Using ArcGIS and Python to Web-Enable USAPI Mapping System

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USAPI

Introduction:

- The USAPI is an offshoot of the US Drought Monitor.
- It is expert driven weekly composite drought index for United States Affiliated Pacific Islands.
- It was developed to allow these islands to participate in the US drought relief programs that require USDM drought status.
- The original maps were developed by Richard Heim and he is still the only USDM author producing the USAPI.

USAPI

Continued:

- The original maps were not well balanced and had lots of extraneous information.
- I talked Richard into letting me automate the process.

The process

- The Dx levels are calculated, discussed and finalized for each island
- The Dx levels for each island is entered into the system and submitted.
- The system checks for new or changed entries and creates and emails maps for these entries.

Issues

- Richard wanted both monthly and weekly maps.
- Some islands would drop out of the based on data availability.
- Needed to be point based rather than area based.
- Needed to be accessible at anytime.

Solution

Move the entire operation to a web interface.

Adjust the MXD for all Island combinations.

Move the USAPI data to a separate database.

Add a Scheduled task that runs every 15 minutes.

The Web Interface

Time Scale

(●) Weekly ( ) Monthly

April 26, 2016 ▼

Author

Heim , Richard ▼

Status

Submit Changes

Marshall Islands

Location	Not Visible	No Data	None	D0	D1	D2	D3	D4	No Impacts	S	L	SL
Ailinglaplap	○	○	○	○	○	○	○	●	○	○	○	●
Jaluit	○	○	○	○	○	○	○	●	○	○	○	●
Kwajalein	○	○	○	○	○	○	○	●	○	○	○	●
Majuro	○	○	○	○	○	○	○	●	○	○	○	●
Mili	○	○	○	○	○	○	●	○	○	○	○	●
Utirik	○	○	○	○	○	○	○	●	○	○	○	●
Wotje	○	○	○	○	○	○	○	●	○	○	○	●

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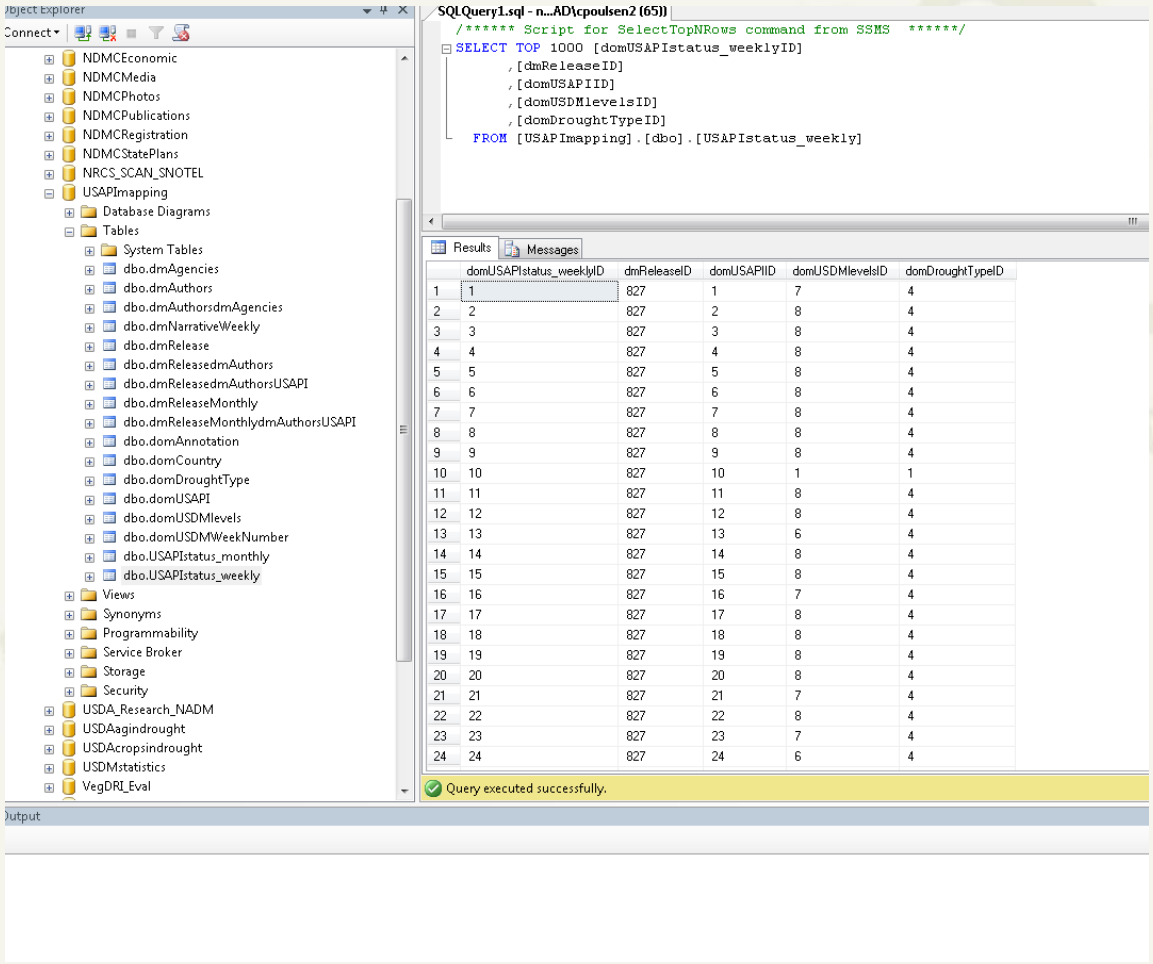
The Database



