



# Surveying the Mycota of two National Parks in California: methods, bottlenecks & achievements



Else C. Vellinga, Thomas D. Bruns et al.  
University of California at Berkeley

Yosemite NP

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Point Reyes National Seashore

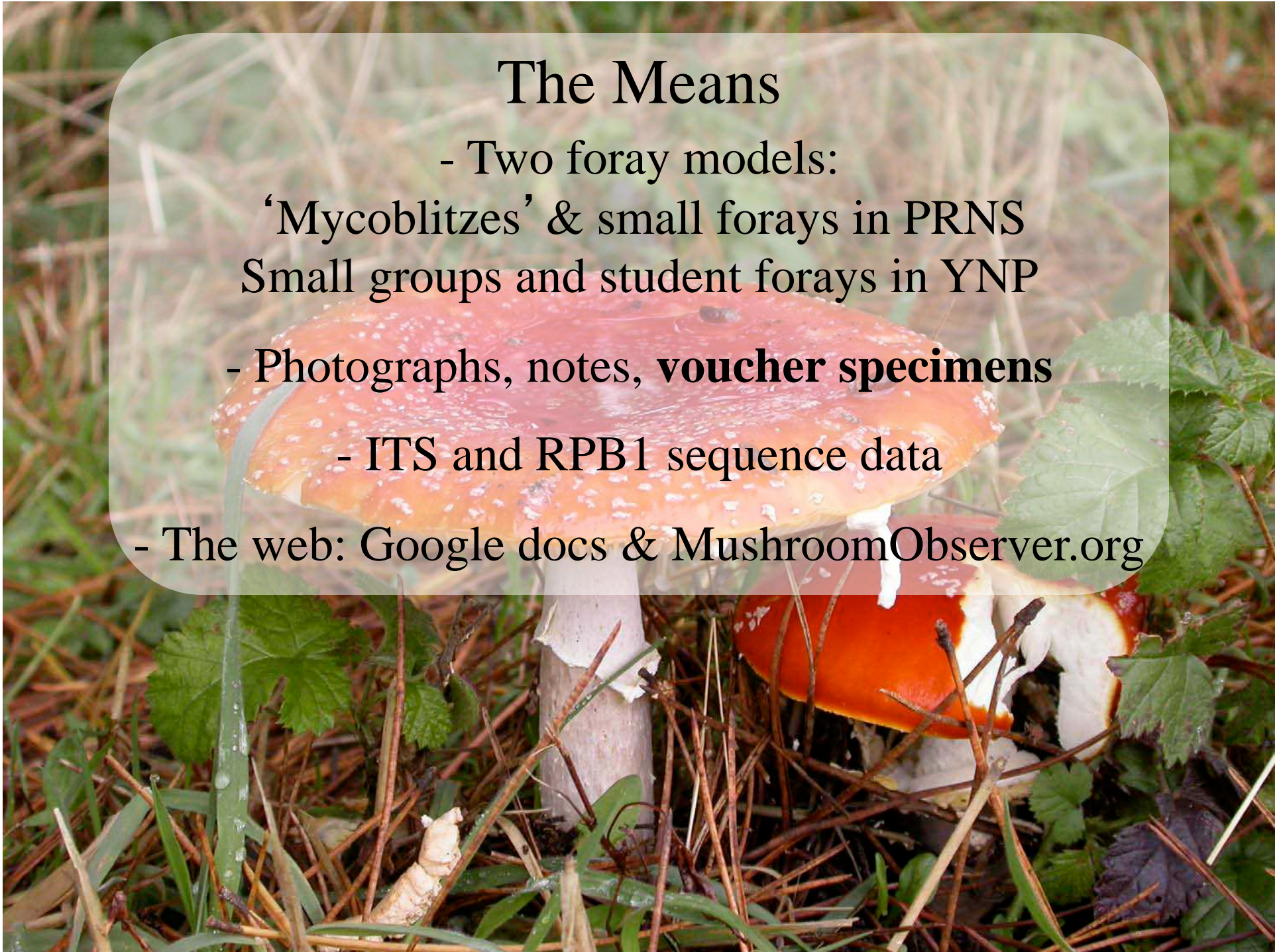
# The Goals

- Inventory all the macrofungi of the two parks
- Involve & educate the local mushroom clubs, mycologists and the general public
- Disseminate the data via the web



# The Means

- Two foray models:
  - 'Mycoblitzes' & small forays in PRNS
  - Small groups and student forays in YNP
- Photographs, notes, **voucher specimens**
  - ITS and RPB1 sequence data
- The web: Google docs & [MushroomObserver.org](http://MushroomObserver.org)



# The Point Reyes mycoblitzes

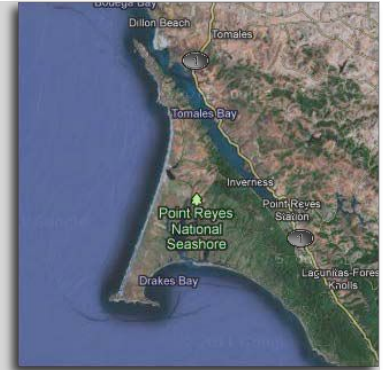
- Five blitzes from December 2005-January 2007, initiated by David Rust
- The general public participated
- 4 local mushroom clubs collected and helped identifying specimens
- People signed up for specific collection routes and zones
- Collections were sorted and identified the next day

