



# ***Increasing Submissions to NGS through Industry Partnership***

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**NOAA's National Geodetic Survey**

# Outline

- Outline of the problem
- Overview
- Ideas
  - The importance of “Tied to the NSRS”

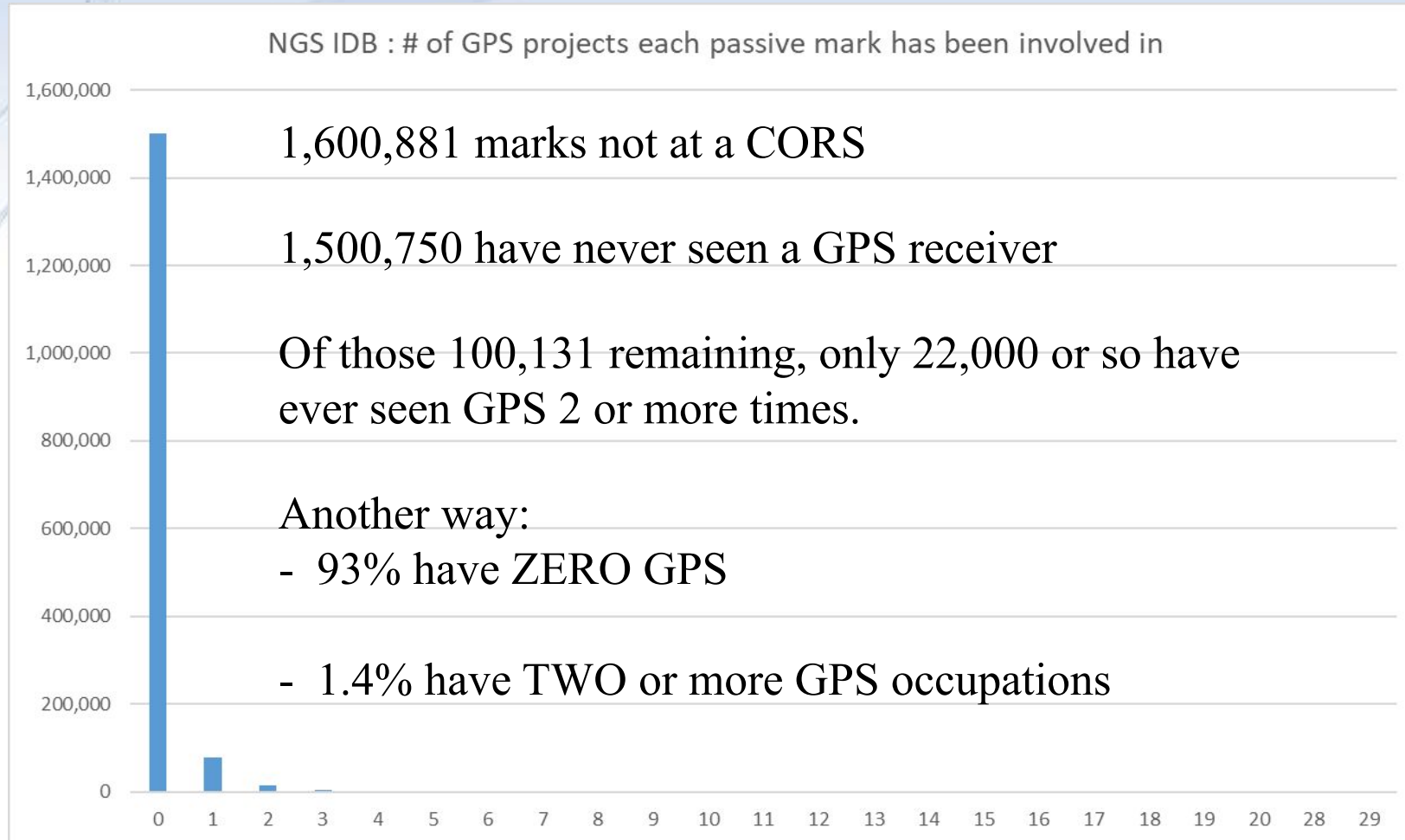
# The problem

- NGS does not really use the product we create
  - For decades we have...
    - Turned our attention to active control
      - But even that is mostly a volunteer service
      - Limited by our own 70 km rule
    - Left the care and maintenance of passive control in the public's hands
- Passive control maintenance requires “Bluebooking”
  - This has, over the years, led to a dearth of submissions
  - OPUS-Projects 4.0 was a first step toward fixing this
  - OPUS-Projects 5.0 will add GNSS vectors
  - OPUS 6.0 should completely re-invent “Bluebooking”
    - Maximum automation, simplicity to users