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Automation part 1

```
import pyodbc
import sys
# Import Custom Modules
sys.path.append("\\\\ndmc-005\\Production\\USAPI\\scripts\\IndividualShps")
sys.path.append("\\\\ndmc-005\\Production\\PYTHON\\email")
## NOTES
##  This peroidically checks the USAPI database for all mapdates that need to be processed
##  It wil run every 15 minutes 24hrs a day 7 days a week. It will email the resulting maps to R Heim


SqlConnection1 = 'DRIVER={SQL Server Native Client 10.0};SERVER=ndmc-002;DATABASE=USAPImapping;UID=NDMCdataWriter;PWD=password'
SqlConnection2 = 'DRIVER={SQL Server Native Client 11.0};SERVER=ndmc-002;DATABASE=USAPImapping;UID=NDMCdataWriter;PWD=password'

#Make DB Connection
try:
    cnxn = pyodbc.connect(SqlConnection2)
except:
    cnxn = pyodbc.connect(SqlConnection1)
#cnxn = pyodbc.connect(SqlConnection)
cursor = cnxn.cursor()

send_to = ['cpoulsen2@unl.edu','richard.heim@noaa.gov']
message_to = "Richard,\n\n"
message_b_p2 = "   Please contact me if you have any questions.\n\n"
message_from = "Chris Poulsen\n"
message_sig1 = "National Drought Mitigation Center\n"
message_sig2 = "GIS Manager\n"
message_sig3 = "(402) 472-8828\n"
message_sig4 = "cpoulsen2@unl.edu\n"
message_sig_hf = "-----------------------------------\n"

needmappingWeek = cursor.execute("SELECT releaseDate FROM USAPImapping.dbo.dmRelease WHERE (needMaps = 1)").fetchall()
needmappingMonth = cursor.execute("SELECT releaseDate FROM USAPImapping.dbo.dmReleaseMonthly WHERE (needMaps = 1)").fetchall()

if len(needmappingWeek)>0:
    theWattachments = []
    theWdates = []
    theRelease = ""
    wcount = 0
    ## Map each outstanding date
    import CreateUSAPISpecificWeek
    print "There are Weekly maps to process"
    for week in needmappingWeek:
        thedate = week.releaseDate
        dyear = thedate.year
        dmonth = thedate.month
        dday = thedate.day
        theWdate = str(dyear)+"/"+str(dmonth)+"/"+str(dday)
        thepaths = CreateUSAPISpecificWeek.mappit(dyear,dmonth,dday)
        ## Append Attachments
```

