NRSA Physical Habitat metric calculation documentation:

The following functions calculate subsets of physical habitat metrics as used by NRSA:

metsBankMorphology (Bank morphology metrics: bangmode, bap_low, bap_med, bap_stp, bap_vst, n_ba, xbka, sdbk_a, intqbka, medbk_a, bka_q1, bka_q3, n_un, xun, sdun, intqbkun, medbkun, bkun_q1, bkun_q3)

metsBedStability (Bed stability metrics: s_rp100, ltest, lrbs_tst, ldmb_bw5, s_ldmb_bw5, ldmb_bw4, lrbs_bw4, lrbs_bw5, s_lrbs_bw5, lrbs_bw6, s_lrbs_bw6, shld_px3, reyp3, rrpw3, cp3ctrpwd_rat, cp3_mill, ct_rpwd, rb3, Dcbf_g08, s_Dcbf_g08, ldcbf_g08, s_ldcbf_g08, lrbs_g08, s_lrbs_g08)

metsCanopyDensiometer (Canopy cover metrics: xcdenmid, vcdenmid, nmid, xcdenbk, vcdenbk, nbnk)

metsChannelChar (Channel characteristics metrics for boatable sites: constraint, confeatures, conpattern, conpercent, conbankfull, convalley, convalleybox)

metsChannelHabitat (Channel habitat metrics: pct_gl, pct_ri, pct_ra, pct_ca, pct_fa, pct_dr, pct_pp, pct_pd, pct_pb, pct_pl, pct_pt, pct_p, pct_fast, pct_slow, pct_pool)

metsChannelMorphology (Channel morphology metrics for wadeable sites: xwidth, sdwidth, n_w, xbkf_w, sdbkf_w, n_bw, xbkf_h, sdbkf_h, n_bh, xinc_h, sdinc_h, n_incis, bfwd_rat, xwxd, xwd_rat, sdwxd, sdwd_rat, n_bfrat, n_wd, n_wdr, xdepth, sddepth, n_d)

metsGeneral (Channel characteristic metrics: pct_side, sidecnt, reachlen)

metsHumanInfluence (Human influence metrics: xb_hag, xc_hag, xcb_hag, xf_hag, xb_hnoag, xcb_hnag, xc_hnoag, xf_hnoag, xb_hall, xcb_hall, xc_hall, xf_hall, sdb_hall, sdcb_hall, sdc_hall, sdwcb_hall, w1_hag, w1_hnoag, w1_hall, w1h_bldg, w1h_ldfl, w1h_log, w1h_mine, w1h_park, w1h_pstr, w1h_pvmt, w1h_pipe, w1h_road, w1h_crop, w1h_wall, x_hag, x_hnoag, x_hall)

metsInvasiveSpecies (Invasive species metrics: f_tamspp, f_none, f_arudon, f_eiccra, f_eupesu, f_lytsal, f_rosmul, f_myrspi, f_hydver, f_butumb, ip_score)

metsLargeWoody (Large woody debris metrics: rchdldll, rchdldml, rchdldsl, rchdmdll, rchdmdml, rchdmdsl, rchdsdll, rchdsdml, rchdsdsl, rchdxdll, rchdxdml, rchdxdsl, rchwldll, rchwldml, rchwldsl, rchwmdll, rchwmdml, rchwmdsl, rchwsdll, rchwsdml, rchwsdsl, rchwxdll, rchwxdml, rchwxdsl, ns, nc, rchdryt, rchwett, rchwdt, rchtldll, rchtldml, rchtldsl, rchtmdll, rchtmdml, rchtmdsl, rchtsdll, rchtsdml, rchtsdsl, rchtxdll, rchtxdml, rchtxdsl, c1d, c1w, c1t, c1dm100, c1tm100, c1wm100, c1w_msq, c2d, c2w, c2t, c2dm100, c2tm100, c2wm100, c2w_msq, c3d, c3w, c3t, c3dm100, c3tm100, c3wm100, c3w_msq, c4d, c4w, c4t, c4dm100, c4tm100, c4wm100, c4w_msq, c5d, c5w, c5t, c5dm100, c5tm100, c5wm100, c5w_msq, mddrydia, mddrylen, mdwetdia,