- Big showy mushrooms well represented
- Boring mushrooms neglected
- Small ascomycetes not collected
- A sample of corticioid fungi



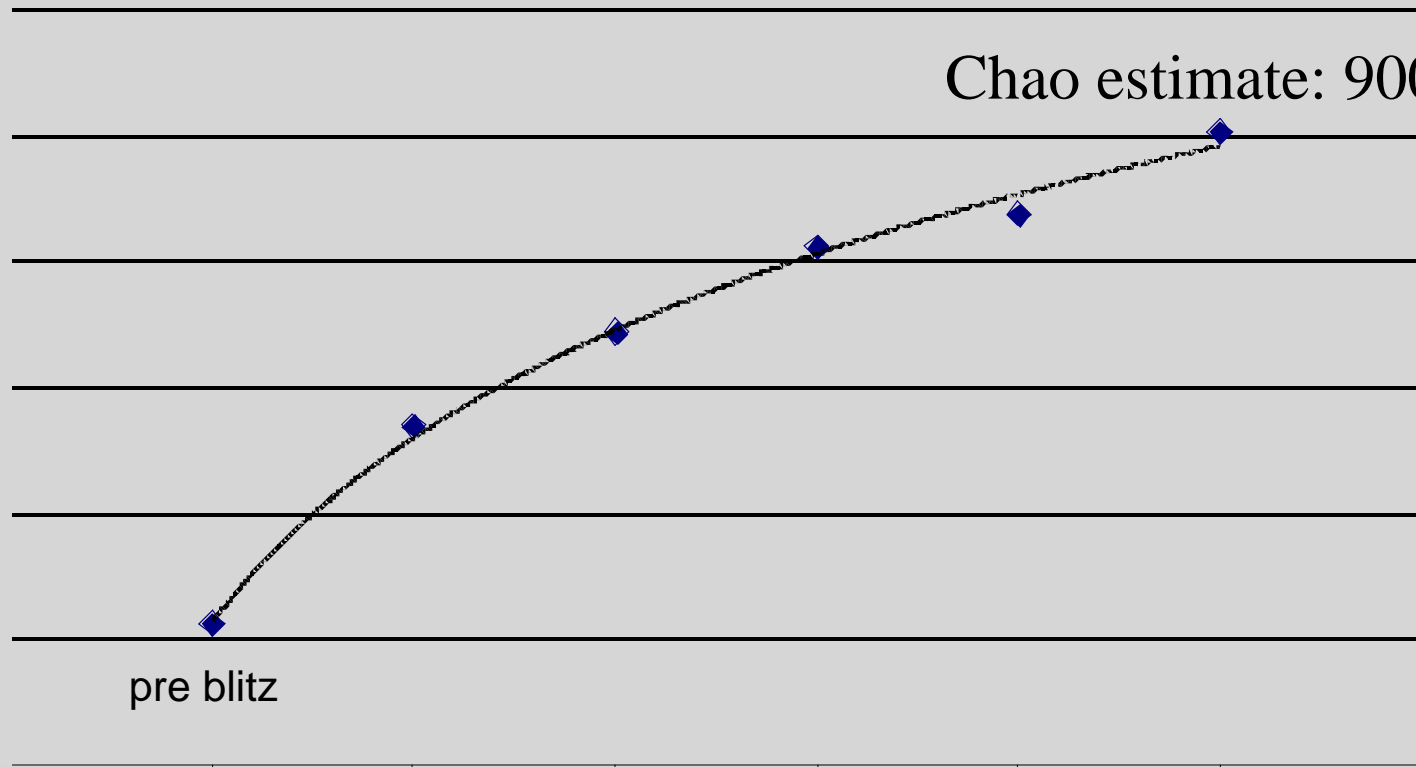
# The Results, so far, PRNS

Increase in number of recorded species with each mycoblitz



# species

Chao estimate: 900 species

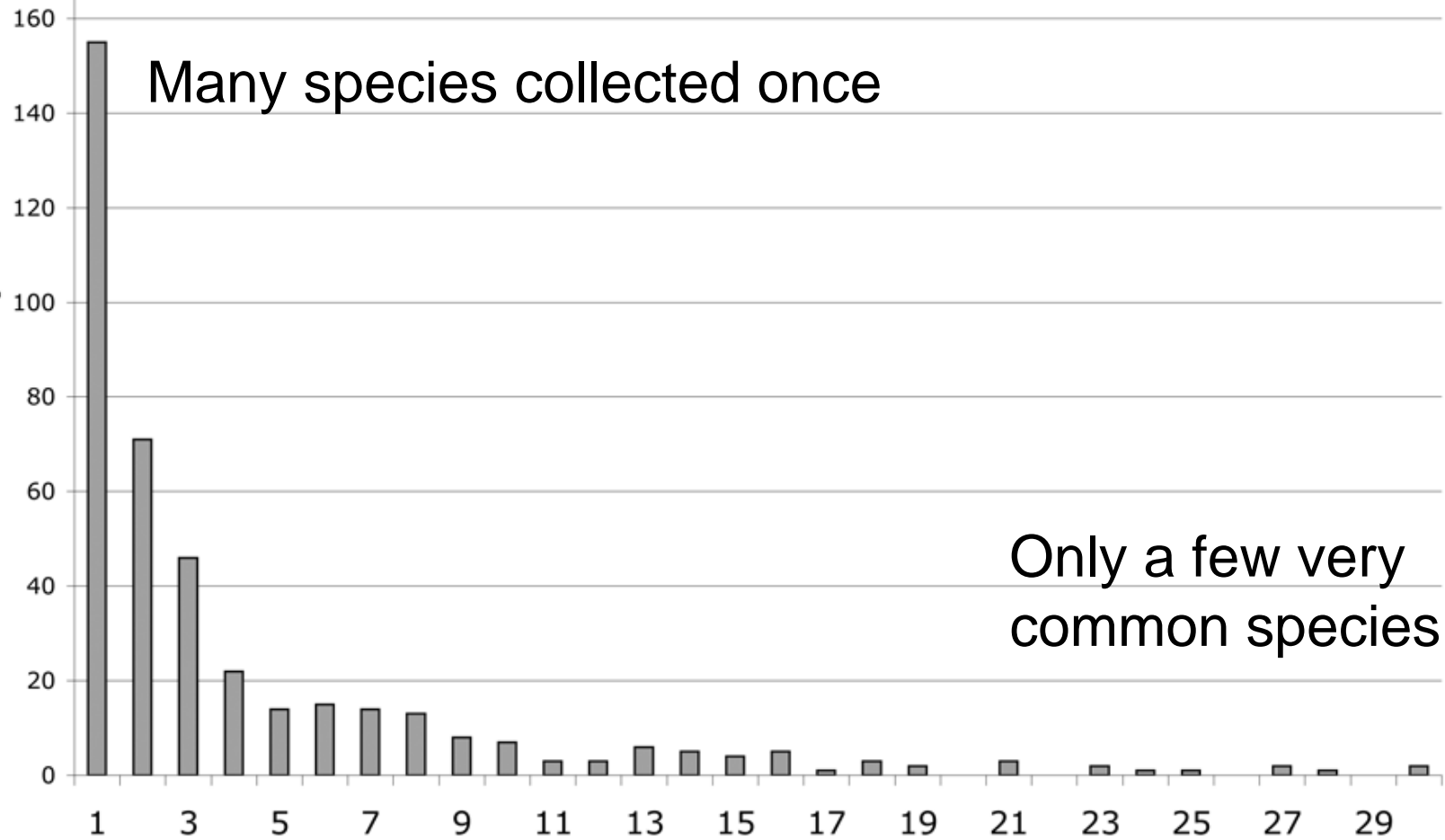


mycoblitzes



# Collection Frequency of Point Reyes species

# species



# collections

# Organization of the