Automation part 2

```
if len(needmappingWeek)>0:
    theWattachments = []
    theWdates = []
    theRelease = ""
    wcount = 0
    ## Map each outstanding date
    import CreateUSAPISpecificWeek
    print "There are Weekly maps to process"
    for week in needmappingWeek:
        thedate = week.releaseDate
        dyear = thedate.year
        dmonth = thedate.month
        dday = thedate.day
        theWdate = str(dyear)+"/"+str(dmonth)+"/"+str(dday)
        thepaths = CreateUSAPISpecificWeek.mappit(dyear,dmonth,dday)
        ## Append Attachments
        theWattachments.append(thepaths[0])
        theWattachments.append(thepaths[1])
        ## Append Dates
        theWdates.append(theWdate)
    ## Set the text and attachments for the email
    if len(theWdates)==1:
        theRelease = theWdates[0]
    else:
        for wDate in theWdates:
            if wcount==0:
                theRelease = wDate+", "
                wcount=1
            else:
                theRelease = theRelease+wDate+", "
    ## Set the email message specifics
    subject = "USAPI weekly maps for "+theRelease+" are complete."
    message_b_p1 = "    The USDM for "+theRelease+" complete and the pdf and png files are attached."
    message_signature = message_from+message_sig_hf+message_sig1+message_sig2+message_sig3+message_sig4+message_sig_hf
    message = message_to+message_b_p1+message_b_p2+message_signature
    ## Use the custom module to send the email
    import ndmc_email
    ndmc_email.send(send_to, subject, message, theWattachments)

    for dtw in theWdates:
        #print "UPDATE USAPImapping.dbo.dmRelease SET [needMaps] = 0 WHERE ([releaseDate] = '"+dtw+"')"
        cursor.execute("UPDATE USAPImapping.dbo.dmRelease SET [needMaps] = 0 WHERE ([releaseDate] = '"+dtw+"')")
        cursor.commit()
```

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Automation part 3

```
if len(needmappingMonth)>0:
    theMattachments = []
    theMdates = []
    theRelease = ""
    mcount = 0
    ## Map each outstanding date
    import CreateUSAPISpecificMonth
    print "There are Monthly maps to process"
    for month in needmappingMonth:
        thedate = month.releaseDate
        dyear = thedate.year
        dmonth = thedate.month
        dday = thedate.day
        thepaths = CreateUSAPISpecificMonth.mappit(dyear,dmonth,dday)
        theMdate = str(dyear)+"/"+str(dmonth)+"/"+str(dday)
        ## Append Attachments
        theMattachments.append(thepaths[0])
        theMattachments.append(thepaths[1])
        ## Append Dates
        theMdates.append(theMdate)
    ## Set the text and attachments for the email
    if len(theMdates)==1:
        theRelease = theMdates[0]
    else:
        for mDate in theMdates:
            if mcount==0:
                theRelease = mDate+", "
                mcount=1
            else:
                theRelease = theRelease+mDate+", "

    ## Set the email message specifics
    subject = "USAPI monthly maps for "+theRelease+" are complete."
    message_b_p1 = "    The USDM for "+theRelease+" complete and the pdf and png files are attached."
    message_signature = message_from+message_sig_hf+message_sig1+message_sig2+message_sig3+message_sig4+message_sig_hf
    message = message_to+message_b_p1+message_b_p2+message_signature
    ## Use the custom module to send the email
    import ndmc_email
    ndmc_email.send(send_to, subject, message, theMattachments)

    for dtm in theMdates:
        #print "UPDATE USAPImapping.dbo.dmReleaseMonthly SET [needMaps] = 0 WHERE ([releaseDate] = '"+dtm+"')"
        cursor.execute("UPDATE USAPImapping.dbo.dmReleaseMonthly SET [needMaps] = 0 WHERE ([releaseDate] = '"+dtm+"')")
        cursor.commit()
```

