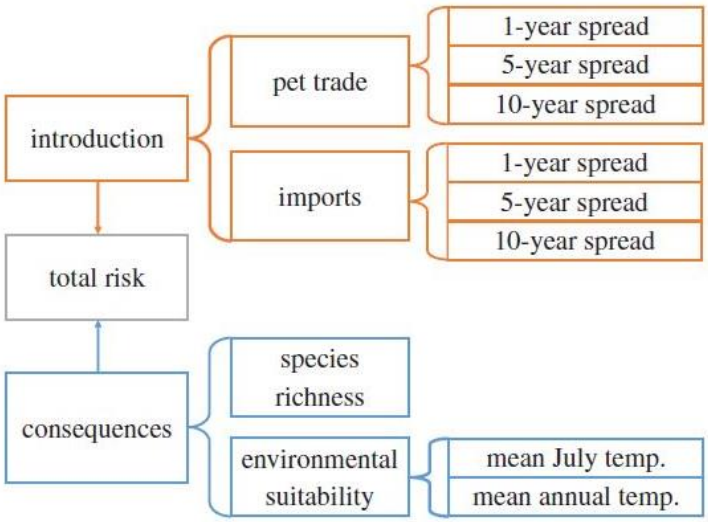


Figure 1. Conceptual diagram showing how each variable contributed to the estimated introduction and consequences assessment for *Bsal*. Component variables were averaged and scaled for each hierarchical factor (from Richgels et al. 2016).

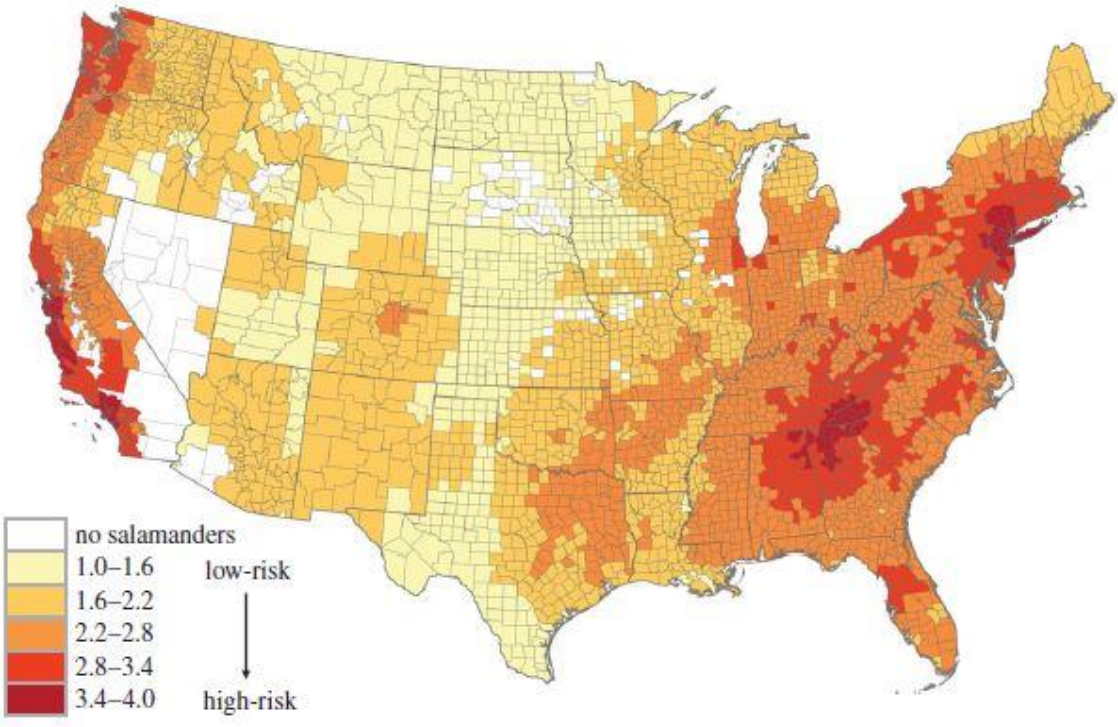


Figure 2. Heat map of the U.S. showing the total relative risk of *Bsal* to native U.S. salamanders based on the introduction and consequences assessment (from Richgels et al. 2016).

For our analysis of *Bsal* relative risk on military sites, we compiled the boundaries of 207 military installations within the continental U.S. and created a single military installation polygon. Military installation boundaries were obtained from the Military Services and the National Geospatial-Intelligence Agency. We used the ArcGIS v. 10.3 Spatial Analyst Intersect tool to split the military installation polygon into sections based on the *Bsal* total relative risk GIS layer from the Richgels et al (2016) publication. The resulting polygon identified one *Bsal* total relative risk value for each section of the intersected installation polygon. This step was necessary because 86 of 207 installations had two or more *Bsal* total relative risk values within a single installation boundary. For example, Fort Stewart had five unique *Bsal* total relative risk zones (range = 2.42-2.67) within the installation boundary (Fig. 3). In order to report one *Bsal* total relative risk for each installation, we used the ArcGIS Spatial Analyst Dissolve tool to calculate the maximum *Bsal* total relative risk for each installation that had more than one *Bsal* total relative risk zone. Lastly, for each military installation, ArcGIS was used to calculate the area (km^2) per site.

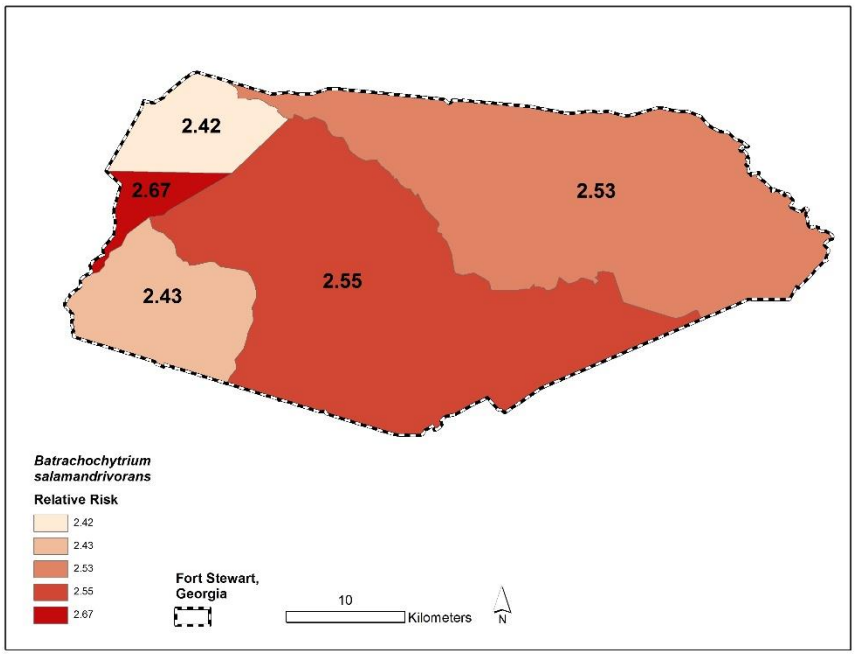


Figure 3. Map of Fort Stewart showing the total relative risk of *Bsal* to native U.S. salamanders in five different sections of the installation.