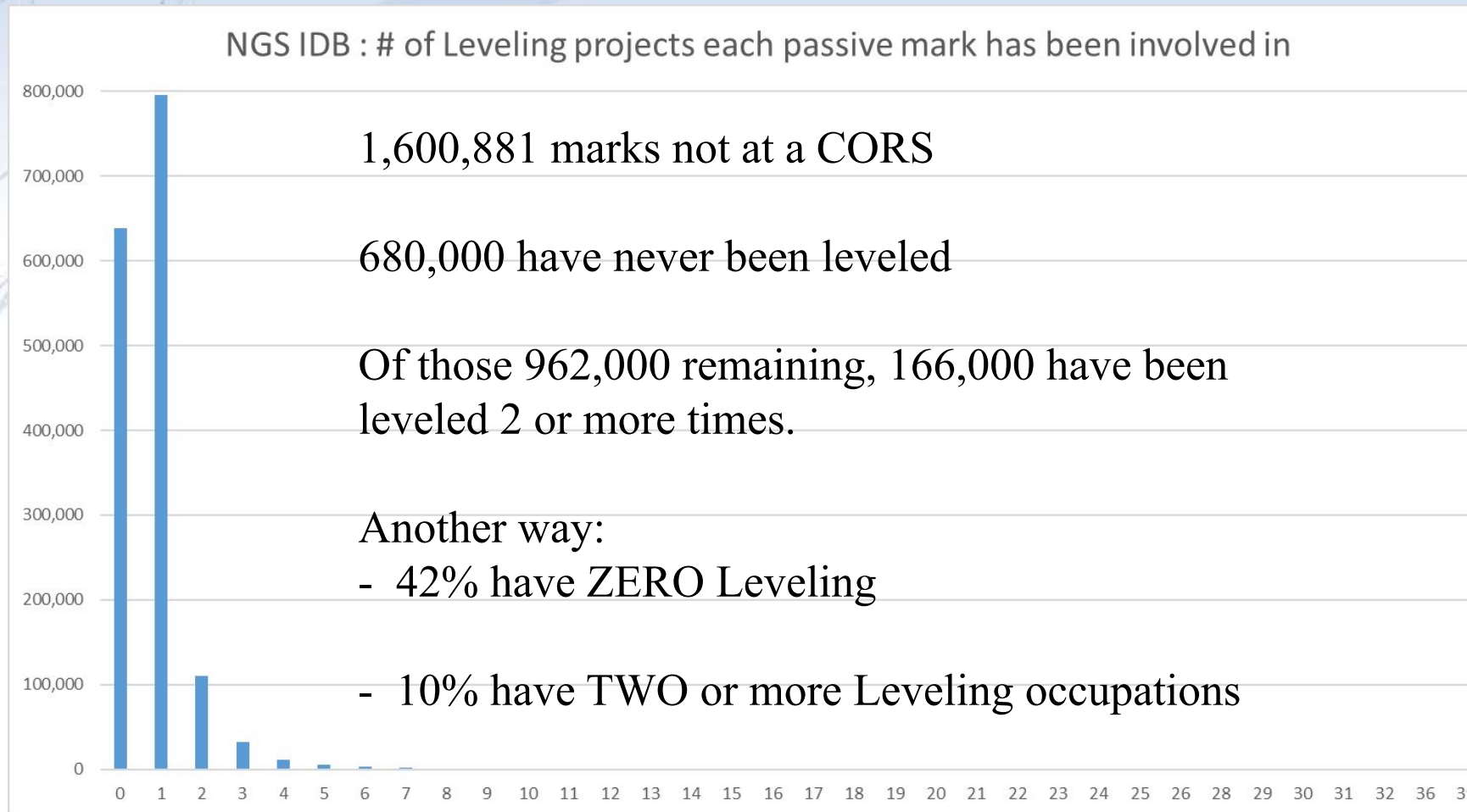
# Passive control

- Its role should change.
  - From: “NGS knows where this mark is”
  - To: “NGS knows where this mark *was*”
    - *And possibly how it is moving*
- Time-dependent information is more powerful than out-of-date coordinates held as “true” indefinitely