mdwetlen, mdlentot, mddiatot, lgdrydia, lgdrylen, lgwetdia, lgwetlen, lglentot, lgdiatot, lwddv33, lwdwv33, lwddvcal, lwdwvcal, lwdtv33, lwdtvcal, shdrylen, shwetlen, shlentot, smdrydia, smwetdia, smdiatot, v1d, v1w, v1t, v1dm100, v1tm100, v1wm100, v1w_msq, v2d, v2w, v2t, v2dm100, v2tm100, v2wm100, v2w_msq, v3d, v3w, v3t, v3dm100, v3tm100, v3wm100, v3w_msq, v4d, v4w, v4t, v4dm100, v4tm100, v4wm100, v4w_msq, v5d, v5w, v5t, v5dm100, v5tm100, v5wm100, v5w_msq, xldrydia, xlwetdia, xldiatot)

metsLegacyTree (Legacy riparian tree metrics: ltmxdbh, ltmxht, ltmxspp, ltmxsize, ltmxdist, ltmxcnt, ltfracs, ltfracm, ltfracl, ltfracx, ltmddist, ltsplist, ltmddom, ltmddomn, ltmdsub, ltmdsubn)

metsLittoralDepth (Littoral depth metrics for boatable sites: xlit, vlit, mxlit, mnlit)

metsResidualPools (Residual pools metrics: rpxlen, rpvlen, rpmxlen, totplen, rpxdep, rpvdep, rpmxdep, rpgt50, rpgt75, rpgt100, rpgt05, rpgt05x, rpgt10, rpgt10x, rpgt20, rpgt20x, rpxarea, rpvarea, rpmxar, areasum, rp100)

metsRiparianVegetation (Riparian vegetation metrics: pcan_c, pcan_d, pcan_e, pcan_m, pcan_n, pmid_c, pmid_d, pmid_e, pmid_m, pmid_n, xcl, xcs, xmw, xmh, xgw, xgh, xgb, xc, xm, xcmw, xcm, xg, xcmgw, xcmg, xpcan, xpmid, xpgveg, xpmgw, xpcm, xpmg, xpcmg)

metsSlopeBearing (Slope and bearing metrics: xslope, xslope_field, pctClinometer, vslope, nslp, transpc, xbearing, sinu)

metsSubstrateCharacterization (Substrate characterization metrics: lsub2d16, lsub2d25, lsub2d50, lsub2d75, lsub2d84, lsub2dmm, lsubd2sd, lsub2iqr, lsub2dmm_nor, dgm, lsubd2sd_nor, sub2dmm_nor, subd2sd_nor, lsub_d16, lsub_d25, lsub_d50, lsub_d75, lsub_d84, lsub_dmm, lsubd_sd, lsub_iqr, lsub_dmm_nor, lsubd_sd_nor, sub_dmm_nor, subd_sd_nor, lsub2d16inor, d16, lsub2d50inor, d50, lsub2d84inor, d84, n_nor, n, pct_bl, pct_cb, pct_fn, pct_gc, pct_gf, pct_hp, pct_om, pct_ot, pct_rc, pct_rr, pct_rs, pct_sa, pct_sb, pct_wd, pct_xb, pct_bigr, pct_bdrk, pct_safn, pct_sfgf, pct_org, pct_bh, pct_gr, pct_dbbl, pct_sbbl, pct_dsbl, pct_ssbl, pct_dbcb, pct_sbcb, pct_dscb, pct_sscb, pct_dbfn, pct_sbfn, pct_dsfn, pct_ssfn, pct_dbgc, pct_sbgc, pct_dsgc, pct_ssgc, pct_dbgf, pct_sbgf, pct_dsgf, pct_ssgf, pct_dbhp, pct_sbhp, pct_dshp, pct_sshp, pct_dbom, pct_sbom, pct_dsom, pct_ssom, pct_dbot, pct_sbot, pct_dsot, pct_ssot, pct_dbrc, pct_sbrc, pct_dsrc, pct_ssrc, pct_dbrr, pct_sbrr, pct_dsrr, pct_ssrr, pct_dbrs, pct_sbrs, pct_dsrs, pct_ssrs, pct_dbsa, pct_sbsa, pct_dssa, pct_sssa, pct_dbsb, pct_sbsb, pct_dssb, pct_sssb, pct_dbwd, pct_sbwd, pct_dswd, pct_sswd, pct_dbxb, pct_sbxb, pct_dsxb, pct_ssxb)