We then calculated three descriptive risk metrics per property: Maximum Total Relative Risk; Area Class; and Surveillance Priority. A Maximum Total Relative Risk value was reported for each installation as described above and then categorized based on the *Bsal* total relative risk classes reported in Richgels et al. (2016) (Fig. 1; Table 1). The Area Class metric was created by grouping the areas (km^2) of each military installation into five classes (Table 2). Lastly, the Surveillance Priority metric was calculated by summing the ranked integer values of the Maximum Total Relative Risk and the Area Class for each installation and grouping the results into eight classes (P1 = highest priority and P8 = lowest priority; Table 3). The Surveillance Priority metric is based on the assumption that those military sites with increasing Total Relative Risk and Area Class rankings would have greater priority for *Bsal* surveillance than military sites with decreasing Total Relative Risk and Area Class rankings. Our rationale that larger military

sites have a greater surveillance priority than smaller sites is based on the following assumptions: 1. Generally larger military sites have greater salamander populations/species diversity and the introduction of *Bsal* could have a greater impact on military activities due to increased regulatory restrictions 2. Responding to an outbreak of *Bsal* on larger military sites could be more expensive to control; thus, early detection of *Bsal* on larger sites has a larger potential for cost savings than early detection on smaller sites. 3. Larger military sites provide a greater opportunity for containing *Bsal* on the installation if an outbreak occurred if detected early, as it is more likely that the outbreak is contained within the boundaries of the military site.

Table 1. Classification scheme for Maximum Total Relative Risk metric.

Maximum Total Relative Risk Class (ranked value)	Value Range (*Bsal* Total Risk)	Number of Installations
Low Risk (1)	1.00-1.60	9
Medium-Low Risk (2)	1.61-2.20	42
Medium Risk (3)	2.21-2.80	93
Medium-High Risk (4)	2.81-3.40	47
High Risk (5)	3.41-4.00	16

Table 2. Classification scheme for Area Class.

Area Class (ranked value)	Value Range (Km^2)	Number of Installations
Small (1)	0-50	126
Medium-Small (2)	51-100	19
Medium (3)	101-500	40
Medium-Large (4)	501-1,000	12
Large (5)	1,001-6,300	10

Table 3. Surveillance priority metric (summed values of the Maximum Total Relative Risk and Area Class ranked values).

Surveillance Priority	Summed Ranked Value (Max. Total Risk + Area Class)	Number of Installations	Priority
P1	9	4	Highest Priority
P2	8	9	
P3	**7**	18	
P4	6	36	
P5	5	52	
P6	4	56	
P7	3	24	
P8	2	8	Lowest Priority

Results

In general, from the Richgels et al. (2016) model, introductions are more likely to occur in areas with higher human populations, where amphibian habitat and high species diversity overlap occur in areas with moist forested climates. Thus, as reflected in the heat map (Fig. 2), the total risk to native amphibian populations from *Bsal* in the U.S. is greatest along the northern Atlantic and southern Pacific Coasts and other heavily urbanized areas, as well as in the heavily forested southern Appalachian Mountains and Pacific Northwest, which support a correspondingly high amphibian species diversity. This geographic pattern is evident in the risk results from our DoD property analyses (Table 4).

Maximum total risk results for each of the 207 military sites ranged from 1.28 (Camp Grafton North, North Dakota) to 3.86 (Parks Reserve Force Training Area, California; Appendix C). The majority of the military sites (93 sites; 45%) had total risk values that were in the medium-risk category, followed by medium-high (47 sites; 23%) and medium-low (42 sites; 20%; Fig. 4; Table 1). There were 16 military installations with high-risk values (Table 4). These military sites are all located on the east and west coasts of the U.S. within the states of New Jersey, New York, and California.

Figure 4. Number of military installations in each of the five Maximum Total Risk categories.

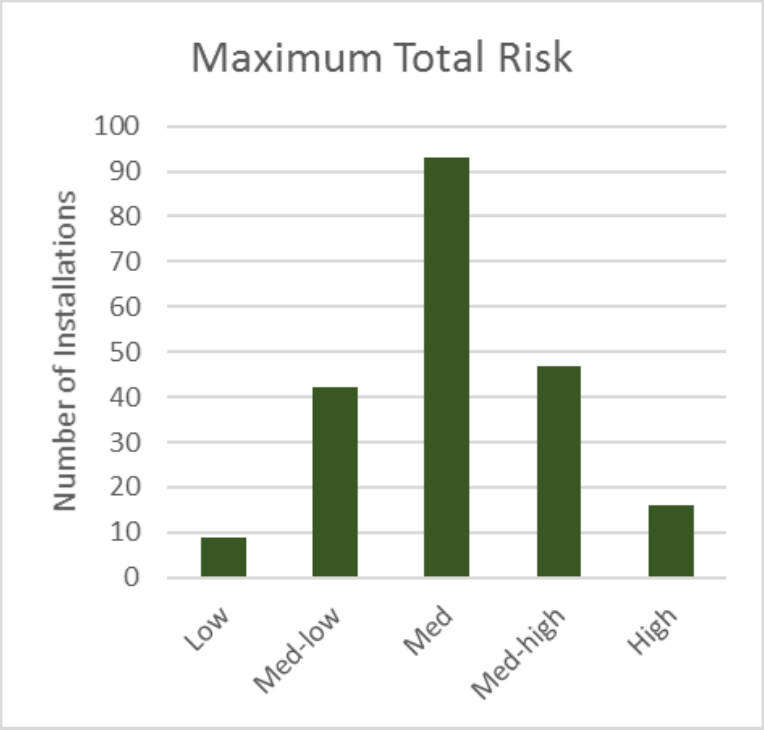
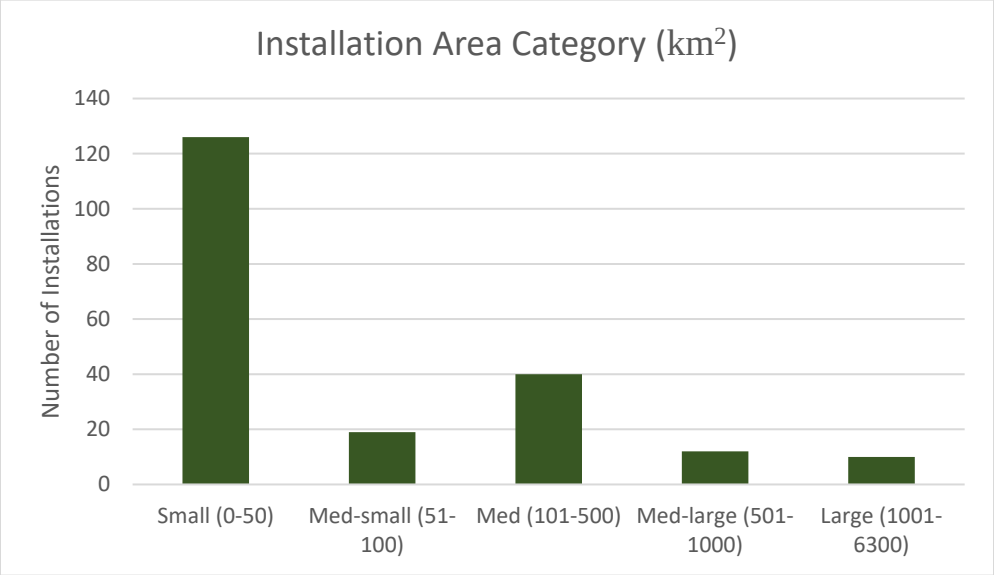