  - But this requires regular refreshes of data
- We can make OPUS as user friendly as possible
  - But if most surveying isn't coming through OPUS, we will miss those refreshes of data

# Does anyone *really* re-survey points?



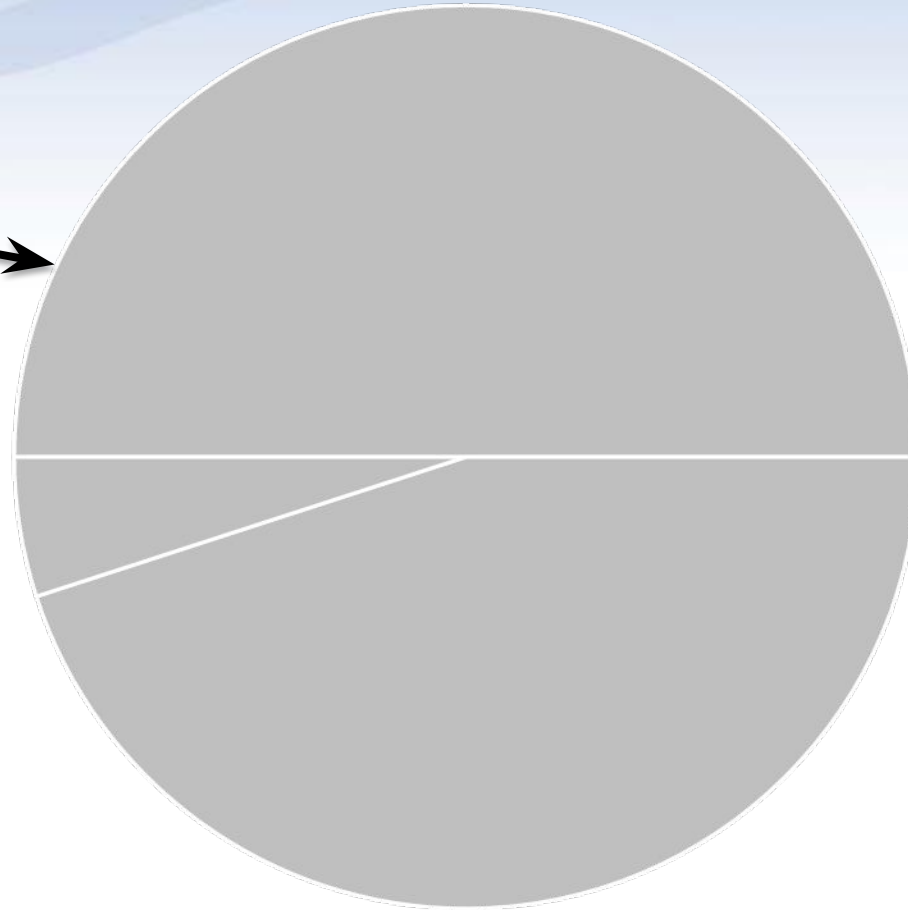
# Does anyone *really* re-survey points?