Yosemite surveys - Google Docs: the non-public coordination interface



Google Yosemite Fungal Survey x [Search] ecvellinga@comcast.net

Docs [New Doc] [Sort] [Settings]

CREATE [Share]

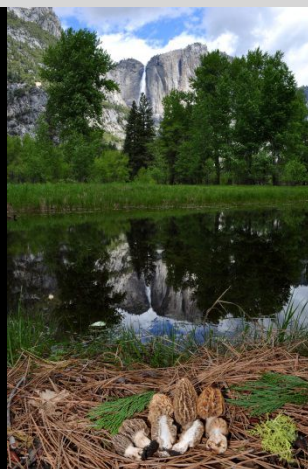
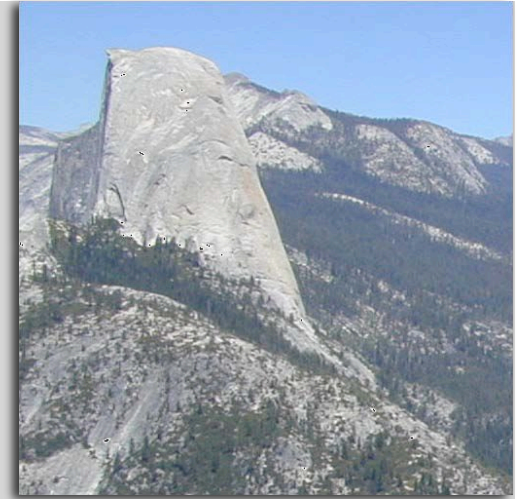
- Home
- Starred
- Owned by me
- All items
- Trash
- My collections
- Collections shared with me
  - GSM Fungi
  - NA Mycoflora whitepaper
  - North American Mycoflora
  - Yosemite Fungal Survey**