Table 4. Military installations with high *Bsal* Total Relative Risk.

Installation Name	State
Camp Roberts Training Site MTC-H	California
Camp San Luis Obispo	California
Camp Smith Training Site	New York
Dover Armory	New Jersey
Fort Hunter Liggett	California
Joint Base McGuire-Dix-Lakehurst	New Jersey
Marine Corps Base Camp Pendleton	California
Naval Weapons Station Seal Beach	California
Naval Support Activity (NSA) Monterey (Dunes/Research)	California
NSA Monterey (Main Grounds, Annex, Lab/Rec)	California
NSA Monterey (NIROP Santa Cruz)	California
Naval Weapons Station Earle	New Jersey
Parks Reserve Force Training Area	California
Picatinny Arsenal	New Jersey
Warren Grove Air National Guard	New Jersey
West Point Military Reservation	New York

One hundred and twenty-six (62%) of the 207 military sites included in this assessment were within the small area category (less than 50 km^2; Fig. 5; Table 2). In contrast, the least number of military sites (10 sites; 5%) were within the large area category (1001-6300 km^2). The number of military installations within the remaining area categories (medium-small, medium, medium-large) ranged from 40 to 12 sites (19-6 percent of the observations).

Figure 5. Number of military installations per installation area category.



Summing the ranked values of the Maximum Total Risk and the Area Classes resulted in a Surveillance Priority metric that collectively included all eight priority levels (Fig. 6; Table 3; Appendix C). Thirteen military sites were classified as P1 or P2, the highest surveillance priority (Table 5). In general, these military sites are located along the northern Atlantic and southern Pacific Coasts. The two categories with the largest number of military sites had priority levels of P5 (52 sites) and P6 (56 sites). These results suggest that over half of the military sites included in this assessment have a moderate to low priority for surveillance for *Bsal*.

Figure 6. Number of military installations per surveillance priority category.

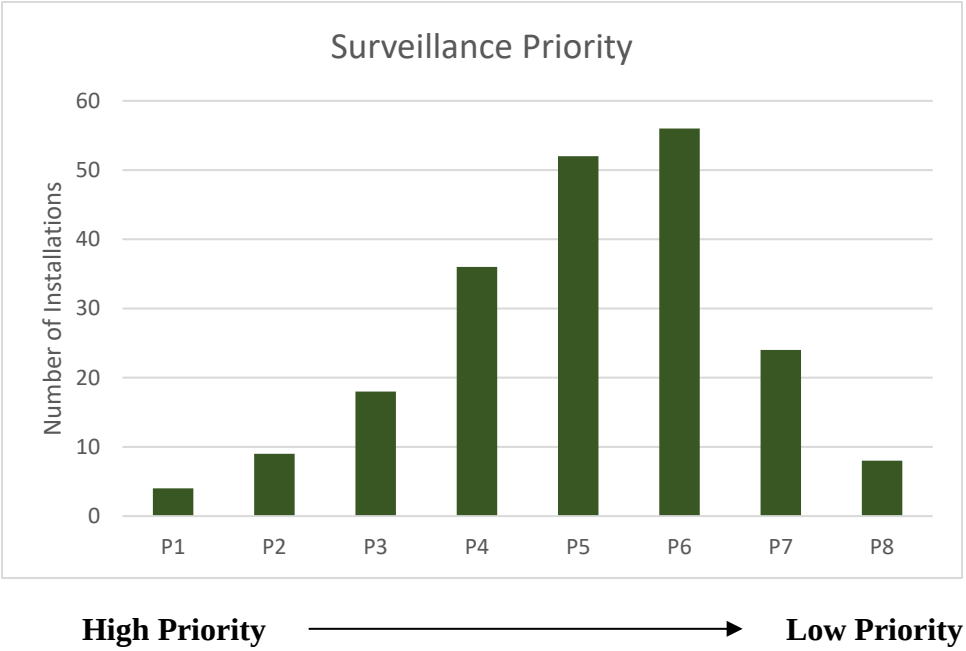


Table 5. Military installations in the high (P1-P2) surveillance priority categories.

Installation Name	State
Camp Butner (Snow Camp Training Site)	North Carolina
Fort Benning	Alabama
MCB Camp Pendleton	California
Fort Hunter Liggett	California
Fort Hood	Texas
Fort Polk	Louisiana
Eglin AFB	Florida
Fort Stewart	Georgia
Fort Knox	Kentucky
Fort Bragg	North Carolina
Vandenberg AFB	California
Camp Roberts Training Site MTC-H	California
West Point Military Reservation	New York

Discussion

Bsal is a potentially lethal pathogen that could have widespread population and even species-level consequences on DoD lands if introduced to the U.S. Continental U.S. DoD installations support populations of 83 salamander species, approximately 43% of all native salamander species in the U.S. (Petersen et al. 2017), including some that are federally and/or state endangered or threatened. Furthermore, there are an additional 25 salamander species unconfirmed, but with the potential to be present, on DoD installations. The threat of *Bsal* introduction highlights the need for some military installations to continue and others to consider enhancing survey and monitoring efforts of salamanders, particularly those with a high number of unconfirmed species.

Our assessment indicates that the majority of military installations with salamander populations have a moderate risk for *Bsal* introduction. The military installations with high-risk are located along the Pacific and Atlantic coasts, due to the likelihood of invasion and known suitability of habitats and fauna for *Bsal* infection as projected by the Richgels et al. (2016) risk model.

Our assessment also indicates that the majority of the military installations have a moderate-to-low priority for *Bsal* surveillance (with the exception of thirteen installations rated as high priority). Development of a pro-active *Bsal* monitoring and response plan for these installations is warranted to ensure biosecurity of native fauna on these federal lands, and to forestall possible transmission of *Bsal* elsewhere, in the event that it is found.