# How survey data is turned in to NGS today

All high quality GNSS surveying in the USA

GPS-only





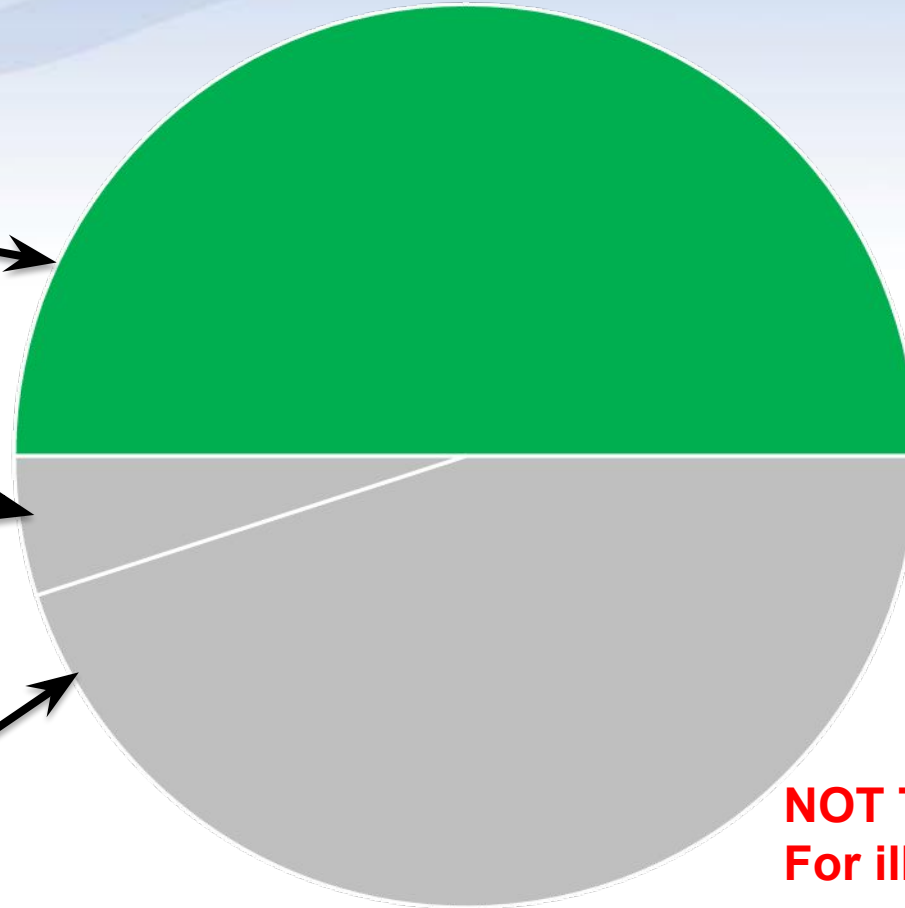
# How survey data is turned in to NGS today

