MPS/AST Portfolio Review

Astronomy & Astrophysics Advisory Committee

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Why Conduct a Portfolio Review?

- Foreseeable budgets will not be sufficient to meet the aspirations of the astronomical community

- National Academy of Sciences (NAS) decadal survey in Astronomy & Astrophysics advised: "If … budget is truly flat … there is no possibility of implementing … the recommended program … without … enacting the recommendations of the first 2006 senior review and/or … a second more drastic … review before mid-decade." (p. 240)
  - NAS survey assumed a budget for the Division of Astronomical Sciences (AST) that rises 4%/yr in purchasing power through the decade.

- Such reviews should be carried out periodically in any case, for responsible stewardship of the AST portfolio

Over-riding Goals

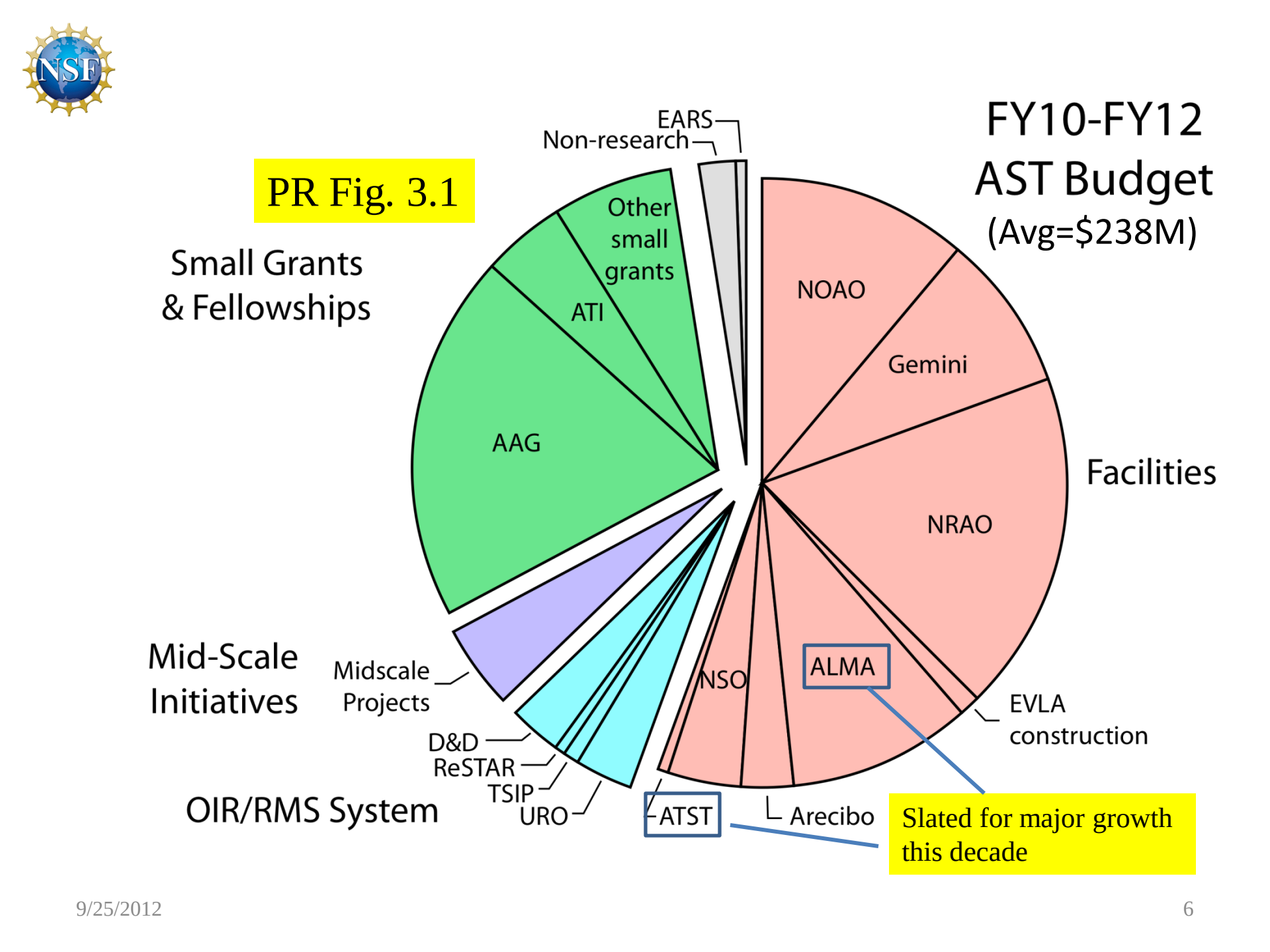
- Foster U.S. leadership in ground-based astronomical research in 2020 and beyond
- Look to the future of scientific advances and our community under a more constrained budget environment
- Achieve the balance that enables the most progress on the key scientific questions from the recent decadal surveys