metsSubstrateEmbed (Substrate embeddedness metrics for wadeable sites: n55, xembed, vembed, n33, xcembed, vcembed)

Data Requirements and Recommendations:
Input data frames for each function must be as specified in the help files for the function (detailed possible values below), without additional columns, as these may cause the code to fail.

Possible Values for Input Datasets:

bankgeometry

UID: Any integer

SAMPLE_TYPE: PHAB_CHANB, PHAB_CHANBFRONT, PHAB_CHANW

TRANSECT:

- For SAMPLE_TYPE='PHAB_CHANB', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K
- For SAMPLE_TYPE='PHAB_CHANBFRONT', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K
- For SAMPLE_TYPE='PHAB_CHANW', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K, XA,XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK

TRANSDIR:

- For SAMPLE_TYPE='PHAB_CHANB', TRANSDIR can be: NONE
- For SAMPLE_TYPE='PHAB_CHANBFRONT', TRANSDIR can be: NONE
- For SAMPLE_TYPE='PHAB_CHANW', TRANSDIR can be: LF, NONE, RT

PARAMETER

- For SAMPLE_TYPE='PHAB_CHANB', PARAMETER can be: CONSTRT, SEEOVRBK, SHOR2RIP
- For SAMPLE_TYPE='PHAB_CHANBFRONT', PARAMETER can be: ANGLE, BANKHT, BANKWID,BARWID, INCISED, WETWID
- For SAMPLE_TYPE='PHAB_CHANW', PARAMETER can be: ANGLE, BANKHGT, BANKWID, BARWID,INCISHGT, UNDERCUT, WETWID

UNITS:

- For PARAMETER='ANGLE', UNITS can be: NONE
- For PARAMETER='BANKHGT', UNITS can be: NONE
- For PARAMETER='BANKHT', UNITS can be: NONE
- For PARAMETER='BANKWID', UNITS can be: M, NONE
- For PARAMETER='BARWID', UNITS can be: M, NONE
- For PARAMETER='CONSTRT', UNITS can be: NONE
- For PARAMETER='INCISED', UNITS can be: M, NONE
- For PARAMETER='INCISHGT', UNITS can be: M, NONE
- For PARAMETER='SEEOVRBK', UNITS can be: NONE
- For PARAMETER='SHOR2RIP', UNITS can be: NONE
- For PARAMETER='UNDERCUT', UNITS can be: M, NONE
- For PARAMETER='WETWID', UNITS can be: M, NONE

channelcover

UID: Any integer

SAMPLE_TYPE: PHAB_CHANB, PHAB_CHANW

TRANSECT:

- For SAMPLE_TYPE='PHAB_CHANB', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K
- For SAMPLE_TYPE='PHAB_CHANW', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K,

- XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK

TRANSDIR:

- For SAMPLE_TYPE='PHAB_CHANB', TRANSDIR can be: DN, LF, RT, UP
- For SAMPLE_TYPE='PHAB_CHANW', TRANSDIR can be: CD, CL, CR, CU, LF, RT

PARAMETER: DENSIOM

chandepth

UID: Any integer
SAMPLE_TYPE: PHAB_CHANBFRONT
TRANSECT: A, B, C, D, E, F, G, H, I, J, K
PARAMETER: POLE, SONAR
UNITS:

- For PARAMETER='POLE', UNITS can be: FT, M, NONE
- For PARAMETER='SONAR', UNITS can be: FT, M, NONE

channelchar

UID: Any integer
SAMPLE_TYPE: PHAB_CHCON
TRANSECT: NONE
PARAMETER: BANKFULL, CONSTRNT, FEATURES, PATTERN, PERCENT, VALLEY, VALLYBOX

channelcrosssection

UID: Any integer
SAMPLE_TYPE: PHAB_CHANW, PHAB_THALW
TRANSECT: A, B, C, D, E, F, G, H, I, J, K, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK
TRANSDIR:

- For SAMPLE_TYPE='PHAB_CHANW', TRANSDIR can be: CT, LC, LF, RC, RT
- For SAMPLE_TYPE='PHAB_THALW', TRANSDIR can be: CT, LC, LF, NONE, RC, RT

PARAMETER:

- For SAMPLE_TYPE='PHAB_CHANW', PARAMETER can be: DEPTH, DIST_LB, EMBED, SIZE_CLS
- For SAMPLE_TYPE='PHAB_THALW', PARAMETER can be: SUB_5_7, XSIZE_CLS

channelgeometry

UID: Any integer
SAMPLE_TYPE: PHAB_CHANBFRONT, PHAB_SLOPE
TRANSECT:

- For SAMPLE_TYPE='PHAB_CHANBFRONT', TRANSECT can be: A, B, C, D, E, F, G, H, I, J,K
- For SAMPLE_TYPE='PHAB_SLOPE', TRANSECT can be: A, B, C, D, E, F, G, H, I, J

PARAMETER:

- For SAMPLE_TYPE='PHAB_CHANBFRONT', PARAMETER can be: ACTRANSP, ARRIVE, BEAR,BEAR2, DISTANCE, DISTANCE2, INTDTRAN, LATDD, LATDD_TOP, LATDD2, LATMM, LATMM_TOP,LATMM2, LATSS, LATSS_TOP,

LATSS2, LEAVE, LONGDD, LONGDD_TOP, LONGDD2, LONGMM, LONGMM_TOP, LONGMM2, LONGSS, LONGSS_TOP, LONGSS2, SLOPE_ND, WAYPT, WAYPT2

- For SAMPLE_TYPE='PHAB_SLOPE', PARAMETER can be: BEARING, BEARING, BEARING2, BEARING3, PROP, PROP2, PROP3, SLOPE, SLOPE2, SLOPE3

UNITS:

- For PARAMETER='ACTRANSP', UNITS can be: M
- For PARAMETER='ARRIVE', UNITS can be: NONE
- For PARAMETER='BEAR', UNITS can be: NONE
- For PARAMETER='BEAR2', UNITS can be: NONE
- For PARAMETER='BEARING', UNITS can be: NONE
- For PARAMETER='BEARING2', UNITS can be: NONE
- For PARAMETER='BEARING3', UNITS can be: NONE
- For PARAMETER='DISTANCE', UNITS can be: M
- For PARAMETER='DISTANCE2', UNITS can be: M
- For PARAMETER='INTDTRAN', UNITS can be: M
- For PARAMETER='LATDD', UNITS can be: NONE
- For PARAMETER='LATDD_TOP', UNITS can be: NONE
- For PARAMETER='LATDD2', UNITS can be: NONE
- For PARAMETER='LATMM', UNITS can be: NONE
- For PARAMETER='LATMM_TOP', UNITS can be: NONE
- For PARAMETER='LATMM2', UNITS can be: NONE
- For PARAMETER='LATSS', UNITS can be: NONE
- For PARAMETER='LATSS_TOP', UNITS can be: NONE
- For PARAMETER='LATSS2', UNITS can be: NONE
- For PARAMETER='LEAVE', UNITS can be: NONE
- For PARAMETER='LONGDD', UNITS can be: NONE
- For PARAMETER='LONGDD_TOP', UNITS can be: NONE
- For PARAMETER='LONGDD2', UNITS can be: NONE
- For PARAMETER='LONGMM', UNITS can be: NONE
- For PARAMETER='LONGMM_TOP', UNITS can be: NONE
- For PARAMETER='LONGMM2', UNITS can be: NONE
- For PARAMETER='LONGSS', UNITS can be: NONE
- For PARAMETER='LONGSS_TOP', UNITS can be: NONE
- For PARAMETER='LONGSS2', UNITS can be: NONE
- For PARAMETER='PROP', UNITS can be: CM, PERCENT
- For PARAMETER='PROP2', UNITS can be: PERCENT
- For PARAMETER='PROP3', UNITS can be: PERCENT
- For PARAMETER='SLOPE', UNITS can be: CM, NONE, PERCENT
- For PARAMETER='SLOPE_ND', UNITS can be: NONE
- For PARAMETER='SLOPE2', UNITS can be: CM, NONE, PERCENT
- For PARAMETER='SLOPE3', UNITS can be: CM, NONE, PERCENT
- For PARAMETER='WAYPT', UNITS can be: NONE
- For PARAMETER='WAYPT2', UNITS can be: NONE

