

# Astrophysics in CAPS

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Astronomy Decadal Survey (*New Worlds* and New Horizons: NWNH)

Major Theme: Understanding the Cosmic Order

Science frontier question related to understanding the cosmic order:

*Do habitable worlds exist around other stars, and can we identify the telltale signs of life on an exoplanet?*

Flagship: WFIRST -> exoplanets; James Webb Space Telescope overrun; postponed to 2020.

Sea change in last 5 years - theoretical and observational astronomers working on aspects of exoplanets

8% of recent arXiv astrophysical preprints

7% of papers in the Astrophysical Journal last year referred to *exoplanet, protoplanet, habitable, biology*.

These people do not (necessarily) regard themselves as “astrobiologists,” but they are a key part of the overall astrobiology enterprise.

Attention must be paid!

Some key topics:

Earth-like planets in habitable zones

Water necessary (how delivered?), but sufficient for life?

Criteria for RNA world?

Planet birth, migration

Hot Jupiters, atmospheres

Ice lines

Rogue planets? - Sumi et al. 2011, Nature.



# Role of CAPS

Oversight of all astronomical research on exoplanets, biomarkers, habitable zones

Integration with astrobiology

Integration with comparative planetology

Other decadal studies:

Solar Science? Young Sun paradox, flares

Earth Science? Our fundamental model, parochial as it might be

## Draft Statement of Task

How will NRC monitor research on astrobiology, whatever stovepipe it is in, other than CAPS?

Problematic for Committee on Astronomy and Astrophysics to properly oversee astrobiology aspects of NWNH.

Short, fast-track reports on astrobiology and planetary science - relevant to NWNH, Solar decadal.

Scope of fast-track reports:

*Solar system science carried out with Large Synoptic Survey Telescope...*

LSST funded by NSF, will also do exoplanets. LSST is first priority of NWNH, camel's nose is already under the tent.

What I'd like to see:

The committee will build on the planetary decadal survey, *the astronomy decadal survey*, *the solar science decadal survey*, *the Earth science decadal survey*, and relevant NRC astrobiology assessment/strategy reports and monitor the progress of their recommended priorities for the most important scientific and technical activities.