Committee Charge and Actions

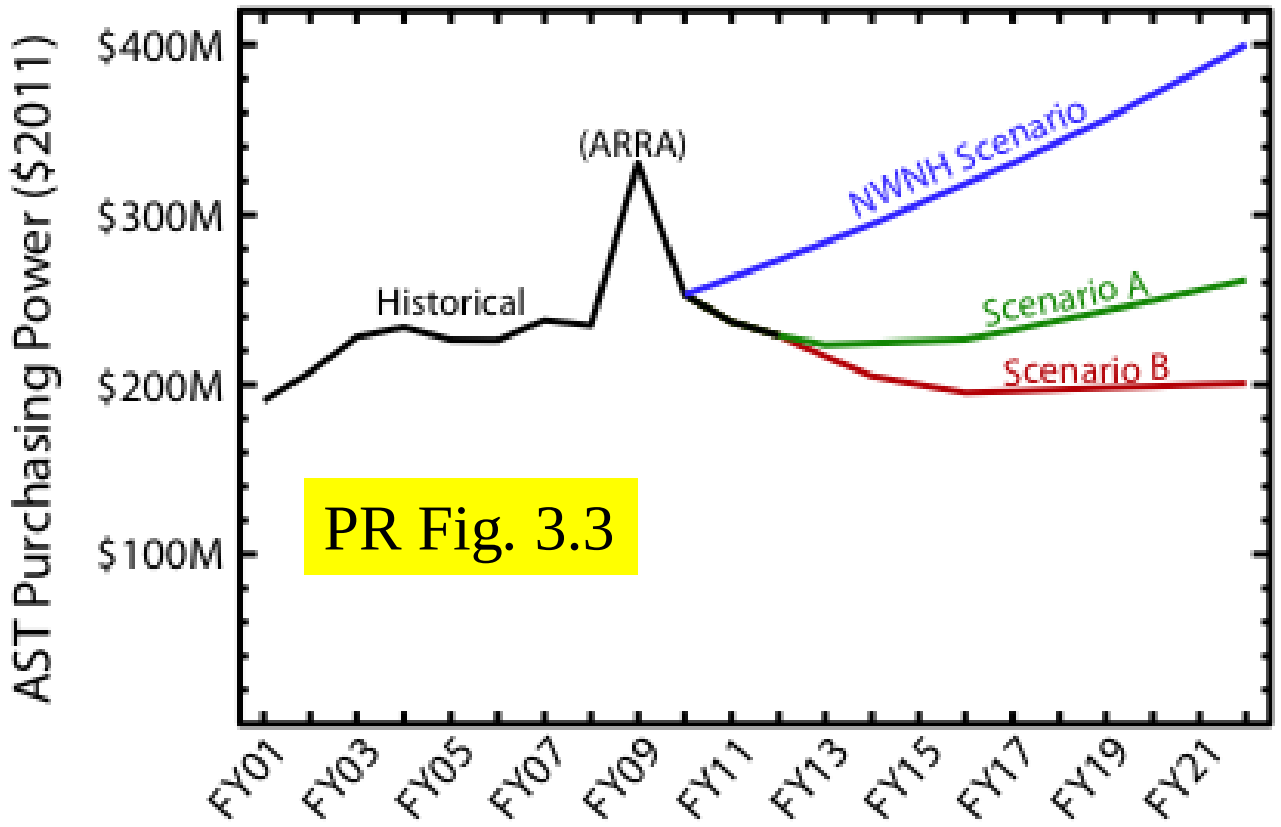
- Recent National Academy decadal surveys are drivers
  - Astronomy: *New Worlds, New Horizons* = *NWNH*
  - Planetary: *Vision and Voyages*
- Boundary conditions: No re-visiting NAS recommendations
  - I.e., take decadal surveys as a "given", and balance their recommendations with existing capabilities, including facilities and all other AST programs
- Considered two possible budget scenarios
  - A: AST budget flattens now, increases 5%/yr after FY16
  - B: AST budget continues downward trend to FY14, flattens, increases 3%/yr after FY16
  - These do not bound all feasible budget scenarios!
  - Committee focused on recommended portfolio for FY17, since that is the earliest that changes could be completed