Biosecurity guidance to forestall introduction or spread of emerging infectious diseases for amphibians and other wildlife is gaining widespread attention in the U.S. and elsewhere (http://www.oie.int/en/for-the-media/press-releases/detail/article/investing-in-biosecurity-a-key-

step-to-curb-the-spread-of-animal-diseases/; accessed 4 December 2018). Buffering our natural heritage of native species from threats inclusive of novel diseases is important to protect the integrity of our native ecosystems. Federal agencies can have an important role to play in this regard, as inadvertent spread of disease-causing pathogens can occur by multiple pathways. Because the aquatic fungus *Bsal* has lifeforms that survive on amphibians, in water, and in substrates around aquatic habitats, biosecurity measures can be considered for a variety of activities. Some of these are provided here for U.S. DoD properties:

- Report the presence of dead or infected amphibians up your military chain of command
- Inform base residents not to release pet amphibians, of any species, into the wild
- Do not transport and release any amphibian among field sites
- If doing field work or recreation involving contact with mud or water, consider adopting a basic field-biosecurity protocol (examples are provided at the following two websites: http://parcplace.org/resources/herpetofaunal-disease-resources; http://www.salamanderfungus.org/resources/disinfection-procedures)

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Appendix A
Salamander Species Confirmed Present on Military Installations
(an asterisk after the common name indicates species is on the Lacey Act list**)**

Scientific Name	Common Name	Number of Military Sites Confirmed Present
Ambystoma annulatum	Ringed Salamander	1
Amphiuma pholeter	One-toed Amphiuma	1
Aneides aeneus	Green Salamander	1
Desmognathus apalachicolae	Apalachicola Dusky Salamander	1
Desmognathus monticola	Seal Salamander	1
Dicamptodon ensatus	California Giant Salamander	1
Eurycea latitans	Cascade Caverns Salamander	1
Eurycea neotenes	Texas Salamander	1
Eurycea spelaeus	Grotto Salamander	1
Necturus lewisi	Neuse River Waterdog	1
Notophthalmus meridionalis	Black-spotted Newt*	1
Plethodon electromorphus	Northern Ravine Salamander*	1
Plethodon kisatchie	Louisiana Slimy Salamander*	1
Plethodon richmondi	Southern Ravine Salamander*	1
Plethodon ventralis	Southern Zigzag Salamander*	1
Plethodon wehrlei	Wehrle's Salamander*	1
Pseudobranchus axanthus	Southern Dwarf Siren	1
Taricha sierrae	Sierra Newt*	1
Desmognathus orestes	Blue Ridge Dusky Salamander	1
Desmognathus quadramaculatus	Black-bellied Salamander	2
Ambystoma cingulatum	Frosted Flatwoods Salamander	2
Batrachoseps attenuatus	California Slender Salamander	2
Cryptobranchus alleganiensis	Hellbender	2
Eurycea chamberlaini	Chamberlain's Dwarf Salamander	2
Necturus beyeri	Gulf Coast Waterdog	2
Notophthalmus perstriatus	Striped Newt*	2
Plethodon serratus	Southern Red-backed Salamander*	2
Pseudobranchus striatus	Northern Dwarf Siren	2
Ambystoma barbouri	Streamside Salamander	3
Ambystoma bishopi	Reticulated Flatwoods Salamander	3
Batrachoseps gavilanensis	Gabilan Mountains Slender Salamander	3
Dicamptodon tenebrosus	Coastal Giant Salamander	3
Plethodon ocmulgee	Ocmulgee Slimy Salamander*	3
Plethodon variolatus	South Carolina Slimy Salamander*	3
Stereochilus marginatus	Many-lined Salamander	3
Ambystoma californiense	California Tiger Salamander	4

Amphiuma tridactylum	Three-toed Amphiuma	4
Batrachoseps nigriventris	Black-bellied Slender Salamander	4
Plethodon albagula	Western Slimy Salamander*	4
Aneides lugubris	Arboreal Salamander	5
Plethodon vehiculum	Western Red-backed Salamander*	5
Batrachoseps major	Southern California Slender Salamander	6
Desmognathus ochrophaeus	Allegheny Mountain Dusky Salamander	6
Plethodon cylindraceus	White-spotted Slimy Salamander*	6
Taricha torosa	California Newt*	6
Plethodon dorsalis	Northern Zigzag Salamander*	7
Ambystoma gracile	Northwestern Salamander	7
Ambystoma laterale	Blue-spotted Salamander	7
Ambystoma mabeei	Mabee's Salamander	7
Plethodon mississippi	Mississippi Slimy Salamander*	7
Ambystoma macrodactylum	Long-toed Salamander	8
Necturus maculosus	Mudpuppy	8
Necturus punctatus	Dwarf Waterdog	8
Gyrinophilus porphyriticus	Spring Salamander	9
Desmognathus conanti	Spotted Dusky Salamander	9
Taricha granulosa	Rough-skinned Newt*	9
Siren lacertina	Greater Siren*	11
Eurycea lucifuga	Cave Salamander	12
Plethodon grobmani	Southeastern Slimy Salamander*	12
Ambystoma jeffersonianum	Jefferson Salamander	13
Ensatina eschscholtzii	Ensatina	16
Plethodon chlorobryonis	Atlantic Coast Slimy Salamander*	16
Eurycea bislineata	Northern Two-lined Salamander	17
Pseudotriton montanus	Mud Salamander	17
Ambystoma mavortium	Western Tiger Salamander	18
Desmognathus auriculatus	Southern Dusky Salamander	18
Eurycea guttolineata	Three-lined Salamander	19
Eurycea longicauda	Long-tailed Salamander	19
Eurycea quadridigitata	Dwarf Salamander	19
Ambystoma texanum	Small-mouthed Salamander	20
Siren intermedia	Lesser Siren*	20
Amphiuma means	Two-toed Amphiuma	21
Ambystoma tigrinum	Eastern Tiger Salamander	25
Plethodon glutinosus	Northern Slimy Salamander*	27
Ambystoma talpoideum	Mole Salamander	27
Hemidactylium scutatum	Four-toed Salamander	30
Desmognathus fuscus	Northern Dusky Salamander	32
Pseudotriton ruber	Red Salamander	32
Eurycea cirrigera	Southern Two-lined Salamander	42

Plethodon cinereus	Eastern Red-backed Salamander*	55
Ambystoma opacum	Marbled Salamander	60
Ambystoma maculatum	Spotted Salamander	79
Notophthalmus viridescens	Eastern Newt*	80