fishcover
UID: Any integer
SAMPLE_TYPE: PHAB_CHANB, PHAB_CHANW
TRANSECT:

- For SAMPLE_TYPE='PHAB_CHANB', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K
- For SAMPLE_TYPE='PHAB_CHANW', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK

PARAMETER

- For SAMPLE_TYPE='PHAB_CHANB', PARAMETER can be: ALGAE, BOULDR, BRUSH, LVTREE, MACPHY, OVRHNG, STRUCT, UNDCUT, WOODY
- For SAMPLE_TYPE='PHAB_CHANW', PARAMETER can be: ALGAE, BOULDR, BRUSH, LVTREE, MACPHY, OVRHNG, STRUCT, UNDCUT, WOODY

invasivelegacy
UID: Any integer
SAMPLE_TYPE: RIPLEG
TRANSECT: A, B, C, D, E, F, G, H, I, J, K
PARAMETER: DBH, DISTANCE, E_WTRMILF, FLWR_RUSH, G_REED, HEIGHT, HYDRILLA, MF_ROSE, NO_INVASIVES, NOT_VIS, P_LSTRIFE, SALT_CED, SPECIES, SPURGE, TREE_TYP, W_HYACINTH, YLW_FLHEAR
UNITS:

- For PARAMETER='DBH', UNITS can be: NONE
- For PARAMETER='DISTANCE', UNITS can be: NONE
- For PARAMETER='E_WTRMILF', UNITS can be: NONE
- For PARAMETER='FLWR_RUSH', UNITS can be: NONE
- For PARAMETER='G_REED', UNITS can be: NONE
- For PARAMETER='HEIGHT', UNITS can be: NONE
- For PARAMETER='HYDRILLA', UNITS can be: NONE
- For PARAMETER='MF_ROSE', UNITS can be: NONE
- For PARAMETER='NO_INVASIVES', UNITS can be: NONE
- For PARAMETER='NOT_VIS', UNITS can be: NONE
- For PARAMETER='P_LSTRIFE', UNITS can be: NONE
- For PARAMETER='SALT_CED', UNITS can be: NONE
- For PARAMETER='SPECIES', UNITS can be: NONE
- For PARAMETER='SPURGE', UNITS can be: NONE
- For PARAMETER='TREE_TYP', UNITS can be: NONE
- For PARAMETER='W_HYACINTH', UNITS can be: NONE
- For PARAMETER='YLW_FLHEAR', UNITS can be: NONE

littoral
UID: Any integer
SAMPLE_TYPE: PHAB_CHANBFRONT
TRANSECT: A, B, C, D, E, F, G, H, I, J, K

PARAMETER: BOTTOMDOM, BOTTOMSEC, SHOREDOM, SHORESEC, SUBOBS

thalweg
UID: Any integer
SAMPLE_TYPE: PHAB_THAL, PHAB_THALW
TRANSECT:

- For SAMPLE_TYPE='PHAB_THAL', TRANSECT can be: A, B, C, D, E, F, G, H, I, J
- For SAMPLE_TYPE='PHAB_THALW', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K, XA, XB, XE, XF, XG, XH, XI, XJ