<input type="checkbox"/>	TITLE	OWNER	LAST MODIF...
<input type="checkbox"/>	★ [Icon] new yosemite collections Shared	Tom Bruns	Jun 1 me
<input type="checkbox"/>	★ [Icon] Field_assistants_letter.pdf Shared	Tom Bruns	Apr 23 Tom Bru
<input type="checkbox"/>	★ [Icon] Yosemite_collection_permit_2012 Shared	Tom Bruns	Apr 23 Tom Bru
<input type="checkbox"/>	★ [Icon] Fungi of Yosemite labels.pdf Shared	Tom Bruns	11/4/11 Xerantb
<input type="checkbox"/>	★ [Icon] Rules for Collecting at Yosemite Shared	Tom Bruns	9/26/11 Tom Br
<input type="checkbox"/>	★ [Icon] Instructions for saving collections Shared	Tom Bruns	9/26/11 Tom Br
<input type="checkbox"/>	★ [Icon] welcome to wilderness 2009.pdf Shared	Tom Bruns	9/26/11 Tom Br
<input type="checkbox"/>	★ [Icon] Fungi of Yosemite labels Shared	Tom Bruns	9/26/11 Tom Br
<input type="checkbox"/>	★ [Icon] W Researcher Equipment Decontamination Policy.doc Shared	Tom Bruns	9/26/11 Tom Br
<input type="checkbox"/>	★ [Icon] Fungi of Yosemite labels.pdf Shared	Tom Bruns	9/26/11 Tom Br
<input type="checkbox"/>	★ [Icon] Supt Order - Flagging & Temp Demarcation Guidance.pdf Shared	Tom Bruns	9/26/11 Tom Br
<input type="checkbox"/>	★ [Icon] W NPS Research General Conditions.doc Shared	Tom Bruns	9/26/11 Tom Br
<input type="checkbox"/>	★ [Icon] Fungi of Yosemite labels Shared	Tom Bruns	9/26/11 Tom Br
<input type="checkbox"/>	★ [Icon] Old_Collections_at_Yosemite Shared	Tom Bruns	9/16/11 Tom Br

# The Results

## Yosemite NP 2010-21012

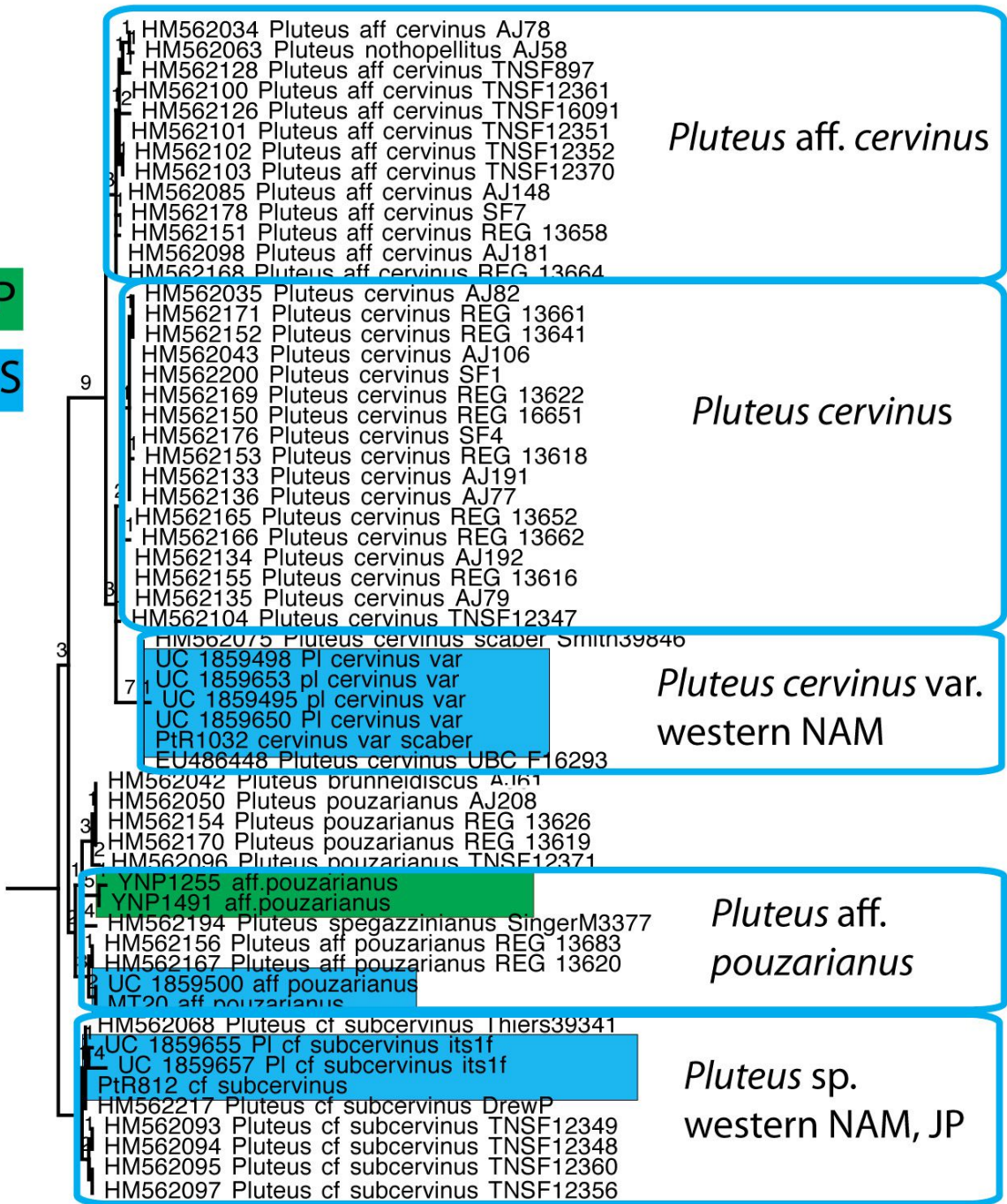
- >750 collections
- >300 species
- 90% of the species and 62% of the genera new records for YNP
- 150 ITS sequences and counting