Appendix B

Number of Salamander Species Confirmed Present per Military Installation

DoD Site Name	Number. of Salamander Species Confirmed Present
Arden Hills Army Training Site	1
Auburn Training Site	1
Bangor Training Site	1
Bog Brook Training Site	1
Brunswick Training Site	1
Camp Ashland	1
Camp Clark Training Site	1
Camp Dodge	1
Camp Grafton North	1
Camp Grafton South	1
Camp Grayling Joint Maneuver Center	1
Camp Guernsey Training Site	1
Camp Navajo	1
Camp Perry Training Site	1
Camp Smith Training Site	1
Camp Swift	1
Cannon AFB/Melrose Air Force Range	1
Douglas Creek Local Training Area	1
Dover Armory	1
Eastern Kentucky Training Site	1
Fairchild AFB	1
Fort Bliss	1
Fort Carson (Main Base)	1
Fort Carson (Pinon Canyon Maneuver Site)	1
Fort Hood	1
Fort Huachuca	1
Fort Riley	1
Francis E. Warren	1
Gardiner Training Center	1
Homestead ARB	1
Hurlburt Field	1
Iowa Army Ammunition Plant	1
Joint Base McGuire-Dix-Lakehurst (MDL)	1
Kirtland AFB	1
Lander Training Area	1
Malmstrom AFB	1
Marine Corps Reserve Center Battle Creek	1
McAlester AAP	1

MCAS Camp Pendleton	1
MCAS Cherry Point (MCOLF Oak Grove)	1
Military Ocean Terminal Concord	1
Minot AFB	1
NAS Oceana (Main Base)	1
NB Coronado (Remote Training Site, Warner Springs)	1
Naval Base Point Loma	1
NRL Chesapeake Bay Detachment	1
Naval Station Mayport	1
Naval Support Activity Orlando (LEFAC/Bugg Spring Facility)	1
NAVSUBASE Kings Bay	1
NCTAMSLANT DET Cutler (High Frequency Site)	1
NRTF Dixon	1
NSA Annapolis	1
NSA Midsouth Memphis	1
NSA Monterey (Dunes/Research)	1
Orchard Training Site	1
Parks Reserve Force Training Area	1
Plymouth Training Site	1
Scott AFB	1
Sheridan Training Area	1
Smyrna Training Site	1
Tinker AFB	1
US Air Force Academy	1
West Camp Rapid Training Area	1
White Sands Missile Range	1
Wright-Patterson AFB	1
Camp Blanding Joint Training Center	2
Camp Edwards	2
Camp Roberts Training Site MTC-H	2
Fort Chaffee	2
Fort Sill	2
JEB Little Creek-Fort Story (Little Creek)	2
Joint Base Antonio (Camp Bullis Training Annex)	2
MCAS Miramar	2
Milan Training Site	2
NAS JRB NOLA	2
NAS Kingsville (Dixie Target Range)	2
Naval Base Kitsap (NBK Keyport)	2
Naval Recreation Center Solomons	2
Naval Weapons Station Seal Beach	2
Naval Weapons Station Seal Beach (Fallbrook Det)	2
NAVSUBASE New London (Admiral Fife Recreational Area)	2

NAVSUBASE New London (Main Base)	2
NCBC Gulfport (Western Maneuver Area)	2
NCTAMSLANT DET Cutler (Very Low Frequency Site)	2
NWS Earle	2
Sheppard AFB	2
Travis AFB	2
Warren Grove Air National Guard	2
Westover Air Reserve Base	2
Blossom Point Research Facility	3
Camp Johnson	3
Camp Ripley	3
Camp San Luis Obispo	3
Carlisle Barracks	3
Caswell Training Site	3
Fort Leavenworth	3
Fort McCoy	3
Joint Base Langley-Eustis (Fort Eustis)	3
Little Rock AFB	3
NALF Fentress	3
NAS Pensacola (Main Base)	3
NAS Pensacola (NOLF Bronson Field)	3
Naval Magazine Indian Island	3
NRL Pomonkey Detachment	3
NAVSUBASE New London (Beaverdam Brook Wetland)	3
NSF Carderock	3
Oregon Army National Guard (Camp Adair)	3
Oregon Army National Guard (Camp Rilea)	3
Otis Air National Guard	3
Robinson Maneuver Training Center	3
Tarlton Readiness Center	3
Camp Curtis Guild	4
Camp Gruber Maneuver Training Center	4
Camp Sherman Joint Training Center	4
Columbus AFB	4
Dare County Range	4
Fort Custer Training Center	4
MCB Camp Pendleton	4
MCLB Albany	4
NAS Oceana (Dam Neck Annex)	4
NAS Whiting Field (Main Base)	4
New Boston AFS	4
NSA Monterey (Main Grounds, Annex, Lab/Rec)	4
Vandenberg AFB	4

Wendell H Ford Regional Training Center	4
Camp Butner (Snow Camp Training Site)	5
Fort Hunter Liggett	5
Fort Jackson	5
Great Pond Outdoor Adventure Center	5
JEB Little Creek-Fort Story (Fort Story)	5
Jim Creek	5
Manchester Fuel Depot	5
Marine Corps Reserve Center Clinton	5
Muscatatuck Urban Training Center	5
NAS Patuxent River (Webster Field)	5
NAS Whiting Field (OLF Holley)	5
Naval Base Kitsap (NBK Bangor)	5
NSF Dahlgren (Mainside/Pumpkin Neck)	5
New Hampshire Army National Guard Training Site	5
NSA Monterey (NIROP Santa Cruz)	5
Navy SERE School	5
Shaw AFB/Poinsett Electronic Combat Range	5
Avon Park AFR	6
Camp Maxey	6
Camp McCain	6
Ethan Allen Firing Range	6
Fort Polk	6
Fort Rucker	6
MCAS Beaufort	6
NWS Yorktown (Yorktown Fuel Depot)	6
NWS Yorktown (Cheatham Annex)	6
Aberdeen Proving Ground	7
Camp Villere	7
Catoosa Training Site	7
Eglin AFB	7
NRL Midway Research Center	7
NSA Hampton Roads Northwest Annex	7
NWS Yorktown (Sugar Grove)	7
Robins AFB	7
Fort Benning	8
Fort Lee	8
MCAS Cherry Point (Main Base)	8
Military Ocean Terminal Sunny Point	8
Moody AFB	8
NAS Meridian (Joe Williams Field)	8
NAS Meridian (Searay Target Range)	8
NAS Patuxent River (Main Base)	8