All high quality GNSS surveying in the USA

GPS-only

GNSS w/o GPS

GNSS with GPS

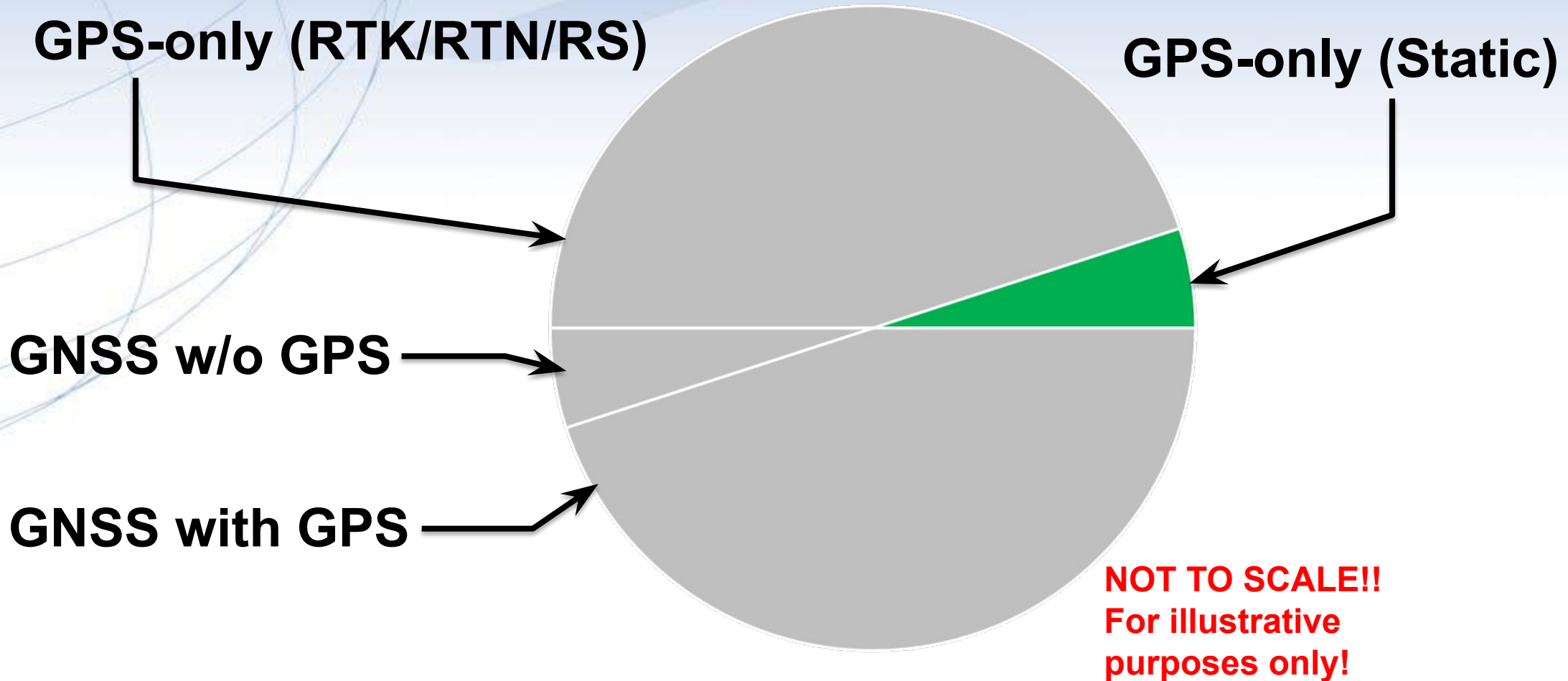


**NOT TO SCALE!!  
For illustrative  
purposes only!**



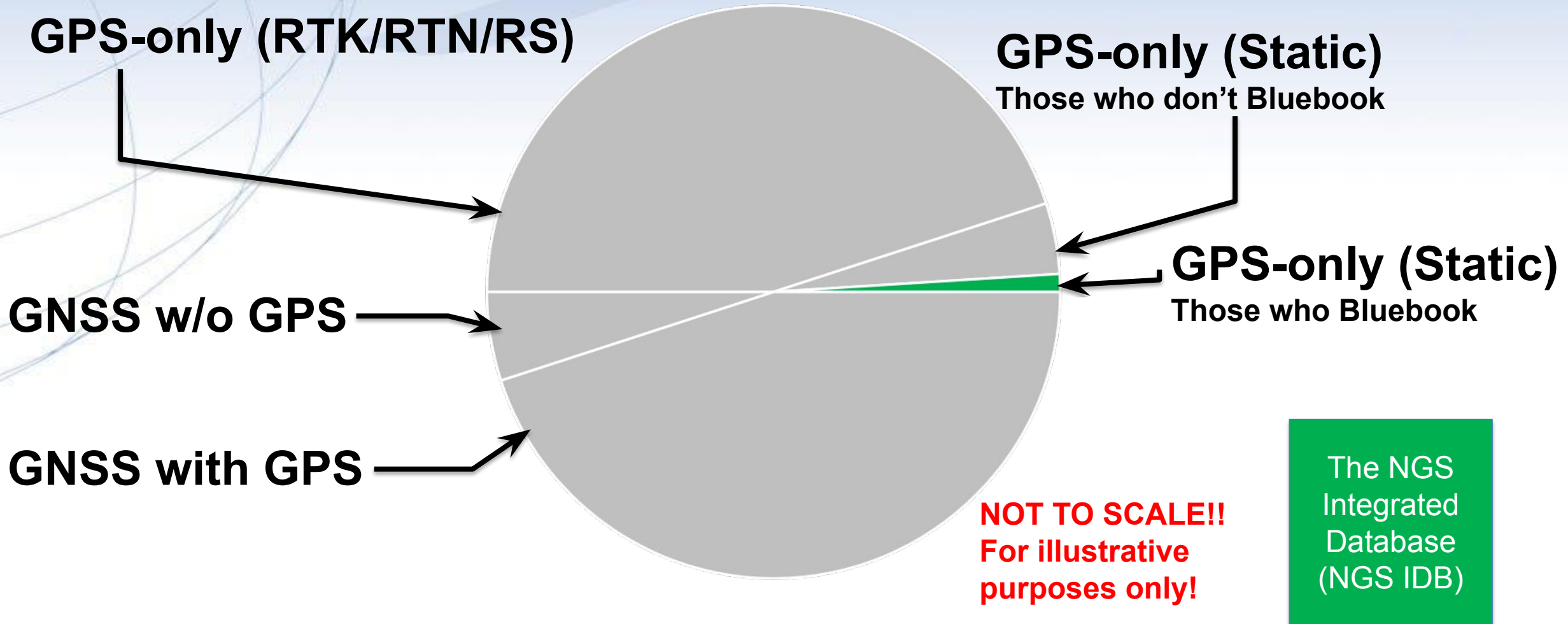
# How survey data is turned in to NGS today...