Photos Noah Siegel

YNP

PRNS



*Pluteus cervinus*  
group:

ITS sorts them out

But none is  
*Pl. cervinus* s. str.  
and there are no  
names yet...



YNP

PRNS

HIM021164\_Helvella\_clone\_RD7\_Pmur  
 F317\_YNP\_its1f\_Plamb  
 F397\_lacunosa\_JSFcampone  
 F316\_Yuba\_its4  
 GU180251\_Helvellaceae\_Pmur  
 HQ650748\_lacunosa\_v\_DAVFP\_28179\_BC\_Psmenz  
 F315\_Yuba\_its4  
 F398\_lacunosa\_JSFcampone\_its4  
 F319\_McCloud\_Ppond  
 F400\_lacunosa\_McKinleyville\_its4  
 F387\_sp\_PIR\_its4  
 F392\_lacunosa\_JSF\_its4  
 F318\_LassenNF\_Psmenz\_Alconc  
 F391\_lacunosa\_JSF\_its1f  
 JN652953\_Helvella\_clone\_via403\_BC\_Psmenz  
 F385\_lacunosa\_PIR\_its1f\_Psmenz\_Qagr  
 F390\_lacunosa\_SPSF\_its1f\_Psmenz  
 F382\_lacunosa\_PIR\_Pmur  
 F139\_bishoppineroottip\_PIR\_Pmur  
 F393\_lacunosa\_JSF\_its1f  
 F388\_lacunosa\_PIR\_Pmur  
 JQ393060\_Helvella\_clone\_1\_81M3\_OR\_ARBENZ  
 F422\_MITam  
 F421\_MITam

Fall and Winter  
 CONIFER associated  
*Helvella lacunosa*

F384\_lacunosa\_PIR\_its4\_Psmenz\_Qagr  
 ECMWX14811\_HCPNNT25  
 ECMWX04911\_HCPNNT059  
 ECMAM04210\_CB08331  
 ECMWX0991\_HCPNNT149  
 ECMAM08410\_AR09990  
 ECMAM04010\_CB08326  
 ECMAM16910\_CB08303  
 ECMWX16511\_HCPNNT266  
 ECMTMO3511\_GO2009088  
 ECMAM03610\_CB08367  
 NTECM02911\_GO2009279

Mexican  
*Helvella lacunosa*

FJ789603\_Helvella\_rt\_EDn6\_OR\_Conifers  
 GU183983\_Helvella\_EMB1\_3\_CA\_mixedconifers\_rt  
 Helvella\_lacunosa\_MES286\_ITS  
 F442\_MS\_NORCAL1\_BarksBar

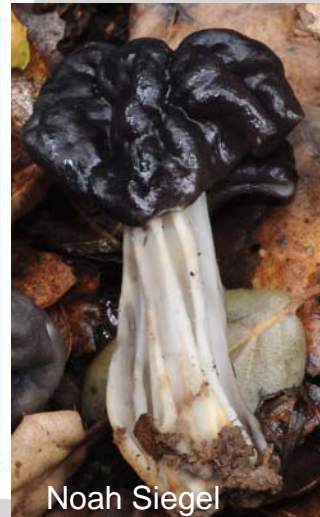
Third "*Helvella lacunosa*"  
 species in CA

F426\_YNP  
 F433\_UCB\_Q\_agrifolia  
 F425\_YNP  
 F436\_UCB\_Q\_robur\_agrifolia  
 F423\_YNP  
 F412  
 F415\_UCB\_Q\_agrifolia  
 JQ393061\_Helvella\_clone\_2\_41P5\_OR\_Arbmenz  
 GQ221639\_Helvella\_OTU28\_PIR  
 EF417822\_Helvella\_clone\_L8CA5\_Sierrath\_QciQw  
 Helvella\_lacunosa\_MES218\_ITS  
 F411\_UCB\_Qagrifolia  
 F411\_UCB\_Qagrifolia\_SATe  
 F410\_Pennyn\_oaks  
 F434\_UCB\_Q\_agrifolia  
 DQ974834\_Helvella\_clone\_bg3c\_Sierrath\_Qd  
 UC1860627\_SCI\_Qagr  
 F435\_UCB\_Q\_agrifolia  
 F389\_lacunosa\_SonomaCo\_its1f\_Q  
 UC1860642\_SCI\_Qagr  
 F443\_MES\_218\_Riverside\_CA  
 F424\_YNP