NSF Indian Head	8
NWS Yorktown (Main Base)	8
Picatinny Arsenal	8
Townsend Bombing Range	8
Camp Atterbury Joint Maneuver Training Center	9
Camp Butner (Main Base)	9
Joint Base Charleston (Weapons Station)	9
MCB Quantico	9
Milan Army Ammunition Plant	9
NAS Meridian (McCain Field)	9
Radford AAP (New River Storage Unit)	9
Barksdale AFB	10
Blue Grass Army Depot	10
Camp Beauregard Training Site	10
Camp Dawson	10
Camp Ravenna Joint Military Training Center	10
Fort Belvoir	10
Fort Indiantown Gap	10
MCB Camp Lejeune	10
NAS Pensacola (Saufley Field NETPDTC)	10
Radford AAP (Main Base)	10
West Point Military Reservation	10
Fort Drum	11
Fort McClellan ARNG Training Center	11
Holston Army Ammunition Plant	11
Maneuver Training Center-Fort Pickett	11
NSA Crane	11
Arnold AFB	12
Fort Leonard Wood	12
Joint Base Lewis-McCord	12
Letterkenny Army Depot	12
Redstone Arsenal	12
Tullahoma Training Site	12
Camp Shelby Joint Forces Training Center	13
Fort A.P Hill	13
Fort Gordon	13
Jefferson Proving Grounds	13
McCrady Training Center	13
Fort Bragg	15
Fort Campbell	15
Fort Knox	15
Fort Stewart	20

Appendix C

Maximum Total Relative Risk, Area Class, and Surveillance Priority per Military Installation

Installation Name	Max. Total Risk	Max. Total Risk Category	Installation Area (Km^2)	Installation Area Category	Surveillance Priority Category Number	Surveillance Priority
Camp Grafton North	1.28	1-low	22.84	1-small	2.00	P8
Camp Grafton South	1.29	1-low	80.73	2-med-small	3.00	P7
Douglas Creek Local Training Area	1.30	1-low	3.34	1-small	2.00	P8
NAS Kingsville (Dixie Target Range)	1.30	1-low	40.78	1-small	2.00	P8
Sheridan Training Area	1.32	1-low	31.59	1-small	2.00	P8
Minot AFB	1.35	1-low	45.55	1-small	2.00	P8
West Camp Rapid Training Area	1.38	1-low	5.78	1-small	2.00	P8
Lander Training Area	1.44	1-low	10.05	1-small	2.00	P8
Malmstrom AFB	1.48	1-low	28.95	1-small	2.00	P8
NAS JRB NOLA	1.61	2-med-low	26.37	1-small	3.00	P7
Camp Guernsey Training Site	1.63	2-med-low	479.98	3-med	5.00	P5
Camp Ripley	1.65	2-med-low	444.29	3-med	5.00	P5
Cannon AFB/Melrose Air Force Range	1.66	2-med-low	22.16	1-small	3.00	P7
Caswell Training Site	1.67	2-med-low	9.15	1-small	3.00	P7
Orchard Training Site	1.69	2-med-low	1089.67	5-large	7.00	P3
Fort Riley	1.70	2-med-low	682.71	4-med-large	6.00	P4
Camp Dodge	1.74	2-med-low	32.16	1-small	3.00	P7
White Sands Missile Range	1.74	2-med-low	0.01	1-small	3.00	P7
Camp Ashland	1.75	2-med-low	7.44	1-small	3.00	P7
Camp Navajo	1.76	2-med-low	171.52	3-med	5.00	P5

Fort Carson (Pinon Canyon Maneuver Site)	1.77	2-med-low	1510.37	5-large	7.00	P3
Arden Hills Army Training Site	1.80	2-med-low	12.14	1-small	3.00	P7
Francis E. Warren	1.80	2-med-low	41.78	1-small	3.00	P7
Kirtland AFB	1.82	2-med-low	302.75	3-med	5.00	P5
Fort Huachuca	1.82	2-med-low	451.67	3-med	5.00	P5
Iowa Army Ammunition Plant	1.83	2-med-low	134.84	3-med	5.00	P5
Fort McCoy	1.86	2-med-low	465.58	3-med	5.00	P5
MCAS Camp Pendleton	1.86	2-med-low	0.20	1-small	3.00	P7
Fort Bliss	1.87	2-med-low	6296.65	5-large	7.00	P3
Fairchild AFB	1.89	2-med-low	37.42	1-small	3.00	P7
Sheppard AFB	1.90	2-med-low	27.16	1-small	3.00	P7
NCTAMSLANT DET Cutler (High Frequency Site)	1.90	2-med-low	1.40	1-small	3.00	P7
NCTAMSLANT DET Cutler (Very Low Frequency Site)	1.90	2-med-low	20.46	1-small	3.00	P7
Fort Leavenworth	1.95	2-med-low	38.76	1-small	3.00	P7
Great Pond Outdoor Adventure Center	1.97	2-med-low	4.21	1-small	3.00	P7
Bangor Training Site	1.98	2-med-low	1.65	1-small	3.00	P7
Plymouth Training Site	1.98	2-med-low	2.52	1-small	3.00	P7
Camp Grayling Joint Maneuver Center	1.99	2-med-low	1180.53	5-large	7.00	P3
Tinker AFB	2.02	2-med-low	29.57	1-small	3.00	P7
Navy SERE School	2.03	2-med-low	472.55	3-med	5.00	P5
Fort Sill	2.05	2-med-low	561.86	4-med-large	6.00	P4
Camp Swift	2.07	2-med-low	63.49	2-med-small	4.00	P6

Auburn Training Site	2.08	2-med-low	1.38	1-small	3.00	P7
Barksdale AFB	2.10	2-med-low	124.62	3-med	5.00	P5
Gardiner Training Center	2.10	2-med-low	0.90	1-small	3.00	P7
Joint Base Antonio (Camp Bullis Training Annex)	2.11	2-med-low	150.49	3-med	5.00	P5
Camp Beauregard Training Site	2.14	2-med-low	3.97	1-small	3.00	P7
Bog Brook Training Site	2.16	2-med-low	1.65	1-small	3.00	P7
Fort Carson (Main Base)	2.17	2-med-low	911.18	4-med-large	6.00	P4
US Air Force Academy	2.17	2-med-low	123.77	3-med	5.00	P5
Milan Training Site	2.17	2-med-low	0.18	1-small	3.00	P7
Fort Hood	2.22	3-med	1174.09	5-large	8.00	P2
Ethan Allen Firing Range	2.22	3-med	87.71	2-med-small	5.00	P5
Camp Johnson	2.22	3-med	0.47	1-small	4.00	P6
NAS Meridian (Joe Williams Field)	2.25	3-med	8.30	1-small	4.00	P6
Moody AFB	2.27	3-med	28.14	1-small	4.00	P6
Camp McCain	2.27	3-med	75.92	2-med-small	5.00	P5
Camp Perry Training Site	2.29	3-med	4.12	1-small	4.00	P6
Robinson Maneuver Training Center	2.29	3-med	198.85	3-med	6.00	P4
Little Rock AFB	2.29	3-med	37.23	1-small	4.00	P6
Fort Polk	2.30	3-med	1065.80	5-large	8.00	P2
McAlester AAP	2.34	3-med	269.11	3-med	6.00	P4
NAS Meridian (McCain Field)	2.35	3-med	45.87	1-small	4.00	P6
Fort Drum	2.36	3-med	859.22	4-med-large	7.00	P3
NAVSUBASE Kings Bay	2.36	3-med	95.60	2-med-small	5.00	P5
NAS Meridian (Searay Target Range)	2.36	3-med	2.55	1-small	4.00	P6
Fort Leonard Wood	2.39	3-med	399.42	3-med	6.00	P4

