SBAG emphasizes the importance of including planetary defense priorities in the upcoming Decadal Survey. As recently highlighted in the National Academies of Science, Engineering and Medicine report *Finding Hazardous Asteroids Using Infrared and Visible Wavelength Telescopes*, planetary defense missions are currently proposed in response to planetary science competed mission solicitations. However, since planetary defense priorities were not included in the last Decadal Survey, there are no criteria available to evaluate these missions' ability to achieve important, non-science, planetary defense objectives. The National Academies report recommends "missions meeting high-priority planetary defense objectives should not be required to compete against missions meeting high-priority science objectives." As there is no current alternative mechanism for the evaluation of proposed planetary defense missions, SBAG encourages the inclusion of planetary defense priorities in the upcoming Decadal Survey, so that these missions, which draw strongly on expertise and technologies used and advanced by the planetary science community, may be evaluated on relevant criteria.

SBAG encourages NASA to increase the number of civil servants and contractors who can attend the Division of Planetary Science (DPS) meeting in Geneva, Switzerland September, 2019. DPS is the primary annual meeting for the small-body community, and is the venue for many important presentations and collaborations between members of the U.S. and international scientific communities. A tight restriction on the number of NASA civil servants and contractors would prevent a large portion of the U.S. community from attending DPS, which would be detrimental for both the scientists who could not attend and for the meeting as a whole.

SBAG reiterates its support for a space-based infrared asteroid survey to discover, detect, track, and characterize small bodies, especially those that may be potentially hazardous to Earth. The recent report of the National Academies of Science, Engineering, and Medicine *Finding Hazardous Asteroids Using Infrared and Visible Wavelength Telescopes* recommends "NASA should fund a dedicated space-based infrared survey telescope" to provide "diameter information that visible wavelength telescopes cannot." Additionally, the report affirms that such a survey presents the best method of attaining the "completeness and size requirements given in the George E. Brown, Jr. Near-Earth Object Survey Act … in a timely fashion" of approximately 10 years. Furthermore, Goal 1 of the *National Near-Earth Object Preparedness Strategy and Action Plan*, a report by the Interagency Working Group for Detecting and Mitigating the Impact of Earth-Bound Near-Earth Objects of the National Science & Technology Council, is to "enhance NEO detection, tracking, and characterization capabilities" over the next 10 years. Therefore, SBAG urges NASA to heed these recommendations and elevate, to a financially feasible extent, a space-based infrared survey, e.g., NEOCam, to Phase B and beyond.

SBAG congratulates the organizers of the 2019 Planetary Defense Conference (PDC; held in College Park, MD), including the scientific and local organizing committees and the International Academy of Astronautics. The 2019 PDC was a productive and successful meeting. The presentations, hypothetical impact scenario exercise, and accompanying media attention reflect increasing awareness in the non-specialist community of the need for near-Earth asteroid surveys, characterization, and mitigation preparation. SBAG recognizes the importance

of NASA engagement to the success of the PDC and encourages their continued engagement in future PDC meetings.

SBAG supports continued Center for Near Earth Object Studies (CNEOS) Near-Earth Object Human Space Flight Accessible Targets Study (NHATS) processing and associated public webpage postings. This effort provides a database of near-Earth asteroid (NEA) targets and mission profiles relevant to human roundtrips from Earth, typically updated on a daily basis. In the interest of maintaining NHATS relevancy to mission planning, SBAG agrees with CNEOS suggestions that the assessed Earth departure window, currently fixed from 2015 to 2041, should (in the next year or so) be shifted 5 years later in order to assess the interval from 2020 to 2046. In addition to NHATS operations, SBAG endorses a proposed parallel CNEOS effort that would provide a list of NEAs accessible as targets for robotic missions without an Earth-return trajectory. As the list of catalogued NEAs continues to grow dramatically, SBAG recognizes that ongoing assessment of the list for practical human and robotic mission opportunities is a valuable service to mission designers and observers alike. Such missions are potentially important for both space exploration and planetary defense.

SBAG expresses its enthusiastic support for ESA's Hera mission, which will significantly advance the goals of planetary defense. In 2022, in the first feasibility test of deflecting an asteroid, NASA's Double Asteroid Redirection Test (DART) spacecraft will impact Didymos B, the 160 meter-sized binary companion of Didymos A, in an attempt to change its orbit around the larger primary. This demonstration is a key step toward planning for mitigation of an NEO approaching Earth. Hera's follow-on survey of the Didymos system in 2026 will gather key information not available from Earth-based observations, including Didymos B's mass, its surface properties including its surface and subsurface composition and the morphology of the impact site, as well as high-resolution information about Didymos A. This assessment of the effects of the impact will enable engineers to design more effective mitigation strategies. Hera includes U.S. team members and thus advances international cooperation in the area of planetary defense.

SBAG expresses its enthusiastic support for including a Participating Scientist Program (PSP) in current and planned mission profiles. PSPs have the potential to greatly enhance the scientific return from planetary missions, to increase mission-involvement opportunities for early-career scientists, to increase the diversity of mission teams, and to encourage more international participation in the analysis of mission datasets. It would also allow early-career participating scientists to gain key insights into planning future missions. Mission planners, principal investigators, and NASA are therefore encouraged to prioritize including PSPs in all missions.

SBAG urges the National Academies to select a Planetary Decadal Survey Committee that reflects the demographic makeup of the planetary science community. NASA has made a concerted effort to promote a diverse and inclusive workforce in recent years, particularly in the make-up of mission teams. NASA's Diversity and Inclusion Strategic Implementation Plan states "creating a diverse and inclusive NASA work environment is critical to the successful

accomplishment of NASA mission objectives." The Planetary Decadal Survey Committee will establish the planetary science priorities through 2032. A diverse and inclusive Planetary Decadal Survey Committee is essential to appropriately represent the interests and inputs of the planetary science community.