Subcommittee Makeup

- 17 scientists, chaired by Dr. Daniel Eisenstein (Harvard)
  - Committee was constructed based on many balancing characteristics, including (but not limited to) science area, wavelengths (or theory) used, geographic/gender/ethnic/institutional diversity, career stage, etc.
  - Employees of national observatories or their managing organizations not included because of conflict-of-interest rules
    - Interests represented by past/present members of users committees, advisory committees, boards, etc.
    - National observatories also asked for targeted input


PR Fig. 3.1
FY10-FY12
AST Budget
(Avg=$238M)
EARS
Non-research
Other
small
grants
ATI
AAG
Small Grants
& Fellowships
NOAO
Gemini
NRAO
Facilities
EVLA
construction
ALMA
NSO
Midscale
Projects
Mid-Scale
Initiatives
D&D
ReSTAR
TSIP
URO
OIR/RMS System
ATST
Arecibo
Slated for major growth
this decade

Portfolio Review Budget Scenarios

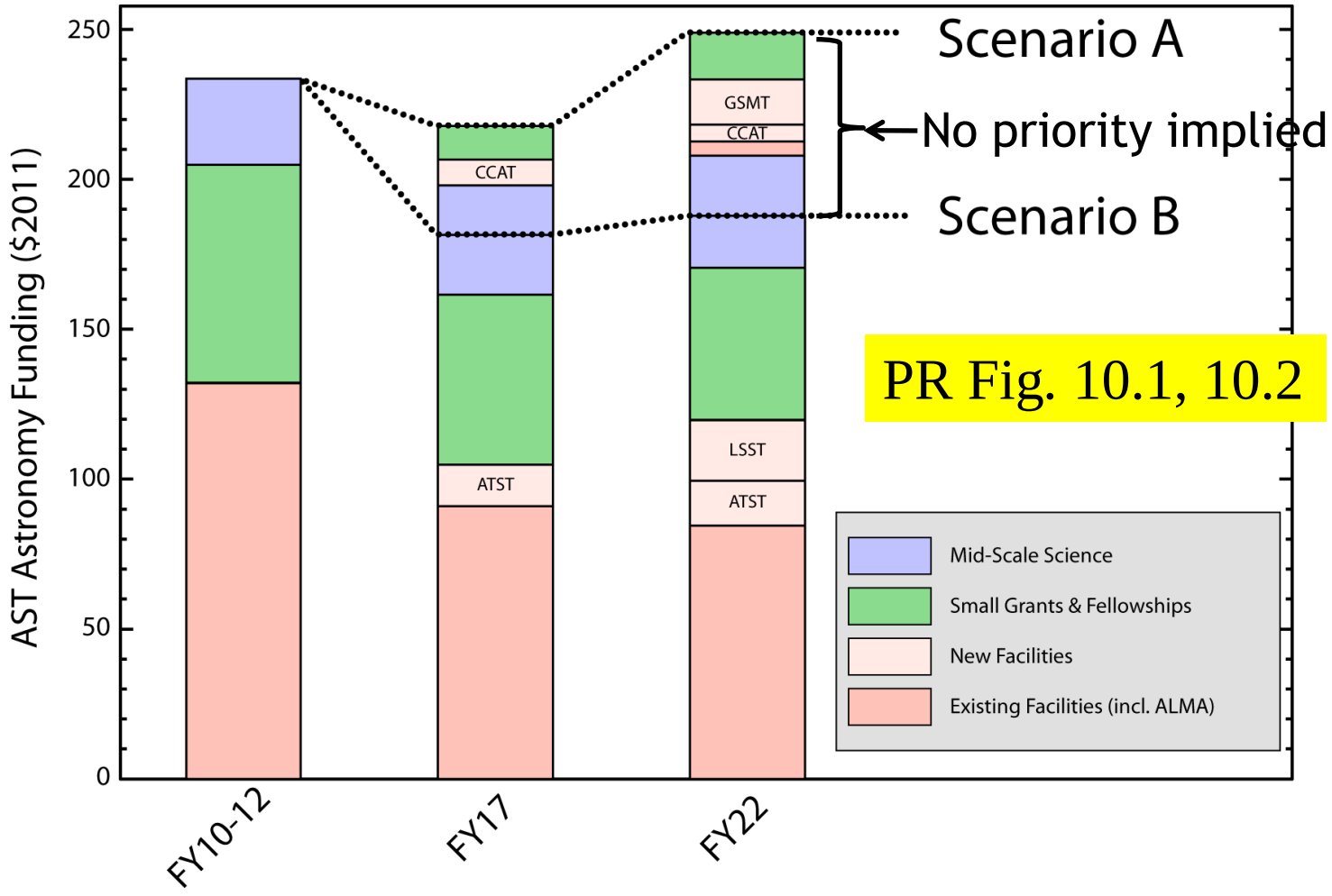


- Committee used two budget scenarios supplied by AST.
  - Scenario A (Optimistic): Adjusting for inflation, AST purchasing power drops over the next few years to 90% of FY10-12 level, then grows to 106% by FY22.