Columbus AFB	2.40	3-med	25.58	1-small	4.00	P6
Hurlburt Field	2.40	3-med	10.34	1-small	4.00	P6
Fort Chaffee	2.41	3-med	394.78	3-med	6.00	P4
Scott AFB	2.41	3-med	19.14	1-small	4.00	P6
Brunswick Training Site	2.42	3-med	0.04	1-small	4.00	P6
Camp Maxey	2.43	3-med	38.70	1-small	4.00	P6
NAS Whiting Field (Main Base)	2.43	3-med	21.39	1-small	4.00	P6
NAS Whiting Field (OLF Holley)	2.43	3-med	3.77	1-small	4.00	P6
Camp Shelby Joint Forces Training Center	2.43	3-med	762.57	4-med-large	7.00	P3
New Hampshire Army National Guard Training Site	2.46	3-med	1.63	1-small	4.00	P6
Otis Air National Guard & Camp Edwards	2.46	3-med	0.57	1-small	4.00	P6
NSA Midsouth Memphis	2.47	3-med	9.04	1-small	4.00	P6
NAS Pensacola (Main Base)	2.48	3-med	29.98	1-small	4.00	P6
NAS Pensacola (NOLF Bronson Field)	2.48	3-med	6.16	1-small	4.00	P6
NAS Pensacola (Saufley Field NETPDTC)	2.48	3-med	4.84	1-small	4.00	P6
NCBC Gulfport (Western Maneuver Area)	2.49	3-med	219.15	3-med	6.00	P4
Camp Villere	2.49	3-med	8.01	1-small	4.00	P6
Eglin AFB	2.49	3-med	2534.58	5-large	8.00	P2
Townsend Bombing Range	2.50	3-med	186.63	3-med	6.00	P4
Camp Gruber Maneuver Training Center	2.51	3-med	194.23	3-med	6.00	P4

Fort Custer Training Center	2.52	3-med	55.33	2-med-small	5.00	P5
Marine Corps Reserve Center Battle Creek	2.52	3-med	0.17	1-small	4.00	P6
Wendell H Ford Regional Training Center	2.52	3-med	71.68	2-med-small	5.00	P5
MCAS Beaufort	2.53	3-med	31.32	1-small	4.00	P6
NAS Patuxent River (Main Base)	2.53	3-med	43.41	1-small	4.00	P6
NAS Patuxent River (Webster Field)	2.53	3-med	5.57	1-small	4.00	P6
Muscatatuck Urban Training Center	2.54	3-med	6.43	1-small	4.00	P6
Dare County Range	2.54	3-med	285.58	3-med	6.00	P4
Homestead ARB	2.58	3-med	9.64	1-small	4.00	P6
Naval Recreation Center Solomons	2.59	3-med	1.86	1-small	4.00	P6
NRL Chesapeake Bay Detachment	2.59	3-med	0.97	1-small	4.00	P6
Milan Army Ammunition Plant	2.59	3-med	137.87	3-med	6.00	P4
NSA Crane	2.59	3-med	411.68	3-med	6.00	P4
Wright-Patterson AFB	2.59	3-med	52.31	2-med-small	5.00	P5
Camp Sherman Joint Training Center	2.60	3-med	3.08	1-small	4.00	P6
MCB Camp Lejeune	2.63	3-med	327.81	3-med	6.00	P4
Camp Atterbury Joint Maneuver Training Center	2.64	3-med	235.96	3-med	6.00	P4
Naval Station Mayport	2.65	3-med	15.69	1-small	4.00	P6
Marine Corps Reserve Center Clinton	2.65	3-med	2.03	1-small	4.00	P6
New Boston AFS	2.65	3-med	21.93	1-small	4.00	P6

JEB Little Creek-Fort Story (Fort Story)	2.66	3-med	9.21	1-small	4.00	P6
NAS Oceana (Dam Neck Annex)	2.66	3-med	11.31	1-small	4.00	P6
NAS Oceana (Main Base)	2.66	3-med	33.43	1-small	4.00	P6
Fort Stewart	2.67	3-med	1570.54	5-large	8.00	P2
Camp Blanding Joint Training Center	2.68	3-med	397.46	3-med	6.00	P4
JEB Little Creek-Fort Story (Little Creek)	2.69	3-med	14.12	1-small	4.00	P6
MCLB Albany	2.70	3-med	18.51	1-small	4.00	P6
Military Ocean Terminal Sunny Point	2.70	3-med	67.96	2-med-small	5.00	P5
Blossom Point Research Facility	2.71	3-med	10.39	1-small	4.00	P6
Naval Magazine Indian Island	2.71	3-med	13.37	1-small	4.00	P6
NRL Pomonkey Detachment	2.71	3-med	0.73	1-small	4.00	P6
NRTF Dixon	2.71	3-med	8.54	1-small	4.00	P6
Joint Base Charleston (Weapons Station)	2.72	3-med	96.39	2-med-small	5.00	P5
Smyrna Training Site	2.72	3-med	0.08	1-small	4.00	P6
Camp Ravenna Joint Military Training Center	2.72	3-med	154.54	3-med	6.00	P4
MCB Quantico	2.73	3-med	388.26	3-med	6.00	P4
NRL Midway Research Center	2.73	3-med	0.71	1-small	4.00	P6
Maneuver Training Center-Fort Pickett	2.74	3-med	260.75	3-med	6.00	P4
NALF Fentress	2.74	3-med	16.25	1-small	4.00	P6