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Mapping part 1

```
# ---------------------------------------------------------------------------
# CreateUSAPICurrentWeek.py
# Created on: 2015-02-25
# Description: Runs all of the mapping python code for the current USAPI USDM
# ---------------------------------------------------------------------------

# Import arcpy module
import ...
# Import Custom Modules
#sys.path.append("\\\\seca\\f\\OperationalProcessing\\PYTHON\\usdm_mapping")
import CreateUSAPIShp
import CreateUSAPIMap
#sys.path.append("\\\\seca\\f\\OperationalProcessing\\PYTHON\\usdm_processing")
#import usdm_daylight

SqlConnection1 = 'DRIVER={SQL Server Native Client 10.0};SERVER=ndmc-002;DATABASE=USAPImapping;UID=NDMCdataWriter;PWD=password'
SqlConnection2 = 'DRIVER={SQL Server Native Client 11.0};SERVER=ndmc-002;DATABASE=USAPImapping;UID=NDMCdataWriter;PWD=password'

#Make DB Connection
try:
    pyodbc.connect(SqlConnection2)
    SqlConnection = SqlConnection2
except:
    pyodbc.connect(SqlConnection1)
    SqlConnection = SqlConnection1
#Make DB Connection
cnxn = pyodbc.connect(SqlConnection)
cursor = cnxn.cursor()

FirstAuthorAffil = ""
FirstAuthorName = ""

#Date (YYYY, M, D)
#cursor.execute("select MAX(releaseDate) As relDate from dmRelease where isActive = 'true'")
cursor.execute("select MAX(releaseDate) As relDate from dmRelease where isUSAPIweek = 1")
maprows = cursor.fetchone()
mapdate = maprows.relDate
print mapdate
# This will set the daylight status
#theDays = usdm_daylight.dates(mapdate.year)
#if theDays[0] < mapdate < theDays[1]:
#    theDSTstatus = "EDT"
#else:
```

Mapping part 2

```
# Global Variables
InputDir = "\\\\ndmc-005\\Production\\USAPI\\data\\weekly"
MappingDir = "\\\\ndmc-005\\Production\\USAPI"
OutputDir = "\\\\ndmc-005\\Production\\USAPI\\data\\weekly"
BaseDir = "\\\\ndmc-005\\Production\\USAPI"
FileDate =  str(mapdate.year) + str("%02d" % (mapdate.month,))  + str("%02d" % (mapdate.day,))
ReleaseDate = str("%02d" % (mapdate.month,)) + "/" + str("%02d" % (mapdate.day,)) + "/" + str(mapdate.year)

PdfPath = "pdf"
PngPath = "png"
JpgPath = "jpg"
SvgPath = "svg"
TifPath = "tif"
EmfPath = "emf"
AiPath = "ai"
ShpPath = "shp"

#Check to see if folders exist and create if necessary
a = os.path.dirname(OutputDir + "\\" + PdfPath + "\\" + FileDate + "\\")
if not os.path.exists(a):
    os.makedirs(a)

b = os.path.dirname(OutputDir + "\\" + PngPath + "\\" + FileDate + "\\")
if not os.path.exists(b):
    os.makedirs(b)

c = os.path.dirname(OutputDir + "\\" + ShpPath + "\\" + FileDate + "\\")
if not os.path.exists(c):
    os.makedirs(c)

#Get the date from db
cursor.execute("select * from dmRelease where releaseDate = '" + ReleaseDate + "'")
weekrows = cursor.fetchone()

# Get Date Values
#mapdate = weekrows.releaseDate
rel_id = weekrows.dmReleaseID

#Get the Annontation ID
ann_id = str(weekrows.domAnnotationID)
```

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Mapping part 3

```
#Get Map Release Date (Check for released on Wed.)
if (weekrows.releasedWednesday == 1):
    releasedate = weekrows.releaseDate + datetime.timedelta(days=1)
else:
    releasedate = weekrows.releaseDate + datetime.timedelta(days=2)

cursor.execute("select * from dmReleasedmAuthorsUSAPI where dmReleaseID = "+str(weekrows.dmReleaseID))
a_rows = cursor.fetchall()

for row in a_rows:
    if (row.authorOrder == 3):
        ThirdAuthorID = row.dmAuthorsID
    elif (row.authorOrder == 2):
        SecondAuthorID = row.dmAuthorsID
    else:
        FirstAuthorID = row.dmAuthorsID


if (FirstAuthorID > 0):
    cursor.execute("select first, last from dmAuthors where dmAuthorsID = " + str(FirstAuthorID))
    fa_rows = cursor.fetchone()
    FirstAuthorName = fa_rows.first + " " + fa_rows.last
    FirstAuthorName = FirstAuthorName.strip()
    cursor.execute("select fullName, acronym from dmAgencies join dmAuthorsdmAgencies on dmAgencies.dmAgenciesID = dmAuthorsdmAgencies.dmAgenciesID where dmAuthorsID = " + str(FirstAuthorID)+ "order by agencyOrder asc")
    aa_rows = cursor.fetchall()
    if (len(aa_rows) > 1):
        for row in aa_rows:
            FirstAuthorAffil = FirstAuthorAffil + "/" + row.acronym
        FirstAuthorAffil = FirstAuthorAffil[1:]
    else:
        for row in aa_rows:
            FirstAuthorAffil = row.fullName

# Close the DB Connection
cnxn.close()

cweek = "true"

##if (not os.path.isfile(OutputDir + "\\" + ShpPath + "\\" + FileDate + "\\" + FileDate + "_usapi.shp")):
##    CreateUSAPIShp.create(OutputDir,mapdate,FileDate,ShpPath,rel_id,"w")
##else:
##    print "Shapefile already exists"
CreateUSAPIShp.create(OutputDir,mapdate,FileDate,ShpPath,rel_id,"w",SqlConnection)
CreateUSAPIMap.mapping(InputDir, ShpPath, OutputDir, MappingDir, PdfPath, PngPath, mapdate, cweek,"w", FirstAuthorName, FirstAuthorAffil)
```