Spring  
 OAK associated  
*Helvella lacunosa*



Darvin Deshazer



Noah Siegel

'*Helvella lacunosa*'  
 one of the top 10  
 species of PRNS

Three different  
 '*Helvella lacunosa*'  
 species in western NAM,  
 at least two nameless

## The top 10 species of PRNS

Armillaria mellea group	<input checked="" type="checkbox"/>	30
Pluteus <del>ce</del> vinus		3 species 30
Helvella lac <sup>?</sup> unosa		2 species 28
Hypholoma <sup>?</sup> fasciculare		27
Laccaria amethysteo-occidentalis	<input checked="" type="checkbox"/>	27
Inocybe sororia	<input checked="" type="checkbox"/>	25
Sarcoscypha <del>co</del> cinea		24
Inocybe geoph <del>yl</del> la var. lil <del>ac</del> ina		23
Russula am <del>o</del> enolens		cerolens 23
Suillus pungens	<input checked="" type="checkbox"/>	21

# The Bottlenecks (1):

## -DATA MANAGEMENT

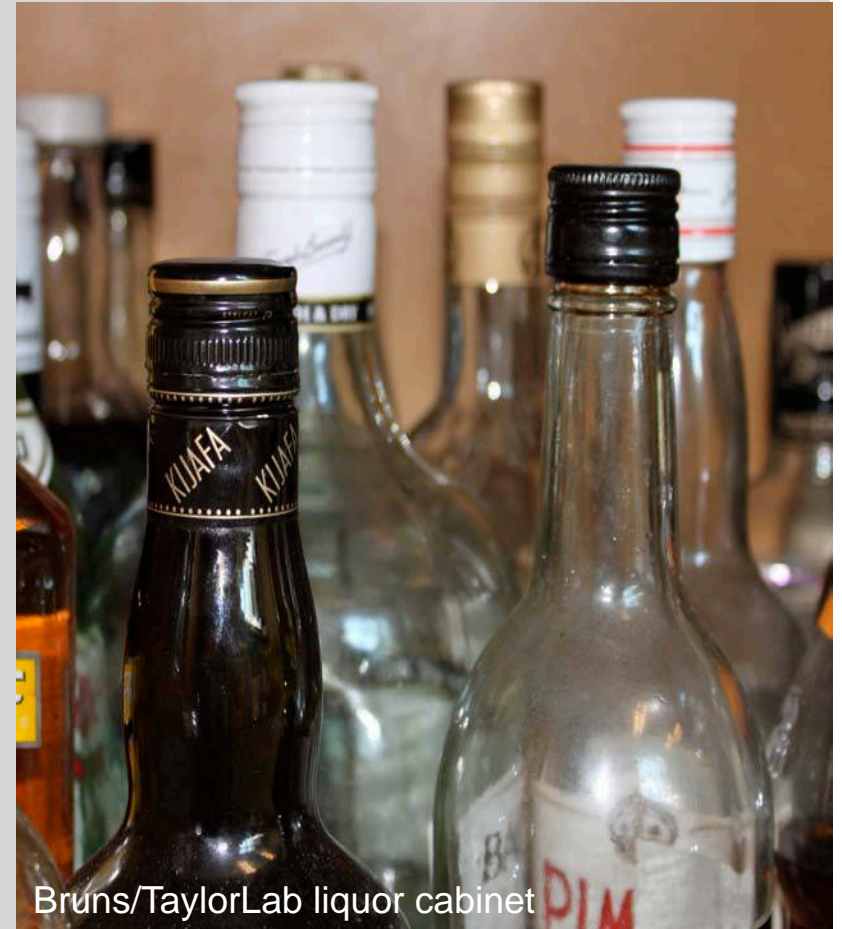
--data input in Mushroom Observer

--data input in google docs

--data input in herbarium database

## -WEB PAGE

## -COLLECTION MANAGEMENT



## The Bottlenecks (2):

-SEQUENCE

--comparison sequences

--comparison material

-DATA MANAGEMENT

photos-vouchers-lables-

sequences-etc.