STATION:

- For SAMPLE_TYPE='PHAB_THAL', STATION can be: 0, 1, 10, 11, 2, 3, 4, 5, 6, 7, 8, 9
- For SAMPLE_TYPE='PHAB_THALW', STATION can be: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

PARAMETER:

- For SAMPLE_TYPE='PHAB_THAL', PARAMETER can be: CHANUNCD, DEP_POLE, DEP_SONR, OFF_CHAN, SIZE_CLS, SNAG
- For SAMPLE_TYPE='PHAB_THALW', PARAMETER can be: BACKWATER, BAR_PRES, BARWIDTH, CHANUNCD, DEPTH, INCREMNT, POOLFMCD, REACHLENGTH, SEDIMENT, SIDCHN, WETWIDTH

UNITS:

- For PARAMETER='BACKWATER', UNITS can be: NONE
- For PARAMETER='BAR_PRES', UNITS can be: NONE
- For PARAMETER='BARWIDTH', UNITS can be: M
- For PARAMETER='CHANUNCD', UNITS can be: NONE
- For PARAMETER='DEP_POLE', UNITS can be: FT, M
- For PARAMETER='DEP_SONR', UNITS can be: FT, M
- For PARAMETER='DEPTH', UNITS can be: CM
- For PARAMETER='INCREMNT', UNITS can be: M
- For PARAMETER='OFF_CHAN', UNITS can be: NONE
- For PARAMETER='POOLFMCD', UNITS can be: NONE
- For PARAMETER='REACHLENGTH', UNITS can be: M
- For PARAMETER='SEDIMENT', UNITS can be: NONE
- For PARAMETER='SIDCHN', UNITS can be: NONE
- For PARAMETER='SIZE_CLS', UNITS can be: NONE
- For PARAMETER='SNAG', UNITS can be: NONE
- For PARAMETER='WETWIDTH', UNITS can be: M

visits
UID: Any integer
VALXSITE: BOATABLE, PARBYBOAT, ALTERED, INTWADE, PARBYWADE, WADEABLE

visrip
UID: Any integer
SAMPLE_TYPE: PHAB_CHANB, PHAB_CHANW

TRANSECT:

- For SAMPLE_TYPE='PHAB_CHANB', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K
- For SAMPLE_TYPE='PHAB_CHANW', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK

TRANSDIR:

- For SAMPLE_TYPE='PHAB_CHANB', TRANSDIR can be: LF, RT
- For SAMPLE_TYPE='PHAB_CHANW', TRANSDIR can be: LF, RT

PARAMETER:

- For SAMPLE_TYPE='PHAB_CHANB', PARAMETER can be:BARE, BUILD, CANBTRE, CANSTRE, CANVEG, GCNWDY, GCWDY, LANDFL, LOG, MINE, PARK, PAST, PAVE, PIPES, ROAD, ROW, UNDERVEG, UNDNWDY, UNDWDY, WALL
- For SAMPLE_TYPE='PHAB_CHANW', PARAMETER can be:BARE, BUILD, CANBTRE, CANSTRE, CANVEG, GCNWDY, GCWDY, LANDFL, LOG, MINE, PARK, PAST, PAVE, PIPES, ROAD, ROW, UNDERVEG, UNDNWDY, UNDWDY, WALL

wood

UID: Any integer

SAMPLE_TYPE: PHAB_CHANBFRONT, PHAB_THALW

TRANSECT:

- For SAMPLE_TYPE='PHAB_CHANBFRONT', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K
- For SAMPLE_TYPE='PHAB_THALW', TRANSECT can be: A, B, C, D, E, F, G, H, I, J, K, XA, XB, XE, XF, XG, XH

PARAMETER: DLDLL, DLDML, DLDSL, DMDLL, DMDML, DMDSL, DSDLL, DSDML, DSDSL, DXDLL, DXDML, DXDSL, WLDLL, WLDML, WLDSL, WMDLL, WMDML, WMDSL, WSDLL, WSDML, WSDSL, WXDLL, WXDML, WXDSL