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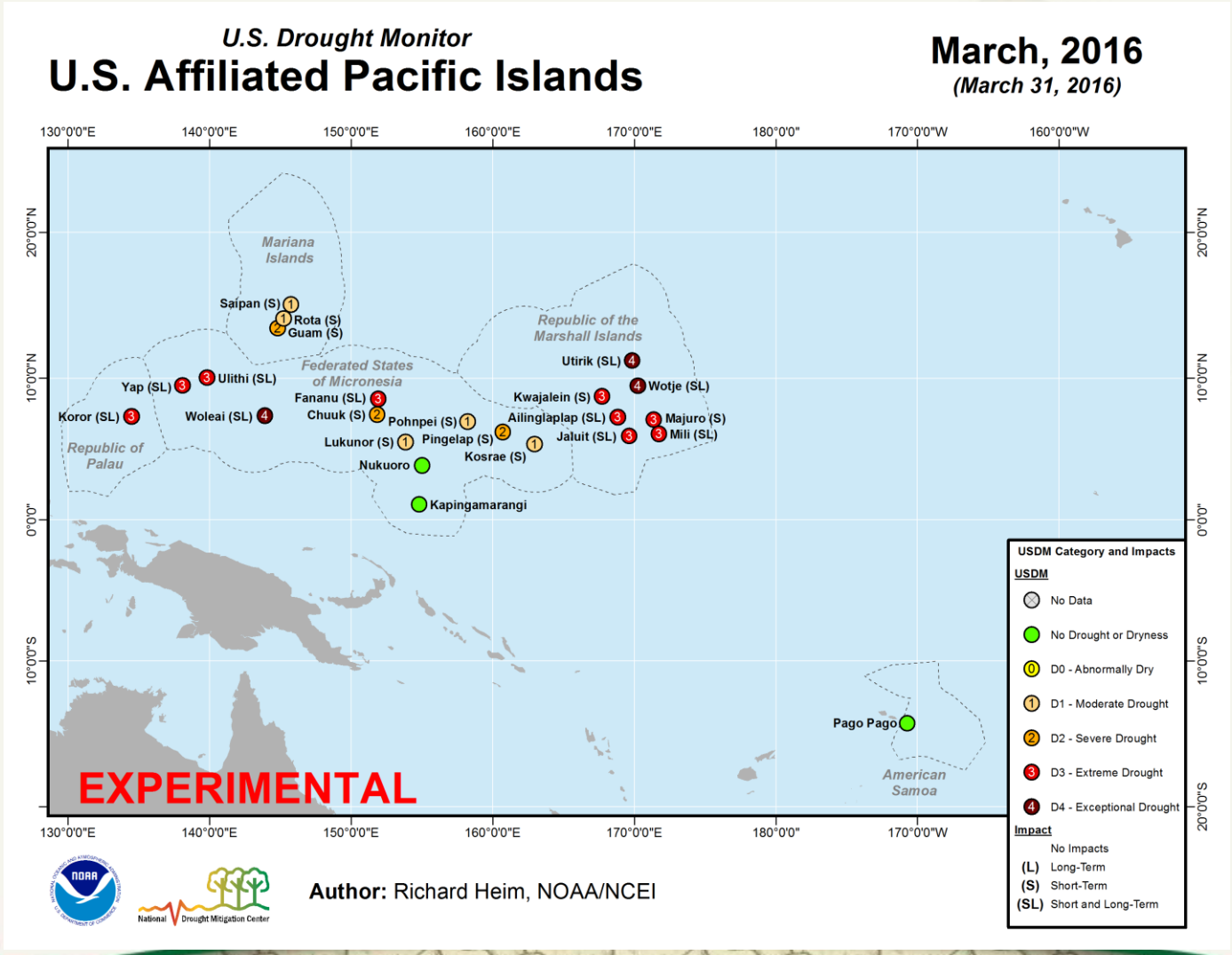
Current Monthly