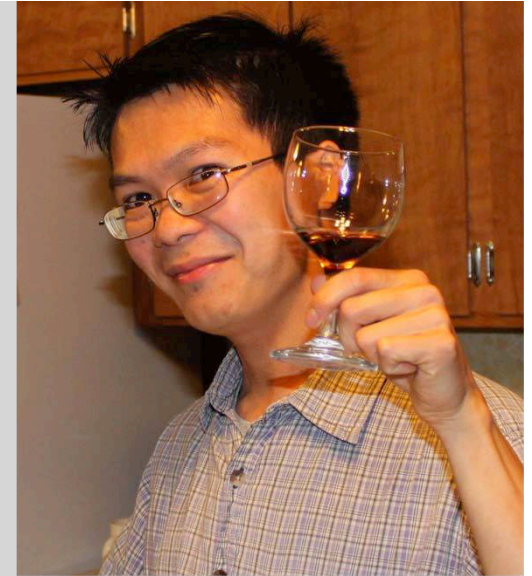
-MONEY and PERSON-POWER





# Results and Achievements

- Species lists & vouchers for PRNS & YNP
- Enthusiasm, involvement, knowledge among participants of mycoblitzes and surveys, outreach to the general public



- 2 new species described, more in the pipeline
- Increased awareness of fungi with PRNS & YNP staff and National Park Service
- Increased knowledge of our local mycoflora

Point Reyes NPS Photo

National Seashore

view map text size: printer friendly

## Mushrooms and Other Fungi

**What are Mushrooms?**

Mushrooms are short-lived, spore-producing structures (akin to apples on a tree); they are designed to release spores, and then decay. Picking a mushroom does not harm the long-lived fungal organism. The "body" of a mushroom is hidden from our eyes, and is composed of a vast, branching network of tiny, elongate cells called hyphae. These hyphal threads grow through and break down dead wood, providing a vital recycling service to our forests. Fungal hyphae also live in the ground, and connect up with the rootlets of trees, shrubs and almost all other green plants, forming a symbiotic (mutually beneficial) relationship. This mycorrhizal (fungus-root) partnership greatly increases the ability of trees and plants to take up water, and absorb essential minerals. In return, the fungus is provided with photosynthetic nutrients. Neither organism is able to function fully without the other.



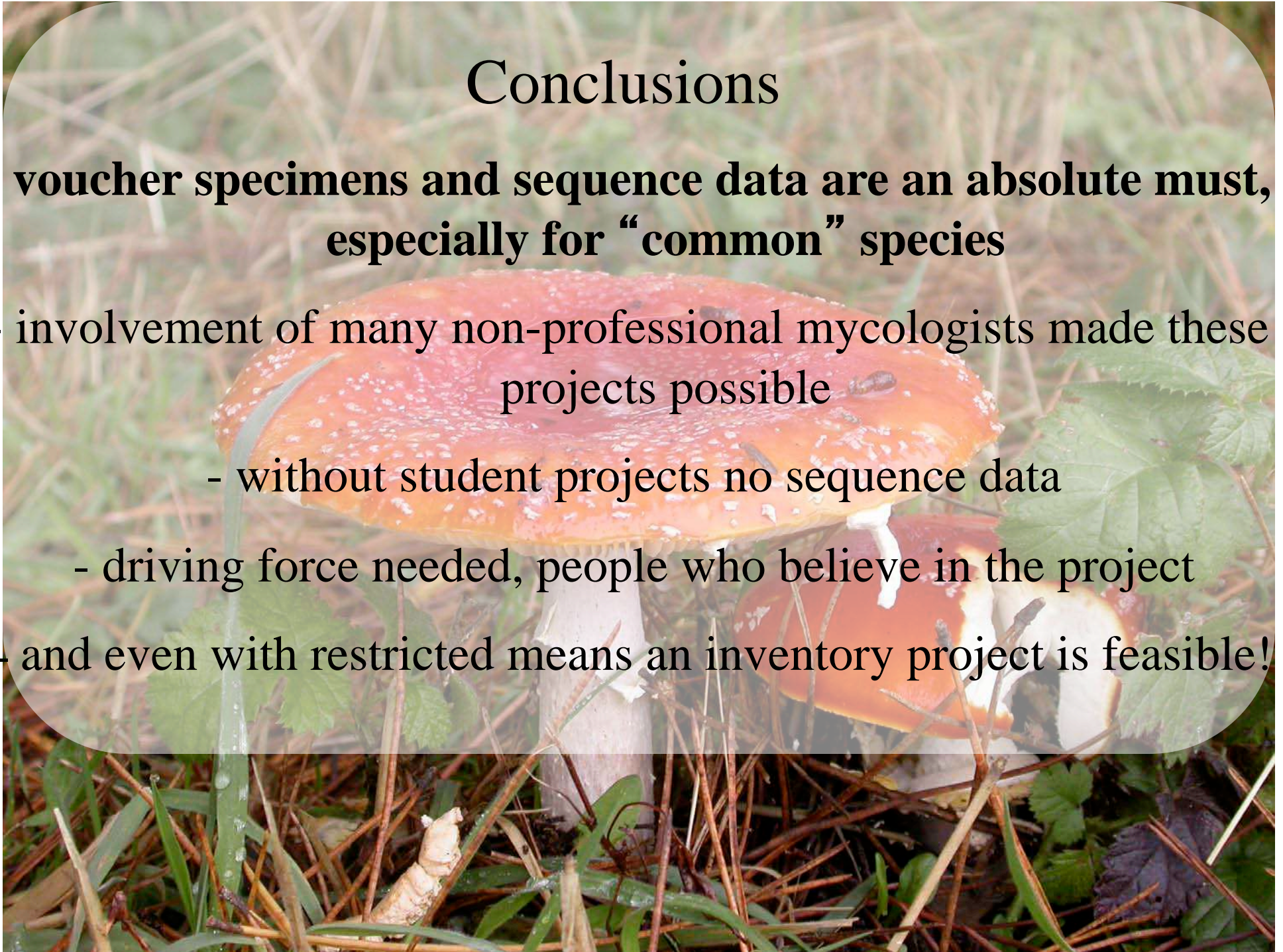
© Debbie Viess

Fly Agaric (*Amanita muscaria*)