All high quality GNSS surveying in the USA



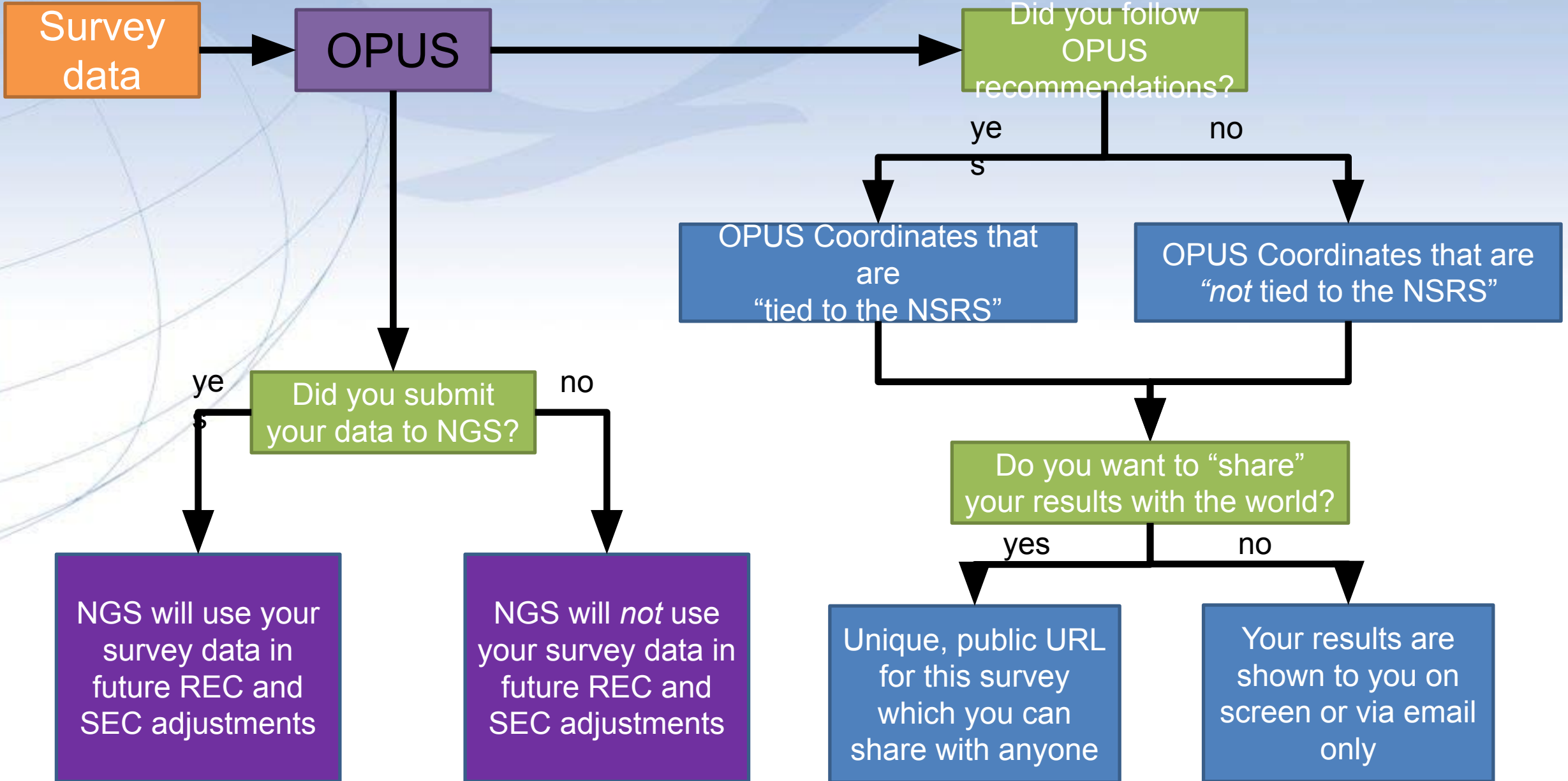
# How survey data is turned in to NGS today...