  - Scenario B (Pessimistic): AST purchasing power drops to 80% of FY10-12, then stays level.
- By FY22, these scenarios are only 50-65% of the *NWNH* scenario!

Basic Recommendations

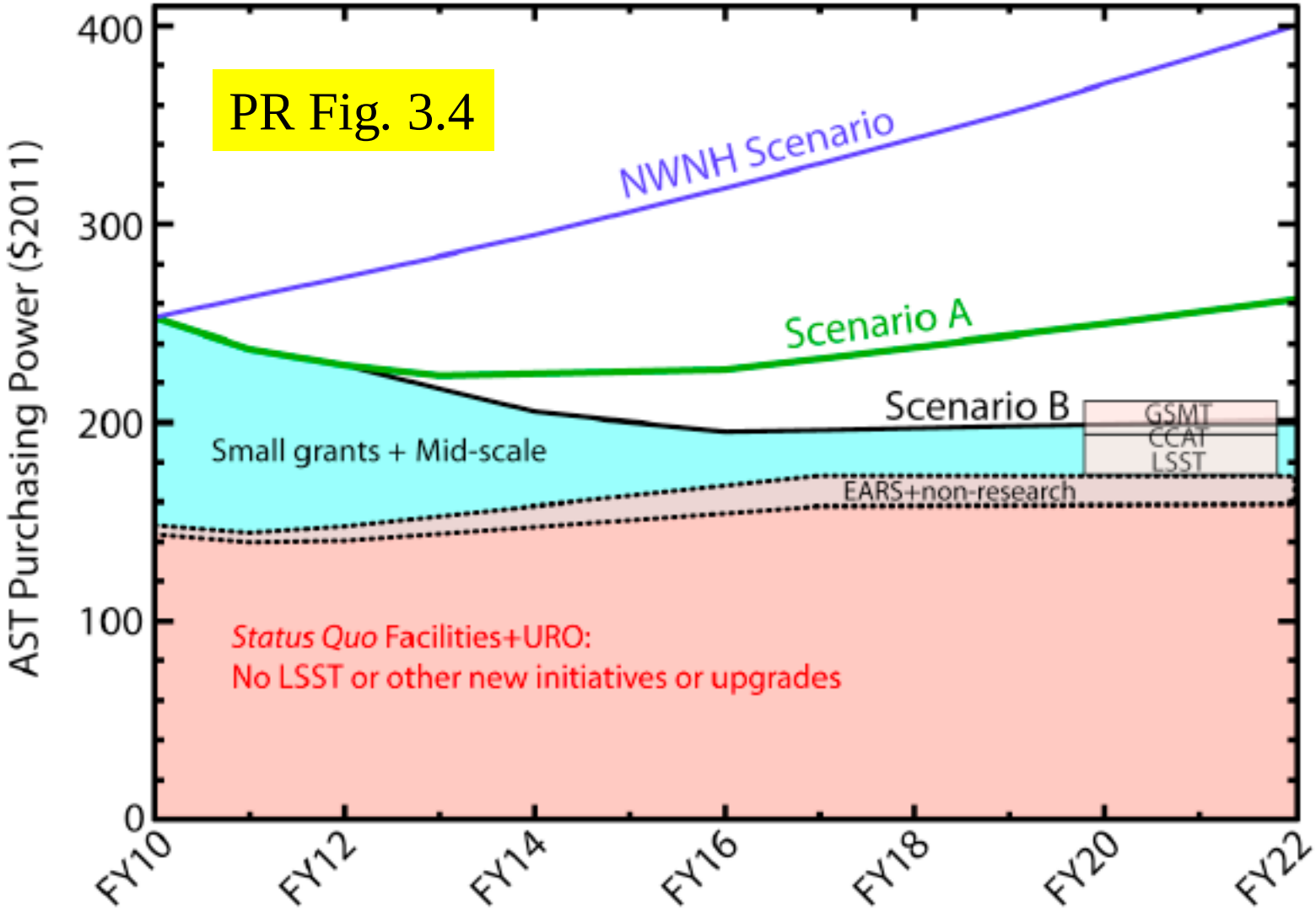
- At either assumed budget level, recommended current-facility portion of the portfolio is the same
  - Driven by facility complexity, dangers of over-optimism
  - At lower level, facilities/grants/mid-scale are all at ~75% of FY10-12 level (i.e., maintain present balance)
  - At higher level, restore funds to grants and midscale, invest in more new NWNH-recommended facilities later
  - Merge dedicated programs (e.g., University Radio Observatories, optical instrumentation) into midscale
- Facility recommendations
  - Priority 1 (Fund): ALMA, ATST, VLA, LSST (operations start in 2020), CTIO, Gemini-S, Dunn Solar Telescope (until ~2017)
  - Priority 2 (Partnerships: keep for now): Arecibo, SOAR, Solar synoptic, Gemini-N
  - Priority 3 (Divest expeditiously): McMath-Pierce Solar Telescope, federal (NOAO) telescopes on Kitt Peak, Green Bank Telescope (NRAO), Very Long Baseline Array (NRAO)