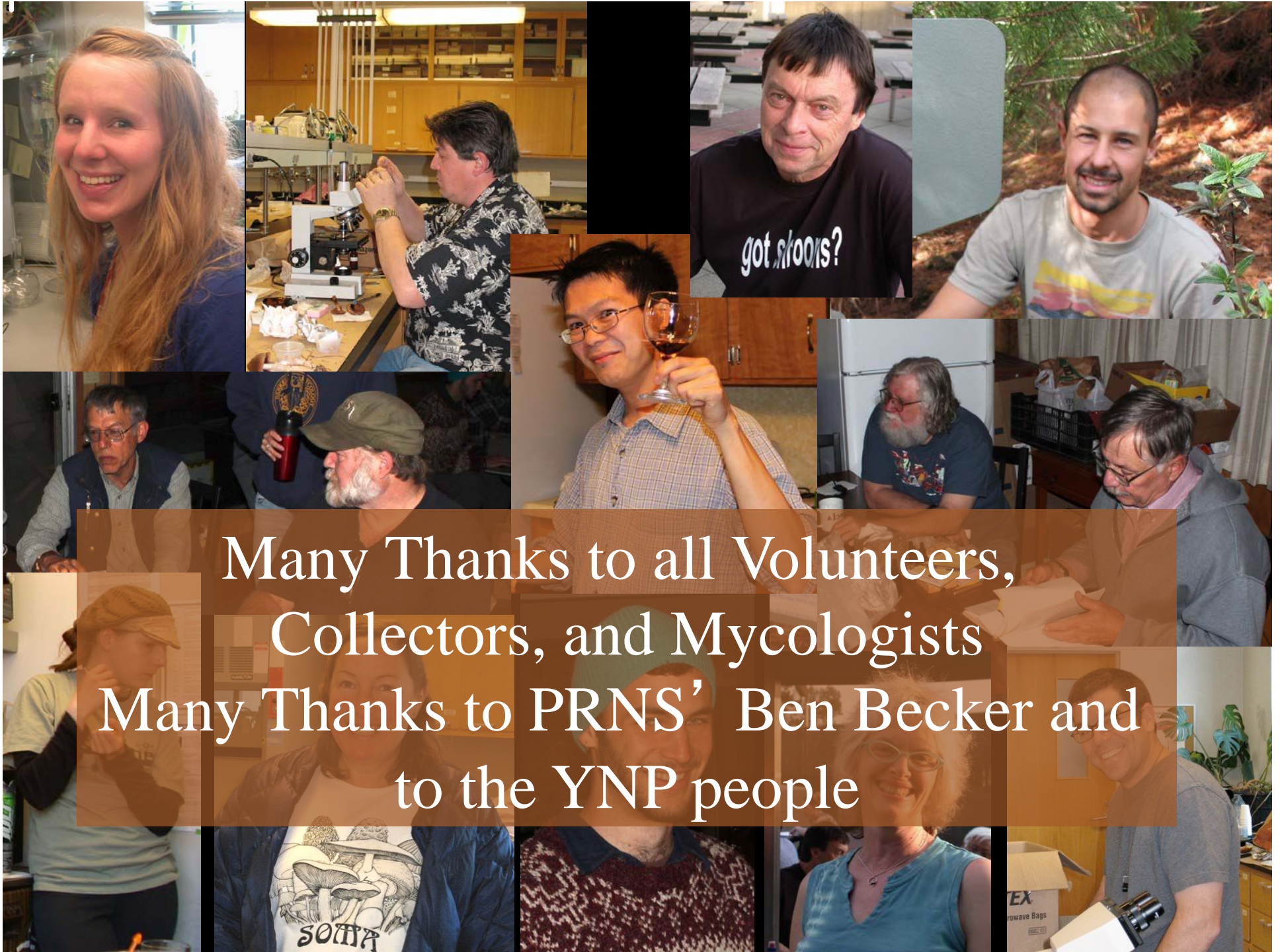
**Mushrooms at Point Reyes National Seashore**

## Conclusions

- **voucher specimens and sequence data are an absolute must, especially for “common” species**
- involvement of many non-professional mycologists made these projects possible
  - without student projects no sequence data
  - driving force needed, people who believe in the project
- and even with restricted means an inventory project is feasible!







Many Thanks to all Volunteers,  
Collectors, and Mycologists  
Many Thanks to PRNS' Ben Becker and  
to the YNP people