NSA Hampton Roads Northwest Annex	2.74	3-med	22.95	1-small	4.00	P6
NSF Carderock	2.74	3-med	1.24	1-small	4.00	P6
Oregon Army National Guard (Camp Adair)	2.74	3-med	4.21	1-small	4.00	P6
NSF Dahlgren (Mainside/Pumpkin Neck)	2.75	3-med	27.37	1-small	4.00	P6
Fort Campbell	2.75	3-med	656.09	4-med-large	7.00	P3
MCAS Cherry Point (MCOLF Oak Grove)	2.75	3-med	5.72	1-small	4.00	P6
Fort A.P Hill	2.76	3-med	486.58	3-med	6.00	P4
Avon Park AFR	2.77	3-med	557.29	4-med-large	7.00	P3
Tarlton Readiness Center	2.77	3-med	0.71	1-small	4.00	P6
Jefferson Proving Grounds	2.77	3-med	337.42	3-med	6.00	P4
MCAS Cherry Point (Main Base)	2.77	3-med	61.65	2-med-small	5.00	P5
Naval Base Kitsap (NBK Bangor)	2.77	3-med	66.94	2-med-small	5.00	P5
Naval Base Kitsap (NBK Keyport)	2.77	3-med	2.42	1-small	4.00	P6
Camp Dawson	2.77	3-med	2.78	1-small	4.00	P6
Letterkenny Army Depot	2.78	3-med	121.65	3-med	6.00	P4
Fort Belvoir	2.78	3-med	55.16	2-med-small	5.00	P5
Jim Creek	2.79	3-med	43.67	1-small	4.00	P6
Shaw AFB/Poinsett Electronic Combat Range	2.79	3-med	19.64	1-small	4.00	P6
Fort Rucker	2.81	4-med-high	340.58	3-med	7.00	P3
Camp Butner (Main Base)	2.82	4-med-high	30.46	1-small	5.00	P5
Manchester Fuel Depot	2.82	4-med-high	2.26	1-small	5.00	P5
NSA Annapolis	2.82	4-med-high	1.91	1-small	5.00	P5

NWS Yorktown (Sugar Grove)	2.83	4-med-high	3.12	1-small	5.00	P5
NSF Indian Head	2.83	4-med-high	23.64	1-small	5.00	P5
NWS Yorktown (Yorktown Fuel Depot)	2.83	4-med-high	0.96	1-small	5.00	P5
Carlisle Barracks	2.85	4-med-high	3.13	1-small	5.00	P5
Oregon Army National Guard (Camp Rilea)	2.85	4-med-high	14.31	1-small	5.00	P5
Fort Knox	2.86	4-med-high	705.45	4-med-large	8.00	P2
Joint Base Lewis-McCord	2.86	4-med-high	39.50	1-small	5.00	P5
Fort Lee	2.86	4-med-high	36.22	1-small	5.00	P5
Joint Base Langley-Eustis (Fort Eustis)	2.87	4-med-high	50.15	2-med-small	6.00	P4
NWS Yorktown (Main Base)	2.87	4-med-high	65.84	2-med-small	6.00	P4
NWS Yorktown (Cheatham Annex)	2.87	4-med-high	14.70	1-small	5.00	P5
NAVSUBASE New London (Admiral Fife Recreational Area)	2.87	4-med-high	0.84	1-small	5.00	P5
NAVSUBASE New London (Beaverdam Brook Wetland)	2.87	4-med-high	2.70	1-small	5.00	P5
NAVSUBASE New London (Main Base)	2.87	4-med-high	4.42	1-small	5.00	P5
Naval Support Activity Orlando (LEFAC/Bugg Spring Facility)	2.89	4-med-high	0.32	1-small	5.00	P5
Travis AFB	2.92	4-med-high	33.22	1-small	5.00	P5
Eastern Kentucky Training Site	2.93	4-med-high	3.40	1-small	5.00	P5
Radford AAP (Main Base)	2.93	4-med-high	26.84	1-small	5.00	P5

Radford AAP (New River Storage Unit)	2.93	4-med-high	19.00	1-small	5.00	P5
Fort Bragg	2.95	4-med-high	923.03	4-med-large	8.00	P2
Camp Curtis Guild	2.96	4-med-high	5.22	1-small	5.00	P5
Fort Jackson	2.99	4-med-high	0.04	1-small	5.00	P5
Westover Air Reserve Base	3.00	4-med-high	17.49	1-small	5.00	P5
Blue Grass Army Depot	3.02	4-med-high	94.09	2-med-small	6.00	P4
McCrady Training Center	3.04	4-med-high	305.28	3-med	7.00	P3
Fort Gordon	3.04	4-med-high	321.33	3-med	7.00	P3
Aberdeen Proving Ground	3.04	4-med-high	332.56	3-med	7.00	P3
Catoosa Training Site	3.05	4-med-high	9.79	1-small	5.00	P5
Fort Indiantown Gap	3.07	4-med-high	128.82	3-med	7.00	P3
Camp Butner (Snow Camp Training Site)	3.10	4-med-high	1674.02	5-large	9.00	P1
Military Ocean Terminal Concord	3.11	4-med-high	0.02	1-small	5.00	P5
Arnold AFB	3.15	4-med-high	237.19	3-med	7.00	P3
Tullahoma Training Site	3.15	4-med-high	0.04	1-small	5.00	P5
Holston Army Ammunition Plant	3.18	4-med-high	38.88	1-small	5.00	P5
NB Coronado (Remote Training Site, Warner Springs)	3.18	4-med-high	35.27	1-small	5.00	P5
MCAS Miramar	3.28	4-med-high	129.30	3-med	7.00	P3
Naval Base Point Loma	3.28	4-med-high	6.65	1-small	5.00	P5
Redstone Arsenal	3.29	4-med-high	227.73	3-med	7.00	P3
Fort Benning	3.30	4-med-high	1033.34	5-large	9.00	P1
Robins AFB	3.32	4-med-high	38.32	1-small	5.00	P5
Fort McClellan ARNG Training Center	3.33	4-med-high	1.89	1-small	5.00	P5

Naval Weapons Station Seal Beach (Fallbrook Det)	3.33	4-med-high	51.70	2-med-small	6.00	P4
Vandenberg AFB	3.34	4-med-high	592.27	4-med-large	8.00	P2
Warren Grove Air National Guard	3.44	5-high	67.57	2-med-small	7.00	P3
Joint Base McGuire-Dix-Lakehurst (MDL)	3.44	5-high	26.29	1-small	6.00	P4
NSA Monterey (NIROP Santa Cruz)	3.46	5-high	2.02	1-small	6.00	P4
Camp San Luis Obispo	3.47	5-high	34.31	1-small	6.00	P4
NWS Earle	3.51	5-high	76.79	2-med-small	7.00	P3
Camp Roberts Training Site MTC-H	3.57	5-high	261.42	3-med	8.00	P2
West Point Military Reservation	3.57	5-high	115.29	3-med	8.00	P2
Naval Weapons Station Seal Beach	3.59	5-high	28.27	1-small	6.00	P4
NSA Monterey (Dunes/Research)	3.62	5-high	0.35	1-small	6.00	P4
NSA Monterey (Main Grounds, Annex, Lab/Rec)	3.62	5-high	1.61	1-small	6.00	P4
MCB Camp Pendleton	3.64	5-high	732.48	4-med-large	9.00	P1
Fort Hunter Liggett	3.67	5-high	998.84	4-med-large	9.00	P1
Dover Armory	3.76	5-high	0.11	1-small	6.00	P4
Picatinny Arsenal	3.76	5-high	41.49	1-small	6.00	P4
Camp Smith Training Site	3.78	5-high	11.29	1-small	6.00	P4
Parks Reserve Force Training Area	3.86	5-high	12.67	1-small	6.00	P4