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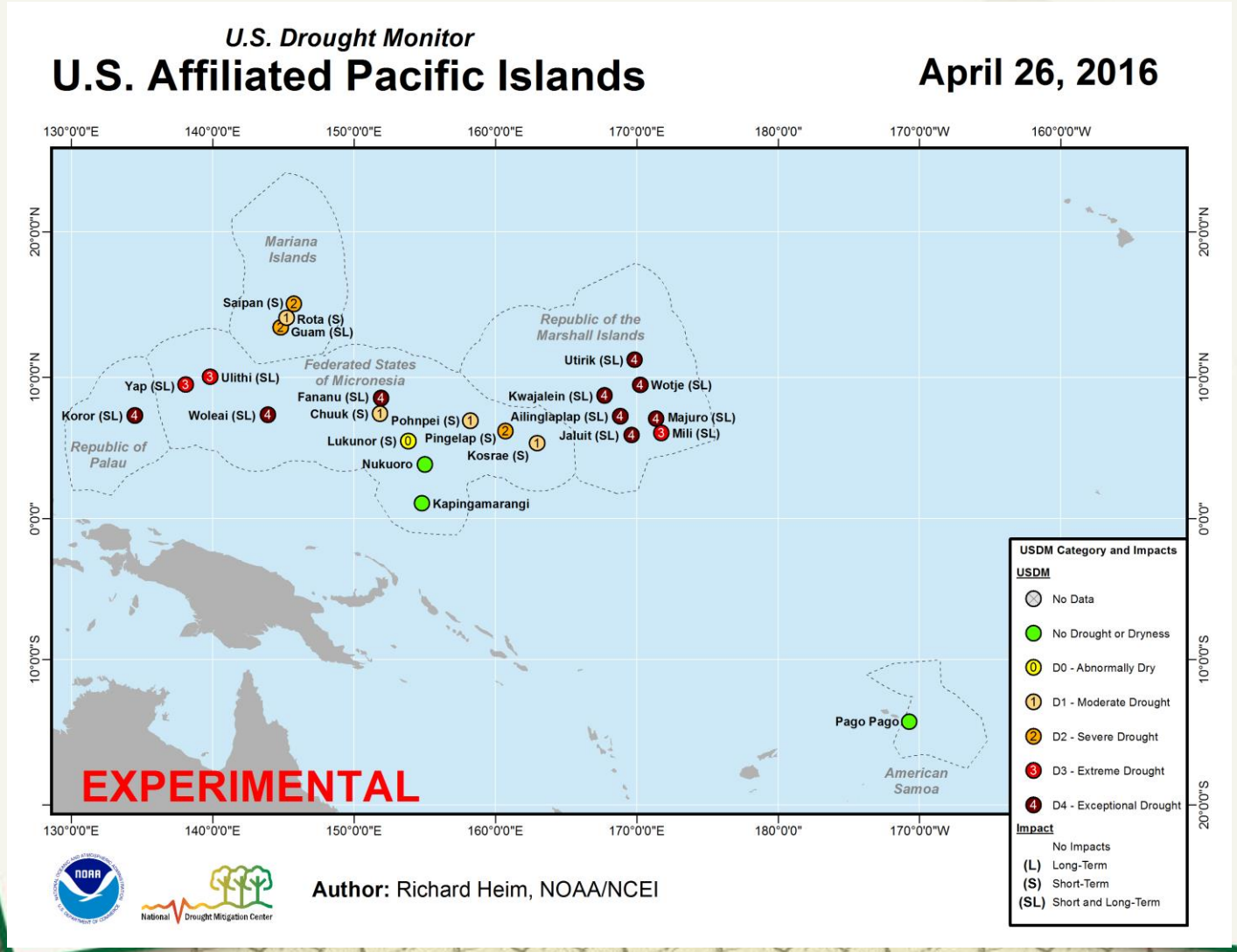
Current Weekly



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Questions?

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