Recommended Portfolios



- Inflation-adjusted graph of the major portfolio components.

Impact of Maintaining Status Quo



Facility Tradeoffs

- From Portfolio Review Report, page 127
  - "We stress that the decisions facing AST and the astronomical community in FY17 Scenario B do not involve new commitments to major facilities. Figure 10.1 [see earlier slide] makes clear that simply bringing the existing commitments to ALMA and ATST to enable their efficient and effective scientific use in a constrained budget environment will require significant evolution in the facility portfolio."
  - "Despite significant cuts in the facility portfolio, our recommended portfolio for Scenario B decreases grants funding somewhat more than facilities funding."

- Facility recommendations are **NOT** based on making room for the Large Synoptic Survey Telescope, which would not affect the AST operations budget until FY20 at the earliest (Fig. 3.4).

Balance: Facilities & Grants

- NSF astronomy facilities include Optical/Infrared (OIR), Radio/millimeter/submillimeter (RMS), and Solar observatories
  - AST average facility budget for FY10-12
    - 57% RMS, 35% OIR, 8% Solar
  - Facility portfolio recommended by Committee for FY17, assuming that divestments occur
    - 57% RMS, 26% OIR, 17% Solar

- Maintaining *status quo* on facilities would cause dramatic shift in facilities/grants balance (see Fig. 3.4, on earlier slide)
  - Building facilities for hundreds of millions of dollars, and not supporting U.S. scientists to do research, will reduce substantially U.S. scientific leadership and productivity.

NSF Response to PR Report

- NSF response document issued on August 31.
- NSF must decide on nature of divestments near the end of CY 2013 in order to realize significant savings by FY 2017.
  - No decisions have been made by NSF; discussions within NSF will lead to President's FY14 budget request, which is then subject to action by Congress.
  - Divesting a telescope does not imply closing a site.
  - Emphasize principle of divestment in a responsible manner.
  - Intersection with management competitions?
- Agree with Committee assessment that failure to act on their recommendations will reduce grants program four-fold in Scenario B
  - Resulting grants success rate would be in 3%-4% range.
  - This success rate would essentially end NSF research funding of the U.S. astronomy community.
  - Committee found this risk unacceptable.