All high quality GNSS surveying in the USA



# OPUS 6

- The modernized NSRS flagship: OPUS 6
  - All users will get “OPUS coordinates” as output
  - OPUS will provide “OPUS recommendations”
    - Stations to use, epochs to use, ways to do the adjustment
  - Users who follow them will see their OPUS coordinates listed as “tied to the NSRS”
    - NGS hopes this will fulfill user’s contractual needs
- But if users don’t use OPUS 6, what’s the point?
  - The only way users will submit data to NGS in the modernized NSRS
  - Can we find a way for users to submit data to NGS through connections in ***your*** products and tools?



# Active Control

- Over 2000 stations in the NOAA CORS Network (NCN)
  - NGS plans to own/operate about 36 stations in the NOAA Foundation CORS Network (NFCN)
- If NGS had the ability to do so, more stations leads to more opportunities
  - Finer deformation modeling
  - Consistency across the nation
  - Non-geodetic applications (weather forecasting, etc.)

# So...

- There are a lot of surveys being processed in your software
  - We do not want to see that stop
  - But could we find a way to get more submissions to NGS, for the good of the nation?
- There are a lot of active control networks out there
  - Some of which you have provided to the public
  - If NGS gets their capacity issues solved, how can we get all active control data into NGS?



# Ideas

- RINEX3, GVX, LVX, CVX and RGX as an input format
  - Alternatively, build an output formatter that supports these
  - Either way, if these formats aren't available, OPUS (and NGS by extension) cannot accept the data
- Point to OPUS as “an independent check on your work”
  - Special selling point: you get results that are “tied to the NSRS”





# Thank You!

# Questions?

# Extra Slides

# Outline

- NGS mostly maintains the active control of the NSRS
- The quality of passive control remains entirely at the mercy of submissions from external users, which have dwindled over the decades down to a few particularly active states or counties
  - The difficulty of Bluebooking is often cited as the reason, though others might be theorized, such as the slowness of NGS to Modernize the NSRS
- Despite this, many legal requirements to tie to the NSRS remain, and they often can be fulfilled through the use of passive control, despite the questionable nature of that control
  - Consider, if you will, tying a FEMA floodmap to some NAVD 88 bench marks which are mutually consistent with one another, but which have never been observed with GNSS to get an absolute idea of their heights, so that any mutual subsidence would be completely undetected. Do you want your home insured for floods based on a 75 year old height?
- We have considered, and decided against abandoning the passive control network. Rather, we view it as needing a new reason for existence:
  - Used to be: “this mark has a known coordinate”
  - Should be: “this mark has a history of coordinates, and NGS will show you that history in the hopes that you’ll see (a) that it’s moving, or not and (b) how much, or how little, NGS trusts the most recent coordinates on this point
- This means we need a continued maintenance of points that are used regularly (and the others can just slowly fade away). But NGS has a reputation of making things difficult (Bluebooking, see above), so people won’t just FLOCK to us when OPUS 6 is available. So what we’d like to propose is that we make things VERY easy for data to be submitted to us....so easy that even if they prefer working entirely in YOUR software, that there could be something as simple as a “submit this to NGS” button, and we would do the rest